PROJECT MANUAL

HIGHLAND FALLS
FORT MONTGOMERY
CENTRAL SCHOOL DISTRICT

21 Morgan Road
Highland Falls, New York 10928

Additions & Alterations to
Fort Montgomery Elementary School

SED Control No.
44-09-01-04-0-005-008

BCA Project No. 2022-138 Phase 1

Bernier, Carr & Associates, Engineers, Architects and Land Surveyors, P.C.
31 Lewis Street, Suite 402
Binghamton, New York 13901
(607) 940–0199

Set # _____

VOLUME I OF I
BIDDING DOCUMENTS AND TECHNICAL SPECIFICATIONS
DIVISIONS 00 – 12, 14, 22, 23, 26 – 28, & 31 – 33

The above signed Architect/Engineer certifies that, to the best of his knowledge, information and belief, the plans and specifications are in accordance with applicable requirements of the New York State Uniform Fire Prevention and Building Code, the State Energy Conservation Code, construction standards of the State Education Department, and Part 56 of Title 12 of the Official Compilation of Codes, Rules and Regulations of the State of New York.

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Highland Falls Fort Montgomery Central School District
Additions & Alterations to Fort Montgomery Elementary School
Project No. 2022-138 PH1

ALL CONTRACTORS:

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NOTICE TO BIDDERS

The **Highland Falls Fort Montgomery Central School District,** invites the submission of Sealed Bid Proposals to furnish materials and labor to complete the

Highland Falls Fort Montgomery Central School District
Additions & Alterations to Fort Montgomery Elementary School
Project No. 2022-138 PH1

all in accordance with the plans and specifications.

This work is to be bid under a MULTIPLE CONTRACT system covering the work of all trades under separate contracts as follows:

Contract No. 1 – General Construction
Contract No. 2 – Mechanical
Contract No. 3 – Plumbing
Contract No. 4 – Electrical

Sealed Bid Proposals will be received until **2:00 p.m.** prevailing time, on **July 29, 2024,** at the

Highland Falls Fort Montgomery Central School District
District Offices
21 Morgan Road
Highland Falls, New York 10928

Any bid may be withdrawn without prejudice prior to the official bid submission time or any publicized postponement thereof.

Complete digital sets of Bidding Documents, drawings and specifications, may be obtained online as a download at the following website: https://thebcgroup.biddyhq.com under 'projects.'

Complete sets of Bidding Documents, Drawings and Specifications, may be obtained from REVplans, 28 Church Street; Suite 7, Warwick, New York 10990 Tel: 1-877-272-0216, upon depositing the sum of $100.00 for each combined set of documents. Checks or money orders shall be made payable to BCA Architects & Engineers. Plan deposit is refundable in accordance with the terms in the Instructions to Bidders to all submitting bids. Bidders wishing documents mailed to them shall include, in addition to the document deposit, a non-refundable check of $15.00 per set for handling and postage or a UPS/FedEx account number.

Please note REVplans (https://thebcgroup.biddyhq.com) is the designated location and means for distributing and obtaining all bid package information. Only those Contract Documents obtained in this manner will enable a prospective bidder to be identified as an official plan holder of record. The Provider takes no responsibility for the completeness of Contract Documents obtained from other sources. Contract Documents obtained from other sources may not be accurate or may not contain addenda that may have been issued.

All bid addenda will be transmitted to registered plan holders via email and will be available at https://thebcgroup.biddyhq.com. Plan holders who have paid for hard copies of the bid documents will need to make the determination if hard copies of the addenda are required for their use and coordinate directly with the printer for hard copies of addenda to be issued. There will be no charge for registered plan holders to obtain hard copies of the bid addenda.

The Bid Documents and Contract Documents may also be examined at the office of BCA Architects & Engineers, 31 Lewis Street, Suite 402 Binghamton, New York 13901.

PLANS AND SPECIFICATIONS REMAIN THE PROPERTY OF BCA Architects & Engineers AND MUST BE RETURNED IN GOOD CONDITION WITHIN THIRTY (30) BUSINESS DAYS AFTER AWARD OF CONTRACT OR REJECTION OF BIDS. The plan deposit for one set of Plans and Specifications will be refunded to bona fide bidders returning Plans and Specifications to REVplans within 30 business days after award of Contract or rejection of bids. A partial refund of the plan deposit, in an amount equal to the full amount of such deposit, less the actual cost of reproduction of the Plans and Specifications shall be made to non-bidders and unsuccessful bidders for the return of all other copies of the Plans and Specifications in good condition within 30 business days following the award of the Contract or the rejection of the bids.

Plan Deposit Policy, Plan Holders List, Pre-Bid Estimates, and a list of Addendums, if any, may be found at www.thebcgroup.com/bidding.

A pre-bid conference and onsite review of the project areas will be conducted by the Architect and Construction Manager on **Monday, July 15, 2024,** commencing at **11:00 a.m.** at the Fort Montgomery Elementary School, 895 Rte. 9W Fort Montgomery, NY 10922. The pre-bid conference will be for all contracts.

Bids shall be prepared as set forth in the Information to Bidders, enclosed in a sealed envelope bearing on its face the name, address and phone number of the bidder and the title of the project.

Each bidder agrees to waive any claim it has or may have against the Owner, the Architect/Engineer, and the respective employees, arising out of or in connection with the administration, evaluation or recommendation of any bid.

The Owner further reserves its right to disqualify bidders for any material failure to comply with the Information for Bidders and General, Supplementary, and Special Conditions.

The Owner reserves the right to reject any or all bids and to waive any informalities or defects in such bid either before or after opening.

Each bidder must deposit with his bid, security in the form and subject to the conditions provided in the "INFORMATION FOR BIDDERS". Attention of bidders is particularly called to the requirements as to conditions of employment to be observed and to the minimum wage rates to be paid under the Contract. No bidder may withdraw his bid within 45 business days after the date of the opening of bids.

ATTENTION OUT-OF-STATE BIDDERS

Please pay particular attention to the Form of Proposal and it related forms in the project manual. Out-of-State Bidders are required to complete the “Statement Concerning Authority to do Business in the State of New York for non-New York State Companies” located in the Form of Proposal package. There are three sections that must be completed. You must also have the Non-Collusion Certificate completed and signed and if you are a corporation, you must have the Resolution completed and signed.

No bid will be considered when opened unless accompanied by a certified copy of your Authority to do Business in New York State. This is not to be confused with a sales tax certificate. The Authority can be obtained by contacting:

New York State Department of State
Division of Corporations
162 Washington Avenue
Albany, NY 12231
(518) 473-2492

If the Certificate does not accompany the bid, the bid is not valid.

In the event you are of the opinion that you are not required to obtain the Authority To Do Business in New York state, and you are not a New York State Corporation, then you should complete the *Statement Concerning Authority to do Business*. You must complete two out of three sections. The top portion must be completed by all vendors needing to complete this document and then either the *Individual Acknowledgement* or the *Corporate Acknowledgement,* depending on the status of your business.

By Order Of:

Date: _____

_____
District Clerk

FORM OF PROPOSAL
Highland Falls Fort Montgomery Central School District
Additions & Alterations to Fort Montgomery Elementary School

BID DESCRIPTION

CONTRACT NO. 1 – GENERAL CONSTRUCTION

Work under this Contract may generally be described to include, but not be limited to the following:

> Procurement and general requirements; and all other work and related materials as indicated on the Contract Drawings, as specified herein, and as required for the complete and proper execution of the Work.

This outline is a general indication of the requirements of this Contract and is not intended to be all inclusive. The complete Contract Documents in their entirety, to include any and all addenda, form the basis of the responsibility of this Contract.

Each contractor is advised that the specification sections in Division 01 - General Requirements apply distinctly to each Prime Contractor and the balance of the technical specifications apply to each Contractor (as appropriate) for the accomplishment of his work.

All work of this contract shall be coordinated with other Prime Contractors involved in the project. All work shall additionally be coordinated with all other activities, construction, or others at each site throughout the progress of the work of this project.

The Contractor shall use all means possible and shall be responsible for coordinating the installation of all materials of this Contract with work of all other trades involved with this project. All work shall be done in strict accordance with the Contract Documents and in compliance with all applicable Local, State and Federal Codes.

Prior to the Bid Date of this project, the Contractor shall be completely responsible for visiting the project site to become completely familiar with the scope of this project.

Each bidder agrees to waive any claim it has or may have against the Owner, the Architect/Engineer, and the respective employees, arising out of or in connection with the administration, evaluation or recommendation of any bid.

It shall be completely understood that the use of asbestos containing materials in this project is strictly forbidden and all materials are provided in accordance with the Federal Asbestos Hazard Emergency Response Act (AHERA), and the New York State Asbestos Safety Act (SASA).

In addition to those items in the Base Bid, the Contractor shall further sub-divide his bid proposal as described in the following bid items, alternates, and/or unit prices. The Contractor shall include in the Base Bid all of the work of this Contract not specifically described in a Bid Item or Alternative. The Owner reserves the right to accept any and/or all of the Bid Items and/or Alternates or any combination thereof and to waive any informalities or defects in the bid proposals either before or after opening.

Bid Items

Allowances - As described in Specification Section 01 2100 – Allowances.

- Bid Item No. 1 – Field Directive Allowance
- Bid Item No. 2 – Rock Removal Directive Allowance

FORM OF PROPOSAL
Highland Falls Fort Montgomery Central School District
Additions & Alterations to Fort Montgomery Elementary School

Unit Prices - As described in Specification Section 01 2200 – Unit Prices

- Unit Price No. 1 – Bulk Rock Removal per cubic yard
- Unit Price No. 2 – Trench Rock Removal per cubic yard
- Unit Price No. 3 – Unsuitable Insitu Materials per cubic yard
- Unit Price No. 4 – Asbestos abatement per mud fitting
- Unit Price No. 5 – Asbestos abatement per linear foot
- Unit Price No. 6 – Asbestos abatement per square foot
- Unit Price No. 7 – Interior concrete slab trenching per square foot
- Unit Price No. 8 – Asphalt Paving (Standard and Heavy Duty – per square foot

Alternates - As described in Specification Section 01 2300 – Alternates.

- None

FORM OF PROPOSAL
Highland Falls Fort Montgomery Central School District
Additions & Alterations to Fort Montgomery Elementary School

The Undersigned _____
Contractor

_____
Address Zip Code

hereby certifies that he/she has examined and fully comprehends the requirements and intent of the drawings and specifications as prepared by BCA Architects & Engineers, for **CONTRACT NO. 1 – GENERAL CONSTRUCTION** to furnish all labor, materials, supplies, plant and equipment and other facilities to properly perform the work for the total:

BASE BID SUM of

_____ DOLLARS ($_____)

Bid Item No. 1 – Field Directive Allowance

Two Hundred Thousand DOLLARS ($200,000.00)

Bid Item No. 2 – Rock Removal Directive Allowance

Fifty Thousand DOLLARS ($50,000.00)

TOTAL BASE BID (Base Bid and Bid Items No. 1 and No. 2)

_____ DOLLARS ($_____)

UNIT PRICES

Unit Price Item No. 1 – Bulk Rock Removal $_____ / per cubic yard

Unit Price Item No. 2 – Trench Rock Removal $_____ / per cubic yard

Unit Price Item No. 3 – Unsuitable Insitu Materials $_____ / per cubic yard

Unit Price Item No. 4 – Asbestos Abatement $_____ / per mudded fitting

Unit Price Item No. 5 – Asbestos Abatement $_____ / per linear foot

Unit Price Item No. 6 – Asbestos Abatement $_____ / per square foot

Unit Price Item No. 7 – Interior Concrete Slab Trenching $_____ / per square foot

Unit Price Item No. 8 – Asphalt Paving (Standard and Heavy Duty)$_____ / per square foot

Receipt of the following Addenda is hereby acknowledged:

No. _____ dated _____ No. _____ dated

No. _____ dated _____ No. _____ dated

No. _____ dated _____ No. _____ dated

No. _____ dated _____ No. _____ dated

_____
(Name of Bidder)

Signed _____

Title _____

Street _____

City/State _____ Zip Code _____

Telephone _____

Fax _____

Cell Phone _____

Email _____

Date _____, 20__

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NON-COLLUSIVE BIDDING CERTIFICATE

By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid, each party thereto certifies as to its own organization, under penalty of perjury, that to the best of his knowledge and belief:

(1) the prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor;

(2) unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly to any other bidder or to any competitor; and

(3) no attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

(Signed) _____

_____
Title

RESOLUTION - for corporate bidders only

RESOLVED that _____ be authorized to sign and submit the bid or proposal
(individual)
of this corporation for the following project

_____
(describe project)

and to include in such bid or proposal the certificate as to non-collusion required by Section 103-d of the General Municipal Law as the act and deed of such corporation, and for any inaccuracies or misstatements in such certificate this corporate bidder shall be liable under the penalties of perjury.

The foregoing is a true and correct copy of the resolution adopted by _____ corporation at a meeting of its Board of Directors held on the _____ day of _____, 20__.

SEAL OF CORPORATION)

_____
Secretary

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Statement Concerning Authority to do Business
in the State of New York for non-New York State Companies

Please complete all requested information in both sections below.

A certificate of authority is required of out of state companies if the company has property, employees or agents used in conducting its business activities within the state of New York. Generally, business activities are defined as having an office in the state, making sales or promotional calls within the state, delivering products or merchandise and/or making service calls within the state.

Companies conducting mail order activities with New York customers are not considered doing business within New York State if the company **has no property, employees, agents and/or representatives in or, traveling into the state.** _____ is such a mail order company, and as such, is not
(Fill in company name)
required to hold a Certificate of Authority.

Performance under the attached bid will not result in any action that would result in a requirement to obtain a Certificate as all commerce will be conducted by mail. It is the opinion of the legal counsel for this firm:

Name _____
Address _____ (Complete the information)
Address _____
Telephone _____

that this firm is not required to file an Authority to do Business in New York State as required by Section 1301 of the NYS Business Corporate Law.

==========

Complete one of the following two acknowledgements in addition to above information.

Individual Acknowledgment for Sole Proprietors or Partnerships

_____
Signature

State of
County of ss.

On this _____ day of _____ two thousand and _____ before me, the subscriber, personally appeared _____ to me personally known and known to me to be the same person described in and who executed the within Instrument, and he/she acknowledged to me that he/she executed the same.

_____
Notary Public

Corporate Acknowledgment for corporations or LLC's

_____
Signature

State of
County of ss.

On this _____ day of _____ two thousand and _____ before me personally known, who, being by me duly sworn did depose and say that he/she resides in _____ that he/she is the _____ of _____ the corporation described in, and which executed, the above Instrument; that he/she knows the seal of said corporation; that the seal affixed to said Instrument is such corporate seal; that it was so affixed by order of the Board of Directors of said corporation; and that he/she signed his/her name thereto by like order.

_____
Notary Public

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FEDERAL LAW CERTIFICATION

I, _____ [insert name], the _____ [insert title] of _____ [name of company], _____ [Nine Digit DUNS Number] hereby swear or affirm that the following is true:

1. The company, its principles or entities related to the company named above, is not now, nor ever has been, debarred from contracting with the United States Government or any State government.

2. The company is not now under investigation by any agency of the Federal Government or the government of any State for any actions by the company, its principles or any related entity, for any alleged malfeasance or misfeasance of any kind or nature which could lead to a debarment from governmental contracting or criminal prosecution, as well as render any contracts signed in reliance on this certification voidable by the party relying on this certification. This includes any violations related to the Davis-Bacon Act, the federal prevailing wage statute, the Copeland Act and the Contract Hours and Safety Standards Act which covers hours of work and safety standards in federal public contracting.

3. I have full legal authority under my company's organizational documents or bylaws to make this certification on the company's behalf.

4. I understand that submission of a false statement on this document will subject me to criminal prosecution.

_____

(Date)

_____

(Signature)

THIS FORM MUST BE COMPLETED AND SUBMITTED WITH THE BID

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STATEMENT OF SURETY'S INTENT

To: _____
(Owner)

We have reviewed the Bid of _____
(Contractor)

of _____
(Address)

for _____

_____
(Project)

Bids for which will be received on _____
(Bid Opening Date)

and wish to advise that should this Bid of the Contractor be accepted, and the Contract awarded to him, it is our present intention to become surety on the performance bond and labor and material bond required by the Contract.

Any arrangement for the bonds required by the Contract is a matter between the Contractor and ourselves and we assume no liability to you or third parties if, for any reason, we do not execute the requisite bonds.

We are duly authorized to do business in the State of New York.

Attest:

_____

_____
(Surety's Authorized Signature)

Attach Power of Attorney

**(Corporate Seal, if any.
If no seal, write "No Seal"
across this place and sign.)**

THIS FORM MUST BE COMPLETED AND SUBMITTED WITH THE BID

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CERTIFICATION OF COMPLIANCE WITH THE IRAN DIVESTMENT ACT

As a result of the Iran Divestment Act of 2012 (the "Act"), Chapter 1 of the 2012 Laws of New York, a new provision has been added to State Finance Law (SFL) § 165-a and New York General Municipal Law § 103-g, both effective Aprils 12, 2012. Under the Act, the Commissioner of the Office of General Services (OGS) will be developing a list of "persons" who are engaged in "investment activities in Iran" (both are defined terms in the law) (the "Prohibited Entities List"). Pursuant to SFL § 165-a(3)(b), the initial list is expected to be issued no later than 120 days after the Act's effective date at which time it will be posted on the OGS website.

By submitting a bid in response to this solicitation or by assuming the responsibility of a Contract awarded hereunder, each Bidder/Contractor, any person signing on behalf of any Bidder/Contractor and any assignee or subcontractor and, in the case of a joint bid, each party thereto, certifies, under penalty of perjury, that once the Prohibited Entities List is posted on the OGS website, that to the best of its knowledge and belief, that each Bidder/Contractor and any subcontractor or assignee is not identified on the Prohibited Entities List created pursuant to SFL § 165-a(3)(b).

Additionally, Bidder/Contractor is advised that once the Prohibited Entities List is posted on the OGS Website, any Bidder/Contractor seeking to renew or extend a Contract or assume the responsibility of a Contract awarded in response to this solicitation must certify at the time the Contract is renewed, extended or assigned that it is not included on the Prohibited Entities List.

During the term of the Contract, should the School District receive information that a Bidder/Contractor is in violation of the above-referenced certification, the School District will offer the person or entity an opportunity to respond. If the person or entity fails to demonstrate that he/she/it has ceased engagement in the investment which is in violation of the Act within 90 days after the determination of such violation, then the School District shall take such action as may be appropriate including, but not limited to, imposing sanctions, seeking compliance, recovering damages or declaring the Bidder/Contractor in default. The School District reserves the right to reject any bid or request for assignment for a Bidder/Contractor that appears on the Prohibited Entities List prior to the award of a contract and to pursue a responsibility review with respect to any Bidder/Contractor that is awarded a contract and subsequently appears on the Prohibited Entities List.

I,_____, being duly sworn, deposes and says that he/she is the _____ of the_____Corporation and that neither the Bidder/ Contractor nor any proposed subcontractor is identified on the Prohibited Entities List.

_____

SIGNED

SWORN to before me this

_____ day of _____

20____

Notary Public: _____

EITHER THIS FORM OR THE "DECLARATION OF BIDDER'S INABILITY TO PROVIDE CERTIFICATION OF COMPLIANCE WITH THE IRAN DIVESTMENT ACT" FORM ON THE FOLLOWING PAGE MUST BE COMPLETED AND SUBMITTED WITH THE BID

DECLARATION OF BIDDER'S INABILITY TO PROVIDE CERTIFICATION OF COMPLIANCE WITH THE IRAN DIVESTMENT ACT

Bidders shall complete this form if they cannot certify that the bidder /contractor or any proposed subcontractor is not identified on the Prohibited Entities List. The District reserves the right to undertake any investigation into the information provided herein or to request additional information from the bidder.

Name of the Bidder: _____

Address of Bidder: _____

Has bidder been involved in investment activities in Iran? _____

Describe the type of activities including but not limited to the amounts and the nature of the investments (*e.g*. banking, energy, real estate) _____

_____

_____

_____

If so, when did the first investment activity occur? _____

Have the investment activities ended? _____

If so, what was the date of the last investment activity? _____

If not, have the investment activities increased or expanded since April 12, 2012? _____

Has the bidder adopted, publicized, or implemented a formal plan to cease the investment activities in Iran and to refrain from engaging in any new investments in Iran? _____

If so, provide the date of the adoption of the plan by the bidder and proof of the adopted resolution, if any and a copy of the formal plan. _____

In detail, state the reasons why the bidder cannot provide the Certification of Compliance with the Iran Divestment Act below (additional pages may be attached):

_____

_____

_____

_____

_____

_____

I, _____ being duly sworn, deposes and says that he/she is the _____ of

the_____ Corporation and the foregoing is true and accurate.

_____

SIGNED

SWORN to before me this

_____ day of _____, 20___

Notary Public: _____

FORM OF PROPOSAL
Highland Falls Fort Montgomery Central School District
Additions & Alterations to Fort Montgomery Elementary School

BID DESCRIPTION

CONTRACT NO. 2 – MECHANICAL CONSTRUCTION

Work under this Contract may generally be described to include, but not be limited to the following:

> Procurement and general requirements; and all other work and related materials as indicated on the Contract Drawings, as specified herein, and as required for the complete and proper execution of the Work.

This outline is a general indication of the requirements of this Contract and is not intended to be all inclusive. The complete Contract Documents in their entirety, to include any and all addenda, form the basis of the responsibility of this Contract.

Each contractor is advised that the specification sections in Division 01 - General Requirements apply distinctly to each Prime Contractor and the balance of the technical specifications apply to each Contractor (as appropriate) for the accomplishment of his work.

All work of this contract shall be coordinated with other Prime Contractors involved in the project. All work shall additionally be coordinated with all other activities, construction, or others at each site throughout the progress of the work of this project.

The Contractor shall use all means possible and shall be responsible for coordinating the installation of all materials of this Contract with work of all other trades involved with this project. All work shall be done in strict accordance with the Contract Documents and in compliance with all applicable Local, State and Federal Codes.

Prior to the Bid Date of this project, the Contractor shall be completely responsible for visiting the project site to become completely familiar with the scope of this project.

Each bidder agrees to waive any claim it has or may have against the Owner, the Architect/Engineer, and the respective employees, arising out of or in connection with the administration, evaluation or recommendation of any bid.

It shall be completely understood that the use of asbestos containing materials in this project is strictly forbidden and all materials are provided in accordance with the Federal Asbestos Hazard Emergency Response Act (AHERA), and the New York State Asbestos Safety Act (SASA).

In addition to those items in the Base Bid, the Contractor shall further sub-divide his bid proposal as described in the following bid items, alternates, and/or unit prices. The Contractor shall include in the Base Bid all of the work of this Contract not specifically described in a Bid Item or Alternative. The Owner reserves the right to accept any and/or all of the Bid Items and/or Alternates or any combination thereof and to waive any informalities or defects in the bid proposals either before or after opening.

Bid Items

Allowances - As described in Specification Section 01 2100 – Allowances.

- Bid Item No. 1 – Field Directive Allowance

Alternates - None

Unit Prices - None

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FORM OF PROPOSAL
Highland Falls Fort Montgomery Central School District
Additions & Alterations to Fort Montgomery Elementary School

The Undersigned _____
Contractor

_____
Address Zip Code

hereby certifies that he/she has examined and fully comprehends the requirements and intent of the drawings and specifications as prepared by BCA Architects & Engineers, for **CONTRACT NO. 2 – MECHANICAL CONSTRUCTION** to furnish all labor, materials, supplies, plant and equipment and other facilities to properly perform the work for the total:

BASE BID SUM of

_____ DOLLARS ($_____)

Bid Item No. 1 – Field Directive Allowance

One Hundred Thousand DOLLARS ($ 100,000.00)

TOTAL BASE BID (Base Bid and Bid Item No. 1)

_____ DOLLARS ($_____)

Receipt of the following Addenda is hereby acknowledged:

No. _____ dated _____ No. _____ dated

No. _____ dated _____ No. _____ dated

No. _____ dated _____ No. _____ dated

No. _____ dated _____ No. _____ dated

_____
(Name of Bidder)

Signed _____

Title _____

Street _____

City/State _____ Zip Code _____

Telephone _____

Fax _____

Cell Phone _____

Email _____

Date _____, 20__

NON-COLLUSIVE BIDDING CERTIFICATE

By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid, each party thereto certifies as to its own organization, under penalty of perjury, that to the best of his knowledge and belief:

(1) the prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor;

(2) unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly to any other bidder or to any competitor; and

(3) no attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

(Signed) _____

_____
Title

RESOLUTION - for corporate bidders only

RESOLVED that _____ be authorized to sign and submit the bid or proposal
(individual)
of this corporation for the following project

_____
(describe project)

and to include in such bid or proposal the certificate as to non-collusion required by Section 103-d of the General Municipal Law as the act and deed of such corporation, and for any inaccuracies or misstatements in such certificate this corporate bidder shall be liable under the penalties of perjury.

The foregoing is a true and correct copy of the resolution adopted by _____ corporation at a meeting of its Board of Directors held on the _____ day of _____, 20__.

SEAL OF CORPORATION)

_____
Secretary

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Statement Concerning Authority to do Business
in the State of New York for non-New York State Companies

Please complete all requested information in both sections below.

A certificate of authority is required of out of state companies if the company has property, employees or agents used in conducting its business activities within the state of New York. Generally, business activities are defined as having an office in the state, making sales or promotional calls within the state, delivering products or merchandise and/or making service calls within the state.

Companies conducting mail order activities with New York customers are not considered doing business within New York State if the company **has no property, employees, agents and/or representatives in or, traveling into the state.** _____ is such a mail order company, and as such, is not
(Fill in company name)
required to hold a Certificate of Authority.

Performance under the attached bid will not result in any action that would result in a requirement to obtain a Certificate as all commerce will be conducted by mail. It is the opinion of the legal counsel for this firm:

Name _____
Address _____ (Complete the information)
Address _____
Telephone _____

that this firm is not required to file an Authority to do Business in New York State as required by Section 1301 of the NYS Business Corporate Law.

==========

Complete one of the following two acknowledgements in addition to above information.

Individual Acknowledgment for Sole Proprietors or Partnerships

_____
Signature

State of
County of ss.

On this _____ day of _____ two thousand and _____ before me, the subscriber, personally appeared _____ to me personally known and known to me to be the same person described in and who executed the within Instrument, and he/she acknowledged to me that he/she executed the same.

_____
Notary Public

Corporate Acknowledgment for corporations or LLC's

_____
Signature

State of
County of ss.

On this _____ day of _____ two thousand and _____ before me personally known, who, being by me duly sworn did depose and say that he/she resides in _____ that he/she is the _____ of _____ the corporation described in, and which executed, the above Instrument; that he/she knows the seal of said corporation; that the seal affixed to said Instrument is such corporate seal; that it was so affixed by order of the Board of Directors of said corporation; and that he/she signed his/her name thereto by like order.

_____
Notary Public

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FEDERAL LAW CERTIFICATION

I, _____ [insert name], the _____ [insert title] of _____ [name of company], _____ [Nine Digit DUNS Number] hereby swear or affirm that the following is true:

1. The company, its principles or entities related to the company named above, is not now, nor ever has been, debarred from contracting with the United States Government or any State government.

2. The company is not now under investigation by any agency of the Federal Government or the government of any State for any actions by the company, its principles or any related entity, for any alleged malfeasance or misfeasance of any kind or nature which could lead to a debarment from governmental contracting or criminal prosecution, as well as render any contracts signed in reliance on this certification voidable by the party relying on this certification. This includes any violations related to the Davis-Bacon Act, the federal prevailing wage statute, the Copeland Act and the Contract Hours and Safety Standards Act which covers hours of work and safety standards in federal public contracting.

3. I have full legal authority under my company's organizational documents or bylaws to make this certification on the company's behalf.

4. I understand that submission of a false statement on this document will subject me to criminal prosecution.

_____

(Date)

_____

(Signature)

THIS FORM MUST BE COMPLETED AND SUBMITTED WITH THE BID

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STATEMENT OF SURETY'S INTENT

To: _____
(Owner)

We have reviewed the Bid of _____
(Contractor)

of _____
(Address)

for _____

_____
(Project)

Bids for which will be received on _____
(Bid Opening Date)

and wish to advise that should this Bid of the Contractor be accepted, and the Contract awarded to him, it is our present intention to become surety on the performance bond and labor and material bond required by the Contract.

Any arrangement for the bonds required by the Contract is a matter between the Contractor and ourselves and we assume no liability to you or third parties if, for any reason, we do not execute the requisite bonds.

We are duly authorized to do business in the State of New York.

Attest:

_____

_____
(Surety's Authorized Signature)

Attach Power of Attorney

**(Corporate Seal, if any.
If no seal, write "No Seal"
across this place and sign.)**

THIS FORM MUST BE COMPLETED AND SUBMITTED WITH THE BID

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CERTIFICATION OF COMPLIANCE WITH THE IRAN DIVESTMENT ACT

As a result of the Iran Divestment Act of 2012 (the "Act"), Chapter 1 of the 2012 Laws of New York, a new provision has been added to State Finance Law (SFL) § 165-a and New York General Municipal Law § 103-g, both effective Aprils 12, 2012. Under the Act, the Commissioner of the Office of General Services (OGS) will be developing a list of "persons" who are engaged in "investment activities in Iran" (both are defined terms in the law) (the "Prohibited Entities List"). Pursuant to SFL § 165-a(3)(b), the initial list is expected to be issued no later than 120 days after the Act's effective date at which time it will be posted on the OGS website.

By submitting a bid in response to this solicitation or by assuming the responsibility of a Contract awarded hereunder, each Bidder/Contractor, any person signing on behalf of any Bidder/Contractor and any assignee or subcontractor and, in the case of a joint bid, each party thereto, certifies, under penalty of perjury, that once the Prohibited Entities List is posted on the OGS website, that to the best of its knowledge and belief, that each Bidder/Contractor and any subcontractor or assignee is not identified on the Prohibited Entities List created pursuant to SFL § 165-a(3)(b).

Additionally, Bidder/Contractor is advised that once the Prohibited Entities List is posted on the OGS Website, any Bidder/Contractor seeking to renew or extend a Contract or assume the responsibility of a Contract awarded in response to this solicitation must certify at the time the Contract is renewed, extended or assigned that it is not included on the Prohibited Entities List.

During the term of the Contract, should the School District receive information that a Bidder/Contractor is in violation of the above-referenced certification, the School District will offer the person or entity an opportunity to respond. If the person or entity fails to demonstrate that he/she/it has ceased engagement in the investment which is in violation of the Act within 90 days after the determination of such violation, then the School District shall take such action as may be appropriate including, but not limited to, imposing sanctions, seeking compliance, recovering damages or declaring the Bidder/Contractor in default. The School District reserves the right to reject any bid or request for assignment for a Bidder/Contractor that appears on the Prohibited Entities List prior to the award of a contract and to pursue a responsibility review with respect to any Bidder/Contractor that is awarded a contract and subsequently appears on the Prohibited Entities List.

I,_____, being duly sworn, deposes and says that he/she is the _____ of the_____Corporation and that neither the Bidder/ Contractor nor any proposed subcontractor is identified on the Prohibited Entities List.

_____

SIGNED

SWORN to before me this

_____ day of _____

20____

Notary Public: _____

EITHER THIS FORM OR THE "DECLARATION OF BIDDER'S INABILITY TO PROVIDE CERTIFICATION OF COMPLIANCE WITH THE IRAN DIVESTMENT ACT" FORM ON THE FOLLOWING PAGE MUST BE COMPLETED AND SUBMITTED WITH THE BID

DECLARATION OF BIDDER'S INABILITY TO PROVIDE CERTIFICATION OF COMPLIANCE WITH THE IRAN DIVESTMENT ACT

Bidders shall complete this form if they cannot certify that the bidder /contractor or any proposed subcontractor is not identified on the Prohibited Entities List. The District reserves the right to undertake any investigation into the information provided herein or to request additional information from the bidder.

Name of the Bidder: _____

Address of Bidder: _____

Has bidder been involved in investment activities in Iran? _____

Describe the type of activities including but not limited to the amounts and the nature of the investments (*e.g*. banking, energy, real estate) _____

_____

_____

_____

If so, when did the first investment activity occur? _____

Have the investment activities ended? _____

If so, what was the date of the last investment activity? _____

If not, have the investment activities increased or expanded since April 12, 2012? _____

Has the bidder adopted, publicized, or implemented a formal plan to cease the investment activities in Iran and to refrain from engaging in any new investments in Iran? _____

If so, provide the date of the adoption of the plan by the bidder and proof of the adopted resolution, if any and a copy of the formal plan. _____

In detail, state the reasons why the bidder cannot provide the Certification of Compliance with the Iran Divestment Act below (additional pages may be attached):

_____

_____

_____

_____

_____

_____

I, _____ being duly sworn, deposes and says that he/she is the _____ of

the_____ Corporation and the foregoing is true and accurate.

_____

SIGNED

SWORN to before me this

_____ day of _____, 20___

Notary Public: _____

FORM OF PROPOSAL
Highland Falls Fort Montgomery Central School District
Additions & Alterations to Fort Montgomery Elementary School

BID DESCRIPTION

CONTRACT NO. 3 – PLUMBING CONSTRUCTION

Work under this Contract may generally be described to include, but not be limited to the following:

> Procurement and general requirements; and all other work and related materials as indicated on the Contract Drawings, as specified herein, and as required for the complete and proper execution of the Work.

This outline is a general indication of the requirements of this Contract and is not intended to be all inclusive. The complete Contract Documents in their entirety, to include any and all addenda, form the basis of the responsibility of this Contract.

Each contractor is advised that the specification sections in Division 01 - General Requirements apply distinctly to each Prime Contractor and the balance of the technical specifications apply to each Contractor (as appropriate) for the accomplishment of his work.

All work of this contract shall be coordinated with other Prime Contractors involved in the project. All work shall additionally be coordinated with all other activities, construction, or others at each site throughout the progress of the work of this project.

The Contractor shall use all means possible and shall be responsible for coordinating the installation of all materials of this Contract with work of all other trades involved with this project. All work shall be done in strict accordance with the Contract Documents and in compliance with all applicable Local, State and Federal Codes.

Prior to the Bid Date of this project, the Contractor shall be completely responsible for visiting the project site to become completely familiar with the scope of this project.

Each bidder agrees to waive any claim it has or may have against the Owner, the Architect/Engineer, and the respective employees, arising out of or in connection with the administration, evaluation or recommendation of any bid.

It shall be completely understood that the use of asbestos containing materials in this project is strictly forbidden and all materials are provided in accordance with the Federal Asbestos Hazard Emergency Response Act (AHERA), and the New York State Asbestos Safety Act (SASA).

In addition to those items in the Base Bid, the Contractor shall further sub-divide his bid proposal as described in the following bid items, alternates, and/or unit prices. The Contractor shall include in the Base Bid all of the work of this Contract not specifically described in a Bid Item or Alternative. The Owner reserves the right to accept any and/or all of the Bid Items and/or Alternates or any combination thereof and to waive any informalities or defects in the bid proposals either before or after opening.

Bid Items

Allowances - As described in Specification Section 01 2100 – Allowances.

- Bid Item No. 1 – Field Directive Allowance

Alternates – None.

Unit Prices – None

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FORM OF PROPOSAL
Highland Falls Fort Montgomery Central School District
Additions & Alterations to Fort Montgomery Elementary School

The Undersigned _____
Contractor

_____
Address Zip Code

hereby certifies that he/she has examined and fully comprehends the requirements and intent of the drawings and specifications as prepared by BCA Architects & Engineers, for **CONTRACT NO. 3 – PLUMBING CONSTRUCTION** to furnish all labor, materials, supplies, plant and equipment and other facilities to properly perform the work for the total:

BASE BID SUM of

_____ DOLLARS ($_____)

Bid Item No. 1 – Field Directive Allowance

Fifty Thousand DOLLARS ($50,000.00)

TOTAL BASE BID (Base Bid and Bid Item No. 1)

_____ DOLLARS ($_____)

Receipt of the following Addenda is hereby acknowledged:

No. _____ dated _____ No. _____ dated

No. _____ dated _____ No. _____ dated

No. _____ dated _____ No. _____ dated

No. _____ dated _____ No. _____ dated

_____
(Name of Bidder)

Signed _____

Title _____

Street _____

City/State _____ Zip Code _____

Telephone _____

Fax _____

Cell Phone _____

Email _____

Date _____, 20__

NON-COLLUSIVE BIDDING CERTIFICATE

By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid, each party thereto certifies as to its own organization, under penalty of perjury, that to the best of his knowledge and belief:

(1) the prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor;

(2) unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly to any other bidder or to any competitor; and

(3) no attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

(Signed) _____

_____
Title

RESOLUTION - for corporate bidders only

RESOLVED that _____ be authorized to sign and submit the bid or proposal
(individual)
of this corporation for the following project

_____
(describe project)

and to include in such bid or proposal the certificate as to non-collusion required by Section 103-d of the General Municipal Law as the act and deed of such corporation, and for any inaccuracies or misstatements in such certificate this corporate bidder shall be liable under the penalties of perjury.

The foregoing is a true and correct copy of the resolution adopted by _____ corporation at a meeting of its Board of Directors held on the _____ day of _____, 20__.

SEAL OF CORPORATION)

_____
Secretary

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Statement Concerning Authority to do Business
in the State of New York for non-New York State Companies

Please complete all requested information in both sections below.

A certificate of authority is required of out of state companies if the company has property, employees or agents used in conducting its business activities within the state of New York. Generally, business activities are defined as having an office in the state, making sales or promotional calls within the state, delivering products or merchandise and/or making service calls within the state.

Companies conducting mail order activities with New York customers are not considered doing business within New York State if the company **has no property, employees, agents and/or representatives in or, traveling into the state.** _____ is such a mail order company, and as such, is not
(Fill in company name)
required to hold a Certificate of Authority.

Performance under the attached bid will not result in any action that would result in a requirement to obtain a Certificate as all commerce will be conducted by mail. It is the opinion of the legal counsel for this firm:

Name _____
Address _____ (Complete the information)
Address _____
Telephone _____

that this firm is not required to file an Authority to do Business in New York State as required by Section 1301 of the NYS Business Corporate Law.

==========

Complete one of the following two acknowledgements in addition to above information.

Individual Acknowledgment for Sole Proprietors or Partnerships

_____
Signature

State of
County of ss.

On this _____ day of _____ two thousand and _____ before me, the subscriber, personally appeared _____ to me personally known and known to me to be the same person described in and who executed the within Instrument, and he/she acknowledged to me that he/she executed the same.

_____
Notary Public

Corporate Acknowledgment for corporations or LLC's

_____
Signature

State of
County of ss.

On this _____ day of _____ two thousand and _____ before me personally known, who, being by me duly sworn did depose and say that he/she resides in _____ that he/she is the _____ of _____ the corporation described in, and which executed, the above Instrument; that he/she knows the seal of said corporation; that the seal affixed to said Instrument is such corporate seal; that it was so affixed by order of the Board of Directors of said corporation; and that he/she signed his/her name thereto by like order.

_____
Notary Public

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FEDERAL LAW CERTIFICATION

I, _____ [insert name], the _____ [insert title] of _____ [name of company], _____ [Nine Digit DUNS Number] hereby swear or affirm that the following is true:

1. The company, its principles or entities related to the company named above, is not now, nor ever has been, debarred from contracting with the United States Government or any State government.

2. The company is not now under investigation by any agency of the Federal Government or the government of any State for any actions by the company, its principles or any related entity, for any alleged malfeasance or misfeasance of any kind or nature which could lead to a debarment from governmental contracting or criminal prosecution, as well as render any contracts signed in reliance on this certification voidable by the party relying on this certification. This includes any violations related to the Davis-Bacon Act, the federal prevailing wage statute, the Copeland Act and the Contract Hours and Safety Standards Act which covers hours of work and safety standards in federal public contracting.

3. I have full legal authority under my company's organizational documents or bylaws to make this certification on the company's behalf.

4. I understand that submission of a false statement on this document will subject me to criminal prosecution.

_____

(Date)

_____

(Signature)

THIS FORM MUST BE COMPLETED AND SUBMITTED WITH THE BID

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STATEMENT OF SURETY'S INTENT

To: _____
(Owner)

We have reviewed the Bid of _____
(Contractor)

of _____
(Address)

for _____

_____
(Project)

Bids for which will be received on _____
(Bid Opening Date)

and wish to advise that should this Bid of the Contractor be accepted, and the Contract awarded to him, it is our present intention to become surety on the performance bond and labor and material bond required by the Contract.

Any arrangement for the bonds required by the Contract is a matter between the Contractor and ourselves and we assume no liability to you or third parties if, for any reason, we do not execute the requisite bonds.

We are duly authorized to do business in the State of New York.

Attest:

_____

_____
(Surety's Authorized Signature)

Attach Power of Attorney

**(Corporate Seal, if any.
If no seal, write "No Seal"
across this place and sign.)**

THIS FORM MUST BE COMPLETED AND SUBMITTED WITH THE BID

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CERTIFICATION OF COMPLIANCE WITH THE IRAN DIVESTMENT ACT

As a result of the Iran Divestment Act of 2012 (the "Act"), Chapter 1 of the 2012 Laws of New York, a new provision has been added to State Finance Law (SFL) § 165-a and New York General Municipal Law § 103-g, both effective Aprils 12, 2012. Under the Act, the Commissioner of the Office of General Services (OGS) will be developing a list of "persons" who are engaged in "investment activities in Iran" (both are defined terms in the law) (the "Prohibited Entities List"). Pursuant to SFL § 165-a(3)(b), the initial list is expected to be issued no later than 120 days after the Act's effective date at which time it will be posted on the OGS website.

By submitting a bid in response to this solicitation or by assuming the responsibility of a Contract awarded hereunder, each Bidder/Contractor, any person signing on behalf of any Bidder/Contractor and any assignee or subcontractor and, in the case of a joint bid, each party thereto, certifies, under penalty of perjury, that once the Prohibited Entities List is posted on the OGS website, that to the best of its knowledge and belief, that each Bidder/Contractor and any subcontractor or assignee is not identified on the Prohibited Entities List created pursuant to SFL § 165-a(3)(b).

Additionally, Bidder/Contractor is advised that once the Prohibited Entities List is posted on the OGS Website, any Bidder/Contractor seeking to renew or extend a Contract or assume the responsibility of a Contract awarded in response to this solicitation must certify at the time the Contract is renewed, extended or assigned that it is not included on the Prohibited Entities List.

During the term of the Contract, should the School District receive information that a Bidder/Contractor is in violation of the above-referenced certification, the School District will offer the person or entity an opportunity to respond. If the person or entity fails to demonstrate that he/she/it has ceased engagement in the investment which is in violation of the Act within 90 days after the determination of such violation, then the School District shall take such action as may be appropriate including, but not limited to, imposing sanctions, seeking compliance, recovering damages or declaring the Bidder/Contractor in default. The School District reserves the right to reject any bid or request for assignment for a Bidder/Contractor that appears on the Prohibited Entities List prior to the award of a contract and to pursue a responsibility review with respect to any Bidder/Contractor that is awarded a contract and subsequently appears on the Prohibited Entities List.

I,_____, being duly sworn, deposes and says that he/she is the _____ of the_____Corporation and that neither the Bidder/ Contractor nor any proposed subcontractor is identified on the Prohibited Entities List.

_____

SIGNED

SWORN to before me this

_____ day of _____

20____

Notary Public: _____

EITHER THIS FORM OR THE "DECLARATION OF BIDDER'S INABILITY TO PROVIDE CERTIFICATION OF COMPLIANCE WITH THE IRAN DIVESTMENT ACT" FORM ON THE FOLLOWING PAGE MUST BE COMPLETED AND SUBMITTED WITH THE BID

DECLARATION OF BIDDER'S INABILITY TO PROVIDE CERTIFICATION OF COMPLIANCE WITH THE IRAN DIVESTMENT ACT

Bidders shall complete this form if they cannot certify that the bidder /contractor or any proposed subcontractor is not identified on the Prohibited Entities List. The District reserves the right to undertake any investigation into the information provided herein or to request additional information from the bidder.

Name of the Bidder: _____

Address of Bidder: _____

Has bidder been involved in investment activities in Iran? _____

Describe the type of activities including but not limited to the amounts and the nature of the investments (*e.g*. banking, energy, real estate) _____

_____

_____

_____

If so, when did the first investment activity occur? _____

Have the investment activities ended? _____

If so, what was the date of the last investment activity? _____

If not, have the investment activities increased or expanded since April 12, 2012? _____

Has the bidder adopted, publicized, or implemented a formal plan to cease the investment activities in Iran and to refrain from engaging in any new investments in Iran? _____

If so, provide the date of the adoption of the plan by the bidder and proof of the adopted resolution, if any and a copy of the formal plan. _____

In detail, state the reasons why the bidder cannot provide the Certification of Compliance with the Iran Divestment Act below (additional pages may be attached):

_____

_____

_____

_____

_____

_____

I, _____ being duly sworn, deposes and says that he/she is the _____ of

the_____ Corporation and the foregoing is true and accurate.

_____

SIGNED

SWORN to before me this

_____ day of _____, 20___

Notary Public: _____

FORM OF PROPOSAL
Highland Falls Fort Montgomery Central School District
Additions & Alterations to Fort Montgomery Elementary School

BID DESCRIPTION

CONTRACT NO. 4 – ELECTRICAL CONSTRUCTION

Work under this Contract may generally be described to include, but not be limited to the following:

> Procurement and general requirements; and all other work and related materials as indicated on the Contract Drawings, as specified herein, and as required for the complete and proper execution of the Work.

This outline is a general indication of the requirements of this Contract and is not intended to be all inclusive. The complete Contract Documents in their entirety, to include any and all addenda, form the basis of the responsibility of this Contract.

Each contractor is advised that the specification sections in Division 01 - General Requirements apply distinctly to each Prime Contractor and the balance of the technical specifications apply to each Contractor (as appropriate) for the accomplishment of his work.

All work of this contract shall be coordinated with other Prime Contractors involved in the project. All work shall additionally be coordinated with all other activities, construction, or others at each site throughout the progress of the work of this project.

The Contractor shall use all means possible and shall be responsible for coordinating the installation of all materials of this Contract with work of all other trades involved with this project. All work shall be done in strict accordance with the Contract Documents and in compliance with all applicable Local, State and Federal Codes.

Prior to the Bid Date of this project, the Contractor shall be completely responsible for visiting the project site to become completely familiar with the scope of this project.

Each bidder agrees to waive any claim it has or may have against the Owner, the Architect/Engineer, and the respective employees, arising out of or in connection with the administration, evaluation or recommendation of any bid.

It shall be completely understood that the use of asbestos containing materials in this project is strictly forbidden and all materials are provided in accordance with the Federal Asbestos Hazard Emergency Response Act (AHERA), and the New York State Asbestos Safety Act (SASA).

In addition to those items in the Base Bid, the Contractor shall further sub-divide his bid proposal as described in the following bid items, alternates, and/or unit prices. The Contractor shall include in the Base Bid all of the work of this Contract not specifically described in a Bid Item or Alternative. The Owner reserves the right to accept any and/or all of the Bid Items and/or Alternates or any combination thereof and to waive any informalities or defects in the bid proposals either before or after opening.

Bid Items

Allowances - As described in Specification Section 01 2100 – Allowances.

- Bid Item No. 1 – Field Directive Allowance

Alternates - None

Unit Prices - None

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FORM OF PROPOSAL
Highland Falls Fort Montgomery Central School District
Additions & Alterations to Fort Montgomery Elementary School

The Undersigned _____
Contractor

_____
Address Zip Code

hereby certifies that he/she has examined and fully comprehends the requirements and intent of the drawings and specifications as prepared by BCA Architects & Engineers, for **CONTRACT NO. 4 – ELECTRICAL CONSTRUCTION** to furnish all labor, materials, supplies, plant and equipment and other facilities to properly perform the work for the total:

BASE BID SUM of

_____ DOLLARS ($_____)

Bid Item No. 1 – Field Directive Allowance

One Hundred Thousand DOLLARS ($100,000.00)

TOTAL BASE BID (Base Bid and Bid Item No. 1)

_____ DOLLARS ($_____)

Receipt of the following Addenda is hereby acknowledged:

No. _____ dated _____ No. _____ dated

No. _____ dated _____ No. _____ dated

No. _____ dated _____ No. _____ dated

No. _____ dated _____ No. _____ dated

_____
(Name of Bidder)

Signed _____

Title _____

Street _____

City/State _____ Zip Code _____

Telephone _____

Fax _____

Cell Phone _____

Email _____

Date _____, 20__

NON-COLLUSIVE BIDDING CERTIFICATE

By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid, each party thereto certifies as to its own organization, under penalty of perjury, that to the best of his knowledge and belief:

(1) the prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor;

(2) unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly to any other bidder or to any competitor; and

(3) no attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

(Signed) _____

_____
Title

RESOLUTION - for corporate bidders only

RESOLVED that _____ be authorized to sign and submit the bid or proposal
(individual)
of this corporation for the following project

_____
(describe project)

and to include in such bid or proposal the certificate as to non-collusion required by Section 103-d of the General Municipal Law as the act and deed of such corporation, and for any inaccuracies or misstatements in such certificate this corporate bidder shall be liable under the penalties of perjury.

The foregoing is a true and correct copy of the resolution adopted by _____ corporation at a meeting of its Board of Directors held on the _____ day of _____, 20__.

SEAL OF CORPORATION)

_____
Secretary

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Statement Concerning Authority to do Business
in the State of New York for non-New York State Companies

Please complete all requested information in both sections below.

A certificate of authority is required of out of state companies if the company has property, employees or agents used in conducting its business activities within the state of New York. Generally, business activities are defined as having an office in the state, making sales or promotional calls within the state, delivering products or merchandise and/or making service calls within the state.

Companies conducting mail order activities with New York customers are not considered doing business within New York State if the company **has no property, employees, agents and/or representatives in or, traveling into the state.** _____ is such a mail order company, and as such, is not
(Fill in company name)
required to hold a Certificate of Authority.

Performance under the attached bid will not result in any action that would result in a requirement to obtain a Certificate as all commerce will be conducted by mail. It is the opinion of the legal counsel for this firm:

Name _____
Address _____ (Complete the information)
Address _____
Telephone _____

that this firm is not required to file an Authority to do Business in New York State as required by Section 1301 of the NYS Business Corporate Law.

==========

Complete one of the following two acknowledgements in addition to above information.

Individual Acknowledgment for Sole Proprietors or Partnerships

_____
Signature

State of
County of ss.

On this _____ day of _____ two thousand and _____ before me, the subscriber, personally appeared _____ to me personally known and known to me to be the same person described in and who executed the within Instrument, and he/she acknowledged to me that he/she executed the same.

_____
Notary Public

Corporate Acknowledgment for corporations or LLC's

_____
Signature

State of
County of ss.

On this _____ day of _____ two thousand and _____ before me personally known, who, being by me duly sworn did depose and say that he/she resides in _____ that he/she is the _____ of _____ the corporation described in, and which executed, the above Instrument; that he/she knows the seal of said corporation; that the seal affixed to said Instrument is such corporate seal; that it was so affixed by order of the Board of Directors of said corporation; and that he/she signed his/her name thereto by like order.

_____
Notary Public

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FEDERAL LAW CERTIFICATION

I, _____ [insert name], the _____ [insert title] of _____ [name of company], _____ [Nine Digit DUNS Number] hereby swear or affirm that the following is true:

1. The company, its principles or entities related to the company named above, is not now, nor ever has been, debarred from contracting with the United States Government or any State government.

2. The company is not now under investigation by any agency of the Federal Government or the government of any State for any actions by the company, its principles or any related entity, for any alleged malfeasance or misfeasance of any kind or nature which could lead to a debarment from governmental contracting or criminal prosecution, as well as render any contracts signed in reliance on this certification voidable by the party relying on this certification. This includes any violations related to the Davis-Bacon Act, the federal prevailing wage statute, the Copeland Act and the Contract Hours and Safety Standards Act which covers hours of work and safety standards in federal public contracting.

3. I have full legal authority under my company's organizational documents or bylaws to make this certification on the company's behalf.

4. I understand that submission of a false statement on this document will subject me to criminal prosecution.

_____

(Date)

_____

(Signature)

THIS FORM MUST BE COMPLETED AND SUBMITTED WITH THE BID

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STATEMENT OF SURETY'S INTENT

To: _____
(Owner)

We have reviewed the Bid of _____
(Contractor)

of _____
(Address)

for _____

_____
(Project)

Bids for which will be received on _____
(Bid Opening Date)

and wish to advise that should this Bid of the Contractor be accepted, and the Contract awarded to him, it is our present intention to become surety on the performance bond and labor and material bond required by the Contract.

Any arrangement for the bonds required by the Contract is a matter between the Contractor and ourselves and we assume no liability to you or third parties if, for any reason, we do not execute the requisite bonds.

We are duly authorized to do business in the State of New York.

Attest:

_____

_____
(Surety's Authorized Signature)

Attach Power of Attorney

**(Corporate Seal, if any.
If no seal, write "No Seal"
across this place and sign.)**

THIS FORM MUST BE COMPLETED AND SUBMITTED WITH THE BID

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CERTIFICATION OF COMPLIANCE WITH THE IRAN DIVESTMENT ACT

As a result of the Iran Divestment Act of 2012 (the "Act"), Chapter 1 of the 2012 Laws of New York, a new provision has been added to State Finance Law (SFL) § 165-a and New York General Municipal Law § 103-g, both effective Aprils 12, 2012. Under the Act, the Commissioner of the Office of General Services (OGS) will be developing a list of "persons" who are engaged in "investment activities in Iran" (both are defined terms in the law) (the "Prohibited Entities List"). Pursuant to SFL § 165-a(3)(b), the initial list is expected to be issued no later than 120 days after the Act's effective date at which time it will be posted on the OGS website.

By submitting a bid in response to this solicitation or by assuming the responsibility of a Contract awarded hereunder, each Bidder/Contractor, any person signing on behalf of any Bidder/Contractor and any assignee or subcontractor and, in the case of a joint bid, each party thereto, certifies, under penalty of perjury, that once the Prohibited Entities List is posted on the OGS website, that to the best of its knowledge and belief, that each Bidder/Contractor and any subcontractor or assignee is not identified on the Prohibited Entities List created pursuant to SFL § 165-a(3)(b).

Additionally, Bidder/Contractor is advised that once the Prohibited Entities List is posted on the OGS Website, any Bidder/Contractor seeking to renew or extend a Contract or assume the responsibility of a Contract awarded in response to this solicitation must certify at the time the Contract is renewed, extended or assigned that it is not included on the Prohibited Entities List.

During the term of the Contract, should the School District receive information that a Bidder/Contractor is in violation of the above-referenced certification, the School District will offer the person or entity an opportunity to respond. If the person or entity fails to demonstrate that he/she/it has ceased engagement in the investment which is in violation of the Act within 90 days after the determination of such violation, then the School District shall take such action as may be appropriate including, but not limited to, imposing sanctions, seeking compliance, recovering damages or declaring the Bidder/Contractor in default. The School District reserves the right to reject any bid or request for assignment for a Bidder/Contractor that appears on the Prohibited Entities List prior to the award of a contract and to pursue a responsibility review with respect to any Bidder/Contractor that is awarded a contract and subsequently appears on the Prohibited Entities List.

I,_____, being duly sworn, deposes and says that he/she is the _____ of the_____Corporation and that neither the Bidder/ Contractor nor any proposed subcontractor is identified on the Prohibited Entities List.

_____

SIGNED

SWORN to before me this

_____ day of _____

20____

Notary Public: _____

EITHER THIS FORM OR THE "DECLARATION OF BIDDER'S INABILITY TO PROVIDE CERTIFICATION OF COMPLIANCE WITH THE IRAN DIVESTMENT ACT" FORM ON THE FOLLOWING PAGE MUST BE COMPLETED AND SUBMITTED WITH THE BID

DECLARATION OF BIDDER'S INABILITY TO PROVIDE CERTIFICATION OF COMPLIANCE WITH THE IRAN DIVESTMENT ACT

Bidders shall complete this form if they cannot certify that the bidder /contractor or any proposed subcontractor is not identified on the Prohibited Entities List. The District reserves the right to undertake any investigation into the information provided herein or to request additional information from the bidder.

Name of the Bidder: _____

Address of Bidder: _____

Has bidder been involved in investment activities in Iran? _____

Describe the type of activities including but not limited to the amounts and the nature of the investments (*e.g*. banking, energy, real estate) _____

_____

_____

_____

If so, when did the first investment activity occur? _____

Have the investment activities ended? _____

If so, what was the date of the last investment activity? _____

If not, have the investment activities increased or expanded since April 12, 2012? _____

Has the bidder adopted, publicized, or implemented a formal plan to cease the investment activities in Iran and to refrain from engaging in any new investments in Iran? _____

If so, provide the date of the adoption of the plan by the bidder and proof of the adopted resolution, if any and a copy of the formal plan. _____

In detail, state the reasons why the bidder cannot provide the Certification of Compliance with the Iran Divestment Act below (additional pages may be attached):

_____

_____

_____

_____

_____

_____

I, _____ being duly sworn, deposes and says that he/she is the _____ of

the_____ Corporation and the foregoing is true and accurate.

_____

SIGNED

SWORN to before me this

_____ day of _____, 20___

Notary Public: _____

DRAFT AIA® Document A132® – 2019

Standard Form of Agreement Between Owner and Contractor,
Construction Manager as Adviser Edition

AGREEMENT made as of the « » day of « » in the year « »
(In words, indicate day, month, and year.)

BETWEEN the Owner:
(Name, legal status, address, and other information)

«Highland Falls-Fort Montgomery Central School District»«»
«21 Morgan Road
Fort Montgomery, New York 10922»
«Telephone Number: (845) 446-9575»
«»

and the Contractor:
(Name, legal status, address, and other information)

« »« »
« »
« »
« »

for the following Project:
(Name, location, and detailed description)

«Additions & Alterations to FMES
»
«Highland Falls-Fort Montgomery Central School District
21 Morgan Road
Fort Montgomery, New York 10922»
«
Contract No. X – [INSERT CONTRACT NAME]

SED Number: 44-09-01-04-0-005-008

BCA Project Number: 2022-138»

The Construction Manager:
(Name, legal status, address, and other information)

«Triton Construction»«»
«1279 Route 300, 1st Floor
Newburgh, New York 12250»
«Telephone Number: (212) 388-5700»
«»

The Architect:
(Name, legal status, address, and other information)

«Bernier, Carr & Associates Engineers, Architects, and Land Surveyors, P.C.»«»
«798 Cascadilla Street
Suite C

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

This document is intended to be used in conjunction with AIA Documents A232™–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition; B132™–2019, Standard Form of Agreement Between Owner and Architect, Construction Manager as Adviser Edition; and C132™–2019, Standard Form of Agreement Between Owner and Construction Manager as Adviser. AIA Document A232™–2019 is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

Ithaca, New York 14850»
«Telephone Number: (607) 319-4053»
«»

The Owner and Contractor agree as follows.

TABLE OF ARTICLES

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than Modifications, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND DATES OF SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

[« X »] The date of this Agreement.

[« »] A date set forth in a notice to proceed issued by the Owner.

[« »] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

« »

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion of the Project or Portions Thereof

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the date of Substantial Completion of the Work of all of the Contractors for the Project will be:

(Insert the date of Substantial Completion of the Work of all Contractors for the Project.)

« »

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work of all of the Contractors for the Project are to be completed prior to Substantial Completion of the entire Work of all of the Contractors for the Project, the Contractors shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date

§ 3.4 When the Work of this Contract, or any Portion Thereof, is Substantially Complete

§ 3.4.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall substantially complete the entire Work of this Contract:
(Check one of the following boxes and complete the necessary information.)

[« »] Not later than « » (« ») calendar days from the date of commencement of the Work.

[« X »] By the following date: « See Spec Section 00 3113 Milestone Construction Schedule »

§ 3.4.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work of this Contract are to be substantially complete prior to when the entire Work of this Contract shall be substantially complete, the Contractor shall substantially complete such portions by the following dates:

Portion of Work	Date to be substantially complete

§ 3.4.3 If the Contractor fails to substantially complete the Work of this Contract, or portions thereof, as provided in this Section 3.4, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be one of the following:
(Check the appropriate box.)

[« X »] Stipulated Sum, in accordance with Section 4.2 below

[« »] Cost of the Work plus the Contractor's Fee, in accordance with Section 4.3 below

[« »] Cost of the Work plus the Contractor's Fee with a Guaranteed Maximum Price, in accordance with Section 4.4 below

(Based on the selection above, complete Section 4.2, 4.3 or 4.4 below.)

§ 4.2 Stipulated Sum

§ 4.2.1 The Contract Sum shall be « » ($ « »), subject to additions and deductions as provided in the Contract Documents.

§ 4.2.2 Alternates

§ 4.2.2.1 Alternates, if any, included in the Contract Sum:

Item	Price

§ 4.2.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance

§ 4.2.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item	Price

§ 4.2.4 Unit prices, if any:
(Identify the item and state the unit price, and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)

§ 4.3 Cost of the Work Plus Contractor's Fee without a Guaranteed Maximum Price

§ 4.3.1 The Cost of the Work is as defined in Exhibit B, Determination of the Cost of the Work.

§ 4.3.2 The Contractor's Fee:
(State a lump sum, percentage of Cost of the Work or other provision for determining the Contractor's Fee.)

« »

§ 4.3.3 The method of adjustment of the Contractor's Fee for changes in the Work:

« »

§ 4.3.4 Limitations, if any, on a Subcontractor's overhead and profit for increases in the cost of its portion of the Work:

« »

§ 4.3.5 Rental rates for Contractor-owned equipment shall not exceed « » percent (« » %) of the standard rental rate paid at the place of the Project.

§ 4.3.6 Unit prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)

§ 4.3.7 The Contractor shall prepare and submit to the Construction Manager, within 14 days of executing this Agreement, a written Control Estimate for the Owner's review and approval. The Control Estimate shall include the items in Section B.1 of Exhibit B, Determination of the Cost of the Work.

§ 4.4 Cost of the Work Plus Contractor's Fee with a Guaranteed Maximum Price

§ 4.4.1 The Cost of the Work is as defined in Exhibit B, Determination of the Cost of the Work.

§ 4.4.2 The Contractor's Fee:
(State a lump sum, percentage of Cost of the Work or other provision for determining the Contractor's Fee.)

« »

§ 4.4.3 The method of adjustment of the Contractor's Fee for changes in the Work:

« »

§ 4.4.4 Limitations, if any, on a Subcontractor's overhead and profit for increases in the cost of its portion of the Work:

« »

§ 4.4.5 Rental rates for Contractor-owned equipment shall not exceed « » percent (« » %) of the standard rental rate paid at the place of the Project.

§ 4.4.6 Unit Prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)

§ 4.4.7 Guaranteed Maximum Price

§ 4.4.7.1 The Contract Sum is guaranteed by the Contractor not to exceed « » ($ « »), subject to additions and deductions by Change Order as provided in the Contract Documents. This maximum sum is referred to in the Contract Documents as the Guaranteed Maximum Price. Costs which would cause the Guaranteed Maximum Price to be exceeded shall be paid by the Contractor without reimbursement by the Owner.

§ 4.4.7.2 Alternates

§ 4.4.7.2.1 Alternates, if any, included in the Guaranteed Maximum Price:

Item	Price

§ 4.4.7.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance

§ 4.4.7.3 Allowances, if any, included in the Guaranteed Maximum Price:
(Identify each allowance.)

Item	Price

§ 4.4.7.4 Assumptions, if any, upon which the Guaranteed Maximum Price is based:
(Identify each assumption.)

« »

§ 4.4.8 To the extent that the Contract Documents are anticipated to require further development, the Guaranteed Maximum Price includes the costs attributable to such further development consistent with the Contract Documents and reasonably inferable therefrom. Such further development does not include changes in scope, systems, kinds and quality of materials, finishes, or equipment, all of which, if required, shall be incorporated by Change Order.

§ 4.4.9 The Owner shall authorize preparation of revisions to the Contract Documents that incorporate the agreed-upon assumptions contained in Section 4.4.7.4. The Owner shall promptly furnish such revised Contract Documents to the Contractor. The Contractor shall notify the Owner and Architect of any inconsistencies between the agreed-upon assumptions contained in Section 4.4.7.4 and the revised Contract Documents.

§ 4.5 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any, to be assessed in accordance with Section 3.4.)

« Per the contract documents. »

§ 4.6 Other:
(Insert provisions for bonus, cost savings or other incentives, if any, that might result in a change to the Contract Sum.)

« N/A »

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Construction Manager by the Contractor, and Certificates for Payment issued by the Construction Manager and Architect, the Owner shall make progress payments on account of the Contract Sum, to the Contractor, as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

« »

§ 5.1.3 Provided that an Application for Payment is received by the Construction Manager not later than the « 20th » day of a month, the Owner shall make payment of the amount certified to the Contractor not later than « thirty (30) » days after receiving the Application for Payment. If an Application for Payment is received by the Construction Manager after the application date fixed above, payment of the amount certified shall be made by the Owner not later than « thirty » (« 30 ») days after the Construction Manager receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Progress Payments Where the Contract Sum is Based on a Stipulated Sum

§ 5.1.4.1 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Construction Manager and Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.4.2 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.4.3 In accordance with AIA Document A232™–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.4.3.1 The amount of each progress payment shall first include:

- **.1** That portion of the Contract Sum properly allocable to completed Work;
- **.2** That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- **.3** That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.4.3.2 The amount of each progress payment shall then be reduced by:

- **.1** The aggregate of any amounts previously paid by the Owner;
- **.2** The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A232–2019;
- **.3** Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- **.4** For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A232–2019; and
- **.5** Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to when the Work of this Contract is substantially complete, the Owner may withhold the following amount, as retainage, from the payment otherwise due:
(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

« Five Percent (5%) »

§ 5.1.7.1.1 The following items are not subject to retainage:
(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

« »

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:
(If the retainage established in Section 5.1.7.1 is to be modified prior to when the entire Work of this Contract is substantially complete, including modifications for completion of portions of the Work as provided in Section 3.4.2, insert provisions for such modifications.)

« »

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, when the Work of this Contract is substantially complete, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted when the Work of this Contract is substantially complete shall not include retainage as follows:
(Insert any other conditions for release of retainage when the Work of this Contract is substantially complete, or upon Substantial Completion of the Work of all Contractors on the Project or portions thereof.)

« »

§ 5.2 Final Payment

§ 5.2.1 Final Payment Where the Contract Sum is Based on a Stipulated Sum

§ 5.2.1.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A232–2019, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment or Project Certificate for Payment has been issued by the Architect.

§ 5.2.1.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the final Certificate for Payment or Project Certificate for Payment, or as follows:

« »

§ 5.2.2 Final Payment Where the Contract Sum is Based on the Cost of the Work with or without a Guaranteed Maximum Price

§ 5.2.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A232–2019, and to satisfy other requirements, if any, which extend beyond final payment;

.2 the Contractor has submitted a final accounting for the Cost of the Work, pursuant to Exhibit B, Determination of the Cost of the Work and a final Application for Payment; and

.3 a final Certificate for Payment or Project Certificate for Payment has been issued by the Architect in accordance with Exhibit B, Determination of the Cost of the Work.

§ 5.2.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the final Certificate for Payment or Project Certificate for Payment, or as follows:

« »

§ 5.3 Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

« » % « »

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as Initial Decision Maker pursuant to Article 15 of AIA Document A232–2019, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

« »
« »
« »
« »

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A232–2019, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

[« »] Arbitration pursuant to Article 15 of AIA Document A232–2019.

[« X »] Litigation in a court of competent jurisdiction.

[« »] Other: *(Specify)*

« »

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 Where the Contract Sum is a Stipulated Sum

§ 7.1.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A232–2019.

§ 7.1.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A232–2019, then the Owner shall pay the Contractor a termination fee as follows:
(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

« »

§ 7.1.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A232–2019.

§ 7.2 Where the Contract Sum is Based on the Cost of the Work with or without a Guaranteed Maximum Price

§ 7.2.1 Termination

§ 7.2.1.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A232–2019.

§ 7.2.1.2 Termination by the Owner for Cause

§ 7.2.1.2.1 If the Owner terminates the Contract for cause as provided in Article 14 of AIA Document A232–2019, the Owner shall then only pay the Contractor an amount as follows:

.1 Take the Cost of the Work incurred by the Contractor to the date of termination;

.2 Add the Contractor's Fee, computed upon the Cost of the Work to the date of termination at the rate stated in Section 4.3.2 or 4.4.2, as applicable, or, if the Contractor's Fee is stated as a fixed sum in that Section, an amount that bears the same ratio to that fixed-sum Fee as the Cost of the Work at the time of termination bears to a reasonable estimate of the probable Cost of the Work upon its completion;

.3 Subtract the aggregate of previous payments made by the Owner; and

.4 Subtract the costs and damages incurred, or to be incurred, by the Owner under Article 14 of AIA Document A232–2019.

§ 7.2.1.2.2 When the Contract Sum is based on the Cost of the Work with a Guaranteed Maximum Price, if the Owner terminates the Contract for cause as provided in Article 14 of AIA Document A232-2019, the amount, if any, to be paid to the Contractor under Article 14 of AIA Document A232-2019 shall not cause the Guaranteed Maximum Price to be exceeded, nor shall it exceed the amount calculated in Section 7.2.1.2.1.

§ 7.2.1.2.3 The Owner shall also pay the Contractor fair compensation, either by purchase or rental at the election of the Owner, for any equipment owned by the Contractor that the Owner elects to retain and that is not otherwise included in the Cost of the Work under Section 7.2.1.2.1.1. To the extent that the Owner elects to take legal assignment of subcontracts and purchase orders (including rental agreements), the Contractor shall, as a condition of receiving the payments referred to in this Article 7, execute and deliver all such papers and take all such steps, including the legal assignment of such subcontracts and other contractual rights of the Contractor, as the Owner may require for the purpose of fully vesting in the Owner the rights and benefits of the Contractor under such subcontracts or purchase orders. All Subcontracts, purchase orders and rental agreements entered into by the Contractor will contain provisions allowing for assignment to the Owner as described above.

§ 7.2.1.3 Termination by the Owner for Convenience

If the Owner terminates the Contract for convenience in accordance with Article 14 of AIA Document A232–2019, then the Owner shall pay the Contractor a termination fee as follows:

(Insert the amount of or method for determining the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

« »

§ 7.3 Suspension

The Work may be suspended by the Owner as provided in Article 14 of AIA Document A232–2019; in such case, the Contract Sum and Contract Time shall be increased as provided in Article 14 of AIA Document A232–2019, except that the term "profit" shall be understood to mean the Contractor's Fee as described in Section 4.3.2 or 4.4.2, as applicable, of this Agreement.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A232–2019 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:

(Name, address, email address, and other information)

«Christopher Carballo»
«21 Morgan Road
Fort Montgomery, New York 10922»
«Telephone Number: (845) 446-9575»
«»
«»
«Email Address: christopher.carballo@hffmcsd.org»

§ 8.3 The Contractor's representative:

(Name, address, email address, and other information)

« »
« »
« »
« »
« »
« »

§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A232™–2019, General Conditions of the Contract for Construction, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A232™–2019, General Conditions of the Contract for Construction, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A232–2019, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:
(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

« »

§ 8.7 Relationship of the Parties

Where the Contract is based on the Cost of the Work plus the Contractor's Fee, with or without a Guaranteed Maximum Price, the Contractor accepts the relationship of trust and confidence established by this Agreement and covenants with the Owner to cooperate with the Architect and exercise the Contractor's skill and judgment in furthering the interests of the Owner; to furnish efficient business administration and supervision; to furnish at all times an adequate supply of workers and materials; and to perform the Work in an expeditious and economical manner consistent with the Owner's interests. The Owner agrees to furnish and approve, in a timely manner, information required by the Contractor and to make payments to the Contractor in accordance with the requirements of the Contract Documents.

§ 8.8 Other provisions:

« »

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

.1 AIA Document A132™–2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition

.2 AIA Document A232™–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition

.3 Drawings: See attached Exhibit A – Index of Drawings and Table of Contents

.4 Specifications: See attached Exhibit A – Index of Drawings and Table of Contents

.5 Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.6 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A232–2019 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

« »

This Agreement is entered into as of the day and year first written above.

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
«Anne Lawless»«, BOE President»	« »« »
(Printed name and title)	*(Printed name and title)*

AIA® Document A232® – 2019

General Conditions of the Contract for Construction, *Construction Manager as Adviser Edition*

for the following PROJECT:
(Name, and location or address)

Highland Falls-Fort Montgomery Central School District Additions and Alterations
Highland Falls-Fort Montgomery Central School District
21 Morgan Road
Fort Montgomery, New York 10922

THE CONSTRUCTION MANAGER:
(Name, legal status, and address)

Triton Construction
1279 Route 300, 1st Floor
Newburgh, New York 12250

THE OWNER:
(Name, legal status, and address)

Highland Falls-Fort Montgomery Central School District
21 Morgan Road
Fort Montgomery, New York 10922

THE ARCHITECT:
(Name, legal status, and address)

Bernier, Carr & Associates Engineers, Architects, and Land Surveyors, P.C.
798 Cascadilla Street
Suite C
Ithaca, New York 14850

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

This document is intended to be used in conjunction with AIA Documents A132™–2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition; B132™–2019, Standard Form of Agreement Between Owner and Architect, Construction Manager as Adviser Edition; and C132™–2019, Standard Form of Agreement Between Owner and Construction Manager as Adviser.

TABLE OF ARTICLES

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents. The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract. The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and the Construction Manager or the Construction Manager's consultants, (3) between the Owner and the Architect or the Architect's consultants, (4) between the Contractor and the Construction Manager or the Construction Manager's consultants, (5) between the Owner and a Subcontractor or Sub-subcontractor (6) between the Construction Manager and the Architect, or (7) between any persons or entities other than the Owner and Contractor. The Construction Manager and Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of their duties.

§ 1.1.3 The Work. The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project. The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by other Contractors, and by the Owner's own forces and Separate Contractors.

§ 1.1.5 Contractors. Contractors are persons or entities, other than the Contractor or Separate Contractors, who perform Work under contracts with the Owner that are administered by the Architect and Construction Manager.

§ 1.1.6 Separate Contractors. Separate Contractors are persons or entities who perform construction under separate contracts with the Owner not administered by the Architect and Construction Manager.

§ 1.1.7 The Drawings. The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.8 The Specifications. The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.9 Instruments of Service. Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.10 Initial Decision Maker. The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building

Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Construction Manager and the Architect do not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work, and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements,

assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities. Unless otherwise provided under the Contract Documents, the Owner, assisted by the Construction Manager, shall secure and pay for the building permit.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 The Owner shall retain a construction manager adviser lawfully practicing construction management in the jurisdiction where the Project is located. That person or entity is identified as the Construction Manager in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.4 If the employment of the Construction Manager or Architect terminates, the Owner shall employ a successor construction manager or architect to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Construction Manager or Architect, respectively.

§ 2.3.5 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.6 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.7 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.3.8 The Owner shall forward all communications to the Contractor through the Construction Manager. Other communication shall be made as set forth in Section 4.2.6.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to review by the Construction Manager and prior approval of the Architect, and the Construction Manager or Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Construction Manager's and Architect's and their respective consultants' additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction

where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Construction Manager or Architect in their administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.5, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Construction Manager and Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information submitted to the Construction Manager in such form as the Construction Manager and Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Construction Manager and Architect any nonconformity discovered by or made known to the Contractor as a request for information submitted to Construction Manager in such form as the Construction Manager and Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner, the Construction Manager, and the Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. The Construction Manager shall review the proposed alternative for sequencing, constructability, and coordination impacts on the other Contractors. Unless the Architect or the Construction Manager objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of the Project already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect, in consultation with the Construction Manager, and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner, Construction Manager, and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Construction Manager or Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work or portions thereof provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 Permits, Fees, Notices, and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Owner, assisted by the Construction Manager, shall secure and pay for the building permit. The Contractor shall secure and pay for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or

(2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner, Construction Manager, and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect and Construction Manager will promptly investigate such conditions and, if the Architect, in consultation with the Construction Manager, determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect, in consultation with the Construction Manager, determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner, Construction Manager, and Contractor, stating the reasons. If the Owner or Contractor disputes the Architect's determination or recommendation, either party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner, Construction Manager, and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents:

- **.1** allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- **.2** Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- **.3** whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect, through the Construction Manager, of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Construction Manager may notify the Contractor, stating whether the Owner, the Construction Manager, or the Architect (1) has reasonable objection to the proposed superintendent or (2) require additional time for review. Failure of the Construction Manager to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner, Construction Manager, or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information, and the Construction Manager's use in developing the Project schedule, a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project. The Contractor shall cooperate with the Construction Manager in scheduling and performing the Contractor's Work to avoid conflict with, and as to cause no delay in, the work or activities of other Contractors, or the construction or operations of the Owner's own forces or Separate Contractors.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Construction Manager's and Architect's approval. The Architect and Construction Manager's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Construction Manager and Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall participate with other Contractors, the Construction Manager, and the Owner in reviewing and coordinating all schedules for incorporation into the Project schedule that is prepared by the Construction Manager. The Contractor shall make revisions to the construction schedule and submittal schedule as deemed necessary by the Construction Manager to conform to the Project schedule.

§ 3.10.4 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner, Construction Manager, and Architect, and incorporated into the approved Project schedule.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Construction Manager, Architect, and Owner, and delivered to the Construction Manager for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data, and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect and Construction Manager is subject to the limitations of Sections 4.2.10 through 4.2.12. Informational submittals upon which the Construction Manager and Architect are not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Construction Manager or Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Construction Manager, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract

Documents, in accordance with the Project submittal schedule approved by the Construction Manager and Architect or, in the absence of an approved Project submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of other Contractors, Separate Contractors, or the Owner's own forces. The Contractor shall cooperate with the Construction Manager in the coordination of the Contractor's Shop Drawings, Product Data, Samples, and similar submittals with related documents submitted by other Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner, Construction Manager, and Architect, that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been reviewed and approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Construction Manager and Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Construction Manager and Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner, the Architect, and the Construction Manager shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Construction Manager shall review submittals for sequencing, constructability, and coordination impacts on other Contractors.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Construction Manager and Architect at the time and in the form specified by the Architect.

§ 3.13 Use of Site

§ 3.13.1 The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.13.2 The Contractor shall coordinate the Contractor's operations with, and secure the approval of, the Construction Manager before using any portion of the site.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner, Separate Contractors, or of other Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner, Separate Contractors, or by other Contractors except with written consent of the Construction Manager, Owner, and such other Contractors or Separate Contractors. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Separate Contractors, other Contractors, or the Owner, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner, or Construction Manager with the Owner's approval, may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

The Contractor shall provide the Owner, Construction Manager, and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner, Construction Manager, and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner, Architect, or Construction Manager. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect through the Construction Manager.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Construction Manager, Architect, Construction Manager's and Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 4 ARCHITECT AND CONSTRUCTION MANAGER

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 The Construction Manager is the person or entity retained by the Owner pursuant to Section 2.3.3 and identified as such in the Agreement.

§ 4.1.3 Duties, responsibilities, and limitations of authority of the Construction Manager and Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Construction Manager, Architect, and Contractor. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Construction Manager and Architect will provide administration of the Contract as described in the Contract Documents and will be the Owner's representatives during construction until the date the Architect issues the final Certificate for Payment. The Construction Manager and Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. On the basis of the site visits, the Architect will keep the Owner and the Construction Manager reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner and Construction Manager known deviations from the Contract Documents and defects and deficiencies observed in the Work.

§ 4.2.3 The Construction Manager shall provide one or more representatives who shall be in attendance at the Project site whenever the Work is being performed. The Construction Manager will determine in general if the Work observed is being performed in accordance with the Contract Documents, will keep the Owner and Architect reasonably informed of the progress of the Work, and will promptly report to the Owner and Architect known deviations from the Contract Documents and the most recent Project schedule, and defects and deficiencies observed in the Work.

§ 4.2.4 The Construction Manager will schedule and coordinate the activities of the Contractor and other Contractors in accordance with the latest approved Project schedule.

§ 4.2.5 The Construction Manager, except to the extent required by Section 4.2.4, and Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, and neither will be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. Neither the Construction Manager nor the Architect will have control over or charge of, or be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or of any other persons or entities performing portions of the Work.

§ 4.2.6 Communications. The Owner shall communicate with the Contractor and the Construction Manager's consultants through the Construction Manager about matters arising out of or relating to the Contract Documents. The Owner and Construction Manager shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Construction Manager otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with other Contractors shall be

through the Construction Manager. Communications by and with the Owner's own forces and Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.7 The Construction Manager and Architect will review and certify all Applications for Payment by the Contractor, in accordance with the provisions of Article 9.

§ 4.2.8 The Architect and Construction Manager have authority to reject Work that does not conform to the Contract Documents, and will notify each other about the rejection. Whenever the Construction Manager considers it necessary or advisable, the Construction Manager will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, upon written authorization of the Owner, whether or not the Work is fabricated, installed or completed. The foregoing authority of the Construction Manager will be subject to the provisions of Sections 4.2.18 through 4.2.20 inclusive, with respect to interpretations and decisions of the Architect. However, neither the Architect's nor the Construction Manager's authority to act under this Section 4.2.8 nor a decision made by either of them in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect or the Construction Manager to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons performing any of the Work.

§ 4.2.9 Utilizing the submittal schedule provided by the Contractor, the Construction Manager shall prepare, and revise as necessary, a Project submittal schedule incorporating information from other Contractors, the Owner, Owner's consultants, Owner's Separate Contractors and vendors, governmental agencies, and participants in the Project under the management of the Construction Manager. The Project submittal schedule and any revisions shall be submitted to the Architect for approval.

§ 4.2.10 The Construction Manager will receive and promptly review for conformance with the submittal requirements of the Contract Documents, all submittals from the Contractor such as Shop Drawings, Product Data, and Samples. Where there are other Contractors, the Construction Manager will also check and coordinate the information contained within each submittal received from the Contractor and other Contractors, and transmit to the Architect those recommended for approval. By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Construction Manager represents to the Owner and Architect that the Construction Manager has reviewed and recommended them for approval. The Construction Manager's actions will be taken in accordance with the Project submittal schedule approved by the Architect or, in the absence of an approved Project submittal schedule, with reasonable promptness while allowing sufficient time to permit adequate review by the Architect.

§ 4.2.11 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Upon the Architect's completed review, the Architect shall transmit its submittal review to the Construction Manager.

§ 4.2.12 Review of the Contractor's submittals by the Construction Manager and Architect is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Construction Manager and Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Construction Manager and Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.13 The Construction Manager will prepare Change Orders and Construction Change Directives.

§ 4.2.14 The Construction Manager and the Architect will take appropriate action on Change Orders or Construction Change Directives in accordance with Article 7, and the Architect will have authority to order minor changes in the Work as provided in Section 7.4. The Architect, in consultation with the Construction Manager, will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.15 Utilizing the documents provided by the Contractor, the Construction Manager will maintain at the site for the Owner one copy of all Contract Documents, approved Shop Drawings, Product Data, Samples, and similar required submittals, in good order and marked currently to record all changes and selections made during construction. These will be available to the Architect and the Contractor, and will be delivered to the Owner upon completion of the Project.

§ 4.2.16 The Construction Manager will assist the Architect in conducting inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion in conjunction with the Architect pursuant to Section 9.8; and receive and forward to the Owner written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10. The Construction Manager will forward to the Architect a final Application and Certificate for Payment or final Project Application and Project Certificate for Payment upon the Contractor's compliance with the requirements of the Contract Documents.

§ 4.2.17 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Construction Manager of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.18 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of the Construction Manager, Owner, or Contractor through the Construction Manager. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.19 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions so rendered in good faith.

§ 4.2.20 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.21 The Construction Manager will receive and review requests for information from the Contractor, and forward each request for information to the Architect, with the Construction Manager's recommendation. The Architect will review and respond in writing, through the Construction Manager, to requests for information about the Contract Documents. The Construction Manager's recommendation and the Architect's response to each request will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include other Contractors or Separate Contractors or the subcontractors of other Contractors or Separate Contractors.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Construction Manager, for review by the Owner, Construction Manager and Architect, of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Construction Manager may notify the Contractor whether the Owner, the Construction Manager or the Architect (1) has reasonable objection to any such proposed person or entity or, (2) requires additional time for review. Failure of the Construction Manager to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner, Construction Manager or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner, Construction Manager or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner, Construction Manager or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner, Construction Manager or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, that the Contractor, by these Contract Documents, assumes toward the Owner, Construction Manager and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner, Construction Manager and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- **.1** assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
- **.2** assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor Contractor or other entity. If the Owner assigns the subcontract to a successor Contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor Contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction with Own Forces and to Award Other Contracts

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When the Owner performs construction or operations with the Owner's own forces or Separate Contractors, the Owner shall provide for coordination of such forces and Separate Contractors with the Work of the Contractor, who shall cooperate with them.

§ 6.1.3 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner's own forces, Separate Contractors, Construction Manager and other Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner's own forces, Separate Contractors or other Contractors, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Construction Manager and Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor or other Contractors that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Construction Manager and the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's or other Contractors' completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractors or other Contractors that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs, including costs that are payable to a Separate Contractors or to other Contractors, because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of delays, improperly timed activities, damage to the Work or defective construction by the Owner's own forces, Separate Contractors, or other Contractors.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction, or to property of the Owner, Separate Contractors, or other Contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner, Separate Contractors, and other Contractors shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, other Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Construction Manager, with notice to the Architect, will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Construction Manager, Architect and Contractor. A Construction Change Directive requires agreement by the Owner, Construction Manager and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

A Change Order is a written instrument prepared by the Construction Manager and signed by the Owner, Construction Manager, Architect, and Contractor, stating their agreement upon all of the following:

.1 The change in the Work;
.2 The amount of the adjustment, if any, in the Contract Sum; and
.3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Construction Manager and signed by the Owner, Construction Manager and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
.2 Unit prices stated in the Contract Documents or subsequently agreed upon;
.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
.4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Construction Manager shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Construction Manager may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

.1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Construction Manager and Architect;
.2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
.5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Construction Manager of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Construction Manager and Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Construction Manager and Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Construction Manager and Architect determine to be reasonably justified. The interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Construction Manager and Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Construction Manager shall prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Construction Manager and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Construction Manager that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner, Architect, Construction Manager, or an employee of any of them, or of the Owner's own forces, Separate Contractors, or other Contractors; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section

15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts and the Architect, based on the recommendation of the Construction Manager, determines justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Construction Manager, before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Construction Manager and the Architect. This schedule, unless objected to by the Construction Manager or Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. The Construction Manager shall forward to the Architect the Contractor's schedule of values. Any changes to the schedule of values shall be submitted to the Construction Manager and supported by such data to substantiate its accuracy as the Construction Manager and the Architect may require, and unless objected to by the Construction Manager or the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least fifteen days before the date established for each progress payment, the Contractor shall submit to the Construction Manager an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner, Construction Manager or Architect require, such as copies of requisitions, and releases of waivers of lien from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Construction Manager and Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all

Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 Where there is only one Contractor, the Construction Manager will, within seven days after the Construction Manager's receipt of the Contractor's Application for Payment, review the Application, certify the amount the Construction Manager determines is due the Contractor, and forward the Contractor's Application and Certificate for Payment to the Architect. Within seven days after the Architect receives the Contractor's Application for Payment from the Construction Manager, the Architect will either (1) issue to the Owner a Certificate for Payment, in the full amount of the Application for Payment, with a copy to the Construction Manager; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Construction Manager and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Construction Manager and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1. The Construction Manager will promptly forward to the Contractor the Architect's notice of withholding certification.

§ 9.4.2 Where there is more than one Contractor performing portions of the Project, the Construction Manager will, within seven days after the Construction Manager receives all of the Contractors' Applications for Payment: (1) review the Applications and certify the amount the Construction Manager determines is due each of the Contractors; (2) prepare a Summary of Contractors' Applications for Payment by combining information from each Contractor's application with information from similar applications for progress payments from the other Contractors; (3) prepare a Project Application and Certificate for Payment; (4) certify the amount the Construction Manager determines is due all Contractors; and (5) forward the Summary of Contractors' Applications for Payment and Project Application and Certificate for Payment to the Architect.

§ 9.4.2.1 Within seven days after the Architect receives the Project Application and Project Certificate for Payment and the Summary of Contractors' Applications for Payment from the Construction Manager, the Architect will either (1) issue to the Owner a Project Certificate for Payment, with a copy to the Construction Manager; or (2) issue to the Owner a Project Certificate for Payment for such amount as the Architect determines is properly due, and notify the Construction Manager and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Project Application for Payment, and notify the Construction Manager and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1. The Construction Manager will promptly forward the Architect's notice of withholding certification to the Contractors.

§ 9.4.3 The Construction Manager's certification of an Application for Payment or, in the case of more than one Contractor, a Project Application and Certificate for Payment, shall be based upon the Construction Manager's evaluation of the Work and the data in the Application or Applications for Payment. The Construction Manager's certification will constitute a representation that, to the best of the Construction Manager's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is, or Contractors are, entitled to payment in the amount certified.

§ 9.4.4 The Architect's issuance of a Certificate for Payment or, in the case of more than one Contractor, Project Application and Certificate for Payment, shall be based upon the Architect's evaluation of the Work, the recommendation of the Construction Manager, and data in the Application for Payment or Project Application for Payment. The Architect's certification will constitute a representation that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is, or Contractors are, entitled to payment in the amount certified.

§ 9.4.5 The representations made pursuant to Sections 9.4.3 and 9.4.4 are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Construction Manager or Architect.

§ 9.4.6 The issuance of a Certificate for Payment or a Project Certificate for Payment will not be a representation that the Construction Manager or Architect has (1) made exhaustive or continuous on-site inspections to check the quality

or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Construction Manager or Architect may withhold a Certificate for Payment or Project Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Construction Manager's or Architect's opinion the representations to the Owner required by Section 9.4.3 and 9.4.4 cannot be made. If the Construction Manager or Architect is unable to certify payment in the amount of the Application, the Construction Manager will notify the Contractor and Owner as provided in Section 9.4.1 and 9.4.2. If the Contractor, Construction Manager and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment or a Project Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Construction Manager or Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment or Project Certificate for Payment previously issued, to such extent as may be necessary in the Construction Manager's or Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from the acts and omissions described in Section 3.3.2 because of

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- **.4** reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- **.5** damage to the Owner or a Separate Contractor or other Contractor;
- **.6** reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- **.7** repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect or Construction Manager withholds certification for payment under Section 9.5.1, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Construction Manager, and both will reflect such payment on the next Certificate for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment or Project Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Construction Manager and Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Construction Manager will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Owner, Construction Manager and Architect on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor

fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner, Construction Manager nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

If the Construction Manager and Architect do not issue a Certificate for Payment or a Project Certificate for Payment, through no fault of the Contractor, within fourteen days after the Construction Manager's receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Construction Manager and Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner, Construction Manager and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall notify the Construction Manager, and the Contractor and Construction Manager shall jointly prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the list, the Architect, assisted by the Construction Manager, will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect, assisted by the Construction Manager, to determine Substantial Completion.

§ 9.8.4 When the Architect, assisted by the Construction Manager, determines that the Work of all of the Contractors, or designated portion thereof, is substantially complete, the Construction Manager will prepare, and the Construction

Manager and Architect shall execute, a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor and Construction Manager shall jointly prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect after consultation with the Construction Manager.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Construction Manager, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon completion of the Work, the Contractor shall forward to the Construction Manager a notice that the Work is ready for final inspection and acceptance, and shall also forward to the Construction Manager a final Contractor's Application for Payment. Upon receipt, the Construction Manager shall perform an inspection to confirm the completion of Work of the Contractor. The Construction Manager shall make recommendations to the Architect when the Work of all of the Contractors is ready for final inspection, and shall then forward the Contractors' notices and Application for Payment or Project Application for Payment, to the Architect, who will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Construction Manager and Architect will promptly issue a final Certificate for Payment or Project Certificate for Payment stating that to the best of their knowledge, information and belief, and on the basis of their on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Construction Manager's and Architect's final Certificate for Payment or Project Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect through the Construction Manager (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6), if required by the Owner, other data

establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Construction Manager and Architect so confirm, the Owner shall, upon application by the Contractor and certification by the Construction Manager and Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect through the Construction Manager prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- **.1** liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents;
- **.3** terms of special warranties required by the Contract Documents; or
- **.4** audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall submit the Contractor's safety program to the Construction Manager for review and coordination with the safety programs of other Contractors. The Construction Manager's responsibilities for review and coordination of safety programs shall not extend to direct control over or charge of the acts or omissions of the Contractors, Subcontractors, agents or employees of the Contractors or Subcontractors, or any other persons performing portions of the Work and not directly employed by the Construction Manager.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- **.1** employees on the Work and other persons who may be affected thereby;
- **.2** the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor;
- **.3** other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction; and
- **.4** construction or operations by the Owner, Separate Contractors, or other Contractors.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2, 10.2.1.3 and 10.2.1.4 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2, 10.2.1.3 and 10.2.1.4. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner, Construction Manager or Architect or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner, Construction Manager and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner, Construction Manager and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor, Construction Manager and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor, the Construction Manager and the Architect will promptly reply to the Owner in writing stating whether or not any of them has reasonable objection to the persons or entities proposed by the Owner. If the Contractor, Construction Manager or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor, the Construction Manager and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Construction Manager, Architect, their consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of

tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Construction Manager and Construction Manager's consultants, and the Architect and Architect's consultants, shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice directly to the Owner, and separately to the Construction Manager, of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the

Contract Documents, the Owner shall inform both the Contractor and the Construction Manager, separately and in writing, prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice directly to the Contractor, and separately to the Construction Manager, of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Construction Manager and Construction Manager's consultants; (3) the Architect and Architect's consultants; (4) other Contractors and any of their subcontractors, sub-subcontractors, agents, and employees; and (5) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Construction Manager, Construction Manager's consultants, Architect, Architect's consultants, other Contractors, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this Section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor, Architect, and Construction Manager for loss of use of the Owner's property, due to fire or other hazards however caused.

§ 11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to

requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Construction Manager, Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Construction Manager, Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Construction Manager's or Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by either, be uncovered for their examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Construction Manager or Architect has not specifically requested to examine prior to its being covered, the Construction Manager or Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Construction Manager or Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion, and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Construction Manager's and Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof, or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner, Construction Manager or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner, Separate Contractors, or other Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Construction Manager, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Construction Manager and Architect timely notice of when and where tests and inspections are to be made so that the Construction Manager and Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become

requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Construction Manager, Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Construction Manager and Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Construction Manager and Architect of when and where tests and inspections are to be made so that the Construction Manager and Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Construction Manager's and Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Construction Manager for transmittal to the Architect.

§ 13.4.5 If the Construction Manager or Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Construction Manager or Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- **.1** Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- **.2** An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- **.3** Because the Construction Manager has not certified or the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- **.4** The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner, Construction Manager and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees, or any other persons performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner, Construction Manager and Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- **.1** repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- **.2** fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- **.3** repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- **.4** otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, after consultation with the Construction Manager, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- **.1** Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- **.2** Accept assignment of subcontracts pursuant to Section 5.4; and
- **.3** Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Construction Manager's and Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall, upon application, be certified by the Initial Decision Maker after consultation with the Construction Manager, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and the Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent:

- **.1** that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- **.2** that an equitable adjustment is made or denied under another provision of this Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- **.1** cease operations as directed by the Owner in the notice;
- **.2** take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition. A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Construction Manager and Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost. If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

§ 15.1.7 Waiver of Claims for Consequential Damages. The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties, the Construction Manager, and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation

within 30 days of receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

Additions and Deletions Report for

AIA® Document A232® – 2019

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 13:26:19 ET on 09/21/2023.

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Highland Falls-Fort Montgomery Central School District Additions and Alterations
Highland Falls-Fort Montgomery Central School District
21 Morgan Road
Fort Montgomery, New York 10922

...

Triton Construction
1279 Route 300, 1st Floor
Newburgh, New York 12250

...

Highland Falls-Fort Montgomery Central School District
21 Morgan Road
Fort Montgomery, New York 10922

...

(Name, legal status, and address)

Bernier, Carr & Associates Engineers, Architects, and Land Surveyors, P.C.
798 Cascadilla Street
Suite C
Ithaca, New York 14850

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, Samantha Smith, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 13:26:19 ET on 09/21/2023 under Order No. 2114414540 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A232™ – 2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, other than those additions and deletions shown in the associated Additions and Deletions Report.

_____

(Signed)

_____

(Title)

_____

(Dated)

Statement of Special Inspections

Project: *Alterations & Additions to Fort Montgomery Elementary School*

Location: *895 Route 9W, Fort Montgomery, New York 10922*

Owner: *Fort Montgomery Central School District*

Design Professional in Responsible Charge: *Elwyn & Palmer Consulting Engineers PLLC*

This *Statement of Special Inspections* is submitted as a condition for permit issuance in accordance with the Special Inspection and Structural Testing requirements of the Building Code. It includes a schedule of Special Inspection services applicable to this project as well as the name of the Special Inspection Coordinator and the identity of other approved agencies to be retained for conducting these inspections and tests. This *Statement of Special Inspections* encompass the following disciplines:

☒ Structural ☐ Mechanical/Electrical/Plumbing
☐ Architectural ☐ Other: _____

The Special Inspection Coordinator shall keep records of all inspections and shall furnish inspection reports to the Building Official and the Registered Design Professional in Responsible Charge. Discovered discrepancies shall be brought to the immediate attention of the Contractor for correction. If such discrepancies are not corrected, the discrepancies shall be brought to the attention of the Building Official and the Registered Design Professional in Responsible Charge. The Special Inspection program does not relieve the Contractor of his or her responsibilities.

Interim reports shall be submitted to the Building Official and the Registered Design Professional in Responsible Charge.

A *Final Report of Special Inspections* documenting completion of all required Special Inspections, testing and correction of any discrepancies noted in the inspections shall be submitted prior to issuance of a Certificate of Use and Occupancy.

Job site safety and means and methods of construction are solely the responsibility of the Contractor.

Interim Report Frequency: *At project completion* or ☐ per attached schedule.

Prepared by:

Joseph E. Caza, PE
(type or print name)

Joseph E. Caza III

10/23/23
Signature Date

Design Professional Seal

Owner's Authorization:

Signature Date

Building Official's Acceptance:

Signature Date

Schedule of Inspection and Testing Agencies

This Statement of Special Inspections / Quality Assurance Plan includes the following building systems:

- ☐ Soils and Foundations
- √ Cast-in-Place Concrete
- √ Precast Concrete
- √ Masonry
- √ Structural Steel
- √ Cold-Formed Steel Framing
- ☐ Spray Fire Resistant Material
- ☐ Wood Construction
- ☐ Exterior Insulation and Finish System
- ☐ Mechanical & Electrical Systems
- ☐ Architectural Systems
- ☐ Special Cases

Special Inspection Agencies	Firm	Address, Telephone, e-mail
1. **Special Inspection Coordinator**	*TBD*	*213 E Seneca St* *Ithaca, NY 14850* *(607) 272-5060* *DLE@ElwynPalmer.com*
2. Inspector	*TBD*	
3. Inspector	*TBD*	
4. Testing Agency	*TBD*	
5. Testing Agency	*TBD*	
6. Other		

Note: The inspectors and testing agencies shall be engaged by the Owner or the Owner's Agent, and not by the Contractor or Subcontractor whose work is to be inspected or tested. Any conflict of interest must be disclosed to the Building Official, prior to commencing work.

Quality Assurance Plan

Quality Assurance for Seismic Resistance

Seismic Design Category	*A*
Quality Assurance Plan Required (Y/N)	*N*

Description of seismic force resisting system and designated seismic systems:
Refer to Contract Drawings

Quality Assurance for Wind Requirements

Basic Wind Speed (3 second gust)	*Vult = 120*
Wind Exposure Category	*B*
Quality Assurance Plan Required (Y/N)	*N*

Description of wind force resisting system and designated wind resisting components:
Refer to contract drawings.

Statement of Responsibility

Each contractor responsible for the construction or fabrication of a system or component designated above must submit a Statement of Responsibility.

	Elwyn & Palmer Consulting Engineers **950 Danby Rd, Suite 201-N** **Ithaca, NY 14850**	**STATEMENT OF SPECIAL INSPECTIONS AND TESTS** **As required by the Building Code of NYS (BCNYS)**

BCNYS §1704.3 requires the project Design Professional to complete the Statement of Special Inspections and Tests. Completion of the Statement of Special Inspections & Tests and submission to the Code Enforcement Officer with the Construction Permit Application as a condition for issuance of the Building Permit.

Project Title: **Alterations & Additions to Fort Montgomery Elementary School**

BCA Project #:2022-138 **Client Project No:**

Project Address: ***895 Route 9W, Fort Montgomery, New York 10922***

Building Information: __

Name of Person Completing this Statement	**Phone**	**Date**
Joseph E. Caza III	***(607) 272-5060***	**10/23/23**

Comments

INSPECTION AND TESTING (Continuous & Periodic is as Defined by the BCNYS)	**CONTINUOUS**	**PERIODIC**	**REFERENCE STANDARD**	**BCNYS REFERENCE**	**CHECK IF REQUIRED**	**IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY** (the default spec sections listed may need to be modified)
A. STEEL CONSTRUCTION (AISC 360-16)						
1. Minimum inspections prior to welding.		X	AISC 360 Table N5.4-1	1705.2.1	√	See inspection specific AISC details
2. Minimum inspections during welding.		X	AISC 360 Table N5.4-2	1705.2.1	√	See inspection specific AISC details
3. Minimum inspections after welding.		X	AISC 360 Table N5.4-3	1705.2.1	√	See inspection specific AISC details
4. Nondestructive Testing (NDT) of welded joints		X	AISC 360 N5.5 AWS D1.1	1705.2.1	√	See inspection specific AISC details
5. CJP Groove Weld NDT: **a.** For Risk Category II **b.** For Risk Category III and IV		 10% 100%	AISC 360 N5.5	1705.2.1	√	See inspection specific AISC details
6. Minimum inspections prior to high-strength bolting		X	AISC 360 Table N5.6-1	1705.2.1	√	See inspection specific AISC details
7. Minimum inspections during high-strength bolting.		X	AISC 360 Table N5.6-2	1705.2.1	√	See inspection specific AISC details
8. Minimum inspections after high-strength bolting. Document acceptance or rejection of bolted connections.		X	AISC 360 Table N5.6-3	1705.2.1	√	See inspection specific AISC details
9. Inspect fabricated or erected steel frame as appropriate to verify compliance with the construction and approved shop drawings. Inspect braces, stiffeners, member locations, and joint details.		X	AISC 360 N5.7	1705.2.1	√	See inspection specific AISC details
10. Inspect during placement of anchor rods and other embedment's supporting		X	AISC 360 N5.7	1705.2.1	√	See inspection specific AISC details

INSPECTION AND TESTING (Continuous & Periodic is as Defined by the BCNYS)	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY (the default spec sections listed may need to be modified)
structural steel for compliance with the construction and approved shop drawings.					√	
11. Inspect Composite Construction prior to concrete placement: **a.** Placement and installation of steel deck **b.** Placement and installation of steel headed stud anchors **c.** Document acceptance or rejection of steel elements	X		AISC 360 N6.1	1705.2.1	√	See inspection specific AISC details
B. COLD-FORMED STEEL DECK (SDI QA/QC-17)						
1. Inspection or Execution Tasks Prior to Deck Placement		X	SDI QA/QC Table 1.1 A and B	1705.2.2	√	
2. Inspection or Execution Tasks After Deck Placement		X	SDI QA/QC Table 1.2 A, B and C	1705.2.2	√	
3. Inspection or Execution Tasks Prior to Welding		X	SDI QA/QC Table 1.3 A, B, C and D	1705.2.2	√	
4. Inspection or Execution Tasks During Welding	X		SDI QA/QC Table 1.4 A, B, C and D	1705.2.2	√	
5. Inspection or Execution Tasks After Welding		X	SDI QA/QC Table 1.5 A, B, C and D	1705.2.2	√	
6. Inspection or Execution Tasks Prior Mechanical Fastening	X		SDI QA/QC Table 1.6 A, B and C	1705.2.2	√	
7. Inspection or Execution Tasks During Mechanical Fastening		X	SDI QA/QC Table 1.7 A and B	1705.2.2	√	
8. Inspection or Execution Tasks After Mechanical Fastening		X	SDI QA/QC Table 1.8 A, B, C, D and E	1705.2.2	√	
C. OPEN-WEB STEEL JOISTS and JOIST GIRDERS (SJI 100-15 and 200-15)						
1. Installation of open-web steel joists and joist girders.			SJI 100 SJI 200 composite	Table 1705.2.3	√	
a. End connections – welding or bolted.	-	X	SJI CJ,SJI K, SJI LH/DLH or SJI JG	Table 1705.2.3 2207.1	√	05 2100
b. Bridging – horizontal or diagonal ▪ Standard bridging ▪ Bridging differing from the SJI specs	-	X	SJI CJ,SJI K, SJI LH/DLH or SJI JG	Table 1705.2.3 2207.1	√	05 2100
D. COLD-FORMED STEEL TRUSSES SPANNING 60 FEET or GREATER						
1. Verify the temporary installation of restraint / bracing is installed per approved truss submittal.		X	Approved truss submittal package	1705.2.4		
2. Verify the permanent individual truss member restraint / bracing is installed per approved truss submittal		X	Approved truss submittal package	1705.2.4		
E. CONCRETE CONSTRUCTION						
1. Inspect reinforcement, including prestressing tendons, and verify placement.	-	X	ACI 318: Ch. 20, 25.2, 25.3, 26.6.1-26.6.3	Table 1705.3, 1908.4	√	03 3000
2a. Reinforcing bar welding: Verify weldability of reinforcing bars other than ASTM A706	-	X	AWS D1.4; ACI 318: 26.6.4	Table 1705.3, 1705.3.1		
2b. Reinforcing bar welding:		X	AWS D1.4;	Table 1705.3,		

INSPECTION AND TESTING (Continuous & Periodic is as Defined by the BCNYS)	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY (the default spec sections listed may need to be modified)
Inspect single-pass fillet welds, maximum $^{5}/_{16}$"			ACI 318: 26.6.4	1705.3.1		
2c. Reinforcing bar welding: Inspect all other welds	X		AWS D1.4; ACI 318: 26.6.4	Table 1705.3, 1705.3.1		
3. Inspect anchors cast in concrete	-	X	ACI 318: 17.8.2	Table 1705.3	√	03 3000
4a. Inspect anchors post-installed in hardened concrete members - Adhesive anchors installed in horizontally or upwardly inclined orientations to resist sustained tension loads.	X		ACI 318: 17.8.2.4	Table 1705.3 See NYS IBC footnote b	√	03 3000
4b. Inspect anchors post-installed in hardened concrete members - Mechanical anchors and adhesive anchors not defined in 4a.		X	ACI 318: 17.8.2	Table 1705.3 See NYS IBC Footnote b		
5. Verify use of required design mix.	-	X	ACI 318: Ch. 19, 26.4.3, 26.4.4	Table 1705.3, 1904.1, 1904.2, 1908.2, 1908.3	√	03 3000
6. Prior to concrete placement, fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.	X	-	ASTM C172, ASTM C31; ACI 318: 26.5, 26.12	Table 1705.3, 1908.10	√	
7. Inspect concrete and shotcrete placement for proper application techniques.	X	-	ACI 318: 26.5	Table 1705.3, 1908.6, 1908.7, 1908.8		
8. Verify maintenance of specified curing temperature & techniques	-	X	ACI 318: 26.5.3-26.5.5	Table 1705.3, 1908.9	√	03 3000
9a. Inspect prestressed concrete for: Application of prestressing forces	X	-	ACI 318: 26.10	Table 1705.3		
9b. Inspect prestressed concrete for: Grouting of bonded prestressing tendons.	X	-	ACI 318: 26.10	Table 1705.3		
10. Inspect erection of precast concrete members. (cast stone)	-	X	ACI 318: Ch. 26.9	Table 1705.3	√	
11. Verify in-situ concrete strength, prior to stressing of tendons in post-tensioned concrete and prior to removal of shores and forms from beams & structural slabs.	-	X	ACI 318: 26.11.2	Table 1705.3		
12. Inspect formwork for shape, location, dimensions of the concrete member being formed.	-	X	ACI 318: 26.11.1.2(b)	Table 1705.3	√	03 3000

F. MASONRY CONSTRUCTION (TMS 402-13) (TMS 602-13)

Level A: (basic) (non-essential)
Risk Category I, II or III designed using Prescriptive or Empirical design methods.

Level B: √ (intermediate) (non-essential / essential)
Risk Category I, II or III designed using Engineered design methods, or Risk Category IV using Prescriptive design method.

Level C: (rigorous) (essential)
Risk Category IV designed using Engineered design methods.

Level A Quality Assurance of Masonry (TMS 402-13/ACI 530-13/ASCE 5-13 Table 3.1.1)

INSPECTION AND TESTING (Continuous & Periodic is as Defined by the BCNYS)	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY (the default spec sections listed may need to be modified)
A1. Verify compliance with the approved submittal and project specifications		X	TMS 402, TMS 602, Table 3.1.1	1705.4		
Level B Quality Assurance of Masonry (TMS 402-13/ACI 530-13/ASCE 5-13 Table 3.1.2)						
Minimum Tests:						
a. Verification of slump flow and Visual Stability Index (VSI) as delivered to the project site in accordance with Art. 1.5 B.1.b.3 for self-consolidating grout		X	TMS 402 Table 3.1.2	1705.4	√	04 2000
b. Verification of f' m and f' acc in accordance w/ specification Art. 1.4B prior to construction except where exempted by TMS 402		X	TMS 402 Table 3.1.2	1705.4	√	04 2000
B1. Verify compliance with approved submittals		X	TMS 602 Art. 1.5	1705.4		
B2. As masonry construction begins, verify the following are in compliance:						
a. Proportions of site-prepared mortar		X	TMS 602 Art. 2.1, 2.6 A	1705.4	√	04 2000
b. Construction of mortar joints		X	TMS 602 Art. 3.3 B	1705.4	√	04 2000
c. Grade and size of prestressing tendons and anchorages		X	TMS 602 Art 2.4 B, 2.4 H	1705.4		
d. Location of reinforcement, connectors, prestressing tendons and anchors		X	TMS 602 Art. 3.4, 3.6 A	1705.4	√	04 2000
e. Prestressing technique		X	TMS 602 Art. 3.6 B	1705.4		
f. Properties of thin-set mortar for ACC masonry	X (b)	X (c)	TMS 602 Art.2.1 C	1705.4		See table footnotes
B3. Prior to grouting, verify that the following are in compliance:						
a. Grout space		X	TMS 602 Art. 3.2 D, 3.2 F	1705.4	√	04 2000
b. Grade, type and size of reinforcement and anchor bolts, and prestressing tendons and anchorages		X	TMS 402 Sec 6.1 / TMS 602 Art. 2.4, 3.4	1705.4	√	04 2000
c. Placement of reinforcement, connectors and prestressing tendons and anchorages		X	TMS 402 Sec 6.1, 6.2.1, 6.2.6, 6.2.7 / TMS 602 Art. 3.2 E, 3.4, 3.6 A	1705.4	√	04 2000
d. Proportions of site prepared grout and prestressing grout for bonded tendons		X	TMS 602 Art 2.6 B, 2.4 G1.b	1705.4		
e. Construction or mortar joints		X	TMS 602 Art. 3.3 B	1705.4	√	04 2000
B4. During Construction verify:						
a. Size and location of structural elements		X	TMS 602 Art. 3.3 F	1705.4	√	04 2000
b. Type, size, & location of anchors, including other details of anchorage of masonry to structural members, frames		X	TMS 402 Sec 1.2.1e, 6.1.4.3, 6.2.1; 1.16.4.3, 1.17.1	1705.4	√	04 2000
c. Welding of reinforcement	X		TMS 402 Sec. 2.1.7.7.2, 3.3.3.4(c); 8.3.3.4(b)	1705.4		
d. Preparation, construction, protection of masonry during cold weather (temperature below 40°F) or hot weather (temperature above 90° F)		X	TMS 602 Art. 1.8 C, 1.8 D	1705.4	√	04 2000
e. Application and measurement of prestressing force	X		TMS 602 Art. 3.6 B	1705.4		

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f. Placement of grout and prestressing grout for bonded tendons is in compliance	X		TMS 602 Art. 3.5, 3.6 C	1705.4		
g. Placement of AAC masonry units and construction of thin-bed mortar joints	X(b)	X (c)	TMS 602 Art. 3.3 B.9, 3.3 F.1.b	1705.4		See table footnotes
h. Installation of post-installed anchors according to manufacturer's printed installation instructions. Verify anchor dimensions, adhesive identification and exp. Date, hole dimensions, edge distances, embedment depth, tightening torque, base material temperature	X(d)	X(e)				See table footnotes
B5. Observe preparation of grout specimens, mortar specimens, and/or prisms		X	TMS 602 Art. 1.4B.2.a.3, 1.4 B.2.b.3, 1.4 B.2.c.3, 1.4B.3, 1.4 B.4		√	04 2000
Footnotes:						
(a) Frequency refers to the frequency of special inspections, which may be continuous during the task listed or periodic during the listed task, as defined in the table						
(b) Required for the first 5000 sq. ft. of AAC masonry						
(c) Required after the first 5000 sq. ft. of AAC masonry						
(d) Required for the first 10% of each different type of anchor and/or installer						
(e) Required for the remaining 90% of each different type of anchor and/or installer						
Level C Quality Assurance of Masonry (TMS 402-13/ACI 530-13/ASCE 5-13 Table 3.1.3)						
Minimum Tests:						
a. Verification of f ' m and f ' aac in accordance with Article 1.4 B prior to construction and for every 5,000 sq. ft. during construction		X	TMS 402 Table 3.1.3	1705.4		
b. Verification of proportions of materials in premixed or preblended mortar, prestressing grout and grout other than self-consolidating grout, as delivered to the site		X	TMS 402 Table 3.1.3	1705.4		
c. Verification of Slump flow and VSI as delivered to the site in accordance with Article 1.5B.1.b.3 for self-consolidating grout		X	TMS 402 Table 3.1.3	1705.4		
C1. Verify compliance with the approved submittals		X	TMS 602 Art. 1.5	1705.4		
C2. Verify that the following are in compliance:						
a. Proportions of site-prepared mortar, grout and prestressing tendons and anchorages		X	TMS 602 Art 2.1, 2.6 A, 2.6 B, 2.6 C, 2.4 G.1.b	1705.4		
b. Grade, type, and size of reinforcement and anchor bolts, prestressing tendons and anchorages		X	TMS 402 Sect. 6.1 / TMS 602 Art. 2.4, 3.4	1705.4		
c. Placement of masonry units and construction of mortar joints		X	TMS 602 Art 3.3 B	1705.4		
d. Placement of reinforcement, connectors, prestressing tendons and anchorages	X		TMS 402 Sec. 6.1, 6.2.1, 6.2.6, 6.2.7 / TMS 602 Art 3.2 E, 3.4, 3.6 A	1705.4		
e. Grout space prior to grouting	X		TMS 602 Art. 3.2 D, 3.2 F	1705.4		

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f. Placement of grout and prestressing grout for bonded tendons	X		TMS 602 Art. 3.5, 3.6 C	1705.4		
g. Size and location of structural elements		X	TMS 602 Art. 3.3 F	1705.4		
h. Types, size, and location of anchors including other details of anchorage of masonry to structural members, frames or other construction	X		TMS 402 Sec. 1.2.1(e), 6.1.4.3, 6.2.1	1705.4		
i. Welding of reinforcement	X		TMS 402 Sec. 8.1.6.7.2, 9.3.3.4 (c), 11.3.3.4(b)	1705.4		
j. Preparation, construction and protection of masonry during cold weather (temperature below 40 F or hot weather (temperature above 90°F)		X	TMS 602 Art. 1.8 C, 1.8 D	1705.4		
k. Application and measurement of prestressing force	X		TMS 602 Art. 3.6 B	1705.4		
l. Placement of AAC masonry units and construction of thin-bed mortar joints	X		TMS 602 Art. 3.3 B.9, 3.3 F.1.b	1705.4		
m. Properties of thin-bed mortar for AAC masonry	X		TMS 602 Art. 2.1 C.1	1705.4		
n. Installation of post-installed anchors according to manufacturer's printed installation instructions. Verify anchor dimensions, adhesive identification and exp. Date, hole dimensions, edge distances, embedment depth, tightening torque, base material temperature	X(b)	X(c)				
C3. Observe preparation of grout specimens. Mortar specimens and/or prisms	X		TMS 602 Art. 1.4B.2.a.3, 1.4 B.2.b.3, 1.4 B.2.c.3, 1.4 B.3, 1.4 B4	1705.4		
D. Vertical Masonry Foundation Elements		X		1705.4.2, 1705.4		
Footnotes:						
(a) Frequency refers to the frequency of special inspections, which may be continuous during the task listed or periodic during the listed task, as defined in the table						
(b) Required for the first 10% of each different type of anchor and/or installer						
(c) Required for the remaining 90% of each different type of anchor and/or installer						
G. WOOD CONSTRUCTION						
1. Inspect high-load diaphragms for grade/thickness of sheathing, nominal size of members, fastener size, number and spacing		X	Construction Documents	1705.5.1 2306.2		06 1000 & 06 1753
2. Metal-plate-connected wood trusses spanning 60 feet or greater: temporary installation restraint / bracing and permanent individual truss member restraint / bracing		X	Applicable truss submittal package	1705.5.2		
H. SOILS						
1. Verify materials below shallow foundations are adequate to achieve the design bearing capacity	-	X	Geotech Report, Contract Documents	Table 1705.6	√	31 2323

INSPECTION AND TESTING (Continuous & Periodic is as Defined by the BCNYS)	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY (the default spec sections listed may need to be modified)
2. Verify excavations are extended to proper depth and have reached proper material	-	X	Geotech Report, Contract Documents	Table 1705.6		31 2323
3. Perform classification and testing of compacted fill materials	-	X	Geotech Report, Contract Documents	Table 1705.6		31 2323
4. Verify use of proper materials, densities and lift thicknesses during placement and compaction of compacted fill	X	-	Geotech Report, Contract Documents	Table 1705.6		31 2323
5. Prior to placement of compacted fill, inspect subgrade and verify that site has been prepared properly	-	X	Geotech Report, Contract Documents	Table 1705.6		31 2323
6. During fill placement inspector shall verify that proper materials and procedures are used per geo-report	X		Geotech Report, Contract Documents	1705.6		31 2323
I. DRIVEN DEEP FOUNDATIONS						
1. Verify element materials, sizes and lengths comply w/ the requirements	X	-	Geotech Report, Contract Documents	Table 1705.7		
2. Determine capacities of test elements and conduct additional load tests, as require.	X	-	Geotech Report, Contract Documents	Table 1705.7		31 2323
3. Inspect driving operations and maintain complete and accurate records for each element	X	-	Geotech Report, Contract Documents	Table 1705.7		31 2323
4. Verify placement locations and plumbness, confirm type and size of hammer, record number of blows per foot of penetration, determine required penetrations to achieve design capacity, record tip and butt elevations and document any damage to foundation element	X	-	Geotech Report, Contract Documents	Table 1705.7		
5. For steel elements, perform additional inspections in accordance with Code Section 1705.2	-	-	Geotech Report, Contract Documents	Table 1705.7 1705.2		
6. For concrete elements and concrete-filled elements, perform tests and additional special inspections in accordance w/ Code Section 1705.3	-	-	Geotech Report, Contract Documents	Table 1705.7 1705.3		
7. For specialty elements, perform additional inspections as determined by the RDP in responsible charge	-	-	Geotech Report, Contract Documents	Table 1705.7		
J. CAST-IN-PLACE DEEP FOUNDATIONS						
1. Inspect drilling operations and maintain complete and accurate records for each element.	X	-	Geotech Report, Contract Documents	Table 1705.8		
2. Verify placement locations and plumbness, confirm element diameters, bell diameters (if applicable), lengths, embedment into bedrock (if applicable) and adequate end-bearing strata capacity. Record concrete or grout volumes.	X	-	Geotech Report, Contract Documents	Table 1705.8		

INSPECTION AND TESTING (Continuous & Periodic is as Defined by the BCNYS)	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY (the default spec sections listed may need to be modified)
3. For concrete elements, perform tests and additional special inspections in accordance with Code Section 1705.3. See Special Inspections Concrete Construction.	-	-	Geotech Report, Contract Documents	Table 1705.8, 1705.3		
K. HELICAL PILE FOUNDATIONS						
1. Record installation equipment used, pile dimensions, tip elevations, final depth, final installation torque and other installation data as required by the RDP.	X		Geotech Report, Contract Documents	1705.9		31 6615
L. FABRICATED ITEMS						
1. The RDP shall identify any structural, load-bearing or lateral load-resisting members or assemblies that are specified to be fabricated off site i.e. in a fabricator's shop. Special inspections shall be required for these items unless: **a.** The fabricator maintains approved detailed fabrication and quality control procedures that provide conformance to the approved construction documents & IBC 2018				1704.2.5 1704.2.5.1 1705.10	√	Structural Steel Steel Joists, Girders Precast Concrete Prestressed Concrete Wood Construction (trusses, walls, floors, roof assemblies)
b. The fabricator is registered and approved				1704.2.5.1		Cold-formed steel trusses
M. WIND-FORCE-RESISTANT ITEMS						
1. Structural Wood	X	X		1705.11.1		
2. Cold Formed Steel Lightweight Construction		X		1705.11.2		
3. Components: Roof covering, roof deck, and roof framing connections		X		1705.11.3 (1)		
4. Components: Exterior wall covering and wall connections to roof and floor diaphragms and framing		X		1705.11.3 (2)		
N. TESTING FOR SEISMIC RESISTANCE (ASCE 341-16 and ASCE 7-16)						
1. Structural Steel			AISC 341	1705.12.1.1 1705.13.1.1		05 1200 05 1213
2. Structural Steel Elements			AISC 341	1705.12.1.2 1705.13.1.2		05 1200, 05 1213
3. Structural Wood gluing and fastening		X		1705.12.2		06 1000, 06 1753 06 1800, 06 1733
4. Cold Formed Steel Lightweight Construction welding and fastening		X		1705.12.3		05 4000 05 4400
5. Designated Seismic Systems			ASCE 7: 13.2.2	1705.12.4		
6. Architectural Components: (seismic)						
a. Exterior cladding, interior or exterior nonbearing walls and int. and ext. veneer 30 ft. or less above grade or walking surface		X		1705.12.5		
b. Exterior cladding or int. or ext. veneer weighing 5 psf or less		X		1705.12.5		

INSPECTION AND TESTING (Continuous & Periodic is as Defined by the BCNYS)	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY (the default spec sections listed may need to be modified)
c. Interior nonbearing walls weighing 15 psf or less		X		1705.12.5		
d. Access floors		X		1705.12.5.1		09 6900
7. Plumbing, Mechanical and Electrical Components: (seismic)						
a. Electric equipment anchorage for emergency and standby power systems		X		1705.12.6 (1)		
b. Other electric equipment anchorage		X		1705.12.6 (2)		
c. Installation and anchorage of piping systems/mechanical units designed to carry hazardous materials		X		1705.12.6 (3)		
d. Installation and anchorage of ductwork designed to carry hazardous material		X		1705.12.6 (4)		23 3100
e. Installation and anchorage of vibration isolation systems		X		1705.12.6 (5)		
f. Installation of mechanical and electrical equipment, including ductwork, piping systems and structural supports where automatic fire sprinkler systems are installed.		X	ASCE/SEI 7: 13.2.3	1705.12.6 (6)		
8. Storage Racks (seismic)		X		1705.12.7		10 5629, 10 5613
9. Seismic Isolation Systems		X		1705.12.8		
10. Cold Formed Steel Special Bolted Moment Frames (seismic)		X		1705.12.9		
O. TESTING FOR SEISMIC RESISTANCE (ASCE 341-16 and ASCE 7-16)						
1. Structural Steel			ASCE 341	1705.13.1		
2. Nonstructural Components			ASCE 7: 13.2.1	1705.13.2		
3. Designated Seismic Systems			ASCE 7: 13.2.2	1705.13.3		
4. Seismic Isolation Systems			ASCE 7: 17.8	1705.13.4		
P. SPRAYED FIRE-RESISTANT MATERIALS (ASTM E605 - 1993(2015) and E736 - 2000(2015)						
1. Physical and visual tests				1705.14.1		07 8100
2. Structural Member Surface Conditions				1705.14.2		07 8100
3. Application				1705.14.3		07 8100
4. Verify thickness of application			ASTM E 605	1705.14.4		07 8100
5. Verify density of material			ASTM E 605	1705.14.5		07 8100
6. Verify cohesive/adhesive bond strength of materials			ASTM E 736	1705.14.6		07 8100
7. Condition of finished application				1705.14.1 (5)		07 8100
Q. MASTIC and INTUMESCENT FIRE-RESISTANT COATINGS (AWCI 12-B 2014)						
1. Verify surface preparation, application, and thickness in accordance with manufacturer's written instructions when applied to structural elements and decks		X	AWCI 12-B	1705.15		07 8123
R. EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS) (ASTM E2570 -2007 (2014)						
1. Water-resistive barrier coatings must be inspected when installed over a sheathing substrate		X	ASTM E2570	1705.16.1		07 2400
S. FIRE-RESISTANT PENETRATION and JOINTS						

INSPECTION AND TESTING (Continuous & Periodic is as Defined by the BCNYS)	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE	CHECK IF REQUIRED	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY (the default spec sections listed may need to be modified)
1. For high-rise buildings or Risk Category III or IV buildings inspect through-penetrations and membrane penetration firestops		X	ASTM E2174, ASTM E814 or UL 1479	1705.17, 1705.17.1, 714.5.1.2, 714.4.2, 714.4.1.2		07 8400
2. For high-rise buildings or Risk Category III or IV buildings inspect fire-resistant joint systems and perimeter fire barrier systems		X	ASTM: E119, E2393, E2307, E1966 or UL 2079	1705.17 1705.17.2 715.3 715.4		07 8400
T. SMOKE CONTROL SYSTEM						
1. Tested during erection of ductwork and prior to concealment for leakage testing and recording of device location		X		1705.18.1 (1)		
2. Tested prior to occupancy and after sufficient completion of pressure difference testing, flow measurements and detection and control verification		X		1705.18.1 (2)		
U. ADDITIONAL SPECIAL INSPECTIONS AND TESTS						
1. Design Strength of Materials				1706		
2. Alternative Test Procedures				1707		
3. In-Situ Load Tests				1708		
4. Preconstruction Load Tests				1709		
5. Structural Observations				1704.6, 1704.6.1 1704.6.2		
V. ALTERNATE MATERIALS AND SYSTEMS / SPECIAL CASES						
1. Construction materials and systems that are alternatives to materials and systems prescribed by the IBC				1705.1.1		
2. Unusual design applications of materials described by the IBC				1705.1.1		
3. Materials and systems required to be installed in accordance with additional manufacturer's instructions that prescribe requirements not contained in code or in standards referenced by the IBC				1705.1.1		

BCA Architects & Engineers
31 Lewis Street
Suite 402
Binghamton, New York 13901
Phone (607) 940-0199
submittals@thebcgroup.com

SHOP DRAWING SUBMITTAL FORM

Project Name: Highland Falls-Fort Montgomery CSD
Additions & Alterations to Fort Montogery Elementary School

BCA Project Number: 2022-138 PH1
Submittal Description:

Contractor Project Number:
Contractor Submittal Number:

Contractor's Name & Address:

Email Address:
Name & Address of Supplier:

Name of Manufacturer:
Specification Section:
Drawing No. / Detail Reference No.:
Deviations: **None:** _____ **As Listed:**

Item as Specified: **Yes:** _____ **No:** _____ **If No, provide information per Specification & Substitution Forms**

In accordance with General Conditions of the Contract for Construction, by submitting Submittal/Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

□ This item requires Electrical Coordination

□ This item requires Plumbing/Mechanical Coordination

Contractor Review and Coordination By:

For Architect/Engineer's Use Only:

Submittal No.:

□ No Exceptions Taken
□ Reviewed
□ Exception as Noted
□ Correspondence Attached
□ Resubmit
□ For Construction Accordance to Notations Revise and Resubmit

In accordance with the General Conditions of the Contract for Construction, the Architect is reviewing, approving or taking action upon this submittal for the limted purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of their obligations of the Contract/Work. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component

□ Electrical Coordination
□ Plumb'g/Mechanical Coordination
□ Electrical Coordination Not required.
□ Plumbing/Mechanical Coordination Not required.

Date Reviewed: **By:**
BCA Architects & Engineers - MPE Department

Date Reviewed: **By:**
BCA Architects & Engineers - Architect

Comments:

Copy To:
□ Office
□ Owner
□ Field
□ Contractor

Date Received:

Date Returned:

Kathy Hochul, Governor

Roberta Reardon, Commissioner

Highland Falls-Fort Montgomery

John Sokol, Principal/Architecht
31 Lewis Street
Suite 402
Binghamton NY 13901

Schedule Year	2023 through 2024
Date Requested	10/26/2023
PRC#	2023012810

Location	Fort Montgomery Elem School
Project ID#	
Project Type	Highland Falls Montgomery CSD Additions & Alterations to FMES SED 44-09-01-04-0-005-008 BCA Project Number 2022-138

PREVAILING WAGE SCHEDULE FOR ARTICLE 8 PUBLIC WORK PROJECT

Attached is the current schedule(s) of the prevailing wage rates and prevailing hourly supplements for the project referenced above. A unique Prevailing Wage Case Number (PRC#) has been assigned to the schedule(s) for your project.

The schedule is effective from July 2023 through June 2024. All updates, corrections, posted on the 1st business day of each month, and future copies of the annual determination are available on the Department's website www.labor.ny.gov. Updated PDF copies of your schedule can be accessed by entering your assigned PRC# at the proper location on the website.

It is the responsibility of the contracting agency or its agent to annex and make part, the attached schedule, to the specifications for this project, when it is advertised for bids and /or to forward said schedules to the successful bidder(s), immediately upon receipt, in order to insure the proper payment of wages.

Please refer to the "General Provisions of Laws Covering Workers on Public Work Contracts" provided with this schedule, for the specific details relating to other responsibilities of the Department of Jurisdiction.

Upon completion or cancellation of this project, enter the required information and mail **OR** fax this form to the office shown at the bottom of this notice, **OR** fill out the electronic version via the NYSDOL website.

NOTICE OF COMPLETION / CANCELLATION OF PROJECT

Date Completed: _____ Date Cancelled: _____

Name & Title of Representative: _____

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12226

Kathy Hochul, Governor

Roberta Reardon, Commissioner

Highland Falls-Fort Montgomery

John Sokol, Principal/Architecht
31 Lewis Street
Suite 402
Binghamton NY 13901

Schedule Year 2023 through 2024
Date Requested 10/26/2023
PRC# 2023012810

Location Fort Montgomery Elem School
Project ID#
Project Type Highland Falls Montgomery CSD Additions & Alterations to FMES SED 44-09-01-04-0-005-008 BCA Project Number 2022-138

Notice of Contract Award

New York State Labor Law, Article 8, Section 220.3a requires that certain information regarding the awarding of public work contracts, be furnished to the Commissioner of Labor. One "Notice of Contract Award" (PW 16, which may be photocopied), **MUST** be completed for **EACH** prime contractor on the above referenced project.

Upon notifying the successful bidder(s) of this contract, enter the required information and mail **OR** fax this form to the office shown at the bottom of this notice, **OR** fill out the electronic version via the NYSDOL website.

Contractor Information
All information must be supplied

Federal Employer Identification Number: _____

Name: _____

Address: _____

_____

City: _____ State: _____ Zip: _____

Amount of Contract: $_____

Approximate Starting Date: ____/____/____

Approximate Completion Date: ____/____/____

Contract Type:
[ ] (01) General Construction
[ ] (02) Heating/Ventilation
[ ] (03) Electrical
[ ] (04) Plumbing
[ ] (05) Other : _____

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12226

SECTION 00 1001
PLAN DEPOSIT POLICY

PART 1 GENERAL

1.01 PLAN DEPOSIT REFUND POLICY

A. Plan deposit refunds shall be made in accordance with the following policy which is guided by General Municipal Law, Article 5-A, Public Contracts:

1. **If a bona fide bid is duly submitted** for a Contract in accordance with the requirements contained in the Plans and Specifications and said copy(s) of the Plans and Specifications is/are returned in good condition within **thirty (30) business days following the award of the Contract or rejection of bids**, the amount of the deposit return shall be as follows:
   a. For the **first set** of Plan and Specifications returned in accordance with Paragraph 1.01.A.1 above, a full reimbursement of said deposit, **less postage and handling**, shall apply;
   b. For any and all **additional sets** of Plans and Specifications returned in accordance with Paragraph 1.01.A.1 above, a reimbursement of the deposit, less the actual cost of reproduction of the Plans and Specifications and less the cost of postage and handling, shall apply.
2. **If a bona fide bid is not duly submitted** for a Contract in accordance with the requirements contained in the Plans and Specifications and said copy(s) of the Plans and Specifications is/are returned in good condition **prior to the bid opening date**, the amount of the deposit return shall be as follows:
   a. For the **first set** of Plans and Specifications returned in accordance with Paragraph 1.01.A.2 above, a full reimbursement of said deposit, **less postage and handling**, shall apply;
   b. For any and all **additional sets** of Plans and Specifications returned in accordance with Paragraph 1.01.A.2 above, a reimbursement of the deposit, less the actual cost of reproduction of the Plans and Specification and less the cost of postage and handling, shall apply.
3. **If a bona fide bid is not duly submitted** for a Contract in accordance with the requirements contained in the Plans and Specifications and said copy(s) of the Plans and Specifications is/are **NOT** returned **prior to the bid opening date**, none of the plan deposit will be returned.

B. Bidders wishing documents mailed to them shall include, in addition to the document deposit, a non-refundable check of $15.00 per set for handling and postage. Checks shall be made payable to Bernier, Carr & Associates.

C. It is important to note that **THE CONTRACT DOCUMENTS (PLANS AND SPECIFICATIONS) REMAIN THE PROPERTY OF THE ARCHITECT'S OFFICE AND MUST BE RETURNED WITHIN THIRTY (30 BUSINESS DAYS FOLLOWING THE AWARD OF THE CONTRACT OR REJECTION OF BIDS.**

PART 2 - NOT USED

PART 3 - NOT USED

END OF SECTION

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SECTION 00 2113
INFORMATION FOR BIDDERS

PART 1 GENERAL

1.01 SUBMISSION OF BIDS

A. The Owner reserves the right to consider informal any bid not prepared and submitted in accordance with the provisions of this Information for Bidders and the General Conditions and to waive any informalities in or to reject any or all bids either before or after opening. No bidder may withdraw a bid within forty-five (45) business days after the actual date of the opening thereof.

1.02 PREPARATION OF PROPOSAL

A. Bidders shall prepare their bids on the "Form of Proposal" sheets furnished by the Architect and available at the Architect's Office. All blank spaces pertinent to the Contract category proposal must be filled in, in both words and figures, with the unit price for the item or the lump sum for which the proposal is made.

B. All bids together with bid security must be submitted in sealed envelopes bearing on the outside of the envelope the name of the bidder, his address, the name of the project and the branch of work covered by the bid. If forwarded by mail or other form of courier, the sealed envelope containing the proposal, marked as above, must be enclosed in another envelope addressed to the Owner. Each bidder shall assume the risk of any delay in the mail or in handling of mail by employees of the Owner or others.

C. ***IMPORTANT***: In the event that a prospective bidder, after securing drawings and specifications, decides not to present a proposal for the work, it is requested that the Architect be so notified at earliest possible moment prior to the date of receipt of bids. All drawings and specifications shall be returned to the Architect's Office and if returned in good condition within 30 days following the award of the Contract covered by such Plans and Specifications, a partial reimbursement in an amount equal to the full amount of such deposit less the actual cost of reproduction of the Plans and Specifications, and less postage and handling, shall be made.

1.03 BID PROPOSALS AND BIDDERS

A. The Owner reserves the right to reject any or all bid proposals and to waive any informalities or defects in such proposals whether before or after the time of opening of bids.

B. Bidders may not withdraw proposals within forty-five (45) days following date of opening of bids.

C. All costs in connection with preparation and submission of bid proposals shall be borne by the bidders.

D. Bidders shall submit promptly upon request of the Owner or Architect documentary evidence as to financial, technical, and practical ability to carry out the work.

1.04 QUALIFICATIONS OF BIDDERS

A. The Owner may make such investigation as he deems necessary to determine the ability of the bidder to perform the work. The bidder shall furnish to the Owner all information and data for this purpose as the Owner may request including but not limited to current financial statements and a list of completed projects (within the last three years) with names and addresses of Owners.

B. The Owner reserves the right to reject any bid if the evidence submitted by or investigation of such bidder fails to satisfy the Owner that such bidder is properly qualified to carry out the obligations of the contract and to complete the work contemplated therein.

C. Conditional bids will not be accepted.

1.05 BID SECURITY

A. Each bid must be accompanied by certified check of the bidder or by a bid bond prepared on a standard approved form, duly executed by the bidder as principal, and having as surety thereon a surety company authorized to do business within the State of New York.

B. Bid security shall be in an amount not less than 5% of the base bid or not less than 5% of the sum of base bids where such base bids may be considered cumulative. Such checks will be returned to all except the three lowest formal bidders, within three working days after the formal opening of bids & the remaining cash or checks will be returned to the three lowest bidders within 48 hours after the Owner and the accepted bidder have executed a contract. If no contract has been so executed within 45 days after the opening of bids, bid security will be returned upon demand of the bidder at any time thereafter so long as he has not been notified of the acceptance of his bid.

1.06 LIQUIDATED DAMAGES FOR FAILURE TO ENTER INTO CONTRACT

A. The successful low bidder, upon his failure or refusal to execute and deliver the contract and required bonds and insurance within 15 days after he has received notice of the acceptance of his bid, shall forfeit to the Owner, as liquidated damages for such failure or refusal, the security deposited with his bid, as specified in Paragraph 1.05.

1.07 CONDITIONS OF WORK

A. Each bidder must inform himself fully of the conditions relating to the construction and labor under which the work is now being or will be performed. Failure to do so will not relieve a successful bidder of his obligations to furnish all material and labor necessary to carry out the provisions of the contract documents and to complete the contemplated work for the consideration set forth in his bid.

B. Insofar as possible, the Contractor in the carrying out of his work must employ such methods or means as will not cause any interruption of or interference with the work of any other Contractor.

1.08 ADDENDA AND INTERPRETATIONS

A. No interpretations of the plans, specifications or other contract documents will be made to any bidder orally. All requests for such interpretations shall submitted in writing to BCA Architects & Engineers (on the attached RFI Form). To be given consideration a request for interpretation the RFI form must be received at least six (6) days prior to the date fixed for the opening of bids. Any and all interpretations and any supplemental instructions will be issued in the form of written addenda. If issued, the addenda will be sent by UPS or via facsimile, to respective addresses furnished for such purposes, not later than two (2) days prior to the day fixed for opening Bids. Failure of any Bidder to receive any such addenda shall not relieve said Bidder from any obligation under his Bid as submitted. All addenda so issued shall become part of the Contract Documents.

B. Prospective Bidders are cautioned concerning the use of a Post Office Box address as facsimile addenda cannot be sent to Post Office Boxes.

1.09 SECURITY FOR FAITHFUL PERFORMANCE

A. Simultaneously with his delivery of the executed contract, the successful bidder must deliver to the Owner three (3) originals of an executed bond in the amount of 100% of the accepted bid as security for the faithful performance of the contract and for the payment of all persons performing labor or furnishing materials in connection therewith, prepared in the standard form of Performance Bond, Labor and Materials Payment Bond, AIA Form A312-2010 and having as surety thereon such surety company or companies as are acceptable to and approved by the Owner, and as are authorized to transact business in New York State. Each Bidder must obtain and submit with his Bid the Statement of Surety's Intent attached to the Bid form, completed and signed by a duly authorized surety company licensed to do business in New York State. This requirement will not apply in the case of contracts for supplies only and involving no labor on the site.

B. All Certificates of Insurance and Surety Bonds shall be delivered to the Architect following award and at least one (1) week before the initial Pre-Construction Meeting in order to provide a timely and proper review of these documents prior to execution of the Contracts.

1.10 POWER OF ATTORNEY

A. Attorneys in fact who sign bid bonds or contracts bonds must file with each bond a certified copy of their power of attorney to sign said bonds.

1.11 STATE LAWS AND REGULATIONS

A. The Contractor and each and every sub-contractor performing the work at the site of the project to which this contract relates shall comply with the applicable provisions of the "Labor Law," as amended, of the State of New York, and all other applicable laws and regulations governing such activities.

B. Dust Hazards:
   1. If, in the construction of the work covered by the Contract, a harmful dust hazard is created for which appliances or methods for the elimination of the dust have been approved by the Board of Standards and Appeals, such appliances or methods shall be installed and maintained and effectively operated by the Contractor at his expense.
   2. The Contract shall be void and of no effect unless the Contractor complies with the provisions of this subdivision of the Contract and Labor Law Section 222-a.

C. Non-Collusion Certification: Each bidder shall complete the Non-Collusive Bidding Certification attached to the Bid form.

D. Worker's Compensation: This Contract shall be void and of no effect unless the person or corporation making or performing such contract shall secure compensation for the benefit of, and keep insured during the life of such contract, such employees, in compliance with the provision of the Worker's Compensation Law and General Municipal Law Section 108.
   1. Effective September 9, 2007, all out-of-state employers (contractors and sub-contractors) working in New York State will be required to carry full, statutory New York State Workers' Compensation Insurance Policy. New York must be listed in Item 3A on the Information Page of the employer's workers' compensation policy in order to meet this requirement.

E. Lien Law:
   1. The attention of the Contractor is invited to the provisions of the Lien Law of the State of New York, wherein funds received by a contractor for a public improvement are declared to constitute trust funds in the hands of such contractor to be applied first to the payment of certain claims.

F. The November 9, 1997 guidelines set forth by the New York State Department of Labor regarding Certified Payrolls are as follows:
   1. "Every contractor and sub-contractor shall submit to the department of jurisdiction within thirty days after issuance of its first payroll, and every thirty days thereafter, a transcript of the original payroll record, as provided by this article, subscribed and affirmed as true under penalties of perjury. The DEPARTMENT OF JURISDICTION shall be required to receive and maintain such payroll records. The original payrolls or transcripts shall be preserved for three years from the completion of the work on the awarded project." Excerpted from "The Fair Contractor"
   2. Payroll shall be sent direct to the Owner. Bernier, Carr & Associates cannot accept the certified payrolls nor do we require copies of the transmittal to the Owner.

G. This provision is an addition to the existing prevailing wage rate law, Labor Law 220, Section 220-h. It requires that on all public work projects of at least $250,000.00, all laborers, workers and mechanics working on the site, be certified as having successfully completed the OSHA 10-hour construction safety and health course. It further requires that the advertised bids and contracts for every public work contract of at least $250,000.00, contain a provision of this requirement.

1.12 FEDERAL REGULATIONS

A. Each Contractor and every sub-contractor performing work (including but not limited to repair, renovation, reconstruction, and painting) that will disturb lead-based paint existing within the project that house children under the age of six (6) shall comply with US EPA 40 CFR 745.80 Subpart E (also known a Lead Renovation, Repair and Painting Rule) effective April 22, 2010. The contractor (firm) and the individuals completing the work shall be certified in accordance with the US EPA requirements and shall provide copies of such certification to the Owner prior to the commencement of all work.

1.13 OBLIGATION OF BIDDER

A. At the time of the opening of bids each bidder will be presumed to have inspected the site and to have read and to be thoroughly familiar with the drawings and contract documents including all Addenda. The failure or omission of any bidder to receive or examine any form, instrument, or document shall in no way relieve any bidder from any obligation in respect to his bid.

1.14 EXEMPTION FROM SALES AND COMPENSATING USE TAXES

A. The Owner is exempt from payment of sales and compensation taxes of the State of New York and of cities, counties and other sub-divisions of the State, of materials sold to it pursuant to the provisions of this contract. These taxes are not to be included in bids.

B. Contractor's purchases of tangible personal property which do not become an integral component part of the exempt organization's real property and are consumed by the Contractor as well as purchases of taxable services, are subject to tax.

1.15 TIME OF COMPLETION

A. Bidders are advised that time of completion is of the essence and shall be taken into account, by the Bidders, in the preparation of the proposals.

B. See Specification Section 00 3113 Milestone Construction Schedule for completion date.

C. Refer to Paragraph 8.3 and 8.4 of the General Conditions of Contract for Construction for information concerning damages for stretch out and delay.

1.16 POST BID INFORMATION

A. Within 96 hours of the Bid Opening the apparent low bidder shall furnish in writing, the following information to the Architect if so requested.
   1. Statement that project can be completed within established time.
   2. Preliminary progress schedule showing dates for major elements of construction and dates by which major sub-contracts will be awarded.
   3. List of proposed major sub-contractors.
   4. AIA - Contractor Qualification Statement.
   5. Financial Statement.
   6. List of References.

1.17 APPROVAL OF SUB-CONTRACTORS

A. Requests for approval of major sub-contractors, and other sub-contractors as may be designated by the Architect , shall include a written statement by the proposed sub-contractor that delivery and installation of materials and equipment can and will be performed in accordance with the approved progress schedule.

B. After bid opening, if the Architect or Owner require the identity of certain Subcontractors, Suppliers or other persons and organizations (including those who are to furnish the principal items of material and equipment) to be submitted, the apparent Successful Bidder, and any other Bidder so requested, shall within seven (7) days after the request submit to the Architect a list of all such Subcontractors, Suppliers, and other persons or organizations proposed for those portions of the work for which such identification is required. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification.

C. Subcontractors must be persons or firms that perform work with persons either in their direct employ or over whom they have personal and direct subdivision.

1.18 EXAMINATION OF SITES

A. Bidders shall be presumed to have visited the site prior to submission of proposals and to have familiarized themselves with surface and sub-surface conditions, existing structures and any and all conditions that may in any way affect the work. Failure to have so acted shall in no way relieve bidders from any obligations in respect to their bids.

1.19 EQUIVALENT/ "OR EQUAL" ITEMS

A. In the Specifications, two or more kinds, types, brands, or manufacturers or materials are regarded as the required standard of quality and are presumed to be equal. The Contractor may select one of these items or, if the Contractor desires to use any kind, type, brand, or manufacturer or material other than those named in the specifications, they shall indicate in writing, and prior to award of contract, what kind, type, brand, or manufacturer is included in the base bid for the specified item.

1.20 HAZARDOUS WASTES

A. It shall be the responsibility of all Contractors and subcontractors to strictly adhere to all Federal, State and Local Regulations pertaining to the use, transportation and disposal of hazardous wastes. These are to include, but not be limited to, the following:
   1. Asbestos-containing materials
   2. Contamination of the atmosphere
   3. Contamination of soil surface or subsurface
   4. Contamination of water or water courses
   5. Contamination of objects or any other intangible matter

B. At the time of project close-out, each Contractor will be required to submit a post-construction certification that they have complied with the requirements as outlined.

1.21 HAZARDOUS MATERIALS

A. It shall be the responsibility of all contractors and subcontractors to furnish materials free of hazardous materials including but not limited to lead, asbestos, PCBs, and any and all material deemed hazardous by the EPA.

1.22 AWARD OF CONTRACT

A. The Owner reserves the right to reject any and all Bids, to waive any and all informalities not involving price, time or changes in the work and to negotiate contract terms with the Successful Bidder, and the right to disregard all non-conforming, non-responsive, unbalanced, or conditional Bids. Also, the Owner reserves the right to reject the Bid of any Bidder if the Owner believes that it would not be in the best interest of the Project to make an award to that Bidder, whether because the bid is not responsive, or the Bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by the Owner. Discrepancies in the multiplication of units of work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

B. In evaluating Bids, the Owner will consider the qualifications of the Bidders, whether or not the Bids comply with the prescribed requirements, and such supplier alternatives, unit prices and other data, as may be requested in the Bid Form or prior to the Notice of Award.

C. The Owner may consider the qualifications and experience of Subcontractors, Suppliers, and other persons and organizations proposed for those portions of the work as to which the identity of Subcontractors, Suppliers, and other persons and organizations must be submitted as provided in the General Conditions of Contract for Construction. The Owner may also consider the operating costs, maintenance requirements, performance data, and guarantees of major items of materials and equipment to be submitted prior to the Notice of Award.

D. The Owner may conduct such investigations as the Owner deems necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, and other personal and organizations to perform and furnish the work in accordance with the Contract Documents to Owner's satisfaction within the prescribed time.

1.23 BID REQUIREMENTS AND CONSIDERATIONS

A. If the Bid is made by a corporation, the official corporation name shall be given, and the Bid shall be signed by an authorized officer of the corporation, and the corporate seal affixed. If the Bid is made by a partnership, the official name as it appears on the Assumed Name Certificate shall be given and the Bid shall be signed by a general partner. If the Bid is made by a sole proprietorship, the Bid shall be signed by the individual Owner.

B. All attachments, certifications or acknowledgments attached to the Bid shall be executed in the same manner as the Bid.

C. Where noted in the Bid, Bidders must submit a separate price for all materials and supplies required for the construction of the project, and a separate price, exclusive of materials and supplies, for all work and labor required for the construction of the Project. In such cases, Bidders must also submit a total Bid for the entire Project which is computed by adding together the Bid for materials and supplies and the Bid for work and labor.

1.24 MINIMUM WAGE RATE SCHEDULE

A. Wage Rates: In accordance with Sections 220, Sub-division 3, and 220-D of the New York State Labor Law, there shall be paid each employee engaged in work on the project under this contract in the trades or occupations, not less than the prevailing rate set for the trade or occupation in which he is engaged.

B. In the event that the Contractor wishes to employ occupations other than that listed in these specifications, he shall request the establishment of a rate for that occupation and they shall pay the rate so established. This payment shall be retroactive if applicable.

C. Wage Rate Redetermination: New Wage Rates may be re-determined during the course of work under this contract by the New York State Department of Labor; Contractors shall use the re-determined Wage Rates when applicable and shall compensate for this increase in their bid proposal. The contract will not be changed nor will the Owner pay for any Wage Rate increase after the bid proposals have been submitted. All updates, corrections, posted on the 1st business day of each month, and future copies of the annual determination are available on the Department's website www.labor.state.ny.us. Updated PDF copies of your schedule can be accessed by entering the assigned PRC# at http://wpp.labor.state.ny.us/wpp/showFindProject.do?method=showIt.

PART 2 - NOT USED

PART 3 - NOT USED

END OF SECTION

Highland Falls - Fort Montgomery Central School District

Additions & Alterations to FMES
Project No. 2022-138 Ph1

REQUEST FOR INFORMATION

Submit to BERNIER, CARR & ASSOCIATES, ENGINEERS, ARCHITECTS AND LAND SURVEYORS, P.C.
Address: 31 Lewis Street, Suite 402, Binghamton, NY 13901

Attention (Project Manager): Maxwell Bendert Email: MBendert@thebcgroup.com

Drawing Reference: _____ Detail Reference: _____

Date: _____ Request No.: _____

Description of RFI

Contractor: _____

Name: _____ Email: _____
(required)

Phone: _____ Fax: _____

Response:

Originated By: Response By:

Signed: _____ Signed: _____
Contractor Architect/Engineer or Field Representative

Date: _____ Date: _____

SECTION 00 3113
MILESTONE CONSTRUCTION SCHEDULE

PART 1 GENERAL

1.01 GENERAL

A. The established Milestone Construction Schedule applies to the Contractor. Particular attention is called to the existing site restrictions, including but not limited to existing roadways, traffic patterns and parking and to the Owner's established operating schedule. At all times, provisions must be made to accommodate the normal working operation of the Owner including working irregular shifts and maintaining open and clear passage for school buses along the established route. Work at the project site which will impact the Owner's operations must be coordinated in advance through the Owner's Representative and the Architect. At no time will the Contractor (s) be allowed to adversely disrupt the operation of the Owner without approval of a written request.

B. The Contractor (s) understands that time is of the essence and that he will schedule accordingly and provide the necessary means, methods, and manpower to complete the Project elements within the allotted Contract time frame.

C. If meeting the established milestone dates requires that the Contractor(s) apply multiple shifts and/or Work during night-time or weekend hours to perform his Work, he may be allowed special access to the site. Expressed written requests must be received and reviewed prior to any such access.

D. All Incomplete and Deficient Work indicated on the Items to be Completed List shall be completed 15 business days after the issuance of the Certification of Substantial Completion unless otherwise noted.

E. Reference Paragraphs 8.3 and 8.4 of the General Conditions of the Contract for Construction for information concerning Delay and Extension of Time and Damages for Delay.

1.02 RESTRICTED WORK PERIOD

A. Contractor: Do not perform the waterproofing and related Work on or after December 1st and up to and including April 15 unless approved otherwise, in writing, on or after December 1st, unless approved Architect and Resident Project Representative and the Owner. During the restricted work period, clear the work area of waterproofing materials, equipment, and debris.

B. Roofing Contractor: Do not perform the roofing and related Work on or after December 1st and up to, but not including April 1st unless approved otherwise, in writing, by the Architect and Resident Project Representative and the Owner. During this period, clear the roof of materials, equipment, and debris. Maintain the roof in a watertight condition.

C. All Contractors: Do not perform any work during the District's scheduled exams. Coordinate with Architect and Resident Project Representative and District for further information on the exam schedule. Work may be permitted to occur after the District's exams are completed in the afternoon.

PART 2

2.01 SCHEDULE

A. Work Schedule
   1. Commence: June 24, 2024
   2. Substantial Completion: August 30, 2024
   3. Final Completion: September 27, 2024

END OF SECTION

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SECTION 01 0000
GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 WORK TO BE PERFORMED

A. Work shown on the Contract Drawings, described in the Specifications, or as required to provide a proper and functionally complete Project all in accordance with the Contract Documents, including any and all addenda.

1.02 WORK BY OTHERS

A. The Owner is occupying the site of the Work and reserves the right to let other Contractors for Work on the premises should the need arise.

1.03 OWNER OCCUPANCY

A. The building site and the building, whether the Work of the Contractor is partially or fully completed, are the properties of the Owner.

B. The Owner will occupy the site and the building during the period the Work is to be completed. All activities in and around the building shall be strictly coordinated by the Architect. In all cases, the Owner's requirements will take precedence.

C. The requirements of Section 155 of the Regulations of the New York State Commissioner of Education apply to this Project. Refer to “NYSED UNIFORM SAFETY STANDARDS”. See Section 01 3529.10 Life Safety Requirements During School Construction for additional information.

1.04 SUBMITTALS

A. Shop Drawing submittals are required for all items specifically required by the Contract Documents; all items indicated on the Contract Drawings not specifically specified and any and all other materials and equipment installed in the Project as requested by the Architect/Engineer.

1.05 CORRELATION, INTERPRETATION, AND INTENT OF CONTRACT DOCUMENTS

A. In resolving conflicts and discrepancies, the Documents shall be given precedence in the following order: Agreement, Modifications, Addenda, Special Conditions, Instruction to Bidders, Supplementary Conditions, General Conditions, Specifications, and Drawings.

B. In the case of conflict or discrepancies between Drawings and Divisions 2 thru 49 of the Specifications or within or among the Contract Documents and not clarified by Addendum, the Architect will determine which takes precedence.

C. In case of discrepancy in regard to the Contract Drawings, the more stringent requirement or the detailed drawing shall take precedence over a less detailed drawing.

1.06 PROJECT MANAGEMENT SOFTWARE

A. BCA Architects & Engineers use Newforma Project Center as their construction management software to control and streamline project tasks such as construction RFI’s, proposal requests, submittals, transmittals, and other related project collaboration. Each Prime Contractor is required to interface with this software.

B. BCA’s Contract Administration allows the Contractor (Newforma Team Member) to send RFI’s, submittals and change order requests electronically. This process saves time, money and allows the Contractor to view the history of all items.

C. Contractors will be given instructions on how to utilize Newforma Project Center upon execution of Agreements.

D. A Contractor (Newforma Team Member) who has worked with BCA and has previously been issued a Newforma password can re-use that password for all projects. If a Newforma Team Member has forgotten their password, they can request a password be re-sent to them.

E. When a new Contractor contact is added to the Newforma Project Team (by BCA Contract Administration) for a specific project, the Contractor will receive an email informing them that they have been added to the project. The email will provide a username and temporary password. Once this information is received, the Contractor (Newforma Team Member) should follow the link within the email to the “Info Exchange” log-in screen. It is recommended that the Newforma Team Member save this link for future use. Once the username and password are inserted, the Newforma Team Member will be prompted to create a permanent password. After the new password is created, the Newforma Team Member will be directed to the Info Exchange home page. From this page, the Newforma Team Member will select the “My Projects” option in the upper left corner of the page. From this page the Newforma Team Member will select the project that they are involved in. This will lead to the project site screen. Along the left-hand side are a series of options available to the Newforma Team Member.

F. File transfers are used to send and receive large files without using email. Items such as addenda, JC (job change) drawings, meeting minutes, and other project related items may be posted at this location for the Newforma Team Member’s use. Some files may be posted for a limited period of time; therefore, Newforma Team Members should download and store files on their own servers.

G. At any time, should a Newforma Team Member have a question regarding Newforma’s Info Exchange, they can contact BCA’s Document Control Manager, Kristan Peck at (315) 782-8130, ext. 226.

1.07 ELECTRONIC DOCUMENTS

A. When requested Architect will develop digital construction files for use by the General Contractor, Mechanical Contractor, Plumbing Contractor, and Electrical Contractor for their use in the development of submittals and shop drawings. The General Contractor, Mechanical Contractor, Plumbing Contractor, and Electrical Contractor will be provided Electronic Drawings in AutoCAD format.

1. Data contained on these electronic files is part of BCA’s instruments of service and shall not be used by the Contractor or anyone else receiving this data through or from the Contractor for any purpose other than as a convenience in the preparation of shop drawing submittals for the referenced project. Any other use or reuse by the Contractor or by others will be at your sole risk and without liability or legal exposure to BCA. The Contractor(s) agree to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against BCA, its officers, directors, employees, agents or sub consultants which may arise out of or in any way connected with your use of the electronic files.
2. The Electronic files (AutoCAD) format will be released to the General Contractor pending the General Contractor, Mechanical Contractor, Plumbing Contractor, and Electrical Contractor's acceptance of the Architect's CAD File Release Agreement.
3. If sub-contractor(s) will utilize the Electronic files as outlined above, the Contractors' subcontractor shall also be required to accept the Architect's CAD File Release Agreement.
4. The fee for the release Architect's electronic media is $300.00.
5. Under no circumstances shall delivery of the electronic files for use by the Contractor be deemed a sale by BCA. BCA makes no representation or warranty, either express or implied, of merchantability and fitness for any particular purpose. In no event shall BCA be liable for any loss of any profit or any consequential or other damages.

1.08 CONSTRUCTION AIDS

A. Scaffolding, Hoists, and etc. This phase of the operation is at the option of the Contractor. All construction aids shall meet the requirements of the various laws and regulations governing the building and the building operation.

1.09 SECURITY

A. Prime Contractor shall be responsible for his own security in reference to the Work completed, materials and equipment stored on-site and in the building, etc. (refer to the General Conditions).

B. Each and every Construction Worker shall be required to wear a photo-identification badge at all times while at the Project. Construction workers not having the required photo identification shall be removed from the site (refer to Section 01 3553 - Security Procedures for additional requirements).

C. Contractor shall maintain manufacturer's Material Safety Data Sheets (MSDS) at site for all products used in Project. MSDS sheets shall be provided to Owner when requested.

1.10 ACCESS TO SITE

A. Access to and egress from site for Contractors' employees, trucks, construction machinery, material deliveries, etc., shall be in accordance with prevailing local or other ordinances, and on existing access roads and drives.

B. Any damage caused to roads, drives, or planted areas by the Contractor or his subcontractor(s) shall be repaired or replaced as required to put them in the same or better condition than at the start of Work.

1.11 SPECIAL CONTROLS

A. SMOKING IS PROHIBITED on the Project site, including construction areas, construction staging areas, field offices, and the entire school campus.

B. The Contractor and their subcontractors shall take any and all necessary precautions required by the Owner, directed by the Architect, and governed by any ordinance relative to noise, dust, water, pest, rodent, mosquito, or pollution control.

C. Construction activities and operations shall not produce noise in excess of 60 dba in occupied spaces. If noise levels in occupied spaces exceed 60 dba, the Contractor shall provide acoustical abatement procedures or schedule activities during unoccupied times.

D. The Contractor is responsible to ensure the protection of personnel engaged in operations where exposure to inorganic lead or lead compounds above the action level can reasonably be expected.

E. The Contractor shall be responsible for safety and adhering to OSHA requirements.

F. The Contractor's attention is called to the matter of LITTER. Litter shall be classified as personal disposable items brought to the site by the Contractor, mechanics, or employees. The Contractor shall be responsible for the removal of litter by such means as trash cans, placed at strategic locations, laborers, or other means.

1.12 PROTECTION AGAINST FIRE

A. Fire Watch: While the Contractor is completing building demolition, qualified personnel shall be provided to serve as an on-site fire watch. The sole duty of fire-watch personnel shall be to watch for the occurrence of fire.

B. Cutting and Welding: Operations involving the use of cutting and welding shall be done in accordance with Chapter 33 - Fire Safety During Construction and Demolition, and Chapter 35 - Welding and Other Hot Work, of the Fire Code of New York State.

C. Spontaneous Ignition: Materials susceptible to spontaneous ignition (i.e., oily rags) shall be stored in listed disposal container.

D. During construction, the Contractor shall provide one (1) fire extinguisher per construction work area. The fire extinguisher shall be approved portable type. Extinguisher(s) shall be provided in accordance with NFPA 10 and the Fire Code of New York State.

1.13 TRANSPORTATION AND HANDLING

A. The Contractor and his subcontractor(s) shall be responsible for the transportation and handling of all materials from, to, and at the project site. All damages thereto shall be replaced by the responsible party at no additional cost to the Owner.

B. The Contractor is advised that under no circumstances shall the Owner's agents take responsibility for receiving any materials or equipment sent to the project site. The Contractor shall make all arrangements to have personnel available to receive all deliveries. The Owner accepts no responsibility for any materials or equipment delivered to the job site.

1.14 STORAGE AND PROTECTION

A. Storage of materials shall be on the sites and location of same on-site is subject to the approval of the Architect and Owner.

B. All construction materials shall be stored in a safe and secure manner.

C. The General Contractor shall provide fencing around all construction supplies, debris, equipment, and construction staging areas throughout the duration of the Project.

D. Gates to construction material/debris storage areas shall be maintained locked at all times unless an authorized worker is in attendance to prevent unauthorized entry.

E. During exterior reconstruction and new construction, the Contractor shall provide overhead protection for any and all existing entry/exits, sidewalks, and egress windows or areas directly below the work site.

1.15 CLEANING-UP

A. All occupied parts of the building affected by renovation activity shall be cleaned at the end of Contractor's work day. The Contractor shall keep all surfaces as free as practical from the accumulation of construction related dust. All surfaces shall be cleaned of dust prior to occupancy by the Owner.

B. The Contractor shall clean up on a regular basis and upon completion of the Work. He shall remove all debris, construction equipment and leave all areas clean, and finishes as required by the specifications, ready for Owner occupancy.

C. All materials removed during the course of the Work shall become the property of this Contractor and shall be immediately removed from the site. The Owner is to have first refusal of any furnishings and/or equipment slated for removal.

D. All debris resulting from the accomplishment of the Work shall be immediately removed from the site.

E. In all special cases (as coordinated with the Owner and Architect) where a Contractor has access to an occupied space during non-operating hours, the Contractor shall be completely responsible for cleaning the work area upon completion of his day's Work, prior to re-occupancy by the Owner.

F. The General Contractor shall be responsible for proper snow removal on a regular basis within the work and staging areas of the addition throughout the duration of the Project.

1.16 LEAD BASED PAINT INVESTIGATION

A. A limited investigation has been made for the presence of lead based paints within areas impacted by the Project. If available, the Contract Documents shall contain the test results.

B. Neither the Owner nor the Architect represent that test results if included in the Contract Documents indicate the conditions that will be encountered in performing the Work. They represent only that the test results indicate conditions encountered at the particular location of the testing. The Contractor shall assume all risk and responsibility for any deductions and conclusions which may be made from these test results.

C. The Owner and Architect disclaim responsibility for any opinions, conclusions, interpretations or deductions that may be expressed or implied in any of the information made available. It is expressly understood that the making of deductions, interpretations, and conclusions from all the accessible factual information is solely the Contractor's responsibility.

D. The Owner may conduct additional investigations as the Work progresses. Additional test results from such investigations will be made available to the Contractor.

1.17 PROJECT LINES AND GRADES

A. Architect will develop a digital construction survey worksheet generating construction stakeout coordinates for clearing limit lines, mass grading grid, ditches, building corners, parking lot corners, catch basins, storm manholes, sanitary manholes, sanitary lines, storm lines water lines, etc. The Site Contractor will be provided Electronic Drawings and coordinate lists in AutoCAD format.

1. Data contained on these electronic files is part of BCA's instruments of service and shall not be used by the Contractor or anyone else receiving this data through or from the Contractor for any purpose other than as a convenience in the preparation of shop drawing submittals for the referenced project. Any other use or reuse by the Contractor or by others will be at your sole risk and without liability or legal exposure to BCA. The Contractor(s) agree to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against BCA, its officers, directors, employees, agents or sub consultants which may arise out of or in any way connected with your use of the electronic files.
2. The Electronic files (AutoCAD) format will be released to the Site Contractor pending the the Site Contractor's acceptance of the Architect's CAD File Release Agreement.
3. The fee for the release Architect's electronic media is $300.00.
4. Under no circumstances shall delivery of the electronic files for use by the Contractor be deemed a sale by BCA. BCA makes no representation or warranty, either express or implied, of merchantability and fitness for any particular purpose. In no event shall BCA be liable for any loss of any profit or any consequential or other damages.

B. The Site Contractor will contract the services of a Licensed Land Surveyor to provide the following project stakeout:

1. The field staking and offsetting of 25 percent of the column lines or the exterior corners of the foundation walls.
2. The field staking of the corners of parking lots, roads, athletic fields, and the center of infrastructure structures. Offsetting the staked points will be the responsibility of the Architect and Site Contractor.
3. Setting of two (2) temporary elevation benchmarks that can be utilized during construction.

C. The Site Contractor will carefully coordinate the Construction Stakeout Work so the site is ready and there is a sufficient amount of Work to keep the survey crew working for at least 1 day. The Owner's Representative will be given 3 working days notice when requesting Survey Stakeout Work.

D. Upon completion of the field staking provided by the Owner, the Site Contractor shall be responsible for protection of the survey points. Should it be required that the survey points be re-established due to no fault of the Owner, the cost associated with this Work will be the responsibility of the Contractor requiring the Work to be performed.

E. Refer to Section 01 7000 - Execution Requirements for Contractor's requirements for laying out his Work.

1.18 RESTRICTED ACCESS

A. The Contractor is hereby notified that access to the site is limited by existing physical and scheduling constraints.

B. Access to and egress from the site for Contractor's employees, trucks, construction machinery, material deliveries, etc., shall be as coordinated and directed by the Owner's designated representative, who shall dictate all traffic patterns.

C. The Owner will designate existing roadways and drives which will be utilized for construction traffic as well as Contractor's staging areas. It is recognized and contemplated by all parties that these areas may sustain damage due to the construction traffic and the General Contractor will, at the time of completion of the Project, be completely responsible for performing all Remedial and Reconstruction Work required to re-construct the driveways, roadways, temporary access roads, and lawn areas as new, in accordance with the requirements of the Contract Documents.

D. Additionally, it shall be the Contractor's responsibility to coordinate his schedule with that of the Owner. The Owner's functions shall take precedence and the Contractor shall ensure safe and convenient access to the existing building on these occasions, subject to the approval of the Owner and the Architect.

1.19 TEMPORARY BARRIERS AND BARRICADES

A. The Contractor shall be responsible for providing temporary barriers and barricades as required and directed by the Owner's designated representative to secure his Work. Barricades to be in place at all times especially when the Contractor is not at the project site. In addition, the General Contractor shall erect barriers for safety and dust control inside and outside the building, as directed by the by the Owner and/or the Architect.

1.20 CONTRACTORS STAGING

A. Areas for the Contractor's vehicle parking, storage trailers, staging, and offices shall be coordinated by the Owner.

1.21 KEY PERSONNEL

A. The Architect and Site Contractor shall have the right to approve the assignments and presence on the job site of all the Contractor's supervisory personnel, including Superintendent, Site Manager and craft foremen to the Work. Removal or reassignment of any such personnel to other Work shall be subject to the prior approval of the Architect.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 1000
SUMMARY - MULTI CONTRACT

PART 1 GENERAL

1.01 PROJECT

A. Project Name: Alterations and Additions to FMES

B. Owner's Name: Highland Falls-Fort Montgomery CSD.

C. Architect's Name: BCA Architects & Engineers.

D. The Project consists of but not limited to the construction and alteration of a new Cafenasium addition, renovation of the existing cafenasium into three new rooms, expansion of the nurse's suite, mechanical and electrical upgrades, renovation of the existing toilet rooms, and site improvements.

1.02 CONTRACT DESCRIPTION

A. Contract Type: Multiple prime contracts, each based on a Stipulated Price.

1.03 DESCRIPTION OF ALTERATIONS WORK

A. Scope of alterations work is indicated on drawings.

B. Plumbing: Alter existing system and add new construction, keeping existing in operation.

C. HVAC: Alter existing system and add new construction, keeping existing in operation.

D. Electrical Power and Lighting: Alter existing system and add new construction, keeping existing in operation.

E. Fire Alarm: Replace existing system with new construction, keeping existing in operation until ready for changeover.

F. Security System: Alter existing system and add new construction, keeping existing in operation.

1.04 WORK BY OWNER

A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by the Owner.

B. Items noted NIC (Not in Contract) will be supplied and installed by Owner before Substantial Completion. Some items include:
   1. Movable cabinets.
   2. Furnishings.
   3. Rugs/walkoff mats.
   4. Card reader access controls on all doors.

C. Owner will supply and install the following:

D. Owner will supply the following for installation by Contractor:

1.05 OWNER OCCUPANCY

A. Owner intends to continue to occupy adjacent portions of the existing building during the entire construction period.

B. Owner intends to occupy the Project upon Substantial Completion.

C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

D. Schedule the Work to accommodate Owner occupancy.

1.06 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas noted on Drawings.
   1. Locate and conduct construction activities in ways that will limit disturbance to site.

B. Arrange use of site and premises to allow:

1. Owner occupancy.
2. Work by Others.
3. Use of site and premises by the public.

C. Provide access to and from site as required by law and by Owner:
1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
2. Do not obstruct roadways, sidewalks, or other public ways without permit.

D. Utility Outages and Shutdown:
1. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
2. Prevent accidental disruption of utility services to other facilities.

1.07 WORK SEQUENCE

A. Coordinate construction schedule and operations with Architect and Construction Manager.

1.08 SPECIFICATION SECTIONS APPLICABLE TO ALL PRIME CONTRACTS

A. All Contractors are responsible for the information regarding thier work on all the drawings and specifications. Each Prime Contractor's scope of work includes the following, but not limited to the following. The below is not intended to limit any Contractor's requirements to review all the drawings for thier work.

B. Unless otherwise noted, all provisions of the sections listed below apply to all contracts. Specific items of work listed under individual contract descriptions constitute exceptions.

C. Division 00 Procurement and Contracting Requirements
1. All Sections including Bidding Requirements, Contract Forms, and Conditions of the Contract.

D. Division 01 General Requirements including but not limited to the following:
1. Section 01 0000 - General Requirements.
2. Section 01 1000 - Summary.
3. Section 01 2000 - Price and Payment Procedures.
4. Section 01 2100 - Allowances.
5. Section 01 2200 - Unit Prices.
6. Section 01 2300 - Alternates.
7. Section 01 3000 - Administrative Requirements.
8. Section 01 3216 - Construction Progress Schedule.
9. Section 01 3529.10 - Life Safety Requirements During School Construction.
10. Section 01 3553 - Security Procedures.
11. Section 01 4000 - Quality Requirements.
12. Section 01 4533 - Code-Required Special Inspections.
13. Section 01 5000 - Temporary Facilities and Controls.
14. Section 01 5100 - Temporary Utilities.
15. Section 01 5500 - Vehicular Access and Parking.
16. Section 01 6000 - Product Requirements.
17. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
18. Section 01 7000 - Execution and Closeout Requirements.
19. Section 01 7800 - Closeout Submittals.
20. Section 01 9113 General Commissioning Requirements.
21. Section 01 9114 Commissioning Authority Responsibilities.

E. Division 02 Existing Conditions
1. Section 02 4119 - Minor Demolition.
2. Section 02 8313 - Lead Hazard Control Activities.

F. Division 02 Concrete

1. Section 03 3000 - Cast-in-Place Concrete.

G. Division 07 Thermal and Moisture Protection
   1. Section 07 8400 - Firestopping.
   2. Section 07 9005 - Joint Sealers.

H. Division 08 Openings
   1. Section 08 3100 - Access Doors and Panels.

I. Division 09 Finishes
   1. Section 09 9000 - Paints and Coatings.

1.09 DRAWINGS APPLICABLE TO ALL PRIME CONTRACTS

A. Unless otherwise noted, all drawing listed below apply to all Contracts.
   1. Drawings: Title Sheet and Index of Drawings.
   2. Drawings: CC series drawings.
   3. Drawings: PP series drawings.
   4. Drawings: RP series drawings.

1.10 TESTING REPORTS APPLICABLE TO ALL CONTRACTS

A. Asbestos, Lead, and PCB Testing Reports.

B. Geotechnical Report.

1.11 CONTRACT NO. 01 - GENERAL CONSTRUCTION (GC)

A. Includes Hazardous Materials, Architectural, Structural, and Site, plus other operations traditionally recognized as General Construction. General Construction contractor is responsible to coordinate all prime contractor tasks. Including administration and coordination responsibilities. Work under this contract includes, but not limited to, the following:
   1. Division 01 - General Requirements:
      a. Specification sections listed above as applicable to all contracts.
      b. Section 01 7000: Basic project engineering and layout.
      c. Section 01 5000: Provide debris receptacles, remove debris from site.
      d. Section 01 5000: Erosion control structures.
      e. Section 01 5000: Temporary Sanitary facilities.
      f. Section 01 5813: Temporary Project Signage.
      g. Section 01 7000: Final cleaning.
   2. Division 2 - Existing Conditions.
      a. Section 02 8213 - Asbestos Abatement.
      b. Section 02 8313 - Lead Safe Work Practices.
      c. Section 02 8314 - Miscellaneous Hazardous & Special Wastes.
   3. Division 3 - Concrete.
      a. With the exception of concrete equipment pads furnished and installed by other prime contracts unless noted otherwise.
   4. Division 4 - Masonry.
   5. Division 5 - Metals.
   6. Division 6 - Woods, Plastics and Composites.
   7. Division 7 - Thermal and Moisture Protection.
      a. With the exception of roof curbing furnished by other prime contracts for installation by the GC.
   8. Division 8 - Openings.
      a. With the exception of the following:
         1) Access doors and panels furnished by other prime contracts for installation by the GC. Card reader access controls
         2) Card reader access controls by the Owner's vendor. GC to coordinate with Owner's vendor.
   9. Division 9 - Finishes.

10. Division 10 - Specialties.
11. Division 11 - Equipment.
12. Division 12 - Furnishings.
13. Division 13 - Special Construction.
14. Division 14 - Conveying Equipment.
15. Division 31 - Earthwork.
16. Division 32 - Exterior Improvements.
17. Division 33 - Utilities.
    a. All Division 33 utilities unless otherwise noted in the Electrical Contract.
18. Division 34 - Transportation.
19. Drawings listed above as applicable to all contracts.
20. Drawings: L series drawings.
21. Drawings: S series drawings.
22. Drawings: A series drawings.
23. Drawings: HM series drawings.
24. Drawings: FS series drawings.

1.12 CONTRACT NO. 03 - PLUMBING (PC)

A. Includes plumbing equipment, fixtures, accessories and piping systems. Work under this contract includes, but not limited, to the following:
    1. Specification sections listed above as applicable to all contracts.
    2. Division 03 - Concrete and the Work of this Contract.
        a. Section 03 -3000 - Cast-in-Place Concrete: Concrete equipment pads.
    3. Division 07 - Thermal and Moisture Protection:
        a. Section 07 8400 - Firestopping: Firestopping of fire-rated vertical and horizontal assembly penetrations, including membrane penetrations for the Work of this Contract. Firestop all openings and voids in fire-rated assemblies occuring from removals of Work.
        b. Section 07 9005 - Joint Sealers for the Work of this Contract.
    4. Division 08 - Openings:
        a. Section 08 3100 - Access Doors and Panels: Access doors and panels in walls and ceilings. Furnish to the GC for installation.
    5. Division 09 - Finishes:
        a. Section 09 9000 - Painting and Coating: Identification painting for equipment and piping.
    6. Division 22 - Plumbing:
        a. All Sections of Division 22
    7. Drawings listed above as applicable to all contracts.
    8. Drawings P series drawings.

1.13 CONTRACT NO. 02 - MECHANICAL (MC)

A. Includes heating, ventilation, air conditioning systems and the temperature control systems. Work under this contract includes, but not limited to, the following:
    1. Specification sections listed above as applicable to all contracts.
    2. Division 03 - Concrete:
        a. Section 03 3000 - Cast-in-Place Concrete: Concrete equipment pads and the Work of this Contract.
    3. Division 07 - Thermal and Moisture Protection:
        a. Section 07 8400 - Firestopping: Firestopping of fire-rated vertical and horizontal assembly penetrations, including membrane penetrations for the Work of this Contract. Firestop all openings and voids in fire-rated assemblies occuring from removals of Work.
        b. Section 07 9005 - Joint Sealants for the Work of this Contract.
        c. Furnish roof curbing, roof equipment rails and pipe portals for installation by the GC.

4. Division 08 - Openings:
    a. Section 08 3100 - Access Doors and Panels: Access doors and panels for walls and ceilings. Furnish to the GC for installation.
5. Division 09 - Finishes:
    a. Section 09 9000 - Painting and Coating: Identification painting for equipment and piping.
6. Division 11 - Equipment:
    a. Section 11 5413 - Kilns.
7. Division 23 - Heating, Ventilating, and Air Conditioning:
    a. All Sections of Division 23.
8. Drawings listed above as applicable to all contracts.
9. Drawings M series drawings.

1.14 CONTRACT NO. 04 - ELECTRICAL (EC)

A. Includes electric power distribution, lighting, technology cabling, fire alarm systems and telecommunications systems. Work under this contract includes, but is not limited to, the following:
    1. Specification sections listed above as applicable to all contracts.
        a. Section 01 5000: Temporary electricity installation.
        b. Section 01 5000: Temporary lighting.
        c. Section 01 5000: Temporary power.
    2. Division 03 - Concrete:
        a. Section 03 3000 - Cast-in-Place Concrete: Concrete equipment pads and the Work of this Contract.
    3. Division 07 - Thermal and Moisture Protection:
        a. Section 07 8400 - Firestopping: Firestopping of fire-rated vertical and horizontal assembly penetrations, including membrane penetrations for the Work of this Contract. Firestop all openings and voids in fire-rated assemblies occuring from removals of Work.
        b. Section 07 9005 - Joint Sealers for the Work of this Contract.
        c. Furnish roof curbing and pipe portals for installation by GC.
    4. Division 08 - Openings:
        a. Section 08 3100 - Access Doors and Panels: Access doors and panels. Furnish to the GC for installation.
    5. Division 09 - Finishes:
        a. Section 09 9000 - Painting and Coating: Identification painting for equipment and piping.
    6. Division 26 - Electrical:
        a. All Sections of Division 26.
    7. Division 27 - Communications:
        a. All Sections of Division 27.
    8. Division 28 - Electronic Safety and Security:
        a. All Sections of Division 28.
            1) EC to coordinate with Owner's Security and Fire Alarm vendor.
    9. Division 33 - Utilities:
        a. Section 33 7000 Electrical Utilities: Electrical utilities.
        b. Section 33 8000 Communications Utilities: Power and communication utilities.
    10. Drawings listed above as applicable to all contracts.
    11. Drawings E series drawings.

1.15 CONTRACT ASSIGNMENTS

A. Contract Assignments: In addition to specific responsibilities indicated in this section, the contracts noted below are assigned certain responsibilities, as follows:

1. Excavation 5'-0" outside the building limits shall be performed by the GC unless otherwise noted.
2. Excavation and backfill within the building limits and extending to 5'-0" outside the building limits shall be performed by each Prime Contractor responsible for said Work. GC shall be responsible for the replacement of concrete slab and flooring materials at all excavated locations.
3. Excavation and backfill 5'-0" outside the building limits shall be performed by the EC for their own Work unless noted otherwise.
4. GC shall be responsible for the removal and replacement of suspended ceiling systems required for the work of all Prime Contracts as noted on the drawings.
5. Blocking for the work of each contract shall be the responsibility of each Prime Contractor for their own Work. Roof blocking shall be the responsibility of the GC. The GC shall be responsible for blocking required for built-in casework and like furnishings as provided by others, unless otherwise noted.
6. Openings in walls, floors and roofs:
    a. In new surfaces: Providing openings, including lintels and structural framing shall be the work of the GC. Each Prime Contractor is responsible for identifying opening sizes and locations for its own work and advising the GC of such, in writing, in a timely manner.
    b. In existing surfaces: Providing openings, including lintels and structural framing shall be the work of the GC. Each Prime Contractor is responsible for identifying opening sizes and locations for its own work and advising the GC of such, in writing, in a timely manner. GC is responsible to patch adjacent surfaces to match the existing conditions. Cut openings under 100 square inches or drilled openings of 8 inches or less in diameter are to be the work of each Prime Contractor.
    c. GC to size lintels and structural framing for openings in accordance with the information on the Drawings and information provided by each Prime Contractor.
    d. Provide openings by personnel experienced in work similar to that indicated for this Project, whose work has resulted in construction with a record of successful service performance.
    e. All penetrations in existing and new fire-rated wall and fire-rated floor/ceiling assemblies shall be the responsibility of each Prime Contractor requiring said penetration, including penetration and membrane firestopping systems. All voids and openings created in fire-rated assemblies by demolition work shall be filled with firestopping systems by each Prime Contractor.
    f. All penetrations in existing and new smoke walls and smoke floor/ceiling assemblies shall be the responsibility of each Prime Contractor requiring said penetration, including penetration and membrane firestopping systems. All voids and openings created by demolition work in smoke partitions and barriers shall be filled with firestopping systems by each Prime Contractor.
    g. All penetrations in new air barriers, vapor barriers and waterproofing membranes shall be the work of the GC. All penetrations in existing air barriers, vapor barriers and waterproofing membranes shall be the work of each Prime Contractor.
7. Furnishing of access doors and panels for the work of each contract shall be by each Prime Contract, except as follows:
    a. In new surfaces: Furnishing and installing wall or ceiling access doors and panels shall be the work of the GC.
    b. In existing surfaces: Furnishing and installing wall and ceiling access doors and panels exposed to view shall be the work of the GC. Each Prime Contract shall be responsible to furnish and install access doors and panels for thier own work which is not exposed to view (i.e.ductwork access panels, etc.) and integral to the equipment. for its own work.
8. Furnishing of roof mounted equipment curbs, equipment rails and pipe portals for the work of each contract shall be the work of each Prime Contract for its own work.

a. Installing of roof-mounted equipment curbs, equipment rails and pipe portals (including flashing, blocking and sealing) shall be the work of the GC in accordance with roofing manuafcturer's requirements..

9. Painting for the work of each contract shall be the work of the GC, except as follows:
   a. Identification painting (such as equipment and piping) for the work of each contract shall be the work of each contract for its own work.
   b. Exposed ductwork (existing or new) identified to be painted shall be the work of the GC.
10. Furnishing linear grilles for casework shall be the work of the MC.
   a. Installation of the linear grilles for casework shall be by the GC.
11. Furnishing mechanical louvers and grilles for exterior walls shall be the work of the MC.
   a. Installation of louvers and grilles for exterior walls (including flashing and sealing) shall be the work of the GC.
12. Furnishing motor starters for the work of each contract shall be the work of each contract for its own work.
   a. Installing motor starters shall be the work of the EC.
13. Providing automatic door operators shall be the work of the GC, including installing control wiring from activation device (push-plate switch) to operator.
   a. Providing power to the operator shall be the work of the EC.
14. Field Engineering and Surveying:
   a. The GC is responsible for the field engineering and surveying for all building work.
   b. The GC is responsible for all field engineering and surveying for all site work.

END OF SECTION

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SECTION 01 1100
ROOF SUMMARY OF WORK

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.02 PROJECT INFORMATION

A. Section Includes:
   1. Scope of Work
   2. Submittal of Bids
   3. Additional Requirements

1.03 PROJECT INFORMATION

A. Project Identification: Highland Falls-Fort Montgomery Elementary School

B. High School Address: 895 Route 9W, Fort Montgomery, NY 10922

C. Project Timing: Completion Summer 2024

1.04 SCOPE OF WORK

A. Fort Montgomery Elementary School: Flat Roof Areas (As indicated on drawings): New 2-Ply Roofing System (Reference Section 07 5200)
   1. Adhere vapor barrier over the deck.
   2. Adhere flat and ¼” tapered, r30 insulation plan based on current drain locations with foam adhesive.
   3. Provide 8x8 sumps at all drain locations with minimum 1/2” slope.
   4. Adhere ½” coverboard (basis of design: DensDeck Prime board) to face of insulation.
   5. Provide blocking around edge and penetrations to accommodate insulation height.
   6. Install all termination bars and counterflashing metal as required to achieve minimum of 8” flashing height. Seal top edge of all termination bars.
   7. At all angle changes for flashings, install a 45 degree wood fiber cant strip in low rise adhesive.
   8. Install modified base sheet field and flashings in cold process adhesive.
   9. Install modified KEE cap sheet field and flashings in spatter spray foam. Contractor to heat weld all seams.
   10. Flashing base plies should return onto the field of the roof at least 6”. Flashing cap plies should return onto the field of the roof at least 9”.
   11. Provide edge metal with engineered pre-fabricated snap on metal edge per wind uplift calculations. Form fascia extenders out of metal flat stock to accommodate blocking height.

1.05 SUBMITTAL OF BIDS

A. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation instructions.

B. Drawings/Details: Submit drawings including installation details of roofing, flashing, fastening, insulation and vapor barrier, including notation of roof slopes and fastening patterns of insulation and base modified bitumen membrane, prior to job start.

C. Design Pressure Calculations: Submit design pressure calculations for the roof area in accordance with ASCE 7 and local Building Code requirements. Include a roof system attachment analysis report, certifying the system's compliance with applicable wind load requirements before Work begins.

D. Recycled or Bio-Based Materials: Provide third-party certification through UL Environment of roof System membranes containing recycled or bio-based materials.

E. Verification Samples: For each modified bituminous membrane ply product specified, two samples, minimum size 6 inches (150 mm) square, representing the actual product, color, and patterns.

F. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic inspection and maintenance of all completed roofing work. Provide product warranty executed by the manufacturer. Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.

1.06 ADDITIONAL REQUIREMENTS

A. It is the intent of “ownership” to purchase all labor and material directly from Garland/DBS, based upon the Agency’s participation in the U.S. Communities™ Government Purchasing Alliance’s program for Roofing Supplies and Related Products and Services, as priced by and awarded to Garland/DBS, resulting from the competitively solicited bid and contract # IFB:PW1925 issued by Racine County.

B. Subcontractor bids for all Non-Garland material and for all labor, tools, equipment and supervision necessary to complete the installation will be submitted directly to Garland/DBS on the approved bid form.

C. Subcontractor will be required to execute a current Garland/DBS Continuing Services Agreement and all Terms and Conditions will apply.

D. Garland/DBS will provide the Owner with Performance and Payment Bonds in the full amount of the contract. Subcontractor does not have any bonding requirements.

E. Prevailing wages apply to this project. Subcontractor will submit Certified Payrolls with each application for payment to Garland/DBS

F. Subcontractor is responsible for acquiring all applicable permits.

G. Subcontractor is responsible for adhering to all OSHA, state, federal, and local regulations.

H. Subcontractor must seek approval from Garland/DBS before performing any or any addition to the Work. Garland/DBS must provide the Subcontractor written documentation of the modification to the Purchase Order within three (3) business days of verbal approval from Contractor that the modification constitutes a change to the Work. Subcontractor is not obligated to perform additional work until written modification has been received from Garland/DBS, but may commence work based upon a reasonable assumption that a Change Order will be issued.
   1. Only changes approved by Garland/DBS in advance will be considered for payment.
   2. Extra work completed without prior approval shall be considered incidental and at no additional cost to Garland/DBS or the Owner.

I. Fasteners for existing Tectum deck must be field tested and approved for wind uplift standards. Field pull-test is the responsibility of the installing contractor.

J. Positive drainage and slope of new insulation (if required) is the responsibility of the installing roofing contractor. Roof must maintain positive drainage and to greatest extent ponding water must be eliminated.

K. Verification of existing system and insulation heights is the responsibility of the installing roofing contractor. Any required core cuts and proper repairs to maintain waterproofing are the responsibility of the installing contractor.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 2000
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

B. Documentation of changes in Contract Sum and Contract Time.

C. Change procedures.

1.02 RELATED REQUIREMENTS

A. AIA Document A101 - 2017 Standard Form of Agreement Between Owner and Contractor.

B. The General Conditions of the Construction Contract, AIA A201 General Conditions of the Contract for Construction.

C. The Supplementary Conditions of Conditions of the Contract for Construction for AIA A201 General Conditions of the Contract for Construction.

D. Section 01 2100 - Allowances: Payment procedures relating to allowances.

E. Section 01 2200 - Unit Prices: Monetary values of unit prices; Payment and modification procedures relating to unit prices.

F. Section 01 7800 - Closeout Submittals: Project record documents.

1.03 SCHEDULE OF VALUES

A. Use Schedule of Values Form: AIA G703, edition stipulated in the Agreement.

B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect for approval.

C. Forms filled out by hand will not be accepted.

D. Submit Schedule of Values digitally via the projects Construction Administration software within 15 days after date of Owner-Contractor Agreement.

E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification section. Identify site mobilzation, bonds, insurance, submittals, closeout, cleaning separately. When the project includes additions or multiple buildings identify each separately.

F. Include in each line item, the amount of Allowances specified in this section. For unit cost Allowances, identify quantities taken from Contract Documents multiplied by the unit cost to achieve the total for the item.

G. Include separately from each line item, a direct proportional amount of Contractor's overhead and profit.

H. Revise schedule to list approved Change Orders, with each Application For Payment.

1.04 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.

B. Use Form AIA G702 and Form AIA G703, edition stipulated in the Agreement.

C. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.

D. Forms filled out by hand will not be accepted.

E. For each item, provide a column for listing each of the following:
   1. Item Number.
   2. Description of work.
   3. Scheduled Values.
   4. Previous Applications.

5. Work in Place and Stored Materials under this Application.
6. Authorized Change Orders.
7. Total Completed and Stored to Date of Application.
8. Percentage of Completion.
9. Balance to Finish.
10. Retainage.
    a. Contractor may request from the Owner a Reduction in or Partial Release of Retainge. The Owner and Architect will review said request and review the Contractor's progress with the Work. Should the request be accepted, the Contractor is to submit AIA Document G707A - Consent of Surety to Reduction in or Partial Release of Retainage along with AIA Document G706- Contractor's Affidavit of Release of Liens, and AIA Document G706 - Contractor's Affidavit of Payment of Debts and Claims for the work completed for the Contractor and the subcontractors.

F. Execute certification by signature of authorized officer.

G. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.

H. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.

I. Submit one electronic and three hard-copies of each Application for Payment.

J. Include the following with the application:
1. Transmittal letter as specified for submittals in Section 01 3000.
2. Construction progress schedule, revised and current as specified in Section 01 3000.
3. Partial release of liens from major subcontractors and vendors.
4. Project record documents as specified in Section 01 7800, for review by Owner which will be returned to the Contractor.
5. Affidavits attesting to off-site stored products.

K. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

L. Each Contractor is to submit to the Owner's Designated Representative their certified payroll and OSHA 10 card in accordance with New York State Labor Law, Article 8 - Contruction.

1.05 MODIFICATION PROCEDURES

A. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Architect will issue instructions directly to Contractor.

B. For other required changes, Architect will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
2. Promptly execute the change.

C. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required . Contractor shall prepare and submit a fixed price quotation within 10 days.

D. Contractor may propose a change by submitting a request for change to Architect, describing the proposed change and its full effect on the work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation and a statement describing the effect on work by separate or other contractors. Do cume

E. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.

F. Substantiation of Costs: Provide full information required for evaluation.
   1. Provide the following data:
      a. Quantities of products, labor, and equipment.
      b. Taxes, insurance, and bonds.
      c. Overhead and profit.
      d. Justification for any change in Contract Time.
      e. Credit for deletions from Contract, similarly documented.
   2. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

G. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

H. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

I. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

J. Promptly enter changes in Project Record Documents.

1.06 APPLICATION FOR FINAL PAYMENT

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

B. Application for Final Payment will not be considered until the following have been accomplished:
   1. All closeout procedures specified in Section 01 7000.
   2. AIA Document G706A - Contractor's Affidavit of Release of Liens.
      a. Prime Contractor to provide at Final Payment.
      b. Each Subcontractor to provide to Prime Contractor. Prime Contractor to provide at Final Payment.
   3. AIA Document G706 - Contractor's Affidavit of Payment of Debts and Claims.
      a. Prime Contractor to provide at Final Payment.
      b. Each Subcontractor to provide to Prime Contractor. Prime Contractor to provide at Final Payment.
   4. AIA Document G707 Consent of Surety to Final Payment.
   5. Contractor's Warranty of Title.
   6. Certification signed and notarized by the Contractor that no asbestos, lead or PCB containing materials have used in the Work..
   7. Insurance.
      a. All policies of insurance required at the commencement of the project shall remain in effect at all times after final payment, when the Contractor is completing, correcting, removing, replacing work and/or completing items enumerated in engineer's Certificate of Substantial Completion. (Certificates of Insurance shall be evidence thereof.)
      b. Completed Operation Insurance: to be maintained for at least two years after final payment. Furnish owner with evidence of continuation at time of final payment and continuation one year thereafter.

END OF SECTION

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SECTION 01 2100
ALLOWANCES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cash allowances.

B. Labor and material allowances.

C. Payment and modification procedures relating to allowances.

1.02 ALLOWANCES

A. When authorized by the Architect/Engineer, cash allowances will be authorized by a Construction Change Directive. The determination shall be as described in Article 7.3 of the General Conditions of the Contract for Construction and Supplementary Conditions of the Contract for Construction.

B. Costs included in the Contractor's labor and materials allowances shall include all costs as outlined in the General Conditions of the Contract for Construction and Supplementary Conditions of the Contract for Construction.

C. Architect/Engineer Responsibilities:
   1. Consult with Contractor for consideration and selection of products.
   2. Select products in consultation with Owner and transmit decision to Contractor.
   3. Prepare allowance authorization.

D. Contractor Responsibilities:
   1. Assist Architect/Engineer in selection of products, suppliers, and installers.
   2. Obtain proposals from suppliers and installers and offer recommendations.
   3. Arrange for and process Shop Drawings, product data, and samples. Arrange for delivery.
   4. Promptly inspect products upon delivery for completeness, damage, and defects.

E. The Owner reserves the right to reduce or eliminate all allowances at any time during this Contract by change order.

1.03 CASH ALLOWANCES

A. Contract No. 1 - General Construction:
   1. Bid Item No.1 - Field Directive Allowance: The General Contractor shall include in his Total Base Bid a cash allowance in the amount $200,000.00 for Work Directive Changes as authorized by the Resident Project Representative in accordance with pertinent provisions of the General Conditions of the Construction Contract.
   2. Bid Item No.2 - Rock Removal Directive Allowance: The General Contractor shall include in his Total Base Bid a cash allowance in the amount $50,000.00 for Work Directive Changes as authorized by the Resident Project Representative in accordance with pertinent provisions of the General Conditions of the Construction Contract.

B. Contract No. 2 - Mechanical:
   1. Bid Item No.1 - Field Directive Allowance: The Mechanical Contractor shall include in his Total Base Bid a cash allowance in the amount $100,000.00 for Work Directive Changes as authorized by the Resident Project Representative in accordance with pertinent provisions of the General Conditions of the Construction Contract.

C. Contract No. 3 - Plumbing:
   1. Bid Item No.1 - Field Directive Allowance: The Plumbing Contractor shall include in his Total Base Bid a cash allowance in the amount $50,000.00 for Work Directive Changes as authorized by the Resident Project Representative in accordance with pertinent provisions of the General Conditions of the Construction Contract.

D. Contract No. 4 - Electrical:

1. Bid Item No.1 - Field Directive Allowance: The Electrical Contractor shall include in his Total Base Bid a cash allowance in the amount $100,000.00 for Work Directive Changes as authorized by the Resident Project Representative in accordance with pertinent provisions of the General Conditions of the Construction Contract.

1.04 PAYMENT AND MODIFICATION PRICE

A. Unit price allowances shall be utilized, when authorized by the Architect/Engineer to determine the value of added or reduced scope to be performed, as described in each Bid Item. Unit pricing shall be prorated based on the actual quantities determined necessary on-site. The ultimate quantities procured may exceed or be less than the quantity stipulated on the Contractor's Form of Proposal and may be utilized in multiple work areas.

B. It is expressly understood that, at the completion of the project, all remaining unused portions of the allowance(s) shall be credited to the Owner. A deductive Change Order shall be prepared by the Architect/Engineer and executed by the Contractor and the Owner.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2200
UNIT PRICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. List of unit prices, for use in preparing Bids.

B. Measurement and payment criteria applicable to Work performed under a unit price payment method.

1.02 RELATED REQUIREMENTS

A. Document 00 2113 - Instructions to Bidders: Instructions for preparation of pricing for Unit Prices.

B. Section 01 2000 - Price and Payment Procedures: Additional payment and modification procedures.

1.03 COSTS INCLUDED

A. Unit Prices included on the Bid Form shall include full compensation for all required labor, products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

1.04 UNIT QUANTITIES SPECIFIED

A. Quantities indicated in the Bid Form are for bidding and contract purposes only. Quantities and measurements of actual Work will determine the payment amount.

1.05 MEASUREMENT OF QUANTITIES

A. Measurement methods delineated in the individual specification sections complement the criteria of this section. In the event of conflict, the requirements of the individual specification section govern.

B. Assist by providing necessary equipment, workers, and survey personnel as required.

1.06 PAYMENT

A. Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities of Work that is incorporated in or made necessary by the Work and accepted by the Architect, multiplied by the unit price.

B. Payment will not be made for any of the following:
   1. Products wasted or disposed of in a manner that is not acceptable.
   2. Products determined as unacceptable before or after placement.
   3. Products not completely unloaded from the transporting vehicle.
   4. Products placed beyond the lines and levels of the required Work.
   5. Products remaining on hand after completion of the Work.
   6. Loading, hauling, and disposing of rejected Products.

1.07 DEFECT ASSESSMENT

A. Replace Work, or portions of the Work, not complying with specified requirements.

1.08 SCHEDULE OF UNIT PRICES

A. Unit Price Item No. 1: Bulk Rock Removal - per cubic yard; Section 31 0000 - Earthwork, Part 1 General, Paragraph 1.03.

B. Unit Price Item No. 2: Trench Rock Removal - per cubic yard; Section 31 0000 - Earthwork, Part 1 General Paragraph 1.03.

C. Unit Price Item No. 3: Unsuitable Insitu Materials - per cubic yard; For materials determined by the Engineer to be unsuitable for use as fill material in place. Payment shall include excavation of unsuitable insitu materials, legal disposal off-site, and placement of granular fill material as in-place fill.

D. Unit Price Item No. 4: Asbestos Abatement - per mudded fitting. For fittings found to contain asbestos or asbestos containing material, base on testing provided by third party agency, provide all labor and materials to remove. Payment shall include removal and legal disposal off-site.

E. Unit Price Item No. 5: Asbestos Abatement - per linear foot of asbestos containing insulation. For asbestos or asbestos containing material, base on testing provided by third party agency, provide all labor and materials to remove. Payment shall include removal and legal disposal off-site.

F. Unit Price Item No. 6: Asbestos Abatement - per square foot of asbestos containing floor tile and mastic. For asbestos or asbestos containing material, base on testing provided by third party agency, provide all labor and materials to remove. Payment shall include removal and legal disposal off-site.

G. Unit Price Item No. 7: Interior Concrete Slab Trenching - per square foot; For concrete slab saw cutting and earth removal for underslab piping renovation work. The piping renovation work is base bid and will be by others. Payment shall include saw cutting the existing concrete slab, trenching, and trench in-fill. Payment shall include excavation, legal disposal off-site, and placement of suitable soils and in-place concrete to match existing slab thickness, level, and condition.

H. Unit Price Item No. 8: Asphalt Paving (Standard and Heavy Duty) - per square foot; For full depth system (subbase, binder, and topcourse).

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 3000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General administrative requirements.

B. Electronic document submittal service.

C. Preconstruction meeting.

D. Site mobilization meeting.

E. Progress meetings.

F. Construction progress schedule.

G. Contractor's daily reports.

H. Progress photographs.

I. Coordination drawings.

J. Submittals for review, information, and project closeout.

K. Number of copies of submittals.

L. Requests for Interpretation (RFI) procedures.

M. Submittal procedures.

1.02 RELATED REQUIREMENTS

A. Section 01 6000 - Product Requirements: General product requirements.

B. Section 01 7000 - Execution and Closeout Requirements: Additional coordination requirements.

C. Section 01 7800 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

D. Section 01 9113 - General Commissioning Requirements: Additional procedures for submittals relating to commissioning.
   1. Where submittals are indicated for review by both Architect and the Commissioning Authority, submit one extra and route to Architect first, for forwarding to the Commissioning Authority.
   2. Where submittals are not indicated to be reviewed by Architect, submit directly to the Commissioning Authority; otherwise, the procedures specified in this section apply to commissioning submittals.

1.03 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with requirements of Section 01 7000 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

B. Make the following types of submittals to Architect:
   1. Requests for Interpretation (RFI).
   2. Requests for substitution.
   3. Shop drawings, product data, and samples.
   4. Test and inspection reports.
   5. Design data.
   6. Manufacturer's instructions and field reports.
   7. Applications for payment and change order requests.
   8. Progress schedules.
   9. Coordination drawings.
   10. Correction Punch List and Final Correction Punch List for Substantial Completion.
   11. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF) format, as appropriate to the document, and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.
   1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.

B. Contractor and Architect are required to use this service.
   1. It is Contractor's responsibility to submit documents in allowable format.
   2. Subcontractors, suppliers, and Architect's consultants will be permitted to use the service at no extra charge.
   3. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
   4. Paper document transmittals will not be reviewed; emailed electronic documents will not be reviewed.
   5. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.

C. BCA Architects & Engineers use Newforma Project Center as their construction management software to control and streamline project tasks such as construction RFI’s, proposal requests, submittals, transmittals, and other related project collaboration. Each Prime Contractor is required to interface with this software.
   1. BCA’s Contract Administration allows the Contractor (Newforma Team Member) to send RFI’s, submittals and change order requests electronically. This process saves time, money and allows the Contractor to view the history of all items for the project duration.
   2. Contractors will be given instructions on how to utilize Newforma Project Center upon execution of Agreements.
   3. A Contractor (Newforma Team Member) who has worked with BCA and has previously been issued a Newforma password can re-use that password for all projects. If a Newforma Team Member has forgotten their password, they can request a password be re-sent to them.
   4. When a new Contractor contact is added to the Newforma Project Team (by BCA Contract Administration) for a specific project, the Contractor will receive an email informing them that they have been added to the project. The email will provide a username and temporary password. Once this information is received, the Contractor (Newforma Team Member) should follow the link within the email to the “Info Exchange” log-in screen. It is recommended that the Newforma Team Member save this link for future use. Once the username and password are inserted, the Newforma Team Member will be prompted to create a permanent password. After the new password is created, the Newforma Team Member will be directed to the Info Exchange home page. From this page, the Newforma Team Member will select the “My Projects” option in the upper left corner of the page. From this page the Newforma Team Member will select the project that they are involved in. This will lead to the project site screen. Along the left-hand side are a series of options available to the Newforma Team Member.

5. File transfers are used to send and receive large files without using email. Items such as addenda, JC (job change) drawings, meeting minutes, and other project related items may be posted at this location for the Newforma Team Member's use. Some files may be posted for a limited period of time; therefore, Newforma Team Members should download and store files on their own servers.
6. At any time, should a Newforma Team Member have a question regarding Newforma's Info Exchange, they can contact BCA's Document Control Manager, Kristan Peck at (315) 782-8130, ext. 226.

D. Project Closeout: Architect will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Owner.

3.02 PRECONSTRUCTION MEETING

A. Architect will schedule a meeting after Notice of Award.

B. Attendance Required:
1. Owner.
2. Architect amd Architect's Resident Project Representative
3. Contractor.
4. Major Sub-contractors.

C. Agenda:
1. Execution of Owner-Contractor Agreement.
2. Submission of executed bonds and insurance certificates.
3. Distribution of Contract Documents.
4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
5. Submission of initial Submittal schedule.
6. Designation of personnel representing the parties to Contract, Owner and Architect.
7. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
8. Scheduling.
9. Scheduling activities of a Geotechnical Engineer.
10. Scheduling activities of an Asbestos Project Monitor.
11. Site Mobilization.

D. Record minutes and distribute copies withinseven days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.03 SITE MOBILIZATION MEETING

A. Attendance Required:
1. Contractor.
2. Owner.
3. Architect.
4. Contractor's superintendent.
5. Major subcontractors.

B. Agenda:
1. Use of premises by Owner and Contractor.
2. Owner's requirements.
3. Construction facilities and controls provided by Owner.
4. Temporary utilities provided by Owner.
5. Survey and building layout.
6. Security and housekeeping procedures.
7. Schedules.
8. Application for payment procedures.
9. Procedures for testing.
10. Procedures for maintaining record documents.

11. Requirements for start-up of equipment.
12. Inspection and acceptance of equipment put into service during construction period.

C. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the work at maximum bi-monthly intervals.

B. Architect will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required:
1. Contractor.
2. Owner.
3. Architect.
4. Contractor's superintendent.
5. Major subcontractors.

D. Agenda:
1. Review minutes of previous meetings.
2. Review of work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede, or will impede, planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of RFIs log and status of responses.
7. Review of off-site fabrication and delivery schedules.
8. Maintenance of progress schedule.
9. Corrective measures to regain projected schedules.
10. Planned progress during succeeding work period.
11. Coordination of projected progress.
12. Maintenance of quality and work standards.
13. Effect of proposed changes on progress schedule and coordination.
14. Other business relating to work.

E. Record minutes and distribute copies within seven days after meeting to participants, with one copies to Architect, Owner, participants, and those affected by decisions made.

3.05 CONSTRUCTION PROGRESS SCHEDULE

A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of work, with a general outline for remainder of work.

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
1. Include written certification that major contractors have reviewed and accepted proposed schedule.

D. Within 10 days after joint review, submit complete schedule.

E. Submit updated schedule with each Application for Payment.

3.06 DAILY CONSTRUCTION REPORTS

A. Include only factual information. Do not include personal remarks or opinions regarding operations and/or personnel.

B. Prepare a daily construction report recording the following information concerning events at Project site and project progress:
1. Date.

2. High and low temperatures, and general weather conditions.
3. List of subcontractors at Project site.
4. List of separate contractors at Project site.
5. Approximate count of personnel at Project site.
    a. Include a breakdown for supervisors, laborers, journeymen, equipment operators, and helpers.
6. Major equipment at Project site.
7. Material deliveries.
8. Safety, environmental, or industrial relations incidents.
9. Meetings and significant decisions.
10. Stoppages, delays, shortages, and losses. Include comparison between scheduled work activities (in Contractor's most recently updated and published schedule) and actual activities. Explain differences, if any. Note days or periods when no work was in progress and explain the reasons why.
11. Change Orders received and implemented.
12. Testing and/or inspections performed.
13. Signature of Contractor's authorized representative.

3.07 PROGRESS PHOTOGRAPHS

A. Submit new photographs at least once a month, within 3 days after being taken.

B. Maintain one set of all photographs at project site for reference; same copies as submitted, identified as such.

C. Photography Type: Digital; electronic files.

D. Provide photographs of site and construction throughout progress of work produced by an experienced photographer, acceptable to Architect.

E. In addition to periodic, recurring views, take photographs of each of the following events:
    1. Completion of site clearing.
    2. Excavations in progress.
    3. Foundations in progress and upon completion.
    4. Structural framing in progress and upon completion.
    5. Enclosure of building, upon completion.
    6. Final completion, minimum of ten (10) photos.

F. Views:
    1. Provide non-aerial photographs from four cardinal views at each specified time, until date of Substantial Completion.
    2. Consult with Architect for instructions on views required.
    3. Provide factual presentation.
    4. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.

G. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
    1. Delivery Medium: Via email.
    2. File Naming: Include project identification, date and time of view, and view identification.
    3. PDF File: Assemble all photos into printable pages in PDF format, with 2 to 3 photos per page, each photo labeled with file name; one PDF file per submittal.

3.08 COORDINATION DRAWINGS

A. Provide information required by Resident Project Representative for preparation of coordination drawings.

B. Review drawings prior to submission to Architect.

3.09 REQUESTS FOR INTERPRETATION (RFI)

A. Definition: A request seeking one of the following:
   1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
   2. A resolution to an issue which has arisen due to field conditions and affects design intent.

B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.

C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
   1. Prepare a separate RFI for each specific item.
      a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
      b. Do not forward requests which solely require internal coordination between subcontractors.
   2. Prepare using software provided by the Electronic Document Submittal Service.

D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
   1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
   2. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
      a. Approval of submittals (use procedures specified elsewhere in this section).
      b. Approval of substitutions (see Section - 01 6000 - Product Requirements)
      c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
      d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
   3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
   4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
      a. The Owner reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the Architect, and any of its consultants, due to processing of such RFIs.

E. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
   1. Official Project name and number, and any additional required identifiers established in Contract Documents.
   2. Owner's, Architect's, and Contractor's names.
   3. Discrete and consecutive RFI number, and descriptive subject/title.
   4. Issue date, and requested reply date.
   5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
   6. Annotations: Field dimensions and/or description of conditions which have engendered the request.

7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.

F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.

G. Review Time: Architect will respond and return RFIs to Contractor within ten calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
   1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

H. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
   1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
   2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
   3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
   4. Notify Architect within ten calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.10 SUBMITTAL SCHEDULE

A. Submit to Architect for review a schedule for submittals in tabular format.
   1. Submit at the same time as the preliminary schedule specified in Section - 01 3216 - Construction Progress Schedule.
   2. Coordinate with Contractor's construction schedule and schedule of values.
   3. Format schedule to allow tracking of status of submittals throughout duration of construction.
   4. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
   5. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.
      a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make corrections or revisions to initial submittals, and time for their review.

3.11 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
   1. Product data.
   2. Shop drawings.
   3. Samples for selection.
   4. Samples for verification.

B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.

C. Samples will be reviewed for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 7800 - Closeout Submittals.

3.12 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
   1. Design data.
   2. Certificates.
   3. Test reports.
   4. Inspection reports.
   5. Manufacturer's instructions.
   6. Manufacturer's field reports.
   7. Other types indicated.

B. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.

C. Submit for Architect's knowledge as contract administrator or for Owner.

3.13 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Correction Punch List for Substantial Completion.

B. Submit Final Correction Punch List for Substantial Completion.

C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 7800 - Closeout Submittals:
   1. Project record documents.
   2. Operation and maintenance data.
   3. Warranties.
   4. Bonds and Insurance: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage. Coordinate with the General Conditions of the Construction Contract and the Supplementary Conditions.
   5. Field Test Reports. Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
   6. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
      a. Name, address, and telephone number of factory-authorized service representative making report.
      b. Statement on condition of substrates and their acceptability for installation of product.
      c. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
      d. Results of operational and other tests and a statement of whether observed performance complies with requirements
      e. Statement whether conditions, products, and installation will affect warranty.
      f. Other required items indicated in individual Specification Sections.
   7. Other types as indicated.

D. Final Property Survey.

E. Submit for Owner's benefit during and after project completion.

3.14 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

B. Extra Copies at Project Closeout: See Section 01 7800.

C. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
   1. After review, produce duplicates.
   2. Retained samples will not be returned to Contractor unless specifically so stated.

3.15 SUBMITTAL PROCEDURES

A. General Requirements:
   1. Use a single transmittal for related items.
   2. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
   3. Transmit using approved form.
      a. Use form generated by Electronic Document Submittal Service software.
   4. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
   5. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
      a. Subcontract List:: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
         1) Name, address, and telephone number of entity performing subcontract or supplying products.
         2) Number and title of related Specification Section(s) covered by subcontract.
         3) Drawing number and detail references, as appropriate, covered by subcontrac
   6. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
      a. Mark each copy of each submittal to show which products and options are applicable.
      b. Include the following information, as applicable:
         1) Manufacturer's written recommendations.
         2) Manufacturer's product Specifications.
         3) Manufacturer's installation instructions.
            (a) Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer.
               (1) Preparation of substrates
               (2) Required substrate tolerances
               (3) Sequence of installation or erection.
               (4) Required installation tolerances.
               (5) Required adjustments.
               (6) Recommendations for cleaning and protection.
         4) Color charts.
         5) Manufacturer's catalog cuts.
         6) Wiring diagrams showing factory-installed wiring.
         7) Printed performance curves.
         8) Operational range diagrams.
         9) Mill reports.
         10) Standard product operation and maintenance manuals.
         11) Compliance with specified referenced standards.
         12) Testing by recognized testing agency.
         13) Application of testing agency labels and seals.
         14) Notation of coordination requirements.
         15) Submit product data before or concurrent with samples.

7. Delegated Design:
    a. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
        1) If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
8. Delegated-Design Submittal: In addition to Shop Drawings, product data, and other required submittals, submit one (1) copy of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
    a. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.
9. Design Data: Prepare written and graphic information including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
10. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents
11. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
12. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
13. Schedule of Tests and Inspections: Comply with requirements specified in Section 01 4000.
14. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
    a. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect
    b. Contractor Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents
    c. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
15. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
    a. Upload submittals in electronic form to Electronic Document Submittal Service.
16. Schedule submittals to expedite the Project, and coordinate submission of related items.
    a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
    b. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 7 days.

c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Architect's approval, allow an additional 30 days.

17. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
18. Provide space for Contractor and Architect review stamps.
19. When revised for resubmission, identify all changes made since previous submission.
20. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
21. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
22. Submittals not requested will not be recognized or processed.
23. Submittals not requested will be recognized, and will be returned "Not Reviewed",

B. Product Data Procedures:
1. Submit only information required by individual specification sections.
2. Collect required information into a single submittal.
3. Submit concurrently with related shop drawing submittal.
4. Do not submit (Material) Safety Data Sheets for materials or products.
a. Submit information directly to Owner; do not submit to Architect

C. Shop Drawing Procedures:
1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
2. Do not reproduce Contract Documents to create shop drawings.
3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

D. Samples Procedures: Submit samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit related items together as single package.
2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.
a. Generic description of sample.
b. Product name and name of manufacturer.
c. Sample source.
d. Number and title of appropriate Specification Section.
e. Disposition: Maintain sets of approved samples at Project Site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
1) Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such samples must be in an undamaged condition at time of use.
2) Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
3) Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
4) Number of Samples: Submit two (2) full set of available choices where color, pattern, texture, or similar characteristics are required to be elected from manufacturer's product line. Architect will return submittal with options selected.

5) Samples for Verification: Submit full-size units or samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples shall include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
6) Number of Samples: Submit three (3) sets of samples. Architect will retain one (1) sample set; remainder will be returned. Mark-up and retain one (1) returned sample set as a Project Record Sample.
7) Submit a single sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
8) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a sample, submit at least three (3) sets of paired units that show approximate limits of variations.

3. Include with transmittal high-resolution image files of samples to facilitate electronic review and approval. Provide separate submittal page for each item image.

E. Schedule: Comply with requirements specified in Section 01 3216 - Construction Progress Schedule. Coordinate submittals with approved construction progress schedule.

F. Schedule of Values: Comply with requirements specified in Section 01 2000 Price and Payment Procedures, the General Conditions of the Construction Contract and Supplementary Conditions.

3.16 SUBMITTAL REVIEW

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Submittals for Review: Architect will review each submittal, and approve, or take other appropriate action.

C. Submittals for Information: Architect will acknowledge receipt and review. See below for actions to be taken.

D. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
1. Notations may be made directly on submitted items and/or listed on appended Submittal Review cover sheet.

E. Architect's and consultants' actions on items submitted for review:
1) Final Unrestricted Release: When the Architect marks a submittal "No Exceptions Taken", the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.
2) Final-But-Restricted Release: When the Architect marks a submittal "Exceptions As Noted", the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final payment depends on that compliance.
3) Restricted Release, Returned for Resubmittal: When the Architect marks a submittal “For Construction According to Notations, Revise and Resubmit”, the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final payment depends on that compliance. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark.

4) Resubmit corrected item, with review notations acknowledged and incorporated. Resubmit separately, or as part of project record documents.
5) Non-responsive resubmittals may be rejected.

b. "Revise and Resubmit".
1) Returned for Resubmittal: When the Architect marks a submittal "Resubmit", do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or ther activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark.
2) Resubmit revised item, with review notations acknowledged and incorporated.
3) Non-responsive resubmittals may be rejected.

F. Architect's and consultants' actions on items submitted for information:

G. Do not use or allow others to use submittals marked "Resubmit" at the Project Site or elsewhere where Work is in progress.

H. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

I. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION

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SECTION 01 3529.10
LIFE SAFETY REQUIREMENTS DURING SCHOOL CONSTRUCTION

PART 1 GENERAL

1.01 BASIC REQUIREMENTS

A. All Construction shall comply with the New York State Education Department Commissioner's Regulations, Section 155.5 Uniform Safety Standards for School Construction and Maintenance Projects.

B. The occupied portion of the school building shall always comply with the minimum requirements necessary to maintain a valid Certificate of Occupancy and shall be monitored during construction for safety violations by School District personnel.

C. The areas to be disturbed by reconstruction, alteration or demoition have been tested for the presence of asbestos and lead. See Section 02 2600 for additional information.

1.02 SAFETY AND SECURITY STANDARDS

A. General Safety and Security Standards for Construction Projects:

1. All Construction, Reconstruction and Renovation Work shall be performed in a manner to protect the workers and public from injury. Adjoining property and structures shall be protected from damage at all times by all Contractors.
2. The Contractors are to maintain clear and safe passage through the existing corridors throughout the duration of the project.
3. All construction materials shall be stored in a safe and secure manner.
4. Fences around construction supplies or debris shall be maintained. Gates shall always be locked unless a worker is in attendance to prevent unauthorized entry.
5. During exterior renovation Work, overhead protection shall be provided for any entry/exit, sidewalks, or areas immediately beneath the Work Site and such areas shall be fenced off and provided with warning signs to prevent unauthorized entry.
6. Workers shall be required to wear photo-identification badges at all times for identification and security purposes while working at the Project Site.
7. Exterior Protection of Pedestrians:

Height of Construction	Distance from Construction to Lot Line	Type of Protection
8 feet or less	Less than 5 feet	Construct railings
8 feet or less	5 feet or more	None
More than 8 feet	Less than 5 feet	Barrier and covered walkway
More than 8 feet	5 feet or more, but no more than one-forth the height of construction	Barrier and covered walkway
More than 8 feet	5 feet or more, but between one-forth and one-half the height of construction	Barrier
More than 8 feet	5 feet or more, but exceeding one-half the height of construction	None

   a. Barrier Design: Barriers shall be designed to resist loads required in Chapter 16 of the Building Code of New York State.

8. Throughout the duration of the project, the E-Contractor (Electrical) is responsible for the maintenance and operation of the existing fire alarm and fire detection system throughout the building including areas occupied by the Owner and areas of renovation.

1.03 SEPARATION

A. Separation of Construction Areas from Occupied Spaces.
   1. Construction areas which are under the control of a Contractor and, therefore, not occupied by District staff or students shall be separated from occupied areas by code compliant construction.
   2. Provisions shall be made to prevent the passage of dust and contaminants into occupied parts of the building. Periodic inspection and repairs of the containment barriers must be made to prevent exposure to dust or contaminants.
   3. Type 'X' gypsum board on metal studs must be used in exit ways and other areas that require fire rated separation.
   4. Heavy duty plastic sheeting may be used only for a vapor, fine dust or air infiltration barrier, and shall not be used to separate occupied spaces from construction areas.
   5. School buildings occupied during a Construction Project shall maintain required health, safety, and educational capabilities at all times that classes are in session.
   6. A specific stairwell and/or elevator shall be assigned for construction worker use during work hours. In general, construction workers may not use corridors, stairs, or elevators designated for students or school staff.
   7. Large amounts of debris must be removed by using enclosed chutes or a similar sealed system. There shall be no movement of debris through halls of occupied spaces of the building. No material shall be dropped or thrown outside the walls of the building.
   8. All occupied parts of the building affected by renovation activity shall be cleaned at the close of each work day utilizing hepa filtered vacuum system.

1.04 VENTILATION

A. The existing ventilation system shall be maintained throughout the Project in occupied areas.

B. The Contractor shall provide temporary ventilation and/or modification to existing ventilation systems as indicated in the Construction Drawings or as required by the Architect, Resident Project Representative, and Owner.

1.05 EXITING

A. Required building exiting shall be maintained at all times so that there are no dead end conditions or corridor pockets greater than 1-1/2 times the corridor or pocket width.

B. The Contractor shall provide temporary exits and related construction to maintain exiting capacities as required in the Construction Drawings or determined by the Architect, Resident Project Representative, and Owner.

1.06 FIRE AND HAZARD PREVENTION

A. Areas of buildings under construction that are to remain occupied shall maintain a Certificate of Occupancy. In addition, all requirements itemized on the Fire Safety Inspection Report shall be in compliance during periods of student or staff occupancy, the following shall be strictly enforced.
   1. NO SMOKING IS ALLOWED ON PUBLIC SCHOOL PROPERTY, INCLUDING CONSTRUCTION AREAS.
   2. During construction daily inspections of District occupied areas shall be conducted by School District personnel to assure that construction materials, equipment, or debris do not block fire exits or emergency egress windows. The Contractor shall promptly move any or all construction debris, materials, and/or equipment as required to maintain exist passages at all times and clear during student or staff occupancy.
   3. Proper operation of fire extinguishers, fire alarm, and smoke/fire detection systems shall be maintained throughout the duration of the Project.

1.07 NOISE ABATEMENT

A. Construction activities and operations shall not produce noise in excess of 60 dba in occupied spaces. If noise levels in occupied classroom spaces exceed 60 dba the Contractor shall provide acoustical abatement procedures or schedule activities during unoccupied times. Each Contractor is advised that the School District may schedule "no work" periods during the Project.

1.08 HAZARD CONTROL

A. The Contractor shall take every precaution to eliminate the potential of construction fumes entering the occupied building. The Contractor shall take care to assure fresh air intakes do not draw construction related fumes into the building.
   1. The contractor shall be responsible for the control of chemical fumes, gases, and other contaminates produced by welding, gasoline or diesel engines, roofing, paving, painting, etc. to ensure they do not enter occupied portions of the building or air intakes.

B. The Contractor shall provide for "off-gassing" of volatile organic compounds introduced during construction before occupancy. Specific attention is warranted for activities including glues, paint, furniture, carpeting, wall coverings, and drapery. Manufacturers shall be contacted to obtain information regarding appropriate temperatures and times needed to cure or ventilate the product during use and before safe occupancy of a space can be assured. Building materials or furnishings which "off-gas" chemical fumes, gases, or other contaminants shall be aired out in a well-ventilated heated warehouse before it is brought to the Project Site for installation or the manufacturer's recommended "off-gassing" periods must be scheduled between installation and use of the space. If the Work will generate toxic gases that cannot be contained in an isolated area, the Work must be done when school classes and programs are not in session. The Work Areas must be properly ventilated and the material must be given proper time to cure or "off gas" before re-occupancy.

C. The Contractor shall maintain the Manufacturer's Material Safety Data Sheets (MSDS) at the site for all products used in the project. MSDS shall be provided to the School District when requested. MSDS indicate chemicals used in the product, product toxicity, typical side effects of exposure to the product, and safe procedures for use of the product.

D. Asbestos abatement protocols. All asbestos abatement projects shall comply with all applicable federal and State laws including but not limited to the New York State Department of Labor industrial code rule 56(12 NYCRR 56), and the Federal Asbestos Hazard Emergency Response Act(AHERA),40 CFR Part 763 (Code of Federal Regulations, 1998 Edition, Superintendent of Public Documents, U.S. Government Printing Office, Washington, DC 20402; 1998.
   1. Large and small asbestos abatement projects as defined by 12NYCRR56 shall not be performed while the building is occupied.” Note, It is the State Education Department's current interpretation that the term “building”, as referenced in this section, means a wing or major section of a building that can be completely isolated from the rest of the building with sealed non combustible construction. The isolated portion of the building must contain potential contaminates which do not pass through the occupied portion and ventilation systems and must be physically separated and sealed at the isolation barrier.
   2. Exterior work such as roofing, flashing, siding, or soffit work may be performed on occupied buildings provided proper variances are in place as required, and complete isolation of ventilation systems and at windows is provided. Care must be taken to schedule work so that classes are not disrupted by noise or visual distraction.
   3. Reference Sections 02 8213 Asbestos Abatement and 02 8314 Miscellaneous Hazardous & Special Wastes for additional information.

E. Asbestos Abatement Protocols. If, in the event unknown, unsuspected asbestos containing materials are discovered in a friable state, or disturbed, or required to be removed to safely accommodate required construction, notify the Architect, Resident Project Representative, and Owner immediately.

F. Lead paint. Any construction or maintenance operations which will disturb lead based paint will require abatement of those areas pursuant to protocols detailed in the "Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing" (June 1995; U.S. Department of Housing and Urban Development, 451 7th Street SW, Washington, D.C. 20410 (202)401-0388; available at the Department of Housing and Urban Renewal web site; www.hud.gov/lea/leadwnlo.html). All areas scheduled for construction as well as areas of flaking and peeling paint shall be tested for the presence of lead and abated or encapsulated in accordance with the above noted guidelines. EPA Certified Lead Risk Assessor must perform analysis and an EPA Certified Lead Supervisor whom is also a New York State licensed Architect or Engineer shall prepare the Lead Hazard Control Plan.

1. Reference Sections 02 6200 Asbestos, Lead and Pcb Assessment for additional information.

G. Lead Paint. All existing painted surfaces identified as lead containing will require control and clean-up pursuant to protocols detailed in the "Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing" (June 1995; U.S. Department of Housing and Urban Development, 451 7th Street SW, Washington, D.C. 20410 (202) 401-0388; available at the Department of Housing and Urban Renewal web site; www.hud.gov/lea/leadwnlo.html). All areas scheduled for construction as well as areas of flaking and peeling paint shall be tested for the presence of lead and abated or encapsulated in accordance with the above noted guidelines. EPA Certified Lead Risk Assessor must perform analysis.

1.09 POST CONSTRUCTION INSPECTION

A. Each Contractor is advised that the School District shall be provided the opportunity for a walk-through inspection by the School District's Health and Safety Committee members to confirm building safety during construction and that the area is ready to be re-opened for occupancy.

PART 2 PRODUCTS - NOT USED.

PART 3 EXECUTION - NOT USED.

END OF SECTION

SECTION 01 4000
QUALITY REQUIREMENTS

PART 3 EXECUTION

1.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

1.02 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not complying with specified requirements.

END OF SECTION

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SECTION 01 4533
CODE-REQUIRED SPECIAL INSPECTIONS AND PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Code-required special inspections.

B. Testing services incidental to special inspections.

C. Submittals.

1.02 RELATED REQUIREMENTS

A. Statement of Special Inspections

B. Section 01 3000 - Administrative Requirements: Submittal procedures.

C. Section 01 4000 - Quality Requirements.

D. Section 01 6000 - Product Requirements: Requirements for material and product quality.

1.03 DEFINITIONS

A. Code or Building Code: ICC (IBC), International Building Code, Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements and specifically, Chapter 17 - Special Inspections and Tests.

B. Authority Having Jurisdiction (AHJ): Agency or individual officially empowered to enforce the building, fire and life safety code requirements of the permitting jurisdiction in which the Project is located.

C. Special Inspection:
   1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the AHJ that also require special expertise to ensure compliance with the approved Contract Documents and the referenced standards.
   2. Special inspections are separate from and independent of tests and inspections conducted by Owner or Contractor for the purposes of quality assurance and contract administration.

1.04 REFERENCE STANDARDS

A. ACI 318 - Building Code Requirements for Structural Concrete; 2019 (Reapproved 2022).

B. AISC 360 - Specification for Structural Steel Buildings; 2022.

C. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field; 2023.

D. ASTM C172/C172M - Standard Practice for Sampling Freshly Mixed Concrete; 2017.

E. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2023.

F. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2021.

G. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2021.

H. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestop Systems; 2020a.

I. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers; 2020a.

J. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).

K. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2018, with Errata (2022).

L. AWS D1.4/D1.4M - Structural Welding Code - Steel Reinforcing Bars; 2018, with Amendment (2020).

M. IAS AC291 - Accreditation Criteria for Special Inspection Agencies AC291; 2019.

N. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

O. SDI (QA/QC) - Standard for Quality Control and Quality Assurance for Installation of Steel Deck; 2017.

P. SUBMITTALS
   1. See Section 01 3000 - Administrative Requirements, for submittal procedures.
   2. Special Inspection Agency Qualifications: Prior to the start of work, the Special Inspection Agency is required to:
      a. Submit agency name, address, and telephone number, names of full time registered Engineer and responsible officer.
      b. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
      c. Submit certification that Special Inspection Agency is acceptable to AHJ.
   3. Special Inspection Reports: After each special inspection, Special Inspector is required to promptly submit at least two copies of report; one to Architect and one to the AHJ.
      a. Include:
         1) Date issued.
         2) Project title and number.
         3) Name of Special Inspector.
         4) Date and time of special inspection.
         5) Identification of product and specifications section.
         6) Location in the Project.
         7) Type of special inspection.
         8) Date of special inspection.
         9) Results of special inspection.
         10) Compliance with Contract Documents.
      b. Final Special Inspection Report: Document special inspections and correction of discrepancies prior to the start of the work.
   4. Test Reports: After each test or inspection, promptly submit at least two copies of report; one to Architect and one to AHJ.
      a. Include:
         1) Date issued.
         2) Project title and number.
         3) Name of inspector.
         4) Date and time of sampling or inspection.
         5) Identification of product and specifications section.
         6) Location in the Project.
         7) Type of test or inspection.
         8) Date of test or inspection.
         9) Results of test or inspection.
         10) Compliance with Contract Documents.
   5. Certificates: When specified in individual special inspection requirements, Special Inspector shall submit certification by the manufacturer, fabricator, and installation subcontractor to Architect and AHJ, in quantities specified for Product Data.
      a. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

1.05 SPECIAL INSPECTION AGENCY

A. Owner or Architect will employ services of a Special Inspection Agency to perform inspections and associated testing and sampling in accordance with ASTM E329 and required by the building code.

B. The Special Inspection Agency may employ and pay for services of an independent testing agency to perform testing and sampling associated with special inspections and required by the building code.

C. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

D. TESTING AND INSPECTION AGENCIES

1.06 QUALITY ASSURANCE

A. Special Inspection Agency Qualifications:
   1. Independent firm specializing in performing testing and inspections of the type specified in this section.
   2. Accredited by IAS according to IAS AC291.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 SCHEDULE OF SPECIAL INSPECTIONS, GENERAL

A. Frequency of Special Inspections: Special Inspections are indicated as continuous or periodic.
   1. Continuous Special Inspection: Special Inspection Agency is required to be present in the area where the work is being performed and observe the work at all times the work is in progress.
   2. Periodic Special Inspection: Special Inspection Agency is required to be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

3.02 SPECIAL INSPECTIONS FOR STEEL CONSTRUCTION

A. Structural Steel: Comply with quality assurance inspection requirements of ICC (IBC)-2018.

B. Cold-Formed Steel Deck: Comply with quality assurance inspection requirements of SDI (QA/QC).

C. High-Strength Bolt, Nut and Washer Material:
   1. Verify identification markings comply with ASTM standards specified in the approved contract and to AISC 360, Section A3.3; periodic.
   2. Submit manufacturer's certificates of compliance; periodic.

D. High-Strength Bolting Installation: Verify items listed below comply with AISC 360, Section M2.5.
   1. Snug tight joints; periodic.

E. Structural Steel and Cold Formed Steel Deck Material:
   1. Structural Steel: Verify identification markings comply with AISC 360, Section M3.5; periodic.
   2. Other Steel: Verify identification markings comply with ASTM standards specified in the approved Contract Documents; periodic.
   3. Submit manufacturer's certificates of compliance and test reports; periodic.

F. Weld Filler Material:
   1. Verify identification markings comply with AWS standards specified in the approved Contract Documents and to AISC 360, Section A3.5; periodic.
   2. Submit manufacturer's certificates of compliance; periodic.

G. Welding:

1. Structural Steel and Cold Formed Steel Deck:
    a. Complete and Partial Joint Penetration Groove Welds: Verify compliance with AWS D1.1/D1.1M; continuous.
    b. Multi-pass Fillet Welds: Verify compliance with AWS D1.1/D1.1M; continuous.
    c. Single Pass Fillet Welds Less than 5/16 inch Wide: Verify compliance with AWS D1.1/D1.1M; periodic.
    d. Plug and Slot Welds: Verify compliance with AWS D1.1/D1.1M; continuous.
    e. Single Pass Fillet Welds 5/16 inch or Greater: Verify compliance with AWS D1.1/D1.1M; continuous.
    f. Floor and Roof Deck Welds: Verify compliance with AWS D1.3/D1.3M; continuous.
2. Reinforcing Steel: Verify items listed below comply with AWS D1.4/D1.4M and ACI 318, Section 3.5.2.
    a. Verification of weldability; periodic.
    b. Reinforcing steel resisting flexural and axial forces in intermediate and special moment frames as well as where it is referenced in older codes. Elements of special structural walls of concrete and shear reinforcement; continuous.
    c. Shear reinforcement; continuous.
    d. Other reinforcing steel; periodic.

H. Steel Frame Joint Details: Verify compliance with approved Contract Documents.
1. Details, bracing and stiffening; periodic.
2. Member locations; periodic.
3. Application of joint details at each connection; periodic.

3.03 SPECIAL INSPECTIONS FOR CONCRETE CONSTRUCTION

A. Reinforcement, Including Prestressing Tendons, and Verification of Placement: Verify compliance with ACI 318, Chapters 20, 25.2, 25.3, 26.6.1-26.6.3; periodic.

B. Reinforcing Steel, Including Prestressing of Tendons and Placement: Verify compliance with approved Contract Documents and ACI 318, Sections 3.5 and 7.1 through 7.7; periodic.

C. Reinforcing Bar Welding: Verify compliance with AWS D1.4/D1.4M and ACI 318, 26.6.4; periodic.
1. Verify weldability of reinforcing bars other than those complying with ASTM A706/A706M; periodic.
2. Inspect single-pass fillet welds, maximum 5/16 inch; periodic.
3. Inspect all other welds; continuous.

D. Reinforcing Steel Welding: Verify compliance with AWS D1.4/D1.4M and ACI 318, Section 3.5.2; periodic.

E. Anchors Cast in Concrete: Verify compliance with ACI 318; periodic.

F. Bolts Installed in Concrete: Where allowable loads have been increased or where strength design is used, verify compliance with approved Contract Documents and ACI 318, Sections 8.1.3 and 21.2.8 prior to and during placement of concrete; continuous.

G. Anchors Post-Installed in Hardened Concrete: Verify compliance with ACI 318.
1. Adhesive Anchors: Verify horizontally or upwardly-inclined orientation installations resisting sustained tension loads - Section 17.8.2.4; continuous.
2. Other Mechanical and Adhesive Anchors: Verify as per Chapter 17.8.2; periodic.

H. Anchors Installed in Hardened Concrete: Verify compliance with ACI 318, Sections 3.8.6, 8.1.3, and 21.2.8; periodic.

I. Design Mix: Verify plastic concrete complies with the design mix in approved Contract Documents and with ACI 318, Chapter 19, 16.4.3, 26.4.4; periodic.

J. Design Mix: Verify plastic concrete complies with the design mix in approved Contract Documents and with ACI 318, Chapter 4 and 5.2; periodic.

K. Concrete Sampling Concurrent with Strength Test Sampling: Each time fresh concrete is sampled for strength tests, verify compliance with ASTM C172/C172M, ASTM C31/C31M and ACI 318, Chapter 26.5, 26.12, and record the following, continuous:
   1. Slump.
   2. Air content.
   3. Temperature of concrete.

L. Specified Curing Temperature and Techniques: Verify compliance with ACI 318, Chapter 26.5.3 through 26.5.5; periodic.

M. Specified Curing Temperature and Techniques: Verify compliance with approved Contract Documents and ACI 318, Sections 5.11 through 5.13; periodic.

N. Formwork Shape, Location and Dimensions: Verify compliance with approved Contract Documents and ACI 318, Chapter 26.11.1.2(b); periodic.

O. Welding of Reinforcing Bars: Conduct special inspections and verify Special Inspector's qualifications in accordance with requirements of AWS D1.4/D1.4M.

P. Materials: If the Contractor cannot provide sufficient data or documentary evidence that concrete materials comply with the quality standards of ACI 318, the AHJ will require testing of materials in accordance with the appropriate standards and criteria in ACI 318, Chapters 19 and 20.

3.04 SPECIAL INSPECTIONS FOR SOILS

A. Materials and Placement: Verify each item below complies with approved construction documents and approved geotechnical report.
   1. Design bearing capacity of material below shallow foundations; periodic.
   2. Design depth of excavations and suitability of material at bottom of excavations; periodic.
   3. Materials, densities, lift thicknesses; placement and compaction of backfill: continuous.
   4. Subgrade, prior to placement of compacted fill verify proper preparation; periodic.

B. Testing: Classify and test excavated material; periodic.

3.05 SPECIAL INSPECTIONS FOR FIRE RESISTANT PENETRATIONS AND JOINTS

A. Verify penetration firestops in accordance with ASTM E2174.
   1. Visual Inspection: Onsite during installation and randomly witness a minimum of 10% of each type of fire stop being installed.
   2. Destructive Inspection: Post installation inspection, which requires destructive type verification of the fire stop and repair of the fire stop. Aminimum of 2%, but not less than one, of each typeof fire stop shall be inspected per floor or for each area of the floor when the floor is larger than 10,000 square feet.

B. Verify fire resistant joints in accordance with ASTM E2393.
   1. Visual Inspection: Randomly witness a minimum of 5% of the total linear feet of each type of fire resistive joint system being installed.
   2. Destructive Inspection: Post installation inspection should consist of a minimum of one sampling per type of joint system per 500 linear feet.

3.06 SPECIAL INSPECTION AGENCY DUTIES AND RESPONSIBILITIES

A. Special Inspection Agency shall:
   1. Verify samples submitted by Contractor comply with the referenced standards and the approved Contract Documents.
   2. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
   3. Perform specified sampling and testing of products in accordance with specified reference standards.
   4. Ascertain compliance of materials and products with requirements of Contract Documents.

5. Promptly notify Architect and Contractor of observed irregularities or non-compliance of work or products.
6. Perform additional tests and inspections required by Architect.
7. Attend pre-construction meetings and progress meetings.
8. Submit reports of all tests or inspections specified.

B. Limits on Special Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency may not approve or accept any portion of the work.
3. Agency may not assume any duties of Contractor.
4. Agency has no authority to stop the work.

C. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.

D. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.07 TESTING AGENCY DUTIES AND RESPONSIBILITIES

A. Testing Agency Duties:
1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
2. Perform specified sampling and testing of products in accordance with specified standards.
3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of work or products.
5. Perform additional tests and inspections required by Architect.
6. Submit reports of all tests or inspections specified.

B. Limits on Testing or Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency may not approve or accept any portion of the work.
3. Agency may not assume any duties of Contractor.
4. Agency has no authority to stop the work.

C. On instructions by Architect, perform re-testing required because of non-compliance with specified requirements, using the same agency.

D. Contractor will pay for re-testing required because of non-compliance with specified requirements.

3.08 CONTRACTOR DUTIES AND RESPONSIBILITIES

A. Contractor Responsibilities, General:
1. Deliver to agency at designated location, adequate samples of materials for special inspections that require material verification.
2. Cooperate with agency and laboratory personnel; provide access to approved documents at project site, to the work, to manufacturers' facilities, and to fabricators' facilities.
3. Provide incidental labor and facilities:
a. To provide access to work to be tested or inspected.
b. To obtain and handle samples at the site or at source of Products to be tested or inspected.
c. To facilitate tests or inspections.
d. To provide storage and curing of test samples.

4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing or inspection services.
5. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
6. Retain special inspection records.

END OF SECTION

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SECTION 01 5000
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 INTERIOR ENCLOSURES

A. Provide temporary partitions and ceilings as indicated to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.

B. Construction: Framing and reinforced polyethylene sheet materials with closed joints and sealed edges at intersections with existing surfaces:

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 01 5100
TEMPORARY UTILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary Utilities: Provision of electricity, lighting, heat, ventilation, and water.

1.02 RELATED REQUIREMENTS

A. Section 01 5000 - Temporary Facilities and Controls:

1.03 REFERENCE STANDARDS

A. 29 CFR 1926 - Safety and Health Regulations for Construction; Current Edition.

B. NFPA 70-2017 - National Electrical Code; 2017.

C. NFPA 70B-2019 - Recommended Practice for Electrical Equipment Maintenance; 2019.

D. NFPA 70E - Standard for Electrical Safety in the Workplace; 2024.

E. NFPA 72 - National Fire Alarm and Signaling Code; Most Recent Edition Cited by Referring Code or Reference Standard.

F. SMACNA (OCC) - IAQ Guidelines for Occupied Buildings Under Construction; 2007.

1.04 TEMPORARY ELECTRICITY

A. Cost: By Contractor.

B. Temporary Electricity - General:
   1. The Electrical Contractor will secure and pay for all required permits, certifications, notarizations and backchardges for the Work related to temporary electricity and other expenses incidental to the installtion of temporary electricity.
   2. All temporary electricity and temporary electrical work shall meet the requirements of the National Electrical Codes (NFPA 70, NFPA 70B, NFPA 70E) the National Fire Alarm Code (NFPA 72); the local utility company and OSHA.
   3. All necessary overhead pole lines, transformers, meters, cables, panelboards, switches, and accessories required by the temporary electricity and lighting installation to be provided by the Electrical Contractor
   4. The Electrical Contractor will provide temporary lighting in all work areas of renovation and new building.
   5. Temporary wiring to temporary lighting, fixtures, fire alarm equipment, other equipment and related accessories required for the Work to be provided by the Electrical Contractor. Temporary wiring, temporary lighting, fixture, fire alarm equipment and related accessories are to be removed by the Electrical Contractor prior to Substantial Completion when permanent systems are available.
   6. The Electrical Contractor is to size and provide the temporary electricity service based on the following:
      a. Rooms or spaces under 250 sf - one (1) 100 watt lamp.
      b. Rooms or spaces over 250 sf and under 500 sf - two (2) 100 watt lamps.
      c. Rooms or spaces over 500 sf - one (1) 200 watt lamp per every 1,000 sf or fraction thereof.
      d. Sufficient wiring outlets and lamps shall be installed to insure proper lighting in stairwells, corridors and passage areas.
      e. Temporary power, in addition to the lighting requirements, shall be provided throughout the areas of renovation and new building for electrically operated tools on a minimum of 0.50 watts per square foot, including for motors up to 1 hp.

C. Connect to Owner's existing power service.
   1. Do not disrupt Owner's need for continuous service.
   2. Exercise measures to conserve energy.

D. The Electrical Contractor is to provide temporary electric feeder from existing building electrical service at location as directed.
   1. Provide and maintain a 120 volt distribution system throughout the Project Work Areas for the temporary outlets to be used by all Contracts.
   2. Circuits for the temporary distribution system shall betaken from any accessible power panel in existing building if adequate power is available for temporary distribution.
   3. Cables used for the temporary service shall be concealed above ceilings in all occupied spaces of the Owner.
   4. The Electrical Contractor is to provide and maintain temporary power to all of the Prime Contractor's field office and the Resident Project Representative's field office, and to disconnect same and remove any necessary power poles at the end of the Project.

E. Complement existing power service capacity and characteristics as required.

F. Provide power outlets for construction operations, with branch wiring and distribution boxes located at each floor. Provide flexible power cords as required.

G. The Electrical Contractor to provide temporary power distribution (outlets) to be spaced so that any Contractor can obtain power for Work at any point within the project with a 50 foot extension cord.
   1. Each Contractor is responsible for providing extensions cords as required to complete their Work.

H. Provide main service disconnect and over-current protection at convenient location .

I. Permanent convenience receptacles may not be utilized during construction.

J. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.

K. The Electrical Contractor shall provide and maintain temporary and/or permanent power to all permanently installed equipment within 15 calendar days of installation including sump pumps, fans, pumps, and boilers any of which require operation prior to substantial completion of the Project.

L. Temporary power will not be used for resistive electric temporary heat or temporary heat of any kind.

M. Under no circumstances will electric welders be connected to the temporary electric service. Contractors requiring welder shall supply engine-driven equipment or make independent arrangements for power.

1.05 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

A. The Electrical Contractor will provide and maintain LED or compact fluorescent lighting as suitable for the application for construction operations in accordance with requirements of 29 CFR 1926, the Building Code of New York State and the National Electric Code.

B. The Electrical Contractor is to provide the temporary lighting based on the following:
   1. Rooms or spaces under 250 sf - one (1) 100 watt lamp.
   2. Rooms or spaces over 250 sf and under 500 sf - two (2) 100 watt lamps.
   3. Rooms or spaces over 500 sf - one (1) 200 watt lamp per every 1,000 sf or fraction thereof.
   4. Sufficient lamps shall be installed to insure proper lighting in stairwells, corridors and passage areas.
   5. The Electrical Contractor shall furnish and install all lamps, both initial and replacement, used for the temporary lighting system
   6. All lamps installed in permanent lighting fixtures that are used as temporary lighting during the construction period, are to be removed and replaced with lamps (bulbs) prior to completion of the project by the Electrical Contractor.
   7. The Electrical Contractor shall provide and maintain temporary lighting (minimum 5 foot candles) in areas of renovation and new construction.

C. The Electrical Contractor is to brovide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.

D. The Electrical Contractor is to maintain lighting and provide routine repairs.

E. Any Contractor requiring additional lighting capabilities other than as provided for herein is to provide, at their own expense, a separate feeder and lighting system.

F. Permanent building lighting may be utilized during construction.

1.06 TEMPORARY HEATING - GENERAL

A. Definitions:
   1. Building is Enclosed: The building shall be considered enclosed when the exterior surfaces are completed sufficiently to exclude the elements and retain heat. The General Contractor shall make all permanent or, at his option, temporary enclosures of the exterior surfaces of the building to exclude the elements and retain heat as soon as practical, in accordance with the approved progress schedule. At a minimum, enclosure shall include, but not be limited to, roof installation, exterior building envelope including wall insulation, windows and doors or material equal in R-value. It shall be the responsibility of the General Contractor to notify the Resident Project Representative, Owner, and other Prime Contractors involved with the Project in writing that the building is enclosed. Upon receipt of the General Contractor's notification, the Resident Project Representative and Owner shall verify that the building is sufficiently enclosed to enact the provisions of the Specifications

B. Provide heating devices and heat as needed to maintain specified conditions for construction operations.

C. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

D. Owner's existing heat plant may be used.

E. Prior to operation of permanent equipment for temporary heating purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

1.07 TEMPORARY HEAT DURING CONSTRUCTION - EXISTING BUILDINGS

A. During such periods where scheduled Renovation Work is to be performed during periods when heat is required, the Mechanical Contractor is completely responsible for providing temporary heat.
   1. Payment for installation and maintenance of temporary heat shall be the complete responsibility of the Mechanical Contractor..

B. The method of temporary heat shall meet all applicable codes and ordinances.

C. At no time shall the temporary heating system be allowed to be connected to the temporary or existing electric system.

D. Heat is to be maintained at not less than 50 degrees F unless lower temperatures are sufficient to meet the following requirements:
   1. Protect his completed Work or Work in progress.
   2. Protect material and equipment being installed.
   3. Enable his workmen to accomplish their Work in a satisfactory manner.
   4. Maintain the approved Progress Schedule.

E. If higher temperatures are required to maintain the environment required to perform specific construction activities including, but not limited to, finishes, the Mechanical Contractor is to provide sufficient temporary heat for the Work.

F. In the event a Contractor removes equipment or otherwise compromises the existing building envelope, said Contractor shall be completely responsible for providing for and maintaining temporary enclosures acceptable to the Resident Project Representative to maintain temporary heat within the space protected from outside elements. This will apply, but not be limited to, the removal of heating units, louvers, vents, windows and doors, and portions of roof and wall systems.

G. Permanent Heating System Operable.
   1. When those portions of the General Construction, Plumbing, Electrical, and Mechanical Work are complete, the Owner shall accept those portions of the Work including related controls and safety devices and use, operate, and maintain them to provide heat.
   2. By accepting the permanent heating system and related controls and safety devices, the Owner agrees to:
      a. Begin the guarantee period for the Work completed and accepted as of the date of acceptance.
      b. Assume full responsibility for the proper operation and maintenance of all accepted portions of the heating system.
      c. Provide sufficient heat continuously to:
      d. Protect completed Work.
      e. Protect material and equipment being installed.
      f. Enable workmen to accomplish their Work in a satisfactory manner.
      g. Maintain the approved progress schedule.
   3. Failure of any Prime Contractor to guard against unnecessary heat loss during the renovation shall render him liable for the resultant fuel cost.
   4. Acceptance of the permanent system relates only to responsibility for damage caused by the Owner's neglect and normal wear and tear. No Prime Contractor is relieved of any contractual requirement for furnishing a complete and operating system in perfect condition at the completion of the Work.

1.08 TEMPORARY HEAT DURING CONSTRUCTION - NEW CONSTRUCTION

A. **PHASE 1** - Building not Enclosed
   1. Prior to the time the building is enclosed, heat shall be provided by the General Contractor, as required to accomplish the following:
      a. Protect his completed Work or Work in progress.
      b. Protect material and equipment being installed.
      c. Enable his workmen to accomplish their Work in a satisfactory manner.
      d. Maintain the approved Progress Schedule.
      e. During Phase 1 all costs associated with heat for construction shall be paid for by the General Contractor, the cost of which shall be included in their Base Bid cost.

B. **PHASE 2** - New Construction - Building is Enclosed; Permanent Heating System not ready for Operation:
   1. When the building is enclosed as defined in this Section the heat shall be provided and paid for by the General Contractor and as required to accomplish the following:
      a. Protect completed Work.
      b. Protect material and equipment being installed.
      c. Enable workmen to accomplish their work in a satisfactory manner.
      d. Maintain the approved progress schedule.
   2. Once the New Construction/Building is "enclosed" and reviewed and approved by the Resident Project Representative, the General Contractor shall provide all temporary heat to accommodate the Work.
      a. Fuel for temporary heat will be provided by the General Contractor and paid for by the Owner.
      b. Approval of fuel type shall be made by the Resident Project Representative prior to installation.
      c. RESISTIVE ELECTRIC HEAT will not be permitted to be used at anytime.

3. The Electrical Contractor shall provide any and all temporary power requirements for the temporary heating units. The Electrical Contractor shall disconnect and remove temporary power from temporary heating units when temporary heat is no longer required.
4. The Mechanical Contractor shall provide any and all temporary service piping required to fuel temporary heating units and shall remove all temporary service piping once temporary heat is no longer required.
5. Within 30 calendar days of notification of enclosure, the General Contractor, Plumbing Contractor, and Electrical Contractor shall have sufficiently completed all Work, including required tests for which he is responsible to enable the Mechanical Contractor to utilize the existing boilers for temporary heat (if available).
6. Within 90 calendar days of notification of enclosure, the Mechanical Contractor shall provide temporary heat which may utilize the existing boilers. This system may include, but not be limited to, temporary hot water piping to hot water coil units. At no time will the new heating systems be utilized for temporary heat during construction. Temporary heat provided by the Mechanical Contractor must be controlled to sustain atmospheric conditions as described in this Section.
7. It shall be the responsibility of the Mechanical Contractor to notify the Resident Project Representative, Owner, Architect, and Other Prime Contractors that the temporary heating system is complete and ready for use.
8. Any Prime Contractor who fails to progress their Work as required in previous paragraphs of this Section, and who thereby delays the completion of the Work as required of this Section shall pay all cost of continuing temporary heat as required herein. Should two (2) or more Prime Contractors fail to progress their Work as required herein they shall jointly be held liable to pay all cost of continuing heat as required of the Section.
9. Payment for installation and maintenance of temporary heat shall be the complete responsibility of the Contractor as described in applicable Sections of these Specifications.
10. Failure of any Prime Contractor to guard against unnecessary heat loss during PHASE 2 shall render him liable for the resultant fuel cost.

C. **PHASE 3** - New Construction - Building Enclosed; Permanent Heating System Operable.
1. When those portions of the General Construction, Plumbing, Electrical, and Mechanical Work are complete, the Owner shall accept those portions of the Work including related controls and safety devices and use, operate, and maintain them to provide heat.
2. By accepting the permanent heating system and related controls and safety devices, the Owner agrees to:
   a. Begin the guarantee period for the Work completed and accepted as of the date of acceptance.
   b. Assume full responsibility for the proper operation and maintenance of all accepted portions of the heating system.
   c. Provide sufficient heat continuously to:
   d. Protect completed Work.
   e. Protect material and equipment being installed.
   f. Enable workmen to accomplish their Work in a satisfactory manner.
   g. Maintain the approved progress schedule.
3. Failure of any Prime Contractor to guard against unnecessary heat loss during PHASE 3 shall render him liable for the resultant fuel cost.
4. Acceptance of the permanent system relates only to responsibility for damage caused by the Owner's neglect and normal wear and tear. No Prime Contractor is relieved of any contractual requirement for furnishing a complete and operating system in perfect condition at the completion of the Work.

1.09 TEMPORARY HEATING EQUIPMENT/APPLIANCES

A. Reference Fire Code of New York State, Chapter 33 - Fire Safety during Construction and Demolition Section 3303.
1. LP-gas heaters: Fuel supplies for liquefied-petroleum gas-fired heaters shall comply with NFPA 58 and the Fuel Gas Code of New York State.

2. Oil-fired heaters: Oil-fired heaters shall comply with Section 603 of the Fire Code of New York State.

B. Supervision: The use of temporary heating equipment/appliances are be supervised and maintained only by competent personnel.

C. Installation: Clearance to combustibles from temporary heating devices are to be maintained in accordance with the labeled equipment. When in operation, temporary heating devices are to be fixed in place and protected from damage, dislodgement, or overturning in accordance with the manufacturer's instructions.
   1. Contractor to maintain manufacturer's operations manual and instructions on site during the use of temporary heating equipment/appliances.

1.10 TEMPORARY COOLING

A. Provide cooling devices and cooling as needed to maintain specified conditions for construction operations.

B. Maintain maximum ambient temperature of 80 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

1.11 TEMPORARY VENTILATION

A. Existing ventilation equipment may not be used.

B. Each Prime Contractor is to provide temporary exhaust fan units as needed or directed to maintain clean air for their construction operations and to minimize construction odors from permeating into other portions of the existing building.

1.12 TEMPORARY WATER SERVICE

A. Cost of Water Used: By Owner.

B. The Contractor is advised that there is a water supply source available at the Project Site.
   1. Contractors are advised that during some periods of construction water in this location may not be available for their use.
   2. When water is available, all Contractors are permitted to use the site water supply as long as it does not interfere with the Owner's operations and/or functions.
   3. No separate arrangements will be made by the Owner to provide a temporary water supply for the Contractors' convenience other than what is currently available.

C. Connect to existing water source.
   1. Exercise measures to conserve water.

D. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.

E. Any Contractor requiring additional water capabilities other than as provided for herein is to provide, at their own expense, a separate water supply as required by the local municipality.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 5500
VEHICULAR ACCESS AND PARKING

PART 3 EXECUTION

END OF SECTION

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SECTION 01 5713
TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Prevention of erosion due to construction activities.

B. Prevention of sedimentation of waterways, open drainage ways, and storm and sanitary sewers due to construction activities.

C. Restoration of areas eroded due to insufficient preventive measures.

D. Compensation of Owner for fines levied by authorities having jurisdiction due to non-compliance by Contractor.

1.02 REFERENCE STANDARDS

A. ASTM D4355/D4355M - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon Arc-Type Apparatus; 2021.

B. ASTM D4491/D4491M - Standard Test Methods for Water Permeability of Geotextiles by Permittivity; 2022.

C. ASTM D4533/D4533M - Standard Test Method for Trapezoid Tearing Strength of Geotextiles; 2015 (Reapproved 2023).

D. ASTM D4632/D4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles; 2015a (Reapproved 2023).

E. ASTM D4751 - Standard Test Methods for Determining Apparent Opening Size of a Geotextile; 2021a.

F. ASTM D4873/D4873M - Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples; 2017 (Reapproved 2021).

1.03 PERFORMANCE REQUIREMENTS

A. Develop and follow an Erosion and Sedimentation Prevention Plan and submit periodic inspection reports.

B. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained; furnish all documentation required to obtain applicable permits.

C. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.

D. Storm Water Runoff: Control increased storm water runoff due to disturbance of surface cover due to construction activities for this project.
   1. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less.
   2. Anticipate runoff volume due to the most extreme short term and 24-hour rainfall events that might occur in 25 years.

E. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
   1. Control movement of sediment and soil from temporary stockpiles of soil.
   2. Prevent development of ruts due to equipment and vehicular traffic.
   3. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.

F. Erosion Off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.

1. Prevent windblown soil from leaving the project site.
2. Prevent tracking of mud onto public roads outside site.
3. Prevent mud and sediment from flowing onto sidewalks and pavements.
4. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.

G. Sedimentation of Waterways On Site: Prevent sedimentation of waterways on the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
   1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
   2. If sediment basins are used as temporary preventive measures, pump dry and remove deposited sediment after each storm.

H. Sedimentation of Waterways Off Site: Prevent sedimentation of waterways off the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
   1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.

I. Open Water: Prevent standing water that could become stagnant.

J. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

1.04 SUBMITTALS

A. See the General Conditions for submittal procedures.

B. Erosion and Sedimentation Control Plan:
   1. Include:
      a. Site plan identifying soils and vegetation, existing erosion problems, and areas vulnerable to erosion due to topography, soils, vegetation, or drainage.
      b. Site plan showing grading; new improvements; temporary roads, traffic accesses, and other temporary construction; and proposed preventive measures.
      c. Where extensive areas of soil will be disturbed, include storm water flow and volume calculations, soil loss predictions, and proposed preventive measures.
      d. Schedule of temporary preventive measures, in relation to ground disturbing activities.
      e. Other information required by law.
      f. Format required by law is acceptable, provided any additional information specified is also included.
   2. Obtain the approval of the Plan by authorities having jurisdiction.
   3. Obtain the approval of the Plan by Owner.

C. Certificate: Mill certificate for silt fence fabric attesting that fabric and factory seams comply with specified requirements, signed by legally authorized official of manufacturer; indicate actual minimum average roll values; identify fabric by roll identification numbers.

D. Inspection Reports: Submit report of each inspection; identify each preventive measure, indicate condition, and specify maintenance or repair required and accomplished.

PART 2 PRODUCTS

2.01 MATERIALS

A. Mulch: Use one of the following:
   1. Straw or hay.
   2. Erosion control matting or netting.

3. Polyethylene film, where specifically indicated only.

B. Grass Seed For Temporary Cover: Select a species appropriate to climate, planting season, and intended purpose. If same area will later be planted with permanent vegetation, do not use species known to be excessively competitive or prone to volunteer in subsequent seasons.

C. Bales: Air dry, rectangular straw bales.
   1. Cross Section: 14 by 18 inches, minimum.
   2. Bindings: Wire or string, around long dimension.

D. Bale Stakes: One of the following, minimum 3 feet long:
   1. Steel U- or T-section, with minimum mass of 1.33 pound per linear foot.
   2. Wood, 2 by 2 inches in cross section.

E. Silt Fence Fabric: Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; fabric including seams with the following minimum average roll lengths:
   1. Average Opening Size: 30 U.S. Std. Sieve, maximum, when tested in accordance with ASTM D4751.
   2. Permittivity: 0.05 sec^-1, minimum, when tested in accordance with ASTM D4491/D4491M.
   3. Ultraviolet Resistance: Retaining at least 70 percent of tensile strength, when tested in accordance with ASTM D4355/D4355M after 500 hours exposure.
   4. Tensile Strength: 100 pounds-force, minimum, in cross-machine direction; 124 pounds-force, minimum, in machine direction; when tested in accordance with ASTM D4632/D4632M.
   5. Elongation: 15 to 30 percent, when tested in accordance with ASTM D4632/D4632M.
   6. Tear Strength: 55 pounds-force, minimum, when tested in accordance with ASTM D4533/D4533M.
   7. Color: Manufacturer's standard, with embedment and fastener lines preprinted.

F. Silt Fence Posts: One of the following, minimum 5 feet long:
   1. Steel U- or T-section, with minimum mass of 1.33 pound per linear foot.
   2. Hardwood, 2 by 2 inches in cross section.

G. Gravel: See Section 32 1123 for aggregate.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to greatest extent possible.

3.02 PREPARATION

A. Schedule work so that soil surfaces are left exposed for the minimum amount of time.

3.03 SCOPE OF PREVENTIVE MEASURES

A. In all cases, if permanent erosion resistant measures have been installed temporary preventive measures are not required.

B. Construction Entrances: Traffic-bearing aggregate surface.
   1. Width: As required; 20 feet, minimum.
   2. Length: 50 feet, minimum.
   3. Provide at each construction entrance from public right-of-way.
   4. Where necessary to prevent tracking of mud onto right-of-way, provide wheel washing area out of direct traffic lane, with drain into sediment trap or basin.

C. Linear Sediment Barriers: Made of silt fences.
   1. Provide linear sediment barriers:
      a. Along downhill perimeter edge of disturbed areas, including soil stockpiles.

2. Space sediment barriers with the following maximum slope length upslope from barrier:
    a. Slope of Less Than 2 Percent: 100 feet..
    b. Slope Between 2 and 5 Percent: 75 feet.
    c. Slope Between 5 and 10 Percent: 50 feet.
    d. Slope Between 10 and 20 Percent: 25 feet.
    e. Slope Over 20 Percent: 15 feet.

D. Storm Drain Curb Inlet Sediment Trap: Protect each curb inlet using one of the following measures:
    1. Filter fabric wrapped around hollow concrete blocks blocking entire inlet face area; use one piece of fabric wrapped at least 1-1/2 times around concrete blocks and secured to prevent dislodging; orient cores of blocks so runoff passes into inlet.
    2. Straw bale row blocking entire inlet face area; anchor into pavement.

E. Storm Drain Drop Inlet Sediment Traps: As detailed on drawings.

F. Temporary Splash Pads: Stone aggregate over filter fabric; size to suit application; provide at downspout outlets and storm water outlets.

G. Soil Stockpiles: Protect using one of the following measures:
    1. Cover with polyethylene film, secured by placing soil on outer edges.
    2. Cover with mulch at least 4 inches thickness of pine needles, sawdust, bark, wood chips, or shredded leaves, or 6 inches of straw or hay.

H. Mulching: Use only for areas that may be subjected to erosion for less than 6 months.

I. Temporary Seeding: Use where temporary vegetated cover is required.

3.04 INSTALLATION

A. Traffic-Bearing Aggregate Surface:
    1. Excavate minimum of 6 inches.
    2. Place geotextile fabric full width and length, with minimum 12 inch overlap at joints.
    3. Place and compact at least 6 inches of 1 1/2 to 3 1/2 inch diameter stone.

B. Silt Fences:
    1. Store and handle fabric in accordance with ASTM D4873/D4873M.
    2. Where slope gradient is less than 3:1 or barriers will be in place less than 6 months, use nominal 16 inch high barriers with minimum 36 inch long posts spaced at 6 feet maximum, with fabric embedded at least 4 inches in ground.
    3. Where slope gradient is steeper than 3:1 or barriers will be in place over 6 months, use nominal 28 inch high barriers, minimum 48 inch long posts spaced at 6 feet maximum, with fabric embedded at least 6 inches in ground.
    4. Where slope gradient is steeper than 3:1 and vertical height of slope between barriers is more than 20 feet, use nominal 32 inch high barriers with woven wire reinforcement and steel posts spaced at 4 feet maximum, with fabric embedded at least 6 inches in ground.
    5. Install with top of fabric at nominal height and embedment as specified.
    6. Do not splice fabric width; minimize splices in fabric length; splice at post only, overlapping at least 18 inches, with extra post.
    7. Fasten fabric to wood posts using one of the following:
        a. Four nails per post with 3/4 inch diameter flat or button head, 1 inch long, and 14 gauge, 0.083 inch shank diameter.
        b. Five staples per post with at least 17 gauge, 0.0453 inch wire, 3/4 inch crown width and 1/2 inch long legs.
    8. Fasten fabric to steel posts using wire, nylon cord, or integral pockets.
    9. Wherever runoff will flow around end of barrier or over the top, provide temporary splash pad or other outlet protection; at such outlets in the run of the barrier, make barrier not more than 12 inches high with post spacing not more than 4 feet.

C. Straw Bale Rows:

1. Install bales in continuous rows with ends butting tightly, with one bale at each end of row turned uphill.
2. Install bales so that bindings are not in contact with the ground.
3. Embed bales at least 4 inches in the ground.
4. Anchor bales with at least two stakes per bale, driven at least 18 inches into the ground; drive first stake in each bale toward the previously placed bale to force bales together.
5. Fill gaps between ends of bales with loose straw wedged tightly.
6. Place soil excavated for trench against bales on the upslope side of the row, compacted.

D. Mulching Over Large Areas:
1. Dry Straw and Hay: Apply 2-1/2 tons per acre; anchor using dull disc harrow or emulsified asphalt applied using same spraying machine at 100 gallons of water per ton of mulch.
2. Erosion Control Matting: Comply with manufacturer's instructions.

E. Mulching Over Small and Medium Areas:
1. Dry Straw and Hay: Apply 4 to 6 inches depth.
2. Erosion Control Matting: Comply with manufacturer's instructions.

F. Temporary Seeding:
1. When hydraulic seeder is used, seedbed preparation is not required.
2. When surface soil has been sealed by rainfall or consists of smooth undisturbed cut slopes, and conventional or manual seeding is to be used, prepare seedbed by scarifying sufficiently to allow seed to lodge and germinate.
3. If temporary mulching was used on planting area but not removed, apply nitrogen fertilizer at 1 pound per 1000 sq ft.
4. On soils of very low fertility, apply 10-10-10 fertilizer at rate of 12 to 16 pounds per 1000 sq ft.
5. Incorporate fertilizer into soil before seeding.
6. Apply seed uniformly; if using drill or cultipacker seeders place seed 1/2 to 1 inch deep.
7. Irrigate as required to thoroughly wet soil to depth that will ensure germination, without causing runoff or erosion.
8. Repeat irrigation as required until grass is established.

3.05 MAINTENANCE

A. Inspect preventive measures weekly, within 24 hours after the end of any storm that produces 0.5 inches or more rainfall at the project site, and daily during prolonged rainfall.

B. Repair deficiencies immediately.

C. Silt Fences:
1. Promptly replace fabric that deteriorates unless need for fence has passed.
2. Remove silt deposits that exceed one-third of the height of the fence.
3. Repair fences that are undercut by runoff or otherwise damaged, whether by runoff or other causes.

D. Straw Bale Rows:
1. Promptly replace bales that fall apart or otherwise deteriorate unless need has passed.
2. Remove silt deposits that exceed one-half of the height of the bales.
3. Repair bale rows that are undercut by runoff or otherwise damaged, whether by runoff or other causes.

E. Clean out temporary sediment control structures weekly and relocate soil on site.

F. Place sediment in appropriate locations on site; do not remove from site.

3.06 CLEAN UP

A. Remove temporary measures after permanent measures have been installed, unless permitted to remain by Architect.

B. Clean out temporary sediment control structures that are to remain as permanent measures.

C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.

END OF SECTION

SECTION 01 5721
INDOOR AIR QUALITY CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Construction procedures to promote adequate indoor air quality after construction.

B. Building flush-out after construction and before occupancy.

C. Testing indoor air quality before commencement of construction; existing building areas only.

D. Testing indoor air quality after completion of construction.

1.02 PROJECT GOALS

A. Dust and Airborne Particulates: Prevent deposition of dust and other particulates in HVAC ducts and equipment.
   1. Cleaning of ductwork is not contemplated under this Contract.
   2. Contractor shall bear the cost of cleaning required due to failure to protect ducts and equipment from construction dust.
   3. Establish condition of existing ducts and equipment prior to start of alterations.

B. Airborne Contaminants: Procedures and products have been specified to minimize indoor air pollutants.
   1. Furnish products meeting the Specifications.
   2. Avoid construction practices that could result in contamination of installed products leading to indoor air pollution.

1.03 RELATED REQUIREMENTS

A. Section 01 3529.10 - Life Safety Requirements During School Construction.

B. Section 01 4000 - Quality Requirements: Testing and inspection services.

C. Section 23 0593 - Testing, Adjusting, and Balancing for HVAC.: Testing HVAC systems for proper air flow rates, adjustment of dampers and registers, and setting for equipment.

1.04 REFERENCE STANDARDS

A. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2012, with 2015 amendments.

B. ASTM D5197 - Standard Test Method for Determination of Formaldehyde and Other Carbonyl Compounds in Air (Active Sampler Methodology); 2009.

C. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers; California Department of Public Health; v1.1, 2010.

D. EPA 625/R-96/010b - Compendium of Methods for Determination of Toxic Organic Compounds in Ambient Air; Jan-99.

E. SMACNA (OCC) - IAQ Guidelines for Occupied Buildings Under Construction; 2007.

1.05 DEFINITIONS

A. Adsorptive Materials: Gypsum board, acoustical ceiling tile and panels, carpet and carpet tile, fabrics, fibrous insulation, and other similar products.

B. Contaminants: Gases, vapors, regulated pollutants, airborne mold and mildew, and the like, as Specified.

C. Particulates: Dust, dirt, and other airborne solid matter.

D. Wet Work: Concrete plaster, coatings, and other products that emit water vapor or volatile organic compounds during installation, drying, or curing.

1.06 SUBMITTALS

A. See Section 01 3300 - Submittal Procedures, for submittal process.

B. Indoor Air Quality Management Plan: Describe in detail measures to be taken to promote adequate indoor air quality upon completion; use SMACNA (OCC) as a guide.
   1. Submit not less than sixty (60) days before enclosure of building.
   2. Identify potential sources of odor and dust.
   3. Identify construction activities likely to produce odor or dust.
   4. Identify areas of project potentially affected, especially occupied areas.
   5. Evaluate potential problems by severity and describe methods of control.
   6. Describe construction ventilation to be provided, including type and duration of ventilation, use of permanent HVAC systems, types of filters and schedule for replacement of filters.
   7. Describe cleaning and dust control procedures.

C. Interior Finishes Installation Schedule: Identify each interior finish that either generates odors, moisture, or vapors or is susceptible ot adsorption of odors and vapors, and indicate air handling zone, sequence of application, and curing times.

D. Duct and Terminal Unit Inspection Report.

PART 2 PRODUCTS

2.01 MATERIALS

A. Auxiliary Air Filters: MERV of 8, minimum, when tested in accordance with ASHRAE Std 52.2.

PART 3 EXECUTION

3.01 CONSTRUCTION PROCEDURES

A. Prevent the absorption of moisture and humidity by adsorptive materials by:
   1. Sequencing the delivery of such materials so that they are not present in the building until Wet Work is completed and dry.
   2. Delivery and storage of such materials in fully sealed moisture-impermeable packaging.
   3. Provide sufficient ventilation for drying within reasonable time frame.

B. Begin construction ventilation when building is substantially enclosed.

C. If extremely dusty or dirty work must be conducted inside the building, isolate HVAC system from the Work Area for the duration; remove dust and dirt completely before restoring systems.

D. When working in a portion of an occupied building, prevent movement of air from construction area to occupied area.

E. HVAC equipment and ductwork may NOT be used for ventilation during construction:
   1. Provide temporary ventilation equivalent to 1-1/2 air changes per hour, minimum.
   2. Exhaust directly to outside.
   3. Seal HVAC air inlets and outlets immediately after duct installation.

F. Do not store construction materials or waste in mechanical or electrical rooms.

G. Prior to use of return air ductwork without intake filters, cleanup and remove dust and debris generated by construction activities.
   1. Inspect duct intakes, return air grilles, and terminal units for dust.
   2. Clean plenum spaces, including top sides of lay-in ceilings, outsides of ducts, topes of pipes, and conduit.
   3. Clean tops of doors and frames.
   4. Clean mechanical and electrical rooms, including tops of pipes, ducts, conduit, equipment, and supports.
   5. Clean return plenums of air handling units.
   6. Remove intake filters last, after cleaning is complete.

H. Do not perform DUSTY or DIRTY WORK after starting use of return air ducts without intake filters.

I. Use other relevant recommendations of SMACNA (OCC) for avoiding unnecessary contamination due to construction procedures.

3.02 BUILDING FLUSH-OUT

A. Contractor's Option: Either full continuous flush-out OR satisfactory air contaminant testing is required, not both.

B. Perform building flush-out before occupancy.

C. Do not start flush-out until:
   1. All construction is complete.
   2. HVAC systems have been tested, adjusted, and balanced for proper operation.
   3. Inspection of inside of return air ducts and terminal units confirms that cleaning is not necessary.
   4. New HVAC filtration media have been installed.

D. Building Flush-Out: Operate all ventilation systems at normal flow rates with 100 percent outside air until a total air volume of 14,000 cubic feet per square foot of floor area has been supplied.
   1. Obtain Owner's concurrence that construction is complete enough before beginning flush-out.
   2. Maintain interior temperature of at least 60 degrees F and interior relative humidity no higher than 60 percent.
   3. If additional construction involving materials that produce particulates or any of the Specified contaminants is conducted during flush-out, start flush-out over.

E. Install new HVAC filtration media after completion of flush-out and before occupancy or further testing.

3.03 AIR CONTAMINANT TESTING

A. Contractor's Option: Either full continuous flush-out OR satisfactory air contaminant testing is required, not both.

B. Perform air contaminant testing before starting construction, as base line for evaluation of post-construction testing.

C. Perform ai contaminant testing before occupancy.

D. Do not start air contaminant testing until:
   1. All construction is complete, including interior finishes.
   2. HVAC systems have been tested, adjusted, and balanced for proper operation.
   3. New HVAC filtration media have been installed.

E. Indoor Air Samples: Collect from spaces representative of occupied areas.
   1. Collect samples while operable windows and exterior doors are closed, HVAC system is running normally as if occupied, with design minimum outdoor air, but with the building unoccupied.
   2. Collect samples from spaces in each contiguous floor area in each air handler zone, but not less than one sample per 25,000 square feet; take samples from areas having the least ventilation and those having the greatest presumed source strength.
   3. Collect samples from height from 36 inches to 72 inches above finished floor.
   4. Collect samples from same locations on three (3) consecutive days during normal business hours; average the results of each set of three (3) samples.
   5. When retesting the same building areas, take samples from at least the same locations as in the first test.

F. Outdoor Air Samples: Collect samples at outside air intake of each air handler at the same time as indoor samples are taken.

G. Analyze air samples and submit report.

H. Air Contaminant Concentration Limits:

1. Formaldehyde: Not more than 27 parts per billion.
2. PM10 Particulates: Not more than 20 micrograms per cubic meter.
3. Total Volatile Organic Compounds (TVOCs): Not more than 200 micrograms per cubic meter.
4. Airborne Mold and Mildew: Measure in relation to outside air; not higher than outside air.

I. If air samples show concentrations higher than those Specified, ventilate with 100 percent outside air and re-test at no cost to the Owner, or conduct full building flush-out as Specified above.

END OF SECTION

SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Section 01 2500 - Substitution Procedures: Substitutions made during procurement and/or construction phases.

B. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions: Requirements for VOC-restricted product categories.

C. Section 01 7419 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

1.02 SUBMITTALS

A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by Contract Documents.

B. Use of products having any of the following characteristics is not permitted:

C. Where other criteria are met, Contractor shall give preference to products that:
   1. If used on interior, have lower emissions, as defined in Section 01 6116.
   2. If wet-applied, have lower VOC content, as defined in Section 01 6116.

2.02 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

A. See Section 01 2500 - Substitution Procedures.

3.02 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 7419.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

G. Comply with manufacturer's warranty conditions, if any.

H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

I. Prevent contact with material that may cause corrosion, discoloration, or staining.

J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 7000
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.

C. Pre-installation meetings.

D. Cutting and patching.

E. Surveying for laying out the work.

F. Cleaning and protection.

G. Starting of systems and equipment.

H. Demonstration and instruction of Owner personnel.

I. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

J. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

A. The General Conditions of the Construction Contract, AIA A201 General Conditions of the Contract for Construction.

B. The Supplementary Conditions of Conditions of the Contract for Construction for AIA A201 General Conditions of the Contract for Construction.

C. Section 01 1000 - Summary - Multi Contract: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.

D. Section 01 4000 - Quality Requirements: Testing and inspection procedures.

E. Section 01 5000 - Temporary Facilities and Controls: Temporary exterior enclosures.

F. Section 01 5000 - Temporary Facilities and Controls: Temporary interior partitions.

G. Section 01 5100 - Temporary Utilities: Temporary heating, cooling, and ventilating facilities.

H. Section 01 5713 - Temporary Erosion and Sediment Control: Additional erosion and sedimentation control requirements.

I. Section 01 7123 - Field Engineering: Additional requirements for field engineering and surveying work.

J. Section 01 7800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.

K. Section 01 7900 - Demonstration and Training: Demonstration of products and systems to be commissioned and where indicated in specific specification sections

L. Section 01 9113 - General Commissioning Requirements: Contractor's responsibilities in regard to commissioning.

M. Section 02 8213 - Asbestos Abatement

N. Section 07 8400 - Firestopping.

O. Individual Product Specification Sections:
   1. Advance notification to other sections of openings required in work of those sections.
   2. Limitations on cutting structural members.

1.03 REFERENCE STANDARDS

A. The Fire Code of New York State, Chapter 33, Fire Safety During Construction and Demolition.

B. The Existing Building Code of New York State, Chapter 15, Construction Safeguards.

C. The Building Code of New York State, Chapter 33, Safeguards During Construction.

D. The Fire Code of New York State, Chapter 35, Welding and Other Hot Work.

E. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2022, with Errata (2021).

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
   1. On request, submit documentation verifying accuracy of survey work.
   2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in compliance with Contract Documents.
   3. Submit surveys and survey logs for the project record.

C. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather exposed or moisture resistant element.
   3. Efficiency, maintenance, or safety of any operational element.
   4. Visual qualities of sight exposed elements.
   5. Work of Owner or separate Contractor.

1.05 QUALIFICATIONS

A. For surveying work, employ a land surveyor registered in the State in which the Project is located and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

1.06 PROJECT CONDITIONS

A. Use of explosives is not permitted.

B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

C. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

D. Perform dewatering activities, as required, for the duration of the project.

E. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

F. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
   1. Provide dust-proof enclosures to prevent entry of dust generated outdoors.
   2. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.

G. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
   1. Minimize amount of bare soil exposed at one time.
   2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.

3. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
4. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

H. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.

I. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.

J. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

K. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

L. COORDINATION
1. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
2. Notify affected utility companies and comply with their requirements.
3. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
4. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
5. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
6. Coordinate completion and clean-up of work of separate sections.
7. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

B. Require attendance of parties directly affecting, or affected by, work of the specific section.

C. Notify Construction Manager four days in advance of meeting date.

D. Prepare agenda and preside at meeting:
   1. Review conditions of examination, preparation and installation procedures.
   2. Review coordination with related work.

E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Resident Project Representiative of any discrepancies discovered.

C. Contractor shall locate and protect survey control and reference points.

D. Control datum for survey is that indicated on drawings.

E. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

F. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

G. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.

H. Utilize recognized engineering survey practices.

I. Establish a minimum of two permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on project record documents.

J. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
   1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
   2. Grid or axis for structures.
   3. Building foundation, column locations, ground floor elevations.
   4. Controlling lines and levels required for mechanical and electrical trades.

K. Periodically verify layouts by same means.

L. Maintain a complete and accurate log of control and survey work as it progresses.

M. On completion of foundation walls and major site improvements, prepare a certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.

3.05 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as indicated.
   2. Report discrepancies to Architect before disturbing existing installation.
   3. Beginning of alterations work constitutes acceptance of existing conditions.

B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
   1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 5000 in locations indicated on drawings.
   2. Provide sound retardant partitions of construction indicated on drawings in locations indicated on drawings.

C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
   1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
   2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.

D. Remove existing work as indicated and as required to accomplish new work.
   1. Remove items indicated on drawings.
   2. Relocate items indicated on drawings.
   3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
   4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.

E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
   2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
   3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.

a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
b. Provide temporary connections as required to maintain existing systems in service.

4. Verify that abandoned services serve only abandoned facilities.
5. Remove abandoned pipe, ducts, conduits, and equipment , including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

F. Protect existing work to remain.
1. Prevent movement of structure; provide shoring and bracing if necessary.
2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
3. Repair adjacent construction and finishes damaged during removal work.

G. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Resident Project Representiative, Architect, and Owner.
2. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
3. Where a change of plane of 1/4 inch or more occurs in existing work, submit recommendation for providing a smooth transition for Resident Project Representiative, Architect, and Owner review and request instructions.
4. Trim existing wood doors as necessary to clear new floor finish. Refinish trim as required.

H. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

I. Refinish existing surfaces as indicated:
1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.

J. Clean existing systems and equipment.

K. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

L. Do not begin new construction in alterations areas before demolition is complete.

M. Comply with all other applicable requirements of this section.

3.07 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. See Alterations article above for additional requirements.

C. Perform whatever cutting and patching is necessary to:
1. Complete the work.
2. Fit products together to integrate with other work.
3. Provide openings for penetration of mechanical, electrical, and other services.
4. Match work that has been cut to adjacent work.
5. Repair areas adjacent to cuts to required condition.
6. Repair new work damaged by subsequent work.
7. Remove samples of installed work for testing when requested.
8. Remove and replace defective and non-complying work.

D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

G. Restore work with new products in accordance with requirements of Contract Documents.

H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 8400, to full thickness of the penetrated element.

J. Patching:
   1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
   2. Match color, texture, and appearance.
   3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.08 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.09 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Prohibit traffic from landscaped areas.

H. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.10 SYSTEM STARTUP

A. Coordinate with requirements of Section 01 9113 - General Commissioning Requirements.

B. Coordinate schedule for start-up of various equipment and systems.

C. Notify Resident Project Representiative, Architect, and Owner seven days prior to start-up of each item.

D. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

E. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

F. Verify that wiring and support components for equipment are complete and tested.

G. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.

H. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

I. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.11 DEMONSTRATION AND INSTRUCTION

A. See Section 01 7900 - Demonstration and Training.

B. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of Substantial Completion.

C. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

D. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

E. The amount of time required for instruction on each item of equipment and system is that specified in individual sections.

3.12 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

B. Testing, adjusting, and balancing HVAC systems: See Section 23 0593 - Testing, Adjusting, and Balancing for HVAC.

3.13 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.
   1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.

B. Use cleaning materials that are nonhazardous.

C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

F. Clean filters of operating equipment.

G. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.

H. Clean site; sweep paved areas, rake clean landscaped surfaces.

I. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.14 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.
   1. Provide copies to Architect and Owner.

B. Accompany Resident Project Representiative on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.

C. Notify Resident Project Representiative and Architect when work is considered ready for Architect's Substantial Completion inspection in accordance with AIA A201 General Conditions of the Contract for Construction and The Supplementary Conditions for AIA A201 General Conditions of the Contract for Construction.

D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Resident Project Representiative and Architect's Substantial Completion inspection.

E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Resident Project Representiative and Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.

F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
   1. Complete all items of Work listed on the Architect's Items to be Completed List issued with AIA G704 -2017.
      a. Complete all items listed on the Items to be Completed List with fifteen (15) working days of issuance.
      b. Exterior and Site related items of Work which are weather dependent are to be completed within fifteen (15) working days of a appropriate weather conditions or on a schedule as mutually agreed upon by Resident Project Representiative, Architect, Owner, and Contractor .

G. Accompany Resident Project Representiative on Contractor's preliminary final inspection.

H. Notify Resident Project Representiative, Architect, and Owner when work is considered finally complete and ready for Resident Project Representiative, Architect, and Owner's Substantial Completion final inspection.

I. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

J. Notify Resident Project Representiative, Architect, and Owner when work listed is 100 percent complete.
   1. Schedule and complete all items of Work to be found incomplete or unacceptable on the Items to be Completed during the final Architect's final inspection.
   2. If Work listed on the Items to be Completed List is found not to be properly completed, the Contractor may be responsible for the expenses of the Resident Project Representiative and Architect for additional inspection(s).

K. See Section 01 7800 - Closeout Submittals for related information regarding Project record documents, operation and maintenance data, warranties, insurances, and bonds.

3.15 MAINTENANCE

A. Provide service and maintenance of components indicated in specification sections.

B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.

C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION

SECTION 01 7800
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project record documents.

B. Operation and maintenance data.

C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

A. The General Conditions of the Construction Contract, AIA A201 General Conditions of the Contract for Construction: Performance bond and labor and material payment bonds, warranty, and correction of work.

B. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

C. Section 01 7000 - Execution and Closeout Requirements: Contract closeout procedures.

D. Individual Product Sections: Specific requirements for operation and maintenance data.

E. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment. Reference the General Conditions of the Contract for Construction and the Supplementary Conditions.

B. Operation and Maintenance Data:
   1. Submit one (1) digital (PDF) copy of preliminary draft with proposed format and outline of contents prior to start of Work. Architect and Resident Project Representative will review draft and return reviewed copy to Contractor with comments.
   2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
   3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect and Resident Project Representative comments. Revise content of all document sets as required prior to final submission.
   4. Submit two sets of revised final documents in final form within 10 days after final inspection.
   5. Submit one (1) digital (PDF) copy of final documents on an electronic media approved by the Architect and Owner.

C. Materials Transparency Manual:
   1. Compile and submit a digital and a printed version of information disclosing materials content for interior finishes. Meet IWBI (BS) requirements for format and content.
   2. Submit documentation that materials utilized in the Work do not contain:
      a. Asbestos.
      b. Lead
      c. PCBs

D. Insurances:
   1. Maintain Insurance Coverages as required in the The General Conditions of the Construction Contract, AIA A201 General Conditions of the Contract for Construction and the Supplementary Conditions.

E. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.

2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Architect ..

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured depths of foundations in relation to finish first floor datum.
   2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   4. Field changes of dimension and detail.
   5. Details not on original Contract drawings.

G. Record Documents shall be turned over to the Owner at the conclusion of the Project at the time of final payment.

3.02 OPERATION AND MAINTENANCE DATA

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:
   1. Product data, with catalog number, size, composition, and color and texture designations.
   2. Information for re-ordering custom manufactured products.

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

D. Additional information as specified in individual product specification sections.

E. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:
   1. Description of unit or system, and component parts.
   2. Identify function, normal operating characteristics, and limiting conditions.
   3. Include performance curves, with engineering data and tests.
   4. Complete nomenclature and model number of replaceable parts.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

D. Include color coded wiring diagrams as installed.

E. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

F. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
   1. Include HVAC outdoor and exhaust air damper calibration strategy.
      a. Include provisions which ensure that full closure of dampers can be achieved.
   2. Include Carbon Dioxide Monitoring Protocol.
   3. Include Carbon Monoxide Monitoring Protocol.
   4. Include Frost Mitigation Strategy for ventilation heat-recovery system.

G. Provide servicing and lubrication schedule, and list of lubricants required.

H. Include manufacturer's printed operation and maintenance instructions.

I. Include sequence of operation by controls manufacturer.

J. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

K. Provide control diagrams by controls manufacturer as installed.

L. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.

M. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

N. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

O. Include test and balancing reports.

P. Additional Requirements: As specified in individual product specification sections.

3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.

B. Where systems involve more than one specification section, provide separate tabbed divider for each system.

C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect and Owner's third party consultants and subcontractors, with names of responsible parties.

F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.

H. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.

I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

J. Arrangement of Contents: Organize each volume in parts as follows:
   1. Project Directory.
   2. Table of Contents, of all volumes, and of this volume.
   3. Operation and Maintenance Data: Arranged by system, then by product category.
      a. Source data.
      b. Product data, shop drawings, and other submittals.
      c. Operation and maintenance data.
      d. Field quality control data.
      e. Photocopies of warranties, bonds and insurances.
   4. Design Data: To allow for addition of design data furnished by Architect or others, provide a tab labeled "Design Data" and provide a binder large enough to allow for insertion of at least 20 pages of typed text.

3.06 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

END OF SECTION

PROJECT CLOSEOUT
CHECK LIST

Highland Falls Fort Montgomery Central School District
Project: Additions & Alterations to FMES **Project No.** 2022-138Ph1

Contract: _____ **Contract Date:** _____

Contractor: _____
Name **Telephone**

_____
Address

_____

==========

After the Contractor has met all of his obligation of the Contract and is ready to submit the "Final Application for Payment" (as defined in the General and Supplementary Conditions), he is responsible for providing the following items along with the Final Payment to the Engineer (Please note that these shall be provided in one full package, partial submissions of these items will be not be allowed):

1) Consent of Surety to Reduction in or Partial Release of Retainage, AIA Document G707A.

2) Consent of Surety to Final Payment, AIA Document G707.

3) Contractor's Affidavit of Release of Liens, AIA Document G706A (one copy required from all subcontractors).

4) Contractor's Affidavit of Payment of Debts and Claims. AIA Document G706. (one copy required from all subcontractors).

5) Warranty of Title: (sample letter enclosed).

6) Certification: Signed and notarized certification that no asbestos containing materials have been used in the construction (enclosed).

7) Insurance:

   a) All policies of insurance required at the commencement of the project shall remain in effect at all times after final payment, when the Contractor is completing, correcting, removing, replacing work and/or completing items enumerated in engineer's Certificate of Substantial Completion. (Certificates of Insurance shall be evidence thereof.)

   b) Completed Operation Insurance: shall be maintained for at least two years after final payment. Furnish owner with evidence of continuation at time of final payment and continuation one year thereafter.

8) Provide the owner with construction Master-Key System. **

Per Specifications

9) Provide the owner with all product warranties and/or guarantees, including the following; **

Per Specifications

10) Provide the Owner with all Maintenance and Operating Manuals, indicating operating instructions and maintenance schedules for all equipment, systems, operating devices and specialties including the following; **

Per Specifications

11) Record Documents (Per Section 01 7800 of Specifications)

**** If previously provided, please indicate date of submission.**

CERTIFICATION

I, _____, being an officer of _____

do hereby certify that _____ was the Contractor for the work for the **Highland Falls Fort Montgomery CSD Alterations to FMES** (Architect/Engineer Project No. 2022-138Ph1) and that pursuant to and in compliance with the Contract Documents, Information to bidders, Paragraph 20, Hazardous Wastes, and Bid Description for Contract No. _____, no asbestos containing materials were used in the construction of this project and all materials were provided in accordance with the Federal Asbestos Hazard Emergency Response Act (AHERA) and the New York State Asbestos Safety Act (SASA).

_____

_____

By:

State of _____)

County of _____

Subscribed and sworn to before me

this _____ day of _____, 20____

_____

Notary Public

CONTRACTOR'S
WARRANTY OF TITLE

To (Owner):

HFFM CSD	**Date:**
21 Morgan Road	**Contract:** No. –
Highland Falls, New York 10928	**Project No.:** 2022-138Ph1

Project: Alterations to Fort Montgomery Elementary School
(Name)

I, the undersigned, pursuant to Article 9.3.3 of the General Conditions of the Contract for Construction, warrants and guarantees that the title to all work, material and equipment, whether incorporated in the project or not, will pass to the Owner no later than the time of Final Payment, free and clear of all liens.

Contractor

By

Date

SECTION 01 7900
DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 SUMMARY

1.02 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures; except:
   1. Make all submittals specified in this section, and elsewhere where indicated for commissioning purposes, directly to the Commissioning Authority.
   2. Submit one copy to the Commissioning Authority, not to be returned.
   3. Make commissioning submittals on time schedule specified by Commissioning Authority.
   4. Submittals indicated as "Draft" are intended for the use of the Commissioning Authority in preparation of overall Training Plan; submit in editable electronic format, Microsoft Word 2003 preferred.

1.03 QUALITY ASSURANCE

A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
   1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
   2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

END OF SECTION

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SECTION 01 9113
GENERAL COMMISSIONING REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. Commissioning is intended to achieve the following specific objectives; this section specifies the Contractor's responsibilities for commissioning:
   1. Verify that the work is installed in accordance with Contract Documents and the manufacturer's recommendations and instructions, and that it receives adequate operational checkout prior to startup: Startup reports and Prefunctional Checklists executed by Contractor are utilized to achieve this.
   2. Verify and document that functional performance is in accordance with Contract Documents: Functional Tests executed by Contractor and witnessed by the Commissioning Authority are utilized to achieve this.
   3. Verify that operation and maintenance manuals submitted to Owner are complete: Detailed operation and maintenance (O&M) data submittals by Contractor are utilized to achieve this.
   4. Verify that the Owner's operating personnel are adequately trained: Formal training conducted by Contractor is utilized to achieve this.

B. The Commissioning Authority directs and coordinates all commissioning activities; this section describes some but not all of the Commissioning Authority's responsibilities.

1.02 RELATED REQUIREMENTS

A. Section 01 7800 - Closeout Submittals: Scope and procedures for operation and maintenance manuals and project record documents.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures; except:
   1. Make all submittals specified in this section, and elsewhere where indicated for commissioning purposes, directly to the Commissioning Authority, unless they require review by Architect; in that case, submit to Architect first.
   2. Submit one copy to the Commissioning Authority, not to be returned.
   3. Make commissioning submittals on time schedule specified by Commissioning Authority.
   4. Submittals indicated as "Draft" are intended for the use of the Commissioning Authority in preparation of Prefunctional Checklists or Functional Test requirements; submit in editable electronic format, Microsoft Word 2010 preferred.
   5. As soon as possible after submittals made to Architect are approved, submit copy of approved submittal to the Commissioning Authority.

B. Product Data: If submittals to Architect do not include the following, submit copies as soon as possible:
   1. Manufacturer's product data, cut sheets, and shop drawings.
   2. Manufacturer's installation instructions.
   3. Startup, operating, and troubleshooting procedures.
   4. Fan and pump curves.
   5. Factory test reports.
   6. Warranty information, including details of Owner's responsibilities in regard to keeping warranties in force.

C. Manufacturers' Instructions: Submit copies of all manufacturer-provided instructions that are shipped with the equipment as soon as the equipment is delivered.

D. Startup Plans and Reports.

E. Completed Prefunctional Checklists.

PART 2 PRODUCTS

2.01 TEST EQUIPMENT

A. Provide all standard testing equipment required to perform startup and initial checkout and required Functional Testing; unless otherwise noted such testing equipment will NOT become the property of Owner.

B. Calibration Tolerances: Provide testing equipment of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified. If not otherwise noted, the following minimum requirements apply:
   1. Temperature Sensors and Digital Thermometers: Certified calibration within past year to accuracy of 0.5 degree F and resolution of plus/minus 0.1 degree F.
   2. Pressure Sensors: Accuracy of plus/minus 2.0 percent of the value range being measured (not full range of meter), calibrated within the last year.
   3. Calibration: According to the manufacturer's recommended intervals and when dropped or damaged; affix calibration tags or keep certificates readily available for inspection.

C. Equipment-Specific Tools: Where special testing equipment, tools and instruments are specific to a piece of equipment, are only available from the vendor, and are required in order to accomplish startup or Functional Testing, provide such equipment, tools, and instruments as part of the work at no extra cost to Owner; such equipment, tools, and instruments are to become the property of Owner.

D. Dataloggers: Independent equipment and software for monitoring flows, currents, status, pressures, etc. of equipment.
   1. Dataloggers required to for Functional Tests will be provided by the Commissioning Authority and will not become the property of Owner.

PART 3 EXECUTION

3.01 COMMISSIONING PLAN

A. Commissioning Authority has prepared the Commissioning Plan.
   1. Attend meetings called by the Commissioning Authority for purposes of completing the commissioning plan.
   2. Require attendance and participation of relevant subcontractors, installers, suppliers, and manufacturer representatives.

B. Contractor is responsible for compliance with the Commissioning Plan.

C. Commissioning Plan: The commissioning schedule, procedures, and coordination requirements for all parties in the commissioning process.

D. Commissioning Schedule:
   1. Submit anticipated dates of startup of each item of equipment and system to Commissioning Authority within 60 days after award of Contract.
   2. Re-submit anticipated startup dates monthly, but not less than 4 weeks prior to startup.
   3. Prefunctional Checklists and Functional Tests are to be performed in sequence from components, to subsystems, to systems.
   4. Provide sufficient notice to Commissioning Authority for delivery of relevant Checklists and Functional Test procedures, to avoid delay.

3.02 STARTUP PLANS AND REPORTS

A. Startup Plans: For each item of equipment and system for which the manufacturer provides a startup plan, submit the plan not less than 8 weeks prior to startup.

B. Startup Reports: For each item of equipment and system for which the manufacturer provides a startup checklist (or startup plan or field checkout sheet), document compliance by submitting the completed startup checklist prior to startup, signed and dated by responsible entity.

C. Submit directly to the Commissioning Authority.

3.03 PREFUNCTIONAL CHECKLISTS

A. A Prefunctional Checklist is required to be filled out for each item of equipment or other assembly specified to be commissioned.
   1. No sampling of identical or near-identical items is allowed.
   2. These checklists do not replace manufacturers' recommended startup checklists, regardless of apparent redundancy.
   3. Prefunctional Checklist forms will not be complete until after award of the contract; the following types of information will be gathered via the completed Checklist forms:
      a. Certification by installing contractor that the unit is properly installed, started up, and operating and ready for Functional Testing.
      b. Confirmation of receipt of each shop drawing and commissioning submittal specified, itemized by unit.
      c. Manufacturer, model number, and relevant capacity information; list information "as specified," "as submitted," and "as installed."
      d. Serial number of installed unit.
      e. List of inspections to be conducted to document proper installation prior to startup and Functional Testing; these will be primarily static inspections and procedures; for equipment and systems may include normal manufacturer’s start-up checklist items and minor testing.
      f. Sensor and actuator calibration information.

B. Contractor is responsible for filling out Prefunctional Checklists, after completion of installation and before startup; witnessing by the Commissioning Authority is not required unless otherwise specified.
   1. Each line item without deficiency is to be witnessed, initialed, and dated by the actual witness; checklists are not complete until all line items are initialed and dated complete without deficiencies.
   2. Checklists with incomplete items may be submitted for approval provided the Contractor attests that incomplete items do not preclude the performance of safe and reliable Functional Testing; re-submission of the Checklist is required upon completion of remaining items.
   3. Individual Checklists may contain line items that are the responsibility of more than one installer; Contractor shall assign responsibility to appropriate installers or subcontractors, with identification recorded on the form.
   4. If any Checklist line item is not relevant, record reasons on the form.
   5. Contractor may independently perform startup inspections and/or tests, at Contractor's option.
   6. Regardless of these reporting requirements, Contractor is responsible for correct startup and operation.
   7. Submit completed Checklists to Commissioning Authority within two days of completion.

C. Commissioning Authority is responsible for furnishing the Prefunctional Checklists to Contractor.
   1. Initial Drafts: Contractor is responsible for initial draft of Prefunctional Checklist where so indicated in Contract Documents.
   2. Provide all additional information requested by Commissioning Authority to aid in preparation of checklists, such as shop drawing submittals, manufacturers' startup checklists, and O&M data.
   3. Commissioning Authority may add any relevant items deemed necessary regardless of whether they are explicitly mentioned in Contract Documents or not.
   4. When asked to review the proposed Checklists, do so in a timely manner.

D. Commissioning Authority Witnessing: Required for:
   1. Each piece of primary equipment, unless sampling of multiple similar units is allowed by the commissioning plan.

2. A sampling of non-primary equipment, as allowed by the commissioning plan.

E. Deficiencies: Correct deficiencies and re-inspect or re-test, as applicable, at no extra cost to Owner.
   1. If difficulty in correction would delay progress, report deficiency to the Commissioning Authority immediately.

3.04 FUNCTIONAL TESTS

A. A Functional Test is required for each item of equipment, system, or other assembly specified to be commissioned, unless sampling of multiple identical or near-identical units is allowed by the final test procedures.

B. Contractor is responsible for execution of required Functional Tests, after completion of Prefunctional Checklist and before closeout.

C. Commissioning Authority is responsible for witnessing and reporting results of Functional Tests, including preparation and completion of forms for that purpose.

D. Contractor is responsible for correction of deficiencies and re-testing at no extra cost to Owner; if a deficiency is not corrected and re-tested immediately, the Commissioning Authority will document the deficiency and the Contractor's stated intentions regarding correction.
   1. Deficiencies are any condition in the installation or function of a component, piece of equipment or system that is not in compliance with Contract Documents or does not perform properly.
   2. When the deficiency has been corrected, the Contractor completes the form certifying that the item is ready to be re-tested and returns the form to the Commissioning Authority; the Commissioning Authority will reschedule the test and the Contractor shall re-test.
   3. Identical or Near-Identical Items: If 10 percent, or three, whichever is greater, of identical or near-identical items fail to perform due to material or manufacturing defect, all items will be considered defective; provide a proposal for correction within 2 weeks after notification of defect, including provision for testing sample installations prior to replacement of all items.
   4. Contractor shall bear the cost of Owner and Commissioning Authority personnel time witnessing re-testing.
   5. Contractor shall bear the cost of Owner and Commissioning Authority personnel time witnessing re-testing if the test failed due to failure to execute the relevant Prefunctional Checklist correctly; if the test failed for reasons that would not have been identified in the Prefunctional Checklist process, Contractor shall bear the cost of the second and subsequent re-tests.

E. Functional Test Procedures:
   1. Some test procedures are included in Contract Documents; where Functional Test procedures are not included in Contract Documents, test procedures will be determined by the Commissioning Authority with input by and coordination with Contractor.
   2. Examples of Functional Testing:
      a. Test the dynamic function and operation of equipment and systems (rather than just components) using manual (direct observation) or monitoring methods under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure setpoint).
      b. Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc.
      c. Systems are run through all the HVAC control system’s sequences of operation and components are verified to be responding as the sequence's state.
      d. Traditional air or water test and balancing (TAB) is not Functional Testing; spot checking of TAB by demonstration to the Commissioning Authority is Functional Testing.

F. Deferred Functional Tests: Some tests may need to be performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions; performance of these tests remains the Contractor's responsibility regardless of timing.

3.05 SENSOR AND ACTUATOR CALIBRATION

A. Calibrate all field-installed temperature, relative humidity, carbon monoxide, carbon dioxide, and pressure sensors and gauges, and all actuators (dampers and valves) on this piece of equipment shall be calibrated. Sensors installed in the unit at the factory with calibration certification provided need not be field calibrated.

B. Calibrate using the methods described below; alternate methods may be used, if approved by Commissioning Authority and Owner beforehand. See PART 2 for test instrument requirements. Record methods used on the relevant Prefunctional Checklist or other suitable forms, documenting initial, intermediate and final results.

C. All Sensors:
   1. Verify that sensor location is appropriate and away from potential causes of erratic operation.
   2. Verify that sensors with shielded cable are grounded only at one end.
   3. For sensor pairs that are used to determine a temperature or pressure difference, for temperature make sure they are reading within 0.2 degree F of each other, and for pressure, within tolerance equal to 2 percent of the reading, of each other.
   4. Tolerances for critical applications may be tighter.

D. Sensors Without Transmitters - Standard Application:
   1. Make a reading with a calibrated test instrument within 6 inches of the site sensor.
   2. Verify that the sensor reading, via the permanent thermostat, gauge or building automation system, is within the tolerances in the table below of the instrument-measured value.
   3. If not, install offset, calibrate or replace sensor.

E. Sensors With Transmitters - Standard Application.
   1. Disconnect sensor.
   2. Connect a signal generator in place of sensor.
   3. Connect ammeter in series between transmitter and building automation system control panel.
   4. Using manufacturer’s resistance-temperature data, simulate minimum desired temperature.
   5. Adjust transmitter potentiometer zero until 4 mA is read by the ammeter.
   6. Repeat for the maximum temperature matching 20 mA to the potentiometer span or maximum and verify at the building automation system.
   7. Record all values and recalibrate controller as necessary to comply with specified control ramps, reset schedules, proportional relationship, reset relationship and P/I reaction.
   8. Reconnect sensor.
   9. Make a reading with a calibrated test instrument within 6 inches of the site sensor.
   10. Verify that the sensor reading, via the permanent thermostat, gauge or building automation system, is within the tolerances in the table below of the instrument-measured value.
   11. If not, replace sensor and repeat.
   12. For pressure sensors, perform a similar process with a suitable signal generator.

F. Sensor Tolerances for Standard Applications: Plus/minus the following maximums:
   1. Watthour, Voltage, Amperage: 1 percent of design.
   2. Pressure, Air, Water, Gas: 3 percent of design.
   3. Air Temperatures (Outside Air, Space Air, Duct Air): 0.4 degrees F.

4. Relative Humidity: 4 percent of design.
5. Barometric Pressure: 0.1 inch of Hg.
6. Flow Rate, Air: 10 percent of design.
7. Flow Rate, Water: 4 percent of design.
8. AHU Wet Bulb and Dew Point: 2.0 degrees F.

G. Critical Applications: For some applications more rigorous calibration techniques may be required for selected sensors. Describe any such methods used on an attached sheet.

H. Valve/Damper Stroke Setup and Check:
1. For all valve/damper actuator positions checked, verify the actual position against the control system readout.
2. Set pump/fan to normal operating mode.
3. Command valve/damper closed; visually verify that valve/damper is closed and adjust output zero signal as required.
4. Command valve/damper to open; verify position is full open and adjust output signal as required.
5. Command valve/damper to a few intermediate positions.
6. If actual valve/damper position does not reasonably correspond, replace actuator or add pilot positioner (for pneumatics).

I. Isolation Valve or System Valve Leak Check: For valves not associated with coils.
1. With full pressure in the system, command valve closed.
2. Use an ultra-sonic flow meter to detect flow or leakage.

3.06 TEST PROCEDURES - GENERAL

A. Provide skilled technicians to execute starting of equipment and to execute the Functional Tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.

B. Provide all necessary materials and system modifications required to produce the flows, pressures, temperatures, and conditions necessary to execute the test according to the specified conditions. At completion of the test, return all affected equipment and systems to their pre-test condition.

C. Sampling: Where Functional Testing of fewer than the total number of multiple identical or near-identical items is explicitly permitted, perform sampling as follows:
1. Identical Units: Defined as units with same application and sequence of operation; only minor size or capacity difference.
2. Sampling is not allowed for:
   a. Major equipment.
   b. Life-safety-critical equipment.
   c. Prefunctional Checklist execution.
3. XX = the percent of the group of identical equipment to be included in each sample; defined for specific type of equipment.
4. YY = the percent of the sample that if failed will require another sample to be tested; defined for specific type of equipment.
5. Randomly test at least XX percent of each group of identical equipment, but not less than three units. This constitutes the "first sample."
6. If YY percent of the units in the first sample fail, test another XX percent of the remaining identical units.
7. If YY percent of the units in the second sample fail, test all remaining identical units.
8. If frequent failures occur, resulting in more troubleshooting than testing, the Commissioning Authority may stop the testing and require Contractor to perform and document a checkout of the remaining units prior to continuing testing.

D. Manual Testing: Use hand-held instruments, immediate control system readouts, or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the “observation”).

E. Simulating Conditions: Artificially create the necessary condition for the purpose of testing the response of a system; for example apply hot air to a space sensor using a hair dryer to see the response in a VAV box.

F. Simulating Signals: Disconnect the sensor and use a signal generator to send an amperage, resistance or pressure to the transducer and control system to simulate the sensor value.

G. Over-Writing Values: Change the sensor value known to the control system in the control system to see the response of the system; for example, change the outside air temperature value from 50 degrees F to 75 degrees F to verify economizer operation.

H. Indirect Indicators: Remote indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100 percent closed, are considered indirect indicators.

I. Monitoring: Record parameters (flow, current, status, pressure, etc.) of equipment operation using dataloggers or the trending capabilities of the relevant control systems; where monitoring of specific points is called for in Functional Test Procedures:
   1. All points that are monitored by the relevant control system shall be trended by Contractor; at the Commissioning Authority’s request, Contractor shall trend up to 20 percent more points than specified at no extra charge.
   2. Other points will be monitored by the Commissioning Authority using dataloggers.
   3. At the option of the Commissioning Authority, some control system monitoring may be replaced with datalogger monitoring.
   4. Provide hard copies of monitored data in columnar format with time down left column and at least 5 columns of point values on same page.
   5. Graphical output is desirable and is required for all output if the system can produce it.
   6. Monitoring may be used to augment manual testing.

3.07 OPERATION AND MAINTENANCE MANUALS

A. See Section 01 7800 - Closeout Submittals for additional requirements.

B. Add design intent documentation furnished by Architect to manuals prior to submission to Owner.

C. Submit manuals related to items that were commissioned to Commissioning Authority for review; make changes recommended by Commissioning Authority.

D. Commissioning Authority will add commissioning records to manuals after submission to Owner.

END OF SECTION

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SECTION 01 9114
COMMISSIONING AUTHORITY RESPONSIBILITIES

PART 1 GENERAL

1.01 SUMMARY

A. Commissioning is intended to achieve the following specific objectives; this section covers the Commissioning Authority's responsibilities for commissioning:
   1. Verify that the work is installed in accordance with Contract Documents and the manufacturer's recommendations and instructions, and that it receives adequate operational checkout prior to startup: Startup reports and Prefunctional Checklists are utilized to achieve this.
   2. Verify and document that functional performance is in accordance with Contract Documents: Functional Tests performed by Contractor and witnessed by the Commissioning Authority are utilized to achieve this.
   3. Verify that operation and maintenance manuals submitted to Owner are complete: Detailed O&M data submittals are specified.
   4. Verify that the Owner's operating personnel are adequately trained: Formal training conducted by Contractor is specified.

B. Commissioning, including Functional Tests, O&M documentation review, and training, is to occur after startup and initial checkout and be completed before Substantial Completion.

C. Coordinate and direct all the commissioning activities in a logical, sequential and efficient manner using consistent protocols and forms, centralized documentation, clear and regular communications and consultations with all necessary parties, frequently updated timelines and schedules and technical expertise.

1.02 SCOPE OF COMMISSIONING

A. The following are to be commissioned:

B. Other equipment and systems explicitly identified elsewhere in Contract Documents as requiring commissioning.

1.03 REFERENCE STANDARDS

A. ASHRAE Guideline 1.1 - HVAC&R Technical Requirements for the Commissioning Process; 2007, with Errata (2012).

1.04 SUBMITTALS

A. Commissioning Plan:
   1. Submit preliminary draft for review by Owner and Architect within 30 days after commencement of Commissioning Authority contract.
   2. Submit revised draft to be included in the construction Contract Documents, not less than 4 weeks prior to bid date.
   3. Submit final plan not more than 90 days after commencement of construction, for issuance to all parties.

B. List of Prefunctional Checklists to be developed:
   1. Submit preliminary list at start of construction documents phase or within 30 days after commencement of contract, whichever is later.
   2. Submit revised list not less than 6 weeks prior to bid date, for inclusion in the construction Contract Documents.
   3. Submit final list not more than 60 days after start of construction.

C. Prefunctional Checklists:
   1. Submit preliminary draft at start of construction documents phase or within 30 days after commencement of contract, whichever is later.

2. Submit revised draft for review by Owner and Architect not less than 6 weeks prior to bid date, for inclusion in the construction Contract Documents.
3. Submit final draft to Contractor not less than 4 weeks prior to startup of particular items to be commissioned.

D. List of Functional Test procedures to be developed:
1. Submit preliminary list at start of construction documents phase or within 30 days after commencement of contract, whichever is later.
2. Submit revised list not less than 6 weeks prior to bid date, for inclusion in Contract Documents; this is intended to be a list of titles, not full description of the tests.
3. Submit final list not more than 60 days after start of construction.

E. Functional Test Procedures:
1. Submit preliminary draft at start of construction documents phase or within 30 days after commencement of contract, whichever is later.
2. Submit revised draft for review by Owner and Architect not less than 6 weeks prior to bid date, for inclusion in the construction Contract Documents.
3. Submit final draft to Contractor not less than 4 weeks prior to startup of particular items to be commissioned.

F. Training Plan.

G. Recommissioning Manual: Submit within 60 days after receipt of Owner's instructions to proceed with preparation.

H. Commissioning Process Record: Submit to Contractor for inclusion with O&M manuals. Include, at a minimum the following:

I. Final Commissioning Report: Submit to Owner. Include the following:

PART 3 EXECUTION

2.01 COMMISSIONING PLAN

A. Prepare and implement the Commissioning Plan, covering commissioning schedule, Prefunctional Checklist and Functional Test procedures, coordination requirements, and forms to be used, for all parties in the commissioning process.
1. Call and chair meetings of the Commissioning team when appropriate.
2. Give Contractor sufficient notice for scheduling commissioning activities.
3. Develop a comprehensive start-up and initial systems checkout plan with cooperation of Contractor and subcontractors.
4. ASHRAE Guideline 1.1 may be used as a guide for the Commissioning Plan.
5. Avoid replication of information included in the construction Contract Documents to the greatest extent possible.

B. Review the construction Contract Documents for Contractor submittals of draft checklists, draft test procedures, manufacturer startup procedures, and other information intended for the use of the Commissioning Authority in preparing the Commissioning Plan.

C. Commissioning Schedule:
1. Coordinate with Contractor anticipated dates of startup of each item of equipment and system.
2. Contractor's scheduling responsibilities are specified in the construction Contract Documents.
3. Revise and re-issue schedule monthly.
4. Prefunctional Checklists and Functional Tests are to be performed in sequence from components, to subsystems, to systems.
5. Deliver relevant Prefunctional Checklists and Functional Test Procedures to Contractor in time to avoid delay.

2.02 CONSTRUCTION CONTRACT DOCUMENTS

A. General Commissioning Specifications: Architect has prepared general commissioning specifications for inclusion in the construction Contract Documents; review and submit comments to Owner.
   1. These specifications include:
      a. Procedures applicable to all types of items to be commissioned.
   2. Prepare specifications for any of the following that would be recommended, for incorporation into the construction Contract Documents by Architect:
      a. Additional Contractor submittals needed for purposes of commissioning, such as startup procedures, draft test procedures, draft training plans, etc.
      b. Additional Owner personnel training.
      c. Additional operation or maintenance data that should be submitted.

B. Prefunctional Checklists: Develop detailed Checklists for each item to be commissioned.
   1. List of Checklists to be Developed: Prepare and maintain a detailed list of titles, not full text.
   2. The Checklist forms are intended to be part of the Contractor's Contract Documents.

C. Functional Testing: Develop detailed procedures for each item to be commissioned; submit for review by Owner and Architect.
   1. List of Test Procedures to be Developed: Prepare and maintain a detailed list of titles, not full text.
   2. The forms the Commissioning Authority will use to report Functional Test results are not intended to be part of Contractor's Contract Documents, but the Functional Test Procedures that must be executed by the Contractor must be made part of the Contract Documents, by modification if necessary.

D. Develop any other reporting forms Contractor will be required to use; if they are likely to require a substantially different amount of work than the Contractor can reasonably anticipate, they must be included in the construction Contract Documents.

E. If any part of the documents described above have not been developed by the bid date, coordinate with Architect the issuance of modifications to the construction Contract Documents

2.03 PREFUNCTIONAL CHECKLISTS

A. Prefunctional Checklists - Content: Prepare forms for Contractor's use, in sufficient detail to document that the work has been installed in accordance with Contract Documents and the manufacturer’s recommendations and instructions, and that it receives adequate operational checkout prior to startup.
   1. Prepare separate Checklists for each type of equipment, system, or other assembly, customized to the item.
   2. Identify each Checklist by using Contract Documents identification number or name, if any; if none, create unique identifiers for each Checklist; do not rely on Contractor to number checklists.
   3. Multiple identical or near-identical items may appear on a single Checklist provided there is space to record all required data for each separately; label each set of data uniquely.
   4. Include space to record manufacturer name, model number, serial number, capacity and other relevant characteristics, and accessories and other features as applicable; include space to record "as specified", "as submitted", and "as installed" data.
   5. Include space to record whether or not the required submittals have been received; list each separate type of submittal.
   6. Include line items for each physical inspection to be performed.
   7. Include line items for each operational inspection to be performed, such as checking switch operation, fan rotation, valve and damper stroke, and measuring actual electrical loads.

8. Include separate section for sensors and actuators, with space for documenting actual physical location and calibration measurements; provide a separate generic calibration checklist identified wherever referenced.
9. Include spaces to record that related Checklists for related work upon which this work depends have been completed.

B. Prefunctional Checklists - Format:
1. Provide a cover sheet showing name of equipment item or system, documentation identification number (see Documentation Identification Scheme), names of accessory components involved, and identification of related checklists.
2. Include on cover sheet space for Contractor's use in attesting to completeness; provide spaces for the signatures of the general contractor and each subcontractor or other entity responsible, customized to the project and the type of item.
3. Include on the cover sheet, above the signature block, the following statement: "The work referenced in this Checklist and other work integral to or dependent on this work is complete and ready for functional testing. The checklist items are complete and have been checked off only by parties having direct knowledge of the event." Include two checkboxes:
   a. "This Checklist is submitted for approval with no exceptions."
   b. "This Checklist is submitted for approval, subject to the attached list of outstanding items, none of which preclude the performance of safe and reliable functional tests. A statement of completion will be submitted upon completion of the outstanding items."
4. Use a consistent, tabular format for all Checklists, with one line per checklist activity.
5. For each line item, provide space for initials and date, and identification of the subcontractor or other entity responsible.

2.04 FUNCTIONAL TEST PROCEDURES

A. Develop test procedures in sufficient detail to demonstrate that functional performance is in accordance with Contract Documents, including proper operation through specified modes of operation where there is a different system response, including seasonal, unoccupied, warm-up, cool-down, part- and full-load regimes.
1. Obtain assistance and review by installing subcontractors.
2. Itemize each test sequence in step-by-step order, with acceptance criteria for each step and for the test as a whole.
3. Include test setup instructions, description of tools and apparatus, special cautions, and.
4. Avoid procedures that would void or otherwise limit warranties; review with Contractor prior to execution.
5. For HVAC systems, procedures may include energy management control system trending, stand-alone datalogger monitoring, or manual functional testing.
6. Obtain explicit approval of Contractor in regard to feasibility and safety prior to execution.

B. Functional Test Forms: Prepare and distribute forms in advance of testing. Use a consistent format to the greatest degree practicable. For each form, include the following:
1. Signature Block: Signature of the designated commissioning lead and the system and equipment installer attesting that the recorded test results are accurate.

2.05 CONSTRUCTION PHASE

A. Coordinate the commissioning work with Contractor and Construction Manager; ensure that commissioning activities are being incorporated into the master schedule.

B. Perform site visits, as necessary, to observe component and system installations. Attend planning and job-site meetings to obtain information on construction progress. Review Contractor's meeting minutes for issues relating to the commissioning process. Assist in resolving discrepancies.

C. Commissioning Kick-Off Meeting: Plan and conduct a meeting early in the construction phase to review proposed commissioning schedule, activities, and responsibilities with parties involved. Require attendance by every member of the Commissioning Team.

D. Conduct periodic meetings as necessary to coordinate, resolve planning issues, and aid in resolution of deficiencies, minimizing the time spent by Contractor and Owner personnel; hold meetings at least monthly.

E. Submit periodic progress reports to Owner and Contractor.

F. Review Contractor shop drawing submittals applicable to systems being commissioned for compliance with commissioning needs; verify that Owner's responsibilities are clearly defined in warranties.

G. Review and approve submittals directly related to commissioning.

H. Deliver Prefunctional Checklists and Functional Test procedures to Contractor.

I. Verify satisfactory completion of Prefunctional Checklists by Contractor by reviewing checklists and by site observation and spot checking; provide formal approval when satisfactory.

J. Verify startup of all systems by reviewing start-up reports and by site observation; provide formal approval when satisfactory.

K. Coordinate, witness and approve Functional Tests performed by Contractor. Coordinate retesting until satisfactory performance is achieved.

L. HVAC Commissioning:
   1. Gather and review the control sequences and interlocks and work with Contractor and design engineers until sufficient clarity has been obtained, in writing, to be able to prepare detailed Functional Test procedures.
   2. Witness all or part of HVAC piping test and flushing procedures, sufficient to be confident that proper procedures were followed; document testing and include documentation in O&M manuals.
   3. Witness all or part of duct testing and cleaning procedures, sufficient to be confident that proper procedures were followed; document testing and include documentation in O&M manuals.
   4. Review TAB Plan prepared by Contractor.
   5. Before TAB is executed, witness sufficient Functional Testing of the control system to approve it to be used for TAB.
   6. Verify air and water systems balancing by spot testing, by reviewing completed reports, and by site observation; provide formal approval when satisfactory.
   7. Analyze trend logs and monitoring data to verify performance.

M. Witness and document testing of systems and components over which the Commissioning Authority does not have direct control, such as smoke control systems, tests contracted directly by Owner, and tests by manufacturer’s personnel; include documentation in O&M manuals.

N. When Functional Testing for specific systems or equipment is specified to be performed by the Commissioning Authority rather than the Contractor, perform such testing without assistance of Contractor.

O. Maintain a master deficiency and resolution log and a separate testing record. Provide written progress and test reports with recommended actions.

P. Operation and Maintenance Data: Review submitted operation and maintenance data for completeness; provide formal approval if satisfactory.

Q. Notify Contractor and Owner of deficiencies in procedures or results; suggest solutions.

2.06 TRAINING

A. Training Plan: Prepare a comprehensive Training Plan, incorporating draft training plans submitted by Contractor.

1. Include a ____ hour session by the HVAC design engineer covering the overall HVAC system and equipment design concepts, with one-line schematic drawings.
2. Include a ____ hour session by the Commissioning Authority on the use of the blank Prefunctional Checklists and Functional Test forms for re-commissioning purposes.
3. Establish criteria for determining satisfactory completion of training.

B. Verify that training was satisfactorily completed; provide formal approval if satisfactory.

2.07 CLOSEOUT

A. Commissioning Record: Use the same format and organization as specified for the O&M manuals.
1. Include the Final Commissioning Plan and Final Report.
2. For each product or system and equipment item, include the following organized as indicated, with separator tabs:
   a. Design intent documentation, furnished by Architect or others.
   b. Detailed operational sequences.
   c. Startup plan and approved startup reports.
   d. Filled out Prefunctional Checklists.
   e. Filled out Functional Test reports; trend logs and monitoring reports and analysis; other verification documentation.
   f. Training plan and training records.
   g. Recommissioning recommendations, including time schedule and procedures; include blank copies of all Prefunctional Checklists and Functional Test report forms.

B. Final Commissioning Report: Include:
1. Executive summary.
2. List of participants and roles.
3. Brief facility description.
4. Overview of commissioning scope and general description of testing and verification methods.
5. For each item commissioned, an evaluation of adequacy of:
   a. The product itself; i.e. compliance with Contract Documents.
   b. Installation.
   c. Functional performance; include a brief description of the verification method used and observations and conclusions from the testing.
   d. O&M documentation, including design intent.
   e. Operator training.
6. List of all outstanding non-compliance items, referenced to the specific functional test, inspection, trend log, etc., where the deficiency is documented.
7. List of unresolved issues, seasonal or deferred testing, and other concerns that could affect facility operation.
8. Recommendations for improvement to equipment or operations, future actions, commissioning process changes, etc. (about four to six pages).
9. Attach appendices containing all commissioning documentation, including logs, minutes, reports, deficiency lists, communications, findings, etc., except that specified to be part of the Commissioning Record.

C. Recommissioning Manual: Revise the Commissioning Plan documents, checklists, and Functional Test forms as necessary based on accepted recommendations of the final Commissioning Report. Provide step-by-step instructions for recommissioning, blank forms, and cross-references to O&M data needed during recommissioning.

2.08 POST-OCCUPANCY PHASE

A. Coordinate deferred and seasonal Functional Tests; verify correction of deficiencies.

B. On-Site Review: 10 months after Substantial Completion conduct on-site review with Owner's staff.
   1. Review the current facility operation and condition of outstanding issues related to the original and seasonal commissioning.
   2. Interview staff to identify problems or concerns they have operating the facility as originally intended.
   3. Make suggestions for improvements and for recording these changes in the O&M manuals.
   4. Identify areas of concern that are still under warranty or are the responsibility of the original construction contractor.
   5. Assist facility staff in developing reports, documents and requests for services to remedy outstanding problems.

END OF SECTION

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SECTION 02 3000
SUBSURFACE INVESTIGATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Soil Investigation and Subsurface Investigation.
   1. A Geotechnical Evaluation has been completed for the site. A copy of this report is included here for informational purposes only and is not part of the Contract Documents.
      a. The report was completed by Atlantic Testing Laboratories, LTD.

B. Use of Data:
   1. The locations of the test boring are generally indicated on the site plan (locations may vary). The test boring locations are also included in the Geotechnical Report.
   2. The results of the test borings are included in the Geotechnical Report and is available for examination by the Contractor. The data in the Geotechnical Report is offered in good faith for the purpose of advising the Contractor of the available information related to the Work. This report is available for the Bidder/Contractor but is not a warranty of the subsurface conditions.
   3. The Geotechnical data information is not part of the Contract Drawings. The Architect does not guarantee the continuity of the conditions outlined in the Geotechnical Report.
   4. Each Bidder and the successful Contractor who is awarded the Contract, are responsible for any conclusions and interpretations drawn from the Geotechnical Report.
   5. Site visits to acquaint the Bidder/Contractor with the existing site conditions are recommended.
   6. Bidder/Contractor who wishes to conduct their own subsoil investigation and employ their own expert to further assess the existing subsurface conditions will be allowed with permission from the Owner. To secure permission to enter the project site to conduct an investigation, contact the Architect at (607) 319-4053 at seven working days in advance. The Bidder/Contractor is responsible for site restoration upon completion of their investigation.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

END OF SECTION

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SECTION 02 82 13
ASBESTOS ABATEMENT

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

B. Refer to C&S Companies *Limited Hazardous Material Pre-Renovation Survey Report, Highland Falls-Fort Montgomery Central School District, Fort Montgomery Elementary School, dated October 2023*, for information regarding materials that have been identified as asbestos-containing materials, or that have been sampled and determined to be non-asbestos containing.

1.02 SUMMARY OF WORK

Abatement Work Area Location	Asbestos Abatement of Work Description	Approximate Quantity
1ST FLOOR-AREAS A & B (ES HM-101 & 102)	NOTE A1 REMOVE PRESUMED ASBESTOS-CONTAINING FLOOR TILE AND MASTIC LOCATED UNDER UNIVENTS SCHEDULED FOR REMOVAL AS IDENTIFIED ON DRAWINGS. COORDINATE LIMITED LOCATIONS OF REMOVAL WITH M/E/P CONTRACTORS FOR DISCONNECTING UNIVENTS PRIOR TO ABATEMENT. EXTENT OF ABATEMENT SHALL BE CUT FLUSH WITH EXISTING CABINETRY, SCHEDULED TO REMAIN. REMOVAL SHALL INCLUDE ALL LAYERS OF FLOORING, INCLUDING TILES, FILLERS, MASTICS, UNDERLAYMENTS, FELTS, ETC. TO CLEAN SUBSTRATE. PROTECT ADJACENT FLOORING MATERIALS SCHEDULED TO REMAIN.	240 SF
1ST FLOOR-AREAS A & B (ES HM-101 & 102)	NOTE A2 REMOVE PRESUMED ASBESTOS-CONTAINING PIPE AND/OR PIPE FITTING INSULATION WITHIN WALL/CEILING CAVITIES. ANY SELECTIVE DEMOLITION TO ACCESS PIPE AND/OR FITTING INSULATION SHALL BE PERFORMED UNDER ABATEMENT CONDITIONS.	160 LF

Abatement Work Area Location	Asbestos Abatement of Work Description	Approximate Quantity
BASEMENT (ES HM-100)	NOTE A3 REMOVE PRESUMED ELECTICIAL COMPONENTS FROM LOCATIONS AS NOTED ON DRAWING. COORDINATE DE-ENERGIZING SYSTEM WITH OWNER AND OTHER TRADES.	40 SF
1ST, 2ND & ATTIC ES HM-102	NOTE A4 AVOID DISTURBING ASBESTOS-CONTAINNG ACM WEATHERPROOFNG MASTIC BEHIND PLASTER WALL AT PERIMETER OF THE BUILDING IN LOCATIONS AS NOTED.	NA
1ST Floor-Area B ES HM-102	NOTE A5 PERFORM FASTENING OPERATIONS THAT PENETRATE FULL DEPTH OF EXISTING WALL PLASTER SYSTEM (AT EXTERIOR WALL LOCATIONS AT DEPTHS THAT WILL IMPACT ACM WEATHERPROOFING ON MASONRY BLOCK. FASTENEING SHALL BE PERFORMED BY THE ABATEMENT CONTRACTOR UNDER ABATEMENT CONDITIONS, COORDINATE SPECIFIC LOCATIONS WITH OTHER TRADES AND A/M/E/P SERIES DRAWINGS.	20 SF
ROOF-AREA B ES HM-103	NOTE A6 REMOVE ASBESTOS-CONTAINING SKYLIGHT CURB FLASHING IN ITS ENTIRETY IN LOCATIONS AS NOTED. THE CONTRACTOR IS RESPONSIBLE FOR WEATHER PROTECTION AT ALL TIMES. COORDINATE REMOVAL WITH OWNER AND OTHER TRADES. REMOVAL INCLUDES ALL LAYERS.	100 SF
ROOF-AREA B ES HM-103	NOTE 7 REMOVE ASBESTOS-CONTAINING ROOF VAPOR BARRIER/TAR PAPER (ON WOOD DECK) IN LOCATIONS AS NOTED ON DRAWING. THE CONTRACTOR IS RESPONSIBLE FOR REMOVAL OF THE ROOF TOP UNITS AS NEEDED TO ACCESS ACM; ALL SUCH REMOVAL SHALL BE CONDUCTED UNDER ABATEMENT CONDITIONS.	80 SF

1.03 GENERAL CONDITIONS

A. The Contractor acknowledges that the quantities of asbestos-containing materials and presumed asbestos-containing materials shall be field-verified, prior to submission of bid. Variations of ±20% in the quantities indicated shall be acknowledged by the Contractor and shall be reflected in their price.

B. The Contractor's pricing shall include costs for all labor, materials, equipment, asbestos project notifications and fees, building permits and fees, insurance, bonding, waste transportation and disposal, overhead and profit, and all other costs necessary to complete the work, as specified.

C. All work shall be performed in accordance with the project design specifications and all applicable federal, state, and local regulations. When conflicts occur between the project design documents and federal, state, and/or local regulations, the most stringent requirement shall apply. The Contractor shall comply with the following, except where more stringent requirements are shown or specified:

1. Federal Regulations:

    a. OSHA 29 CFR Part 1910.1001 – Asbestos

    b. OSHA 29 CFR Part 1910.1200 – Hazard Communication

    c. OSHA 29 CFR Part 1910.134 – Respiratory Protection

    d. OSHA 29 CFR Part 1910.145 – Specification for Accident Prevention Signs and Tags

    e. OSHA 29 CFR Part 1926 – Construction Industry

    f. OSHA 29 CFR Part 1926.1101 – Asbestos, Tremolite, Anthophyllite, and Actinolite

    g. OSHA 29 CFR Part 1926.500 – Guardrails, Handrails, and Covers

    h. USEPA 40 CFR Part 61, Subpart A – General Provisions

    i. USEPA 40 CFR Part 61, Subpart M – Asbestos NESHAP

    j. USEPA 40 CFR Part 763, Subpart E, Asbestos Hazard Emergency Response Act (AHERA)

2. New York State Regulations:

    a. NYSDOL 12 NYCRR Part 56 – "Asbestos," as amended 3/21/2007

    b. NYSDEC 6 NYCRR Parts 360 and 364 – Waste Disposal & Transportation

    c. NYSDOH 10 NYCRR Part 73 – Asbestos Safety Program Requirements

3. All Local Regulations

4. Standards and Guidance Documents:

    a. American National Standard Institute (ANSI) Z88.2-80, Practices for Respiratory Protection

    b. ANSI Z9.2-79, Fundamentals Governing the Design and Operation of Local Exhaust Systems

    c. USEPA 560/585-024, Guidance for Controlling Asbestos Containing Materials in Buildings (Purple Book)

d. USEPA 530-SW-85-007, Asbestos Waste Management Guidance

5. All applicable building and fire codes.

D. The Contractor accepts that multiple means of clearance criteria will be utilized for final clearance criteria based on the applicable regulatory requirements for the abatement work performed. Final visual inspections and clearance air sampling will be utilized to determine satisfactory completion of the asbestos abatement work of this project. Phase Contrast Microscopy (PCM) or Transmission Electron Microscopy (TEM) analysis of air samples will be utilized to determine satisfactory clearance, based upon the size of the regulated work area.

E. The Abatement Contractor shall be responsible for, but not limited to, the following:

a. Submission and approval of required local, state and federal notifications, notification fees and applicable variances prior to commencement of work, as required by regulations.
b. Verification of all site conditions and locations and quantities of all ACM. Abatement Contractor shall immediately notify Hazardous Material Engineer of any discrepancies noted.
c. Posting of the building to provide notification of the abatement activities, as required under ICR 56, section 56-3.6. The posting shall occur ten (10) calendar days prior to commencement of work at the site by the Abatement Contractor, and shall be placed at all direct means of access to the floor, including all stairways, elevators, hallways, corridors, exterior doors, and emergency egress points. Each posting shall include description of the areas in which the work will be conducted; the types and amounts of ACM being removed; commencement and completion dates of the work; name and asbestos handling license number of the Abatement Contractor; name and address of the air monitoring firm and the laboratory for the project; and a statement that it is unlawful for any person to interfere with or remove the posting.
d. Removal of all asbestos material within the areas indicated on the project plans
e. All movable objects inside abatement work areas shall be removed from the work areas as part of the initial work area cleaning prior to abatement.
f. Abatement Contractor shall inspect facility and insure that all asbestos material has been removed in accordance with the specifications prior to coordinating final visual inspection by the Project Monitor. Visual inspection by Project Monitor shall not be coordinated until such time as the Abatement Contractor's Project Supervisor has deemed that all abatement and cleaning work has been sufficiently completed in the respective regulated work area.
g. Furnish all labor, materials, services, insurance and equipment necessary to carry out the removal operation in accordance with applicable regulations and codes.
h. Obtaining approval from a NYSDEC-permitted waste disposal site for proper disposal of all generated waste streams and coordinating transportation of waste by a hauling firm having a valid 6NYCRR Part 364 waste transporter permit issued by the New York State Department of Environmental Conservation.
i. Post all applicable regulations, licenses, permits, certifications, and other necessary documentation at the job site.
j. Maintain the required log of all persons entering work area.
k. Provide Hazardous Material Engineer with close-out documentation containing all information pertaining to the removal and disposal of asbestos containing materials.

1.04 OWNER RESPONSIBILITIES

A. The Owner shall be responsible for:

1. Moving items out of areas affected by abatement work activities.

2. Providing a source for electricity and water at the project site.

3. Hiring an independent, third-party asbestos project monitoring / air sampling firm.

1.05 CONTRACTOR RESPONSIBILITIES

A. The Contractor shall be responsible for:

1. Performing the asbestos abatement work in accordance with all applicable federal, state, and local regulations. Where conflicts occur between federal, state, and local regulations, the most stringent shall apply. As such, the Contractor shall include all necessary costs in their price to complete the work in a legal and safe manner.

2. Providing supervisors and workers who are competent, trained, and medically fit to conduct the asbestos abatement work as well as all materials and equipment necessary to satisfactorily complete the work.

3. Collection and analysis of personal exposure assessment air samples of his employees as required by applicable OSHA standards. The third-party asbestos project monitoring / air sampling firm shall not be responsible for the collection, shipping / delivery, or analysis of the Contractor's personal exposure assessment air samples on this project.

4. Completing the project as specified in the design documents. The Contractor accepts that the asbestos abatement work is not complete until satisfactory final visual inspections are made and after clearance air testing results are deemed to be acceptable, as applicable.

5. Packaging, transporting, and disposing of all asbestos waste generated by the work in accordance with all applicable federal, state, and local regulations.

6. Ensuring regulated work area security during the course of the project, so that unauthorized personnel do not enter regulated work areas.

7. Providing emergency plans and emergency telephone numbers to on-site abatement personnel. The emergency plans and telephone numbers shall be kept on site at all times during the project.

8. Obeying the Owner's policies and procedures pertaining to work on-site.

9. Ensuring that no employee of his company speaks to the media without written permission from the Owner.

10. Complying with the contractual requirements set forth by the Owner.

11. Posting a notice at all building entrances notifying all persons of the Contractor's intent to conduct asbestos abatement, in accordance with State and Federal requirements.

12. Notifying the NYSDOL and USEPA about the asbestos abatement work and paying the associated fees, as applicable.

13. Contractor shall follow the direction of the Owner and Owner's Representatives pertaining to schedule, health / safety issues, and other site activities. The Contractor shall be responsible for the legal means and methods of performing the work in accordance with the contract.

1.06 PERSONAL PROTECTIVE EQUIPMENT

A. The Contractor shall be responsible for providing his personnel with adequate personal protective equipment to perform the work on this project as per the applicable federal and state regulations.

B. The Contractor will be responsible for collecting OSHA personal asbestos samples for their workers on this project. Representative samples shall be taken daily and sample results shall be posted at the personal decontamination unit within 48-hours of collection. The Contractor is responsible for providing their employees with adequate respiratory protection based upon the sample results received.

C. Street clothing is not permitted inside regulated work areas during abatement activities.

D. The Contractor is responsible for providing the Project Designer, the Project Monitor, Owner/Owner's Representative, and state and federal inspectors with personal protective equipment (PPE). This may include some or all of the following: protective clothing, respirators, high efficiency particulate air (HEPA) cartridges, hard hats, gloves, eye protection, and rubber disposable boots.

E. Protective suits and respiratory protection shall be required (at a bare minimum) during all asbestos removal activities, regardless of any negative exposure assessment data.

1.07 SUBMITTALS

A. Qualification Submittals. If requested, the following information shall be transmitted to the Owner / Owner's Representative prior to contract award:

1. Contractor's Asbestos Handling License issued by the NYSDOL.

2. A notarized statement, signed by an officer of the company, containing the following information:

   a. Any federal, state, or local regulatory agency citations, violations, notices, orders to comply, or penalties recorded against the asbestos abatement contractor in the last three (3) years.

   b. Any claims or legal proceedings in which the Contractor has been involved in the past three (3) years.

   c. Any Occupational Safety and Health Administration (OSHA) fines and/or citations, and a list of OSHA recordable accidents per year for the last three (3) years.

   d. Any asbestos related projects where a contract has been terminated, including project name, client, dates, and reasons for termination.

3. A minimum of five (5) project references for projects similar in nature to this project that have been self-performed and completed in the past three (3) years including the project name and location, scope of work, client, and contact person's name, telephone number, and e-mail address.

B. Pre-Abatement Submittals. The following information shall be transmitted to the Project Designer at least ten (10) days prior to the commencement of work activities:

1. Contractor's Asbestos Handling License issued by the NYSDOL.

2. NYSDOL Asbestos Project Notification.

3. USEPA Notification of Demolition & Renovation.

4. Asbestos Project Notice to be posted at the building prior to the start of the work, as required by ICR 56-3.6.

5. NYSDEC waste transporter permit.

6. NYSDEC landfill permit, where asbestos project wastes from the site will be disposed.

7. Project schedule showing phases of work for each regulated work area including, but not limited to, mobilization, work area preparation, abatement/removal, cleanings, work area dismantlement, and demobilization.

8. NYSDOL-approved asbestos project variance to be used on the project, if applicable.

9. Wastewater discharge permit required by state, county, or local municipality. If a permit is not required or will not be obtained, submit a written statement describing how wastewater from this project will be collected and disposed.

10. Safety Data Sheets (SDS) for all chemicals, solvents, products, and materials utilized on the project.

11. Manufacturer's specifications/certifications for all materials and equipment utilized on the project.

12. Written notifications to local fire, rescue, and emergency agencies informing them of the nature and schedule of the work at the site.

13. List of contact persons and emergency phone numbers for Contractor personnel to be posted at the project site.

14. Asbestos abatement personnel/worker documentation, including:

    a. NYSDOL Asbestos Handling Certificates.

    b. NYSDOH 2832 Asbestos Training Certificates.

    c. Medical examinations/evaluations.

    d. Respirator fit test certifications.

    e. OSHA 10-Hour Construction Safety Training certificates.

15. The Contractor shall not proceed with any work until the pre-abatement submittals have been approved by the Owner/Owner's Representative.

C. Abatement Submittals. The following information shall be transmitted during the course of the work as per Specification 01.

1. OSHA personal exposure assessment air sampling data. The Owner, Owner's Representatives, and Project Designer are not responsible for the interpretation of these results. The intent is only to show that the Contractor is collecting these samples as required by OSHA.

2. A daily list of the personnel on-site accompanied by their NYSDOL Asbestos Handling Certificate number.

D. Post-Abatement/Closeout Submittals. The following information shall be transmitted within 30 days after completion of the work, as per Specification Section 01 33 00:

1. Copies of all waste disposal manifests, disposal logs, and weight tickets. All original waste disposal records shall be submitted directly to the Owner/Owner's Representative by the Contractor.

2. Copy of supervisor's daily project log as required by ICR 56-7.3 documenting all pertinent events that occur throughout the project and including the following:

    a. Elevated air sampling results shall be noted along with the time of the work cessation, results of barrier and negative air system inspection, and a summary of any necessary repairs and the required cleaning(s).

    b. Manometer readings to be documented twice per work shift, if applicable.

    c. Daily (including days without work shifts) inspection results of negative-air ventilation system and any necessary repairs, if applicable.

    d. Daily (including days without work shifts) inspections of HVAC system positive pressurization and any necessary repairs, if applicable.

    e. Daily (including days without work shifts) inspection results of barriers and any necessary repairs, if applicable. Inspections shall be twice per work shift on days with scheduled work.

    f. Daily testing of barriers and enclosures as per ICR 56-8.2(f) and any necessary repairs, if applicable.

    g. Daily cleaning of enclosures to be documented at the end of each work shift, if applicable.

    h. Results of each visual inspection and time of each intermediate completion, if applicable.

    i. Results of visual inspection by Supervisor and Project Monitor for each asbestos abatement work area prior to clearance air sampling.

3. Entry/exit logs for each asbestos abatement work area.
4. Final NYSDOL and USEPA project notifications, and any asbestos variances, if applicable.
5. Any other submittal requested by Owner, Owner's Representatives, or Project Designer.

E. The Owner / Owner's Representative shall ensure that the Contractor has met all the contractual obligations to close out this project. Failure to provide all of the requested project closeout documentation may result in the delay of payment to the Contractor. The Contractor shall not be entitled to any additional compensation caused by their failure to submit the requested closeout information in a timely manner.

PART 2 - PRODUCTS

2.01 MATERIALS & EQUIPMENT

A. The Contractor shall be responsible for:

1. Providing all materials and equipment necessary to complete the work.

2. Providing safe and reliable materials and equipment.

3. Providing personal protective equipment for all abatement personnel.

4. Providing HEPA-filtered air filtration devices and HEPA vacuums.

5. Providing continuous negative air pressure within regulated work areas for the duration of the project, as applicable.

6. Utilizing barrier tape and danger signs to keep unauthorized personnel away from the work area. Danger signs shall contain the following language:

DANGER

CONTAINS ASBESTOS FIBERS

AVOID CREATING DUST

CANCER AND LUNG DISEASE HAZARD

7. Utilizing airless sprayers to limit airborne dust in regulated work areas.

8. Utilizing flame-retardant 6-mil polyethylene sheeting for the construction of abatement work areas, decontamination units, and the lining of waste containers.

9. Utilizing 6-mil polyethylene bags for the containerization of all asbestos wastes.

10. Utilizing duct tape or approved equivalent to seal polyethylene sheeting and waste disposal bags.

11. Utilizing electrical equipment and power cords in compliance with all applicable OSHA standards.

12. Utilizing Ground Fault Interrupters (GFIs) or Ground Fault Circuit Interrupters (GFCIs) on all power sources.

B. Any miscellaneous products not covered in this specification must have written approval from the Project Architect and Project Designer prior to use on-site.

C. Any miscellaneous products used at the site must be accompanied by manufacturer's product information and safety data sheet (SDS). This information must be submitted to the Project Architect and Project Designer prior to the products arriving on site. The Contractor may not proceed until the products have been approved for use in writing by the Project Architect and Project Designer.

PART 3 - EXECUTION

3.01 UTILITIES

A. All water and electrical service connections shall be installed by the Contractor in accordance with all applicable federal, state, and local codes, rules, and regulations.

B. The Contractor shall be responsible for the maintenance of all electrical cords and water hoses, and keeping them in a secure location to prevent unnecessary tripping and/or slipping hazards.

C. The Contractor shall temporarily shut down / de-energize, isolate / seal, modify, and/or alter existing mechanical, HVAC, electrical, plumbing, and any other related systems, services, and utilities at the site, as required by applicable regulations, prior to the start of the asbestos abatement work. All such work shall be carefully coordinated with the Owner and Owner's Representative.

D. Existing mechanical, HVAC, electrical, plumbing, and all other building systems, services, and utilities within regulated work areas that are to remain in operation shall be adequately protected by the Contractor during all work activities.

3.02 DECONTAMINATION FACILITIES

A. All personal and waste decontamination facilities shall be constructed, installed, or otherwise provided by the Contractor to meet the requirements of ICR 56 and shall be deemed adequate by the Project Monitor prior to the commencement of any asbestos abatement preparation work.

B. The personal decontamination unit shall be equipped with one (1) shower per six (6) full-shift abatement workers.

C. Decontamination units shall be cleaned at the beginning, during, and end of each work shift. Accumulations of dirt / debris in decontamination units shall not be permitted.

3.03 NEGATIVE PRESSURE VENTILATION

A. Negative air pressure ventilation shall be installed for all OSHA Class I, Class III, and interior Class II regulated asbestos abatement work areas.

B. The negative air pressure equipment shall operate continuously, 24-hours a day, from startup of negative air pressure ventilation equipment through cleanup operations and clearance air sampling until satisfactory clearance air sampling results are obtained.

C. If more than one (1) primary HEPA-filtered ventilation unit is installed, the units shall be turned on one at a time and the integrity of temporary hard-wall isolation barriers checked for secure attachment. A minimum of one (1) additional negative air pressure ventilation unit, having a capacity of at least equal to that of the primary unit, shall be installed as a backup unit to be used upon primary unit failure and during primary unit filter changes.

D. Negative air pressure ventilation equipment shall be installed and operated continuously to provide at least four (4) air changes per hour in the regulated work area including during clearance air sampling.

E. The exhaust shall be vented to the outside of the building or structure, to a controllable area away from public access. Each negative pressure ventilation unit exhaust duct shall not terminate less than 15 feet from a receptor or adversely affect the air intake of any building or structure. If the exhaust duct termination location cannot be met due to allowable space restrictions or the regulated abatement work area being located above the ground floor, the exhaust shall terminate at the exterior of the building or structure, and all receptors within 15 feet of the exterior exhaust duct termination location shall be plasticized with two (2) layers of 6-mil polyethylene. Exhaust tubes may be grouped together in banks of no more than five (5) tubes, with each tube exhausting separately and the bank of tubes terminating together at the same controlled area.

F. Construction fence at a height of four (4) feet with appropriate signage shall be installed a minimum of 10 feet from the end of the exhaust duct tube or bank of duct tubes to surround and control the area from public access. For ground level exhaust duct terminations at the immediate exterior of the building/structure, the fence shall be installed at the tube discharge location.

G. Manometers shall be used to document the pressure differential for all OSHA Class I large and small size regulated asbestos abatement work areas. A minimum of -0.02 column inches of water pressure differential, relative to pressure outside the regulated work area, shall be maintained within the regulated work area, as evidenced by manometric measurements. Once installed, on a daily basis and at least twice per work shift, the Contractor shall document the manometer readings in the daily project log.

H. The manometer shall be installed and made operational once negative air ventilation has been established in the regulated work area. At a minimum, magnahelic manometers shall be calibrated semi-annually, and a copy of the current calibration certification shall be posted at the work site, as required by ICR 56.

I. The Contractor shall be responsible for the following:

1. Monitoring of negative air pressure equipment and records of the daily manometer readings in the supervisor's project log.

2. Stoppage of activities when negative air pressure is lost or is less than required. The Contractor shall not resume activities until constant negative air pressure is has been reestablished and maintained for at least 30 minutes.

3.04 PRE-CLEANING ACTIVITIES

A. Pre-cleaning of regulated work areas shall be conducted in accordance with ICR 56.

B. The Contractor shall request a visual inspection by the Project Monitor to ensure that regulated work areas have been satisfactorily pre-cleaned prior to commencement of work area preparation activities.

3.05 CRITICAL & ISOLATION BARRIERS

A. After the pre-cleaning activities are completed, the Contractor shall install critical barriers and isolation barriers in accordance with ICR 56.

B. Critical barriers shall be constructed to seal off all openings and penetrations to regulated work areas including, but not limited to, operable windows and skylights, doorways and corridors that shall not be used for passage, ducts, grilles, diffusers, HVAC system seams, and any other penetrations to surfaces within the regulated work areas. Critical barriers shall be constructed using two (2) independent layers of 6-mil fire-retardant plastic sheeting, with each layer sealed separately with duct tape. Caulk and fire-retardant expandable foam may be used to seal small openings or penetrations. Doorways and corridors, which shall not be used for passage during the asbestos abatement work, shall also be sealed.

C. Temporary hard-wall barriers to complete containments/enclosures and establish regulated work areas shall be constructed using the following framing, sheathing, sealing, and plasticizing criteria:

1. Isolation barrier partitions shall be constructed of wood or metal framing in all openings greater than 32 square feet except, where any one dimension is one (1) foot or less, framing is not required. Existing walls or framing may be used to support isolation barrier partition framing and sheathing.

2. Plywood or oriented strand board (OSB) sheathing of at least ⅜-inch thickness shall be fastened to the regulated work area side of the barrier partition.

3. Edges of the isolation barrier partition at the floor, ceiling, walls, and fixtures and seams within the partition sheathing shall be sealed using caulk, fire-retardant expandable foam, or tape to form an airtight seal.

4. The regulated work area side of isolation barrier partitions shall be covered with two (2) layers of 6-mil fire-retardant plastic sheeting with staggered joints and sealed airtight.

D. Smoke testing shall be conducted by the Contractor prior to the start of abatement activities and at least once a day thereafter until satisfactory clearance air sampling results have been obtained to ensure the effectiveness of all critical barriers, isolation barriers, personal and waste

decontamination system enclosures, and regulated work area enclosures. Negative air pressure ventilation units shall be in operation during this testing. Testing of barriers and enclosures is not required on days when there are no Phase IIB or cleaning activities scheduled. Test results, observations and any modifications shall be documented in the daily project log by the asbestos abatement supervisor.

E. The Contractor shall inspect all barriers at least twice daily – before the start of and following the completion of each day's abatement activities. Inspections are also required on days when there is no Phase II work or support activities scheduled. Inspections and observations shall be documented in the daily project log by the asbestos abatement supervisor.

3.06 ASBESTOS HANDLING & CLEANING ACTIVITIES

A. The Contractor shall conduct all asbestos abatement activities in accordance with ICR 56 or an approved asbestos project variance.

B. Negative air machines shall be utilized at all regulated work areas, until satisfactory air sample results have been achieved. HEPA vacuums may only be utilized to provide continuous negative air pressure ventilation on minor-sized abatement projects.

C. All asbestos materials shall be removed using wet methods. Dry removal, sweeping, wire brushing, use of pressurized water/pressurized air, or other inappropriate techniques will not be permitted.

D. Airless sprayers shall be utilized to control airborne asbestos fiber concentrations.

E. The Contractor is responsible for taking appropriate measures to reduce nuisance odors and noise from migrating to other areas of the building.

F. Waste shall be immediately bagged and be transported to the waste decontamination enclosure. Waste bags shall then be cleaned in the waste decontamination enclosure, double-bagged, labeled, and transported to the waste dumpster, trailer, etc.

G. Waste bag transfer shall take place inside a cart that has been lined with two (2) layers of 6-mil polyethylene. This cart shall be covered by polyethylene during any waste transfer activities and be labeled with appropriate asbestos signage.

H. Workers shall wear PPE during work area preparation, abatement activities, cleaning, and during any other work area activities until final air clearance criteria has been achieved.

I. The Contractor shall be responsible for providing the Project Monitor / Air Sampling Technician with sufficient power to conduct air sampling at the project site. The Contractor shall also provide the Project Monitor / Air Sampling Technician with access to the decontamination unit and hot water on days when final/clearance air sampling is required (even when abatement work is not taking place).

3.07 WASTE DISPOSAL

A. The Contractor shall ensure that all asbestos waste/debris is sufficiently wet prior to being bagged/containerized for disposal.

B. Bags, drums, or other acceptable packages/containers used for asbestos waste shall be labeled with appropriate asbestos waste generator tags/labels.

C. Two (2) 6-mil polyethylene bags or two (2) layers of 6-mil plastic sheeting shall be utilized for the disposal of all asbestos waste.

D. A daily count of asbestos waste bags, drums, containers, etc. shall be recorded by the asbestos abatement supervisor. This count shall be provided to the Project Monitor each day.

E. All asbestos waste generated by the work shall be sent to a properly permitted landfill or disposal facility. Waste manifests shall accompany all regulated asbestos-containing material (RACM) waste that is removed from the site. Original waste manifests shall be submitted directly to the Owner/Owner's Representative.

F. Vehicles used for the transport of all asbestos waste shall bear all appropriate permit tags, markings, and placards.

3.08 INSPECTIONS

A. The Contractor shall not interfere, impede, or delay any inspections by the Owner/Owner's Representative, Project Designer, Project Monitor, or federal, state, or local inspectors.

B. The Contractor shall request inspections from the Project Monitor at the following intervals, as applicable to the project:

1. Upon completion of the decontamination system enclosure(s).
2. Upon completion of the pre-cleaning effort.
3. Upon completion of the preparation of the work area.
4. Upon completion of the abatement process.
5. Upon completion of teardown/dismantling activities.

C. The asbestos abatement supervisor shall be responsible for adequately documenting inspections in the daily project log.

3.09 ASBESTOS PROJECT MONITORING/AIR SAMPLING

A. The Contractor shall not include any costs in their price for project monitoring or air sampling. The Contractor will not be responsible for the selection or payment of the Project Monitoring/Air Sampling firm.

B. The Project Monitor/Air Sampling Technician will be responsible for the following:

1. Conducting air sampling during the asbestos abatement phase of the project when required.
2. Conducting a visual inspection for completeness of abatement and completeness of cleanup as per the provisions of the current ASTM Standard E1368 - "Standard Practice for Visual Inspection of Asbestos Abatement Projects." An entry shall be made into the daily project log by both the asbestos abatement supervisor and the individual performing the inspection, detailing the findings of the visual inspection. The full name and NYSDOL asbestos handling certificate number of the certified individual performing the inspection shall also be documented in the supervisor's daily project log.
3. Performing aggressive air sampling techniques for final clearance air sampling when required.
4. Collecting final clearance air samples when required.

C. The Contractor understands that a Project Monitor has been retained by the Owner to oversee the asbestos abatement work and that the Owner/Owner's Representative has authorized the Project Monitor to stop the Contractor's work if the Contractor is not following the contract

documents or the applicable codes, rules, and regulations. Work shall only be permitted to commence if allowed by the Owner/Owner's Representative after corrective actions have been made. The Contractor acknowledges that it is their responsibility to follow all applicable rules and regulations and failure to do so may result in lost time and/or dismissal from site at no cost to the Owner, Project Designer, or Project Monitor. The Contractor shall not be compensated for any lost time, labor, materials, etc., due to inappropriate action.

END OF SECTION

SECTION 02 83 13
LEAD-SAFE WORK PRACTICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

B. Refer to C&S Engineers Inc, *Limited Hazardous Material Pre-Renovation Survey Report, Highland Falls-Fort Montgomery Central School District, Fort Montgomery Elementary School, dated October 2023* for information regarding materials that have been identified as lead-based paint or lead-containing materials.

1.02 DEFINITIONS

A. Lead-based paint (LBP), as defined by the U.S. Environmental Protection Agency (USEPA) and the U.S. Department of Housing and Urban Development (HUD), means painted or glazed materials (i.e. ceramic tile) containing 0.5% lead or more by weight.

B. Lead, as defined by OSHA 29 CFR Part 1926.62, means metallic lead, all inorganic lead compounds, and organic lead soaps. All other organic lead compounds are excluded from this definition.

C. Action Level, as defined by OSHA 29 CFR Part 1926.62, means employee exposure, without regard to the use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter (30 $\mu g/m^3$) of air calculated as an 8-hour time-weighted average (TWA).

D. Permissible Exposure Limit (PEL), as defined by OSHA 29 CFR Part 1926.62, means employee exposure, without regard to personal protective equipment, to an airborne concentration of lead of 50 $\mu g/m^3$ (calculated as a TWA).

E. Competent person, as defined by OSHA 29 CFR Part 1926.62, means one who is capable of identifying lead hazards and implementing corrective measures to eliminate hazards.

F. Lead-containing material (LCM) includes LBP, lead-containing components / surfaces, and glazed / ceramic tile applications. A building material is defined as an LCM if any detectable amount of lead is present in that building material.

1.03 SUMMARY OF WORK

A. Unless otherwise indicated, all painted surfaces and building materials are presumed to contain lead and shall be treated as LCM. Upon request, the Contractor may review available survey reports for additional details pertaining to LCMs identified at the site.

B. Activities that will disturb LCM shall comply with the conditions specified herein. The Occupational Safety & Health Administration (OSHA) regulates occupational exposure to lead under 29 CFR Part 1926.62, Lead in Construction Standard. Any Contractor disturbing LCM shall comply with all

the requirements of 29 CFR Part 1926.62 and this specification. The intent is for the Contractor to protect his workers and building occupants from unnecessary exposures to lead.

C. The Contractor shall provide all labor, materials, tools, and equipment necessary to protect both workers and building occupants from potential lead exposure.

D. Any waste products shall be considered industrial or hazardous waste, based on the results of a Toxicity Characteristic Leaching Procedure (TCLP) test. The cost of this testing shall be the responsibility of the Contractor and included in their bid for the project.

E. Exact quantities and locations of LCMs that will be disturbed shall be determined by the Contractor at the time of bidding. The Contractor must be satisfied as to the quantity of waste requiring disposal, and include all such costs in their bid price.

F. All work shall be performed in accordance with this specification and applicable federal, state, and/or local regulations. Dry sweeping of lead-containing dust is prohibited. Lead-containing debris shall be removed and collected using high efficiency particulate air (HEPA) vacuums designed to collect waste including paint chips, debris, and dust.

G. It is the Contractor's responsibility to ensure that waste materials are contained, transported, and disposed of in accordance with all applicable federal, state, and local regulations.

1.04 APPLICABLE REGULATIONS

A. The Contractor shall comply with all federal, state, and local laws, ordinances, rules, and regulations regarding the handling, storage, and disposal of LCM. The Contractor is further responsible to conduct work in compliance with all applicable codes, rules, laws, and regulations including, but not limited to:

1. Worker Protection - Occupational Safety and Health Administration (OSHA)
    a. 29 CFR Part 1910.134 - Respiratory Protection Standard
    b. 29 CFR Part 1926. 20 - General Safety and Health Provisions
    c. 29 CFR Part 1926.59 - Hazard Communication
    d. 29 CFR Part 1926.62 - Lead Exposure in Construction
    e. 29 CFR Part 1910.94 and Part 1926. 57 – Ventilation

2. Ambient Air Quality - Environmental Protection Agency (EPA)
    a. 40 CFR Part 50.6 - National Primary and Secondary Ambient Air Quality Standards for Particulate Matter
3. Water Quality - Environmental Protection Agency (EPA)
    a. 40 CFR Part 122 - Administered Permit Programs; The National Pollutant Discharge Elimination System
4. Waste Disposal - Environmental Protection Agency (EPA)
    a. 40 CFR Part 261 - Identification and Listing of Hazardous Waste
    b. 40 CFR Part 262 - Standards Applicable to Generators of Hazardous Waste
    c. 40 CFR Part 263 - Standards Applicable to Transporters of Hazardous Waste
5. New York State Department of Environmental Conservation (NYSDEC)
    a. Title 6 Parts 360-7, 364, and 370 through 374

B. The Contractor shall comply with the following regulations and guidance documents:

1. U.S. Department of Labor
2. Occupational Safety and Health Administration Pub. 3126 - Working with Lead in the Construction Industry
3. USEPA Lead Renovation, Repair and Painting (RRP) Program

1.05 LEAD HAZARDS

A. Work practices / methods that may release lead dust or fumes into the air and onto surrounding surfaces are prohibited. It is the Contractor's responsibility to reduce potential exposure to lead.

B. Lead is a toxic substance, which travels into the body by inhalation or ingestion due to lead dust and/or fumes that are present. Upon entering the body, lead enters the bloodstream, traveling throughout the body. The body cannot eliminate all of the lead; therefore, it is stored in tissue and organs. Stored quantities of lead may cause irreversible damage to cells, organs, and body systems.

C. Exposure to lead may affect individuals differently. Exposure may occur without any indication of exposure or symptoms developing. Symptoms of lead poisoning to be aware of include, but are not limited to, loss of appetite, trouble sleeping, irritability, fatigue, headache, joint and muscle ache, metallic taste, decreased sex drive, lack of concentration, and moodiness.

D. Prolonged exposure may result in damage to the body's systems including nervous, reproductive and circulatory systems. Symptoms of such exposures may include, but are not limited to, stomach pains, high blood pressure, nausea, tremors, seizures, anemia, constipation, and convulsions.

2. The Contractor's Supervisor is responsible to monitor any workers for such symptoms and is further responsible for ensuring affected workers are removed from the area. Affected workers shall not return until such time that the requirements outlined in the OSHA Lead in Construction Standard (29 CFR Part 1926.62) have been met.

1.06 GENERAL REQUIREMENTS

A. The Contractor is responsible for complying with the following general requirements applicable to the project (at a minimum):

1. Respiratory Protection and personal protection
2. Medical examinations
3. Utilization of engineering controls, as necessary, to reduce potential exposure
4. Proper clean up and disposal of all lead-related waste materials, as required.

B. The Contractor is solely responsible for properly protecting their workers. Additional safety measures beyond OSHA requirements are encouraged, but are at the implementation and discretion of the Contractor.

1.07 SUBMITTALS

A. The following information shall be transmitted for review and approval, prior to starting the work:

1. Work Plan - The Contractor shall submit a work plan in compliance with the requirements of the OSHA Lead in Construction Standard (29 CFR Part 1926.62). The plan shall include but is not limited to: handling, cleaning, containerizing, transport, and disposal.
2. Equipment - Information for all equipment utilized shall be submitted for review prior to commencement of project activities. This includes, but is not limited to, equipment specifications and safety data sheets (SDS).
3. Training - The Contractor shall provide proof of Lead Awareness training in accordance with OSHA 29 CFR Part 1926.62 for all employees performing renovation/repair activities resulting in disturbance of LCMs.
4. Disposal - The Contractor shall submit documentation including all required permits, anticipated disposal facilities, and anticipated transporter information should construction waste be determined to be hazardous. If applicable, copies of applicable laboratory credentials shall be provided for the laboratory performing TCLP analysis.

B. Post-Abatement / Closeout Submittals. The following information shall be transmitted for review and approval within 30 days following completion of the work:

1. Copies of all OSHA personal/employee lead exposure assessment air sampling data collected during the project.
2. Original waste manifests/disposal records associated with any LCM waste removed from the site to be provided to the Building Owner.
3. Any other documentation requested by the Building Owner or Environmental Consultant.

1.08 PERSONAL AIR SAMPLING & ANALYSIS

A. The Contractor is responsible for conducting personal lead exposure assessment air monitoring of his employees, as required by OSHA 29 CFR Part 1926.62. Personal air samples shall be collected which are representative of a full-shift including at least one sample for each job classification in each work area either for each shift or for the shift with the highest exposure level. Full-shift personal samples shall be representative of the monitored employee's regular, daily exposure to lead.

B. If requested by the Building Owner or Consultant, the Contractor shall provide laboratory analysis reports showing that they are conducting personal lead exposure assessment air monitoring of employees working with lead in accordance with OSHA 29 CFR Part 1926.62.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cleaning Solutions - A lead-specific cleaning solution shall be utilized for all cleaning activities. The cleaning solution shall be an approved solution that does not contain tri-sodium phosphate (TSP).

B. Plastic Sheeting - To prevent dust migration, dust barriers, containments, and/or enclosures shall be constructed utilizing 6-mil fire-retardant plastic sheeting. These barriers shall be constructed to minimize dust migration into adjacent non-work areas.

C. Framing - If framing is utilized for the construction of dust barriers/containments, all reinforcement framing/sheathing materials must be at least ⅜-inch thick. Minimum requirements for framing materials shall be comprised of 2"x4" stud framing in accordance with all applicable building codes.

D. Adhesives - Commercially available tape and spray adhesives designed for such purposes to maintain the integrity of barriers, containments, and enclosures.

2.02 EQUIPMENT

A. Protective Clothing - Coveralls, gloves, eye protection, ear protection, safety footwear, hard hats, and fall protection are required as per all applicable OSHA regulations.

B. Respiratory Protection - The Contractor shall provide workers with adequate respiratory protection based on the lead hazards identified at the site. The level of respiratory protection shall be determined through personal exposure assessment air monitoring.

C. Respirator Filters - The Contractor shall provide his workers with appropriate respirator filters for the respiratory protection the workers are utilizing as per OSHA 29 CFR Part 1910.134.

PART 3 - EXECUTION

3.01 LEAD COMPLIANCE PLAN

A. The Contractor is required to establish and follow a lead compliance plan for the project. The requirements, as outlined in OSHA 29 CFR Part 1926.62, include written procedures for construction activities with regard to control methods and engineering controls.

B. If the Contractor fails to follow their lead compliance plan, the Building Owner may elect to hire a third-party consultant to oversee the Contractor's work. The cost for the third-party consultant shall be borne by the Contractor.

3.02 SIGNAGE

A. Warning signs shall be posted where the potential for any lead exposure exists.

B. Signs shall remain in place until renovation/demolition activities have been completed and the area cleaned.

C. All signage shall comply with OSHA 29 CFR Part 1926.62.

3.03 WORK METHODS

A. The Contractor shall select work methods in compliance with OSHA 29 CFR Part 1926.62. All work shall be performed utilizing wet methods and other engineering controls, as necessary.

B. The Contractor is prohibited from dry methods of removal, heat gun applications, mechanical methods (grinding/sanding), and/or torch-cutting during renovation / demolition activities.

3.04 CLEANING & CLEARANCE

A. Following the completion of all lead-related work activities, all surfaces within and 25 feet beyond the areas impacted by the work shall be cleaned of all visible paint chips, dust, and debris.

B. Visual examinations/inspections of all areas affected by the lead-related work shall be conducted by the Contractor's competent person to determine satisfactory cleaning of all affected areas; however, the Building Owner may retain a third-party consultant to perform visual clearance examinations/inspections and/or perform lead dust wipe sampling to determine satisfactory cleaning and satisfactory completion of the work.

C. If the Contractor does not satisfactorily clean an area based on visual examinations, or if lead dust-wipe sampling results are unacceptable, the affected areas shall be re-cleaned by the Contractor at his own expense. The cost for re-cleaning, third-party consultant oversight, and additional sampling / testing associated with re-cleaning activities shall be borne by the Contractor.

3.05 WASTE TRANSPORTATION & DISPOSAL

A. The Contractor is responsible for proper waste characterization sampling and laboratory analysis of LCM prior to disposal / removal from site. Waste materials include, but are not limited to, the following: personal protective equipment, plastic sheeting, signage, barrier tape, LBP components, and associated materials.

B. The Contractor is responsible to coordinate interim storage of waste containers at the site with the Owner / Owner's Representative while awaiting waste characterization laboratory results.

C. Lead paint chips and lead paint debris shall not be co-mingled with construction and demolition (C+D) debris. Failure to do so may result in the Contractor having to pay the associated fees for co-mingled lead waste disposal.

END OF SECTION

SECTION 02 83 14
MISCELLANEOUS HAZARDOUS & SPECIAL WASTES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

B. Refer to C&S Engineers Inc. *Limited Hazardous Material Pre-Renovation Survey Report, Highland Falls-Fort Montgomery Central School District, Fort Montgomery Elementary School, dated October 2023* for information regarding materials that have been identified as miscellaneous hazardous & special waste.

1.02 SUMMARY OF WORK

A. The scope of work includes the handling, packaging, containerization, characterization, transportation, and disposal of all the miscellaneous hazardous / special wastes from the project site. In general, the miscellaneous hazardous / special wastes to be properly handled and disposed of on this project include,but are not necessarily limited to fluorescent light bulbs (mercury), fluorescent light ballasts (PCBs), and thermostats (mercury).

B. Due to the potential presence of hazardous wastes and/or regulated materials, these waste materials may not be disposed of as construction and demolition (C&D) debris. The Contractor shall comply with all applicable state and federal (i.e., OSHA, NYSDEC, USEPA, etc.) regulations when characterizing, handling, packaging, containerizing, transporting, and disposing of these wastes.

C. If any spills or releases of mercury, PCBs, petroleum, or any other hazardous or regulated material occurs, the Contractor shall notify the Owner's Representative immediately and take all necessary precautions and measures to contain and cleanup such spills or releases in accordance with all applicable regulations.

D. The Contractor shall ensure that their workers are properly trained and protected during all operations.

E. The Contractor is responsible for following all applicable federal, state, and local regulations. Failure to comply with regulations shall result in the Contractor having to pay for any legal fees, fines, cleanup costs, and/or other penalties associated with improper activities. If conflicts occur between any regulations and the project specifications, the Contractor is responsible for following the most stringent course of action.

1.03 SUBMITTALS

A. The Contractor shall provide the following submittals prior to conducting any work activities at the project site:

1. Proof of Training – In accordance with OSHA regulations, training must be provided to inform workers about the potential hazards associated with hazardous / special wastes prior to conducting operations at the project site. HAZMAT or HAZWOPER training certificates are recommended.

2. Waste Container Information – Contractor shall provide documentation detailing the description of the waste containers that shall be utilized for all of the miscellaneous hazardous / special wastes during the course of this project.

1.04 OWNER'S REPRESENTATIVE

A. The Owner's Representative will oversee the Contractor during the handling of the hazardous / special wastes. The Owner's Representative will be responsible for the following tasks:
   1. Keeping a daily project log of the Contractor's activities on-site.
   2. Providing oversight of the Contractor.
   3. Notifying the Owner if any damaged, leaking, or broken light ballasts, tubes, bulbs, batteries, or thermostats are present.
   4. Recording the daily hazardous / special waste count, as provided by the Contractor.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Contractor shall only utilize proper NYSDOT / USDOT shipping containers to package and containerize waste products for disposal purposes.

B. Raw vermiculite insulation shall not be utilized to package miscellaneous hazardous / special wastes, unless the Contractor has sufficient documentation to verify that the vermiculite insulation is asbestos-free. The documentation must be provided directly from the manufacturer.

PART 3 - EXECUTION

3.01 GENERAL

A. The Contractor shall be responsible for the characterization, removal, packaging, containerization, transportation, and disposal of all miscellaneous hazardous and special wastes associated with the buildings scheduled for demolition.

B. The Contractor shall provide all labor, materials, tools, equipment, and personal protective equipment (PPE) necessary to remove and dispose of all of the hazardous materials/special wastes from the project site.

3.02 CLOSE-OUT DOCUMENTATION

A. The Contractor shall provide the Owner's Representative with quantities of all hazardous / special wastes removed on a daily basis. This shall include a final summary at the conclusion of the project.

B. The Contractor shall provide the Owner / Owner's Representative with all pertinent waste documentation and manifests for the hazardous / special wastes removed and disposed of as part of this project. Original waste manifests and/or waste documentation shall be returned to the Owner within ten (10) days of the wastes leaving the project site.

END OF SECTION

SECTION 03 3000
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SUMMARY

1. Section Includes Cast-in-place (CIP) structural concrete, including

    a. Concrete Formwork and Formwork Accessories
    b. Concrete Mixtures and Admixtures
    c. Steel Concrete Reinforcement and Accessories
    d. Curing compounds
    e. Grout
    f. Crack repair and epoxy adhesives
    g. Joint fillers and sealants
    h. Concrete slab surface densifier and sealer
    i. Evaporation reducer for freshly placed concrete
    j. Vapor Barrier under slabs on grade
    k. Handling, placing, and constructing

2. Products Installed but Not Furnished Under This Section:

    a. Anchor rods, leveling plates, railing sleeves, brackets, and other embedded items of steel, vinyl, plastic, or other materials. Refer to specification sections where the embedded item is described.

    b. Sleeves for pipe, conduit and other items passing through or embedded in concrete. Refer to the specification section where the item is described.

3. Related Sections.

    a. Code Required Special Inspections and Procedures – Section 01 4533
    b. Unit Masonry – Section 04 2000
    c. Structural Steel Framing – Section 05 1200

1.02 DEFINITIONS

A. ACI 301, Section 1.2 - Definitions:
    1. Add the following definitions:
        - Cementitious Material: Cementitious materials include cement, ground blast furnace slag and fly ash.
        - Corrosion Inhibitor Admixture: A liquid admixture, calcium nitrite that inhibits corrosion of concrete-embedded steel in the presence of chloride ions.
        - Pumped Concrete: Concrete that is conveyed by pumping pressure through rigid pipe or flexible hose.
        - Water-to-Cementitious Ratio (w/c): An equational value representing quantity in pounds of free moisture available for cement hydration divided by quantity of cementitious materials in pounds per cubic yard concrete.

1.03 REFERENCES

A. Work on this project shall conform to all requirements of ACI 301-16 published by the American Concrete Institute, Farmington Hills, Michigan, except as modified by these Contract Documents.

B. Reference publications
1. ACI 301-16: Specifications for Structural Concrete.
2. ACI 302.1R-15: Guide for Concrete Floor and Slab Construction.
3. ACI 304.2R-17: Placing Concrete by Pumping Methods.
4. ACI 305R-20: Hot Weather Concreting.
5. ACI 306R-16: Cold Weather Concreting (Re-approved 1997).
6. ACI 308.1-11: Standard Specification for Curing Concrete.
7. ACI 318-14 Building Code Requirements for Reinforced Concrete.
8. ASTM C 94/C 94M – 15a: Standard Specification for Ready- Mixed Concrete.
9. ASTM C33/C33M – Standard Specification for Concrete Aggregates 2018.
10. ASTM C39/C39M – Standard Text Method for Compressive Strength of Cylindrical Concrete Specimens 2021.
11. ASTM C 494/C 494M – 119: Standard Specification for Chemical Admixtures for Concrete.
12. ASTM C143/C143M – Standard Test Method for Slump of Hydraulic-Cement Concrete 2020.
13. ASTM C150/C150M – Standard Specification for Portland Cement 2020.
14. ASTM C 311-18 Standard Methods of Sampling and Testing Fly Ash or Natural Pozzolans for use as a mineral admixture in Portland Cement Concrete.
15. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method 2016.
16. ASTM E1155 - Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers 2020.
11. Manual of Standard Practice, MSP of the Concrete Reinforcing Steel Institute.

1.04 STANDARDS PRODUCING ORGANIZATIONS

A. Refer to ACI 301-16

1.05 SUBMITTALS

A. See Section 01 3000 – Administrative Requirements for submittal procedures.

B. Product Data: Submit manufacturer's data on manufactured products showing compliance with specified requirements and installation instructions.
1. For curing compounds, provide data on compatibility with floor covering products and adhesives and/or method of removal in the event of incompatibility with floor covering adhesive.

C. Mix Design
1. Mix Design: Submit proposed concrete design mix(es) together with name and location of batching plant at least 28 days prior to the start of concrete work.
a. Include test results of proposed concrete proportions based on previous field experience or laboratory trial batches in accordance with ACI 301, Section 4.
b. Pumped Concrete: Include test results of proposed design mix(es) tested under actual field conditions with the maximum horizontal run and vertical lift required for this project.
2. Portland Cement: Brand and manufacturer's name.

3. Fly Ash: Name and location of source, and DOT test numbers.
4. Air-entraining Admixture: Brand and manufacturer's name.
5. Water-reducing Admixture: Brand and manufacturer's name.
6. High Range Water-reducing Admixture (Superplasticizer): Brand and manufacturer's name.
7. Accelerating Admixture: Brand and manufacturer's name.
8. Aggregates: Name and location of source, and DOT reference and test numbers.

C. Reinforcing Steel
1. Shop Drawings: Placing drawings for bar reinforcement.
2. Affidavit by the bar reinforcement manufacturer certifying that bar material meets the contract requirements.

1.06 QUALITY ASSURANCE

A. Refer to Section 014533-Special Inspections and Testing, for Concrete Construction inspection and testing to be performed by the Owner's Inspection and Testing Agency.

B. Qualifications of Crew Pumping Concrete: Workers pumping concrete shall have had at least one year of experience pumping concrete.

C. Concrete batching plants shall be currently approved as concrete suppliers by the New York State Department of Transportation.

D. Truck mixers for concrete shall be currently approved by the New York State Department of Transportation.

E. Pumping equipment for pumped concrete shall be subject to the approval of the Architect.

F. Fly ash supplier shall be on the New York State Department of Transportation's current "Approved List of Suppliers of Fly Ash".

G. Source Quality Control: The Owner reserves the right to inspect and approve the following items, at his own discretion, either with his own forces or with a designated inspection agency:
1. Batching and mixing facilities and equipment.
2. Sources of materials.

H. Pre-Construction Conference: Attend a Pre-Construction Conference at the job site conducted by the Architect's Representative prior to the start of concrete placement for the purpose of reviewing the requirements and procedures of the Contract Documents.

I. Field Quality Control

1. ACI 301, Section 1.6.4.2 - Testing Services:
a. Add the following paragraph:
- 1.6.4.2.e Strength Tests for Pumped Concrete: Prepare strength test specimens and make strength tests from concrete samples obtained at the truck discharge chute and at the end of the pump delivery line in accordance with paragraph 16.3.4.4.

2. ACI 301, Section 1.6.3.3.

a. Add the following paragraph:

- 1.6.3.3.c Make available to the Owner's Inspections and Testing Agency whatever test samples are required to make tests. Furnish shipping boxes for compression test cylinders.

3. Adjustment to Concrete Mixes: Mix design adjustments may be requested by the Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, at no additional cost to the Owner and as accepted by the Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by the Architect's Representative before using in the work.

4. Test results will be reported by the Owner's Testing Agency in writing to the Architect's Representative and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.

5. Nondestructive Testing: Impact hammer, Windsor probe, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.

6. Additional Tests: The Architect shall require additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by the Architect's Representative. The Owner's Testing Agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. Contractor shall pay for such tests when unacceptable concrete is verified, including all inspection and Engineering fees when non-conforming work is verified.

1.07 DELIVERY

A. ASTM C 94/C 94M - 04, Article 13.1 - Batch Ticket Information: In addition to the information required by Paragraph 16.1, also include the following:
   1. Type and brand, and amount of cement.
   2. Weights of fine and coarse aggregates.
   3. Class and brand, and amount of fly ash (if any).

PART 2 PRODUCTS

2.01 MATERIALS

A. Cement: ASTM C 150, Type I or II Portland cement.

B. Water: Potable

C. Air-entraining Admixture: ASTM C 260, and on the New York State Department of Transportation's current "Approved List".

D. Water-reducing Admixture: ASTM C 494/C 494M - 04, Type A, and on the New York State Department of Transportation's current "Approved List".

E. High Range Water-reducing Admixture (Superplasticizer): ASTM C 494/C 494M - 04, Type F, and on the New York State Department of Transportation's current "Approved List".

F. Retarding Admixture: ASTM C 494, Type D, Water-reducing and retarding, for use in hot weather concreting, and on the New York State Department of Transportation's current "Approved List".

G. Accelerating Admixture: Non-corrosive admixture, containing no chloride, complying with ASTM C 494, Type C or E, and on the New York State Department of Transportation's current "Approved List".

H. Fly Ash: ASTM C 618, including Table 1 (except for footnote A), Class F except that loss on ignition shall not exceed 4.0 percent.

I. ACI 301, Section 4.2.1.2 - Aggregates:
1. Add the following paragraph:
   - Fine aggregate for pumped concrete shall meet the requirements of ASTM C 33, except 15 to 30 percent shall pass the No. 50 sieve and 5 to 10 percent shall pass the No. 100 sieve. The fineness modulus of the fine aggregate for pumped concrete shall not vary more than 0.20 from the average value used in proportioning.
2. Add the following paragraph:
   - Aggregates shall be taken from storage silos or other approved locations that have been tested and approved by the New York State Department of Transportation, unless otherwise approved in writing by the Architect.

J. Moisture-Retaining Cover: Waterproof paper, polyethylene film, or polyethylene-coated burlap complying with ASTM C 171.

K. Joint Fillers and Sealants (Contraction Joints within the building and in the concrete slabs on grade):
1. Elastomeric Polyurea Joint Sealant
   a). MasterSeal CR 100 by BASF Building Systems
   b). Euco QWIKjoint 200, as manufactured by the Euclid Chemical Company, 19218 Redwood Road, Cleveland, OH 44110

L. Reinforcing Steel
1. Bar Reinforcement: ASTM A 615, Grade 60, deformed steel bars.
2. Fabric Reinforcement: ASTM A 185, welded wire fabric, fabricated into flat sheets unless otherwise indicated.
3. Bar Supports; Either of the Following Types:
   a. Galvanized steel or AISI Type 430 stainless steel, and without plastic tips.
   b. Insoluble plastic, with minimum 1,500 psi tensile strength and capable of retaining fabricated shape at temperatures between 5 degrees F and 170 degrees F.
   c. Solid concrete brick
4. Fabric Reinforcement Supports:
   a. Uni Zag by Universal Form Clamp, 840 South 25th Avenue, Bellwood, IL 60104, (800)728-1958.
   b. Continuous Support, "CS" by Dayton Superior, 721 Richard Street, Miamisburg, OH 45342, (800) 745-3700.
   c. Solid concrete brick

5. Tie Wire: Black annealed wire, 16-1/2 gage or heavier.

N. Chemical Curing and Anti-Spalling Compound: ASTM C-309, Type 1D, Class B, with a minimum 18 percent total solids content. No thinning of material allowed.
1. SureCure Emulsion, Kaufman Products, Inc. 3811 Curtis Avenue, Baltimore, MD 21226, (800) 637-6372.
2. Cure & Seal by Symons Corp., 200 East Touhy Ave., PO Box 5018, Des Plaines, IL 60017-5018, (847) 298-3200.
3. Kure-N-Seal by Sonneborn/ BASF Building Systems, 889 Valley Park Dr., Shakopee, MN 55379, (800) 433-9517.
4. Day-Chem Cure & Seal UV 26 percent (J-22 UV) by Dayton Superior Corp., 721 Richard St., Miamisburg, OH 45342, (800) 745-3700.
5. Acrylseal HS by Master Builders/ BASF Building Systems, 23700 Chagrin Blvd., Cleveland, OH 44122, (800) 628-9990.

O. Concrete Chemical Densifier and Sealer.
1. Seal Hard, L&M Chemical Chemicals Inc. 14851 Calhoun Road Omaha, NE USA 68152
2. Diamond Hard, Euclid Chemical Company, 19218 Redwood Road, Cleveland, OH 44110
3. Ashford Formula, Curecrete Distribution Inc., 1203 West Spring Creek Place, Springville, UT 84663

P. Evaporation Reducer for freshly placed concrete. Laticrete E-Con by L&M Construction Chemicals.

Q. Vapor Barrier under slabs on grade. 10 mil thick cross laminated polyethylene sheet vapor barrier complying with ASTM 1745, Standard Specification for Water Vapor Retarders used in Contact with Soil or Granular Fill under Concrete Slabs, Class A.

2.02 PROPORTIONING OF MIXES

A. Normal weight concrete for all other concrete unless otherwise specified, shall have a minimum compressive strength of 3000 psi and a water cement ratio of 0.45. Slump: Maximum 4 inches; minimum 2 inches before the addition of any water-reducing admixtures or high-range water-reducing admixtures (superplasticizers) at the Site.

B. Normal weight concrete for interior slabs, including composite deck fill, ramps, stairs and footings shall have a minimum compressive strength of 3500 psi and a water cement ratio of 0.50. Slump: Maximum 3 inches; minimum 2 inches before the addition of any water-reducing admixtures or high-range water-reducing admixtures (superplasticizers) at the Site.

C. Normal weight concrete for exterior slabs, ramps and stairs to be exposed to deicing salts shall have a minimum compressive strength of 5000 psi and a water cement ratio of 0.40. Slump: Maximum 3 inches; minimum 2 inches before the addition of any water-reducing admixtures or high-range water-reducing admixtures (superplasticizers) at the Site. Concrete shall be air-entrained.

D. Normal weight concrete for foundation walls and piers shall have a minimum compressive strength of 4500 psi and a water cement ratio of 0.40. Slump: Maximum 3 inches; minimum 2 inches before the addition of any water-reducing admixtures or high-range water-reducing admixtures (superplasticizers) at the Site. Concrete shall be air-entrained.

E. Optional Material: Fly ash may be substituted for (Portland) cement in normal weight and lightweight concrete up to a maximum of 40 percent by weight of the required minimum (Portland) cement. If fly ash is incorporated in a concrete design mix, make necessary adjustments to the design mix to compensate for the use of fly ash as a partial replacement for (Portland) cement.
   a. Adjustments shall include the required increase in air-entraining admixture to provide the specified air content.
   b. Lower early strength of the concrete shall be considered in deciding when to remove formwork.

F. Slump for Pumped Concrete: When a water-reducing admixture is not used, maximum slump shall be 4 inches. When a water-reducing admixture is used, maximum slump shall be 6 inches and when a high-range water-reducing admixture (superplasticizers) is used, maximum slump shall be 8 inches.

G. Design Air Content: Design air content for concrete required to be air entrained shall be 6 percent by volume, with an allowable tolerance of plus or minus 1.5 percent for total air content, except as otherwise specified. Use air-entraining admixture, not air-entrained cement. Concrete to be air-entrained shall be exterior slabs, ramps, and stairs.

H. ACI 301, Section 4.2.2.3: Change article to read as follows:
- 4.2.2.3 - Size of Coarse Aggregates:
  - 4.2.2.3.a Normal Weight Concrete: Coarse aggregates shall conform to graduation requirements for various sizes as tabulated in Table No. 2 of ASTM C 33. The sizes of coarse aggregates for various classes of Work shall be as follows with all percentages being determined by weight.
  - 4.2.2.3.c For concrete Work having a minimum cross-sectional dimension of not more than 6 inches, the coarse aggregate shall be a well graded mixture of No. 67 (3/4" to No. 4) and No. 57 (1" to No. 4), provided that not more than 50 percent nor less than 30 percent shall be Size No. 67 and not more than 70 percent nor less than 50 percent shall be Size No. 57.
  - 4.2.2.3.d For concrete Work having a minimum cross-sectional dimension greater than 6 inches and not more than 12 inches, including concrete floors, the coarse aggregate shall consist of a mixture of No. 67, No. 57 and No. 467 (1 ½" to No. 4), providing that not more than 25 percent nor less than 10 percent shall be Size No. 67 and not more than 40 percent shall be Size No. 467.
  - 4.2.2.3.e For concrete Work having a minimum cross-sectional dimension of more than 12 inches, the coarse aggregate shall consist of a mixture of No. 67, No. 57 and No. 357 (2" to No. 4), providing not more than 25 percent nor less than 10 percent shall be Size No. 67 and not more than 40 percent shall be Size No. 357.

I. Admixtures: Do not use admixtures in concrete unless specified or approved in writing by the Architect.

J. ACI 301, Section 4.1.2.1 - Mixture Proportions:
1. Add the following to paragraph 4.1.2.1:
   - Proposed design mix(es) for pumped concrete and the pumping equipment shall have been tested under actual field conditions with the maximum horizontal run and vertical lift required for this project.

2.03 JOINTS

A. ACI 301, Section 5.3.2.6 - Construction joints and other bonded joints:
   1. Delete the following subparagraphs:
      - Use an acceptable surface retarder in accordance with manufacturer's recommendations.
      - Roughen the surface in an acceptable manner that exposes the aggregate uniformly and does not leave laitance, loosened particles of aggregate, or damaged concrete at the surface; or

B. ACI 301, Section 10.2.5 – Isolation-joint filler materials:
   1. Add the following paragraphs:
      - Except as otherwise shown on the Drawings, expansion joints shall be as follows:
      - In joints required to receive a sealant, the joint filler shall be 1/2 inch thick and recessed as required to form a caulking slot.
      - In joints not required to receive a sealant, the joint filler shall be 1/2 inch thick and extend through the full cross-section of the concrete.
      - Tool edges of concrete with 1/8 inch radius edging tool.

2.04 PRODUCTION OF CONCRETE

A. Provide ready-mixed concrete, either central-mixed or truck-mixed, unless otherwise approved in writing by the Architect.

B. ACI 301, Section 5.3.2.1 Weather considerations
   1. Delete paragraph under 5.3.2.1.c - Hot Weather, and add the following:
      - 5.3.2.1.c Provide adequate controls to insure that the temperature of the concrete when placed does not exceed 90 degrees F., and make every effort to place it at a lower temperature. The temperature of the concrete as placed shall not be so high as to cause difficulty from loss of slump, flash set or cold joints. Ingredients may be cooled before mixing by shading the aggregates, fog spraying the coarse aggregate, chilling the mixing water or other approved means. Mixing water may be chilled with flake ice or well-crushed ice of a size that will melt completely during mixing, providing the water equivalent of the ice is calculated into the total amount of mixing water.

C. Protect concrete from physical damage or reduced strength due to weather extremes during mixing, placement and curing.
   1. In cold weather, comply with ACI 306R.
      a. When air temperature is below 40 degrees F (4 degrees C) heat the mixing water and, if necessary, the aggregates to obtain a concrete mixture temperature of not less than 50 degrees F (10 degrees C) and not more than 80 degrees F (27 degrees C) at point of placement. If the mixing water is heated, do not exceed a temperature of 140 degrees F at the time it is added to the cement and aggregates.
   2. In hot weather, comply with ACI 305R.
      a. When air temperature is between 85 degrees F (30 degrees C) and 90 degrees F (32 degrees C), reduce mixing and delivery time from 1 1/2 hours to 75 minutes, and when air temperature is above 90 degrees F (32 degrees C), reduce mixing and delivery time to 60 minutes.

PART 3 EXECUTION

3.01 EXAMINATION AND PREPARATION

A. Do not use items of aluminum for mixing, chuting, conveying, forming or finishing concrete, except magnesium alloy tools may be used for finishing.

B. Check items of aluminum required to be embedded in the concrete and insure that they are coated, painted or otherwise isolated in an approved manner.

C. Install water stops in accordance with manufacturer's printed instructions.

D. Hardened concrete, reinforcement, forms, and earth which will be in contact with fresh concrete shall be free from frost at the time of concrete placement.

E. Do not deposit concrete in water. Keep excavations free of water by pumping or by other approved methods.

F. Prior to placement of concrete, remove all hardened concrete spillage and foreign materials from the space to be occupied by the concrete.

3.02 ADMIXTURE ADDITIONS AT THE SITE

A. Site additions shall be limited to high-range water-reducers, non-chloride accelerators, and corrosion inhibitors. Comply with manufacturers' printed instructions for discharge of admixtures shall be furnished.

B. High-Range Water-Reducers:
1. Concrete shall arrive at a slump of 2 to 4 inches (50 to 100 mm). Water additions at the Site shall be limited to comply with water-to-cementitious ratio requirements.
2. Following addition of high-range water-reduced concrete, a minimum of 70 revolutions or 5 minutes of mixing shall be completed to assure a consistent mixture.

C. All concrete with other admixture additions shall mix a minimum of 70 revolutions or 5 minutes to assure a consistent mixture.

3.03 PLACING

A. ACI 301, Section 5.3.2.3 Conveying equipment:
1. Add the following paragraphs:
   - 5.3.2.3.d When pumping concrete, the lubricating mortar for the delivery line shall not be discharged into an area of concrete placement.
   - 5.3.2.3.e The inside diameter of the delivery lines for pumped concrete shall be the greater of either a minimum of 5 inches or 3 times the maximum size of coarse aggregate.

B. ACI 301, Section 5.3.2.2 - Conveying:
1. Add the following paragraph:
   - Operation of truck mixers and agitators and discharge limitations shall conform to the requirements of ASTM C 94.

C. ACI 301, Section 5.3.2.4 - Depositing:
1. Add the following paragraph:
- Do not allow concrete to free fall more than 4 feet.

3.04 REPAIRING SURFACE DEFECTS

A. ACI 301, Section 5.3,7 – Repair of surface defects:
1. Add the following paragraph:
- 5.3.7.1.a Finish patched areas to match the texture of the surrounding surface.

B. ACI 301, Section 5.3.7.2 - Repair of tie holes:
1. Delete last paragraph in 5.3.7.2 and replace with the following:
- The patch mixture shall consist of a mixture of dry-pack mortar, consisting of one part Portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for placing and handling. For surfaces exposed to view, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

3.05 FINISHING FORMED SURFACES

A. Finish Schedule: Except where indicated otherwise on the Drawings, provide the finishes below:
1. Rough Form Finish (Unspecified – as-cast finish) for concrete surfaces not exposed to view.
2. Smooth Rubbed Finish for interior and exterior concrete surfaces exposed to view. Remove forms as soon as removal operations will not damage concrete. Patch holes, remove projections and rub concrete to provide a Surface Tolerance Class A as specified in ACI 117.

3.06 SLABS

A. Slabs On Grade: Provide saw-cut type control joints at 12’-0 on center, unless otherwise shown, using the early entry dry saw-cut method. Saw-cut joints within 4 hours of finishing the slab. All slab joints are to be filled with a polyurea joint filler as specified above. Slab to cure a minimum of 28 days prior to filling joints.

B. ACI 301, Section 5.3.4 – Finishing unformed surfaces:
1. Add the following paragraph to section 5.3.4.1 Placement:
- Provide monolithic finishes on concrete floors and slabs without the addition of mortar or other filler material. Finish surfaces in true planes, true to line, with particular care taken during screeding to maintain an excess of concrete in front of the screed so as to prevent low spots. Screed and darby concrete to true planes while plastic and before free water rises to the surface. Do not perform finishing operations during the time free water (bleeding) is on the surface. Refer to flatness and levelness requirements below.

C. Finish Schedule: Except where indicated otherwise on the Drawings, provide the finishes below:

1. Floated Finish for:
   a. Treads and platforms of exterior steps and stairs.
   b. Slabs and fill over which waterproofing, roofing, vapor barrier, insulation, terrazzo, or resin bound flooring is required.
2. Troweled Finish for:
   a. Interior slabs that are to be exposed to view.
   b. Slabs and fill over which resilient wood flooring, resilient tile or sheet flooring, carpet, or thin-film coating system is required.
   c. Slabs and fill over which thin-set ceramic tile is required, except fine-broom finished surface.
   d. Treads and platforms of interior steps and stairs.
3. Broom or Belt Finish for:
   a. Exterior slab. Texture as approved by the Architect's Representative.
4. Scratched Finish for:
   a. Surfaces to be covered with ceramic tile set in a bonded thick mortar bed, except screed to a Class B tolerance.
   b. Surfaces to be covered with floor topping.

D. ACI 302 Chapter 8.2.8.2 - Tools for jointing; Saw-cutting.
1. Add the following paragraph:

   - Early-entry dry-cut saws are required in place of conventional wet-cut saws.

E. Floor flatness and levelness tolerances:

Class	Locations	Finish	Flatness F(f)	Levelness (F(l)
1	Basements, Mech Rooms. Areas to receive thick set tile. Slab under gymnasium and Stage flooring.	Normal Steel-troweled finish	20	15
2	Carpeted and VCT tile areas	Light steel-troweled Finish	25	20
3	Exterior Walks	Broome Finish	35	25
4	Areas to receive thin-set Terrazzo or file finishes	Normal steel-troweled finish	35	25

3.07 CURING AND PROTECTION

A. Cure all exposed concrete using supervised wet cure or an approved curing compound.

B. Hot Weather Concreting: Comply with ACI 305R whenever the atmospheric temperature or the form surface temperature is at or above 90 degrees F., or climatic conditions of wind and/or low humidity will cause premature drying of the concrete.

C. Curing Temperature: Maintain the temperature of the concrete at 50 degrees F. or above during the curing period. Keep the concrete temperature as uniform as possible and protect from rapid atmospheric temperature changes. Avoid temperature changes in concrete which exceeds 5 degrees F. in any one hour and 50 degrees F. in any 24-hour period.

D. Curing of Slabs to Receive Moisture-Sensitive Finish Flooring, including vinyl composition tile (VCT), rubber flooring, sheet vinyl, resilient tile, carpet, ceramic tile, wood flooring, and laminates:

- Cure the slab by covering with a moisture retaining cover as defined above for a period of 7 days.
- Do not add water (ponding or wet bulap)
- Do not use curing compounds or cure-and-seal materials unless approved in writing by the Architect. Architect will require written approval from the adhesive and floor covering manufacturer that the curing compound or cure-and-seal material will not compromise the adhesion of the floor covering to the concrete slab, and will not require removal of the curing compound or cure-and-seal material prior to placement of the finish floor covering.

END OF SECTION

SECTION 04 0100
MAINTENANCE OF MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Replacement of brick units.

B. Repointing mortar joints.

C. Repair of damaged masonry.

1.02 RELATED REQUIREMENTS

A. Section 04 0511 - Masonry Mortaring and Grouting.

B. Section 04 2000 - Unit Masonry: Brick masonry units.

C. Section 04 2000 - Unit Masonry: Mortar and grout.

1.03 PRICE AND PAYMENT PROCEDURES

A. See Section 01 2200 - Unit Prices, for additional unit price requirements.

1.04 REFERENCE STANDARDS

A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata.

B. IMIAWC (CW) - Recommended Practices & Guide Specifications for Cold Weather Masonry Construction; International Masonry Industry All-Weather Council; 1993.

C. IMIAWC (HW) - Recommended Practices & Guide Specifications for Hot Weather Masonry Construction; International Masonry Industry All-Weather Council; current edition.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week prior to commencing work of this section.
   1. Require attendance of parties directly affecting work of this section.
   2. Review conditions of installation, installation procedures, and coordination with related work.

B. Scheduling:
   1. Perform cleaning and washing of masonry between the hours of 7 am to 11 pm only.

1.06 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal process.

B. Shop Drawings: Indicate setting details of stone. Detail shoring.

C. Product Data: Provide data on masonry accessories and masonry accessories.

D. Samples: Submit four (4) samples of face brick units and mortar to illustrate matching color, texture, and extremes of color range.

E. Field determine locations and quantities of masonry replacement and repointing.

F. Manufacturer's Instructions: For cleaning materials, indicate special procedures, conditions requiring special attention.

1.07 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of the Contract Documents.
   1. Maintain one copy of each document on project site.

B. Restorer: Company specializing in masonry restoration with minimum 3 years of documented experience.

1.08 MOCK-UP

A. Restore and repoint a designated masonry wall sized 8 feet long x 6 feet high, which includes mortar and masonry.

B. Clean a 10 ft by 10 ft panel of wall to determine extent of cleaning.
   1. Repeat, using different cleaning methods for up to three different panels.

C. Locate where directed.

D. Acceptable panel and procedures employed will become the standard for work of this section.

E. No Work shall proceed without the written approval of the material samples, and in-place sample areas by the Architect/Engineer.

F. Mock-up may remain as part of the Work.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver masonry neatly stacked and tied on pallets. Store clear of ground with adequate waterproof covering.

B. Store restoration cleaner materials in manufacturer's packaging.

1.10 FIELD CONDITIONS

A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.

B. Cold Weather Requirements: Comply with recommendations of IMIAWC (CW).

C. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

D. Hot Weather Requirements: Comply with IMIAWC Recommended Practices and Guide Specifications for Hot Weather Masonry Construction.

E. Do not blast clean or use process creating dust, dirt, _____ , when wind is over 10 mph.

PART 2 PRODUCTS

2.01 CLEANING MATERIALS

A. Cleaning Agent: Detergent type. Provide 1/2 cup Trisodium Phosphate (TSP) mixture to 1 gallon of water. Increase concentration of TSP as needed to remove staining after starting first with a weaker solution. The use of acid solutions are not permitted.

B. Cleaning Agent: 0.5 lb of sodium hydrosulphite mixture to one gallon of water.

2.02 MORTAR MATERIALS

A. Unless otherwise indicated, mortar for this Work shall comply with the following:
   1. Portland Cement: Type I, ASTM C150, white and/or gray as required.
   2. Hydrated Lime: Type S, ASTM C207.
   3. Sand (color and grain size to match existing): ASTM C144, clean and free of impurities.
   4. Water: Shall be clean, potable, and free of deleterious materials.
   5. Additives: The use of additives, especially anti-freeze, calcium chloride and/or air entraining agents, is clearly prohibited without the written approval of the Architect/Engineer.

B. Mortar Mix:
   1. Interior: Type N.
   2. Exterior: Type S.

C. Color, Texture and Joint Profile:
   1. Materials shall be mixed to product mortar of color and texture equal to undisturbed adjacent mortar, as defined and identified during an on-site inspection meeting.
   2. Joint profile shall match existing.

D. Comply with requirements of Section 04 0511.

2.03 MASONRY MATERIALS

A. Brick: Provide new replacement brick to match original in size, color, texture, and hardness.

B. Brick: Section 04 2000.

2.04 SEALANT MATERIALS

A. Conform to the requirements of Section 07 9005 - Joint Sealers. Sealant shall be exterior sealant, polyurethane, 2-part.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces to be cleaned are ready for Work of this Section.

3.02 PREPARATION

A. Protect surrounding elements from damage due to restoration procedures.

B. Carefully remove and store removable items located in areas to be restored, including fixtures, fittings, finish hardware, and accessories; reinstall upon completion.

C. Separate areas to be protected from restoration areas using means adequate to prevent damage.

D. Cover existing landscaping with tarpaulins or similar covers.

E. Mask immediately adjacent surfaces with material that will withstand cleaning and restoration procedures.

F. Close off adjacent occupied areas with dust proof and weatherproof partitions.

G. Immediately remove stains, efflorescence, or other excess resulting from the Work of this Section.

H. Protect roof membrane and flashings from damage with 1/2 inch plywood laid over EPDM roofing sheets on roof surfaces over full extent of Work Area and traffic route.

I. Provide sand dams to divert flowing water to exterior.

J. When using cleaning methods that involve water or other liquids, install drainage devices to prevent runoff over adjacent surfaces unless those surfaces are impervious to damage from runoff.

K. Do not allow cleaning runoff to drain into sanitary or storm sewers.

3.03 REBUILDING

A. Cut out damaged and deteriorated masonry with care in a manner to prevent damage to any adjacent remaining materials.

B. Support structure as necessary in advance of cutting out units.

C. Cut away loose or unsound adjoining masonry as directed.

D. Build in new units following procedures for new Work specified in other Section(s).

E. Mortar Mix: Colored and proportioned to match existing work.

F. Ensure that anchors are correctly located and built in.

G. Install built in masonry work to match and align with existing, with joints and coursing true and level, faces plumb and in line. Build in all openings, accessories and fittings.

3.04 REPOINTING

A. Perform repointing prior to cleaning masonry surfaces.

B. Remove all loose, cracked, or deteriorated mortar and rake all damaged joints to a minimum uniform depth of 2-1/2 times the width of the joints.

C. Cut out loose or disintegrated mortar in joints to minimum 1/2 inch depth or until sound mortar is reached.

D. Use power tools only after test cuts determine no damage to masonry units will result.

E. Do not damage masonry units.

F. Joints shall be raked and care shall be taken to prevent damage to adjacent bricks.

G. When cutting is complete, remove dust and loose material by brushing.

H. Wet surfaces to improve bond without allowing free water to remain. No bonding agents will be permitted without written approval of the Architect/Engineer.

I. Premoisten joint and apply mortar. Pack tightly in maximum 1/4 inch layers. Form a smooth, compact concave joint to match existing.

J. Moist cure for 72 hours.

3.05 INSTALLATION

A. Using a mortar board and pointing tool, mortar shall be applied and compacted to produce uniform fills, 3/4 inch thick.

B. When previous fill is thumbnail hard the next may be applied, until the joint is filled.

C. Joints:
   1. All joints shall be tooled as approved in the in-place masonry samples.
   2. When the mortar sets to thumbnail hardness, tool joints to match original or adjacent joints in order to provide visual continuity.

D. Curing:
   1. Provide periodic misting to allow proper curing for 48 hours following Mortar Work.
   2. Maintain a minimum temperature of 45 degrees F during curing period.

3.06 CLEANING EXISTING MASONRY

A. Remove all excess surface mortar with a stiff fibrous bristle brush (natural fiber, masonry type "Tampico") and low pressure water wash (200 psi maximum f28) before it can harden. No wire brushing will be allowed. No ionic cleaning substances will be used without the written approval of the Architect/Engineer.

B. Cleaning Detergent: Brush clean masonry surfaces at specific locations with cleaning agent in accordance with the manufacturer's instructions. Saturate masonry with clean water and flush loose mortar and dirt.

3.07 CLEANING NEW MASONRY

A. Verify mortar is fully set and cured.

B. Clean surfaces and remove large particles with wood scrapers, brass or nylon wire brushes.

C. Scrub walls with cleaning agent solution using stiff brush. Thoroughly rinse and wash off cleaning solution, dirt and mortar crumbs using clean, pressurized water.

D. Use acid solution mixed with water in accordance with manufacturer's instructions. Apply acid solution and scrub masonry with stiff fiber brushes. Do not scrub the mortar joints.

E. Protect area below cleaning operation and keep masonry soaked with water and flushed free of acid and dissolved mortar continuously for duration of cleaning.

F. Before solution dries, rinse and remove acid solution and dissolved mortar, using clean, pressurized water.

3.08 RESTORATION CLEANING

A. Clean surfaces and remove large particles with wood scrapers or non-ferrous wire brush.

B. Spray coat masonry with _____ restoration cleaner, mixed into solution in accordance with manufacturer's instructions.

C. Provide a second application if required to match mock-up area.

D. Allow sufficient time for solution to remain on masonry and agitate with soft fiber brush or sponge.

E. Rinse from the bottom up with potable water applied at 400 psi and at a rate of 4 gal/min.

3.09 AGING

A. Rub in new masonry work to match, as close as possible, adjacent original work.
   1. Use carbon black in small amounts, rubbing in well with burlap rags.

B. After each application, dust off surplus and wash down with low pressure hose. Allow surface to dry before proceeding with succeeding applications.

C. Continue process until acceptance.

3.10 CLEANING

A. Immediately remove stains, efflorescence, or other excess resulting from the work of this section.

B. Remove excess mortar, smears, and droppings as work proceeds and upon completion.

C. Clean surrounding surfaces.

D. Remove all staging, scaffolding and protective equipment.

3.11 SCHEDULES

A. Refer to the Drawings for locations and extent of Work required.

END OF SECTION

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SECTION 04 0511
MASONRY MORTARING AND GROUTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Mortar for masonry.

B. Grout for masonry.

1.02 RELATED REQUIREMENTS

A. Section 04 0100 - Maintenance of Masonry: Bedding and pointing mortar for masonry restoration work.

B. Section 04 2000 - Unit Masonry: Installation of mortar and grout.

C. Section 04 2613 - Masonry Veneer: Installation of mortar.

D. Section 08 1113 - Hollow Metal Doors and Frames: Products and execution for grouting steel door frames installed in masonry.

1.03 REFERENCE STANDARDS

A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata.

B. ASTM C5 - Standard Specification for Quicklime for Structural Purposes; 2018.

C. ASTM C91/C91M - Standard Specification for Masonry Cement; 2023.

D. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2023.

E. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2018.

F. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.

G. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2018.

H. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.

I. ASTM C387/C387M - Standard Specification for Packaged, Dry, Combined Materials for Concrete and High Strength Mortar; 2023.

J. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2018.

K. ASTM C476 - Standard Specification for Grout for Masonry; 2023.

L. ASTM C780 - Standard Test Methods for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2023.

M. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2016.

N. ASTM C1019 - Standard Test Method for Sampling and Testing Grout for Masonry; 2020.

O. ASTM C1072 - Standard Test Methods for Measurement of Masonry Flexural Bond Strength; 2022.

P. ASTM C1142 - Standard Specification for Extended Life Mortar for Unit Masonry; 1995 (Reapproved 2013).

Q. ASTM C1148 - Standard Test Method for Measuring the Drying Shrinkage of Masonry Mortar; 1992a (Reapproved 2014).

R. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms; 2023a.

S. ASTM E514/E514M - Standard Test Method for Water Penetration and Leakage Through Masonry; 2020.

T. ASTM E518/E518M - Standard Test Methods for Flexural Bond Strength of Masonry; 2022.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C270 is to be used. Also include required environmental conditions and admixture limitations.

C. Samples: Submit two samples of mortar, illustrating mortar color and color range.

D. Reports: Submit reports on mortar indicating conformance ofmortar to property requirements of ASTM C270and test and evaluation reports per ASTM C780.

E. Reports: Submit reports on grout indicating conformance of component grout materials to requirements of ASTM C476and test and evaluation reports to requirements of ASTM C1019.

F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

G. Manufacturer's Installation Instructions: Submit packaged dry mortar manufacturer's installation instructions.

1.05 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of the contract documents.
   1. Maintain one copy of each document on project site.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.07 FIELD CONDITIONS

A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.

B. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

PART 2 PRODUCTS

2.01 MORTAR AND GROUT APPLICATIONS

A. Use only factory premixed packaged dry materials for mortar and grout, with addition of water only at project site.
   1. Exception: If a specified mix design is not available in a premixed dry package, provide equivalent mix design using standard non-premixed materials.

B. Mortar Color: Natural gray unless otherwise indicated.

C. Mortar Mix Designs: ASTM C270, Property Specification.
   1. Masonry below grade and in contact with earth: Type S.
   2. Exterior Masonry Veneer: Type N.
   3. Exterior Cavity Walls: Type S mortar with Type N pointing mortar.
   4. Exterior, Loadbearing Masonry: Type N.
   5. Exterior, Non-loadbearing Masonry: Type N.
   6. Exterior Repointing Mortar: Type N with maximum 2 percent ammonium stearate or calcium stearate per cement weight.
   7. Interior, Loadbearing Masonry: Type N.
   8. Interior, Non-loadbearing Masonry: Type O.

D. Grout Mix Designs:
   1. Bond Beams and Lintels: 3,000 psi strength at 28 days; 8-10 inches slump; provide premixed type in accordance with ASTM C 94/C 94M.
      a. Fine grout for spaces with smallest horizontal dimension of 2 inches or less.
      b. Coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

2.02 MATERIALS

A. Packaged Dry Material for Mortar for Unit Masonry: Premixed masonry cement and mason's sand; complying with ASTM C387/C387M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
   1. Type: Type N.
   2. Color: Standard gray.
   3. Water repellent mortar for use with water repellent masonry units.
   4. Manufacturers:
      a. Amerimix, an Oldcastle brand; AMX 500: www.amerimix.com/#sle.
      b. Amerimix, an Oldcastle brand; AMX 510: www.amerimix.com/#sle.
      c. The QUIKRETE Companies; QUIKRETE® Mason Mix: www.quikrete.com/#sle.
      d. Substitutions: See Section 01 6000 - Product Requirements.

B. Packaged Dry Material for Mortar for Repointing: Premixed Portland cement, graded sand, and chemical admixtures complying with ASTM C91/C91M with the addition of water only.
   1. Color: Natural gray.
   2. Manufacturers:
      a. Substitutions: See Section 01 6000 - Product Requirements.

C. Packaged Dry Material for Mortar for Repointing: Premixed Portland cement, hydrated lime, and graded sand; capable of producing Type O mortar in accordance with ASTM C270 with the addition of water only.
   1. Color: Standard gray.
   2. Manufacturers:
      a. Amerimix, an Oldcastle brand; AMX 420: www.amerimix.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

D. Packaged Dry Material for Grout for Masonry: Premixed cementitious materials and dried aggregates; capable of producing grout of the specified strength in accordance with ASTM C476 with the addition of water only.
   1. Type: Fine.
   2. Manufacturers:
      a. Amerimix, an Oldcastle brand; AMX 600: www.amerimix.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

E. Portland Cement: ASTM C150/C150M.
   1. Type: Type I - Normal; ASTM C150/C150M.
   2. Color: Standard gray.
   3. Manufacturers:
      a. Solomon Colors; Solomon Colors Concentrated A, H, and X Series: www.solomoncolors.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

F. Masonry Cement: ASTM C91/C91M.
   1. Type: Type N; ASTM C91/C91M.
   2. Colored Mortar: Premixed cement as required to match Architect's color sample.
   3. Manufacturers:
      a. Solomon Colors; Solomon Colors Concentrated A, H, and X Series: www.solomoncolors.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

G. Hydrated Lime: ASTM C207, Type S.

H. Quicklime: ASTM C5, non-hydraulic type.

I. Mortar Aggregate: ASTM C144.

J. Grout Aggregate: ASTM C404.

K. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
   1. Color(s): As selected by Architect from manufacturer's full range.
   2. Manufacturers:
      a. Solomon Colors; Solomon Colors Concentrated A, H, and X Series: www.solomoncolors.com/#sle.
      b. Davis Colors: www.daviscolors.com/#sle.
      c. Lambert Corporation: www.lambertusa.com/#sle.
      d. Substitutions: See Section 01 6000 - Product Requirements.

L. Water: Clean and potable.

M. Accelerating Admixture: Nonchloride type for use in cold weather.

N. Moisture-Resistant Admixture: Water repellent compound designed to reduce capillarity.

O. Bonding Agent: Latex type.

P. Integral Water Repellent Admixture: Polymeric liquid admixture added to mortar at the time of manufacture.
   1. Performance of Mortar with Integral Water Repellent:
      a. Water Permeance: When tested per ASTM E514/E514M and for a minimum of 72 hours:
         1) No water visible on back of wall above flashing at the end of 24 hours.
         2) No flow of water from flashing equal to or greater than 0.032 gallons per hour at the end of 24 hours.
         3) No more than 25% of wall area above flashing visibly damp at end of test.
      b. Flexural Bond Strength: ASTM C1072; minimum 10 percent increase.
      c. Compressive Strength: ASTM C1314; maximum 5 percent decrease.
      d. Drying Shrinkage: ASTM C1148; maximum 5 percent increase in shrinkage.
   2. Use only in combination with masonry units produced with integral water repellent admixture.
   3. Manufacturers:
      a. Substitutions: See Section 01 6000 - Product Requirements.

2.03 MORTAR MIXING

A. Ready Mixed Mortar: ASTM C1142, Type equivalent to that specified according to ASTM C270.

B. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use.

C. Maintain sand uniformly damp immediately before the mixing process.

D. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio; mix in accordance with manufacturer's instructions, uniform in coloration.

E. Add admixtures in accordance with manufacturer's instructions; mix uniformly.

F. Do not use anti-freeze compounds to lower the freezing point of mortar.

G. If water is lost by evaporation, re-temper only within two hours of mixing.

2.04 GROUT MIXING

A. Mix grout in accordance with ASTM C94/C94M.

B. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476 for fine and coarse grout.

C. Add admixtures in accordance with manufacturer's instructions; mix uniformly.

D. Do not use anti-freeze compounds to lower the freezing point of grout.

2.05 PRECONSTRUCTION TESTING

A. Testing will be conducted by an independent test agency, in accordance with provisions of Section 01 4000 - Quality Requirements.

B. Mortar Mixes: Test mortars prebatched by weight in accordance with ASTM C780 recommendations for preconstruction testing.
   1. Test results will be used to establish optimum mortar proportions and establish quality control values for construction testing.

C. Grout Mixes: Test grout batches in accordance with ASTM C1019 procedures.
   1. Test results will be used to establish optimum grout proportions and establish quality control values for construction testing.

PART 3 EXECUTION

3.01 PREPARATION

A. Apply bonding agent to existing concrete surfaces.

B. Plug clean-out holes for grouted masonry with brick masonry units. Brace masonry to resist wet grout pressure.

3.02 INSTALLATION

A. Install mortar and grout to requirements of section(s) in which masonry is specified.

B. Work grout into masonry cores and cavities to eliminate voids.

C. Do not install grout in lifts greater than 16 inches without consolidating grout by rodding.

D. Do not displace reinforcement while placing grout.

E. Remove excess mortar from grout spaces.

3.03 GROUTING

A. Use either high-lift or low-lift grouting techniques, at Contractor's option, subject to other limitations of contract documents.

B. Low-Lift Grouting:
   1. Limit height of pours to 12 inches.
   2. Limit height of masonry to 16 inches above each pour.
   3. Pour grout only after vertical reinforcing is in place; place horizontal reinforcing as grout is poured. Prevent displacement of bars as grout is poured.
   4. Place grout for each pour continuously and consolidate immediately; do not interrupt pours for more than 1-1/2 hours.

C. High-Lift Grouting:
   1. Verify that horizontal and vertical reinforcement is in proper position and adequately secured before beginning pours.
   2. Brick: Limit pours to maximum 12 feet in height and 25 feet horizontally.
   3. Hollow Masonry: Limit lifts to maximum 4 feet and pours to maximum height of 24 feet.
   4. Place grout for spanning elements in single, continuous pour.

3.04 FIELD QUALITY CONTROL

A. An independent testing agency will perform field tests, in accordance with provisions of Section 01 4000 - Quality Requirements.

B. Test and evaluate mortar in accordance with ASTM C780 procedures.
   1. Test with same frequency as specified for masonry units.

C. Test and evaluate grout in accordance with ASTM C1019 procedures.
   1. Test with same frequency as specified for masonry units.

D. Prism Tests: Test masonry and mortar panels for compressive strength in accordance with ASTM C1314, and for flexural bond strength in accordance with ASTM C1072 or ASTM E518/E518M; perform tests and evaluate results as specified in individual masonry sections.

END OF SECTION

SECTION 04 2000
UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete block.

B. Reinforcement and Anchorage.

C. Flashings.

D. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Installation of dovetail slots for masonry anchors.

B. Section 04 0100 - Maintenance of Masonry.

C. Section 04 0511 - Masonry Mortaring and Grouting.

D. Section 05 5000 - Metal Fabrications: Loose steel lintels.

E. Section 06 1000 - Rough Carpentry: Nailing strips built into masonry.

F. Section 07 1113 - Bituminous Dampproofing: Dampproofing parged masonry surfaces.

G. Section 07 2100 - Thermal Insulation: Insulation for cavity spaces.

H. Section 07 8400 - Firestopping: Firestopping at penetrations of fire-rated masonry and at top of fire-rated walls.

I. Section 07 9200 - Joint Sealants: Sealing control and expansion joints.

J. Section 07 9005 - Joint Sealers: Backing rod and sealant at control and expansion joints.

1.03 PRICE AND PAYMENT PROCEDURES

A. See Section 01 2100 - Allowances, for cash allowances affecting this section.

1.04 REFERENCE STANDARDS

A. ASTM A1 - Standard Specification for Carbon Steel Tee Rails; 2000 (Reapproved 2018).

B. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata.

C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

D. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2023.

E. ASTM A580/A580M - Standard Specification for Stainless Steel Wire; 2023.

F. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.

G. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2019.

H. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

I. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

J. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement; 2022.

K. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2022.

L. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction; 2022.

M. ASTM C27 - Standard Classification of Fireclay and High-Alumina Refractory Brick; 1998 (Reapproved 2022).

N. ASTM C34 - Standard Specification for Structural Clay Loadbearing Wall Tile; 2023.

O. ASTM C55 - Standard Specification for Concrete Building Brick; 2022.

P. ASTM C56 - Standard Specification for Structural Clay Nonloadbearing Tile; 2022.

Q. ASTM C62 - Standard Specification for Building Brick (Solid Masonry Units Made from Clay or Shale); 2023.

R. ASTM C67/C67M - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile; 2023.

S. ASTM C73 - Standard Specification for Calcium Silicate Brick (Sand-Lime Brick); 2023.

T. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2022.

U. ASTM C91/C91M - Standard Specification for Masonry Cement; 2023.

V. ASTM C126 - Standard Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units; 2022.

W. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units; 2022.

X. ASTM C140/C140M - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units; 2023.

Y. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2018.

Z. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.

AA. ASTM C199 - Standard Test Method for Pier Test for Refractory Mortars; 2022.

BB. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2018.

CC. ASTM C212 - Standard Specification for Structural Clay Facing Tile; 2022.

DD. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale); 2023.

EE. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.

FF. ASTM C315 - Standard Specification for Clay Flue Liners and Chimney Pots; 2007 (Reapproved 2021).

GG. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2018.

HH. ASTM C476 - Standard Specification for Grout for Masonry; 2023.

II. ASTM C530 - Standard Specification for Structural Clay Nonloadbearing Screen Tile; 2023.

JJ. ASTM C652 - Standard Specification for Hollow Brick (Hollow Masonry Units Made from Clay or Shale); 2022.

KK. ASTM C744 - Standard Specification for Prefaced Concrete and Calcium Silicate Masonry Units; 2021.

LL. ASTM C780 - Standard Test Methods for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2023.

MM. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2016.

NN. ASTM C1072 - Standard Test Methods for Measurement of Masonry Flexural Bond Strength; 2022.

OO. ASTM C1148 - Standard Test Method for Measuring the Drying Shrinkage of Masonry Mortar; 1992a (Reapproved 2014).

PP. ASTM C1261 - Standard Specification for Firebox Brick for Residential Fireplaces; 2013, with Editorial Revision (2017).

QQ. ASTM C1283 - Standard Practice for Installing Clay Flue Lining; 2015 (Reapproved 2021).

RR. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms; 2023a.

SS. ASTM C1405 - Standard Specification for Glazed Brick (Single Fired, Brick Units); 2020a.

TT. ASTM C1634 - Standard Specification for Concrete Facing Brick and Other Concrete Masonry Facing Units; 2023.

UU. ASTM C1714/C1714M - Standard Specification for Preblended Dry Mortar Mix for Unit Masonry; 2019a.

VV. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2017 (Reapproved 2023).

WW. ASTM D4637/D4637M - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane; 2015, with Editorial Revision (2022).

XX. ASTM E11 - Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves; 2022.

YY. ASTM E514/E514M - Standard Test Method for Water Penetration and Leakage Through Masonry; 2020.

ZZ. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing; 2017.

AAA. BIA Technical Notes No. 13 - Ceramic Glazed Brick Exterior Walls; 2017.

BBB. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls; 2005.

CCC. BIA Technical Notes No. 46 - Maintenance of Brick Masonry; 2017.

DDD. ICC-ES AC380 - Acceptance Criteria for Termite Physical Barrier Systems; 2021, with Editorial Revision (2022).

EEE. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata.

FFF. IMIAWC (CW) - Recommended Practices & Guide Specifications for Cold Weather Masonry Construction; International Masonry Industry All-Weather Council; 1993.

GGG. IMIAWC (HW) - Recommended Practices & Guide Specifications for Hot Weather Masonry Construction; International Masonry Industry All-Weather Council; current edition.

HHH. UL (FRD) - Fire Resistance Directory; Current Edition.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all relevant installers.

1.06 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal process.

B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.

C. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

D. Manufacturer's Certificate: Certify that water repellent admixture manufacturer has certified masonry unit manufacturer as an approved user of water repellent admixture in the manufacture of concrete block.

E. Test Reports: Concrete masonry manufacturer's test reports for units with integral water repellent admixture.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.

1.07 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of the Contract Documents.
   1. Maintain one (1) copy of each document on Project Site.

B. Fire Rated Assemblies: Comply with applicable code for UL Assemblies as indicated.

C. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum three years of documented experience.

D. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.08 MOCK-UP

A. Construct a masonry wall as a mock-up panel sized 4 feet long x 4 feet high, which includes all specified masonry unit types, mortar and accessories and structural backup.

B. Locate where directed.

C. Mock-up, if acceptable, may remain as part of the Work.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

B. Handle and store ceramic glazed masonry units in protective cartons or trays. Do not remove from protective packaging until ready for installation.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 16 inches x 8 inches and nominal depths as indicated on the Drawings for specific locations.
   2. Integral Water Repellent: All concrete masonry units used in exterior cavity wall, including lintel block shall contain the recommended amount of integral water-repellent known as the "Dry-Block System, admix", as manufactured by W.R. Grace Chemical Company or equal.
   3. Special Shapes: At all external corners at interior walls, concrete block shall be provided with bull-nosed corners.
      a. Provide bullnose units for outside corners.
   4. Load-Bearing Units: ASTM C90, normal weight.
      a. Hollow block, as indicated shall be two (2) core standard unit and shall be a minimum of 28 days old.
      b. Exposed faces: Manufacturer's standard neutral color and texturewhere indicated.
      c. Pattern: Vertical single score.
      d. Manufacturers:
         1) The Concrete Products Group; Spec-Brik: www.concreteproductsgroup.com/#sle.
         2) The Concrete Products Group; Polished and Textured Collection: www.concreteproductsgroup.com/#sle.
         3) Substitutions: See Section 01 6000 - Product Requirements.
   5. Non-Loadbearing Units: ASTM C129.
      a. Hollow block, as indicated shall be two (2) core standard unit and shall be a minimum of 28 days old.
      b. Normal weight.
   6. Color: As selected by Architect.
   7. Comply with ASTM C90 for finish and appearance requirements. Do not include units in the Work which do not meet the minimum established requirements.

2.02 MORTAR AND GROUT MATERIALS

A. Mortar and Grout: As specified in Section 04 0511.

2.03 REINFORCEMENT AND ANCHORAGE

A. Manufacturers:
   1. Blok-Lok Limited: www.blok-lok.com/#sle.
   2. Hohmann & Barnard, Inc; X-Seal Anchor: www.h-b.com/#sle.
   3. WIRE-BONDwww.wirebond.com/#sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi), deformed billet bars; galvanized.

C. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.

D. Single Wythe Joint Reinforcement: ASTM A951/A951M.
   1. Type: Truss or ladder.
   2. Material: ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M Class 3.
   3. Size: 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not less than 5/8 inch of mortar coverage on each exposure.

E. Single Wythe Joint Reinforcement: Truss type; ASTM A 82/A 82M steel wire, hot dip galvanized after fabrication to ASTM A 153/A 153M, Class B; 0.1875 inch side rods with 0.1483 inch cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure. Single wythe joint reinforcement shall be Dur-O-Wal D/A 3100 truss type as manufactured by Dur-O-Wal, Inc., or approved equal.

F. Strap Anchors: Bent steel shapes, 1-1/2 inch width, 0.105 inch thick, 24 inch length, with 1-1/2 inch long, 90 degree bend at each end to form a U or Z shape or with cross pins, hot dip galvanized to ASTM A153/A153M Class B.

G. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and building frame, sized to provide not less than 5/8 inch of mortar coverage from masonry face.
   1. Concrete frame: Dovetail anchors of bent steel strap, nominal 1 inch width x 0.024 in thick, with trapezoidal wire ties 0.1875 inch thick, hot dip galvanized to ASTM A 153/A 153M, Class B.
   2. Steel frame: Crimped wire anchors for welding to frame, 0.25 inch thick, with trapezoidal wire ties 0.1875 inch thick, hot dip galvanized to ASTM A 153/A 153M, Class B.

H. Two-Piece Wall Ties: Formed steel wire, 0.1875 inch thick, adjustable, eye and pintle type, hot dip galvanized to ASTM A 153/A 153M, Class B, sized to provide not less than 5/8 inch of mortar coverage from masonry face and to allow vertical adjustment of up to 1-1/4 in.

I. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural back-up, hot dip galvanized to ASTM A 153/A 153M, Class B2. Wood/Metal stud or Concrete block back-up shall be X-SEAL Anchor with X-Seal Tape as manufactured by Hohmann & Barnard or equal. Structural Steel back-up shall be #359 as manufactured by Hohmann & Barnard or equal.
   1. Anchor plates: Not less than 0.075 inch thick, designed for fastening to structural backup through sheathing by two fasteners; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.
   2. Wire ties: Triangular shape, 0.1875 inch thick. Vee Byna-Tie as manufactured by Hohmann & Barnard, Inc., or equal.
   3. Vertical adjustment: Not less than 2 inches.
   4. Seismic Feature: Provide lip, hook, or clip on end of wire ties to engage or enclose not less than one continuous horizontal joint reinforcement wire of 0.1483 inch diameter.

J. Metal-to-Metal Fasteners: Self-drilling, self-tapping screws; corrosion resistant finish or hot dip galvanized to ASTM A153/A153M.
   1. Manufacturers:
      a. ITW Commercial Construction North America; Teks Select Series; _____: www.ITWBuildex.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

2.04 FLASHINGS

A. Metal Flashing Materials:
   1. Copper Flashing: ASTM B370, 060 soft annealed; 20 oz/sq ft thick; natural finish.
   2. Stainless Steel Flashing: ASTM A666, Type 304, soft temper; 26 gage, 0.0187 inch thick; finish 2B to 2D.
   3. Prefabricated Metal Flashing: Smooth fabricated 12 oz/sq ft copper flashing for surface mounted conditions.
      a. Manufacturers:
         1) Cheney Flashing Company: www.cheneyflashing.com/#sle.
         2) Hohmann & Barnard, Inc: www.h-b.com/#sle.
         3) Substitutions: See Section 01 6000 - Product Requirements.

B. Combination Asphaltic Flashing Materials - Copper:
   1. Copper/Asphalt Flashing: 3 oz/sq ft copper sheet coated with elastic asphalt compound on both sides.
      a. Manufacturers:
         1) Advanced Building Products, Inc; Copper Fabric Flashing: www.advancedbuildingproducts.com/#sle.
         2) Hohmann & Barnard, Inc: www.h-b.com/#sle.
         3) WIRE-BOND: www.wirebond.com/#sle.
         4) Substitutions: See Section 01 6000 - Product Requirements.

C. Combination Non-Asphaltic Flashing Materials - Stainless Steel:
   1. Stainless Steel Flashing - Self-adhering: ASTM A240/A240M; 2 mil type 304 stainless steel sheet with 8 mil of butyl adhesive and a removable release liner.
      a. Manufacturers:
         1) STS Coatings, Inc: www.stscoatings.com/#sle.
         2) VaproShield, LLC: www.vaproshield.com/#sle.
         3) York Manufacturing, Inc; York 304: www.yorkmfg.com/#sle.
         4) _____.
         5) Substitutions: See Section 01 6000 - Product Requirements.

D. Copper/Rubberized Asphalt Flashing: 3 oz/sq ft copper sheet coated with elastic asphalt compound.

E. Factory-Fabricated Flashing Corners and Ends: Stainless steel.

F. Prefabricated Corners and End Dams: 5 ounces Advanced Building Products or equal.

G. Lap Sealant: Butyl type flashing mastic as recommended by flashing manufacturer.

H. Flashing Sealant/Adhesives: Silicone, polyurethane, or silyl-terminated polyether/polyurethane or other type required or recommended by flashing manufacturer; type capable of adhering to type of flashing used.

I. Termination Bars: Stainless steel; compatible with membrane and adhesives.

J. Drip Edge: Stainless steel; angled drip with hemmed edge; compatible with membrane and adhesives.

K. Lap Sealants and Tapes: As recommended by flashing manufacturer; compatible with membrane and adhesives.

2.05 ACCESSORIES

A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
   1. Manufacturers:
      a. Blok-Lok Limited: www.blok-lok.com/#sle.
      b. Hohmann & Barnard, Inc: www.h-b.com/#sle.
      c. WIRE-BOND; _____: www.wirebond.com/#sle.
      d. Substitutions: See Section 01 6000 - Product Requirements.

B. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self expanding; 1 inch wide by maximum lengths available.
   1. Manufacturers:
      a. Hohmann & Barnard, Inc: www.h-b.com/#sle.
      b. WIRE-BOND: www.wirebond.com/#sle.
      c. Substitutions: See Section 01 6000 - Product Requirements.

C. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
   1. Full-Height Airspace Maintenance and Drainage Material: Mesh panels, fitted between masonry ties.
      a. Manufacturers:
         1) Advanced Building Products, Inc.; Mortairvent-CW: www.advancedbuildingproducts.com/#sle.
         2) CavClear/Archovations, Inc; CavClear Masonry Mat: www.cavclear.com/#sle.
         3) CavClear/Archovations, Inc; CavClear Polyisocyanurate Insulation System: www.cavclear.com/#sle.
         4) Substitutions: Not permitted.
   2. Mortar Diverter: Semi-rigid mesh designed for installation at flashing locations.
      a. Manufacturers:
         1) Advanced Building Products Inc; Mortar Break DT: www.advancedbuildingproducts.com/#sle.
         2) Advanced Building Products Inc; Mortar Break: www.advancedflashing.com/#sle.
         3) Mortar Net Solutions; _____: www.mortarnet.com/#sle.
         4) York Manufacturing, Inc: www.yorkmfg.com/#sle.
         5) Substitutions: See Section 01 6000 - Product Requirements.

D. Building Paper: ASTM D226/D226M, Type I ("No.15") asphalt felt.

E. Nailing Strips: Softwood lumber, preservative treated; as specified in Section 06 1000.

F. Mortar Maze Cell Vents: Durable polypropylene as manufactured by Advanced Building Products or equal. Color as selected by Architect/Engineer.

G. Weep: Provide polypropylene weep vents in the head joints in the first course immediately above flashing. Weep vents shall be spaced 24" o.c. maximum. Keep weep vents and cavity areas above flashing free from mortar droppings.

H. Color(s): As selected by Architect from manufacturer's full range.

I. Cavity Vents:
   1. Type: Preformed aluminum vents with sloping louvers.
   2. Color(s): As selected by Architect from manufacturer's full range.

J. Termite-Excluding Weep and Vent:
   1. Type: Polytetrafluoroethylene (PTFE) vent body with stainless-steel mesh closure.
   2. Termite Resistance: 100 percent when tested in accordance with ICC-ES AC380.
   3. Stainless Steel Mesh: ASTM E11 ; opening size 0.018 inch, maximum.

4. Products:
    a. Polyguard Barrier Systems, Inc, a division of Polyguard Products, Inc; TERM Weep and Vent Barrier: www.polyguardbarriers.com/#sle.
    b. _____.
    c. Substitutions: See Section 01 6000 - Product Requirements.

K. Drainage Fabric: Polyester or polypropylene mesh.
1. Manufacturers:
    a. Advanced Building Products, Inc.; Mortairvent: www.advancedbuildingproducts.com/#sle.
    b. Mortar Net Solutions: www.mortarnet.com/#sle.
    c. York Manufacturing, Inc; Weep Armor Weep Vent Protection: www.yorkmfg.com/#sle.
    d. Substitutions: See Section 01 6000 - Product Requirements.

L. Air Space Maintenance and Drainage System: Dovetail Mortar Mat or equal.
1. Required thickness of mat for air space between insulation and exterior wythe.
    a. 3/4 inch for air spaces 1 inch to 1-1/8 inches.
    b. 1 inch for air spaces 1-1/4 inches to 1-3/8 inches.
    c. 1-1/4 inch for air spaces greater than or equal to 1-1/2 inches.

M. Cleaning Solution: Non-acidic, not harmful to masonry Work or adjacent materials.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

B. Verify that related items provided under other Sections are properly sized and located.

C. Do not commence installation until foundations are clean, rough and level. Remove all laitance and foreign material.

D. Verify that the foundation elevation is such that the bed joint thickness will be between 1/4 inch and 3/4 inch and that the foundation is true to line with masonry not projecting over more than 1/4 inch.

E. Verify that built-in items are in proper location and ready for roughing into masonry work.

F. Clean projecting dowels free from loose scale, dirt, concrete, and other material that will inhibit bond.

3.02 PREPARATION

A. Direct and coordinate placement of metal anchors supplied for installation under other Sections.

B. Provide temporary bracing during installation of Masonry Work. Maintain in place until building structure provides permanent bracing.

3.03 COLD AND HOT WEATHER REQUIREMENTS

A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.

B. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

3.04 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:
   1. Bond: Running, or as otherwise indicated.
   2. Coursing: One (1) unit and one mortar joint to equal 8 inches.
   3. Mortar Joints: Concave.

3.05 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

B. Lay hollow masonry units with face shell bedding on head and bed joints.

C. Lay all masonry in running bond unless otherwise shown on the Contract Drawings. Use only brick that are clean and free from dust and other foreign matter.

D. Furrowing of bed joints shall not be permitted.

E. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

F. Remove excess mortar as work progresses. Do not permit mortar to drop and accumulate into cavity air space or to plug weeps.

G. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.

H. Interlock intersections and external corners, except for units laid in stack bond.

I. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

J. Perform Job Site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

K. Cut mortar joints flush where wall tile is scheduled or resilient base is scheduled.

L. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.

M. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.06 MINIMUM REQUIREMENTS OF COLD WEATHER CONSTRUCTION

A. Air Temperature:
   1. Above 40 degrees F:
      a. Heating of Materials: Normal masonry procedures.
      b. Protection: Cover walls with plastic or canvas at end of workday to prevent water entering masonry.
   2. Below 40 degrees F:
      a. Do not lay masonry units having a temperature below 20 degrees F. Remove visible ice on masonry units before the unit is laid in the masonry.
      b. Heating of Materials: Heat mortar sand or mixing water to maintain mortar temperatures between 40 and 120 degrees F at the time of mixing. Maintain mortar above freezing until used in masonry.
      c. Protection: Cover walls with plastic or canvas at end of work day to prevent water entering masonry.
      d. Mean daily temperature is between 40 and 32 degrees F:
         1) Protect completed masonry from rain or snow by covering with a weather resistive membrane for 24 hours after construction.
   3. Below 32 degrees F:
      a. Heating of Materials: In addition to the above, heat the sand. Frozen sand and frozen wet masonry units must be thawed.
      b. Protection: With wind velocities over 10 mph, provide windbreaks during the work day and cover walls and materials at the end of the work day to prevent wetting and freezing.

c. Mean daily temperature is between 32 and 25 degrees F:
    1) Completely cover masonry with a weather resistive membrane for 24 hours after construction.
d. Mean daily temperature is between 25 and 20 degrees F:
    1) Completely cover completed masonry with insulation blankets or equal protection for 24 hours after construction.
e. Ambient Temperature Between 25 and 20 degrees F:
    1) Use heat sources on both sides of the masonry under construction and install wind breaks when wind velocity is in excess of 10 mph.
f. Mean daily temperature is below 20 degrees F:
    1) Maintain masonry temperature above 32 degrees F for a 24 hour period after construction by enclosure with supplementary heat, by electric heating blankets, by infrared heat lamps, or by other acceptable methods as approved by the Architect/Engineer.
g. Ambient Temperature Below 20 degrees F:
    1) Provide an enclosure for the masonry under construction and use heat source to maintain temperatures above 32 degrees F within the enclosure.

3.07 MINIMUM REQUIREMENTS OF HOT WEATHER CONSTRUCTION

A. Preparation:
1. When Ambient temperature exceeds 100 degrees F or exceeds 90 degrees F with a wind velocity greater than 8 mph:
    a. Maintain sand piles in a damp, loose condition.
    b. Provide necessary conditions and equipment to produce mortar having a temperature below 120 degrees F.
2. When Ambient temperature exceeds 115 degrees F or exceeds 105 degrees F with a wind velocity greater than 8 mph:
    a. Maintain sand piles in a damp, loose condition.
    b. Provide necessary conditions and equipment to produce mortar having a temperature below 120 degrees F and shade materials and mixing equipment from direct sunlight.

B. During Construction:
1. When Ambient temperature exceeds 100 degrees F or exceeds 90 degrees F with a wind velocity greater than 8 mph:
    a. Maintain temperature of mortar and grout below 120 degrees F.
    b. Flush mixer, mortar transport container, and mortar boards with cool water before they come into contact with mortar ingredients or mortar.
    c. Maintain mortar consistency by re-tempering with cool water.
    d. Use mortar within 2 hours of initial mixing.
2. When Ambient temperature exceeds 115 degrees F or exceeds 105 degrees F with a wind velocity greater than 8 mph:
    a. Maintain temperature of mortar and grout below 120 degrees F.
    b. Flush mixer, mortar transport container, and mortar boards with cool water before they come into contact with mortar ingredients or mortar.
    c. Maintain mortar consistency by re-tempering with cool water.
    d. Use mortar within 2 hours of initial mixing.
    e. Use cool mixing water for mortar and grout.
    f. Ice is permitted in the mixing water prior to use. Do not permit ice in the mixing water when added to the other mortar or grout materials.

C. Protection:
1. When Ambient temperature exceeds 100 degrees F or exceeds 90 degrees F with a wind velocity greater than 8 mph:
    a. Fog spray all newly constructed masonry until damp, at least three times a day until the masonry is three days old.

3.08 WEEPS/CAVITY VENTS

A. Install weeps in veneer and cavity walls at 24 inches on center horizontally on top of through-wall flashing above shelf angles and lintels and at bottom of walls.

B. Install cavity vents in veneer and cavity walls at 32 inches on center horizontally below shelf angles and lintels and near top of walls.

3.09 CAVITY MORTAR CONTROL

A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.

B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.

C. Install cavity mortar control panels continuously throughout full height of exterior masonry cavities during construction of exterior wythe, complying with manufacturer's installation instructions.
   1. Verify that airspace width is no more than 3/8 inch greater than panel thickness.
   2. Hold cavity mortar control panel tight to face wythe.
   3. Install horizontally between joint reinforcement.
   4. Stagger end joints in adjacent rows.
   5. Fit to perimeter construction and penetrations without voids.

D. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

3.10 REINFORCEMENT AND ANCHORAGE - GENERAL, SINGLE WYTHE MASONRY, AND CAVITY WALL MASONRY

A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.

B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.

C. Place continuous joint reinforcement in first and second joint below top of walls.

D. Embed longitudinal wires of joint reinforcement in mortar joint with at least 5/8 inch mortar cover on each side.

E. Lap joint reinforcement ends minimum 6 inches.

F. Reinforce stack bonded unit joint corners and intersections with strap anchors 16 inches on center.

G. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 36 inches horizontally and 24 inches vertically.

H. Embed ties and anchors in mortar joint and extend into masonry unit a minimum of 1-1/2 inches with at least 5/8 inch mortar cover to the outside face of the anchor.

3.11 REINFORCEMENT AND ANCHORAGE - SINGLE WYTHE MASONRY

A. Install horizontal joint reinforcement 16 inches on vertical center.

B. Place masonry joint reinforcement in firstand second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.

C. Place continuous joint reinforcement in firstand second joint below top of walls.

D. Lap joint reinforcement ends minimum 6 inches.

E. Reinforcestack bonded unit joint corners and intersections with strap anchors 16 inches on center.

3.12 MASONRY FLASHINGS

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.

1. Extend flashings full width at such interruptions and at least 8 inches minimum into adjacent masonry or turn up at least 8 inches minimum to form watertight pan at non-masonry construction.
2. Remove or cover protrusions or sharp edges that could puncture flashings.
3. Seal lapped ends and penetrations of flashing before covering with mortar.

B. Terminate flashing up 8 inches minimum on vertical surface of backing:
1. Install vertical leg of flashing behind water-resistive barrier sheet over backing.
2. Install vertical leg of flashing over fluid-applied or self-adhered air/vapor barriers over backing or per manufacturer's directions.
3. Terminate vertical leg of flashing into bed joint in masonry or reglet in concrete.
4. Anchor vertical leg of flashing into backing with a termination bar and sealant.
5. Apply cap bead of sealant on top edge of self-adhered flashing.

C. Install flashing in accordance with manufacturer's instructions and BIA Technical Notes No. 7.

D. Extend metal flashings through exterior face of masonry and terminate in an angled drip with hemmed edge. Install joint sealer below drip edge to prevent moisture migration under flashing.

E. Support flexible flashings across gaps and openings.

F. Lap end joints of flashings at least 6 inches and seal watertight with flashing sealant/adhesive.

3.13 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control or expansion joints.

B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

C. Size control joints as indicated on drawings; if not indicated, 3/4 inch wide and deep.

D. Size control joint in accordance with Section 07 9005 - Joint Sealers for sealant performance.

E. Form expansion joint as detailed on drawings.

3.14 BUILT-IN WORK

A. As Work progresses, install built-in metal door frames and other items to be built into the Work and furnished under other Sections.

B. Install built-in items plumb, level, and true to line.

C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
2. Fill adjacent masonry cores with grout minimum one full core from framed openings.

D. Do not build into masonry construction organic materials that are subject to deterioration.

3.15 SITE TOLERANCES

A. Install masonry within the site tolerances found in TMS 402/602.

B. Erect masonry within the following tolerances from the specified dimensions.
1. Dimension of Elements:
a. In cross section or elevation: -1/4 inch, + 1/2 inch.
b. Mortar Joint Thickness:
1) Bed: +/- 1/8 inch.
2) Head: - 1/4 inch, + 3/8 inch.
3) Collar: - 1/4 inch, + 3/8 inch.
c. Grout space of cavity width, except for masonry walls passing framed construction: -1/4 inch, + 3/8 inch.
2. Elements:
a. Variation from Level:
1) Bed joints: +/- 1/4 inch in 10 feet; +/- 1/2 inch maximum.

2) Top surfacing of bearing walls: +/- 1/4 inch in 10 feet; +/- 1/2 inch maximum.

b. Variation from Plumb:
1) +/- 1/4 inch in 10 feet; +/- 3/8 inch in 20 feet; +/- 1/2 inch maximum.

c. True to a Line:
1) +/- 1/4 inch in 10 feet; +/- 3/8 inch in 20 feet; +/- 1/2 inch maximum.

d. Alignment of Columns and Walls (bottom versus top):
1) Bearing walls: +/- 1/2 inch.
2) Non-bearing walls: +/- 3/4 inch.

3. Locations of Elements:
a. Indicated in plan: +/- 1/2 inch in 20 feet; +/- 3/4 maximum.
b. Indicated in elevation: +/- 1/2 inch in story height; +/- 3/4 maximum.

4. If the above conditions cannot be met due to previous construction, notify the Architect/Engineer.

C. Maximum Variation from Alignment of Columns: 1/4 inch.

D. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

E. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

F. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

G. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

H. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.

I. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.16 CUTTING AND FITTING

A. Cut and fit for chases. Coordinate with other sections of work to provide correct size, shape, and location.

B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.17 PARGING

A. Dampen masonry walls prior to parging.

B. Scarify each parging coat to ensure full bond to subsequent coat.

C. Parge masonry walls in two uniform coats of mortar to a total thickness of 3/4 inch.

D. Steel trowel surface smooth and flat with a maximum surface variation of 1/8 inch per foot.

E. Strike top edge of parging at 45 degrees.

3.18 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

B. Clay Masonry Unit Tests: Test each variety of clay masonry in accordance with ASTM C67/C67M requirements, sampling 5 randomly chosen units for each 50,000 installed.

C. Concrete Masonry Unit Tests: Test each variety of concrete unit masonry in accordance with ASTM C140/C140M for compliance with requirements of this specification.

D. Mortar Tests: Test each type of mortar in accordance with ASTM C780, testing with same frequency as masonry samples.

3.19 CLEANING

A. Remove excess mortar and mortar droppings.

B. At the completion of this portion of the Work, visually inspect the Work of this Section. Point or cut out and repoint all holes and defective joints, if necessary.

C. Replace defective mortar. Match adjacent Work.

D. Replace defective masonry units not conforming to ASTM appearance requirements.

E. Thoroughly clean all brick surfaces to be left exposed in the Finished Work by brush, water, and an approved cleaning solution, removing all traces of mortar, grout efflorescence, and foreign matter. In the event ordinary cleaning is not adequate, provide acid cleaning when so directed by the Architect/Engineer and at no additional cost to the Owner.

F. Clean soiled surfaces with cleaning solution.

G. Use non-metallic tools in cleaning operations.

3.20 PROTECTION

A. Without damaging Completed Work, provide protective boards at exposed external corners which may be subject to damage by construction activities.

END OF SECTION

SECTION 04 2613
MASONRY VENEER

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete Block.
B. Concrete Brick.
C. Clay Facing Brick.
D. Hollow Brick.
E. Sand-Lime Face Brick.
F. Ceramic Glazed Face Brick.
G. Reinforcement and Anchorage.
H. Flashings.
I. Installation of Lintels.
J. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 04 0100 - Maintenance of Masonry.
B. Section 04 0511 - Masonry Mortaring and Grouting.
C. Section 05 4000 - Cold-Formed Metal Framing: Steel stud backup for masonry veneer.
D. Section 05 5000 - Metal Fabrications: Loose steel lintels.
E. Section 06 1000 - Rough Carpentry: Wood stud backup for masonry veneer.
F. Section 07 9200 - Joint Sealants: Sealing control and expansion joints.
G. Section 07 9005 - Joint Sealers: Backing rod and sealant at control and expansion joints.

1.03 PRICE AND PAYMENT PROCEDURES

A. See Section 01 2100 - Allowances, for cash allowances affecting this section.

1.04 REFERENCE STANDARDS

A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata.
B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
C. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2023.
D. ASTM A580/A580M - Standard Specification for Stainless Steel Wire; 2023.
E. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.
F. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2019.
G. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
H. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.
I. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2022.

J. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction; 2022.

K. ASTM C55 - Standard Specification for Concrete Building Brick; 2022.

L. ASTM C67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile; 2017.

M. ASTM C73 - Standard Specification for Calcium Silicate Brick (Sand-Lime Brick); 2023.

N. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2022.

O. ASTM C91/C91M - Standard Specification for Masonry Cement; 2023.

P. ASTM C126 - Standard Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units; 2022.

Q. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units; 2022.

R. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2018.

S. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.

T. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2018.

U. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale); 2023.

V. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.

W. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2018.

X. ASTM C476 - Standard Specification for Grout for Masonry; 2023.

Y. ASTM C652 - Standard Specification for Hollow Brick (Hollow Masonry Units Made from Clay or Shale); 2022.

Z. ASTM C744 - Standard Specification for Prefaced Concrete and Calcium Silicate Masonry Units; 2021.

AA. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2016.

BB. ASTM C1634 - Standard Specification for Concrete Facing Brick and Other Concrete Masonry Facing Units; 2023.

CC. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2017 (Reapproved 2023).

DD. ASTM D4637/D4637M - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane; 2015, with Editorial Revision (2022).

EE. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing; 2017.

FF. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls; 2005.

GG. BIA Technical Notes No. 46 - Maintenance of Brick Masonry; 2017.

HH. BIA Technical Notes No. 7 - Water Penetration Resistance - Design and Detailing; 2005.

II. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls; 2005.

JJ. BIA Technical Notes No. 46 - Maintenance of Brick Masonry; 2005.

KK. UL (FRD) - Fire Resistance Directory; Current Edition.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.06 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for masonry units, fabricated wire reinforcement, and mortar.

C. Samples: Submit four samples of decorative block units to illustrate color, texture, and extremes of color range.

D. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.

1.07 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of the contract documents.
   1. Maintain one copy of each document on project site.

B. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum five years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of documented experience.

1.08 MOCK-UP

A. Construct a masonry wall as a mock-up panel sized 8 feet long by 6 feet high; include mortar and accessories and structural backup in mock-up.

B. Locate where directed.

C. Mock-up may remain as part of the Work.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

B. Handle and store ceramic glazed masonry units in protective cartons or trays. Do not remove from protective packaging until ready for installation.

1.10 FIELD CONDITIONS

A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.

B. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

PART 2 PRODUCTS

2.01 UNIT MASONRY - GENERAL

A. Conform to applicable code for UL Assembly No. ____.

2.02 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depth of 8 inches.
   2. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depths as indicated on drawings for specific locations.
   3. Special Shapes: Provide non-standard blocks configured for corners.
   4. Load-Bearing Units: ASTM C90, normal weight.
      a. Hollow block, as indicated.
      b. Exposed Faces: Manufacturer's standard color and texture where indicated.
      c. Exposed Faces: Special color and texture where indicated, as follows: _____.
      d. Pattern: Vertical single score.
      e. Pattern: Vertically ribbed and split.

f. Pattern: _____.

5. Non-Loadbearing Units: ASTM C129.
   a. Hollow block, as indicated.
   b. Lightweight.
6. Pre-Faced Units: ASTM C90, hollow block, with smooth resinous facing complying with ASTM C744.
   a. Colors and Styles: As scheduled.
   b. Manufacturer: _____.
   c. Substitutions: See Section 01 6000 - Product Requirements.

B. Concrete Brick:
1. For architectural and paver use, ASTM C1634 (or ASTM C55-03 Grade N), non-cored (solid), normal weight.
2. For below grade use, ASTM C1634 (or ASTM C55-03 Grade N), normal weight.
3. For other uses, ASTM C55, normal weight.
4. Size: As indicated on drawings.
5. Special Shapes: Provide non-standard brick configured for corners.

2.03 BRICK UNITS

A. Manufacturers:
1. Boral Bricks, Inc: www.boralbricks.com/#sle.
2. Endicott Clay Products Co: www.endicott.com/#sle.
3. General Shale Brick: www.generalshale.com/#sle.
4. Metro Brick: www.metrothinbrick.com/#sle.
5. Substitutions: See Section 01 6000 - Product Requirements.

B. Facing Brick: ASTM C216, Type FBS, Grade SW.
1. Color and texture to match Architect's sample.
2. Nominal Size: As indicated on drawings.
3. Special Shapes: Molded units as required by conditions indicated, unless standard units can be sawn to produce equivalent effect.
4. Compressive Strength: As indicated on drawings, measured in accordance with ASTM C67.

C. Hollow Facing and Building Brick: ASTM C652, Grade SW; Type HBS; Class H40V.
1. Color and texture to match Architect's sample.
2. Nominal Size: As indicated on drawings.
3. Compressive Strength: As indicated on drawings, measured in accordance with ASTM C67.

D. Sand-Lime Brick: ASTM C73, Grade SW.
1. Color and texture to match Architect's sample.
2. Color and Texture: _____.
3. Nominal Size: As indicated on drawings.

E. Ceramic Glazed Face Brick: ASTM C126, Grade S (Select), Type I (single-faced units).
1. Color and texture to match Architect's sample.
2. Color and Texture: _____.
3. Nominal Size: As indicated on drawings.
4. Special Shapes: Molded units as required by conditions indicated, unless standard units can be sawn without chipping glaze to produce equivalent effect.
5. Compressive Strength: As indicated on drawings, measured in accordance with ASTM C67.

2.04 MORTAR AND GROUT MATERIALS

A. Mortar and Grout: As specified in Section 04 0511.

2.05 REINFORCEMENT AND ANCHORAGE

A. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi) yield strength, deformed billet bars; galvanized.

B. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.

C. Joint Reinforcement: Truss type; ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M, Class B; 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.
   1. Manufacturers:
      a. Blok-Lok Limited: www.blok-lok.com/#sle.
      b. Hohmann & Barnard, Inc; HB 213 Veneer Anchor: www.h-b.com/#sle.
      c. WIRE-BOND: www.wirebond.com/#sle.
      d. Substitutions: See Section 01 6000 - Product Requirements.

D. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A 153/A 153M, Class B.
   1. Anchor plates: Not less than 0.075 inch thick, designed for fastening to structural backup through sheathing by two fasteners; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.
   2. Wire ties: Manufacturer's standard shape, 0.1875 inch thick.
   3. Vertical adjustment: Not less than 3-1/2 inches.
   4. Seismic Feature: Provide lip, hook, or clip on end of wire ties to engage or enclose not less than one continuous horizontal joint reinforcement wire of 0.1483 inch diameter.
   5. Manufacturers:
      a. Hohmann & Barnard, Inc: www.h-b.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

E. Metal-to-Metal Fasteners: Self-drilling, self-tapping screws; corrosion resistant finish or hot dip galvanized to ASTM A153/A153M.
   1. Products:
      a. ITW Commercial Construction North America; Teks Select Series: www.ITWBuildex.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

2.06 FLASHINGS

A. Metal Flashing Materials:
   1. Copper Flashing: ASTM B370, 060 soft annealed; 20 oz/sq ft thick; natural finish.
   2. Stainless Steel Flashing: ASTM A666, Type 304, soft temper; 26 gage, 0.0187 inch thick; finish 2B to 2D.

B. Combination Asphaltic Flashing Materials - Copper:
   1. Copper/Asphalt Flashing: 3 oz/sq ft copper sheet coated with elastic asphalt compound on both sides.

C. Copper/Rubberized Asphalt Flashing: 3 oz/sq ft copper sheet coated with elastic asphalt compound.
   1. Manufacturer:
      a. Hohmann & Barnard, Inc: www.h-b.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

D. Rubberized Asphalt Flashing: Self-adhering polymer-modified asphalt sheet; 0.025 inch total thickness; with cross-linked polyethylene top and bottom surfaces.
   1. Manufacturers:
      a. York Manufacturing, Inc; York Seal: www.yorkmfg.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

E. Copper: ASTM B370, 060 soft annealed; 20 oz/sq ft; natural finish.

F. Prefabricated Metal Flashing: Smooth fabricated 12 oz/sq ft copper flashing for through-wall conditions.
   1. Manufacturers:
      a. Hohmann & Barnard, Inc: www.h-b.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

G. Factory-Fabricated Flashing Corners and Ends: Stainless steel.
   1. Manufacturers:
      a. Hohmann & Barnard, Inc: www.h-b.com/#sle.
      b. Mortar Net Solutions; CompleteFlash: www.mortarnet.com/#sle.
      c. York Manufacturing, Inc: www.yorkmfg.com/#sle.
      d. Substitutions: See Section 01 6000 - Product Requirements.

H. Pre-Coated Galvanized Steel: ASTM A653/A653M, with G90/Z275 coating, 24 gage, 0.0239 inch base metal thickness, shop precoated with fluoropolymer coating in color matching masonry.

I. Stainless Steel: ASTM A666, Type 304, soft temper; 26 gage, 0.0187 inch thick; finish 2B to 2D.

J. Flashing Sealant/Adhesives: Silicone, polyurethane, or silyl-terminated polyether/polyurethane, or other type required or recommended by flashing manufacturer; type capable of adhering to type of flashing used.

K. Drip Edge: Stainless steel; compatible with membrane and adhesives.

L. Lap Sealants and Tapes: As recommended by flashing manufacturer; compatible with membrane and adhesives.

M. Lap Sealant: Butyl type as specified in Section 07 9005.

2.07 ACCESSORIES

A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
   1. Manufacturers:
      a. Blok-Lok Limited: www.blok-lok.com/#sle.
      b. Hohmann & Barnard, Inc; _____: www.h-b.com/#sle.
      c. WIRE-BOND: www.wirebond.com/#sle.
      d. Substitutions: See Section 01 6000 - Product Requirements.

B. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self expanding; 1 inch wide by maximum lengths available.
   1. Manufacturers:
      a. Hohmann & Barnard, Inc: www.h-b.com/#sle.
      b. WIRE-BOND: www.wirebond.com/#sle.
      c. Substitutions: See Section 01 6000 - Product Requirements.

C. Building Paper: ASTM D226/D226M, Type I ("No. 15") asphalt felt.

D. Weeps: Molded PVC grilles, insect resistant.
   1. Color(s): As selected by Architect from manufacturer's full range.
   2. Manufacturers:
      a. Blok-Lok Limited: www.blok-lok.com/#sle.
      b. CavClear/Archovations, Inc: www.cavclear.com/#sle.
      c. Hohmann & Barnard, Inc: www.h-b.com/#sle.
      d. WIRE-BOND: www.wirebond.com/#sle.
      e. Substitutions: See Section 01 6000 - Product Requirements.

E. Cavity Vents: Polyester mesh.
   1. Manufacturers:

a. Blok-Lok Limited: www.blok-lok.com/#sle.
b. CavClear/Archovations, Inc; CavClear Weep Vents: www.cavclear.com/#sle.
c. Hohmann & Barnard, Inc: www.h-b.com/#sle.
d. WIRE-BOND: www.wirebond.com/#sle.
e. Substitutions: See Section 01 6000 - Product Requirements.

F. Drainage Fabric: Polyester mesh.
1. Manufacturers:
a. York Manufacturing, Inc; Weep Armor Weep Vent Protection: www.yorkmfg.com/#sle.
b. Substitutions: See Section 01 6000 - Product Requirements.

G. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
1. Mortar Diverter: Panels installed at flashing locations.

H. Termination Bars: Stainless steel; compatible with membrane and adhesives.

I. Drip Edge: Stainless steel; compatible with membrane and adhesives.

J. Lap Sealants and Tapes: As recommended by flashing manufacturer; compatible with membrane and adhesives.

K. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Brick Units:
1. Bond: Running.
2. Coursing: Three units and three mortar joints to equal 8 inches.
3. Mortar Joints: Concave.

3.03 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

B. Lay hollow masonry units with face shell bedding on head and bed joints.

C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

D. Remove excess mortar as work progresses.

E. Interlock intersections and external corners, except for units laid in stack bond.

F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

H. Isolate top joint of masonry veneer from horizontal structural framing members or support angles with compressible joint filler.

3.04 WEEPS/CAVITY VENTS

A. Install weeps in veneer walls at 24 inches on center horizontally above through-wall flashing, above shelf angles and lintels, and at bottom of walls.

B. Install cavity vents in veneer walls at 32 inches on center horizontally below shelf angles and lintels and at top of walls.

3.05 CAVITY MORTAR CONTROL

A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.

B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.

C. Install cavity mortar control panels continuously throughout full height of exterior masonry cavities during construction of exterior wythe, complying with manufacturer's installation instructions. Verify that airspace width is no more than 3/8 inch greater than panel thickness. Install horizontally between joint reinforcement. Stagger end joints in adjacent rows. Fit to perimeter construction and penetrations without voids.

D. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

3.06 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

A. Install horizontal joint reinforcement 16 inches on center.

B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.

C. Place continuous joint reinforcement in first and second joint below top of walls.

D. Lap joint reinforcement ends minimum 6 inches.

E. Masonry Back-Up: Embed anchors to bond veneer at maximum 16 inches on center vertically and 36 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.

F. Stud Back-Up: Secure veneer anchors to stud framed back-up and embed into masonry veneer at maximum 16 inches on center vertically and 24 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.

G. Seismic Reinforcement: Connect veneer anchors with continuous horizontal wire reinforcement before embedding anchors in mortar.

H. Reinforce stack bonded unit joint corners and intersections with strap anchors 16 inches on center.

3.07 MASONRY FLASHINGS

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
   1. Extend flashings full width at such interruptions and at least 4 inches into adjacent masonry or turn up at least 8 inches to form watertight pan at non-masonry construction.
   2. Remove or cover protrusions or sharp edges that could puncture flashings.
   3. Seal lapped ends and penetrations of flashing before covering with mortar.

B. Extend metal flashings through exterior face of masonry and turn down to form drip.

C. Extend plastic, EPDM, and _____ flashings to within 1/4 inch of exterior face of masonry.

D. Lap end joints of flashings at least 4 inches and seal watertight with flashing sealant/adhesive.

3.08 LINTELS

A. Install loose steel lintels over openings.

B. Maintain minimum ____ inch bearing on each side of opening.

3.09 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control or expansion joints.

B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

C. Size control joints as indicated on drawings; if not shown, 3/4 inch wide and deep.

D. Size control joint in accordance with Section 07 9005 for sealant performance.

E. Form expansion joint as detailed on drawings.

3.10 TOLERANCES

A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

B. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

C. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

D. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

E. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.

3.11 CUTTING AND FITTING

A. Cut and fit for pipes and conduit. Coordinate with other sections of work to provide correct size, shape, and location.

B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.12 CLEANING

A. Remove excess mortar and mortar smears as work progresses.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

D. Use non-metallic tools in cleaning operations.

3.13 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

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SECTION 05 1200
STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Structural shapes.
2. Channels and angles.
3. Hollow structural sections.
4. Structural pipe.
5. Structural plates and bars.
6. Floor plates.
7. Bolts, connectors, and anchors.
8. Shear connectors.
9. Grout.
10. Connection Design

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Structural Steel Connections shall be selected, completed or designed by the fabricator to withstand the design loads indicated.

B. Delegated Engineering Responsibility. Structural Steel Connection Design is delegated by the Engineer of Record to a qualified licensed professional engineer retained by the structural steel fabricator. The connection design engineer retained by the fabricator shall prepare calculations, shop drawings, and other structural design details for submission to the Engineer of Record with the fabricator's structural steel shop drawings.

1.3 RELATED SECTIONS

A. Code Required Special Inspections and Procedures – Section 01 4533
B. Cast-In-Place Concrete – Section 03 3000
C. Unit Masonry – Section 04 2000
D. Steel Joist Framing – Section 05 2100
E. Steel Decking – Section 05 3100
F. Cold Formed Structural Metal Framing – Section 05 4000
G. Metal Fabrications – 05 5000
H. Metal Stairs - 055100

1.4 REFERENCE STANDARDS

A. American Institute of Steel Construction:
1. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges.
2. AISC 341 - Seismic Provisions for Structural Steel Buildings.
3. AISC 360 - Specification for Structural Steel Buildings.

B. American Society of Civil Engineers:
1. ASCE 19 - Standard Applications of Steel Cables for Buildings.

C. ASTM International:

1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
2. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
3. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
4. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
5. ASTM A193/A193M - Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
6. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
7. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
8. ASTM A354 - Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners.
9. ASTM A449 - Standard Specification for Quenched and Tempered Steel Bolts and Studs.
10. ASTM A490 - Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.
11. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
12. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
13. ASTM A514/A514M - Standard Specification for High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding.
14. ASTM A529/A529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality.
15. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
16. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
17. ASTM A588/A588M - Standard Specification for High-Strength Low-Alloy Structural Steel with 50 ksi (345 MPa) Minimum Yield Point to 4-in. (100-mm) Thick.
18. ASTM A618/A618M - Standard Specification for Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing.
19. ASTM A786/A786M - Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.
20. ASTM A847/A847M - Standard Specification for Cold-Formed Welded and Seamless High Strength, Low Alloy Structural Tubing with Improved Atmospheric Corrosion Resistance.
21. ASTM A852/A852M - Standard Specification for Quenched and Tempered Low-Alloy Structural Steel Plate with 70 ksi (485 MPa) Minimum Yield Strength to 4 in. (100 mm) Thick.
22. ASTM A913/A913M - Standard Specification for High-Strength Low-Alloy Steel Shapes of Structural Quality, Produced by Quenching and Self-Tempering Process (QST).
23. ASTM A992/A992M - Standard Specification for Structural Steel Shapes.
24. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
25. ASTM E94 - Standard Guide for Radiographic Examination.
26. ASTM E119 – Standard Test Methods for Fire Tests of Building Construction and Materials.
27. ASTM E164 - Standard Practice for Ultrasonic Contact Examination of Weldments.
28. ASTM E165 - Standard Test Method for Liquid Penetrant Examination.
29. ASTM E709 - Standard Guide for Magnetic Particle Examination.
30. ASTM F436 - Standard Specification for Hardened Steel Washers.

31. ASTM F959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.
32. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
33. ASTM F1852 - Standard Specification for Twist-Off Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
34. ASTM F2329 - Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners.

D. American Welding Society:
1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
2. AWS D1.1 - Structural Welding Code - Steel.

E. California Department of Health Services:
1. CA/DHS/EHLB/R-174 - Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

F. Green Seal:
1. GC-03-2nd Edition, January 7, 1997 - Anti-Corrosive Paints.

G. Research Council on Structural Connections:
1. RCSC - Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts.

H. SSPC: The Society for Protective Coatings:
1. SSPC - Steel Structures Painting Manual.
2. SSPC Paint 15 - Steel Joist Shop Paint.
3. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).
4. SSPC SP 3 - Power Tool Cleaning.
5. SSPC SP 6 - Commercial Blast Cleaning.
6. SSPC SP 10 - Near-White Blast Cleaning.

1.5 SUBMITTALS

A. Section 013000 – Administrative Requirements for Submittal Procedures.

B. Shop Drawings:
1. Indicate profiles, sizes, spacing, and locations of structural members, openings, attachments, and bolts.
2. Connections. Connections not detailed.
3. Cambers and loads.
4. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.

C. Manufacturer's Mill Certificate: Certify products meet or exceed specified requirements.

D. Mill Test Reports: Submit indicating structural strength, destructive and non-destructive test analysis, and.

E. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

F. Qualification data for firms and persons specified in the Qualifications section documenting compliance with the specified requirements.

G. Connection design calculations, stamped by a licensed NYS Professional Engineer.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with the following:
   1. Structural Steel: AISC 303, ASIC 341 and AISC 360.
   2. High Strength Bolted Connections: RCSC Specification for Structural Joints Using ASTM A325 or A490 Bolts.

B. Perform Work in accordance with 2018 Building Code of New York State.

C. Maintain one copy of document on site.

1.7 QUALIFICATIONS

A. Fabricator: Company specializing in performing Work of this section with minimum 5 years documented experience with any of the following current AISC Certification:
   1. Standard Steel Building Structures (STD).
   2. Conventional Steel Building Structures (SBD).
   3. Complex Steel Building Structures (CBD).

B. Erector: Company specializing in performing Work of this section with minimum 5 years documented experience with any of the following current AISC Certification:
   1. Certified Steel Erector (CSE).
   2. Advanced Certified Steel Erector (ACSE).

C. Shop Painter: Company specializing in performing Work of this section with minimum 5 years documented experience with any the following current AISC Certification:
   1. Sophisticated Paint Endorsement - Enclosed (P1).
   2. Sophisticated Paint Endorsement - Covered (P2).
   3. Sophisticated Paint Endorsement - Outside (P3).

D. Welders and Welding Procedures: AWS D1.1 qualified within previous 12 months.

E. Professional Engineer Qualifications: Current active registration in New York State with experience with structural steel framing connection design similar to that indicated and shown in the contract drawings.

PART 2 - PRODUCTS

2.1 STRUCTURAL STEEL

A. Structural W-Shapes: ASTM A992/A992M. ASTM A572/A572M; Grade 50. ASTM A913/A913M; Grade 50.

B. Structural T-Shapes: Cut from structural W-shapes.

C. Channels and Angles: ASTM A36/A36M.

D. Round Hollow Structural Sections: ASTM A500/A500M, Grade B.

E. Rectangular Hollow Structural Sections: ASTM A500/A500M, Grade B.

F. Structural Pipe: ASTM A53/A53M, Grade B.

G. Structural Plates and Bars: ASTM A36/A36M.

H. Floor Plates: ASTM A786/A786M raised pattern.

I. Sliding Bearing Plates: Teflon coated.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. Bolts: Heavy hex, structural type.
   1. ASTM A325; Type 1, plain, or hot dipped.

B. Nuts: ASTM A563; heavy hex type.
   1. Finish: Plain or Hot dipped galvanized.

C. Washers: ASTM F436; Type 1, beveled. Furnish clipped washers where space limitations require.
   1. Finish: Plain or Hot dipped galvanized.

D. Compressible-Washer-Type Direct Tension Indicators: ASTM F959; Type 325.
   1. Finish: Mechanically galvanized.

E. Tension Control Assemblies: ASTM F1852; Type 1, heavy hex head, twist off type; complete with washers and heavy hex nuts.
   1. Finish: Finish: Unfinished.

F. Anchor Rods: ASTM F1554; Grade 36.
   1. Shape: Hooked or Straight.
   2. Plate Washers: ASTM A36/A36M.

G. Threaded Rods: ASTM A36/A36M.
   1. Finish: Hot dipped galvanized.

H. Forged Structural Steel Hardware:
   1. Clevises and Turnbuckles: ASTM A108; Grade 1085.
   2. Eye Nuts and Eye Bolts: ASTM A108; Grade 1030.
   3. Sleeve Nuts: ASTM A108; Grade 1018.
   4. Rod Ends, Yoke Ends and Pins, Cotter Pins, and Coupling Nuts: Carbon steel.

I. Shear Connectors. ASTM A108; headed, unfinished and in accordance with AWS D1.1; Type B

2.3 WELDING MATERIALS

A. Welding Materials: AWS D1.1; type required for materials being welded.

2.4 FABRICATION

A. Continuously seal joined members by intermittent welds and plastic filler. Continuous welds. Grind exposed welds smooth.

B. Fabricate connections for bolt, nut, and washer connectors.

C. Develop required camber for members.

2.5 FINISHES

A. Prepare structural component surfaces in accordance with SSPC SP 3.

B. Shop prime structural steel members to a dry film thickness not less than 1.5 mils. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete, or high strength bolted.
   1. Primer: Fabricator's standard lead, chromate, and asphalt free, rust inhibiting primer compatible with architectural finishes.

C. Galvanizing: ASTM A123/A123M; hot dip galvanize after fabrication.

D. Galvanizing for Bolts, Connectors, and Anchors:
   1. Hot-Dipped Galvanizing:
      a. Bolts, Nuts, and Washers: ASTM F2329.
      b. Connectors and Anchors: ASTM A153/A153M.
   2. Mechanical Galvanizing: ASTM B695; Class 50 minimum.

2.6 ACCESSORIES

A. Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing minimum compressive strength of 7,000 psi at 28 days.

B. Shop Primer: SSPC Paint 15, Type 1, red oxide.

C. Touch-Up Primer: Match shop primer.

2.7 SOURCE QUALITY CONTROL

A. Section 01 45 33 - Quality Requirements: Testing and inspection requirements.

B. Shop test bolted and welded connections as specified for field quality control tests.

C. When fabricator is approved by Architect, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.
   1. Specified shop tests are not required for Work performed by approved fabricator.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 70 00 - Execution: Requirements for installation examination.

B. Verify bearing surfaces are at correct elevation.

C. Verify anchors rods are set in correct locations and arrangements with correct exposure for steel attachment.

3.2 PREPARATION

A. Section 01 70 00 - Execution: Requirements for installation preparation.

B. Furnish templates for installation of anchor rods and embedment in concrete and masonry work.

3.3 ERECTION

A. Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in alignment until completion of erection and installation of permanent bracing.

B. Field weld components indicated on shop drawings.

C. Field connect members with threaded fasteners; tighten to snug tight for bearing type connections.

D. Do not field cut or alter structural members without approval of Architect/Engineer.

E. After erection, touch up welds and abrasions to match shop finishes.

3.4 GROUT INSTALLATION

A. Remove defective concrete, laitance, dirt, oil, grease and other foreign material from concrete surfaces by brushing, hammering, chipping or other similar means until sound, clean concrete surface is achieved.

B. Rough concrete lightly, but not enough to interfere with placement of grout.

C. Remove foreign materials from metal surfaces in contact with grout.

D. Align, level and maintain final positioning of components to be grouted.

E. Saturate concrete surfaces with clean water; remove excess water, leave none standing.

F. Shim bearing plates and equipment supports to proper elevation as shown on drawings, snug tighten anchor bolts.

G. Fill void under bearing surface with grout. Install and pack grout to remove air pockets.

H. Moist cure grout.

I. Remove forms after grout is set. Trim grout edges to from smooth surface, splayed 45 degrees.

J. Tighten anchor bolts after grout has cured for a minimum of 3 days.

3.5 TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

C. Maximum Offset From Alignment: 1/4 inch.

3.6 FIELD QUALITY CONTROL

A. Section 01 45 33 – Special Inspections: Requirements for inspecting, testing.

B. Section 01 70 00 - Execution: Requirements for testing, adjusting, and balancing.

C. Bolted Connections: Inspect in accordance with AISC 303.
   1. Visually inspect all bolted connections.
   2. For Direct Tension Indicators, comply with requirements of ASTM F959. Verify that gaps are less than gaps specified in Table 2.

D. Welding: Inspect welds in accordance with AWS D1.1.
   1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
   2. Visually inspect all welds.
   3. Ultrasonic Inspection: ASTM E164; perform on all full penetration welds.
   4. Liquid Penetrant Inspection: ASTM E165.
   5. Magnetic Particle Inspection: ASTM E709.
   6. Radiographic Inspection: ASTM E94.

E. Correct defective bolted connections and welds.

END OF SECTION

SECTION 05 2100
STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Open web steel joists, with bridging, attached seats and anchors.
2. Loose bearing plates and anchor bolts for site placement.

B. Related Requirements:
1. Section 01 4533 – Special Inspections and Testing
2. Section 05 1200 - Structural Steel Framing.
3. Section 05 3100 – Steel Decking.
4. Section 05 4000 – Structural Cold Formed Metal Framing
5. Section 09 9000 – Painting and Coating

1.2 REFERENCE STANDARDS

A. American Institute of Steel Construction:
1. AISC 341 - Seismic Provisions for Structural Steel Buildings.

B. ASTM International:
1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
2. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
3. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
4. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
5. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
6. ASTM A354 - Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners.
7. ASTM A449 - Standard Specification for Quenched and Tempered Steel Bolts and Studs.
8. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
9. ASTM A563M - Standard Specification for Carbon and Alloy Steel Nuts (Metric).
10. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
11. ASTM F436 - Standard Specification for Hardened Steel Washers.
12. ASTM F436M - Standard Specification for Hardened Steel Washers (Metric).
13. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
14. ASTM F2329 - Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners.

C. American Welding Society:
1. AWS D1.1 - Structural Welding Code - Steel.

D. Steel Joist Institute:
1. SJI K-1.1 - Standard Specifications for Open Web Steel Joists, K-series.
2. SJI LH/DLH-1.1 - Standard Specifications for Longspan Steel Joists, LH-Series and Deep Longspan Steel Joists, DLH-Series.

3. SJI JG-1.1 - Standard Specification for Joist Girders.

E. SSPC: The Society for Protective Coatings:
1. SSPC - Steel Structures Painting Manual.
2. SSPC SP 1 - Solvent Cleaning.
3. SSPC SP 10 - Near-White Blast Cleaning.

1.3 SUBMITTALS

A. Section 01 30 00 – Administrative Requirements for submittal procedures.

B. Shop Drawings:
1. Indicate standard designations, configuration, sizes, spacing, locations of joists, and joist leg extensions.
2. Joist coding, bridging, connections, and attachments.
3. Connection details.

C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

D. Welders' Certificates: Submit manufacturer's certificates, certifying welders employed on the Work, verifying AWS qualification within previous 12 months.

E. Mill Test Reports: Furnish 3 copies of certified reports of steel component compliance with the requirements of applicable ASTM specifications.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with the following:
1. SJI K-1.1, SJI LH/DLH-1.1, SJI JG-1.1, including headers and other supplementary framing.

B. Perform Work in accordance with the 2018 Uniform Fire Prevention and Building Code of New York State.

1.5 QUALIFICATIONS

A. Fabricator: Company specializing in performing Work of this section with minimum 5 years documented experience and a member of the Steel Joist Institute.

B. Erector: Company specializing in performing Work of this section with minimum 5 years documented experience.

C. Design connections not detailed on drawings under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of New York.

D. Welder’s Qualifications: Welding shall be performed only by certified welding operators, and tackers who have been qualified as prescribed in the SJI Specifications to perform the type of welding required.

1.6 INSPECTION

A. Manufacturer’s Quality Control Shop Inspection: Insure joist manufacturer’s compliance with inspection program provisions of the SJI Specifications.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 01 – Materials and Equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:
   1. Vulcraft; Nucor Vulcraft Group; Charlotte, NC 28211.
   2. New Millennium Building Systems, Fort Wayne, IN 46804
   3. Substitutions: Refer to General Requirements.

2.2 MATERIALS

A. Open Web Joists Members: SJI K Series.

B. Bolts: ASTM A325; Type 1 or Type 3, plain; heavy hex, structural type.

C. Nuts: ASTM A563 heavy hex type.
   1. Finish: Unfinished.

D. Washers: ASTM F436; Type 1, circular.
   1. Finish: Unfinished.

E. Structural Steel for Supplementary Framing and Joist Leg Extensions: ASTM A36.

F. Welding Materials: AWS D1.1; type required for materials being welded.

G. Shop Primer: SSPC Paint 15, Type 1, red oxide.

H. Touch-Up Primer: Match shop primer.

I. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20 Type I Inorganic.

J. Bedding Mortar:
   1. Cement Grout: 1 part Portland cement conforming to ASTM C150, Type I or III, to 3 parts natural sand complying with ASTM C404, size No. 2, mixed with minimum amount of water required for placement and hydration. Ratio by volume.
   2. Shrink-Resistant Grout: Pre-mixed, factory-packaged, non-catalyzed, ferrous aggregate mortar grouting compound selected from the following:
      a. Embeco 636 by Master Builders.
      b. Ferrolith G-NC by Sonneborn.
      c. Ferr-Grout by L&M Construction Chemicals.
      d. Vibra-Foil by A.C. Horn.

2.3 FABRICATION

A. Do not fabricate work of this section until receipt of approved shop drawings. When drawings are “Approved as Noted”, progress fabrication in conformity with the correction notes thereon and submit revised drawings for formal approval and record.

B. Furnish joists of sizes indicated on the drawings.

C. Do not use connection which will interfere with bearing of steel deck on top chords.

D. Bridging: Horizontal bridging complying with the SJI Specifications.

E. Holes in Chord Members: Punch or drill approved holes in chord members where required for securing related work to joists. Deduct area of holes from chord area when calculating the strength of the member.

F. Extended Ends: Furnish extended ends on joists where indicated. Use joist manufacturer's standard method complying with Steel Joist Institute requirements and load tables.

G. Ceiling Extensions: Furnish ceiling extensions in areas where a ceiling is directly attached to or supported by the joist bottom chord. Extend ends to within one inch of finished wall surface. Use joist manufacturer's standard extension system of sufficient strength to support ceiling system.

H. Joist Ends: Manufacturer's standard ends complying with the SJI Specifications to suit type of supporting construction indicated, unless otherwise specified or shown.

I. Anchors: Furnish bearing plates, anchor bolts, and other required devices to be built into masonry and concrete construction. Furnish templates necessary for accurate location of anchors in other work.
   1. Furnish unfinished threaded fasteners for anchor bolts unless otherwise indicated.

J. Header Units: Furnish header units to support tail joists at openings in floor and/or roof system not framed with steel shapes.

L. Furnish bottom and top chord extensions as indicated on drawings.

M. Fabricate to achieve end bearing of:
   1. 2-1/2 inches on steel.
   2. 4 inches on masonry.

N. Frame special sized openings in joist web framing as detailed.

2.4 FINISHES

A. Prepare joist component surfaces in accordance with SSPC SP 2.

B. Shop prime joists and supplementary framing members. Do not prime surfaces that will be fireproofed, field welded, or in contact with concrete.

C. Apply one coat of shop paint, resulting in a continuous dry film thickness of not less than 1.0 mil, to the joists, bridging and accessories.

D. Leave joists and supplementary framing members unprimed.

E. Galvanizing: ASTM A123/A123M; hot dip galvanize after fabrication.

F. Galvanizing for Bolts, Connectors, and Anchors:
   1. Hot-Dipped Galvanizing:
      a. Bolts, Nuts, and Washers: ASTM F2329.
      b. Connectors and Anchors: ASTM A153/A153M.
   2. Mechanical Galvanizing: ASTM B695; Class 50 minimum.

2.5 SOURCE QUALITY CONTROL

A. When fabricator is a member of the Steel Joist Institute, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.
   1. Specified shop tests are not required for Work performed by an SJI member fabricator.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify bearing plates are set to required location and elevation.

B. Verify bearing surfaces are ready to receive joists.

3.2 ERECTION

A. Erect and bear joists on supports.

B. Allow for erection loads. Install sufficient temporary bracing to maintain framing safe, plumb, and in alignment.

C. Coordinate placement of anchors in masonry construction for securing bearing plates.

D. After joist alignment and installation of framing, field weld joist seat to bearing plates.

E. Position and field weld joist chord extensions and wall attachments as detailed.

F. Frame roof openings greater than 12 inches with supplementary framing.

G. Do not permit erection of decking until joists are braced and secured or until completion of erection and installation of permanent bridging and bracing.

H. Do not field cut or alter structural members without approval of Architect/Engineer.

I. After erection, prime welds, abrasions, and surfaces not shop primed [except surfaces to be in contact with concrete.

3.3 TOLERANCES

A. Section 01 4533 - Quality Requirements: Tolerances.

B. Maximum Variation From Plumb: 1/4.

C. Maximum Offset From Alignment: 1/4.

3.4 FIELD QUALITY CONTROL

A. Section 01 45 33 – Special Inspections and Testing.

B. Field inspect members, connections, welds, and tightening of high strength bolts in slip-critical connections.

END OF SECTION

SECTION 05 3100
STEEL DECKING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Composite Steel Floor Deck
B. Acoustical Steel Roof Deck
C. Steel Roof Deck
D. Dovetail Steel Roof Deck

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Structural Steel Framing - Section 05 1200
B. Cast-In-Place Concrete - Section 03 3000.
C. Steel Joist Framing – Section 05 2100
D. Painting and Coating – Section 09 9000

1.03 REFERENCES

A. Comply with the following reference standards unless otherwise shown or specified:
   1. Design: "Specification for the Design of Cold-Formed Steel Structural Members" by the American Iron and Steel Institute (AISI Specification).
   2. Welding: "Structural Welding Code - Sheet Steel, AWS D 1.3", by the American Welding Society (AWS Code).
   3. Steel Deck Institute (SDI): “Design Manual for Composite Decks, Form Decks, and Roof Decks, Publication 26.”
   4. ASTM A 611 “Standard Specification for Steel, Carbon, Cold Rolled, Structural Quality.”
   5. ASTM A 525 “Steel Sheet, Zinc Coated, Galvanized by the Hot Dip Process.”

1.04 SUBMITTALS

A. Shop Drawings: Show application to project. Prepare separate drawings, coordinated with, but not superimposed on, joist drawings or structural steel erection drawings. Show plan layout, deck span, support locations, edge of deck location of openings and reinforcing at openings, and attachment requirements.

B. Product Data: Manufacturer's printed specifications and installation instructions.

1.05 HANDLING AND STORAGE

A. Handle and stack materials carefully in order to prevent deformation or damage. During unloading and hoisting, take extra care to prevent damage to ends and sides of individual metal deck panels. Do no place panels in direct contact with the ground. Protect panels from the elements and keep panels dry.
   1. If mud, dirt, or other foreign matter is accumulated on panels, remove such accumulation completely prior to installation.

1.06 QUALITY ASSURANCE

A. Fabricator and erector to submit documentation showing a minimum of 5 years experience with project of similar size and scope. All welders to submit documentation showing current AWS certification.
B. Deck installation inspection: By Owner's Special Inspector in accordance with Specification Section 01 4533 Special Inspections and Testing.

PART 2 PRODUCTS

2.01 MATERIALS

A. Fluted Deck and Steel Metal Metal Accessories. Sheet steel conforming to ASTM A 653 SQ Grade 33. Before fabrication, sheet steel shall receive ASTM A 525, Class G 90, hot dip zinc coating; Accessories shall be fabricated of not lighter than 26 US Standard Gage sheet steel. Deck standard of function and quality shall be as manufactured by Nucor Vulcraft Steel Roof & Floor Deck of the type, depth, and gauge shown on the drawings.
   1. Steel roof deck for the gymnasium to be 2" 20 gauge acoustical deck; Vulcraft NA.
      a) Bottom surface of gymnasium deck to be shop primed and field finish coated.
      b) For the gymnasium acoustic deck, furnish and field install inert, non-organic glass fiber sound absorbing batts within deck flutes.
   2. Exposed composite floor deck and steel roof deck to be shop primed and field finish painted. See notes on floor and roof framing plan for areas to be shop primed.

B. Self-Drilling Fasteners: No. 12-14 x 3/4 inch, hex washer head, self-drilling fastener with pilot point.

C. Powder Driven Fasteners: Hilti X-EDN19 or equal.

D. Touch-up primer for galvanized surfaces: SSPC 20, Type I- Inorganic.

E. Accessories: Shop fabricated accessories, compatible with steel deck, as required to complete the Work, including, but not limited to, the following:
   1. Sheet metal cants beneath flashings when required for roofing over steel deck.
   2. Column closures, end closures, Z closures, and cover plates.
   3. Pour stop at deck edges and openings.

2.02 FABRICATION

A. Furnish units in lengths to be continuous over 3 spans wherever possible.

B. Unless otherwise indicated or approved, fabricate deck for predetermined openings, and reinforce where required to maintain deck strength, alignment, and profile.
   1. Small openings, as recommended by the deck manufacturer, may be field cut.

C. Progress shop fabrication from "APPROVED" or "APPROVED AS NOTED" detail drawings only.
   1. When detail drawings are "APPROVED AS NOTED", progress fabrication in strict accordance with notes thereon.
   2. Fabrication progressed from "DISAPPROVED" or "RETURNED FOR CORRECTION" detail drawings will be rejected. The contractor shall have no claim against the Owner for any costs or delays due to rejection

of items fabricated from "DISAPPROVED" or "RETURNED FOR CORRECTION" detail drawings.

D. Fabricate deck units to provide a minimum of 2” lap over supports. Provide minimum of 1.5” bearing over steel supports.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine supporting framing and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of steel deck.

B. Do not start installation of metal deck until corresponding steel framework has been plumbed, aligned and completed and until temporary shoring, where required, has been installed.

C. Steel surfaces to which materials, provided under this Section, are to be welded, shall be free of paint, ice, water, oil, dirt, rust and other materials detrimental to welding.

D. Locate decking bundles to prevent overloading of supporting members

3.02 INSTALLATION

A. Install the Work of this Section in accordance with the manufacturer's printed instructions except where shown or specified otherwise.
1. Welding shall comply with the AWS Code.
2. Perform welding free of sharp points.

B. Place deck units on supporting steel framework and adjust to final position with ends bearing on supporting members and flutes in straight and true alignment through entire length of run before being permanently fastened. Do not stretch or contract side lap interlocks. Install temporary shoring before placing single span deck panels when required to meet manufacturer’s recommendations.

C. End Bearing: Install deck units over supporting framing with a minimum end bearing of 1-1/2 inches, with end joints as follows:
1. Non-Composite Deck End Joints: Lapped 2 inches minimum.
2. Composite Deck End Joints: Butted.

D. Deck Fastening: Fasten deck units at perimeter supports with arc spot welds (puddle welds) not less than 3/4 inch diameter, at 6 inches on center, or mechanically fasten. At intermediate supports, fasten deck units with arc spot welds (puddle welds) not less than 3/4 inch diameter, at 12 inches on centers, along the supporting members, or mechanically fasten. Weld/fasten the first and last deck flutes. Use welding washers for all deck lighter than 20 gage.

E. Side lap fastening: Fasten side laps at intervals not exceeding 24 inches with No. 10 diameter self-drilling carbon steel screws, unless more stringent requirements are indicated on the drawings or required by the fire resistance ratings indicated on the drawings.

F. Immediately after welding deck and other metal components into position, coat welds, burned areas, and damaged surface coating with touch-up prime paint.

END OF SECTION

SECTION 054000
COLD-FORMED STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Curtain Wall Support.

B. Exterior wall framing.

1.2 RELATED REQUIREMENTS

A. Section 051223 - Structural Steel.

1.3 REFERENCE STANDARDS

A. AISI SG02-1 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2001 with 2004 supplement. (Replaced SG-971)

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2011.

D. ASTM C955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases; 2011c.

E. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2010.

F. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with work of other sections that is to be installed in or adjacent to the metal framing system, including but not limited to structural anchors, cladding anchors, utilities, insulation, and firestopping.

1.5 SUBMITTALS

A. See Section 013300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on standard framing members; describe materials and finish, product criteria, limitations.

C. Product Data: Provide manufacturer's data on factory-made framing connectors, showing

compliance with requirements.

1. Manufacturer's printed specifications and installation instructions for each type of metal framing and accessory, including data required to show compliance with the Drawings and Specifications.

D. Calculations: Provide Cold Framed Structural Metal Framing Contractor's Design Engineer's calculations demonstrating that the cold formed framing system will comply with the performance requirements of this section and the contract drawings. Refer to loading information provided on Sheet S001 and in relevant plans and details.

E. Shop Drawings: Indicate component details, framed openings, bearing, anchorage, loading, welds, and type and location of fasteners, and accessories or items required of related work.

1. Include the following in submission:
   a. Erection drawings indicating sizes and locations of all metal framing members.
   b. Anchor bolt plan showing anchor bolts, if any, to be placed in cast-in-place concrete Work.
   c. Show plans and elevations at not less than 1/4 inch to 1'-0" scale, and details at not less than 1-1/2 inch to 1'-0" scale.
2. Indicate ceiling joist layout and support.
3. Describe method for securing bearing and shear walls to floor joist framing, and floor joists framing to supporting structure.
4. Provide design engineer's stamp on shop drawings.

F. Manufacturer's Installation Instructions: Indicate special procedures, conditions requiring special attention.

1.6 QUALITY ASSURANCE

A. Designer Qualifications: Design framing system under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in New York State.

B. Calculate structural properties of framing members in accordance with requirements of AISI North American Specification for the Design of Cold-Formed Steel Structural Members.

C. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, and with minimum three years of documented experience.

D. Installer Qualifications: Company specializing in performing the work of this section with minimum three years of experience.

F. Certification: Affidavit certifying that sheet steel complies with specified quality, grade, and zinc-coating.

G. Fire Rated Construction: Wherever a fire resistance classification is indicated for metal framing components, provide framing and accessories which have been tested and classified or listed for the construction and rating shown.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver metal framing to the Site in manufacturer's unopened containers or bundles, identified with brand, type, and gage.

B. Protect metal framing from damage and rusting. Store off the ground in dry, ventilated space.

C. Store and handle metal framing in a manner that will not cause distortion.

1.8 PROJECT CONDITIONS

A. Verify that field measurements are as indicated on shop drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Metal Framing, Connectors, and Accessories:
   1. Clark Dietrich Building Systems LLC: www.clarkdietrich.com.
   2. Marino\Ware: www.marinoware.com.
   3. The Steel Network, Inc: www.SteelNetwork.com.
   4. Substitutions: See Section 012500 – Substitution Procedures.

2.2 FRAMING SYSTEM

A. Provide primary and secondary framing members, bridging, bracing, plates, gussets, clips, fittings, reinforcement, and fastenings as required to provide a complete framing system.

B. Design Criteria: Provide completed framing system having the following characteristics:
   1. Design: Calculate structural characteristics of cold-formed steel framing members according to AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
   2. Structural Performance: Design, engineer, fabricate, and erect to withstand specified design loads for project conditions within required limits.
   3. Design Loads: As indicated on the drawings.
   4. Live load and wind load deflection meeting the following, unless otherwise indicated:
      a. Floor Joists: Maximum vertical deflection under design live load of 1/360 of span.
      b. Wall Studs: Maximum lateral deflection under wind load of 1/600 of span (brick exterior veneer).
   5. Able to tolerate movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
   6. Able to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

2.3 FRAMING MATERIALS

A. Studs and Track: ASTM C955; studs formed to channel, "C", or "Sigma" shape with punched web; U-shaped track in matching nominal width and compatible height.
   1. Gage and depth: As indicated on the drawings.
      a. Members of 12, 14, and 16 Gage Steel: Galvanized, structural quality sheet

steel; ASTM A653, Grade D (minimum yield 50 ksi).
b. Members of 18 and 20 Gage Steel: Galvanized, structural quality sheet steel; ASTM A653, Grade A (minimum yield 33 ksi).
2. Galvanized in accordance with ASTM A653/A653M G90/Z275 coating.
3. For exterior wall studs, provide studs with a minimum stud gauge of 16.

B. Joists: Fabricated from ASTM A653/A653M steel sheet, with G90/Z275 hot dipped galvanized coating.
1. Base Metal: Structural Steel (SS), Grade 33/230.
2. Gage and depth: As indicated on the drawings.
a. Members of 12, 14, and 16 Gage Steel: Galvanized, structural quality sheet steel; ASTM A653, Grade D (minimum yield 50 ksi).
b. Members of 18 and 20 Gage Steel: Galvanized, structural quality sheet steel; ASTM A653, Grade A (minimum yield 33 ksi).

C. Framing Connectors: Factory-made formed steel sheet, ASTM A653/A653M SS Grade 50, with G60/Z180 hot dipped galvanized coating and factory punched holes.

1. Structural Performance: Maintain load and movement capacity required by applicable code, when evaluated in accordance with AISI North American Specification for the Design of Cold Formed Steel Structural Members; minimum 16 gage, 0.06 inch thickness.
2. Movement Connections: Provide mechanical anchorage devices that accommodate movement using slotted holes, screws and anti-friction bushings, while maintaining structural performance of framing. Provide movement connections where indicated on drawings.
a. Where top of non-bearing stud wall terminates below structural floor or roof, connect studs to structure in manner allowing vertical movement without affecting studs; allow for minimum movement of 1/2 inch.
b. Provide top track preassembled with connection devices spaced to fit stud spacing indicated on drawings; minimum track length of 12 feet.
c. Acceptable Products: VertiClip(r) or DriftClip(tm) manufactured by The Steel Network Inc.
3. Provide non-movement connections for tie-down to foundation, floor-to-floor tie-down, roof-to-wall tie-down, joist hangers, gusset plates, and stiffeners and for all bearing wall stud framing connections.

2.4 ACCESSORIES

A. Bracing, Furring, Bridging, Strapping, Reinforcement, Stiffeners, Plates, Gussets, Clip Angles, and Hangers: Unless otherwise indicated, metal framing manufacturer's standard products formed from ASTM A653 galvanized, structural quality sheet steel. Thickness and grade shall be determined by application requirements, with a minimum thickness of 20 gage and a minimum yield of 33 ksi.

B. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.5 FASTENERS

A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers:
   1. Cadmium plated, No. 12-14 x 3/4 inch, hex washer head, self-drilling, self-tapping fastener with pilot point.

B. Anchorage Devices: Powder actuated.
   1. Powder-Actuated Fasteners: Low velocity, powder activated, threaded studs complying with ASTM E 1190 and zinc coated in accordance with ASTM B633, Type III, Classification 5.
      a. Minimum Stud Size: 1/4-20 thread, 0.145 inch dia shank, with 1/4-20 nut and 5/8 inch outside dia washer.
      b. Stud Material: ASTM A510 1060 or 1065 steel.
      c. Minimum Core Hardness: 51-56 Rockwell C.
      d. Minimum Tensile Strength: 285,000 psi.
      e. Minimum Shear Strength: 182,000 psi.

C. Galvanizing: Hot-dip process complying with ASTM A525, Coating Designation G 60.

D. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

E. Anchorage Devices: Power actuated, Drilled expansion bolts, Screws with sleeves, or ASTM A325 High Strength Bolts.

F. Welding: In conformance with AWS D1.1.

2.6 FABRICATION

A. Fabricate metal framing in accordance with “Approved” or “Approved as Noted” fabrication drawings only.

B. Repairing Galvanizing: Clean shop welded and abraded surfaces, and repair them with a 2 mil (dry) minimum thick coating of galvanizing repair paint. Comply with paint manufacturer's application instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that building framing components are ready to receive work.

B. Verification of Conditions: Examine surfaces to receive metal framing for defects that will adversely affect the execution and quality of the Work. Do not proceed until unsatisfactory conditions are corrected.

C. Verify field measurements and adjust installation as required.

3.2 INSTALLATION

A. Install metal framing and accessories in accordance with approved shop drawings, and with the metal framing manufacturer's printed installation instructions.

B. Provide temporary bracing to ensure stability of the structure during construction.

C. Repairing Galvanizing: Clean field welded and abraded surfaces, and repair them with a 2 mil (dry) minimum thick coating of galvanizing repair paint. Comply with paint manufacturer's application instructions.

D. Tolerances:
   1. Vertical Alignment (Plumbness) of Studs: Within 1/960th (1/8 inch in 10 feet) of the height.
   2. Horizontal Alignment (Levelness) of Walls: Within 1/960th (1/8 inch in 10 feet) of their respective lengths.
   3. Spacing of Studs: Not more than + 1/8 inch from the designed spacing, providing that the cumulative error does not exceed the requirements of the finishing materials.

E. For metal framing indicated to receive insulation, install full width insulation in voids which will be inaccessible after erection.

F. Installation of Runner Tracks:
   1. Install continuous bottom and top tracks of size and gage shown. Align track accurately and, unless otherwise shown, attach to supporting structure with power-driven fasteners at 16 inches oc. Install fasteners at corners and ends of tracks.
   2. At track butt joints, securely attach abutting pieces of track to a common structural element, or splice them with a welded butt joint.

3.3 INSTALLATION OF JOISTS

A. Install framing components in accordance with manufacturer's instructions.

B. Make provisions for erection stresses. Provide temporary alignment and bracing.

C. Set ceiling joists parallel and level, with lateral bracing and bridging.
   1. Install bridging at joist ends and at intermediate supports, unless joists are otherwise restrained from rotation.
   2. Unless otherwise shown, install joists with a minimum bearing of 1-1/2 inches at end supports and 3-1/2 inches at intermediate supports.

D. Provide web stiffeners at reaction points.

E. Touch-up field welds and damaged galvanized surfaces with primer.

END OF SECTION 054000

SECTION 05 5000
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated steel and aluminum items.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.

B. Section 04 2000 - Unit Masonry: Placement of metal fabrications in masonry.

C. Section 04 2613 - Masonry Veneer: Placement of metal fabrications in masonry.

D. Section 05 1200 - Structural Steel Framing: Structural steel column anchor bolts.

E. Section 05 2100 - Steel Joist Framing: Structural joist bearing plates, including anchorage.

F. Section 05 3100 - Steel Decking: Bearing plates for metal deck bearing, including anchorage.

G. Section 05 5100 - Metal Stairs.

H. Section 05 5133 - Metal Ladders.

1.03 PRICE AND PAYMENT PROCEDURES

A. See Section 01 2200 - Unit Prices, for additional requirements.

B. Components:
   1. Basis of Measurement: By the pound.
   2. Basis of Payment: Includes fabrication, finishing, and installation.

C. Components:
   1. Basis of Measurement: By the unit.
   2. Basis of Payment: Includes fabrication, finishing, and installation.

1.04 REFERENCE STANDARDS

A. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2023.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.

D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

E. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

F. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2023.

G. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2018.

H. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.

I. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2021a.

J. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2021.

K. ASTM A554 - Standard Specification for Welded Stainless Steel Mechanical Tubing; 2021.

L. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

M. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

N. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.

O. ASTM B210/B210M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes; 2019a.

P. ASTM B211/B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire; 2019.

Q. ASTM B26/B26M - Standard Specification for Aluminum-Alloy Sand Castings; 2018, with Editorial Revision.

R. ASTM B85/B85M - Standard Specification for Aluminum-Alloy Die Castings; 2018, with Editorial Revision.

S. ASTM B177/B177M - Standard Guide for Engineering Chromium Electroplating; 2011 (Reapproved 2021).

T. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

U. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

V. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

W. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.

X. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2022.

Y. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.

Z. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.

AA. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).

BB. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2014, with Errata (2020).

CC. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172; 2019.

DD. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.

EE. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.

FF. SSPC-SP 2 - Hand Tool Cleaning; 2018.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
   1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
   2. Design data: Submit drawings and supporting calculations, signed and sealed by a qualified professional structural engineer.
      a. Include the following, as applicable:
         1) Design criteria.

2) Engineering analysis depicting stresses and deflections.
3) Member sizes and gauges.
4) Details of connections.
5) Support reactions.
6) Bracing requirements.

C. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

D. Designer's Qualification Statement.

E. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.06 QUALITY ASSURANCE

A. Design under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.

B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.2/D1.2M and dated no more than 12 months before start of scheduled welding work.

C. Fabricator Qualifications: A qualified steel fabricator that is accredited by IAS AC172.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Steel Sections: ASTM A36/A36M.

B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.

C. Plates: ASTM A283/A283M.

D. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.

E. Stainless Steel, General: ASTM A666, Type 304.

F. Stainless Steel Tubing: ASTM A554, Type 304, 16 gauge, 0.0625 inch minimum metal thickness, 1-1/2 inch diameter.

G. Stainless Steel Bars, Shapes and Moldings: ASTM A276/A276M, Type 304.

H. Slotted Channel Fittings: ASTM A1011/A1011M.

I. Mechanical Fasteners: Same material as or compatible with materials being fastened; type consistent with design and specified quality level.

J. Bolts, Nuts, and Washers: ASTM A307, Grade A, plain.

K. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.

L. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

M. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

N. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Continuously seal joined members by intermittent welds and plastic filler.

D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

F. Furnish components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.03 FABRICATED ITEMS

A. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.

B. Joist Hangers: Strap anchors, fabricated with sheet steel, 18 gauge, 0.0478 inch minimum base metal thickness; galvanized finish.

C. Ledge Angles, Shelf Angles, Channels, and Plates Not Attached to Structural Framing: For support of metal decking; prime paint finish.

D. Lintels: As detailed; prime paint finish.

E. Sill Angles for Tempered Glass Railing Assemblies: ASTM A36/A36M steel angles with anchoring devices and sizes as indicated in shop drawings for railing assembly, drilled and tapped for fastener types, sizes, and spacing indicated, prime paint finish.

F. Elevator Hoistway Divider Beams: Beam sections; prime paint finish.

2.04 FINISHES - STEEL

A. Prime paint steel items.
   1. Exceptions: Galvanize items to be embedded in concrete, items to be embedded in masonry, and items specified for _____ finish.
   2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.

B. Prepare surfaces to be primed in accordance with SSPC-SP2.

C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

D. Prime Painting: One coat.

E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.

F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.05 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Furnish setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Field weld components as indicated on drawings.

D. Perform field welding in accordance with AWS D1.1/D1.1M.

E. Obtain approval prior to site cutting or making adjustments not scheduled.

F. After erection, prime welds, abrasions, and surfaces not shop primed , except surfaces to be in contact with concrete.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

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SECTION 05 5133
METAL LADDERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Prefabricated ladders.

1.02 REFERENCE STANDARDS

A. 29 CFR 1926.1053 - Ladders; Current Edition.

B. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.

C. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

D. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements; 2008 (Reaffirmed 2018).

E. ASTM B211/B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire; 2019.

F. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's data sheets on each ladder safety system product to be used, including installation instructions.

C. Shop Drawings:
   1. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

D. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

2.02 MATERIALS - ALUMINUM

2.03 PREFABRICATED LADDERS

A. Prefabricated Ladder: Welded metal unit complying with ANSI A14.3; factory fabricated to greatest degree practical and in the largest components possible.
   1. Components: Manufacturer's standard rails, rungs, treads, handrails. returns, platforms and safety devices complying with the requirements of the MATERIALS article of this section.
   2. Materials: Aluminum; ASTM B211/B211M 6063 alloy, T52 temper.
   3. Finish: Powder coat; color to be selected by Architect from manufacturer's standard range.
   4. Manufacturers:
      a. O'Keeffe's Inc; Model 500: www.okeeffes.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

2.04 FINISHES - ALUMINUM

A. Exterior Aluminum Surfaces: Class I natural anodized.

B. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

A. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Obtain approval prior to site cutting or making adjustments not scheduled.

END OF SECTION

SECTION 05 5213
PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall mounted handrails.

B. Stair railings and guardrails.

C. Free-standing railings at steps and ramps.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Placement of anchors in concrete.

1.03 REFERENCE STANDARDS

A. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.

B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

C. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2021a.

D. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

C. Welder's Qualifications Statement.

1.05 QUALITY ASSURANCE

A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer.

B. Welder Qualifications: Show certification of welders employed on the Work, verifying AWS qualification within the previous 12 months.

PART 2 PRODUCTS

2.01 RAILINGS - GENERAL REQUIREMENTS

A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of applicable local code.

B. Allow for expansion and contraction of members and building movement without damage to connections or members.

C. Dimensions: See drawings for configurations and heights.

D. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.

E. Provide welding fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of componenets, failure of connections, and other detrimental effects.
   1. Temperature Change: 120 degree F, ambient; 180 degree F, material surfaces.

G. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

2.02 STEEL RAILING SYSTEM

A. Steel Tube: ASTM A500/A500M Grade B cold-formed structural tubing.

B. Steel Pipe: ASTM A53/A53M Grade B Schedule 80, black finish.

C. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.

D. Exposed Fasteners: No exposed bolts or screws.

E. Galvanizing: In accordance with requirements of ASTM A123/A123M.
   1. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20 Type I - Inorganic.

2.03 FABRICATION

A. Accurately form components to suit specific project conditions and for proper connection to building structure.

B. Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less thanthat required to support structural loads.

C. Fit and shop assemble components in largest practical sizes for delivery to site.

D. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.

E. Welded Joints:
   1. Exterior Components: Continuously seal joined pieces by intermittent welds and plastic filler. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
   2. Interior Components: Continuously seal joined pieces by intermittent welds and plastic filler.
   3. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Examine plaster and gypsum board assemblies, where reinforced to recieve anchors, to verify that locations of concealed reinforcements have been clearly marked for installer. Locte reinforcemets and mark locations if not already done.

3.02 PREPARATION

A. Supply items required to be cast into concrete with setting templates, for installation as work of other sections.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.

C. Anchor railings securely to structure and capable of withstanding design loads.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

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SECTION 06 1000
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sheathing.

B. Concealed wood blocking, nailers, and supports.

1.02 RELATED REQUIREMENTS

A. Section 07 2500 - Weather Barriers: Water-resistive barrier over sheathing.

1.03 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

B. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing; 2003 (Reapproved 2017).

C. ASTM D3498 - Standard Specification for Adhesives for Field-Gluing Wood Structural Panels (Plywood or Oriented Strand Board) to Wood Based Floor System Framing; 2019a.

D. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.

E. ASTM E2357 - Standard Test Method for Determining Air Leakage Rate of Air Barrier Assemblies; 2023a.

F. PS 20 - American Softwood Lumber Standard; 2021.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.

C. ABAA Field Quality Control Submittals: Submit third-party reports of testing and inspection required by ABAA QAP.

D. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.

E. ABAA Installer Qualification: Submit documentation of current contractor accreditation and current installer certification. Keep copies of all contractor accreditation and installer certification on site during and after installation. Present on-site documentation upon request.

F. Blocking details and anchorage for for items listed in this section or noted on the drawings.

1.05 QUALITY ASSURANCE

A. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP); www.airbarrier.org/#sle:

1. Installer Qualification: Use accredited contractor, certified installers, evaluated materials, and third-party field quality control audit.
2. Manufacturer Qualification: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture. Use secondary materials approved in writing by primary material manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
   1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
   2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Sizes: Nominal sizes as indicated on drawings, S4S.

B. Moisture Content: S-dry or MC19.

2.03 CONSTRUCTION PANELS

A. Wall Sheathing: Glass mat faced gypsum with integral water-resistive and air barrier, ASTM C1177/C1177M, 5/8 inch thick.
   1. Edges: Square.
   2. Water Vapor Permeance: 1 perm, minimum, when tested in accordance with ASTM E96/E96M.
   3. Air Permeance, Sheathing: 0.001 cfm per square foot, maximum, when tested in accordance with ASTM E2178.
   4. Air Permeance, Assembly: 0.04 cfm per square foot, maximum, when tested in accordance with ASTM E2357.
   5. Fluid-Applied Flashing: Approved by sheathing manufacturer.
   6. Warranty:
      a. Exposure: Manufacturer's standard; 12 months, against exposure damage, and dated from installation of product.
      b. Defect: Manufacturer's standard; 5 years, against manufacturing defects, and dated from purchase of product.
      c. Material: Manufacturer's standard; 5 years, dated from Date of Substantial Completion.
      d. Effective Drainage Warranty: 12 years, dated from installation of product, when sheathing is used as substrate under approved, water-managed exterior insulation finish system (EIFS).
   7. Manufacturers:
      a. Georgia-Pacific LLC; DensElement Barrier System: www.DensElement.com/#sle.
      b. Tremco Commercial Sealants & Waterproofing; Securock ExoAir 430 Panel: www.tremcosealants.com/#sle.
      c. Substitutions: See Section 01 6000 - Product Requirements.

2.04 ACCESSORIES

A. Fasteners and Anchors:
   1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
   2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.

B. Construction Adhesives: Adhesives complying with ASTM C557 or ASTM D3498.

C. Water-Resistive Barrier: As specified in Section 07 2500.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

3.02 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. Secure blocking to structure with fasteners of adequate size and spacing to resist specified design loads for grab bars, handrails, guards, wind, etc. If not specified, follow building code requirements.

C. Provide the following specific non-structural framing and blocking:
   1. Cabinets and shelf supports.
   2. Wall brackets.
   3. Handrails and Guards. Resist a linear load of 50 pounds per linear foot and concentrated load of 200 pounds.
   4. Grab bars. Resist a single concentrated load of 250 pounds in any direction at any point on the grab bar so as to produce the maximum load effects.
   5. Towel and bath accessories.
   6. Wall-mounted door stops.
   7. Tack Boards and marker boards.
   8. Wall paneling and trim.
   9. Joints of rigid wall coverings that occur between studs.

3.03 INSTALLATION OF CONSTRUCTION PANELS

A. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.
   1. Place water-resistive barrier horizontally over wall sheathing, weather lapping edges and ends.
   2. Install per manufacturer's installation instructions. Coordinate weather barrier installation with weather barrier manufacturer's installation instructions.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Coordination of ABAA Tests and Inspections:
   1. Provide testing and inspection required by ABAA QAP.
   2. Notify in ABAA writing of schedule for air barrier work. Allow adequate time for testing and inspection.
   3. Cooperate with ABAA testing agency.
   4. Allow access to air barrier work areas and staging.
   5. Do not cover air barrier work until tested, inspected, and accepted.

3.05 CLEANING

A. Waste Disposal: Comply with the requirements of Section 01 7419 - Construction Waste Management and Disposal.
   1. Comply with applicable regulations.
   2. Do not burn scrap on project site.
   3. Do not burn scraps that have been pressure treated.
   4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 07 0153.10
EPDM ROOFING REPAIR

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Repair and modification of existing EPDM Roofing System.

1.02 EXISTING SYSTEM DESCRIPTION

A. Existing Roof System Manufacturer:Carlisle 60 mil EPDM membrane system .

B. Roof Color: Match existing color.

1.03 REFERENCE STANDARDS

A. ANSI/SPRI/FM 4435/ES-1 - Test Standard for Edge Systems Used with Low Slope Roofing Systems; 2017.

B. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2017.

C. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2023.

D. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.

E. ASTM D4637/D4637M - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane; 2015, with Editorial Revision (2022).

F. ASTM D4811/D4811M - Standard Specification for Nonvulcanized (Uncured) Rubber Sheet Used as Roof Flashing; 2016 (Reapproved 2023).

G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.

H. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 °C; 2022.

I. FM 4470 - Examination Standard for Single-Ply, Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for Use in Class 1 and Noncombustible Roof Deck Construction; 2022.

J. FM DS 1-28 - Wind Design; 2015, with Editorial Revision (2024).

K. FM DS 1-29 - Roof Deck Securement and Above-Deck Roof Components; 2016, with Editorial Revision (2022).

L. PS 1 - Structural Plywood; 2019.

M. PS 20 - American Softwood Lumber Standard; 2021.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Catalog sheets, specifications, installation instructions for each material specified.

C. Quality Control Submittals:
   1. Membrane Manufacturer's Qualifications, showing minimum of ten years experience with the manufacture and installation of EPDM Roofing Systems.
   2. Roofing applicator qualifications:
      a. Current certification from Roofing System Manufacturer indication the Roofing System Applicator has Master Contractor status or equal.
      b. Minimum five years experience in the completion of EPDM System Repairs/Modifications while maintaining manufacturer's existing warranty.

3. Product Data: Catalog sheets, specifications, installation instructions for each material specified.
4. Installation Instructions: Provide manufacturer's instructions to installer, marked up to show exactly how all components will be installed; where instructions allow installation options, clearly indicate which option will be used.

D. Shop Drawings: Provide the roof membrane manufacturer's standard details customized for this project for all relevant conditions, including flashings, base tie-ins, roof edges, terminations, expansion joints, penetrations, and drains.

E. Submit all items, except contract closeout submittals and MSDS, at one time as a complete package. Partial submittals will not be considered.

F. See Section 01 7800 - Closeout Submittals for additional submittals.

1.05 QUALITY ASSURANCE

A. Fire Hazard Classification: The sheet membrane roof system shall have an Underwriters Laboratories Class A or B External Fire Resistance rating, as determined by tests conducted in conformity with UL-790 “Tests for Fire Resistance of Roof Covering Materials”.

B. Material Classification Identification: Materials delivered to the site that are a component of the roofing system shall bear the UL Classification mark.

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least five years of documented experience.
1. The manufacturer shall have the technical expertise and qualified technical representatives to resolve questions or problems that may arise both during and after the Work is completed.
2. The manufacturer will require the roof system modifications/repair to be installed by a licensed or approved applicator.

D. Installer Qualifications: Company specializing in performing work of the type specified and with at least ten years of documented experience.

E. The Owner reserves the sole right to determine if the Contractor meets the minimum experience requirement of this Section based on a completed Contractor's Qualification Statement (AIA A305).

F. Perform Work in accrodance with NRCA Roof and Waterproofing Manual: Membrane Roof Systems - 2019.

G. Manufacturer's Inspection:
1. Manufacturer will provide a minimum of two progress inspections and one final inspection.
2. Manufacturer's inspection is to be completed by an Technical Representative whom does not perform any sales functions.
3. The Roofing System Manufacturer will provide an inspection of the roofing system modifications/repairs upon the completion of the work to confirm the existing warranty has not been compromised. The Manufacturer's Field Representative is to provide a copy of the written inspection report to the Architect, Owner and Roofing Applicator.
4. Contractor is to complete any/all necessary repairs noted by the Roofing Manufacturer's Technical Representative and those noted by the Architect.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.

B. Store products in weather protected environment, clear of ground and moisture.

C. Keep all combustible materials/products away from ignition sources.

1.07 FIELD CONDITIONS

A. Complete roof modifications/repairs only when surfaces are clean, dry, free of water, snow and ice.

B. Do not complete roofing membrane modification repairs/modifications during inclement weather or when ambient conditions will not allow proper application. Consult roofing system manufacturer on cold weather application.

C. The Contractor will provide temporary closure/protection and temporary water cut-offs which will assure moisture damage does not occur to interior spaces during roofing system modification/repair procedures.

D. Limit the removal of existing materials to areas that can be completely repaired or temporarily protected within the same day. At the discretion of the Resident Project Representative and Owner Representative a watertight built-up vapor barrier may be acceptable temporary protection for a maximum of 48 hours.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Provide Certification from Roofing System Manufacturer confirming roof system modifications/repairs have not compromised the current warranty and that the original Roof System Manufacturer Warranty has remained intact.

C. Contractor Correction Period for Roofing System modifications/repairs: Correct defective work within two-year period commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.01 EPDM SHEET MEMBRANE, SHEET FLASHING, AND RELATED PRODUCTS

A. The EPDM sheet membrane shall be visually free of streaks, particles of foreign matter, undispersed raw material, pinholes, cracks, tears, and shall be uniform in thickness. When unrolled in a relaxed position, the membrane shall be free of wrinkles, distortions, and blisters.

B. EPDM (Ethylene, Propylene, Diene, Monomer) Sheet Membrane:
   1. One of the following types as required to achieve a UL Class A external fire rating:
      a. 60 mil , fire retardant, unreinforced, EPDM membrane.

C. Sheet Flashing: Membrane manufacturer’s cured and uncured EPDM as specified

D. Inseam Tape: Membrane manufacturer’s minimum 6 inch wide self adhering tape consisting of cured butyl double sided adhesive tape, for inseam splicing of rubber to rubber.

E. Cured EPDM Cover Tape: Membrane manufacturer’s minimum 5 inch wide self adhering tape consisting of cured butyl adhesive laminated to cured EPDM, for installation over EPDM seams, cuts in field membrane, and for stripping in metal work.

F. Uncured EPDM Cover Tape: Membrane manufacturer’s minimum 5 inch wide self adhesive tape, consisting of, cured butyl adhesive laminated to uncured EPDM, for installation over base flashing corners, inside and outside corners, pipe flashings and other detail work.

G. Related Products: Membrane manufacturer’s bonding adhesive, splicing cement, lap sealant, water cut-off mastic, nite seal, pourable sealer, splice joint cleaning agent and primer, insulation adhesive, and all other products related to the sheet membrane system.

H. Manufacturer's:
   1. The existing EPDM is currently under warranty.
   2. The warranty is currenlty held by _____
   3. Source Limitations: Furnish products produced by single manufacturer and obtained from single supplier.

2.02 INSULATION

A. Uniform Thickness isocyanurate insulation and Tapered isocyanurate insulation:
   1. Approved closed cell isocyanurate foam core insulation skinned on both sides with factory applied fiberglass facers suitable for installation with hot asphalt and cold adhesive. ASTM C1289-02, Type II, Class 1, Grade 2. UL Classified and Factory Mutual Approved for direct application over steel deck.

a. R-valus (Minimum LTTR): 6.0 per inch thickness. Match existing thickness.
b. Adhesively Secured Insulation: Maximum board size 4 feet x 4 feet.

2. Tapered Insulation System: Membrane manufacturer's approved factory tapered polyisocyanurate insulation to match existing taper.

2.03 ROOF DECK SHEATHING AND COVER BOARD

A. Roof Deck Sheathing (Underlayment): Gypsum roof board composed of a silicone treated gypsum core with fiberglass facers. Match existing thickness.
1. Acceptable Product: "DensDeck" by Georgia-Pacific Corporation, Gypsum Division, Atlanta, GA 30303, (800) 225-6119, www.gp.com..
2. Board Sizes:
a. Adhesively Attached Board: Maximum board size 4 feet x 4 feet.
b. Mechanically Attached Board: Minimum board size 4 feet x 8 feet.

B. Coverboard over insulation (gypsum based):
1. Match existing thickness with gypsum roof board composed of a silicone treated gypsum core with fiberglass facers.
a. Acceptable Product: "DensDeck" by Georgia-Pacific Corporation, Gypsum Division, Atlanta, GA 30303, (800) 225-6119, www.gp.com.
2. Board Sizes:
a. Adhesively Attached Board: Maximum board size 4 feet x 4 feet.

2.04 VAPOR BARRIER REPAIR MATERIALS

A. Materials For Repair Of Existing Vapor Barrier:
1. Membrane: High density polyethylene sheet with SBS modified bitumen adhesive.
a. Attachment: Self adhering.

2.05 FASTENERS AND ADHESIVES

A. Termination Bar and Fasteners:
1. Termination Bar: Factory fabricated one inch wide x .100 inches thick, mill finish aluminum bar, with 1/4 inch x 3/8 inch slotted holes 8 inches on center and with a 1/4-inch wide 35 degree caulking and stiffener flange.
2. Fasteners:
a. Concrete Or Masonry Surfaces: Slotted hex washer head masonry screws or zinc alloy hammer driven expansion anchors. Length as required to securely hold the compression bar tight against the wall surface.
b. Wood and Sheet Metal Surfaces: Hardened, self-tapping, slotted hex washer head screws.

B. Insulation Adhesive: Two-Part, Low rise polyurethane foam adhesive designed to attach polyisocyanurate insulation to various acceptable substrates.

C. Bonding Adhesive: Neoprene-based, formulated for compatibility with EPDM membrane and wide variety of substrate materials, including masonry, wood, and insulation facings.
1. Bonding adhesive to be Low-VOC, solvent free.
2. Splice wash to be Low-VOC, solvent free.

2.06 MISCELLANEOUS MATERIALS

A. Pre-Molded Pipe Flashings: EPDM, molded for quick adaptation to different sized pipes.

B. Multi-pipe Flashing: QuadFlash/WideFlash as manufactured by OMG Roofing Products.

C. Compression Clamp: Stainless steel or cadmium plated steel worm drive clamp.

D. Rooftop Pipe Supports:
1. Rooftop Pipe Supports: "PipeGuard" as manufactured by OMG Roofing Products.
a. Supports small rooftop pipes with engineered, prefabricated pipe supports.
b. Material: Smooth, flexible, black, EPDM rubber.
c. Protects roof system from damage due to movement.

d. Pipe Support Height: 1-1/2 inches (Mini) , 3-1/2 inches (Small) , and 6 inches (Tall Small).
e. Supports Nominal Pipe Size: 1/2 to 1-1/2 inches (Mini) , 3/4 to 2 inches (Small) , 3/4 to 2 inches (Tall Small), and 2-1/2" to 5 inches (Large)
f. Drainage Slots: Prevent pipes from sitting in standing water.

2. Height Adjustable PipeGuard:
   a. Strut Channel (First & Second Strut): Low profile, 1-5/8-inch (40-mm), galvanized steel, accepts standard strut clamps.
      1) Second Strut is height adjustable with 2 zinc plated threaded rods with nuts.
   b. Pipe Support Heights: Adjustable from 4 inches (after removing second strut channel or setting it above pipes) to 10 inches.
   c. Width at Top: 10 inches (255 mm).

E. Equipment Rails:
   1. Rail Construction:
      a. Galvanized Steel; 18 Gauge.
      b. Cap flashing: Glavanized.
      c. Nailer: Overhanging to accommodate insulation of rail.
      d. Construction:
         1) Unitized Construction.
         2) Internal Reinforcement.
         3) Continuously welded corner seams.
         4) Minimum Height: 14 inches above membrane.
      e. Manufacturer: Roof Products & Systems, Carol Stream, IL.

F. Pitch Pocket Filler Material:
   1. Pourable Sealer: Membrane manufacturer's 2 component liquid urethane.
   2. Mortar: ASTM C 270, Type S.

G. Water Block Seal: Butyl rubber sealant for use between two surfaces, not exposed.

H. Sealant at termination bar with no cap flashing: One-part, low modulus, silicone sealant: Dow Corning's 790, General Electric's Silpruf, Pecora's 864, or Tremco's TremPro 646.

I. Roof Walkway Pads: EPDM, 0.30 inch (7.6 mm) thick by 30 by 30 inches (760 by 760 mm) with EPDM tape adhesive strips laminated to the bottom.

PART 3 EXECUTION

3.01 PREPARATION

A. Cleaning: Before the roofing repair commences, sweep and/or vacuum all surfaces as required to remove all ballast, dirt, dust, loose aggregate, foreign matter, and debris from repair area, a minimum 6 inches beyond where the perimeter of the area to be modified or repaired.
   1. Scrub area of membrane with a solution of detergent and water such as Spic 'n Span or other detergent containing trisodium phosphate as approved by the roofing system manufacturer. Use warm water and a stiff bristle brush to clean the membrane. Rinse thoroughly with clean water and allow membrane to dry. A rubber bladed squeegee and clean, absorbent, lint-free cloths may be used to facilitate drying. Dirt must be removed from area to be patched.
   2. Use warm water and a stiff bristle brush to clean the membrane.
   3. Rinse thoroughly with clean water and allow membrane to dry. A rubber bladed squeegee and clean, absorbent, lint-free cloths may be used to facilitate drying.
   4. Dirt must be removed from area to be modified or repaired.

B. Ensure roof drain strainers are in place and secured during removal of insulation and other debris.
   1. Provide cast iron strainers where existing strainers are missing. Do not allow debris to enter drains.

3.02 INSTALLATION OF INFILL INSULATION

A. Install in accordance with manufacturer's written instructions.

B. Keep insulation absolutely dry at all times. Discard insulation that contains moisture.
   1. Install only as much insulation as can be covered with roofing membrane the same day.
   2. Discard all units with broken corners or similar defects.
   3. At roof drains, terminate the insulation with tapered edge strips so that all flashing and coverstrip joint laps can be made within the tapered portion.

C. Cut back the membrane at affected area to expose the insulation. Remove fasteners holding the insulation, if present. Cut the insulation and discard properly, taking care not to damage vapor barrier, if present.

D. Installing Adhesively Secured Insulation: Set each board in insulation adhesive applied in accordance with manufacturer's printed instructions. Press insulation into the adhesive immediately and as necessary thereafter to assure proper bonding. Maintain pressure on the adhesive until the adhesive has completely set (20 to 45 minutes).

E. Installing Insulation Board: Install each layer of insulation with joints staggered. Butt edges and ends snugly so there are no gaps between the insulation boards. Discard boards with broken corners and boards that are warped.

F. Installing Tapered Insulation System: Install the tapered insulation to match the existing tapered insulation system. Install each layer of insulation with joints staggered. Butt edges and ends snugly so that there are no gaps between the insulation boards.

G. Install coverboard insulation over the polyisocyanurate insulation.

3.03 MEMBRANE PREPARATION

A. Preparing Existing Roof Membrane:
   1. Repair Splits, Cuts and Seams: Cut the membrane a short distance from and parallel with the perimeter, base of the wall, curb or termination point to relieve the tension. Allow the membrane to relax for a minimum of 30 minutes.
   2. Membrane Shrinkage Repairs:
      a. Cut the membrane a short distance from and parallel with the perimeter, base of the wall, curb or termination point to relieve the tension. Allow the membrane to relax for a minimum of 30 minutes.
      b. Secure the existing membrane to the deck or base of the wall by mechanically fastening with metal batten bars or plates and fasteners, or as directed by the membrane manufacturer.
      c. Thoroughly clean the surface of the membrane area to be repaired and backside of the patch material of the patch material with a clean, absorbent, lint-free cloth and an acceptable solvent cleaner as prescribed by the membrane manufacturer. If the membrane manufacturer can not be identified, other solvents such as Heptane, unleaded gasoline or Xylene may be used. Turn the cloth frequently and replace when dirty to prevent dirt and contaminants from being scrubbed into the membrane. Allow the solvent-wash to thoroughly flash-off and dry.

B. Maintain clean surface in a clean condition until EPDM Membrane Repair is complete. If cleaned area becomes soiled/contaminated prior to repair of membrane, reclean as necesary for proper membrane repair.

3.04 EPDM MEMBRANE REPAIR INSTALLATION

A. Cut a piece of like membrane large enough to extend 4 inches beyond any part of the cut and to provide an expansion fold of 4 to 6 inches. Round the corners of the patch to prevent peeling of square corners.
   1. Apply primer to both surfaces to be mated and allow to dry.

2. If the existing membrane surface is excessively degraded, insert the new patch material under the existing membrane so that adhering of the patch may be accomplished to the underside of the existing membrane.

B. Adhering Roofing Membrane To The Substrate:
   1. Adhere the roofing membrane to the substrate bonding adhesive. Mating surfaces must be clean and dry before adhering the membrane.
   2. Apply a uniform coating of bonding adhesive to both mating surfaces at the rate recommended by the manufacturer. Do not leave “skips” or “holidays”. Do not allow the bonding adhesive to puddle.
   3. Do not allow bonding adhesive to come in contact with areas to be spliced.
   4. Allow the adhesive to dry until it does not stick to the dry finger touch. Do not attempt to adhere the membrane if the bonding adhesive is wet to the touch.
   5. Adhere the membrane to the substrate so it is free of wrinkles, fishmouths, or voids.
   6. Broom the membrane to achieve maximum adhesion. Do not try to reposition the sheet once it has been adhered to the substrate.
   7. Apply lap sealant along edges of repair.

C. Phasing of Membrane Installation:
   1. Limit the removal of existing materials and repairs to areas that can be completely repaired within the same day.

3.05 FIELD QUALITY CONTROL

A. As the repairs are completed or at the end of each workday, in the presence Resident Project Representative of the closely examine joints in the membrane and repairs. Cut out and repair areas of the joints that are not fully bonded or that contain “fishmouths” or “wrinkles”. Repair the membrane so it is restored to its full waterproof integrity. Lap patches a minimum of 6 inches beyond cuts.
   1. After the Resident Project Representative has examined the repair, redistribute the ballast over the exposed area.

END OF SECTION

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SECTION 07 0553
FIRE AND SMOKE ASSEMBLY IDENTIFICATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Identification markings for fire and smoke rated partitions, and fire rated walls.

1.02 REFERENCE STANDARDS

A. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's printed product literature for each type of marking, indicating font, foreground and background colors, wording, and overall dimensions.

C. Schedule: Completely define scope of proposed marking, and indicate location of affected walls and partitions, and number of markings.

D. Samples: Submit one sample of each type of marking proposed for use, of size similar to that required for project, illustrating font, wording, and method of application.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.05 FIELD CONDITIONS

A. Do not install adhered markings when ambient temperature is lower than recommended by label or sign manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Partition Identification Labels:
   1. Fire Wall Signs, Inc; _____: www.firewallsigns.com/#sle.
   2. Safety Supply Warehouse, Inc; _____: www.safetysupplywarehouse.com/#sle.
   3. My Safety Sign: www.mysafetysign.com.
   4. Smart Sign: www.smartsign.com.
   5. Seton: www.seton.com.
   6. Or approved equal.

2.02 FIRE AND SMOKE ASSEMBLY IDENTIFICATION

A. Regulatory Requirements: Comply with "Marking and Identification" requirements of "Fire-Resistance Ratings and Fire Tests" chapter of ICC (IBC).

B. Adhered Fire and Smoke Assembly Identification Signs: Printed vinyl sign with factory applied adhesive backing.

C. Include lettering not less than 3 inches in height with a minimum 3/8-inch stroke in a contrasting color incorporating the suggested wording "1 HR RATED FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS AND PENETRATIONS". Substitute the "1 HR" wording with the appropriate hourly fire-resistive ratings noted on the drawing plans. A sample sign is illustrated below:

D. Languages: Provide sign markings in English.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.02 PREPARATION

A. Prepare substrate per manufacturer's recommendations.

3.03 INSTALLATION

A. Locate markings as required by ICC (IBC).
   1. Permanently and effectively mark all fire walls, fire barriers, fire partition, smoke barriers, smoke partitions and any other wall required to have protected openings or penetrations with signs.
   2. Locate in accessible concealed spaces below floors, above ceilings and in attic spaces.
   3. Locate in non-occupied fire rated service rooms such as mechanical, electrical, plumbing, communications and equipment rooms.
   4. Locate markings on both sides of walls.
   5. Locate within 15 feet of the end of each wall and at intervals not exceeding 30 feet measured horizontally along the wall or partition.

B. Install adhered markings in accordance with manufacturer's instructions.

C. Install neatly, with horizontal edges level.

D. Protect from damage until Date of Substantial Completion; repair or replace damaged markings.

END OF SECTION

SECTION 07 1400
FLUID-APPLIED WATERPROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fluid applied membrane waterproofing.
   1. Cold-applied rubberized asphalt waterproofing.

B. Below-grade waterproofing accessories.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Concrete substrate.

B. Section 07 2100 - Thermal Insulation: Insulation used for protective cover.

1.03 ABBREVIATIONS

1.04 REFERENCE STANDARDS

A. ASTM C836/C836M - Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course; 2018 (Reapproved 2022).

B. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2016 (Reapproved 2021).

C. ASTM D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers; 2000 (Reapproved 2020).

D. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2015 (Reapproved 2021).

E. ASTM D 4586

F. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022a, with Editorial Revision (2023).

G. ICC-ES AC29 - Acceptance Criteria for Cold, Liquid-Applied, Below-Grade, Exterior Dampproofing and Waterproofing Materials; 2011, with Editorial Revision (2020).

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal process.

B. Product Data: Provide data for membrane and protection board.

C. Certificate: Certify that products meet or exceed specified requirements.

D. Manufacturer's Installation Instructions: Indicate special procedures.

E. Testing Firm's Qualification Statement.

F. Warranty:
   1. Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
   2. Submit installer's certification that installation complies with warranty conditions for the waterproofing membrane.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacture of fluid-applied waterproofing membranes with 3 years experience.

B. Installer Qualifications: Company specializing in installation of fluid-applied waterproofing with minimum 5 years experience.

C. Testing Firm Qualifications: Company specializing in performing work of the type specified and approved by manufacturer.

1.07 MOCK-UP

A. Construct mock-up consisting of 100 sq ft of vertical waterproofed panel; to represent finished work including internal and external corners, drainage panel, base flashings, control joints, expansion joints, counterflashings, and protective cover.

B. See Section 01 4000 - Quality Requirements for additional requirements.

C. Locate where directed.

D. Mock-up may remain as part of this Work.

1.08 PROJECT CONDITIONS

A. Proceed with the Work of this Section only after curbs, blocking, nailer strips, piping, conduit, and other projections through the substrate construction are complete, after all framing of openings is complete, and when existing and forecasted weather conditions will permit the Work to be performed in accordance with the manufacturer's recommendations, the established procedures, and the construction schedule.

1.09 FIELD CONDITIONS

A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application and until cured.

1.10 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Contractor shall correct defective Work within a five year period after Date of Substantial Completion; remove and replace materials concealing waterproofing at no cost to Owner.

C. Provide five year manufacturer warranty for waterproofing failing to resist penetration of water, except where such failures are the result of structural failures of building. Hairline cracking of concrete due to temperature change or shrinkage is not considered a structural failure.

PART 2 PRODUCTS

2.01 MEMBRANE AND FLASHING MATERIALS

A. Cold-Applied Rubberized Asphalt Waterproofing: Rubberized asphaltic compound, suitable for installation on concrete and concrete masonry.
   1. Cured Thickness: 90 mils, 0.090 inch, minimum.

B. Rubberized Asphalt Membrane:
   1. Suitable for installation over concrete substrates.
   2. Tensile Strength: 400 psi, measured in accordance with ASTM D 412.
   3. Ultimate Elongation: 800 percent, measured in accordance with ASTM D 412.
   4. Hardness: 55, measured in accordance with ASTM D 2240, using Type A durometer.
   5. Tear Strength: 55 kN/m, measured in accordance with ASTM D 624.
   6. Water Absorption: 07 percent increase in weight, maximum.
   7. Complying with ICC-ES AC29; evidence of compliance includes current ICC-ES evaluation report citing ICC-ES AC29.
   8. Low Temperature Resistance: No cracking, loss of adhesion, splitting or pinholes when tested at minus 15 degrees F in accordance with ASTM C836/C836M.
   9. Adhesion: No separation when tested in accordance with ASTM C836/C836M.
   10. Decay Resistance: No decay when tested in accordance with ASTM E154/E154M.
   11. Wet Film Sag Resistance: No sag or sag within plus/minus 5 mils when tested in accordance with ASTM C836/C836M.
   12. Water Vapor Permeance: Less than 1 perm, when tested in accordance with ASTM E96/E96M.
   13. Heat Aging Resistance: No cracking, splitting, or pinholes when tested in accordance with ASTM C836/C836M.

2.02 ACCESSORIES

A. Surface Conditioner: compatible with membrane compound; as recommended by membrane manufacturer.

B. Sealant for Joints and Cracks in Substrate: Type compatible with waterproofing material and as recommended by waterproofing manufacturer.

C. Vapor Barrier Sheet: Sheet polyethylene, 15 mil thick, unless otherwise noted.

D. Protection Board: Rigid insulation specified in Section 07 2100.

E. Drainage Panel: Drainage layer with geotextile filter fabric on earth side.
   1. Composition: Dimpled polystyrene core; polypropylene filter fabric.
   2. Thickness: 1/4 inch, minimum.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting Work.

B. Verify substrate surfaces are free of frozen matter, dampness, loose particles, cracks, pits, projections, penetrations, or foreign matter detrimental to adhesion or application of waterproofing system.

3.02 PREPARATION

A. Protect adjacent surfaces not designated to receive waterproofing.

B. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions. Vacuum substrate clean.

C. Do not apply waterproofing to surfaces unacceptable to manufacturer.

D. Prepare building expansion joints at locations as indicated on drawings.

3.03 INSTALLATION

A. Apply waterproofing in accordance with manufacturer's instructions to specified minimum thickness.

B. Apply primer or surface conditioner at a rate recommended by manufacturer, and protect conditioner from rain or frost until dry.

3.04 INSTALLATION - PROTECTION BOARD

A. Place protection drainage board directly against drainage panel; butt joints. Scribe and cut boards around projections, penetrations, and interruptions.

B. Adhere protection board to substrate with compatible adhesive.

3.05 PROTECTION

A. Do not permit traffic over unprotected or uncovered membrane.

END OF SECTION

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SECTION 07 2119
FOAMED-IN-PLACE INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Foamed-in-place insulation.
   1. In underside of floor decks.

B. Protective intumescent coating.

1.02 REFERENCE STANDARDS

A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.

B. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics; 2019.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.

D. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022a, with Editorial Revision (2023).

E. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.

F. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2023.

H. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2019.

I. ICC-Evaluation Service - ICC-ES AC 377 Acceptance Criteria for Spray-Applied Foam Plastic Insulation.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week prior to commencing work of this section.
   1. Agenda:
      a. Construction site safety relating to potential hazards or fire risks during application;
      b. materials approved for use and their compatibility;
      c. submittals;
      d. protectivet coatings;
      e. coordination with substrate preparation;
      f. coordination with installation of adjacent and covering materials;
      g. ventilation of building;
      h. construction and testing of mock-up, and;
      i. protection of material.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide product description, insulation properties, overcoat properties, and preparation requirements.

C. Certificates: Certify that products of this section meet or exceed specified requirements.

D. Manufacturer's Installation Instructions: Indicate special procedures, and perimeter conditions requiring special attention.

E. Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.

F. Installer Qualification: Submit documentation of current contractor accreditation and current installer certification. Keep copies of all contractor accreditation and installer certification on site during and after installation. Present on-site documentation upon request.

G. Compatibility: Submit letter from primary material manufacturer stating thatr matererials proposed for use are permanently chemically compatible and adhesively compatible with adjacent materials or adjacent materials proposed for use.

H. Tests and Evaluation Reports:
   1. Submit research/evaluation report for foam plastic insulation from ICC-ES or equivalent.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with not less than three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified, with minimum three years documented experience, and approved by manufacturer.

1.06 MOCK-UPS

A. See Section 01 4000 - Quality Requirements for additional requirements.

B. Provide _____ mock-up, ____ feet long by ____ feet wide; include insulation overcoat, wall construction, window and frame, and door frame in mock-up.

C. Locate where directed.

D. Mock-up may remain as part of the Work.

1.07 PROTECTION

A. Ventilate area to receive insulation by introducing fresh air and exhausting air continuously during and 24 hours after application to maintain non-toxic, unpolluted, safe working conditions.

B. Provide temporary enclosures to prevent spray and noxious vapors from contaminating air beyond application area. Post warning signs to advise non-protected personnel to avoid the spray area.

C. Shut down and seal off existing ventilation equipment.

1.08 FIELD CONDITIONS

A. Do not apply foam when temperature is below that specified by the manufacturer for ambient air and substrate.

B. Do not apply foam when temperature is within 5 degrees F of dew point.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Foamed-In-Place Insulation:
   1. Huntsman Building Solutions; Heatlok HFO High Lift: www.huntsmanbuildingsolutions.com.
   2. BASF Corporation; WALLTITE US Series Closed Cell: www.spf.basf.com/#sle.
   3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

A. Foamed-In-Place Insulation: Medium-density, rigid or semi-rigid, closed cell polyurethane foam; foamed on-site, using blowing agent of water or non-ozone-depleting gas.
   1. Thermal Resistance: R-value of ___, minimum, per 1 inch thickness at 75 degrees F mean temperature when tested in accordance with ASTM C518.
   2. Water Vapor Permeance: Vapor retarder; 2 perms, maximum, when tested at intended thickness in accordance with ASTM E96/E96M, desiccant method.
   3. Water Absorption: Less than 2 percent by volume, maximum, when tested in accordance with ASTM D2842.

4. Air Permeance: 0.04 cfm per square foot, maximum, when tested at intended thickness in accordance with ASTM E2178 at 1.57 psf.
5. Closed Cell Content: At least 90 percent.
6. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/450, maximum, when tested in accordance with ASTM E84.

2.03 ACCESSORIES

A. Primer: As required by insulation manufacturer.

B. Protective Coating: Intumescent coating of type recommended by insulation manufacturer and as required to comply with applicable codes.
1. Coating Type: Single component, water based.
2. Protected Insulation Type: Spray polyurethane foam (SPF).
3. Application: Apply using brush, roller, or airless sprayer.
4. Fire Test: Flame spread index (FSI) of 0 (Zero) and smoke developed index (SDI) of 10 (Ten), when tested in accordance with ASTM E84.
5. Flammability: Comply with local building code acceptance criteria for NFPA 286.
6. Exterior Wall System: Comply with NFPA 285.
7. Color: Gray.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify work within construction spaces or crevices is complete prior to insulation application.

B. Verify that surfaces are clean, dry, and free of matter that may inhibit insulation or overcoat adhesion.

3.02 PREPARATION

A. Mask and protect adjacent surfaces from over spray or dusting.

B. Apply primer in accordance with manufacturer's instructions.

3.03 APPLICATION

A. Apply insulation in accordance with manufacturer's instructions.

B. Apply insulation by spray method, to a uniform monolithic density without voids.

C. Apply to a minimum cured thickness of 4 inch.

D. Apply overcoat monolithically, without voids, to fully cover foam insulation, to achieve fire rating required.

E. Patch damaged areas.

F. Where applied to voids and gaps assure space for expansion to avoid pressure on adjacent materials that may bind operable parts.

G. Trim excess away for applied trim or remove as required for continuous sealant bead.

3.04 FIELD QUALITY CONTROL

A. Field inspections and tests will be performed by an independent testing agency under provisions of Section 01 4000 - Quality Requirements.

B. Inspection will include verification of insulation and overcoat thickness and density.

3.05 PROTECTION

A. Do not permit subsequent construction work to disturb applied insulation.

B. Protect adjacent surfaces and equipment from damage by overspray, fallout, and dusting of insulation materials.

END OF SECTION

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SECTION 07 2200
ROOF DECK AND INSULATION

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes roof insulation over the properly prepared deck substrate.

1.02 REFERENCES

A. National Roofing Contractors Association (NRCA):
   1. Roofing and Waterproofing Manual.

1.03 SUBMITTALS

A. Product Data: Provide manufacturer's specification data sheets for each product

B. Certification
   1. Submit roof manufacturer's certification that insulation fasteners furnished are acceptable to roof manufacturer.
   2. Submit roof manufacturer's certification that insulation furnished is acceptable to roofing manufacturer as a component of roofing system and is eligible for roof manufacturer's system warranty.

1.04 QUALITY ASSURANCE

A. Fire Classification, ASTM E-108.

B. Manufacturer's Certificate: Certify that roof system furnished is approved by Factory Mutual, Underwriters Laboratories, Warnock Hersey or approved third party testing facility in accordance with ASTM E108, Class A for external fire and meets local or nationally recognized building codes.

C. Manufacturer's Certificate: Certify that the roof system is adhered properly to meet or exceed the requirements of FM [1-90].

D. Pre-installation meeting: Refer to Division 07 roofing specifications for pre-installation meeting requirements.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site with seals and labels intact, in manufacturer's original containers, dry and undamaged.

B. Store all insulation materials in a manner to protect them from the wind, sun and moisture damage prior to and during installation. Any insulation that has been exposed to any moisture shall be removed from the project site.

C. Keep materials enclosed in a watertight, ventilated enclosure (i.e. tarpaulins).

D. Store materials off the ground. Any warped, broken or wet insulation boards shall be removed from the site.

PART 2 – PRODUCTS

2.01 PRODUCTS, GENERAL

A. Refer to Division 01 Section "Common Product Requirements."

B. Basis of Design: Materials, manufacturer's product designations, and/or manufacturer's names specified herein shall be regarded as the minimum standard of quality required for work of this Section. Comply with all manufacturer and contractor/fabricator quality and performance criteria specified in Part 1.

2.02 INSULATION MATERIALS

A. Thermal Insulation Properties and Approved Insulation Boards.
   1. Rigid Polyisocyanurate Roof Insulation; ASTM C1289:

a. Qualities: Rigid, closed-cell polyisocyanurate foam core bonded to heavy-duty glass fiber mat facers.
b. Thickness: Minimum one layer 2.6 inches.
c. R-Value: Minimum 30.
d. Compliances: UL, WH or FM listed under Roofing Systems
    1) Federal Specification HH-I-1972, Class 1.
e. Acceptable Products:
    1) ENRGY-3; Johns Manville
    2) Hytherm; Dow
    3) EnergyGuard; GAF
    4) Approved Equivalent

2. Roof Cover Board
a. Qualities: Nonstructural, noncombustible, homogenous composition panel.
b. Board Size: Four by eight feet (4'x8') or four by four (4'x4').
c. Thickness: One-half (1/2) inch.
d. R-Value: 0.5 nominal
e. Compliances: UL. WH or FM listed under Roofing Systems.
f. Acceptable Products:
    1) Densdeck Prime (Basis of Design)
    2) Securock

2.03 RELATED MATERIALS

A. Fiber Cant and Tapered Edge Strips: Performed rigid insulation units of sizes/shapes indicated, matching insulation board or of perlite or organic fiberboard, as per the approved manufacturer.
1. Acceptable Manufacturers:
    a. The Garland Company, Inc.
    b. Celotex
    c. Johns Manville
    d. GAF
    e. Approved Equivalent

B. Low Rise Adhesive: Insul-Lock HR - Dual-component, high rise foam adhesive as recommended by insulation manufacturer and approved by FM indicated ratings.
1. Tensile Strength (ASTM D412)…….250 psi
2. Density (ASTM D1875)……8.5 lbs./gal.
3. Viscosity (ASTM D2556)……..22,000 to 60,000 cP.
4. 2 `Peel Strength (ASTM D903)……17 lb/in.
5. 3 `Flexibility (ASTM D816)……....Pass @ -70°F

PART 3 – EXECUTION

3.01 EXECUTION, GENERAL

A. Comply with requirements of Division 01 Section "Common Execution Requirements."

B. Positive drainage and slope of new insulation (if required) is the responsibility of the installing roofing contractor. Roof must maintain positive drainage.

C. Verification of existing system and insulation heights is the responsibility of the installing roofing contractor. Any required core cuts and proper repairs to maintain waterproofing are the responsibility of the installing contractor.

3.02 INSPECTOR OF SURFACES

A. Roofing contractor shall be responsible for preparing an adequate substrate to receive insulation.
1. Verify that work which penetrates roof deck has been completed.
2. Verify that wood nailers are properly and securely installed.

3. Examine surfaces for defects, rough spots, ridges, depressions, foreign material, moisture, and unevenness.
4. Do not proceed until defects are corrected.
5. Do not apply insulation until substrate is sufficiently dry.
6. Broom clean substrate immediately prior to application.
7. Use additional insulation to fill depressions and low spots that would otherwise cause ponding water.
8. Verify that temporary roof has been completed.

3.03 INSTALLATION

A. Attachment with Insulation Adhesive
1. Ensure all surfaces are clean, dry, free of dirt, debris, oils, loose ore embedded gravel, unadhered coatings, deteriorated membrane and other contaminants that may inhibit adhesion.
2. Apply insulation adhesive directly to the substrate using a ribbon pattern with one quarter to one half (1/4-1/2) inch wide beads 12 inches o.c., using either the manual applicator or an automatic applicator, at a rate of one (1) gallon per one hundred (150) square feet per cartridge.
3. Immediately place insulation boards into wet adhesive. Do not slide boards into place. Do not allow the adhesive to skin over before installing insulation boards.
4. Briefly step each board into place to ensure contact with the adhesive. Substrates with irregular surfaces may prevent the insulation board from making positive contact with the adhesive. Relief cuts or temporary weights may be required to ensure proper contact.
5. All boards shall be cut and fitted where the roof deck intersects a vertical surface. The boards shall be cut to fit a minimum of one quarter (1/4) inch away from the vertical surface.
6. Tape joints of insulation as per manufacturer's requirements.

3.04 CLEANING

A. Remove debris and cartons from the roof deck. Leave insulation clean and dry, ready to receive roofing membrane.

3.05 CONSTRUCTION WASTE MANAGEMENT

A. Remove and properly dispose of waste products generated during installation. Comply with requirements of authorities having jurisdiction.

END OF SECTION

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SECTION 07 4100
ARCHITECTURAL WALL PANELS

PART I GENERAL

1.01 SECTION INCLUDES

A. Work described in this section includes pre-formed flat seam wall panel system complete with anchor clips, fasteners, flashing, and trim.

1.02 REFERENCES

A. American Iron and Steel Institute (AISI):
   1. 1996 Ed. Specification for the Design of Cold-Formed Steel Structural Members.

B. American Society for Testing and Materials (ASTM):
   1. A240-96 Specification for Heat Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels.
   2. A792-96 Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
   3. A875-99 Specification for Steel Sheet, Zinc-5% Aluminum Alloy-Coated by the Hot Dip Process.
   4. B209-96 Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
   5. B370-92 Specification for Copper Sheet and Strip for Building Construction.
   6. E331-86 Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

C. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
   1. Architectural Sheet Metal Manual, 5th edition.

1.03 SUBMITTALS

A. Product Data: Include manufacturer's detailed material and system description, concealed anchor clips, sealant and closure installation instructions, and finish specifications. Indicate fastener types and spacing; and required fastener pullout values.

B. Samples: Provide full-scale samples of the following materials and system components. Samples shall be of identical material type, thickness, panel width, and material grade/alloy as the system specified for this project. Except for item 2, samples may be of any of the manufacturer’s standard colors.
   1. Submit a twelve (12) inch long by actual width sample of panel showing seam profile.
   2. Provide a six by six (6 x 6) inches sample of the color selected for this project. The sample shall be the actual specified coating system on a metal substrate.
   3. Provide samples of actual system components, including: each type of anchor clip and fastener required, roll goods (if specified), and any other framing or accessory items (if specified).

C. Test report showing passing results from the ASTM E331-86 standard method for water penetration of exterior windows, curtain walls, and doors by uniform static air pressure difference.

1.04 QUALITY ASSURANCE

A. Engage an experienced metal roofing contractor (erector) to install wall panel system who has a minimum of three (3) years experience specializing in the installation of architectural standing seam metal roof systems and wall panels.

B. Contractor must be certified by manufacturer specified as supplier of wall panel system and obtain written certification from manufacturer that installer is approved for installation of specified system. If requested, the contractor must supply the owner with a copy of this certification.

C. Successful contractor is required to maintain a full-time supervisor/foreman who is on the jobsite at all times during installation of new wall panel system. Foreman must have a minimum of three (3) years experience with the installation of systems similar to that specified.

D. Successful contractor must obtain all components of wall panel system from a single manufacturer including any roll good materials if required. Any secondary products that are required which cannot be supplied by the specified manufacturer must be recommended and approved in writing by primary manufacturer prior to bidding.

E. If required, fabricator/installer shall submit work experience and evidence of adequate financial responsibility. The owner's representative reserves the right to inspect fabrication facilities in determining qualifications.

1.05 DELIVERY, STORAGE, AND HANDLING.

A. Manufacturer's responsibility:
   1. Protect components during fabrication and packing from mechanical abuse, stains, discoloration, and corrosion.
   2. Provide protective interleaving between contact areas of exposed surfaces to prevent abrasion during shipment, storage, and handling.

B. Installer's responsibility:
   1. Store materials off ground providing for drainage; under cover providing for air circulation; and protected from wind movement, foreign material contamination, mechanical damage, cement, lime or other corrosive substances.
   2. Handle materials to prevent damage to surfaces, edges and ends of panels and sheet metal items. Damaged material shall be rejected and removed from the site.
   3. Protect panels from wind-related damage.
   4. Inspect materials upon delivery. Reject and remove physically damaged or marred material from project site.

1.06 JOB CONDITIONS

A. Determine that work of other trades will not hamper or conflict with necessary fabrication and storage requirements for pre-formed wall panel system.
   1. Protection:
   2. Provide protection around completed wall panel surfaces.
   3. Support no wall-mounted equipment or fixtures directly on wall panels.

B. Ascertain that work of other trades which penetrates the wall panels or is to be made watertight by the wall panels is in place and approved prior to installation of panels.

1.07 WARRANTIES

A. Owner shall receive one (1) warranty from manufacturer of wall panels covering all of the following criteria. Multiple warranties are not acceptable.

B. Manufacturer's 10-year watertight warranty
   1. Manufacturer's standard 20 year finish warranty covering checking, crazing, peeling, chalking, fading, or adhesion.
   2. Installer's 2-year warranty covering wall panel system installation.
   3. Warranties shall commence on the date of substantial completion.

PART II PRODUCTS

2.01 ARCHITECTURAL WALL PANEL SYSTEM

A. General.

1. Whenever a particular make of material, trade name and/or manufacturer's name is specified herein, it shall be regarded as being indicative of the minimum standard of quality required. A bidder who proposes to quote on the basis of an alternate material and/or system will only be considered if the proposed alternate is submitted on time and is documented as being equivalent or superior in quality to the specified system in accordance with article 1.5. Additionally, all manufacturer and contractor/fabricator guidelines and criteria must be met as specified in articles 1.4, 1.5, and 1.6.
2. Product names for the metal wall panel system and waterproofing materials used in this section shall be based on performance characteristics of the R-MER Wall-Pan system manufactured by the Garland Company, Cleveland, OH, and shall form the basis of the contract documents. Any proposed alternate systems must meet or exceed the following listed characteristics and be submitted for approval ten (10) days prior to bid opening. Additionally, all requirements listed in “Warranty Criteria (article 1.7) must be met and submitted as well as all items listed in the Alternate Manufacturer’s Qualifications (article 1.5).

B. Materials.
1. Panel material: 040 Aluminum
2. Flashing and flat stock material: Fabricate in profiles indicated on drawings of same material, thickness, and finish as wall panel system, unless indicated otherwise.

C. Finish on surfaces:
1. Exposed surfaces for coated panels:
   a. Two coat coil applied, baked-on full-strength (70% resin) fluorocarbon coating system (polyvinylidene fluoride, PVF2), applied by manufacturer's approved applicator.
   b. Coating system shall provide nominal 1.0 mil dry film thickness, consisting of primer and color coat.
   c. Color shall be standard color determined by architect and owner.
2. Unexposed surfaces for coated panels shall be baked-on polyester coating with .20 - .30 dry film thickness (TDF).

D. Characteristics:
1. Fabrication: Panels shall be factory roll-formed from the specified metal. Field rolled panels will not be allowed.
2. Configuration: Interlocking flush/flat seams incorporating concealed anchor clips. Through-fastened or exposed fastener systems are not acceptable.
3. Panel seam legs shall be one (1) inch nominal concealed depth behind the panel face. Seam shall allow for expansion and contraction of panels due to thermal changes.
4. Anchor clips: Clips shall be 22-gauge galvalume steel designed to allow thermal movement of the panel in each direction along the longitudinal dimension.
5. Panel Width (Seam Spacing): 13" nominal.
6. Panel lengths: Full length without joints to the extent as is practical.
7. Profile of panel face shall have a single Vee-groove reveal located three (3) inches in from each panel seam. These will absorb thermal stresses, reduce oil canning, and provide aesthetic appeal.

E. Accessories:
1. Fasteners:
   a. Concealed fasteners: Corrosion resistant steel screws, #10 x 1" long, pancake head, Phillips drive. Use self-drilling, self-tapping for metal substrate or A-point for plywood substrate.
   b. Exposed fasteners: Series 410 stainless steel screws or one eighth (1/8) inch diameter stainless steel waterproof rivets. All exposed fasteners shall be factory painted to match the color of the wall panels.
2. Provide all miscellaneous accessories for complete installation.

3. Underlayments: Prior to installation of metal wall panels, underlayment is to be applied to brick substrate on the parapet wall. Underlayment shall be one ply of self-adhering membrane. Seams shall be lapped in accordance with manufacturer's recommendations.

2.02 METAL SOFFIT PANELS

A. Basis of Design: R-Mer Soffit as manufactured by Garland Company.
   1. Non-vented soffit
   2. Width: 12 inches
   3. Thickness: 0.032 aluminum with Kynar finish.
   4. Color: As selected by Architect from Manufacturer's full range of colors.

2.03 ACCESSORY PRODUCTS

A. Sealant:
   1. Acceptable product:
      a. Concealed Application: Bostik Chem-Calk butyl sealant or equal.
      b. Exposed Application: Tri-Polymer sealant or equal.
   2. Colors: As selected by architect from sealant manufacturer's standard selection.

B. Wall Substrate:
   1. Exterior grade sheathing.
   2. After wall has been prepared, prime surface with SA Primer and install Garland RMer Seal.

2.04 FABRICATION

A. Shop fabricate metal panels and flashing components to the maximum extent possible, forming metal work with clear, sharp, straight, and uniform bends and rises. Hem exposed edges of flashings.

B. Form flashing components from full single width sheet in minimum ten (10'-0") feet sections. Provide shop fabricated, mitered corners, joined using closed end pop rivets and joint sealant.

C. Fabricate panels and related sheet metal work in accordance with approved shop drawings and applicable standards.

PART III EXECUTION

3.01 PREPARATION

A. Inspection: Examine the alignment and placement of the building structure and substrate. Correct any objectionable warp, waves or buckles in the substrate before proceeding with installation of the pre-formed metal panels.

B. Pre-installation conference: Prior to beginning metal wall panel work, a pre-installation conference shall be held to review work to be accomplished.
   1. Contractor, metal wall panel subcontractor, metal wall panel system manufacturer's representative and all other subcontractors who have equipment penetrating wall panels or whose work involves access to wall panel area shall be present.

3.02 WALL PANEL INSTALLATION

A. Install panels and flashings in accordance with manufacturer's product data, within specified erection tolerances.

B. Prepare wall for the installation of panels, including:
   1. In accordance with wall panel installation a new modified roof system is being installed. New modified flashings must be installed prior to installation of metal wall panel system. New flashings are to be installed minimum 8” up the wall so that they are behind wall panel system. Then cement and fabric the top edge of flashings.
   2. Install underlayment prior to wall panel installation.
   3. New coping cap to be installed around the perimeter of parapet walls.

C. Directly over the completed wall substrate, install metal wall panels. All panels will be fastened into the structural substrate with concealed anchor at thirty (30) inches on center maximum spacing along each panel seam.

D. Seal laps and joints in accordance with roofing system manufacturer's product data.

E. Coordinate flashing and sheet metal work to provide weathertight conditions at wall panel terminations. Fabricate and install in accordance with the standards of SMACNA Manual.

F. Installed system shall be true to line and plane and free of dents, and physical defects. In light gauge panels with wide flat surfaces, some oil canning may be present. Oil canning does not affect the finish or structural integrity of the panel and is therefore not cause for rejection.

G. Form joints in linear sheet metal to allow for one quarter (1/4) inch minimum expansion at twenty (20'-0") feet on center maximum and eight (8'-0") feet from corners.

H. At joints in linear sheet metal items, set sheet metal items in two (2) one quarter (1/4) inch beads of butyl sealant. Extend sealant over all metal surfaces. Mate components for positive seal. Allow no sealant to migrate onto exposed surfaces.

I. Remove damaged work and replace it with new, undamaged components.

J. Touch up exposed fasteners using paint furnished by wall panel manufacturer and matching exposed panel surface finish.

K. Clean exposed surfaces of panels and accessories after completion of installation. Leave in clean condition at date of substantial completion. Touch up minor abrasions and scratches in finish.

END OF SECTION

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SECTION 07 5200
2-PLY MODIFIED HYBRID MEMBRANE ROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cold Applied, 2-Ply Modified Hybrid System

B. Accessories.

C. Edge Treatment and Roof Penetration Flashings.

1.02 RELATED SECTIONS

A. Section 01 1100 – Summary of Work

B. Section 07 2200 – Roof Deck and Insulation

1.03 REFERENCES

A. ASTM D 6163 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.

B. National Roofing Contractors Association (NRCA): Roofing and Waterproofing Manual.

C. ASCE 7, Minimum Design Loads for Buildings and Other Structures

D. UL - Fire Resistance Directory.

1.04 DESIGN / PERFORMANCE REQUIREMENTS

A. Perform work in accordance with all federal, state and local codes.

B. Exterior Fire Test Exposure: Roof system shall achieve a UL, FM or WH Class rating for roof slopes indicated on the Drawings as follows:
   1. Factory Mutual Class A Rating.

C. Design Requirements:
   1. Uniform Wind Uplift Load Capacity
      a. Installed roof system shall withstand negative (uplift) design wind loading pressures complying with the following criteria.
         1) Design Code: ASCE 7, Method 2 for Components and Cladding.
         2) Refer to Garland Wind Uplift Calculations provided in bid package for approved system

D. Roof System membranes containing recycled or bio-based materials shall be third party certified through UL Environment.

E. Roof system shall have been tested in compliance with the following codes and test requirements:
   1. Cool Roof Rating Council:
      a. CRRC Directory
   2. International Code Council Evaluation Service (ICC-ES):
      a. Membrane Systems
         1) ESR-3460
         2) Or Approved Equal.
      b. Roofing Underlayments
         1) Garland Underlayments ESR-3460
         2) Surfacing UDL ESR-3460
         3) Or Approved Equal.
   3. Texas Department of Insurance:
      a. Product Evaluation RC-45
   4. Underwriters Laboratories:
      a. Certification TGFU.R8384

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with NRCA Roofing and Waterproofing Manual.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified with documented ISO 9001 certification and minimum of twelve years of documented experience and must not have been in Chapter 11 bankruptcy during the last five years.

C. Manufacturer Field Supervision: Company must provide a technical representative on site to assist installing contractor and architect. Representative must be on site 2 days per week, or during each phase change. Company must provide photographic progress reports on a weekly basis throughout the project.

D. Installer Qualifications: Company specializing in performing Work of this section with minimum five years documented experience and a certified Pre-Approved Garland Contractor.

E. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work while roofing work is in progress.

F. Product Certification: Provide manufacturer's certification that materials are manufactured in the United States and conform to requirements specified herein, are chemically and physically compatible with each other, and are suitable for inclusion within the total roof system specified herein.

1.06 PRE-INSTALLATION MEETINGS

A. Convene minimum two weeks prior to commencing Work of this section.

B. Review installation procedures and coordination required with related Work.

C. Inspect and make notes of job conditions prior to installation:
   1. Record minutes of the conference and provide copies to all parties present.
   2. Identify all outstanding issues in writing designating the responsible party for follow-up action and the timetable for completion.
   3. Installation of roofing system shall not begin until all outstanding issues are resolved to the satisfaction of the Architect.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in manufacturer's unopened packaging with labels intact until ready for installation.

B. Store all roofing materials in a dry place, on pallets or raised platforms, out of direct exposure to the elements until time of application. Store materials at least 4 inches above ground level and covered with "breathable" tarpaulins.

C. Stored in accordance with the instructions of the manufacturer prior to their application or installation. Store roll goods on end on a clean flat surface except store KEE-Stone FB 60 rolls flat on a clean flat surface. No wet or damaged materials will be used in the application.

D. Store at room temperature wherever possible, until immediately prior to installing the roll. During winter, store materials in a heated location with a 50 degree F (10 degree C) minimum temperature, removed only as needed for immediate use. Keep materials away from open flame or welding sparks.

E. Avoid stockpiling of materials on roofs without first obtaining acceptance from the Architect/Engineer.

F. Adhesive storage shall be between the range of above 50 degree F (10 degree C) and below 80 degree F (27 degree C). Area of storage shall be constructed for flammable storage.

1.08 COORDINATION

A. Coordinate with all related trades (masonry, plumbing, GC, mechanical) where required.

B. Coordinate with Architect and Manufacturer to ensure proper installation of roofing system and to maintain warranty standards per architectural drawings and manufacturer's specifications.

1.09 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.10 WARRANTY

A. Contractors Guarantee: 3 Years
   1. The Contractor guarantees that the total roofing installation, together with all related composition flashings, plastic flashings, metal flashings, patented preformed polystyrene panels, and base sheet fasteners, roof insulation, any vapor seal, blocking, adhesives and seals in connection with the same, will be watertight and free from defects as to materials, installation and/or workmanship for a period of 3-years from the date of acceptance of the completed project.
   2. During the 2-year guarantee period, the contractor agrees that within 24 hours of receipt of notice from the Owner, he will inspect and make immediate emergency repairs to defects or to leaks in the roof system, and within a reasonable time, he will restore the affected items to the standard of the original specifications.
   3. All emergency and permanent work during the life of the Contractors guarantee will be done without cost to the Owner, except in the event it is determined that such leaks were caused by abuse, lightning, hurricane, tornado, hail storm or other unusual climatic phenomena of the elements, or failure of adjacent or related work previously installed by others.

B. Manufacturer’s Warranty: In addition to the 3-year period specified above, furnish the membrane manufacturer’s printed 30-Year (continuous) No Dollar Limit, edge-to-edge, non-prorated, Full System Warranty, covering workmanship, materials, metal edge system and wind related damage, for the Work of this Section.
   1. The warranty shall include, but not be limited to, repair of leakage and the repair and/or replacement of the roofing system as necessary to correct defects or damage caused by; materials, workmanship, or wind speeds less than 90 MPH (V3s).
   2. The manufacturer approved roof system shall withstand extended peak gust wind speed coverage up to 90 MPH (V3s).
   3. Warranty shall commence with the Owner final acceptance of all the work covered under the warranty as written above.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: Garland Company, Inc. (The); 3800 E. 91st St., Cleveland, OH 44105. Contact: John Lesko (332) 999-4131 jlesko@garlandind.com

B. Or Approved Equal.

2.02 2-PLY MODIFIED SYSTEM – ROLL GOODS

A. Modified Base Sheet Field/Flashings (Cold Process / Ply #1):
   1. FlexBase E 80: 80 mil SBS (Styrene-Butadiene-Styrene) rubber modified roofing base sheet reinforced with a fiberglass and polyester composite scrim, performance requirements according to ASTM D 5147.
      a. Tensile Strength, ASTM D 5147
         1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 550 lbf/in XD 550 lbf/in
         2) 50 mm/min. @ 23 +/- 2 deg. C MD 96.2 kN/m XD96.2 kN/m
      b. Tear Strength, ASTM D 5147
         1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 1,000 lbf XD 1,000 lbf
         2) 50 mm/min. @ 23 +/- 2 deg. C MD 4,448 N XD 4,448 N
      c. Elongation at Maximum Tensile, ASTM D 5147
         1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 9% XD 9%

2) 50 mm/min. @ 23 +/- 2 deg. C MD 9% XD 9%
d. Low Temperature Flexibility, ASTM D 5147, Passes -40 deg. F (-40 deg. C)

B. Hybrid Modified Cap Sheet Field/ Flashings (Cold Process / Ply #2):
1. KEE-Stone FB 60: 60 mil thermoplastic, ketone ethylene ester (KEE) roofing membrane with polyester scrim. ASTM D6754
a. Breaking Strength, ASTM D 751, Proc. B, strip
1) 375 lbf. (1,668 N)
b. Tear Strength ASTM D 751
1) 120 lbf. min. (534 N)
c. Elongation at Break (%), ASTM D 751, Proc. B, Strip
1) 40% at Break, strip: <90% of original.

C. Vapor Barrier (Cold Process)
1. Vapor Smart: 80 mil SBS (Styrene-Butadiene-Styrene) rubber modified roofing base sheet reinforced with a fiberglass and polyester composite scrim, performance requirements according to ASTM D 5147.
a. Tensile Strength, ASTM D 5147
1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 550 lbf/in XD 550 lbf/in
2) 50 mm/min. @ 23 +/- 2 deg. C MD 96.2 kN/m XD96.2 kN/m
b. Tear Strength, ASTM D 5147
1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 1,000 lbf XD 1,000 lbf
2) 50 mm/min. @ 23 +/- 2 deg. C MD 4,448 N XD 4,448 N
c. Elongation at Maximum Tensile, ASTM D 5147
1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 9% XD 9%
2) 50 mm/min. @ 23 +/- 2 deg. C MD 9% XD 9%
d. Low Temperature Flexibility, ASTM D 5147, Passes -40 deg. F (-40 deg. C)

2.03 2-PLY MODIFIED SYSTEM – ADHESIVES AND SEALANTS

A. Interply Adhesive for 2-Ply System
1. Base Ply + Flashings
1) Green-Lock Plus White/Black Adhesive: High-performance, moisture-cured polymer, white/black adhesive used to construct cold process roofing systems on single or multiple plies of Garland-approved base sheets and Garland-approved membranes.
2) Non-Volatile Content ASTM D 4586 100%
3) Density ASTM D 1475 12.8 lbs./gal. (1.47 g/cm3)
4) Viscosity Brookfield Spindle T-E at 5 rpm 60,000 cPs.
5) Flash Point ASTM D 93 400 deg. F min. (232 deg. C)
6) Slope: up to 3:12
2. Cap Ply + Flashings
1) KEE-Lock Foam: Dual component, single bead (spatter spray/ribbon applied) urethane insulation/membrane adhesive.
2) Tensile Strength (ASTM D 412) 250 psi
3) Density (ASTM D 1875) 8.5 lbs./gal.
4) Viscosity (ASTM D 2556) 22,000 - 60,000 cP
5) Peel Strength (ASTM D 903) 17 lb./in.
6) Flexibility (ASTM D 816) Pass @ -70 deg. F (-56.7 deg. C)

B. Flashing Adhesive and Mastic
1. Green-Lock Plus White Flashing Grade
2. KEE WB Bonding Adhesive

C. Sealants

1. Garland Green-Lock Structural Sealant: High Performance Polyether, single component sealant used for all details, termination bar, skylights and penetrations. Capable of bonding to asphalt, wood, metal, masonry, glass and Styrofoam.

2.04 ACCESSORIES:

A. Roof Insulation: In accordance with Section 07 2200.

2.05 EDGE TREATMENT AND ROOF PENETRATION FLASHINGS

A. Pre-Manufactured Edge Metal: R-Mer Force Flash-less Snap-On Fascia Cover and Splice Plate.
   1. Steel, in thickness of 24 g nominal.
      a. Color: Standard color selected by Owner.

B. Pre-Manufactured Edge Metal: R-Mer Force Flash-less Snap-On Fascia Extruded Base Anchor and Components.
   1. Base Anchor: 6005A-T61 extruded aluminum.
   2. Compression Seal for top of anchor: TPE thermoplastic elastomer.
   3. Sealant for Flange: Green-Lock Sealant XL: Single-component high performance 100% solids, interior and exterior polyether joint sealant.

C. Coping Caps to be fabricated by roofing contractor in accordance with ANSI-SPRI ES-1 based on field conditions and measurements

D. R-Mer SS Sheet Stock: High gloss, factory painted steel
   1. Material and Thickness:
      a. 24 g Steel, Kynar Painted
      b. Color: Standard color selected by Owner.

E. Pitch pans, Rain Collar 24 gauge stainless or 20oz (567gram) copper. All joints should be welded/soldered watertight. See details for design.

F. Drain Flashings shall be lead formed and rolled

G. Plumbing stacks shall be copper formed and rolled.

H. Fabricated Flashings:
   1. Fabricated flashings and trim shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the CDA Copper Development Association "Copper in Architecture - Handbook" as applicable.

I. Manufactured Roof Specialties: Shop fabricated copings, fascia, gravel stops, control joints, expansion joints, joint covers and related flashings and trim
   1. Manufactured roof specialties shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the NRCA "Roofing and Waterproofing Manual" as applicable.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Inspect and approve the deck condition, slopes and fastener backing if applicable, parapet walls, expansion joints, roof drains, stack vents, vent outlets, nailers and surfaces and elements.

C. Verify that work penetrating the roof deck, or which may otherwise affect the roofing, has been properly completed.

D. If substrate preparation and other conditions are the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. General: Clean surfaces thoroughly prior to installation.

1. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
2. Fill substrate surface voids that are greater than 1/4 inch wide with an acceptable fill material.
3. Roof surface to receive roofing system shall be smooth, clean, free from loose gravel, dirt and debris, dry and structurally sound.
4. Wherever necessary, all surfaces to receive roofing materials shall be power broom and vacuumed to remove debris and loose matter prior to starting work.
5. Do not apply roofing during inclement weather. Do not apply roofing membrane to damp, frozen, dirty, or dusty surfaces.
6. Fasteners and plates for fastening components mechanically to the substrate shall provide a minimum pull-out capacity of 300 lbs. (136 k) per fastener. Base or ply sheets attached with cap nails require a minimum pullout capacity of 40 lb. per nail.
7. Prime decks where required, in accordance with requirements and recommendations of the primer and deck manufacturer.

B. Roof Deck
1. Decks shall be clean, dry and free of flaws and attached securely to the supporting structure as recommended by the deck manufacturer.
2. Check deck for excessive degradation and any structural flaws prior to attaching roof system.

C. Insulation:
1. All joints between layers should be staggered when multiple layers of insulation are installed. Insulation greater than 2.5 inches shall be installed in multiple layers.
2. Insulation shall be kept dry at all times. Install only as much insulation as can be covered with completed roofing membrane before the end of the day's work or prior to onset of inclement weather.
3. Edges shall butt tightly and all cuts shall fit neatly against adjoining surfaces to provide a smooth overall surface. Gaps of greater than 1/4 inch width shall be filled with insulation.
4. Install tapered insulation around roof drains and penetrations to provide adequate slope for proper drainage.
5. Mechanically attached insulation shall be fastened in accordance with code and insurance requirements for the applicable geographic zone with the required number and type of fasteners and plates.

3.03 INSTALLATION - GENERAL

A. Install modified bitumen membranes and flashings in accordance with manufacturer's instructions and with the recommendations provided by the National Roofing Contractors Association's Roofing & Waterproofing Manual, the Asphalt Roofing Manufacturers Association, and applicable codes.

B. General: Avoid installation of modified bitumen membranes at temperatures lower than 40-45 degrees F. When work at such temperatures unavoidable use the following precautions:
1. Take extra care during cold weather installation and when ambient temperatures are affected by wind or humidity, to ensure adequate bonding is achieved between the surfaces to be joined. Use extra care at material seam welds and where adhesion of the applied product to the appropriately prepared substrate as the substrate can be affected by such temperature constraints as well.
2. Unrolling of cold materials, under low ambient conditions must be avoided to prevent the likelihood of unnecessary stress cracking. Rolls must be at least 40 degrees F at the time of application. If the membrane roll becomes stiff or difficult to install, it must be replaced with roll from a heated storage area.

C. Commence installation of the roofing system at the lowest point of the roof (or roof area), working up the slope toward the highest point. Lap sheets shingle fashion so as to constantly shed water

3.04 INSTALLATION OF MODIFIED BITUMEN ROOF SYSTEM

A. Base Sheet Field – (Cold Process): Cut base ply sheets into 18 foot lengths and allow plies to relax before installing. Install base sheet in Interply Adhesive: applied at the rate required by the manufacturer. Shingle base sheets uniformly to achieve one ply throughout over the prepared substrate. Shingle in proper direction to shed water on each large area of roofing.
   1. Lap ply sheet ends 8 inches. Stagger end laps 12 inches minimum.
   2. Solidly bond to the substrate and adjacent ply with specified cold adhesive at the rate of 2-1/2 gallons per 100 square feet.
   3. Roll must push a puddle of adhesive in front of it with adhesive slightly visible at all side laps. Use care to eliminate air entrapment under the membrane.
   4. Install subsequent rolls of modified across the roof as above with a minimum of 4 inch side laps and 8 inch staggered end laps. Lay modified membrane in the same direction as the underlayers but the laps shall not coincide with the laps of the base layers.
   5. Extend plies 2 inches beyond top edges of cants at wall and projection bases.
   6. Install base flashing ply to all perimeter and projection details.
   7. Allow the one ply of base sheet to cure at least 30 minutes before installing the modified membrane. However, the modified membrane must be installed the same day as the base plies.

B. Base Sheet Flashings – (Cold Process): Cut base ply sheets into 18 foot lengths and allow plies to relax before installing. Install base sheet in Interply Adhesive: applied at the rate required by the manufacturer. Shingle base sheets uniformly to achieve one ply throughout over the prepared substrate. Shingle in proper direction to shed water on each large area of roofing.
   1. Lap ply sheet ends 8 inches. Stagger end laps 12 inches minimum.
   2. Solidly bond to the substrate and adjacent ply with specified cold adhesive at the rate of 2 to 2-1/2 gallons per 100 square feet.
   3. Roll must push a puddle of adhesive in front of it with adhesive slightly visible at all side laps. Use care to eliminate air entrapment under the membrane.
   4. Install subsequent rolls of modified across the roof as above with a minimum of 4 inch side laps and 8 inch staggered end laps. Lay modified membrane in the same direction as the underlayers but the laps shall not coincide with the laps of the base layers.
   5. Extend plies up and over the concrete wall and nail off on outer edge.
   6. Install base flashing ply to all perimeter and projection details.
   7. Allow the one ply of base sheet to cure at least 30 minutes before installing the modified membrane. However, the modified membrane must be installed the same day as the base plies.

C. Cap Sheet Field/Flashings – (Cold Process): Allow plies to relax before installing. Install in interplay adhesive applied at the rate required by the manufacturer. Shingle sheets uniformly over the prepared substrate to achieve the number of plies specified. Shingle in proper direction to shed water on each large area of roofing.
   1. All field seams exceeding 10 feet in length shall be welded with an approved automatic welder.
   2. All field seams must be clean and dry prior to initiating any field welding. Remove foreign materials from the seams (dirt, oils, etc.) with acetone or authorized alternative. Use CLEAN WHITE COTTON cloths and allow approximately five minutes for solvents to dissipate before initiating the automatic welder. Do not use denim or synthetic rags for cleaning.
   3. Contaminated areas within a membrane seam will inhibit proper welding and will require a membrane patch or strip.
   4. All welding shall be performed only by qualified personnel to ensure the quality and continuity of the weld. The lap or seam area of the membrane may be intermittently tack welded to hold the membrane in place.

5. The back interior edge of the membrane shall be welded first, with a thin, continuous weld to concentrate heat along the exterior edge of the lap during the final welding pass.
6. Follow local code requirements for electric supply, grounding and surge protection. The use of a dedicated, portable generator is highly recommended to ensure a consistent electrical supply, without fluctuations that can interfere with weld consistency.

D. Properly welded seams shall utilize a 1.5 inch wide nozzle, to create a homogeneous weld, a minimum of 1.5 inches in width.

E. Fibrous Cant Strips: Provide non-combustible perlite or glass fiber cant strips at all wall/curb detail treatments where angle changes are greater than 45 degrees. Cant may be set in approved cold adhesives, hot asphalt or mechanically attached with approved plates and fasteners.

F. Metal Work: Provide metal flashings, counter flashings, parapet coping caps and thru-wall flashings in accordance with the SMACNA "Architectural Sheet Metal Manual" or the NRCA Roofing Waterproofing manual.

G. Termination Bar: Provide a metal termination bar or approved top edge securement at the terminus of all flashing sheets at walls and curbs. Fasten the bar a minimum of 8 inches (203 mm) o/c to achieve constant compression. Provide Green-Lock Structural Sealant at top edge.

3.05 INSTALLATION EDGE TREATMENT AND ROOF PENETRATION FLASHING

A. Pre-Manufactured Flash-less Snap-On Metal Edge System:
1. Position base ply of the Built-Up and/or Modified Roofing membrane over the roof edge covering nailers completely, fastening eight (8) inches on center. Install membrane and thermoplastic cap ply with proper material and procedure according to manufacturer's recommendations. Thermoplastic cap ply shall stop at the edge of the roof and shall not turn over the edge of the nailer.
2. Prior to installing the base anchor, assure a level plane is present. If not, shim the roof edge surface as required.
3. Extruded base anchor: Apply two 1/4" beads of Green-Lock Sealant XL or equal on the bottom surface of the top flange of the extruded anchor.
4. Set the extruded anchor on the edge and face fasten through pre-punched slots every 18 inches o.c. for 5.75 inch face fascia, and 18 inches o.c. staggered for any fascia size greater than 5.75 inches. Begin fastening 6 inches from ends.
5. Install Green-Lock Sealant XL or equal at the ends of the base frame to prevent water from running between base anchor joints.
6. Install compression seals every 40 inches on center in the slots located at the top of the extruded anchor.
7. Install fascia cover setting the top flange over the top flange and compression seals of the base anchor. Assure compression seals are in place during this process. Beginning on one end and working towards the opposite end, press downward firmly (do not rotate) until "snap" occurs and cover is engaged along entire length of miter.
8. Install splice plate at each end of the base anchor and fascia cover prior to the installation of the next adjacent ten foot piece.

B. Fabricated Flashings:
1. Fabricated flashings and trim shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the Copper Development Association "Copper in Architecture - Handbook" as applicable.

C. Roof Drain:
1. Plug drain to prevent debris from entering plumbing.
2. Taper insulation to drain minimum of 24 inches (609 mm) from center of drain.
3. Run roof system plies over drain. Cut out plies inside drain bowl.

4. Set lead/copper flashing (30 inch square minimum) in 1/4 inch bed of mastic. Run lead/copper into drain a minimum of 2 inches (50 mm). Prime lead/copper at a rate of 100 square feet per gallon and allow to dry.
5. Install base flashing ply (40 inch square minimum) in bitumen.
6. Install modified membrane (48 inch square minimum) in bitumen.
7. Install clamping ring and assure that all plies are under the clamping ring.
8. Remove drain plug and install strainer.

3.06 CLEANING

A. Clean-up and remove daily from the site all wrappings, empty containers, paper, loose particles and other debris resulting from these operations.

B. Remove asphalt markings from finished surfaces.

C. Repair or replace defaced or disfigured finishes caused by Work of this section.

3.07 PROTECTION

A. Provide traffic ways, erect barriers, fences, guards, rails, enclosures, chutes and the like to protect personnel, roofs and structures, vehicles and utilities.

B. Protect exposed surfaces of finished walls with tarps to prevent damage.

C. Plywood for traffic ways required for material movement over existing roofs shall be not less than 5/8 inch (16 mm) thick.

D. In addition to the plywood listed above, an underlayment of minimum 1/2 inch (13 mm) recover board is required on new roofing.

E. Special permission shall be obtained from the Manufacturer before any traffic shall be permitted over new roofing.

3.08 FIELD QUALITY CONTROL

A. Inspection: Provide manufacturer's field observations at start-up and at intervals of approximately 2 days per week. Provide a final inspection upon completion of the Work.
   1. Warranty shall be issued upon manufacturer's acceptance of the installation.
   2. Field observations shall be performed by a Sales Representative employed full-time by the manufacturer and whose primary job description is to assist, inspect and approve membrane installations for the manufacturer.
   3. Provide observation reports from the Sales Representative indicating procedures followed, weather conditions and any discrepancies found during inspection.
   4. Provide a final report from the Sales Representative, certifying that the roofing system has been satisfactorily installed according to the project specifications, approved details and good general roofing practice.

END OF SECTION

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SECTION 07 7200
ROOF ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Curbs.

B. Equipment rails.

C. Roof penetrations mounting curbs.

D. Roof hatches.

1.02 REFERENCE STANDARDS

A. 29 CFR 1910.23 - Ladders; Current Edition.

B. 29 CFR 1910.29 - Fall Protection Systems and Falling Object Protection - Criteria and Practices; Current Edition.

C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used.
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
   4. Maintenance requirements.

C. Shop Drawings: Submit detailed layout developed for this project and provide dimensioned location and number for each type of roof accessory.

D. Warranty Documentation:
   1. Submit manufacturer warranty.
   2. Ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store products under cover and elevated above grade.

1.05 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 ROOF CURBS

A. Roof Curbs Mounting Assemblies: Factory fabricated hollow sheet metal construction, internally reinforced, and capable of supporting superimposed live and dead loads and designated equipment load with fully mitered and sealed corner joints welded or mechanically fastened, and integral counterflashing with top and edges formed to shed water.
   1. Roof Curb Mounting Substrate: Curb substrate consists of corrugated metal roof deck with insulation.
   2. Sheet Metal Material:
      a. Aluminum: 0.080 inch minimum thickness, with 3003 alloy, and H14 temper.

3. Roofing Cants: Provide integral sheet metal roofing cants dimensioned to begin slope at top of roofing system at 1:1 slope; minimum cant height 4 inches.
4. Provide layouts and configurations indicated on drawings.

B. Curbs Adjacent to Roof Openings: Provide curb on each side of opening, with top of curb horizontal for equipment mounting.
1. Provide preservative treated wood nailers along top of curb.
2. Insulate inside curbs with 1-1/2 inch thick fiberglass insulation.
3. Height Above Finished Roof Surface: 8 inches, minimum.

C. Equipment Rail Curbs: Straight curbs on each side of equipment, with top of curbs horizontal and level with each other for equipment mounting.

D. Pipe, Duct, or Conduit Mounting Curbs: Vertical posts, minimum 8 inches square unless otherwise indicated.

2.02 ROOF HATCHES AND VENTS, MANUAL AND AUTOMATIC OPERATION

A. Roof Hatch Manufacturers:
1. Acudor Products Inc; Aluminum Roof Hatch: www.acudor.com/#sle.
2. Babcock-Davis; ThermalMAX: www.babcockdavis.com/#sle.
3. Bilco Company; Type S: www.bilco.com/#sle.
4. Substitutions: See Section 01 6000 - Product Requirements.

B. Roof Hatches: Factory-assembled aluminum frame and cover, complete with operating and release hardware.
1. Style: Provide flat metal covers unless otherwise indicated.
2. Mounting Substrate: Provide frames and curbs suitable for mounting on corrugated metal roof deck with insulation.
3. For Ladder Access: Single leaf; 30 by 36 inches.

C. Frames and Curbs: One-piece curb and frame with integral cap flashing to receive roof flashings; extended bottom flange to suit mounting.
1. Material: Mill finished aluminum, 11 gauge, 0.0907 inch thick.
2. Insulation: Manufacturer's standard; 1 inch rigid glass fiber, located on outside face of curb.
3. Curb Height: 12 inches from surface of roof deck, minimum.

D. Metal Covers: Flush, insulated, hollow metal construction.
1. Capable of supporting 40 psf live load.
2. Material: Mill finished aluminum; outer cover 11 gauge, 0.0907 inch thick, liner 0.04 inch thick.
3. Insulation: Manufacturer's standard 1 inch rigid glass fiber.
4. Gasket: Manufacturer's standard, continuous around cover perimeter.

E. Safety Railing System: Roof hatch manufacturer's standard accessory safety rail system mounted directly to curb.
1. Railing: Comply with 29 CFR 1910.23 for ladder safety, with a safety factor of two.
2. Self-Closing Gate: Comply with 29 CFR 1910.29 for safe egress and fall protection through hatch opening.
3. Posts and Rails: Aluminum tubing.
4. Gate: Same material as railing; automatic closing with latch.
5. Finish: Manufacturer's standard, factory applied finish.
6. Gate Hinges and Post Guides: ASTM B221 (ASTM B221M), 6063 alloy, T5 temper aluminum.
7. Mounting Brackets: Hot dipped galvanized steel, 1/4 inch thick, minimum.
8. Fasteners: Stainless steel, Type 316.

F. Hardware: Type 316 stainless steel, unless otherwise indicated or required by manufacturer.

1. Lifting Mechanisms: Compression or torsion spring operator with shock absorbers that automatically opens upon release of latch; capable of lifting covers despite 10 psf load.
2. Hinges: Heavy duty pintle type.
3. Hold open arm with vinyl-coated handle for manual release.
4. Latch: Upon closing, engage latch automatically and reset manual release.
5. Manual Release: Pull handle on interior.
6. Locking: Padlock hasp on interior.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Coordinate any roof mounted items as furnished by the Mechanical Contractor and installed by the General Contractor.

B. Clean surfaces thoroughly prior to installation.

C. Prepare surfaces using methods recommended by manufacturer for achieving acceptable results for applicable substrate under project conditions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions, in manner that maintains roofing system weather-tight integrity.

3.04 CLEANING

A. Clean installed work to like-new condition.

3.05 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

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SECTION 07 8400
FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Firestopping systems.

B. Firestopping of joints and penetrations in fire-resistance-rated and smoke-resistant assemblies, whether indicated on drawings or not, and other openings indicated.

C. Firestopping membrane penetrations in fire rated and smoke rated assemblies, whether indicated on drawings or not.

1.02 SUMMARY

A. Each Prime Contractor shall provide tested and listed firestop systems consisting of a material or combination of materials installed to retain the integrity of fire-resistance rated construction by maintaining an effective barrier against the spread of flame, smoke, and/or hot gases through penetrations, blank openings, construction joints, or at the gap that is created at the building perimeter of the horizontal fire-resistance rated assembly and exterior wall and in or adjacent to either fire-resistance or non-rated-resistance rated barriers in accordance with the requirements of the Building Code for this project.

B. Firestop systems shall be used in locations including, but not limited to, the following:
   1. Penetrations through fire-resistance-rated floor and roof assemblies requiring protected openings including both empty openings and openings that contain penetrations.
   2. Penetrations through fire-resistance-rated wall assemblies including both empty openings and openings that contain penetrations.
   3. Membrane penetrations in fire-resistance-rated wall and roof-ceiling assemblies where items penetrate one side of the barrier.
   4. Joints in fire-resistance-rated assemblies that allow independent movement.
   5. Perimeter of the horizontal fire-resistance rated assembly and exterior wall between a rated floor/roof and the exterior wall assembly that is not fire-resistance rated.
   6. Joints, through penetrations and membrane penetrations in smoke barriers, smoke partitions and those assemblies required to limit, restrict or retard the passage of smoke.

1.03 RELATED REQUIREMENTS

A. Refer to "Code Compliance Drawings" for location or fire rated assemblies. At a minimum all corridor walls and all floors between stories shall have a 1 hour fire rating.

B. Statement of Special Inspections (included in the front end documents when applicable).

C. Sample Firestop Schedule (at the end of this section).

D. Section 01 4533 - Code Required Special Inspections.

E. Section 01 7000 - Execution and Closeout Requirements: Cutting and patching.

F. Section 07 0553 - Fire and Smoke Assembly Identification.

G. Section 09 2116 - Gypsum Board Assemblies: Gypsum wallboard fireproofing.

H. Division 03 0000 - Concrete; concrete work.

I. Division 04 0000 - Masonry.

J. Division 22 0000 - Plumbing.

K. Division 23 0000 - Heating, Ventilation and Air Conditioning.

L. Division 26 0000 - Electrical.

M. Division 27 0000 - Communications.

N. Division 28 0000 - Electronic Safety and Security.

1.04 DEFINITIONS

A. Barrier: Any bearing or non-bearing wall or floor that has an hourly fire and smoke rating.

B. Fire-Resistant Firestop Joint System: An assemblage of specific materials or products that are designed, tested and fire-resistance rated in accordance with either ASTM E1966 or UL 2079 to resist for a prescribed period of time the passage of fire through joints made in or between fire-resistance rated assemblies.

C. Joint: Any gap, joint, or opening, whether static or dynamic, between two fire-rated barriers including to where the top of the wall meets the floor; bottom of wall meets the floor; wall edge to wall edge applications; floor edge to floor edge applications; floor edge to wall; or where one fire-rated barrier meets a non fire-rated assembly such as at fire-rated floor edge to non-fire-rated exterior wall and top of fire-rated wall to non-fire-rated roof assembly.

D. Membrane Penetration: Any penetration in a fire-rated wall or floor/roof-ceiling assembly that breaches only one side of the barrier.

E. Membrane Penetration Firestop System: An assemblage consisting of a fire-resistance rated floor-ceiling, roof-ceiling or wall assembly, one or more penetrating items installed into or passing through the breach in one side of the assembly and the materials or devices, or both, installed to resist the spread of fire into the assembly for a prescribed period of time.

F. Through Penetration: Any penetration of a fire-rated wall or floor assembly that completely breaches the barrier.

G. Through Penetration Firestop System: An assemblage of specific materials or products that are designed, tested and fire-resistance rated in accordance with either ASTM E814 or UL 1479 to resist for the prescribed period of time the passage of fire through penetrations made in fire-resistance rated assemblies.

1.05 REFERENCE STANDARDS

A. ICC (IBC) - International Building Code; Most Recent Edition adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

B. International Firestop Council (IFC) - Recommended IFC Guidelines for Evaluating Firestop System Engineering Judgements; Current Edition.

C. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.

D. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2023a.

E. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems; 2015 (Reapproved 2019).

F. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestop Systems; 2020a.

G. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers; 2020a.

H. ASTM E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus; 2023a.

I. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies; 2023.

J. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).

K. ITS (DIR) - Directory of Listed Products; Current Edition.

L. FM 4991 - Approval Standard of Firestop Contractors; 2013.

M. FM (AG) - FM Approval Guide; Current Edition.

N. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2022).

O. UL 1479 - Standard for Fire Tests of Penetration Firestops; Current Edition, Including All Revisions.

P. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.

Q. UL (DIR) - Online Certifications Directory; Current Edition.

R. UL (FRD) - Fire Resistance Directory; Current Edition.

1.06 PERFORMANCE REQUIREMENTS

A. Penetrations: Provide and install firestopping products that once installed to the tested and listed system or engineering judgement (EJ) / equivalent fire-resistance rated assembly (EFRRA) to become firestop systems or EJ/EFRRA's that are produced to resist the spread of fire, and/or the passage of smoke through breaches, gaps, openings, in fire-resistance-rated and smoke resistant assemblies according to requirements indicated, including but not limited to the following:

1. Firestop all breaches made in fire-resistance-rated assemblies for penetrating items passing through fire-resistance-rated wall and floor assemblies and other locations indicated on the Contract Drawings.
2. Provide and install complete penetration firestopping systems that have been tested and approved by a nationally recognized third-party testing agency to the listing and the manufacturer's installation instructions.
3. F-Rated Through-Penetration Firestop Systems: Provide through-penetration firestop systems with F (fire resistance) ratings indicated, as determined through testing in accordance with ASTM E 814 or UL1479, but not less than one hour or the fire-resistance rating of the construction being penetrated by the penetrating item.
4. T-Rating Through-Penetration Firestop Systems: Provide firestop systems with T (temperature) ratings, in addition to F ratings, as determined per ASTM E 814 or UL 1479, in horizontal fire-resistance-rated assemblies and where required by the Building Code.
5. L-Rated Through-Penetration Firestop Systems: Provide firestop systems with L (air leakage) ratings, in addition to F and T ratings, as determined in accordance with UL 1479, in smoke barriers and smoke partitions where required by the Building Code.
6. W-Rated Through-Penetration Firestop Systems: Provide firestop systems with W (water resistance) ratings, in addition to F, T and L ratings, as determined in accordance with UL 1479, for wet areas of the building including but not limited to janitor closets, bathrooms, kitchen areas and for wet piping penetrations for plumbing, mechanical and wet-pipe sprinkler systems.
7. For penetrations involving non-metallic, CPVC, PVC, or plastic piping, tubing, or conduit, provide firestop systems that are chemically compatible in accordance with manufacturer requirements.
8. For penetrations involving insulated piping, provide firestop systems not requiring removal of insulation.
9. For penetrations involving fire or fire/smoke dampers, only firestop products approved by the damper manufacturer shall be installed in accordance with the damper installation instructions.
10. Penetrations near head-of-wall joints are restricted within 6 inches of the head-of-wall joint where dynamic joints require proper movement.

B. Perimeter Interior Fire Barrier Systems: Provide perimeter interior fire barrier systems with fire-resistance ratings indicated, as determined per ASTM E 2307, but not less than fire-resistance rating of the floor construction.

C. Fire-Resistance Joints: Provide fire-resistive joint systems with fire-resistance ratings indicated, as determined by tests performed to ASTM E 1966 and ASTM E 1399, E 2837, or UL 2079, but not less than the fire-resistance rating of the assembly in which the breach, void or joint occurs. For where fire-resistance rated walls do not meet and create a breach between a non-fire-resistant horizontal assembly, provide fire-resistive joint systems with fire-resistance ratings as determined by ASTM E 2837.
   1. For firestopping assemblies exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.
   2. For floor penetrations exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates, covers, or by other means, as specified by the Architect.
   3. L-Rating Systems: Provide firestop systems with L-ratings at smoke barrier joints and at the intersection of horizontal smoke barriers and exterior curtain wall construction not exceeding 5 cfm/lf. Provide firestop system at smoke barrier joints.

D. Where there is no specific third-party tested and listed, classified firestop system available for a particular firestop configuration, the Contractor with the Firestop Manufacturer's Representative shall obtain from the firestop manufacturer, an (EJ) or (EFRRA) for submittal. All EJ's shall follow the current International Firestop Council (IFC) Guidelines for Evaluating Firestop Systems in Engineering Judgements and shall state that the manufacturer believes the EJ would pass the fire tests referenced for the application, if tested.

1.07 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Schedule of Firestopping: List each type of penetration and joint system, fire rating of the penetrated assembly, and firestopping test or design number. The BCA Sample Firestop Schedule is for information only and will not be acted on for approval. See BCA Sample Firestop Schedule at the end of this section.

C. Product Data: Provide data on product characteristics, performance ratings, and limitations. Provide illustration drawings on each type of tested and listed firestop system being used on the Project.

D. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Manufacturer's qualification statement.

G. Installer's qualification statement.

H. Firestopping Manufacturer's Representative contact information as listed in Quality Assurance.

I. Engineering Judgements if applicable.

J. Manufacturer's self-adhering vinyl firestop label samples. Include the following information:
   1. "WARNING - Do Not Disturb, Through Penetration Firestop System. Notify Building Management of Any Damage." or "WARNING - Do Not Disturb, Joint Firestop System. Notify Building Management of Any Damage."
   2. F, T, L and W ratings as applicable.
   3. Firestop system manufacturer's name.
   4. Firestop system UL designation.
   5. Product.
   6. Contractor's name.
   7. Installer's name and phone number.
   8. Date of installation.

K. Manufacturer's qualifications as listed in Quality Assurance.

L. Installer's qualifications as listed in Quality Assurance.

1.08 QUALITY ASSURANCE

A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
   1. Listing in the current-year classification or certification books of UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
   2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.
   3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section and:
   1. Trained by manufacturer.
   2. Approved by Factory Mutual Research Corporation under FM 4991, or meeting any two of the following requirements:
      a. Verification of minimum three years documented experience installing work of this type.
      b. Verification of at least five satisfactorily completed projects of comparable size and type.
      c. Licensed by local authorities having jurisdiction (AHJ).

D. Pre-Installation Conference: This conference should be a joint meeting attended by the Owner's Representative and Prime Contractors, respective firestopping sub-contractors, firestopping company field advisors and testing agencies to review project requirements. The agenda should include the following topics:
   1. Review Scope of Work.
   2. Review shop drawings and completed firestop schedule.
   3. Discuss identification labeling and locations.
   4. Discuss wall markings and locations.
   5. Review schedule, coordination and sequencing with all Trades.
   6. Review coordination with special inspection requirements.
   7. Review any engineering judgements or other special requirements.
   8. Review mock-up requirements.
   9. Review Firestop Application Log.

E. Manufacturer's Company Field Advisor: Secure the services of a Company Field Advisor for the following:
   1. Render advice to the Contractor regarding suitability of firestopping systems for the various project conditions.
   2. Assist Contractor with completing the Schedule of Firestopping. See Sample Firestop Schedule at the end of this Section.
   3. Attend Pre-installation Conference.
   4. Assist installers with manufacturer's installation requirements.
   5. Advise the Contractor on ASTM special inspection requirements for both visual and destructive testing methods.
   6. Assist in providing Engineering Judgements from manufacturer's technical specialists when necessary.

F. Special Inspections are required for buildings designated as Risk Category III as determined by the building code. Visual inspections per ASTM E2174 and ASTM E2393 are required. Destructive testing inspections will be conducted when visual inspections are not properly coordinated by each Prime Contractor with the {GT#10003583} and the third party testing agency. Provide 48 hours notice for special inspections.

G. Single Source Limitations: Each Prime Contractor shall obtain firestop systems for their Scope of Work from a single manufacturer to the greatest extent possible.

1. Tested and listed, classified firestop systems are to be used. If another manufacturer has a tested and listed system, then that system shall be used prior to an EJ or EFRRA.
2. Material from different manufacturer than allowed by the tested and listed system shall not be intermixed in the same firestop system, void, breach, gap, intersection, or opening.

H. Inspection of penetrations through fire-rated floor and wall assemblies shall be in accordance with ASTM E 2174 - Standard Practice for On-Site Inspection of Installed Firestop Systems and ASTM E 2393 - Standard Practice for On-Site Inspection of Installed Fire-Resistive Joint Systems and Perimeter Fire Barriers.

1.09 FIELD CONDITIONS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.

B. Provide ventilation in areas where solvent-cured materials are being installed.

1.10 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed in accordance with specified firestopping system design.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accomodate penetration firestopping systems.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Firestopping Manufacturers:
1. 3M Fire Protection Products: www.3m.com/firestop/#sle.
2. A/D Fire Protection Systems Inc: www.adfire.com/#sle.
3. Everkem Diversified Products, Inc: www.everkemproducts.com/#sle.
4. Hilti, Inc: www.us.hilti.com/#sle.
5. HoldRite, a Brand of Reliance Worldwide Corporation: www.holdrite.com/#sle.
6. Nelson FireStop Products: www.nelsonfirestop.com/#sle.
7. Passive Fire Protection Partners: www.firestop.com/#sle.
8. Specified Technologies Inc: www.stifirestop.com/#sle.
9. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
10. RectorSeal: www.rectorseal.com.
11. Or approved equal.
12. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

A. Firestopping Materials: Any materials meeting requirements.

B. Prohibited Materials: Do not use firestopping materials containing asbestos or lead and shall not incorportae nor require use of hazardous solvents.

C. Volatile Organic Compound (VOC) Content: Provide products having VOC content lower than that required by SCAQMD 1168.

D. Mold and Mildew Resistance: Provide firestopping materials with mold and mildew resistance rating of zero(0) in accordance with ASTM G21.

E. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

F. Fire Ratings: Refer to drawings for required systems and ratings.

G. Firestopping sealants must be flexible, allowing for normal movement.

H. Firestopping materials shall not shrink upon drying as evidenced by cracking or pulling back from contact surfaces such that a void is created.

I. Firestopping material shall be moisture resistant and may not dissolve in water after curing.

2.03 FIRESTOPPING ASSEMBLY REQUIREMENTS

A. Perimeter Fire Containment Firestopping: Use system that has been tested according to ASTM E2307 to have fire resistance F Rating equal to required fire rating of floor assembly.
   1. Movement: Provide systems that have been tested to show movement capability as indicated.
   2. Temperature Rise: Provide systems that have been tested to show T Rating as indicated or where required by Building Code.
   3. Air Leakage: Provide systems that have been tested to show L Rating as indicated or required by Building Code.
   4. Where floor assembly is not required to have a fire rating, provide systems that have been tested to show L Rating as indicated or required by Building Code.

B. Head-of-Wall (HW) Joint System Firestopping at Joints Between Fire-Rated Wall Assemblies and Non-Rated Horizontal Assemblies: Use system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of wall assembly.
   1. Movement: Provide systems that have been tested to show movement capability as indicated.

C. Floor-to-Floor (FF), Floor-to-Wall (FW), Head-of-Wall (HW), and Wall-to-Wall (WW) Joints, Except Perimeter, Where Both Are Fire-Rated: Use system that has been tested according to ASTM E1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.
   1. Movement: Provide systems that have been tested to show movement capability as indicated.
   2. Air Leakage: Provide systems that have been tested to show L Rating as indicated or required by Building Code.
   3. Watertightness: Provide systems that have been tested to show W Rating as indicated.
   4. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.

D. Through Penetration Firestopping: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.
   1. Temperature Rise: Provide systems that have been tested to show T Rating as indicated or required by Building Code.
   2. Air Leakage: Provide systems that have been tested to show L Rating as indicated or required by Building Code.
   3. Watertightness: Provide systems that have been tested to show W Rating as indicated.
   4. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.

E. Membrane Penetrations: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrating assembly.

2.04 FIRESTOPPING FOR PERIMETER CONTAINMENT

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify openings are ready to receive the work of this section.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Verify that all pipes, conduits, cables, clips, and/or other items which penetrate fire-rated construction have been permanently installed prior to installation of firestops.

3.02 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.

B. Remove incompatible materials that could adversely affect bond.

C. Install backing materials to prevent liquid material from leakage.

D. Remove laitance and form-release agents from concrete

E. Prime substrates where recommended by firestopping manufacturer using manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.03 INSTALLATION

A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

B. Do not cover installed firestopping until inspected by Owner's Independent Testing Agency.

C. The General Contractor shall coordinate with other Prime Contractors firestopping work prior to installation of ceilings.

D. Identification: Each Prime Contractor is to install firestop system labeling.
   1. Identify installed firestop systems with preprinted vinyl labels.
   2. Clean surfaces of dust and debris.
   3. Attach self-adhesive labels permanently to surfaces adjacent to firestop systems so that labels will be visible to anyone seeking to remove or compromise penetrating items or firestop systems.
   4. In addition, the General Contractor shall install joint firestop labels at all fire-rated wall assembly joints. Locate labels within 15 feet of the wall or partition end, and no more than 30 feet apart horizontally.

3.04 FIELD QUALITY CONTROL

A. Independent Testing Agency: Inspection agency employed and paid by Owner, will examine penetration firestopping in accordance with ASTM E2174 (penetrations) and ASTM E2393 (joints).

B. Coordinate visual inspections with Independent Testing Agency as Work is being performed according to ASTM E2174 and ASTM E2393.

C. Repair or replace penetration firestopping and joint firestopping at locations where visual inspection results indicate penetration and joint firestopping do not meet specified requirements and manufacturer's tested and listed firestop system.

D. If Work is not coordinated with Independent Testing Agency for visual inspections, then destructive inspections will be required according to ASTM E2174 and ASTM E2393.

E. Repair or replace through-penetration, membrane penetration and joint penetration firestopping at locations where destructive inspection is performed at no cost to the Owner.

3.05 CLEANING

A. Clean adjacent surfaces of firestopping materials.

B. Leave finished Work in neat, clean condition with no evidence of spillovers or damage to adjacent surfaces.

3.06 PROTECTION

A. Protect adjacent surfaces from damage by material installation.

3.07 BCA SAMPLE FIRESTOP SCHEDULE:

A. The sample firestop schedule indicated below is available in Excel or PDF format for contractor's / manufacturer's representative use when requested. Otherwise, the manufacturer's representative shall use their own schedule.

BCA SAMPLE FIRESTOP SCHEDULE

No.	Manufacturer's Product Reference Numbers and/or Drawing Numbers (include fill materials)	U.L, FM, Warnock Hersey or Omega Point Lab Penetration,	Penetrating Item: Material, Size, Insulated, Combustible, Joint, Perimeter, etc. Description:	Maximum Allowable Annular Space or Maximum Size Opening	Assembly Wall type Construction		Assembly Floor or Roof-Ceiling Type Construction	Fire Resistance Rating of Wall or Floor (Hour)	F Rating (Hour)	T Rating floors only	L Rating if available (air leakage)	W Rating optional if available	Movement
					Architects Designation	Construction Description							
	Through-Penetration Vertical Firestopping Systems (walls)												
1	Example No.1 Tremstop Acrylic	UL C-AJ-1205	6" steel pipe schedule 40	min 1/4" to max 1"	P3	6" reinf normal weight concrete	NA	2 Hour	2 Hour		Ambient less than 1 CFM/ Lin		
2	Example No.2 Tremstop Acrylic SP Thermafiber SAF	W-D-1022	NA	4" max opng	Curtain Wall/ Perimeter	NA	4 ½" reinforced LW concrete	2 Hour	2 Hour	1/4 Hr			Class II
	Through-Penetration Horizontal Firestopping Systems (floors)												
3	Example No.3 EGS Nelson Firestop ES1399 Sealant	UL X-HEZ-F-E-3007	Cables - max 3 1/2" dia	0" point contact to max 1/2"	NA	NA	concrete / joists / gypsum board	1 Hour	1 Hour	1 Hour			
	Fire-resistant Joint Systems (construction joints, perimeter joints, top-of-wall and bottom-of-wall joints)												
4	Example No.4 EGS Nelson Firestop ES 1399 Sealant	UL HW-D-019	NA	NA	P8	steel studs / gyp bd	3 " fluted deck w/ 2 1/2" concrete	2 Hour					Class II & III
5	Example No. 5 3M FB-2000+ Rockwool Roxul Safe	UL FW-D-1009	NA	4" nominal joint width	P4	6" nominal, cmu	6" thick reinforced concrete	2 Hour	3 Hour				Class II & III
	Membrane Penetrations (vertical and horizontal)												
6	Example No.6 Hilti - CP 617 Firestop Putty Pad	UL W-L-1462	medical gas station outlets (max 100 psig) Beacon Medical Products	1/8" min. thick moldable putty pads	P8	3 1/2" steel studs 16" oc	NA	1 Hour	1 Hour	1 Hour			

END OF SECTION

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SECTION 07 9005
JOINT SEALERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sealants and joint backing.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-In-Place Concrete.

B. Section 04 2000 - Unit Masonry.

C. Section 08 8000 - Glazing: Glazing sealants and accessories.

D. Section 09 2116 - Gypsum Board Assemblies: Acoustic sealant.

1.03 REFERENCE STANDARDS

A. ASTM C834 - Standard Specification for Latex Sealants; 2017 (Reapproved 2023).

B. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2022.

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

D. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).

E. ASTM C 1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants.

F. ASTM D1667 - Standard Specification for Flexible Cellular Materials—Poly (Vinyl Chloride) Foam (Closed-Cell); 2022.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal process.

B. Product Data: Provide data indicating sealant chemical characteristics.

1.05 QUALITY ASSURANCE

A. Maintain one (1) copy of each referenced document covering installation requirements on-site.

B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this Section with minimum 7 years documented experience.

C. Applicator Qualifications: Company specializing in performing the Work of this Section with minimum 7 years documented experience and approved by manufacturer.

1.06 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective work within a five year period after Date of Substantial Completion.

C. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 SEALANTS

A. General Purpose Exterior Sealant: One (1) component, neutral cure, silicone rubber for structural and non-structural applications; ASTM C 920, Type S, Grade NS, Class 50, Uses NT, G, A, and O; single component.
   1. Color: Custom color as selected by the Architect/Engineer from the manufacturer's standard colors.
   2. Product: 795 manufactured by Dow Corning, or equal.

3. Applications: Use for:
    a. Control, expansion, and soft joints in masonry.
    b. Joints between concrete and other materials.
    c. Joints between metal frames and other materials.
    d. Other exterior joints for which no other sealant is indicated.
4. Warranty: Installers 5 year workmanship warranty and manufacturer's 20 year material warranty.

B. General Purpose Interior Sealant: Siliconized acrylic emulsion latex; ASTM C834, Type OP, Grade NF single component, paintable.
1. Color: To be selected by Architect from manufacturer's standard range.
2. Product: Sonolac manufactured by Sonneborn or equal.
3. Applications: Use for:
    a. Interior wall and ceiling control joints.
    b. Joints between door and window frames and wall surfaces.
    c. Other interior joints for which no other type of sealant is indicated.

C. Sanitary Sealant: Acetoxy silicone; ASTM C 920, Uses S, Grade NS, Class 25; single component, mildew resistant.
1. Product: 786 manufactured by Dow Corning or equal.
2. Applications: Use for:
    a. Joints between plumbing fixtures and floor and wall surfaces.
    b. Joints between kitchen and bath countertops and wall surfaces.
3. Warranty: Installers 5 year workmanship warranty and manufacturer's 10 year material warranty.

D. Acoustical Sealant for Concealed Locations:
1. Product: Tremco Acoustical Sealant manufactured by Tremco or equal.
2. Applications: Use for concealed locations only:
    a. Sealant bead between top stud runner and structure and between bottom stud track and floor.

E. Interior and Exterior Joint Sealant: 1-part, cold applied, non-sag silicone; ASTM C D5893.
1. Approved by manufacturer for wide joints up to 1 inch.
2. Color: To be selected by Architect/Engineer from manufacturer's standard range.
3. Product: 888 manufactured by Dow Corning or equal.
4. Applications: Use for:
    a. Concrete to concrete expansion joints in floors.
5. Warranty: Installers 5 year workmanship warranty and manufacturer's 10 year material warranty.

2.02 ACCESSORIES

A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; and compatible with joint forming materials.

C. Joint Backing: Round foam rod compatible with sealant; ASTM C 1330, closed cell PVC; oversized 25 to 30 percent larger than joint width; Soft Backer-rod manufactured by Sonneborn or equal.

D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive Work.

B. Verify that joint backing and release tapes are compatible with sealant.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean and prime joints in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Protect elements surrounding the Work of this Section from damage or disfigurement.

3.03 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Perform Acoustical Sealant Application Work in accordance with ASTM C919.

D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.

E. Install bond breaker where joint backing is not used.

F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

G. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

H. Tool joints concave unless otherwise indicated on Contract Drawings.

3.04 CLEANING

A. Clean adjacent soiled surfaces.

3.05 PROTECTION

A. Protect sealants until cured.

END OF SECTION

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SECTION 07 9513
EXPANSION JOINT COVER ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Expansion joint assemblies for floor, wall, and ceiling surfaces.

1.02 RELATED REQUIREMENTS

A. Section 03 1000 - Concrete Forming and Accessories: Placement of joint assembly frames in formwork.

B. Section 03 3000 - Cast-in-Place Concrete: Expansion and contraction joints in exterior concrete joints.

C. Section 04 2000 - Unit Masonry: Placement of joint assembly frames in masonry.

1.03 REFERENCE STANDARDS

A. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal process.

B. Product Data: Provide joint assembly profiles, profile dimensions, anchorage devices, available colors and finish, and _____.

C. Shop Drawings: Indicate joint and splice locations, miters, layout of the Work, affected adjacent construction, and anchorage locations, and _____.

D. Manufacturer's Installation Instructions: Indicate rough-in sizes; provide templates for cast-in or placed frames or anchors; required tolerances for item placement.

1.05 QUALITY ASSURANCE

A. Manufacturer: Furnish assemblies from one (1) manufacturer with a minimum of 10 years of experience in the fabrication of expansion joint assemblies.

1.06 WARRANTY

A. Manufacturer's warranty that materials furnished will perform as specified for a period of not less than 1 year when installed in accordance with manufacturer's recommendations.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Balco Metalines.

B. C/S Group.

C. Or Approved Equal.

D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 EXPANSION JOINT COVER ASSEMBLIES

A. Expansion Joint Cover Assemblies - General: Factory-fabricated and assembled; designed to completely fill joint openings, sealed to prevent passage of air, dust, water, smoke; suitable for traffic expected.
   1. Joint Dimensions and Configurations: As indicated on drawings.
   2. Joint Cover Sizes: Selected to suit joint width and configuration, based on manufacturer's published recommendations and limitations.
   3. Lengths: Provide covers in full lengths required; avoid splicing wherever possible.

2.03 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper; or ASTM B308/B308M, 6061 allow, T6 temper.

B. ASTM B 209, alloy 6061-T651 for plate.

C. ASTM B 209, alloy 5052-H32 for sheet.

D. Abrasive: 2-part epoxy combined with aluminum oxide grit.

E. Fire Barrier: Metaflex.

F. Fasteners, accessories, and other materials required for complete installation in accordance with the manufacturer's instructions.

2.04 FABRICATION

A. Fabricate joint cover assemblies as detailed. Provide centering bars, sealing washers, gaskets, splice covers, and closures as necessary for complete installation.
   1. Fabricate special transitions and corner fittings as required.
   2. Fabricate fire barrier and provide fire-resistant sealant as required for fire-resistant installations.
   3. Miter and weld joints as applicable.
   4. Provide necessary and related parts, devices, water barrier, anchors, form clips, and other items required for water-resistant and fire-resistant installations.
   5. Provide corners, tees, transitions, curb risers, etc., assembled with connection (mitered) or (interlocking) and secured to ensure proper fit and alignment as applicable.
   6. Special conditions shall be shop fabricated.
   7. Cover plates shall have smooth on wall surfaces and abrasive on floor surfaces.

2.05 FINISHES

A. Floors: Mill finish.

B. Walls and and Ceilings: Clear anodized.

C. Abrasive: Color to match adjacent surface.

D. Filler Strips: Gray.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joint preparation and dimensions are acceptable and in accordance with manufacturer's requirements.

3.02 INSTALLATION

A. Install components and accessories in accordance with manufacturer's instructions.

B. Align Work plumb and level, flush with adjacent surfaces.

C. Rigidly anchor to substrate to prevent misalignment.

D. Make allowances for change in joint size due to difference between installation and building operating temperatures.

E. Set centering bars diagonally at 20 inches on center maximum (or 10 inches on center for heavy duty models). Centering Bars shall be fully engaged with the base members.

F. Water Barrier: Provide water barriers at exterior joints and where called for on Drawings. Provide drainage fittings where called for on Drawings.

3.03 ADJUSTING AND PROTECTION OF FINISHED WORK

A. Adjust joint cover to freely accommodate joint movement.

B. Protect installation from damage by Work of other Sections. Where required, remove and store cover plate and install temporary protection over joints; re-install cover plate before completion of Work.

C. See Contract Drawings.

END OF SECTION

SECTION 08 1113
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-fire-rated hollow metal doors and frames.

B. Hollow metal frames for wood doors.

C. Fire-rated hollow metal doors and frames.

D. Hollow metal borrowed lites glazing frames.

1.02 RELATED REQUIREMENTS

A. Section 08 7100 - Door Hardware.

B. Section 08 8000 - Glazing: Glass for doors and borrowed lites.

1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2022.

C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2023.

D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2020.

E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2021a.

G. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.

H. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020.

I. ASTM C476 - Standard Specification for Grout for Masonry; 2023.

J. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

K. ITS (DIR) - Directory of Listed Products; Current Edition.

L. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2017.

M. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.

N. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.

O. UL (DIR) - Online Certifications Directory; Current Edition.

P. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

D. Manufacturer's Qualification Statement.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provide hollow metal doors and frames from SDI Certified manufacturer: https://steeldoor.org/sdi-certified/#sle.

B. Maintain at project site copies of reference standards relating to installation of products specified.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hollow Metal Doors and Frames:
   1. Ceco Door, an Assa Abloy Group company; _____: www.assaabloydss.com/#sle.
   2. Republic Doors, an Allegion brand; ____: www.republicdoor.com/#sle.
   3. Steelcraft, an Allegion brand; ____: www.allegion.com/#sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

A. Requirements for Hollow Metal Doors and Frames:
   1. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
   2. Accessibility: Comply with ICC A117.1 and ADA Standards.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

A. Door Finish: Factory primed and field finished.

B. Interior Doors, Non-Fire-Rated:
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 2 - Heavy-duty.
      b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Model 1 - Full Flush.
      d. Door Face Metal Thickness: 18 gauge, 0.042 inch, minimum.
   2. Door Thickness: 1-3/4 inches, nominal.

C. Fire-Rated Doors:
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 2 - Heavy-duty.
      b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Model 1 - Full Flush.
      d. Door Face Metal Thickness: 18 gauge, 0.042 inch, minimum.
   2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").

3. Temperature-Rise Rating (TRR) Across Door Thickness: In accordance with local building code and authorities having jurisdiction.
4. Provide units listed and labeled by UL (DIR) or ITS (DIR).
   a. Attach fire rating label to each fire rated unit.
5. Door Thickness: 1-3/4 inches, nominal.

2.04 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. Frame Finish: Factory primed and field finished.

C. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
   1. Frame Metal Thickness: 18 gauge, 0.042 inch, minimum.

D. Door Frames, Fire-Rated: Knock-down type.
   1. Fire Rating: Same as door, labeled.
   2. Frame Metal Thickness: 18 gauge, 0.042 inch, minimum.

E. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.

F. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.

2.05 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

2.06 ACCESSORIES

A. Glazing: As specified in Section 08 8000, factory installed.

B. Door Frame Anchors
   1. Masonry Anchors: (New Construction)
      a. "T"- Anchor, 16 ga. galvanized Fixed snap-in anchor.
         1) Minimum 3 anchor/ bolts per vertical leg of frame for frames up to 7'-0" in height.
         2) Minimum 4 anchor/bolts per vertical leg of frame for frames up to 7'-6" in height.
         3) Minimum 5 anchor/bolts per vertical leg of frame for frames up to 10'-0" in height.
      b. "Yoke and Strap", 16 ga, Galvanized welded anchor.
         1) Minimum 3 anchor/ bolts per vertical leg of frame for frames up to 7'-0" in height.
         2) Minimum 4 anchor/bolts per vertical leg of frame for frames up to 7'-6" in height.
         3) Minimum 5 anchor/bolts per vertical leg of frame for frames up to 10'-0" in height.
      c. Floor anchor: 16. ga., welded Fixed Floor Anchor
   2. Masonry Anchors (Existing Construction):
      a. Butterfly Anchor: 16 ga. galvanized snap-in in anchor with bolts.
         1) Minimum 3 anchor/ bolts per vertical leg of frame for frames up to 7'-0" in height.
         2) Minimum 4 anchor/bolts per vertical leg of frame for frames up to 7'-6" in height.
         3) Minimum 5 anchor/bolts per vertical leg of frame for frames up to 10'-0" in height.
      b. Pipe & Plate Anchors: 16 ga. galvanized pipe with 12 ga. galvanized plate.
         1) Minimum 3 anchor/ bolts per vertical leg of frame for frames up to 7'-0" in height.
         2) Minimum 4 anchor/bolts per vertical leg of frame for frames up to 7'-6" in height.
         3) Minimum 5 anchor/bolts per vertical leg of frame for frames up to 10'-0" in height.
      c. Floor anchor: 16. ga., welded Fixed Floor Anchor
   3. Metal Stud Anchors:
      a. "Z" Anchor: 16 ga, welded anchor with wall board pocket.
         1) Minimum 3 anchor/ bolts per vertical leg of frame for frames up to 7'-0" in height.

2) Minimum 4 anchor/bolts per vertical leg of frame for frames up to 7'-6" in height.
3) Minimum 5 anchor/bolts per vertical leg of frame for frames up to 10'-0" in height.
4) Provide one additional jamb anchor at existing studs walls.

b. Floor anchor: 16. ga., welded Fixed Floor Anchor

C. Grout for Frames: Mortar grout complying with ASTM C476 with maximum slump of 4 inches as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.

D. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.

E. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

B. Install fire rated units in accordance with NFPA 80.

C. Coordinate frame anchor placement with wall construction.

D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.

E. Install door hardware as specified in Section 08 7100.

F. Comply with glazing installation requirements of Section 08 8000.

G. Coordinate installation of electrical connections to electrical hardware items.

H. Touch up damaged factory finishes.

3.04 TOLERANCES

A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.05 ADJUSTING

A. Adjust for smooth and balanced door movement.

END OF SECTION

SECTION 08 1416
FLUSH WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flush wood doors; flush configuration; positive pressure fire rated and non-rated.

1.02 RELATED REQUIREMENTS

A. Section 08 1113 - Hollow Metal Doors and Frames.

B. Section 08 7100 - Door Hardware.

C. Section 08 8000 - Glazing.

1.03 REFERENCE STANDARDS

A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).

B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.

C. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.

D. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.

E. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

F. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

G. WDMA I.S. 1A - Interior Architectural Wood Flush Doors; 2021, with Errata (2022).

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal process.

B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.

C. Shop Drawings: Illustrate door opening criteria, show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing, and other details.

1. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).

D. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

E. Samples: Submit two (2) samples of door veneer, 8 inch x 10 inch in size, showing species and cut specified and illustrating reasonable color variation, stain color, and sheen.

F. Manufacturer's Qualification Statement.

G. Installer's Qualification Statement.

1.05 QUALITY ASSURANCE

A. Maintain one copy of the specified door quality standard on site for review during installation and finishing.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum 5 years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Package, deliver and store doors in accordance with specified quality standard.

B. Accept doors on site in manufacturer's packaging. Inspect for damage.

C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than 1 week. Break seal on site to permit ventilation.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Interior Doors: Provide manufacturer's warranty for the life of the installation.

C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Wood Veneer Faced Doors:
   1. Basis of Design: Masonite Architectural; Cendura Standard Wood Veneer Doors
      a. Non-Rated Doors: Particleboard Core Non-Rated & 20 Min / Bonded Construction.
      b. Fire-Rated Doors: Fire-Resistant Mineral Core 45 Min / Bonded Construction.
         1) Substitutions: See Section 01 6000 - Product Requirements.

2.02 DOORS

A. Doors: See drawings for locations and additional requirements.
   1. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS), AWMAC/WI (NAAWS) or WDMA I.S. 1A.
   2. Wood Veneer Faced Doors: Door Types SLC-5 and FD-5 , 5-ply unless otherwise indicated.

B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
   1. Provide solid core doors at each location.
   2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with UL 10C - Positive Pressure; Underwriters Laboratories Inc (UL) or Intertek/Warnock Hersey (WHI) labeled without any visible seals when door is open.

2.03 DOOR AND PANEL CORES

A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.

B. Fire Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

2.04 DOOR FACINGS

A. Veneer Facing for Transparent Finish: Red oak, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
   1. "Running Match" each pair of doors and doors in close proximity to each other.
   2. Stain: As selected by Architect from manufacturer's full range.

B. Facing Adhesive: Type I - waterproof.

2.05 DOOR CONSTRUCTION

A. Fabricate doors in accordance with AWI Quality Standards requirements. In addition, fire-rated doors shall comply with UL requirements and fire-rating label attached to door.

B. Fire Rated Doors: Provide solid blocks at lock edge and top of door for closer for hardware reinforcement.
   1. Provide solid blocking for other throughbolted hardware.

C. Where supplementary protective edge trim is required, install trim after veneer facing has been applied full-width.

D. Factory machine doors for hardware other than surface-mounted hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware. Factory pre-drill all hinge pilot holes.

E. Provide edge clearances in accordance with the quality standard specified.

2.06 FACTORY FINISHING - WOOD VENEER DOORS

A. Finish work in accordance with AWI/AWMAC/WI (AWS), Section 5 - Finishing for grade specified and as follows:
   1. Transparent:
      a. System - 11, Polyurethane, Catalyzed, Premium quality (TR-6).
      b. Stain: As selected by Architect.
      c. Sheen: Flat.

2.07 ACCESSORIES

A. Hollow Metal Door Frames: As specified in Section 08 1113.

B. Glazing: As specified in Section 08 8000.

C. Door Hardware: As specified in Section 08 7100.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and AWI P-200 requirements.
   1. Install fire-rated doors in accordance with NFPA 80 requirements and as specified herein (more stringent shall apply).

B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
   1. No more than 3/4 inch between finished floor and bottom of door will be allowed.

C. Drill pilot holes for hinges and all other screw and bolt holes and machine cut for hardware templated cut outs.

D. Coordinate installation of doors with installation of frames and hardware.

E. Coordinate installation of glazing.

3.03 TOLERANCES

A. Conform to AWI requirements for fit and clearance tolerances.

B. Conform to specified quality standard for telegraphing, warp, diagonal distortion, and squareness.

C. Maximum Vertical Distortion (Bow): 1/4 inch measured with straight edge or taut string, top to bottom, over an imaginary 36 inch x 84 inch surface area.

D. Maximum Width Distortion (Cup): 1/4 inch measured with straight edge or taut string, edge to edge, over an imaginary 36 inch x 84 inch surface area.

3.04 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

3.05 SCHEDULE- SEE DRAWINGS

END OF SECTION

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SECTION 08 1743
FRP/ ALUMINUM HYBRID DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. SL-17 Pebble Grain FRP/ Aluminum Hybrid Door installed in All Fiberglass Framing.

B. AF-217BR³ Pebble Grain Composite Fiberglass Ballistic Door installed in AF-150BR³ Pultruded Fiberglass Ballistic Framing.

1.02 RELATED SECTIONS

A. Section 08 06 71 – Door Hardware Schedule.

B. Section 08 06 80 – Glazing Schedule.

C. Section 08 10 00 – Doors and Frames.

D. Section 08 71 00 – Door Hardware.

1.03 REFRENCES

A. AAMA 1304 – Voluntary Specification for Forced Entry Resistance of Side-Hinged Door Systems.

B. AAMA 1503-98 – Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.

C. ANSI A250.4 – Test Procedure and Acceptance Criteria for Physical Endurance of Steel Doors and Hardware Reinforcing.

D. ASTM-B117 – Standard Practices for Operating Salt Spray (Fog) Apparatus.

E. ASTM-B209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

F. ASTM-B221 – Standard Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

G. ASTM-C518 – Standard test Method for Steady-State Thermal Transmission Properties by Means of Heat Flow Meter Apparatus.

H. ASTM-D256 – Standard Test Methods for Determining the Pendulum Impact Resistance of Plastics.

I. ASTM-D570 – Standard Test Method for Water Absorption of Plastics.

J. ASTM-D638 – Standard Test Method for Tensile Properties of Plastics.

K. ASTM-D790 – Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

L. ASTM-D1621 – Standard Test Method for Compressive Properties of Rigid Cellular Plastics.

M. ASTM-D1622 – Standard Test Method for Apparent Density of Rigid Cellular Plastics.

N. ASTM-D1623 – Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.

O. ASTM-D2126 – Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.

P. ASTM-D2583 – Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.

Q. ASTM-D3029 – Test Methods for Impact Resistance of Flat Rigid Plastic Specimens by Means of a Tup (Falling Weight) (Withdrawn 1995) (Replaced by ASTM-D5420).

R. ASTM-D5116 – Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/ Products.

S. ASTM-D5420 – Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact).

T. ASTM-D6670 – Standard Practice for Full-Scale Chamber Determination of Volatile Organic Emissions from Indoor Materials/ Products.

U. ASTM-E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

V. ASTM-E90 – Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.

W. ASTM-E283 – Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

X. ASTM-E330 – Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

Y. ASTM-E1886 – Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors and Storm Shutters Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.

Z. ASTM-E1996 – Standard Specification for Performance of Exterior Windows, Glazed Curtain Walls, Doors and Storm Shutters Impacted by Wind Borne Debris in Hurricanes.

AA. ASTM-F476 – Standard Test Methods for Security of Swinging Door Assemblies.

BB. ASTM-F1642-04 – Standard Test Method for Glazing Systems Subject to Air Blast Loading.

CC. NWWDA T.M. 7-90 – Cycle Slam Test Method.

DD. NFRC 100 – Procedure for Determining Fenestration Products U-Factors.

EE. NFRC 400 – Procedure for Determining Fenestration Products Air Leakage.

FF. TAS 201 – Impact Test Procedures.

GG. TAS 202 – Criteria for Testing Impact & Nonimpact Resistant Building Envelope Components Using Uniform Static Air Pressure.

HH. TAS 203 – Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.

1.04 SUBMITTALS

A. Must comply with Section 01 33 00 – Submittal Procedures.

B. Action Submittals/ Informational Submittals.
   1. Product Data.
      a. Submit manufacturer's product data sheets, catalog pages illustrating the products, description of materials, components, fabrication, finishes, installation instructions, and applicable test reports.
   2. Shop Drawings.
      a. Submit manufacturer's shop drawings, including elevations, sections, and details indicating dimensions, tolerances, materials, fabrication, doors, panels, framing, hardware schedule, and finish.
   3. Samples.
      a. Submit manufacturer's door sample composed of door face sheet, core, framing and finish.
      b. Submit manufacturer's sample of standard colors for door face and frame.
   4. Testing and Evaluation Reports.
      a. Submit testing reports and evaluations provided by manufacturer conducted by and accredited independent testing agency certifying doors and frames comply with specified performance requirements listed in Section 2.04.
   5. Manufacturer Reports.
      a. Manufacturer's Project References.
         1) Submit list of successfully completed projects including project name, location, name of architect, type, and quantity of doors manufactured.

C. Closeout Submittals.
   1. Operation and Maintenance Manual.

a. Submit manufacturer's maintenance and cleaning instructions for doors and frames, including maintenance and operating instructions for hardware.

2. Warranty Documentation.
   a. Submit manufacturer's standard warranty.

1.05 QUALITY ASSURANCE

A. Manufacturer's Qualifications.
   1. Continuously engaged in manufacturing of doors of similar type to that specified, with a minimum of 25 years concurrent successful experience.
   2. Door and frame components must be fabricated by same manufacturer.
   3. Evidence of a documented complaint resolution quality management system.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivery.
   1. Deliver materials to site in manufacturer's original, unopened, containers and packaging.
   2. Labels clearly identifying opening, door mark, and manufacturer.

B. Storage.
   1. Store materials in a clean, dry area, indoors in accordance with manufacturer's instructions.

C. Handling.
   1. Protect materials and finish from damage during handling and installation.

1.07 WARRANTY

A. Warrant doors, frames, and factory installed hardware against failure in materials and workmanship, including excessive deflection, faulty operation, defects in hardware installation, and deterioration of finish or construction in excess of normal weathering.

B. Standard Period.
   1. Ten years starting on date of shipment.

C. Limited lifetime
   1. Covers failure of corner joinery, core deterioration, and delamination or bubbling of door skin and corrosion of all-fiberglass products while the door is in its specified application in its original installation.

D. Finish
   1. Fluropan painted aluminum: 10 years.
   2. Painted SL-17 face sheets: 5 years.
   3. SpecLite3® face sheets 10 years from the date of shipment.
   4. Painted AF-217, AF-150 frames, AF-250 frames: 3 years.
   5. Anodized, aluminum:10 years.
   6. Thresholds do not have a finish warranty.

PART 2 PRODUCTS

2.01 FRP/ALUMINUM HYBRID DOORS

A. Manufacturer.
   1. Special-Lite, Inc.
      a. PO Box 6, Decatur, Michigan 49045.
      b. Toll Free (800) 821-6531, Phone (269) 423-7068, Fax (800) 423-7610.
      c. Web Site www.special-lite.com.

2.02 DESCRIPTION

A. Model.
   1. SL-17 Pebble Grain FRP/ Aluminum Hybrid Door.
   2. Door Opening Size.
      a. As indicated on door schedule.

3. Construction.
    a. Door Thickness.
        1) 1-3/4”.
    b. Stiles & Rails.
        1) Aluminum extrusions made from 6063 aluminum alloys with a minimum temper of T5.
        2) Minimum 2-5/16” deep one-piece extrusion with have integral reglets to accept face sheet on both interior and exterior side of door which secure face sheet into place and permit flush appearance.
        3) Screw or snap in place applied caps are not acceptable.
        4) Top rails must have integral legs for interlocking continuous extruded aluminum flush cap.
        5) Bottom rails must have integral legs for interlocking continuous weather bar with single nylon brush weather stripping or manually adjustable SL-301 door bottom with two nylon brush weather stripping.
        6) Meeting stiles to include integral pocket to accept pile brush weather seal.
    c. Corners.
        1) Mitered.
        2) Secured with 3/8” diameter full-width steel tie rod through extruded splines top and bottom which are integral to standard tubular shaped rails.
        3) 1-1/4” x 1-1/4” x 3/16” 6061 aluminum angle reinforcement at corner to give strong, flat surface for locking hex nut to bear on.
        4) Weld, glue, or other methods of corner joinery are not acceptable.
    d. Core.
        1) Poured-in-place polyurethane foam.
        2) Laid in foam cores are not acceptable.
        3) Foam Plastic Insulated Doors: IBC 2603.4.
            (a) Foam plastic shall be separated from the interior of a building by an approved thermal barrier.
            (b) Approved thermal barrier must meet the acceptance criteria of the Temperature Transmission Fire Test and Integrity Fire Test as stated in NFPA 275.
            (c) IBC 2603.4.1.7 foam plastic insulation, having a flame spread index less than 75 and a smoke developed index of not more than 450 shall be permitted as a door core when the face is metal minimum 0.032” aluminum or 0.016” steel.
            (d) Standard door assembly can be tested to show it meets these requirements without the use of thermal barrier. If no independent testing conducted all doors with foam plastic core must have a thermal barrier.
    e. Face Sheet.
        1) Exterior
            (a) 0” thick, pebble texture, through color with SpecLite 3® integral surfaseal film FRP sheet.
            (b) Optional painted finish consult manufacturer.
            (c) Class C standard.
        2) Interior
            (a) 0” thick, pebble texture, through color with SpecLite 3® integral surfaseal film FRP sheet.
            (b) Optional painted finish consult manufacturer.
            (c) Class C standard optional Class A available consult manufacturer.
        3) Attachment of face sheet.
            (a) Extruded stiles and rails to have integral reglets to accept face sheet on both interior and exterior side of door which secure face sheet into place and permit flush appearance.

(b) Use of glue to bond face sheet to core or extrusions is not acceptable.

f. Cutouts.
   1) Manufacture doors with cutouts for required vision lites, louvers, and panels.

g. Hardware.
   1) Pre-machine doors in accordance with templates from specified hardware manufacturers.
   2) Surface mounted closures will be reinforced for but not prepped or installed at factory.
   3) Factory install door hardware.

h. Reinforcements.
   1) Aluminum extrusions made from 6061 or 6063 aluminum alloys.
   2) Sheet and plate to conform to ASTM-B209.
   3) Alloy and temper to be selected by manufacturer for strength, corrosion resistance, and application of required finish, and control of color.
      (a) Bars and tubes to meet ASTM-B221.

B. Model.
   1. AF-217BR³ Pebble Grain Composite Fiberglass Ballistic Door.
   2. Door Opening Size.
      a. As indicated on door schedule.
   3. Construction.
      a. Door Thickness.
         1) 1-3/4”.
      b. Stiles & Rails.
         1) Pultruded fiberglass with rabbited channel for accept ballistic core material.
      c. Corners.
         1) Mitered.
         2) Chemically welded to stiles and rails.
         3) Mechanical fasteners to secure corner joints not acceptable.
      d. Core.
         1) Sandwich panel consisting of PP Polypropylene Honeycomb, Fiberglass Ballistic Panel, and PP Polypropylene Honeycomb.
         2) PP Polypropylene Honeycomb.
            (a) pcf density.
            (b) High strength to weight ratio.
            (c) Corrosion, fungi, rot, chemical and moisture resistant.
            (d) Sound and vibration dampening.
            (e) Energy absorbing and recyclable.
      e. Face Sheet.
         1) Exterior
            (a) 0” thick, pebble texture, through color with SpecLite 3® integral surfaseal film FRP sheet.
            (b) Optional painted finish consult manufacturer.
            (c) Class C standard.
         2) Interior
            (a) 0” thick, pebble texture, through color with SpecLite 3® integral surfaseal film FRP sheet.
            (b) Optional painted finish consult manufacturer.
            (c) Class C standard optional Class A available consult manufacturer.
         3) Attachment of face sheet.
            (a) Face sheets to be flame treated to promote durable, long lasting bond.
            (b) Face sheets adhered to stiles, rails, and core using hot melt adhesive evenly coated across all surfaces to produce strong bond and prevent moisture absorption.

f. Cutouts.
    1) Manufacture doors with cutouts for required vision lites, louvers, and panels.
g. Hardware.
    1) Pre-machine doors in accordance with templates from specified hardware manufacturers.
    2) Surface mounted closures will be reinforced for but not prepped or installed at factory.
h. Reinforcements.
    1) Solid high-density polyurethane shapes chemically welded to stiles, rails and/ or core.
    2) No metallic reinforcements will be allowed.

2.03 FRAMING

A. Framing
    1. AF-150.
        a. Jamb Depth.
            1) As indicated on door schedule.
        b. Materials.
            1) See 2.05.A.
        c. Perimeter Frame Members.
            1) ¼" thick pultruded fiberglass open throat with return.
            2) Factory fabricated.
            3) 2" or 4" face available for frame headers.
            4) Reinforced with ballistic fiberglass where required.
        d. Transoms and Sidelites.
            1) Same as perimeter frame members.
            2) Removable stop for ¼", 5/8" or 1" glass or panels.
        e. Integral Door Stops.
            1) 5/8" x 2-1/4".
        f. Frame Assembly.
            1) Single frames chemically welded at factory.
            2) Pairs knock down for field assembly.
        g. Frame Member to Member Connections.
            1) Corners mitered with 4" x 4" x 3/8" pultruded FRP angle reinforcement with interlocking pultruded FRP brackets.
            2) All member to member connections knocked down at factory unless chemically welded at factory requested.
            3) Provide hairline butt joint appearance.
        h. Reinforcements.
            1) Standard.
                (a) ¼" thick pultruded FRP chemically welded to frame at all hinge, strike, and closer locations.
        i. Hardware
            1) Pre-machine and reinforce frame members for hardware in accordance with manufacturer's standards and door hardware schedule.
            2) Surface mounted closures will be reinforced for but not prepped or installed at factory.
        j. Anchors:
            1) Masonry.
                (a) Existing concrete or block punch and dimple.
                (b) Sill anchor.
                (c) Concealed existing masonry anchor.
                (d) Fiberglass masonry t anchor.
            2) Drywall.

(a) Standard jamb anchor tuck.
(b) KD wrap.
(c) Optional punch and dimple tuck with either metal or wood studs.

2.04 PERFORMANCE

A. Face Sheet.
1. Standard Interior and Exterior Class C 0.120” thick, pebble texture, through color with SpecLite 3® integral surfaseal film FRP sheet.
a. Flexural Strength, ASTM-D790: 21 x 103 psi.
b. Flexural Modulus, ASTM-D790: 0.7 x 106 psi.
c. Tensile Strength, ASTM-D638: 13 x 103 psi.
d. Tensile Modulus, ASTM-D638: 1.2 x 106 psi.
e. Barcol Hardness, ASTM-D2583: 55.
f. Izod Impact, ASTM-D256: 14.0 ft-lb/in.
g. Gardner Impact Strength, ASTM-D5420: 120 in-lb.
h. Water Absorption, ASTM-D570: 0.20%/24hrs at 77°F.
i. Surface Burning, ASTM-E84: Flame Spread ≤ 200, Smoke Developed ≤ 450.
j. Taber Abrasion Resistance, Taber Test: 0.007% Max Wt. Loss, cs-17 wheels, 1000g. Wt., 25 cycles.
k. Chemical Resistance.
1) Excellent Rating.
(a) Acetic Acid, Concentrated.
(b) Acetic Acid, 5%.
(c) Bleach Solution.
(d) Detergent Solution.
(e) Distilled Water.
(f) Ethyl Acetate.
(g) Formaldehyde.
(h) Heptane.
(i) Hydrochloric Acid, 10%.
(j) Hydrogen Peroxide, 3%.
(k) Isooctane.
(l) Lactic Acid, 10%.
l. USDA/FSIS Requirements.
1) FRP face sheet with SpecLite 3® integral surfaseal is a finished outer surface material that is rigid; durable; non-toxic; non-corrosive; moisture resistant; a light, solid color such as white; easily inspected; smooth or an easily cleaned texture.
2) FRP face sheet with SpecLite 3® integral surfaseal does not contain any known carcinogen, mutagen, or teratogen classified as hazardous substances; heavy metals or toxic substances; antimicrobials; pesticides or substances with pesticidal characteristics.
2. Optional Interior Face Only Class A 0.120” thick, pebble texture, through color with SpecLite 3® integral surfaseal film FRP sheet.
a. Flexural Strength, ASTM-D790: 13 x 103 psi.
b. Flexural Modulus, ASTM-D790: 0.57 x 106 psi.
c. Tensile Strength, ASTM-D638: 6.8 x 103 psi.
d. Tensile Modulus, ASTM-D638: 0.90 x 106 psi.
e. Barcol Hardness, ASTM-D2583: 40.
f. Izod Impact, ASTM-D256: 12.0 ft-lb/in notched.
g. Gardner Impact Strength, ASTM-D3029: 45 in-lb.
h. Water Absorption, ASTM-D570: 0.32%/24hrs at 77°F.
i. Surface Burning, ASTM-E84: Flame Spread ≤ 25, Smoke Developed ≤ 450.

j. Taber Abrasion Resistance, Taber Test: 0.02% Max Wt. Loss, cs-17 wheels, 1000g. Wt., 25 cycles.

B. Door Core.
1. Density, ASTM-D1622: ≤ 5.0 pcf.
2. Compressive Properties, ASTM-D1621: Compressive Strength ≥ 60 psi, Compressive Modulus ≥ 1948 psi.
3. Tensile and Tensile Adhesion Properties, ASTM-D1623: Tensile Adhesion, 3” x 3” FRP Facers ≥ 53 psi, Tensile Adhesion, 1” x 1” Foam ≥ 104 psi.
4. Thermal and Humid Aging, ASTM-D2126: Volume Change at 158 °F, 100% humidity, 14 days ≤ 13%.
5. Thermal Conductivity, ASTM-C518, Thermal Resistance ≥ 0.10 m2K/W.

C. Door Panel.
1. Thermal Transmittance, AAMA 1503-98: U-Factor = 0.29 Btu/hr·ft²·°F, CRFp = 55.
2. Indoor Air Quality, ASTM-D5116, ASTM-D6607: GreenGuard, GreenGuard Gold.

D. Door and AF-150 Frame Assembly.
1. Thermal Transmittance, NFRC 100.
a. Opaque Swinging Door (< than 50% glass)
1) U-Factor = 0.32 Btu/hr·ft²·°F.
b. Commercially Glazed Swinging Entrance Door (> than 50% glass)
1) U-Factor = 0.57 Btu/hr·ft²·°F.
2. Air Leakage, NFRC 400, ASTM-E283.
a. Opaque Swinging Door (< than 50% glass)
1) cfm/sqft @ 1.57 psf.
2) cfm/sqft @ 6.24 psf.
b. Commercially Glazed Swinging Entrance Door (> than 50% glass)
1) cfm/sqft @ 1.57 psf.
2) cfm/sqft @ 6.24 psf.

E. Door and Hollow Metal Steel Frame.
1. Cycle Slam, NWWDA T.M. 7-90.
a. 5,000,000 cycles.
1) No Operational Damage.
2) No Hinge Separation.

F. AF-150 Framing.
1. Tensile Strength, ASTM-D638: 15,900 psi.
2. Tensile Modulus of Elasticity, ASTM-D638: 1.58 x 106 psi.
3. Maximum Compressive Strength, ASTM-D695: 15,500 psi.
4. Compressive Modulus of Elasticity, ASTM-D695: 6.7 x 105 psi.
5. Flexural Strength, ASTM-D790: 39.3 x 103 psi.
6. Flexural Modulus, ASTM-D790: 1.23 x 106 psi.
7. Izod Impact, ASTM-D256: 8.1 ft-lb/in.
8. Barcol Hardness, ASTM-D2583: 57.
9. Specific Gravity, ASTM-D792: 1.45 @ 23 °C.
10. Density, ASTM-D792: 1445.6 kg.m3 @ 23 °C.
11. Coefficient of Linear Expansion, ASTM-D696: 1.26 x 10-5 in/in/°F.
12. Short Beam Strength, ASTM-D2344: 3,980 psi.
13. Fastener Withdrawal, ASTM-D1761: 924 lbs.
14. Percent Fiberglass: 60%.

G. AF-150BR³ Framing.
1. Tensile Strength, ASTM-D638: 15,900 psi.
2. Tensile Modulus of Elasticity, ASTM-D638: 1.58 x 106 psi.
3. Maximum Compressive Strength, ASTM-D695: 15,500 psi.

4. Compressive Modulus of Elasticity, ASTM-D695: 6.7 x 105 psi.
5. Flexural Strength, ASTM-D790: 39.3 x 103 psi.
6. Flexural Modulus, ASTM-D790: 1.23 x 106 psi.
7. Izod Impact, ASTM-D256: 8.1 ft-lb/in.
8. Barcol Hardness, ASTM-D2583: 57.
9. Specific Gravity, ASTM-D792: 1.45 @ 23 °C.
10. Density, ASTM-D792: 1445.6 kg.m3 @ 23 °C.
11. Coefficient of Linear Expansion, ASTM-D696: 1.26 x 10-5 in/in/°F.
12. Short Beam Strength, ASTM-D2344: 3,980 psi.
13. Fastener Withdrawal, ASTM-D1761: 924 lbs.
14. Percent Fiberglass: 60%.
15. Ballistic Resistance.
    a. UL-752 Level 3.
    b. NIJ-STD-0108.01 Level 3A.

H. Door and AF-150BR³ Frame Assembly.
1. Ballistic Resistance.
    a. UL-752 Level 3.
    b. NIJ-STD-0108.01 Level 3A.
2. Thermal Transmittance, NFRC 100.
    a. Opaque Swinging Door (< than 50% glass)
        1) U-Factor = 0.24 Btu/hr·ft²·°F.
3. Air Leakage, NFRC 400, ASTM-E283.
    a. Opaque Swinging Door (< than 50% glass)
        1) cfm/sqft @ 1.57 psf.
        2) cfm/sqft @ 6.24 psf.

2.05 MATERIALS

A. Aluminum Members.
1. Aluminum extrusions made 6061 or 6063 aluminum alloys.
2. Sheet and plate to conform to ASTM-B209.
3. Alloy and temper to be selected by manufacturer for strength, corrosion resistance, and application of required finish, and control of color.

B. Fiberglass.
1. See 2.02.C.5.

C. Fasteners.
1. All exposed fasteners will have a finish to match material being fastened.
2. 410 stainless steel or other non-corrosive metal.
3. Must be compatible with items being fastened.

2.06 FABRICATION

A. Factory Assembly.
1. Door and frame components from the same manufacturer.
2. Required size for door and frame units, shall be as indicated on the drawings.
3. Complete cutting, fitting, forming, drilling, and grinding of metal before assembly.
4. All cut edges to be free of burs.
5. Welding of doors or frames is not acceptable.
6. Maintain continuity of line and accurate relation of planes and angles.
7. Secure attachments and support at mechanical joints with hairline fit at contact surfaces.

B. Shop Fabrication
1. All shop fabrication to be completed in accordance with manufactures process work instructions.
2. Quality control to be performed before leaving each department.

2.07 FINISHES

A. Door.
  1. Aluminum.
    a. Mill.
      1) AA-M10C22A21-Flash.
    b. Anodizing.
      1) Class 1 Anodizing, minimum 0.7 mils thick.
        (a) Color.
          (1) As chosen by architect.
    c. Paint.
      1) Aluminum.
        (a) Fluropan®.
          (1) Topcoat: 70% polyvinylidene difluoride (PVDF) resin, meets or exceeds all AAMA 2605 specifications
          (2) Color: Consult manufacturer.
  2. FRP Face Sheets
    a. Through color.
      1) Color.
        (a) As chosen by architect.
    b. Painted.
      1) Color.
      2) As chosen by architect if required.
      3) Custom colors available consult manufacturer.

B. Frame
  1. Aluminum.
    a. Mill.
      1) AA-M10C22A21-Flash.
    b. Anodizing.
      1) Class 1 Anodizing, minimum 0.7 mils thick.
        (a) Color.
          (1) As chosen by architect.
    c. Paint.
      1) Aluminum.
        (a) Fluropan®.
          (1) Topcoat: 70% polyvinylidene difluoride (PVDF) resin, meets or exceeds all AAMA 2605 specifications
          (2) Color: Consult manufacturer.
  2. Fiberglass.
    a. Two-component flexible acrylic urethane Satin topcoat.
      1) Color.
      2) As chosen by architect.
      3) Custom colors available consult manufacturer.
      4) Excellent exterior durability.
      5) Unique, high-solids, high-build, multifunctional coating.
      6) Low VOC, Satin coating.
      7) Impact Resistance, ASTM D-4226 Minimum 1.2 in/lb/mil
      8) Color retention: ≤1Δ (CIE L.a.b.), Montreal 45° South: 12 months
      9) Very good chemical resistance.

2.08 ACCESSORIES

A. Vision Lites.
  1. Factory Glazing.

a. Model.
    1) FL Standard.
b. Glazing Thickness.
    1) 1".

B. Hardware.
1. Pre-machine doors in accordance with templates from specified hardware manufactures and hardware schedule.
2. Factory install hardware.
3. Hardware Schedule.
    a. As written in section 087100 unless indicated here.
        1) Hinges.
            (a) SL-11HD.
        2) Door Pulls.
            (a) SL-86.
        3) Concealed adjustable bottom brush.
            (a) SL-301.
                (1) Not for use with CVR type hardware.
        4) Concealed adjustable meeting stile astragal.
            (a) Adjustable astragal by Special-Lite.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas to receive doors.

B. Notify architect of conditions that would adversely affect installation or subsequent use.

C. Do no proceed with installation until unsatisfactory conditions are corrected.

3.02 PREPARATION

A. Ensure openings to receive frames are plumb, level, square, and in tolerance.

3.03 ERECTION

A. Install doors in accordance with manufacturer’s instructions.

B. Install doors plumb, level, square, true to line, and without warp or rack.

C. Anchor frames securely in place.

D. Separate aluminum from other metal surfaces with bituminous coatings or other means approved by architect.

E. Set thresholds in bed of mastic and back seal.

F. Install exterior doors to be weathertight in closed position.

G. Repair minor damages to finish in accordance with manufacturer’s instructions and as approved by architect.

H. Remove and replace damaged components that cannot be successfully repaired as determined by architect.

3.04 FIELD QUALITY CONTROL

A. Manufacture’s Field Services.
1. Manufacturer’s representative shall provide technical assistance and guidance for installation of doors.

3.05 ADJUSTING

A. Adjust doors, hinges, and locksets for smooth operation without binding.

3.06 CLEANING

A. Clean doors promptly after installation in accordance with manufacturer’s instructions.

B. Do not use harsh cleaning materials or methods that would damage finish.

3.07 PROTECTION

A. Protect installed doors to ensure that, except for normal weathering, doors will be without damage or deterioration at time of substantial completion.

END OF SECTION

SECTION 08 3100
ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

C. Product Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

PART 2 PRODUCTS

2.01 ACCESS DOORS AND PANELS ASSEMBLIES

A. Wall-Mounted Units:
   1. Location: As indicated on drawings.
   2. Panel Material: Steel.
   3. Size: 36 by 36 inches.
   4. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
   5. Wall Mounting Criteria: Provide surface-mounted face frame and door surface flush with frame surface.
   6. Gypsum Board Mounting Criteria: Provide drywall bead frame with door surface flush with wall surface.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that rough openings are correctly sized and located.

B. Begin installation only after substrates have been properly prepared, and if the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to proceeding with this work.

B. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

3.03 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Install frames plumb and level in openings, and secure units rigidly in place.

C. Position units to provide convenient access to concealed equipment when necessary.

3.04 SCHEDULE

END OF SECTION

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SECTION 08 3326
OVERHEAD COILING GRILLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Overhead coiling metal grilles and operating hardware; manually operated.

1.02 RELATED REQUIREMENTS

A. Section 08 7100 - Door Hardware: Cylinder cores and keys.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide general construction component connections and details.

C. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.

D. Manufacturer's Installation Instructions: Indicate installation sequences and procedures, adjustment and alignment procedures.

E. Manufacturer's qualification statement.

F. Specimen warranty.

G. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.

1.05 QUALITY ASSURANCE

1.06 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide 2-year manufacturer warranty for roller shaft counterbalance assembly. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Overhead Coiling Grilles:
   1. Raynor Garage Doors; DuraGrille Standard Series, Model GSA: www.raynor.com/#sle.
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 GRILLES AND COMPONENTS

A. Grille: Aluminum; horizontal bar curtain, coiling on overhead counterbalanced shaft.
   1. Finish: Clear Anodized.
   2. Lock Devices: Lock and latch handle on outside.
   3. Manual hand chain lift operation.
   4. Mounting: Within framed opening.

B. Curtain: Round horizontal bars connected with vertical links.
   1. Horizontal bars: 5/16 inch diameter.
   2. Bar spacing: 1-1/2 inch on center.
   3. Link spacing: 9 inch on center.
   4. Bar Ends: Provide with polypropylene pile runners for quiet operation.
   5. Bottom Bar: Reinforced aluminum extruded tubular bar.

C. Guides: Extruded aluminum angles, of profile to retain grille in place with snap-on trim, mounting brackets of same metal.

D. Hood Enclosure and Trim: Sheet metal; completely covering operating mechanisms; internally reinforced to maintain rigidity and shape.

1. Material: Same metal as grille.

E. Lock Hardware:
   1. Cylindrical Locking Mechanism: Latchset lock cylinder, specified in Section 08 7100.
   2. Latch Handle: Manufacturer's standard.

F. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension; requiring 25 lb nominal force to operate.

2.03 MATERIALS

A. Aluminum: ASTM B221 (ASTM B221M).

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that adjacent construction is suitable for door installation.

B. Verify that door opening is plumb, header is level, and dimensions are correct.

C. Notify Architect of any unacceptable conditions or varying dimensions.

D. Commencement of installation indicates acceptance of substrate and door opening conditions.

3.02 INSTALLATION

A. Install grille unit assembly in accordance with manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Install enclosure and perimeter trim.

3.03 ADJUSTING

A. Adjust grille, hardware and operating assemblies for smooth and noiseless operation.

3.04 CLEANING

A. Clean grille and components.

B. Remove labels and visible markings.

END OF SECTION

SECTION 08 4523
INSULATED TRANSLUCENT FIBERGLASS SANDWICH PANEL WALL SYSTEM

PART 1 GENERAL

1.01 SUMMARY

A. Section includes the insulated, translucent sandwich panel system and accessories as shown and specified. Work includes providing and installing:
   1. Flat insulated, translucent sandwich panels
   2. Aluminum clamptite installation system
   3. Aluminum sill flashing

B. Related Sections:
   1. Section 07 2500 - Weather Barriers: Sealing perimeter frame to weather barrier installed on adjacent construction.
   2. Section 07 9200 - Joint Sealants: Sealing joints between perimeter frame and adjacent construction.

1.02 SUBMITTALS

A. Submit manufacturer's product data. Include construction details, material descriptions, profiles, and finishes of components.

B. Submit shop drawings. Include plans, elevations, and details.

C. Submit manufacturer's color charts showing the full range of colors available for factory finished exposed aluminum.
   1. When requested, submit samples for each exposed finish required, in same thickness and material indicated for the work and in size indicated below.
      a. Sandwich panels: 7" x 12" units
      b. Factory finished aluminum: 3" long sections

D. Submit Installer Certificate, signed by installer, certifying compliance with project qualification requirements.

E. Submit product reports from a qualified independent testing agency indicating each type and class of panel system complies with the project performance requirements, based on comprehensive testing of current products. Previously completed reports will be acceptable if for current manufacturer and indicative of products used on this project.
   1. Reports required (if applicable) are:
      a. Flame Spread and Smoke Developed (((UL 723))) – Submit UL Card
      b. Burn Extent (ASTM D 635)
      c. Color Difference (ASTM D 2244)
      d. Impact Strength (((UL 972)))
      e. Bond Tensile Strength (ASTM C 297 after aging by ASTM D 1037)
      f. Bond Shear Strength (ASTM D 1002)
      g. Beam Bending Strength (ASTM E 72)
      h. Insulation U-Factor (((NFRC 100)))
      i. NFRC System U-Factor Certification (((NFRC 700)))
      j. NFRC Visible Light Transmittance (((NFRC 202)))
      k. Solar Heat Gain Coefficient (NFRC or Calculations)
      l. Condensation Resistance Factor (((AAMA 1503))) (Thermally Broken, insulated panels only)
      m. Air Leakage (ASTM E 283)
      n. Structural Performance (ASTM E 330)
      o. Water Penetration (ASTM E 331)

p. Fire Penetration of Exterior Wall Assemblies Using a Direct Flame Impingement Exposure (((ASTM E2707)))

1.03 CLOSEOUT SUBMITTALS

A. Provide field maintenance manual to include in project maintenance manuals.

1.04 QUALITY ASSURANCE

A. Manufacturer's Qualifications:
   1. Material and products shall be manufactured by a company continuously and regularly employed in the manufacture of specified materials for a period of at least ten consecutive years and which can show evidence of those materials being satisfactorily used on at least six projects of similar size, scope, and location. At least three of the projects shall have been in successful use for ten years or longer.
   2. Panel system must be listed by an ANSI accredited Evaluation Service, which requires quality control inspections and fire, structural, and water infiltration testing of sandwich panel systems by an accredited agency.
   3. Quality control inspections shall be conducted at least once each year and shall include manufacturing facilities, sandwich panel components, and production sandwich panels for conformance with AC177 "Translucent Fiberglass Reinforced Plastic (FRP) Faced Panel Wall, Roof and Skylight Systems" as issued by the ICC-ES.
   4. Material and products

B. Installer's Qualifications: Installation shall be by an experienced installer, which has been in the business of installing Kalwall panel systems for at least two consecutive years and can show evidence of satisfactory completion of projects of similar size, scope, and type.

1.05 PERFORMANCE REQUIREMENTS

A. The manufacturer shall be responsible for the configuration and fabrication of the complete panel system.
   1. When requested, include span analysis data.
   2. Standard panel system shall have less than 0.01 cfm/ft² air leakage by ASTM E 283 at 6.24 PSF (50 mph) and no water penetration by ASTM E 331 at 15 PSF; and structural testing by ASTM E 330.
   3. Structural Loads. Provide system capable of handling the following loads:
      a. Positive Wind Load (PSF):
      b. Negative Wind Load (PSF):

B. Deflection Limits:
   1. Walls: Limited to L/120 of clear span for each assembly component.

C. Thermal Movements: Allow for thermal movements from ambient- and surface-temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change (Range): 110 deg F (43 deg C), ambient; 150 deg F (66 deg C), material surfaces.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver panel system, components, and materials in manufacturer's standard protective packaging.

B. Store panels on the long edge; several inches above the ground, blocked and under cover in accordance with manufacturer's storage and handling instructions.

1.07 WARRANTY

A. Provide manufacturer's and installer's written warranties agreeing to repair or replace panel system work, which fails in material or workmanship, within one year from the date of delivery. Failure of material or workmanship shall include deterioration of finish on metal in excess of normal weathering; and defects in accessories; insulated, translucent sandwich panels; and other components of the work.

B. Extended Panel Warranty: 5 years from date of delivery.

C. Extended Manufacturer’s factory applied Finish Warranty: 10 years from date of delivery.

1.08 REFERENCE STANDARDS

A. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems; 2015.

B. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.

C. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

D. ASTM E2707 - Standard Test Method for Determining Fire Penetration of Exterior Wall Assemblies Using a Direct Flame Impingement Exposure; 2015.

E. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

F. UL 972 - Standard for Burglary Resisting Glazing Material; Current Edition, Including All Revisions.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. The basis for this specification is for products manufactured by Kalwall Corporation. Other manufacturers may bid this project subject to compliance with all of the performance requirements of this specification and submission of evidence thereof. Listing other manufacturers’ names in this specification does not constitute approval of their products or relieve them of compliance with all the performance requirements contained herein.

B. Kalwall Corporation, Tel: (800) 258-9777 – Fax: (603) 627-7905 – Email: info@kalwall.com

C. Structures Unlimited Inc. Tel: (800) 225-3895

D. Distinctive Skylights

2.02 PANEL COMPONENTS

A. Face Sheets:
   1. Translucent faces: Manufactured from glass fiber reinforced thermoset resins, formulated specifically for architectural use.
      a. Thermoplastic (e.g. polycarbonate, acrylic) faces are not acceptable.
      b. Face sheets shall not deform, deflect, or drip when subjected to fire or flame.
   2. Interior face sheets:
      a. Flame spread: Underwriters Laboratories (UL) listed, which requires periodic unannounced retesting, with flame spread rating no greater than 50 and smoke developed no greater than 450 when tested in accordance with UL 723.
      b. Burn extent by ASTM D 635 shall be no greater than 1”.
   3. Exterior face sheets:

a. Color stability: Full thickness of the exterior face sheet shall not change color more than 3 CIE Units DELTA E by ASTM D 2244 after 5 years outdoor South Florida weathering at 5° facing south as measured on a white sample, with and without a protective film or coating to ensure long-term color stability. Color stability shall be unaffected by abrasion or scratching.
b. Strength: Exterior face sheet shall be uniform in strength, impenetrable by hand held pencil and repel an impact minimum of 70 without fracture or tear when impacted by a 3-1/4" diameter, 5 lb. free-falling ball per UL 972.
c. Erosion Protection: Integral, embedded-glass erosion barrier.

4. Appearance:
a. Exterior face sheet: Smooth, .070" thick and Crystal in color.
b. Interior face sheet: Smooth, .045" thick and White in color.
c. Face sheets shall not vary more than ± 10% in thickness and be uniform in color.

B. Grid Core:
1. Thermally-broken composite I-beam grid core shall be of alloy and temper recommended by manufacturer with provisions for mechanical interlocking of muntin-mullion and perimeter. Width of I-beam shall be no less than 7/16".
2. I-beam Thermal break: Minimum 1", thermoset fiberglass composite. Poured and de-bridged thermal break is not acceptable.

C. Laminate Adhesive:
1. Heat and pressure resin type adhesive engineered for structural sandwich panel use, with minimum 25-years field use. Adhesive shall pass testing requirements specified by the International Code Council "Acceptance Criteria for Sandwich Panel Adhesives".
2. Minimum tensile strength of 750 PSI when the panel assembly is tested by ASTM C 297 after two exposures to six cycles each of the aging conditions prescribed by ASTM D 1037.
3. Minimum shear strength of the panel adhesive by ASTM D 1002 after exposure to four separate conditions:
a. 50% Relative Humidity at 68° F: 540 PSI
b. 182° F: 100 PSI
c. Accelerated Aging by ASTM D 1037 at room temperature: 800 PSI
d. Accelerated Aging by ASTM D 1037 at 182° F: 250 PSI

2.03 PANEL CONSTRUCTION

A. Provide sandwich panels of flat fiberglass reinforced translucent face sheets laminated to a grid core of mechanically interlocking I-beams. The adhesive bonding line shall be straight, cover the entire width of the I-beam and have a neat, sharp edge.
1. Thickness: 2-3/4 inches
2. Grid Core Insulation: Fill panel cores with fiberglass batt.
3. Panel U-factor by NFRC certified laboratory:
a. 2-3/4" thermally broken grid 23
4. Visible Light Transmittance (VLT): 26%
a. Visible LT (((NFRC 202))) by NFRC certified laboratory:
5. Solar heat gain coefficient : 0.30
6. Grid pattern as viewed: Nominal size 24" x 12" rectangle

B. Standard panels shall deflect no more than 1.9" at 30 PSF in 10'-0" span without a supporting frame by ASTM E 72.

C. Panels shall meet the conditions of acceptance according to ASTM E2707 Fire Penetration of Exterior Wall Assemblies Using a Direct Flame Impingement Exposure:
1. Absence of flame penetration through the wall assembly at any time.

2. Absence of evidence of glowing combustion on the interior surface of the assembly at the end of the 60-min observation period.
3. Absence of evidence of flame, glow, and smoke if the test is terminated prior to the completion of the 60-min observation period.

D. Thermally broken, insulated panels: Minimum Condensation Resistance Factor of 80 by AAMA 1503 measured on the bond line.

2.04 ALUMINUM CLAMPTITE INSTALLATION SYSTEM

A. Aluminum clamptite installation system:
1. 2¾" Thermal Strut System-Flat Thermally Broken closure system: Thermal barrier shall consist of polyamide thermal strut construction with multi-directional glass fiber reinforcing. Aluminum components shall be mechanically crimped into cross knurled cavities. Poured and de-bridged thermal break is not acceptable.

B. Sealing tape: Manufacturer's standard, pre-applied to aluminum clamptite installation system at the factory under controlled conditions.

C. Fasteners: 300 series stainless steel screws for aluminum clamptite installation system, excluding final fasteners to the building.

D. Finish:
1. Manufacturer's factory applied finish, which meets the performance requirements of AAMA 2604. Color to be selected from manufacturers standards

PART 3 - EXECUTION

3.01 EXAMINATION

A. Installer shall examine substrates, supporting structure, and installation conditions.

B. Do not proceed with panel installation until unsatisfactory conditions have been corrected.

PREPARATION

A. Metal Protection:
1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by sealant manufacturer for this purpose.
2. Where aluminum will contact concrete, masonry, or pressure treated wood, protect against corrosion by painting contact surfaces with bituminous paint or method recommended by sealant manufacturer.

INSTALLATION

A. Install the panel system in accordance with the manufacturer's fabrication drawings and suggested installation instructions.
1. Anchor component parts securely in place by permanent mechanical attachment system.
2. Accommodate thermal and mechanical movements.
3. Seal aluminum clamptite installation system as shown on the manufacturer's fabrication drawings and suggested installation instructions.

B. Install joint sealants at perimeter joints and within the panel system in accordance with manufacturers fabrication drawings and suggested installation instructions.

FIELD QUALITY CONTROL DELETE THIS SECTION IF NOT APPLICABLE.

A. Water Test: Installer to test a representative section of installed materials according to procedures in AAMA 501.2.

B. Repair or replace work that does not pass testing or that is damaged by testing and retest work.

CLEANING

A. Clean the panel system, interior and exterior, immediately after installation.

B. Refer to manufacturer's written recommendations.

END OF SECTION

SECTION 08 5113
ALUMINUM WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Extruded aluminum windows with fixed sash, operating sash, and infill panels.

B. Operating hardware.

1.02 RELATED REQUIREMENTS

A. Section 05 5000 - Metal Fabrications: Steel lintels.

B. Section 06 1000 - Rough Carpentry: Wood perimeter shims.

C. Section 07 9005 - Jo intS: Perimeter sealant and back-up materials.

D. Section 08 8000 - Glazing.

E. Section 12 2400- Window Shades.

1.03 REFERENCE STANDARDS

A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for Windows, Doors, and Skylights; 2022.

B. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site; 2015.

C. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.

D. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.

E. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

F. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

G. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

H. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; American Architectural Manufacturers Association; 2012.

I. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).

J. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2023).

1.04 PERFORMANCE REQUIREMENTS

A. Performance Requirements: As specified in PART 2, with the following additional requirements:

1. Movement: Accommodate movement between window and perimeter framing and deflection of lintel, without damage to components or deterioration of seals as recommended by manufacturer.
2. Fixed Windows - 4-5/8 Inch Depth:
    a. Air Infiltration: Limit air infiltration through assembly to 0.1 cubic feet/minute/square foot of wall area, measured at a reference differential pressure across assembly of 6.2 psf as measured in accordance with ASTM E 283-04.
    b. Condensation Resistance Factor: CRF of 59 (frame) and 72 (glass) when measured in accordance with AAMA 1503.98.

c. Thermal Transmittance: Maximum .33 BTU/hour/square foot/F U value.
d. Water Leakage: None, when measured in accordance with ASTM E 331 with a test pressure difference of .15 lbf/square foot.
e. Solar Heat Gain Coefficient: 0.4 or better.

3. Fixed - Stand Alone Windows - 4 Inch Depth:
   a. Air Infiltration: Limit air infiltration through assembly to 0.1 cubic feet/minute/square foot of wall area, measured at a reference differential pressure across assembly of 6.24 psf as measured in accordance with ASTM E 283-04.
   b. Condensation Resistance Factor: CRF of 60 (frame) and 69 (glass) when measured in accordance with AAMA 1503.98.
   c. Thermal Transmittance: Maximum .42 BTU/HR/SQ.FT/F U value.
   d. Water Leakage: None, when measured in accordance with ASTM E 331 with a test pressure difference of 12 lbf/square foot.
   e. Solar Heat Gain Coefficient: 0.4 or better.
4. Horizontal Sliding Windows - 4-5/8 Inch Depth:
   a. Air Infiltration: Limit air infiltration through assembly to 0.3 cubic feet/minute/square foot of wall area, measured at a reference differential pressure across assembly of 6.24 psf as measured in accordance with ASTM E 283.
   b. Condensation Resistance Factor: CRF of 33 when measured in accordance with AAMA 1503.1.
   c. Thermal Transmittance: maximum .45 BTU/HR/SQ.FT/F U value.
   d. Water Leakage: None, when measured in accordance with ASTM E 331 with a test pressure difference of .10 lbf/square foot.
   e. Solar Heat Gain Coefficient: 0.4 or better.
   f. Horizontal Sliding Windows - 4-5/8 inch Depth:
      1) Air Infiltration: Limit air infiltration through assembly to 0.3 cubic feet/minute/square foot of wall area, measured at a reference differential pressure across assembly of 6.24 psf as measured in accordance with ASTM E 283.
      2) Condensation Resistance Factor: CRF of 53 when measured in accordance with AAMA 1503.1.
      3) Thermal Transmittance: maximum .55 BTU/hour/square foot/F U value.
      4) Water Leakage: None, when measured in accordance with ASTM E 331 with a test pressure difference of .25 lbf/square foot.
      5) Solar Heat Gain Coefficient: 0.4 or better.
5. Glazing shall comply with the CPSC 16 CFR, Part 1201 criteria for Category 1 or Category 2:
   a. Category 1: 9 square feet or less of exposed surface area.
   b. Category 2: more than 9 square feet of exposed surface area.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.06 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal process.

B. Product Data: Provide component dimensions, information on glass and glazing, internal drainage details, and descriptions of hardware and accessories.

C. Shop Drawings: Indicate opening dimensions, elevations of different types, framed opening tolerances, method for achieving air and vapor barrier seal to adjacent construction, anchorage locations, glass types, and installation requirements.

D. Manufacturer's Installation Instructions: Include complete preparation, installation, and cleaning requirements.

E. Manufacturer's Qualification Statement.

F. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.07 QUALITY ASSURANCE

A. Manufacturer and Installer: Company specializing in fabrication of commercial aluminum windows of types required with not fewer than 5 years of experience.

B. Furnish a valid AAMA "Notice of Product Certification" indicating that the windows for the Project conform to AAMA/NWWDA 101/I.S.2-97.

C. Furnish visible, permanent IGCC certification labels for the CBA rating level on dual-seal double insulating glass units.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of AAMA CW-10.

B. Protect finished surfaces with wrapping paper or strippable coating during installation. Do not use adhesive papers or sprayed coatings that bond to substrate when exposed to sunlight or weather.

1.09 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F.

B. Maintain this minimum temperature during and 24 hours after installation of sealants.

C. Verify all existing conditions prior to order release.

1.10 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Windows: Warrant for 1 year against defects in material or workmanship under normal use.

C. Insulating Glass Units: Warrant seal for 5 years against visual obstruction from film formation or moisture collection between internal glass surfaces, excluding that caused by glass breakage or abuse.

D. Paint Finish: Duranar™ Organic Finish Conforming to AAMA 2605-02: Warrant for 15 years against chipping, peeling, cracking, chalking, or fading.

E. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Traco; Product TR-780 Heavy Commercial AW-PG80-FW Fixed, Thermal Aluminum Window - 4-5/8" Depth. (If using with other window types)

B. Traco; Product TR-9500 Heavy Commercial F-AW100 Fixed, Thermal Aluminum Window - 4" Depth. (Stand Alone Unit)

C. Traco; Product TR-6800 Heavy Commercial HS-AW50 Horizontal Sliding Thermal Aluminum Window - 3-1/4" Depth.

D. Traco; Product TR-6300 Heavy Commercial HS-AW50 Horizontal Sliding Thermal Aluminum Window - 4-5/8" Depth.

E. Or approved equal.

F. Substitutions: See Section 01 6000 - Product Requirements.

2.02 WINDOWS

A. Aluminum Windows: Extruded aluminum frame and sash, factory fabricated, factory finished, with operating hardware, related flashings, and anchorage and attachment devices.

B. Performance Requirements: Provide products that comply with the following:
   1. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific window type:

a. Performance Class (PC): R.
2. Performance Requirements: AAMA/NWWDA 101/I.S.2 AP-AW65 C-AW65; HS-AW50; H-AW40.

C. Fixed, Non-Operable Type:
1. Construction: Thermally broken.
2. Glazing: Double; clear; Solarban 60 on # 3 surface Low E.
3. Exterior Finish: Class I natural anodized.
4. Interior Finish: Class I natural anodized.

D. Horizontal Sliding Type:
1. Construction: Thermally broken.
2. Provide screens.
3. Glazing: Double; clear; Solarban 60 on # 3 surface Low E.
4. Exterior Finish: Class I natural anodized.
5. Interior Finish: Class I natural anodized.

2.03 COMPONENTS

A. Glazing: As specified in Section 08 8000.

B. Insect Screens (Sliding): Half; held in exterior integral tracks with two (2) stainless steel leaf springs; 5/16 inch x 1-1/2 inches x .050 inch extruded tubular aluminum frame with finish to match window in color and performance; corners mitered, gusset reinforced, and crimped; 18 x 16 dark aluminum mesh secured with PVC spline.
1. Insect screens shall not be installed on emergency egress windows.

C. Weatherstrip (Sliding Windows): Secured in extruded ports; double rows on sash perimeters: rigid PVC weatherseal in one side of the horizontal sash rails, and pile conforming to AAMA 701-00 with polypropylene center fin in remaining locations.

D. Glazing Materials: As specified in Section 08 8000.

2.04 MATERIALS

A. Extruded Aluminum: ASTM B 221, 6063 alloy, T5 temper.

2.05 HARDWARE

A. Hardware (Sliding): Two (2) stainless steel wheel housings per sash with one (1) ball bearing stainless adjustable steel wheel per housing; one (1) black zinc automatic handle/lock mounted with stainless steel screws and one (1) black zinc keeper on meeting stiles.

B. Pulls: Manufacturer's standard type.

C. Bottom Rollers: Stainless steel, adjustable.

2.06 FABRICATION

A. Sliding:
1. Frame: Head and sill coped and fastened to jambs with two (2) stainless steel screws per frame head/jamb corner, four (4) per frame sill/jamb corner; corners factory-sealed with sealant conforming to AAMA 800-92.
2. Water Control: Tubular frame sill with separate and offset weep slots for each track; concealed exterior weep covers with flaps to allow water to drain by gravity and resist wind-driven water.
3. Sash: Tubular vertical sash stiles coped and fastened to horizontal sash rails with a telescope-design joint secured with one (1) stainless steel screw per sash corner.
4. Sash Design: Mechanical meeting stile interlock; sash removed by removing take-out stop in frame head, lifting sash, and swinging sash bottom to interior; weep holes for drainage.

B. Stand alone windows shall be provided with an extruded sill with drip leg matching existing profile and setback whether a replacement or new installation, or as indicated on drawings. Windows in receptor or panning systems shall meet the same criteria, but will incorporate manufacturer's entire system.

2.07 FINISHES

A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

B. Class I Natural Finish Anodized 2-step Finish:
   1. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

C. Class I Color Anodized Finish: AAMA 611 AA-M12C22A44 Electrolytically deposited colored anodic coating not less than 0.7 mils thick; dark bronze or black.

D. Superior Performance Organic Coating System: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride system; color as selected from manufacturer's standard colors.
   1. Coating: PPG Duranar™ with resin containing 70 percent fluoropolymer; thermosetting; alternative finishes will not be acceptable.
   2. Quality standard: conforming to AAMA 2605-02, including 10 years Florida exposure and 4,000 hours humidity tests.
   3. Pretreatment: 5-stage; zinc chromate conversion coating.
   4. Application: Electrostatic spray and oven bake by approved applicator.
   5. Coating quantity: Minimum one (1) primer coat and one color coat.
   6. Dry film thickness: Minimum 1.2 mils on exposed surfaces, except inside corners and channels.

E. Finish Color: As selected by Architect from manufacturer's standard range.

2.08 ACCESSORIES

A. Roller Shades for all new windows as described in Section 12 2400 - Window Shades.

PART 3 EXECUTION

3.01 EXAMINATION

A. Prepare openings to be in tolerance, plumb, level, provide for secure anchoring, and in accordance with approved Shop Drawings. Provide perimeter wood blocking as required for secure anchoring.

B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive aluminum windows.

3.02 INSTALLATION

A. Use only skilled tradesmen with Work done in accordance with the Contract Drawings and approved Shop Drawings.

B. Install windows in accordance with manufacturer's instructions.

C. Install window assembly in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.

D. Provide perimeter wood blocking as required for secure anchoring. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.

E. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent Work.

F. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

G. Coordinate attachment and seal of perimeter air barrier and vapor retarder materials.

H. Install operating hardware not pre-installed by manufacturer.

I. Install glass in accordance with requirements specified in Section 08 8000.

J. Install perimeter sealant in accordance with requirements specified in Section 07 9005 - Joint Sealers.

1. Prior to installing, window subsills shall be dammed at each end to substrate a minimum 1 inch vertical and horizontal. Sealant shall be tooled to create swale moving water away from each end. Fastener heads shall be sealed with manufacturer recommended sealant prior to setting window. Receptor and panning systems shall be dammed at the head on each end, and at all exterior joints where vertical and horizontal members meet. Systems that are required to be reversed due to existing conditions shall be dammed at the interior members intersections, however, prior approval by Architect is required.

K. Sliding windows in receptor or panning systems shall receive blocking prior to installing closure strips near the sill on either side to prevent movement from closing.
   1. Post installation, windows shall be sealed at the exterior junction between window and subsill along with full perimeter sealant as required.
   2. Fasteners shall be concealed under glazing stops or where otherwise possible.

3.03 TOLERANCES

A. Maximum Variation from Level or Plumb: 1/16 inches every 3 ft non-cumulative or 1/8 inches per 10 ft, whichever is less.

3.04 FIELD QUALITY CONTROL

A. Test installed units in conformance with AAMA 502-02 minimum requirements for air and water infiltration with the window manufacturer, Contractor, and Owner present.

B. Select test units as directed by the Owner's Representative and use an AAMA-accredited laboratory provided by the Owner or Contractor.

C. Replace windows that have failed field testing and retest until performance is satisfactory.

3.05 ADJUSTING

A. Adjust hardware for smooth operation and secure weathertight closure.

3.06 CLEANING

A. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant and window manufacturer.

END OF SECTION

SECTION 08 5653
SECURITY WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Security view windows, with glazing.

B. Security transaction windows with pass-through device.

C. Bullet Resistant Drawer.

1.02 RELATED REQUIREMENTS

A. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.

1.03 REFERENCE STANDARDS

A. ASTM F1233 - Standard Test Method for Security Glazing Materials And Systems; 2021.

B. NIJ 0108.01 - Standard for Ballistic Resistant Protective Materials; 1985.

C. UL 752 - Standard for Bullet-Resisting Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Furnish anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, to be embedded into concrete or masonry, with setting diagrams and installation, to applicable installer in time for installation.

B. Preinstallation Meeting: Prior to start of installation arrange a meeting on site to familiarize installer and installers of related work with requirements relating to this work.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's published data showing materials, construction details, dimensions of components, and finishes.

C. Shop Drawings: Drawings prepared specifically for this project, showing plans, elevations, sections, details of construction, anchorage to other work, hardware, and glazing.
   1. For existing openings show verified field dimensions.
   2. For new work show required opening dimensions and allowance for field deviation.

D. Samples of Color Anodized Finishes: Frame member sections showing range of color to be expected in finished work.

E. Coordination Drawings: For each window opening, show locations and details of items necessary to anchor windows that must be installed by others, in sufficient detail that installer of those items can do so correctly without reference to the actual window itself.

F. Manufacturer's Qualification Statement.

G. Installer's Qualification Statement.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firm with at least 5 years experience in the manufacture of windows of the type specified and able to provide test reports showing that their standard manufactured products meet the specified requirements; custom designed products not acceptable.

B. Testing Agency Qualifications: Independent testing agency able to show experience in conducting tests of the type specified and:

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Provide manufacturer's warranty agreeing to repair or replace windows and window components that fail within three years after Date of Substantial Completion due to, but not limited to, the following:
   1. Structural failure, failure of welds, and deterioration of metals and finishes beyond that expected under detention use and normal weathering.
   2. Failure of glazing due to excessive deflection of supporting members under wind load.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Security Transaction Windows with Pass-Through Device and integrated speaker:
   1. Basis of Design: Armortex; www.armortex.com/#sle..
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ASSEMBLIES

A. Security and Detention Windows:
   1. Dimensions, profiles, features, and performance specified and indicated on drawings are required; do not deviate unless specifically approved by Architect under substitution procedures; see Section 01 6000.
   2. Design to fit openings indicated on drawings; design to accommodate deviation of actual construction from dimensions indicated on drawings.
   3. Fabricate frames and sash with corners mitered or coped full depth with concealed welded joints.
   4. Design anchorages to provide performance equivalent to that required for window unit; provide anchorages at least equivalent to those by which the tested units were anchored to the test frame.
   5. Separate dissimilar metals to prevent corrosion by galvanic action by painting contact surfaces with primer or with sealant or tape recommended by manufacturer for the purpose.
   6. Weld components before finishing and in concealed locations, to greatest extent possible; minimize distortion and discoloration of finish; remove residue of welding; grind exposed welds smooth and finish to match.
   7. Label units to indicate which side is which, such as inside/outside or secure/non-secure; use labels that are removable after installation but durable enough not to be lost during delivery, storage, handling, and installation.

2.03 SECURITY TRANSACTION WINDOWS WITH PASS-THROUGH DEVICE

A. Security Transaction Windows with Pass-Though Device: Factory-assembles fixed glazing panle reglazable from secure side with out disassembly of frame, with non-removable trim and glazing stops on non-secure side (inside toward office); glazing slanted outward at 5 degrees from sill to head.
   1. Location: Built within interior wall, as indicated on drawings.
   2. Type of Use: As indicated on drawings.
   3. Ballistic Resistance: Tested to meet UL 752, Level 3.
   4. Window Type: Fixed.
      a. Overall Window Frame Size: As indicated on drawings.
      b. Frame Material: Stainless steel.
         1) Finish: #3 Satin finish.
   5. Steel Sheet:
      a. ASTM A1008/1008M, cold rolled, free from scale, pitting, coil breaks and other surface defects.
   6. Bullet-Resistant Composite: UL Listed Bullet Resistant Composite by Armortex, of UL Ballistic Level equal to specified frame ballistic protection level.
   7. Ballistic Steel: Hi-Hard Ballistic Steel of UL Ballistic Level equal to specified frame ballistic protection level.

8. Glazing: UL liste Glass-clad polycarbonate; kind as required to acheive performance criteria specified.
9. Frames:
    a. Fabricate for 16-gauge steel lined with ballistic steel.
    b. Bullet-resistant rating equivalent or equal to or greater than glazing.
    c. Weld frame corners; knowck-down and mechanical joints not acceptable. Welding in accordance with AWS D1.3/D1.3M. Grind exposed welds flush and smooth.
    d. Replacement of glazing from secure side of window, not requiring removal of frame from opening.
10. Pass-Through Device: Drawer mounted below window and deal tray built into window sill.
    a. Operation: Manual.
11. Window Speaker:
    a. Battery operated Haven Tech #SC100 Speak-thru by Armortex.
    b. Maximum Balllistic protection level-3.
    c. Material: Aluminum.
    d. Finish Color: As selected from manufacturer's standard colors.
    e. Communication: Integrated microphone, speaker, and call button.

B. Product:
1. Armortex- Stainless Steel Transaction Window with Package receiver.
2. Substitutions: See Section 01 6000 - Product Requirements.

2.04 ACCESSORIES

A. Bullet Resistant Drawer:
1. Ballistic Level: Level 3.
2. Finish: #3 Brushed.
3. Primary Material: 16 ga. Steel.
4. Height: 7"
5. Length: 24"
6. Width: 17-3/4"

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that window openings are ready for installation of windows.

B. Verify that correct embedded anchors are in place and in proper location; repair or replace anchors as required to achieve satisfactory installation.

C. Notify Architect if conditions are not suitable for installation of windows; do not proceed until conditions are satisfactory.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions and drawing details.

B. Install windows in correct orientation (inside/outside or secure/non-secure).

C. Anchor windows securely in manner so as to achieve performance specified.

D. Set sill members and sill flashing in continuous bead of sealant.

3.03 ADJUSTING

A. Adjust operating components for smooth operation while also providing tight fit at contact points and a secure enclosure; lubricate operating hardware.

3.04 CLEANING

A. Clean exposed surfaces promptly after installation without damaging finishes.

B. Remove and replace defective work.

END OF SECTION

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Part 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes but not limited to the following:

1. Mechanical and/or electrical hardware.
2. Cylinder for hardware specified in other sections.

B. Related Requirements

1. Division 01 Section “Closeout Procedures”
2. Division 06 Section “Rough Carpentry”.
3. Division 06 Section “Finish Carpentry”.
4. Division 08 Section “Hollow Metal Doors and Frames”.
5. Division 08 Section “Fiberglass Doors”.

C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.
4. NFPA 101 - Life Safety Code.
5. State Building Codes, Local Amendments.

1.3 COORDINATION

A. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

B. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

1.4 COORDINATION AND MEETINGS

A. Location: Conduct conferences on project site or other location as directed by the Architect/Owner.

B. Preinstallation Conference

1. Purpose of the Preinstallation conference is to:

a. Coordinate between trades, so all understand their responsibilities.

b. To instruct the installing contractors' personnel on the proper installation and adjustment of their respective products.
   1. Hardware supplier is responsible for bringing the installation instructions to the meeting.
c. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
d. Review sequence of operation narratives for each unique access-controlled opening.
e. Review the requirements for local and state building codes and how they apply to doors, frames, and hardware.
   1. Opening forces to follow DOJ's "2010 ADA Standards for accessible design".
f. Review any special applications.

2. Conference participants shall include but not limited to:

   a. General Contractor.
   b. Installer for doors, frames, and hardware.
   c. Supplier Representative.
   d. Owner and/or Owners Representative.
   e. Construction Manager (if applicable).
   f. Engineer and/or Engineers Consultant.

C. Keying Conference:

1. Incorporate conference decisions into keying schedule after reviewing door hardware keying system including, but not limited to, the following:

   a. Flow of traffic and degree of security required.
   b. Preliminary key system schematic diagram.
   c. Requirements for key control system.
      1. This is to include the number of keys per keyset.
      2. Number of Master level keys.
      3. Use of keyed construction cores.
   d. Requirements for access control.
   e. Address for delivery of keys.

2. Keying Conference participants shall include but not limited to:

   a. Supplier Representative.
   b. Owner and/or Owners Representative.
      Engineer and/or Engineers Consultant

1.5 SUBMITTALS

A. Submittal Sequence to follow in this order and each are to be submitted under separate cover:
   1. Door Hardware Schedule.
   2. Hardware Product Data.
   3. Samples.
   4. Keying Schedule (Only after the keying meeting has taken place).
   5. Closeout Submittals.
   6. Submit door hardware schedule concurrent with submissions of Product Data, Samples, Riser Diagrams.

B. Information Submittals:

1. Qualification Data: Submit qualification data for the Installer and Supplier as defined under Quality Assurance of the Section.
2. Product Certifications:
   a. Certify that door hardware for use on each type and size of labeled fire-rated doors complies with listed fire-rated door assemblies.

C. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Use same scheduling sequence and use same door numbers as in the Contract Documents.

2. Content: Include the following information:
   a. Index of openings showing hardware set assignments.
   b. Identification number, location, hand, fire rating, size, degree of opening, and material of each door and frame.
   c. Locations of each door hardware set, cross-referenced to floor plans, and to door and frame schedule.
   d. Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
   e. Description of electrified door hardware sequences of operation and interfaces with other building control systems.
   f. Fastenings and other installation information.
   g. Explanation of abbreviations, symbols, and designations contained in door hardware schedule.
   h. Mounting locations for door hardware.
   i. Complete list of related door devices specified or supplied in other Sections for each door and frame.

D. Door Hardware Product Data: Prepared by or under the supervision of supplier.
1. Provide an index of products used grouped by manufacturer.
2. Each product shall be highlighted or marked accordingly.
   a. Do not include pages or products that are not applicable to the project. If they appear on the same page as a product being used, they shall be crossed out.

E. Samples:

1. Provide a finish sample for each exposed product in each finish specified, in manufacturer's standard size.

2. Tag Samples with full product description to coordinate samples with the door hardware schedule.

F. Keying Schedule: Only after a keying meeting with the owner has taken place, prepare a keying schedule detailing final instruction. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions.

1. The owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

G. Closeout Submittals:

1. After final approval is received from the architect, submit a Record Copy of the Door and Hardware Schedule with all the content as previously required.
   a. Submittal must be stamped “RECORD COPY”.
   b. The Record Copy will be given to the installer for the installation of the hardware.

2. Warranty Submittal: Warranty information to include the following information:
   a. Original factory order number.
   b. Date order was placed.
   c. Date of installation (approximately if unknown).

3. Operating and Maintenance Manuals:
   a. Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

H. Submittals that do not comply with all the requirements above will be rejected and will have to be resubmitted. Any project delays caused by incorrect/incomplete submittals will be the responsibility of the General Contractor and Hardware Supplier.

1.6 QUALITY ASSURANCE

A. Installer Qualifications:

1. A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Door Hardware Supplier Qualifications:

1. Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project.
2. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity.

1.7 DELIVERY AND STORAGE

A. All hardware for field installation shall be delivered to the project site.

1. Any hardware that is required to be factory installed shall be delivered to the factory at the cost of the supplier of the doors or frames requiring the factory installation.

B. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site.

1. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
2. Storage area must be maintaining low humidity and a temperature between 60 to 90 degrees Fahrenheit.

C. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

D. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.8 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:

1. Ten (10) years for mechanical mortise locks.
2. Ten (10) years for mechanical exit hardware.
3. Ten (10) years for mechanical, manual overhead door closers.

1.9 MAINTENANCE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

Part 2 – PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of door hardware from single manufacturer.

1. Provide electrified door hardware from same manufacturer as mechanical door hardware unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

2.2 PERFORMANCE REQUIREMENTS

A. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

B. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the DOJ's "2010 ADA Standards for Accessible Design".

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
2. Comply with the following maximum opening-force requirements:
   a. Interior, Hinged Doors: 5 lbf applied perpendicular to door.
   b. Sliding or Folding Doors: 5 lbf applied parallel to door at latch.
   c. Provide thresholds not more than 1/2 inch high.
   d. Adjust door closer sweep periods so that, from an open position of 90 degrees, the door will take at least 5 seconds to move to a position of 12 degrees from the latch.
   e. Adjust spring hinges so that, from an open position of 70 degrees, the door will take at least 1.5 seconds to move to the closed position.

2.3 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. For products furnished, but not installed, under this Section, Coordinating, purchasing, delivering, and scheduling remain requirements of this Section.

C. Equals: Requests for equals and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

D. Substitutions: Are not allowed unless the specified product(s) are no longer available.

2.4 HINGES

A. Hinges are to meet or exceed ANSI/BHMA A156.1 requirements.

B. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.

C. Hinge Size: Provide the size listed in the hardware sets.

D. Hinge Type: Provide the type listed in the hardware sets.

E. Manufacturers:

1. PBB Hinge Company (PBB). (Basis of Design).
2. Hager (HA).
3. Stanley Hardware (ST).

2.5 CONTINUOUS HINGES

A. General Requirements:

1. Continuous Hinges are to meet or exceed ANSI/BHMA A156.26 Grade 1 Requirements.

2. Fabricated to full height of door and to template screw locations; with components finished after milling and drilling are complete.
3. Hinges are to be non-handed.
4. Factories to prepare for electrical cut-outs.
5. Hinge Type: Provide the type listed in the hardware sets.
6. Coordinate with door manufacturers for the exact type required, as it varies between door manufacturers and application.

B. Continuous, Gear-Type Hinges:

1. Manufactured out of 6063-T6 extruded-aluminum, pin-less, geared hinge leaves joined by a continuous extruded-aluminum channel cap; with concealed, self-lubricating bearings.
2. Manufacturers:

a. Select (SEL) (Basis of Design).
b. Architectural Builders Hardware (ABH)
c. PBB Hinge Company (PBB).

2.6 MANUAL FLUSH BOLTS

A. Bolts are to meet or exceed ANSI/BHMA A156.3 and A156.16, Grade 1 requirements.

B. Furnish Dustproof Strikes for all bottom bolts at interior doors.

C. Provide related accessories or mounting brackets as required for appropriate installation and operation.

D. Manufacturers:

1. Ives (IVE) (Basis of Design).
2. Rockwood Manufacturing (ROC).
3. Trimco (TRI).

2.7 CYLINDERS AND KEYING

A. Cylinders: Original manufacturer cylinders complying with the following:

1. Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.
2. Meet or exceed ANSI/BHMA A156.5 Grade 1 requirements.
3. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
4. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
   a. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes. Stamped collars are not allowed.
5. Face finished to match lockset.
6. Core Type: Small format Interchangeable (SFIC).
7. Keyway: Match existing.
8. Keying: Factory Keyed, per approved Keying Schedule.
9. Key Quantity:
   a. Change keys per cylinder/core: Two (2).
   b. Master keys per level: Five (5).
   c. Key Blanks: One Hundred (100).

B. Construction Keying:

1. Construction Master Keys: Provide temporary construction cores for the construction period. Owner to provide permanent cores.
   a. Provide 10 construction master keys.

C. Manufacturers:

1. TownSteel (TOW). (Basis of Design).
2. Best (BES).
3. Schlage (SCH).

2.8 MECHANICAL LOCK AND LATCHING DEVICE

A. Cylindrical Locks:

1. Locks shall meet or exceed ANSI/BHMA A156.2 Series 4000 Operation Grade 1 requirements.
2. Locks are to be non-handed and fully field reversible.
3. Basket:
   a. 2-3/4” unless noted otherwise.
4. Lock trim and function as shown in hardware sets.
5. Latchbolt:
   a. Provide deadlocking latchbolt for all locks with a keyed function.
6. Manufacturers:

   a. TownSteel (TOW). CE Series (Basis of Design)
   b. Schlage (SCH) ND Series.
   c. Sargent Manufacturing (SAR) 10 Line.

2.9 EXIT DEVICES

A. Exit Devices and Auxiliary Items shall meet or exceed ANSI/BHMA A156.3, Grade 1 requirements.

B. Where function of the Exit Device requires a cylinder, provide a cylinder per the requirements of the Keying System.

C. Function and Trim design as listed in the Hardware Sets.

D. Provide mounting bracket or spacers as required for proper installation and operation.

E. Do not cut perimeter gasket to mount the Exit Device Strikes. Adjust template accordingly.

F. Manufacturers:

1. TownSteel (TOW) ED2000 Series (Basis of Design).
2. Von Duprin (VON) 98 Series.
3. Detex (DET) Advantex Series.

2.10 SURFACE CLOSERS

A. Surface Closers shall meet or exceed ANSI/BHMA A156.4, Grade 1 requirements.

B. Surface Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.

C. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use.

D. Provide Surface Closers complying the Americans with Disabilities Act, ANSI ICC/A117.1.

E. Provide accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation and operation.

F. Coordinate with Overhead Holder/Stop installation, provide special templates as required to avoid hardware conflicts.

G. Manufacturers:

1. TownSteel (TOW). TDC-40 Series (Basis of Design).
2. Norton (NOR) 9500 Series.
3. LCN (LCN) 4040XP Series.

2.11 OVERHEAD STOPS AND HOLDERS

A. Stops and Holders shall meet or exceed ANSI/BHMA A156.8, Grade 1 requirements.

B. Provide units that are through bolted on all Wood Door applications.

C. Coordinate with door closer installation, special templating may be required.

D. Where stops and holders are specified, coordinate with door manufacturer to insure proper application, installation, and operation.

E. Function as show in Hardware Sets.

F. Manufacturers:

1. Glynn Johnson (GLY) (Basis of Design).
2. Architectural Builders Hardware (ABH).
3. Rixson (RIX).

2.12 ARCHITECTURAL TRIM

A. Protective Plates:

1. Shall meet ANSI/BHMA A156.6 requirements.

2. Protective plates, fabricated from the following:
   a. Stainless Steel: 300 grade, 050-inch thick.

3. Kick Plates are to be installed on the push side of the door, unless stated otherwise.

4. Size: Fabricate protection plates not more than 1 1/2" less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates.

5. Provide Plates with countersunk screw holes.

6. Provide Plates are to be beveled on all 4 edges.

7. Height: 10”, unless noted otherwise.

8. Manufacturers:

    a. Ives (IVE) (Basis of Design).
    b. Rockwood Products (ROC).
    c. Burns Manufacturing (BUR).

2.13 DOOR STOPS AND HOLDERS

A. Door Stops and Holders shall comply with ANSI/BHMA A156.16, Grade 1 requirements.

B. Provide wall bumpers, either convex or concave types as required.

C. Provide Door stops with anchorage required based upon wall or floor application.

D. Do not mount floor stops where they will impede traffic.

E. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

F. Manufacturers:

1. Ives (IVE). (Basis of Design).
2. Burns Manufacturing (BUR).
3. Trimco (TRI).

2.14 THRESHOLDS

A. Thresholds shall comply with ANSI/BHMA A156.21 requirements.

B. Thresholds shall be fabricated to full width of opening.

C. Provide non-slip surface.

D. Provide Stainless Steel Fasteners, type as detailed or required for specific floor conditions.

E. Manufacturers:

1. K.N. Crowder (KNC) (Basis of Design).
2. Hager Companies (HAG).
3. National Guard Products (NGP).

2.15 GASKETING

A. Door Gasketing shall comply with ANSI/BHMA A156.22 requirements.

B. Provide with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

C. Perimeter gasketing should not be cut around door hardware. Gaskets must maintain a continuous seal at top and vertical edges. Adjust hardware templates accordingly.

D. Manufacturers:

1. K.N. Crowder (KNC) (Basis of Design).
2. Hager Companies (HAG).
3. National Guard Products (NGP).

2.16 SILENCERS

A. Provide "push-in" type silencers for hollow metal or wood frames.

B. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.

C. Omit where gasketing is specified.

D. Manufacturers:

1. Ives (IVE) (Basis of Design).
2. Burns (BUR).
3. Rockwood (ROC).

2.17 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rating labels and as otherwise approved by Architect.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.

1. The use of Aluminum or Brass/Bronze based screws is not acceptable.

C. Fasteners: Provided by door hardware manufacturer, to comply with published installation instructions, templates and as test for fire rated applications.

1. The use of other fasteners will be rejected.

2. Provide Phillips flat-head screws with finished heads to match surface of door hardware unless otherwise indicated.

3. The use of Self-Drilling or Self-Tapping Screws is not permitted.

4. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners.

5. Gasket Fasteners: Provide Stainless Steel fasteners.

6. Threshold Fasteners:

a. Concrete floors: Provide ¼-20 Stainless Steel Machine Screws and Expansion Shields.

7. Hinge Fasteners:

a. Provide screws our of steel or stainless Steel to match hinge base material.
b. Provide Machine Screws for metal door and frame applications.

2.18 FINISHES

A. Provide finishes complying with ANSI/BHMA A156.18 as indicated in door hardware schedule.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

Part 3 – EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance of the Work.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware.

C. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Steel Doors and Frames: For surface-applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

3.3 INSTALLATION

A. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.

B. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.

C. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI' s "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames".
2. Comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities".

D. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

E. Self-closing doors must close and latch completely from the fully opened position.

F. Lock Cylinders:

1. Install construction cylinders to secure building and areas during construction period.

G. Thresholds: Set thresholds in full bed of sealant, and caulk around all edges, complying with requirements specified in Section 079200 "Joint Sealants."

H. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

1. Do not notch or cut perimeter gasketing to install other surface-applied hardware.

I. Door Bottoms: Apply to bottom of door, forming seal with floor or threshold when door is closed.

J. Door Closers: Adjust closers to follow opening forces listed under this sections Performance Requirements.

1. Degree of opening: Template the closer to allow for the maximum degree of opening the conditions will allow.

2. Back Check valve shall be adjusted so it engages 10 degrees prior to the door reaching full swing.

3. Latch Speed valve shall be adjusted so the door latches properly without slamming.

4. When through-bolts are used on wood doors, do not overtighten, and crush the door. If this happens the door is to be replaced.

K. Wall Bumpers or Stops: Note that blocking in drywall partitions where wall stops, or other wall mounted hardware is located is required.

3.4 FIELD QUALITY CONTROL

A. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating, and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.

B. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.
1. Submit documentation of incomplete items in PDF electronic format.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

3.6 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.7 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

3.8 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.9 DOOR HARDWARE SCHEDULE

A. The hardware sets represent the design intent and direction of the owner and architect. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process.

B. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required.

Abbreviation	Name
GLY	Glynn-Johnson Corp
IVE	H.B. Ives
KNC	K.N. Crowder Mfg. Inc.
LCN	Lcn Commercial Division
PBB	Pbb Inc
SEL	Select Products Ltd
SPE	Special-Lite Inc
TOW	Townsteel Inc

Hardware Group No. 01

For use on Door #(s):
100A

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONTINUOUS HINGE	SL24 HD		628	SEL
2	EA	FIRE EXIT DEVICE	ED1200F LBR		630	TOW
1	EA	EXIT DEVICE TRIM	ED308R		626	TOW
1	EA	RIM CYLINDER	TS1 ICR7		626	TOW
1	EA	SFIC PERMANENT CORE	BY OWNER		626	BES
2	EA	FIRE/LIFE HOLDER	4040SEH SEH AC/DC	✓	689	LCN
2	EA	SURFACE CLOSER	TDC40 CUSH		689	TOW
4	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
1	EA	GASKETING	W-66		BK	KNC
2	EA	MEETING STILE ASTRAGAL	W-5S		AL	KNC

DOORS NORMALLY HELD OPEN ELECTRONICALLY.
AUTOMATIC RELEASE UPON SMOKE/FIRE ALARM ACTIVATION

Hardware Group No. 02

For use on Door #(s):
101-1A

Provide each RU door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	RIM OR MORTISE CYLINDER	AS REQUIRED	626	TOW
1	EA	SFIC PERMANENT CORE	BY OWNER	626	BES
1			BALANCE OF HARDWARE BY DOOR MANUFACTURER		

Hardware Group No. 03

For use on Door #(s):
101A 101B

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	4B81 5" NRP		US26D	PBB
1	EA	ACCESS CONTROL LOCK	BY SECURITY VENDOR	✓	626	
1	EA	SFIC PERMANENT CORE	BY OWNER		626	BES
1	EA	SURFACE CLOSER	TDC40 EDA		689	TOW
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
1	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
1	EA	MAGNET	SEM7850 12V/24V/120V	✓	689	LCN
1	EA	GASKETING	W-66		BK	KNC

DOOR CAN BE HELD OPEN BY WALL MAGNET.
AUTOMATIC RELEASE UPON SMOKE/FIRE ALARM ACTIVATION.

Hardware Group No. 04

For use on Door #(s):
102-1A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	BB81 4.5"	US26D	PBB
1	EA	PRIVACY LOCK W/ IND	MSS-19-O-S	626	TOW
1	EA	SURFACE CLOSER	TDC40 EDA	689	TOW
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS	630	IVE
1	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	HOOK & BUMPER	UB14	CH	A&J

Hardware Group No. 05

For use on Door #(s):
102-2A

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	4B81 5" NRP	US26D	PBB
2	EA	MANUAL FLUSH BOLT	FB358	626	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	CEI-86-S	626	TOW
1	EA	SFIC PERMANENT CORE	BY OWNER	626	BES
2	EA	OH STOP	90S	630	GLY
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 06

For use on Door #(s):
102-3A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	BB81 4.5"	US26D	PBB
1	EA	OFFICE/ENTRY LOCK	CEI-109-S	626	TOW
1	EA	SFIC PERMANENT CORE	BY OWNER	626	BES
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Hardware Group No. 07

For use on Door #(s):
103A 109A 115A 202A 203A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	BB81 4.5"		US26D	PBB
1	EA	ACCESS CONTROL LOCK	BY SECURITY VENDOR	↙	626	
1	EA	SFIC PERMANENT CORE	BY OWNER		626	BES
1	EA	SURFACE CLOSER	TDC40		689	TOW
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	W-66		BK	KNC

Hardware Group No. 08

For use on Door #(s):
102A

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONTINUOUS HINGE	SL24 HD		628	SEL
1	EA	REMOVABLE MULLION	EDF170-8		689	TOW
2	EA	EXIT DEVICE	ED1100F		630	TOW
2	EA	EXIT DEVICE TRIM	ED308R		626	TOW
1	EA	MORTISE CYLINDER	4046I		626	TOW
2	EA	RIM CYLINDER	TS1 ICR7		626	TOW
3	EA	SFIC PERMANENT CORE	BY OWNER		626	BES
2	EA	SURFACE CLOSER	TDC40 CUSH		689	TOW
4	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
2	EA	MAGNET	SEM7850 12V/24V/120V	✓	689	LCN
1	EA	MULLION SEAL	8780NBK PSA		BK	ZER
1	EA	GASKETING	W-66		BK	KNC
2	EA	MEETING STILE ASTRAGAL	W-5S		AL	KNC

DOORS CAN BE HELD OPEN BY WALL MAGNETS.
AUTOMATIC RELEASE UPON SMOKE/FIRE ALARM ACTIVATION

Hardware Group No. 09

For use on Door #(s):
102B 102C

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONTINUOUS HINGE	SL11 HD EPT (BY DOOR MFR.)		628	SEL
1	EA	ELECTRIC POWER TRANSFER	EPT-1	✓	689	TOW
1	EA	EXIT DEVICE	ED1100ELR	✓	630	TOW
1	EA	INTEGRAL FLUSH PULL	SL-86 (BY DOOR MFR.)		628	SPE
1	EA	SURFACE CLOSER	TDC40 SCUSH		689	TOW
1	EA	WEATHER STRIPPING	W-20S		CLR	KNC
1	EA	ADJUSTABLE DOOR BOTTOM	SL-301 (BY DOOR MFR.)		AL	SPE
1	EA	THRESHOLD	CT-46		MIL	KNC
1	EA	CREDENTIAL READER	BY SECURITY VENDOR	✓		
1	EA	DOOR CONTACT	679-05HM/WD	✓	BLK	SCE
1	EA	REQUEST TO EXIT	BY SECURITY VENDOR	✓		
1	EA	POWER SUPPLY	PS-101	✓		TOW
1		CARD READER	BY SECURITY VENDOR			

Hardware Group No. 10

For use on Door #(s):
104-1A 117-1A 204-1A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	BB81 4.5"		US26D	PBB
1	EA	PRIVACY LOCK W/ IND	MSS-19-O-S		626	TOW
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
1	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
3	EA	SILENCER	SR64		GRY	IVE
1	EA	HOOK & BUMPER	UB14		CH	A&J

Hardware Group No. 11

For use on Door #(s):
104-2A 115-1A 204-2A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	BB81 4.5"		US26D	PBB
1	EA	ACCESS CONTROL LOCK	REINSTALL EXISTING	✓	626	
1	EA	SURFACE CLOSER	TDC40		689	TOW
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
3	EA	SILENCER	SR64		GRY	IVE

Hardware Group No. 12

For use on Door #(s):
104A 204A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	BB81 4.5"		US26D	PBB
1	EA	ACCESS CONTROL LOCK	REINSTALL EXISTING	✓	626	
1	EA	SURFACE CLOSER	TDC40 EDA		689	TOW
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	EA	GASKETING	W-66		BK	KNC

Hardware Group No. 13 - Omitted

Hardware Group No. 14

For use on Door #(s):
109-1A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	BB81 4.5"		US26D	PBB
1	EA	CLASSROOM LOCK	CEI-84-S		626	TOW
1	EA	SFIC PERMANENT CORE	BY OWNER		626	BES
1	EA	OH STOP & HOLDER	450F		630	GLY
3	EA	SILENCER	SR64		GRY	IVE

Hardware Group No. 15

For use on Door #(s):
111A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	BB81 4.5"		US26D	PBB
1	EA	ACCESS CONTROL LOCK	BY SECURITY VENDOR	↙	626	
1	EA	SFIC PERMANENT CORE	BY OWNER		626	BES
1	EA	SURFACE CLOSER	TDC40		689	TOW
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	SET	GASKETING	870AA-S		AA	ZER
1	EA	DOOR BOTTOM	364AA		AA	ZER

Hardware Group No. 16

For use on Door #(s):
115B

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	BB81 4.5" NRP		US26D	PBB
2	EA	ELECTRIC POWER TRANSFER	EPT-1	✓	689	TOW
2	EA	EXIT DEVICE	ED1300			
1	EA	ELECTRONIC EXIT TRIM	ED309R-E24-FSE	✓	626	TOW
1	EA	RIM CYLINDER	TS1 ICR7		626	TOW
1	EA	SFIC PERMANENT CORE	BY OWNER		626	BES
2	EA	SURFACE CLOSER	TDC40 EDA		689	TOW
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
2	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	ASTRAGAL	W-8P		CLR	KNC
2	EA	SILENCER	SR64		GRY	IVE
2	EA	DOOR CONTACT	679-05HM/WD	✓	BLK	SCE
1	EA	POWER SUPPLY	BY SECURITY VENDOR	✓		
1	EA	REQUEST TO EXIT	BY SECURITY VENDOR	✓		
1		CARD READER	BY SECURITY VENDOR			

Hardware Group No. 17

For use on Door #(s):
117-2A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	BB81 4.5"	US26D	PBB
1	EA	CLASSROOM LOCK	CEI-84-S	626	TOW
1	EA	SFIC PERMANENT CORE	BY OWNER	626	BES
3	EA	SILENCER	SR64	GRY	IVE
1	EA	HOOK & BUMPER	UB14	CH	A&J

Hardware Group No. 18

For use on Door #(s):
117A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	BB81 4.5"		US26D	PBB
1	EA	ACCESS CONTROL LOCK	REINSTALL EXISTING	✓	626	
1	EA	OH STOP	90S		630	GLY
1	EA	SURFACE CLOSER	TDC40		689	TOW
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
1	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
1	EA	GASKETING	W-66		BK	KNC

Hardware Group No. 19

For use on Door #(s):
118A 120A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	BB81 4.5"	US26D	PBB
1	EA	PRIVACY LOCK W/ IND	MSS-19-O-S	626	TOW
1	EA	SURFACE CLOSER	TDC40	689	TOW
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS	630	IVE
1	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	W-66	BK	KNC

Hardware Group No. 20

For use on Door #(s):
126A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	BB81 4.5"		US26D	PBB
1	EA	ACCESS CONTROL LOCK	REINSTALL EXISTING	✓	626	
1	EA	SURFACE CLOSER	TDC40		689	TOW
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	W-66		BK	KNC

Hardware Group No. 21

For use on Door #(s):
128A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	BB81 4.5"		US26D	PBB
1	EA	ACCESS CONTROL LOCK	REINSTALL EXISTING	✓	626	
1	EA	SURFACE CLOSER	TDC40		689	TOW
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
1	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	W-66		BK	KNC

Hardware Group No. 22

For use on Door #(s):
115-2A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	4B81 5"		US26D	PBB
1	EA	ACCESS CONTROL LOCK	REINSTALL EXISTING	✓	626	
1	EA	SURFACE CLOSER	TDC40		689	TOW
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	EA	GASKETING	W-66		BK	KNC

Hardware Group No. 23

For use on Door #(s):
115-3A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	4B81 5"	US26D	PBB
1	EA	CLASSROOM LOCK	CEI-84-S	626	TOW
1	EA	SFIC PERMANENT CORE	BY OWNER	626	BES
1	EA	SURFACE CLOSER	TDC40 CUSH	689	TOW
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS	630	IVE
1	EA	GASKETING	W-66	BK	KNC

Hardware Group No. 24

For use on Door #(s):
112A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	BB81 4.5"	US26D	PBB
1	EA	PRIVACY LOCK W/ IND	MSS-19-O-S	626	TOW
1	EA	SURFACE CLOSER	TDC40 EDA	689	TOW
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS	630	IVE
1	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	EA	GASKETING	W-66	BK	KNC
1	EA	HOOK & BUMPER	UB14	CH	A&J

PROVIDE OCCUPIED INDICATOR, PROVIDE DOOR MOUNTED COAT HOOK/BUMPER

Hardware Group No. 25

For use on Door #(s):
201A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	BB81 4.5"	US26D	PBB
1	EA	STOREROOM LOCK	CEI-86-S	626	TOW
1	EA	SFIC PERMANENT CORE	BY OWNER	626	BES
1	EA	SURFACE CLOSER	TDC40	689	TOW
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	W-66	BK	KNC

Hardware Group No. 26

For use on Door #(s):
203-1A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	BB81 4.5"		US26D	PBB
1	EA	ACCESS CONTROL LOCK	BY SECURITY VENDOR	✓	626	
1	EA	SFIC PERMANENT CORE	BY OWNER		626	BES
1	EA	SURFACE CLOSER	TDC40		689	TOW
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
3	EA	SILENCER	SR64		GRY	IVE

Hardware Group No. 27

For use on Door #(s):
203-2A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	BB81 4.5"		US26D	PBB
1	EA	PRIVACY SET	CE-76-S		626	TOW
1	EA	WALL STOP	WS406/407CCV		630	IVE
3	EA	SILENCER	SR64		GRY	IVE

Hardware Group No. 28

For use on Door #(s):
203-3A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	4B81 5"		US26D	PBB
1	EA	ACCESS CONTROL LOCK	BY SECURITY VENDOR	✓	626	
1	EA	SFIC PERMANENT CORE	BY OWNER		626	BES
1	EA	SURFACE CLOSER	TDC40		689	TOW
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
3	EA	SILENCER	SR64		GRY	IVE

Hardware Group No. 29

For use on Door #(s):
C1-2A

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONTINUOUS HINGE	SL24 HD		628	SEL
2	EA	FIRE EXIT DEVICE	ED1200F LBR		630	TOW
1	EA	EXIT DEVICE TRIM	ED308R		626	TOW
1	EA	RIM CYLINDER	TS1 ICR7		626	TOW
1	EA	SFIC PERMANENT CORE	BY OWNER		626	BES
2	EA	SURFACE CLOSER	TDC40 EDA		689	TOW
4	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
2	EA	MAGNET	SEM7850 12V/24V/120V	✓	689	LCN
1	EA	GASKETING	W-66		BK	KNC
2	EA	MEETING STILE ASTRAGAL	W-5S		AL	KNC

DOORS NORMALLY HELD OPEN BY WALL MAGNETS.
AUTOMATIC RELEASE UPON SMOKE/FIRE ALARM ACTIVATION

Hardware Group No. 30

For use on Door #(s):
C3-1A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONTINUOUS HINGE	SL11 HD EPT (BY DOOR MFR.)		628	SEL
1	EA	ELECTRIC POWER TRANSFER	EPT-1	✓	689	TOW
1	EA	EXIT DEVICE	ED1100ELR	✓	630	TOW
1	EA	RIM CYLINDER	TS1 ICR7		626	TOW
1	EA	SFIC PERMANENT CORE	BY OWNER		626	BES
1	EA	INTEGRAL FLUSH PULL	SL-86 (BY DOOR MFR.)		628	SPE
1	EA	SURFACE CLOSER	TDC40 SCUSH		689	TOW
1	EA	WEATHER STRIPPING	W-20S		CLR	KNC
1	EA	ADJUSTABLE DOOR BOTTOM	SL-301 (BY DOOR MFR.)		AL	SPE
1	EA	THRESHOLD	CT-46		MIL	KNC
1	EA	CARD READER	EXISTING TO REMAIN	✓	BLK	
1	EA	DOOR CONTACT	679-05HM/WD	✓	BLK	SCE
1	EA	REQUEST TO EXIT	BY SECURITY VENDOR	✓		
1	EA	POWER SUPPLY	PS-101	✓		TOW

Hardware Group No. 31

For use on Door #(s):
ST1-1A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONTINUOUS HINGE	SL24 HD		628	SEL
1	EA	EXIT DEVICE	ED1100F		630	TOW
1	EA	EXIT DEVICE TRIM	ED308R		626	TOW
1	EA	RIM CYLINDER	TS1 ICR7		626	TOW
1	EA	SFIC PERMANENT CORE	BY OWNER		626	BES
1	EA	SURFACE CLOSER	TDC40 EDA		689	TOW
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
1	EA	MAGNET	SEM7850 12V/24V/120V	✓	689	LCN
1	EA	GASKETING	W-66		BK	KNC

DOOR NORMALLY HELD OPEN BY WALL MAGNET.
AUTOMATIC RELEASE UPON SMOKE/FIRE ALARM ACTIVATION.

Hardware Group No. 32

For use on Door #(s):
ST1-2A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONTINUOUS HINGE	SL24 HD		628	SEL
1	EA	EXIT DEVICE	ED1100F		630	TOW
1	EA	EXIT DEVICE TRIM	ED314R		626	TOW
1	EA	SURFACE CLOSER	TDC40		689	TOW
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
1	EA	MAGNET	SEM7850 12V/24V/120V	✓	689	LCN
1	EA	GASKETING	W-66		BK	KNC

DOOR NORMALLY HELD OPEN BY WALL MAGNET.
AUTOMATIC RELEASE UPON SMOKE/FIRE ALARM ACTIVATION.

Hardware Group No. 33

For use on Door #(s):
V1-2A

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONTINUOUS HINGE	SL11 HD (BY DOOR MFR.)		628	SEL
1	EA	CONTINUOUS HINGE	SL11 HD EPT (BY DOOR MFR.)		628	SEL
1	EA	ELECTRIC POWER TRANSFER	EPT-1	✓	689	TOW
1	EA	REMOVABLE MULLION	ED170-8		689	TOW
1	EA	EXIT DEVICE	ED1100		630	TOW
1	EA	EXIT DEVICE	ED1100ELR	✓	630	TOW
1	EA	MORTISE CYLINDER	4046I		626	TOW
1	EA	RIM CYLINDER	TS1 ICR7		626	TOW
2	EA	SFIC PERMANENT CORE	BY OWNER		626	BES
2	EA	INTEGRAL FLUSH PULL	SL-86 (BY DOOR MFR.)		628	SPE
2	EA	SURFACE CLOSER	TDC40 EDA		689	TOW
2	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	MULLION SEAL	8780NBK PSA		BK	ZER
1	EA	WEATHER STRIPPING	W-20S		CLR	KNC
1	EA	ADJUSTABLE ASTRAGAL	AS-4A (BY DOOR MFR.)		AL	SPE
2	EA	ADJUSTABLE DOOR BOTTOM	SL-301 (BY DOOR MFR.)		AL	SPE
1	EA	THRESHOLD	CT-46		MIL	KNC
2	EA	DOOR CONTACT	679-05HM/WD	✓	BLK	SCE
1	EA	REQUEST TO EXIT	BY SECURITY VENDOR	✓		
1	EA	POWER SUPPLY	PS-101	✓		TOW
1		CARD READER	BY SECURITY VENDOR			

Hardware Group No. 34

For use on Door #(s):
V1-2B

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONTINUOUS HINGE	SL11 HD (BY DOOR MFR.)		628	SEL
2	EA	DUMMY PUSH BAR	1000 SERIES		630	TOW
2	EA	INTEGRAL FLUSH PULL	SL-86 (BY DOOR MFR.)		628	SPE
1	EA	SURFACE CLOSER	TDC40 EDA		689	TOW
1	EA	SURFACE CLOSER	TDC40 SCUSH		689	TOW
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	ADJUSTABLE ASTRAGAL	AS-4A (BY DOOR MFR.)		AL	SPE
2	EA	ADJUSTABLE DOOR BOTTOM	SL-301 (BY DOOR MFR.)		AL	SPE

Hardware Group No. 35

For use on Door #(s):
V2-1B

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONTINUOUS HINGE	SL11 HD (BY DOOR MFR.)		628	SEL
1	EA	CONTINUOUS HINGE	SL11 HD EPT (BY DOOR MFR.)		628	SEL
1	EA	ELECTRIC POWER TRANSFER	EPT-1	↯	689	TOW
1	EA	REMOVABLE MULLION	ED170-8		689	TOW
1	EA	EXIT DEVICE	ED1100		630	TOW
1	EA	EXIT DEVICE	ED1100ELR	↯	630	TOW
1	EA	MORTISE CYLINDER	4046I		626	TOW
2	EA	RIM CYLINDER	TS1 ICR7		626	TOW
3	EA	SFIC PERMANENT CORE	BY OWNER		626	BES
2	EA	INTEGRAL FLUSH PULL	SL-86 (BY DOOR MFR.)		628	SPE
2	EA	INTEGRAL FLUSH PULL	SL-86 (BY DOOR MFR.)		628	SPE
2	EA	SURFACE CLOSER	TDC40 EDA		689	TOW
2	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	MULLION SEAL	8780NBK PSA		BK	ZER
1	EA	GASKETING	W-66		BK	KNC
1	EA	MEETING STILE ASTRAGAL	W-5S		AL	KNC
1	EA	SWEEP	W-25S		AL	KNC

END OF SECTION

SECTION 08 8000
GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Insulating glass units.

B. Glazing units.

C. Glazing compounds.

1.02 RELATED REQUIREMENTS

A. Section 07 9200 - Joint Sealants: Sealants for other than glazing purposes.

B. Section 08 1213 - Hollow Metal Frames: Glazed borrowed lites.

C. Section 08 1416 - Flush Wood Doors: Glazed lites in doors.

D. Section 08 4313 - Aluminum-Framed Storefronts: Glazing provided as part of storefront assembly.

E. Section 08 5113 - Aluminum Windows: Glazing provided by window manufacturer.

1.03 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.

B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015 (Reaffirmed 2020).

C. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2019).

D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

E. ASTM C1036 - Standard Specification for Flat Glass; 2021.

F. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.

G. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2019.

H. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).

I. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2021a.

J. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.

K. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2019.

L. GANA (GM) - GANA Glazing Manual; 2022.

M. GANA (SM) - GANA Sealant Manual; 2008.

N. GANA (LGRM) - Laminated Glazing Reference Manual; 2019.

O. IGMA TM-3000 - North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use; 1990 (Reaffirmed 2016).

P. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2023.

Q. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2023.

R. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2023.

S. UL 752 - Standard for Bullet-Resisting Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by each of the affected installers.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data on Insulating Glass Unit, Glazing Unit, Plastic Sheet Glazing Unit, Plastic Film, and _____ Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.

C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.

D. Samples: Submit two samples ___ by ___ inch in size of glass units.

E. Certificate: Certify that products of this section meet or exceed specified requirements.

F. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with GANA (GM), GANA (SM), GANA (LGRM), IGMA TM-3000, and FGMA Sealant Manual for glazing installation methods. Maintain one copy on site.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

1. Provide company, field supervisors, and installers that hold active ANSI accredited certifications in appropriate categories for work specified.

1.07 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 40 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Insulating Glass Units: Provide a five (5) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.

C. Laminated Glass: Provide a five (5) year manufacturer warranty to include coverage for delamination, including providing products to replace failed units.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.

1. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
2. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
3. Glass thicknesses listed are minimum.

B. Weather-Resistive Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure water-resistive barrier, vapor retarder, and/or air barrier.

1. In conjunction with weather barrier related materials described in other sections, as follows:

C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
   1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
   2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
   3. Solar Optical Properties: Comply with NFRC 300 test method.

2.02 GLASS MATERIALS

A. Float Glass: Provide float glass based glazing unless otherwise indicated.
   1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.
   2. Kind HS - Heat-Strengthened Type: Complies with ASTM C1048.
   3. Kind FT - Fully Tempered Type: Complies with ASTM C1048.
   4. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.
   5. Impact Resistant Safety Glass: Complies with ANSI Z97.1 - Class B, or 16 CFR 1201 - Category I criteria.
   6. TypeSafety Glass: Type G-2, Clear; Fire Rated.
      a. Fire Rating of 20 minutes (Interior Doors and Borrowed Lites): 1/4 inch thick, clear, tempered glass, impact resistant, exempt from hose stream test, UL listed. Fireglass20 by J.R. Four Ltd. and distributed by Technical Glass Products or Approved Equal.
      b. Fire Rating of 20 minutes (Transoms and Sidelights), 45 and 60 minutes (Interior Doors, Transoms, Sidelights, Borrowed Lites): 5/16 inch thick, clear, ceramic glass, impact resistant, hose stream tested, UL listed. Firelite Plus by Nippon Electric Glass Company, Ltd. and distributed by Technical Glass Products or Approved Equal.
      c. Fire Rating of 60 minutes and 90 minutes with glazing in excess of 100 square inches (Interior Doors, Transoms, Sidelights, Borrowed Lites): 7/8 inch or 1-7/16 inches thick respectively, clear, annealed glass, impact resistant, hose stream tested, UL listed, ASTM E-119 Heat Barrier Protected. Pyrostop by Pilkington Group and distributed by Technical Glass Products or Approved Equal.
      d. All glass to be clear. No visual distortion and/or imperfections will be accepted.
   7. Thicknesses: As indicated; provide greater thickness as required for exterior glazing wind load design.

B. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
   1. Laminated Safety Glass: Complies with ANSI Z97.1 - Class B or 16 CFR 1201 - Category I impact test requirements.

2.03 INSULATING GLASS UNITS

A. Manufacturers:
   1. Guardian Glass, LLC: www.guardianglass.com/#sle.
   2. Pilkington North America Inc: www.pilkington.com/na/#sle.Pilkington North America Inc: www.pilkington.com/na/#sle.
   3. Vitro Architectural Glass (formerly PPG Glass): www.vitroglazings.com/#sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Insulating Glass Units: Types as indicated.
   1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
   2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
   3. Warm-Edge Spacers: Low-conductivity thermoplastic with desiccant warm-edge technology design.
      a. Spacer Width: As required for specified insulating glass unit.

b. Spacer Height: Manufacturer's standard.
4. Spacer Color: Black.
5. Edge Seal:
a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.
b. Color: Black.
6. Purge interpane space with dry air, hermetically sealed.

C. Type G-3 - Insulating Glass Units: Vision glass, double glazed.
1. Applications: Exterior glazing unless otherwise indicated.
2. Space between lites filled with air.
3. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
a. Tint: Clear.
b. Coating: Low-E (passive type), on #2 surface.
4. Warm-edge spacer.
5. Inboard Lite: Annealed float glass, 1/4 inch thick, minimum.
a. Tint: Clear.
6. Total Thickness: 1 inch.
7. Thermal Transmittance (U-Value), Summer - Center of Glass: Refer to the code information charts on the drawings.
8. Visible Light Transmittance (VLT): 70 percent, minimum.
9. Solar Heat Gain Coefficient (SHGC): 0.61, nominal.

D. Insulated glass for the aluminum entrances and the windows are to be provided by the manufacturer and is as specified in the appropriate sections.

2.04 GLAZING UNITS

A. Type G-1 - Monolithic Safety Glazing: Non-fire-rated.
1. Applications:
a. Glazed lites in doors, except fire doors.
b. Glazed sidelights to doors, except in fire-rated walls and partitions.
c. Other locations required by applicable federal, state, and local codes and regulations.
d. Other locations indicated on drawings.
2. Glass Type: Fully tempered safety glass as specified.
3. Tint: Clear.
4. Thickness: 1/4 inch, nominal.

2.05 GLAZING COMPOUNDS

A. Type GC-2 - Butyl Sealant: Single component; ASTM C920 Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.

B. Silicone Sealant: Single component; moisture curing; capable of water immersion without loss of properties; nonbleeding, nonstaining; ASTM C920 Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 26 to 30; color as selected.

2.06 ACCESSORIES

A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.

B. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

3.02 PREPARATION

A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

A. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

B. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.

C. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, and paint.

3.04 INSTALLATION - WET/DRY GLAZING METHOD (PREFORMED TAPE AND SEALANT)

A. Application - Exterior Glazed: Set glazing infills from the exterior of the building.

B. Cut glazing tape to length and set against permanent stops, 3/16 inch below sight line. Seal corners by butting tape and dabbing with butyl sealant.

C. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.

D. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

E. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to attain full contact at perimeter of pane or glass unit.

F. Install removable stops, with spacer strips inserted between glazing and applied stops 1/4 inch below sight lines.
   1. Place glazing tape on glazing pane of unit with tape flush with sight line.

G. Fill gap between glazing and stop with butyl type sealant to depth equal to bite of frame on glazing, but not more than 3/8 inch below sight line.

H. Apply cap bead of silicone type sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.05 INSTALLATION - WET/DRY GLAZING METHOD (TAPE AND SEALANT)

A. Application - Interior Glazed: Set glazing infills from the interior of the building.

B. Cut glazing tape to length and install against permanent stops, projecting 1/16 inch above sight line.

C. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

D. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.

E. Install removable stops, spacer shims inserted between glazing and applied stops at 24 inch intervals, 1/4 inch below sight line.

F. Fill gaps between pane and applied stop with _____ type sealant to depth equal to bite on glazing, to uniform and level line.

G. Carefully trim protruding tape with knife.

3.06 FIELD QUALITY CONTROL

A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.

B. Monitor and report installation procedures and unacceptable conditions.

3.07 CLEANING

A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.

B. Remove nonpermanent labels immediately after glazing installation is complete.

C. Clean glass and adjacent surfaces after sealants are fully cured.

D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.08 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

SECTION 09 0561
COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section applies to floors identified in Contract Documents that are receiving the following types of floor coverings:
   1. Resilient tile and sheet.
   2. Thin-set ceramic tile and stone tile.

B. Removal of existing floor coverings.

C. Preparation of new and existing concrete floor slabs for installation of floor coverings.

D. Testing of concrete floor slabs for moisture and alkalinity (pH).

E. Patching compound.

F. Remedial floor coatings.

1.02 RELATED REQUIREMENTS

A. Section 01 4000 - Quality Requirements: Additional requirements relating to testing agencies and testing.

B. Section 03 3000 - Cast-in-Place Concrete: Concrete admixture for slabs to receive adhered flooring, to prevent moisture content-related flooring failures.

1.03 REFERENCE STANDARDS

A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50 mm] Cube Specimens); 2021.

B. ASTM C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters, and Gypsum Concrete; 2020.

C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2022.

D. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2023.

E. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.

F. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; 2018.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate scheduling of cleaning and testing, so that preliminary cleaning has been completed for at least 24 hours prior to testing.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Visual Observation Report: For existing floor coverings to be removed.

C. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
   1. Moisture and alkalinity (pH) limits and test methods.
   2. Manufacturer's required bond/compatibility test procedure.

D. Testing Agency's Report:
   1. Description of areas tested; include floor plans and photographs if helpful.
   2. Summary of conditions encountered.
   3. Moisture and alkalinity (pH) test reports.

4. Copies of specified test methods.
5. Recommendations for remediation of unsatisfactory surfaces.
6. Submit report not more than two business days after conclusion of testing.

E. Adhesive Bond and Compatibility Test Report.

F. Floor Moisture Testing Technician Certificate: International Concrete Repair Institute (ICRI) Concrete Slab Moisture Testing Technician- Grade I certificate.

G. Copy of RFCI (RWP).

1.06 QUALITY ASSURANCE

A. Testing Agency Qualifications: Independent testing agency experienced in the types of testing specified.
1. Submit evidence of experience consisting of at least 3 test reports of the type required, with project Owner's project contact information.

B. Contractor's Responsibility Relating to Independent Agency Testing:
1. Provide access for and cooperate with testing agency.
2. Confirm date of start of testing at least 10 days prior to actual start.
3. Allow at least 4 business days on site for testing agency activities.
4. Achieve and maintain specified ambient conditions.
5. Notify Architect when specified ambient conditions have been achieved and when testing will start.

C. Floor Moisture Testing Technician Qualifications: International Concrete Repair Institute (ICRI) Concrete Slab Moisture Testing Technician Certification- Grade I.

D. Remedial Coating Installer Qualifications: Company specializing in performing work of the type specified in this section, trained by or employed by coating manufacturer, and able to provide at least 3 project references showing at least 3 years' experience installing moisture emission coatings.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, handle, and protect products in accordance with manufacturer’s instructions and recommendations.

B. Deliver materials in manufacturer’s packaging; include installation instructions.

C. Keep materials from freezing.

1.08 FIELD CONDITIONS

A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F or more than 85 degrees F.

B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

PART 2 PRODUCTS

2.01 MATERIALS

A. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:
1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.
2. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M or ASTM C472, whichever is appropriate.
3. Products:

a. ARDEX Engineered Cements; ARDEX Feather Finish: www.ardexamericas.com/#sle.
b. H.B. Fuller Construction Products, Inc; TEC Feather Edge Skim Coat: www.tecspecialty.com/#sle.
c. LATICRETE International, Inc; SKIM LITE: www.laticrete.com/#sle.
d. Substitutions: See Section 01 6000 - Product Requirements.

B. Alternate Flooring Adhesive: Floor covering manufacturer's recommended product, suitable for the moisture and pH conditions present; low-VOC. In the absence of any recommendation from flooring manufacturer, provide a product recommended by adhesive manufacturer as suitable for substrate and floor covering and for conditions present.

C. Remedial Floor Coating: Single- or multi-layer coating or coating/overlay combination intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.
1. Thickness: As required for application and in accordance with manufacturer's installation instructions.
2. Products:
a. ARDEX Engineered Cements; ARDEX VB 100: www.ardexamericas.com/#sle.
b. LATICRETE International, Inc; LATICRETE VAPOR BAN E with LATICRETE NXT LEVEL PLUS: www.laticrete.com/#sle.
c. Sika Corporation; Sikafloor Moisture Tolerance Epoxy Primer and Sikafloor Self-Leveling Moisture Tolerant Resurfacer: www.sikafloorusa.com/#sle.
d. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 CONCRETE SLAB PREPARATION

A. Perform following operations in the order indicated:
1. Existing concrete slabs (on-grade and elevated) with existing floor coverings:
a. Visual observation of existing floor covering, for adhesion, water damage, alkaline deposits, and other defects.
b. Removal of existing floor covering.
2. Preliminary cleaning.
3. Moisture vapor emission tests; 3 tests in the first 1000 square feet and one test in each additional 1000 square feet, unless otherwise indicated or required by flooring manufacturer.
4. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
5. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
6. Specified remediation, if required.
7. Patching, smoothing, and leveling, as required.
8. Other preparation specified.
9. Adhesive bond and compatibility test.
10. Protection.

B. Remediations:
1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct this condition before doing any other remediation; re-test after correction.
2. Excessive Moisture Emission or Relative Humidity: If an adhesive that is resistant to the level of moisture present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply remedial floor coating or remedial sheet membrane over entire suspect floor area.

3. Excessive Alkalinity (pH): If remedial floor coating is necessary to address excessive moisture, no additional remediation is required; if not, if an adhesive that is resistant to the level present is available and acceptable to the flooring manufacturer, use that adhesive for installation of the flooring; otherwise, apply a skim coat of specified patching compound over entire suspect floor area.

3.02 REMOVAL OF EXISTING FLOOR COVERINGS

A. Comply with local, State, and federal regulations and recommendations of RFCI (RWP), as applicable to floor covering being removed.

B. Dispose of removed materials in accordance with local, State, and federal regulations and as specified.

3.03 PRELIMINARY CLEANING

A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.

B. Do not use solvents or other chemicals for cleaning.

3.04 MOISTURE VAPOR EMISSION TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.

C. Test in accordance with ASTM F1869 and as follows.

D. Plastic sheet test and mat bond test may not be substituted for the specified ASTM test method, as those methods do not quantify the moisture content sufficiently.

E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet per 24 hours.

F. Report: Report the information required by the test method.

3.05 ALKALINITY TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

3.06 PREPARATION

A. See individual floor covering section(s) for additional requirements.

B. Comply with requirements and recommendations of floor covering manufacturer.

C. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.

D. Do not fill expansion joints, isolation joints, or other moving joints.

3.07 ADHESIVE BOND AND COMPATIBILITY TESTING

A. Comply with requirements and recommendations of floor covering manufacturer.

3.08 APPLICATION OF REMEDIAL FLOOR COATING

A. Comply with requirements and recommendations of coating manufacturer.

3.09 PROTECTION

A. Cover prepared floors with building paper or other durable covering.

END OF SECTION

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SECTION 09 2116
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Performance criteria for gypsum board assemblies.

B. Metal stud wall framing.

C. Metal channel ceiling framing.

D. Acoustic insulation.

E. Gypsum wallboard.

F. Joint treatment and accessories.

G. Glass mat faced board.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Building framing and sheathing.

B. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.

C. Section 07 2100 - Thermal Insulation: Acoustic insulation.

D. Section 07 2500 - Weather Barriers: Water-resistive barrier over sheathing.

1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

B. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2017 (Reapproved 2022).

C. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2018.

D. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2020.

E. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2020.

F. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2022.

G. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2022.

H. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2019.

I. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.

J. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2023.

K. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels; 2019, with Editorial Revision (2020).

L. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.

M. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).

N. ASTM E413 - Classification for Rating Sound Insulation; 2022.

O. GA-216 - Application and Finishing of Gypsum Panel Products; 2021.

P. GA-600 - Fire Resistance and Sound Control Design Manual; 2021.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Shop Drawings: Submit proposed control joint layout for review prior to installation.

C. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.

D. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.

B. Interior Partitions, Indicated as Acoustic: Provide completed assemblies with the following characteristics:
   1. Acoustic Attenuation: STC of 50-54 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

C. Shaft Walls at HVAC Shafts: Provide completed assemblies with the following characteristics:
   1. Air Pressure Within Shaft: Sustained loads of 5 lbf/sq ft with maximum mid-span deflection of L/240.
   2. Acoustic Attenuation: STC of 35-39 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

D. Shaft Walls at Elevator Shafts: Provide completed assemblies with the following characteristics:
   1. Air Pressure Within Shaft: Intermittent loads of 5 lbf/sq ft with maximum mid-span deflection of L/240.
   2. Acoustic Attenuation: STC of 35-39 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

E. Fire-Resistance-Rated Assemblies: Provide completed assemblies with the following characteristics:
   1. Fire Rated Floor and Roof Systems:IBC Table 721.1(3).1(2) Item 3, 4, 9, 13, 15.
   2. As indicated on the Drawings.

2.02 METAL FRAMING MATERIALS

A. Manufacturers - Metal Framing, Connectors, and Accessories:
   1. ClarkDietrich: www.clarkdietrich.com/#sle.
   2. Marino: www.marinoware.com/#sle.
   3. SCAFCO Corporation: www.scafco.com/#sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Non-structural Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.
   1. Studs: "C" shaped with knurled or emobossed faces.
   2. Runners: U shaped, sized to match studs.
   3. Ceiling Channels: C-shaped.
   4. Furring Members: Hat-shaped sections, minimum depth of 7/8 inch.
   5. Resilient Furring Channels: Single or double leg configuration; 1/2 inch channel depth.

C. Shaft Wall Studs and Accessories: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 and specified performance requirements.

D. Partition Head To Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and fastened as indicated on drawings.

E. Deflection and Firestop Track: Intumescent strip factory-applied to track flanges expands when exposed to heat or flames to provide a perimeter joint seal.

F. Non-structural Framing Accessories:
   1. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
   2. Partial Height Wall Framing Support: Provides stud reinforcement and anchored connection to floor.
   3. Framing Connectors: ASTM A653/A653M G90 galvanized steel clips; secures cold rolled channel to wall studs for lateral bracing.

2.03 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
   1. Georgia-Pacific Gypsum: www.gpgypsum.com/#sle.
   2. National Gypsum Company: www.nationalgypsum.com/#sle.
   3. USG Corporation: www.usg.com/#sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
   2. Glass mat faced gypsum panels, as defined in ASTM C1658/C1658M, suitable for paint finish, of the same core type and thickness may be substituted for paper-faced board.
   3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   4. At Assemblies Indicated with Fire-Resistance Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
   5. Thickness:
      a. Vertical Surfaces: 5/8 inch.
      b. Ceilings: 1/2 inch.
      c. Multi-Layer Assemblies: Thicknesses as indicated on drawings.

C. Abuse Resistant Wallboard:
   1. Application: High-traffic areas indicated.
   2. Surface Abrasion: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.
   3. Indentation: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
   4. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   5. Type: Fire-resistance-rated Type X, UL or WH listed.
   6. Thickness: 5/8 inch.
   7. Edges: Tapered.

D. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Ceilings, unless otherwise indicated.
   2. Thickness: 1/2 inch.
   3. Edges: Tapered.

E. Exterior Sheathing Board: As specified in Section 06 1000.

2.04 GYPSUM WALLBOARD ACCESSORIES

A. Acoustic Insulation: As specified in Section 07 2100.

B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.

C. Water-Resistive Barrier: As specified in Section 07 2500.

D. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, galvanized steel, or rolled zinc, unless noted otherwise.
   1. Corner Beads: Low profile, for 90 degree outside corners.

2. L-Trim with Tear-Away Strip: Sized to fit 1/2 inch thick gypsum wallboard.
3. Expansion Joints:
   a. Type: V-shaped PVC with tear away fins.

E. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
1. Fiberglass Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
2. Paper Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
3. Joint Compound: Drying type, vinyl-based, ready-mixed.
4. Joint Compound: Setting type, field-mixed.

F. High Build Drywall Surfacer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.

G. Abuse Resistant Finishes:
1. Acrylic, water-based, non-textured, high build, tintable primer and surfacer.

H. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.

I. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion-resistant.

J. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

B. Coordinate and conduct a pre-closure inspection prior to enclosing ceilings, walls, chases, and shafts with gypsum board products with the Owner's Representative and all involved trades (sub-contractors and prime contractors) to verify that thier work is complete including any testing.

C. Do not install gypsum board until all unsatifactory conditions have been corrected.

3.02 SHAFT WALL INSTALLATION

A. Shaft Wall Framing: Install in accordance with manufacturer's installation instructions.
1. Fasten runners to structure with short leg to finished side, using appropriate power-driven fasteners at not more than 24 inches on center.
2. Install studs at spacing required to meet performance requirements.

B. Shaft Wall Liner: Cut panels to accurate dimensions and install sequentially between special friction studs.
1. On walls over sixteen feet high, screw-attach studs to runners top and bottom.

3.03 FRAMING INSTALLATION

A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.

B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
1. Laterally brace entire suspension system.

C. Studs: Space studs at 16 inches on center.
1. Extend partition framing to structure where indicated and to ceiling in other locations.
2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.

3. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging.

D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

E. Acoustic Furring: Install resilient channels at maximum 24 inches on center. Locate joints over framing members.

F. Furring for Fire-Resistance Ratings: Install as required for fire-resistance ratings indicated and to GA-600 requirements.

G. Blocking: Install wood blocking for support of:
1. Framed openings.
2. Wall-mounted cabinets.
3. Plumbing fixtures.
4. Toilet partitions.
5. Toilet accessories.
6. Wall-mounted door hardware.

3.04 ACOUSTIC ACCESSORIES INSTALLATION

A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

B. Acoustic Sealant: Install in accordance with manufacturer's instructions.

3.05 BOARD INSTALLATION

A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Fire-Resistance-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.

C. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.

D. Installation on Metal Framing: Use screws for attachment of gypsum board except face layer of nonrated double-layer assemblies, which may be installed by means of adhesive lamination.

3.06 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as follows:
1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
2. Provide blocking at control joints in fire rated wall and ceiling assemblies according to GA-600 Gypsum Associan's Fire Resistance Design Manual.
3. Install joints where specifically indicated for design accent or architectural features.

B. Corner Beads: Install at external corners, using longest practical lengths.

C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.07 JOINT TREATMENT

A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, embed and finish with setting type joint compound.

B. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.

C. Finish gypsum board in accordance with levels defined in ASTM C840, as follows and indicated elsewhere in the construction documents:
1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated, and other areas specifically indicated.
2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.

3. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
4. Level 1: Fire-resistance-rated wall areas above finished ceilings, whether or not accessible in the completed construction.

D. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
1. Feather coats of joint compound so that camber is maximum 1/32 inch.

E. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

3.08 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09 3000
TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tile for floor applications.

B. Tile for wall applications.

C. Cementitious backer board as tile substrate.

D. Stone thresholds.

E. Ceramic trim.

F. Non-ceramic trim.

1.02 RELATED REQUIREMENTS

A. Section 07 9200 - Joint Sealants: Sealing joints between tile work and adjacent construction and fixtures.

B. Section 09 0561 - Common Work Results for Flooring Preparation: Concrete slab moisture and alkalinity testing and remediation procedures.

C. Section 09 2116 - Gypsum Board Assemblies: Tile backer board.

D. Section 09 2400 - Cement Plastering: Lath and Portland cement scratch coat, where required by the TCNA (HB) Method specified.

1.03 REFERENCE STANDARDS

A. ANSI A108/A118/A136 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2019.

B. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2017 (Reaffirmed 2022).

C. ANSI A108.1b - Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set, Modified Dry-Set, or Improved Modified Dry-Set Cement Mortar; 2023.

D. ANSI A108.1c - Contractor's Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set, Modified Dry-Set, or Improved Modified Dry-Set Cement Mortar; 2023.

E. ANSI A108.2 - American National Standard General Requirements: Materials, Environmental and Workmanship; 2019.

F. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesive or Water Cleanable Tile-Setting Epoxy Adhesive; 2023.

G. ANSI A108.5 - Setting of Ceramic Tile with Dry-Set Cement Mortar, Modified Dry-Set Cement Mortar, EGP (Exterior Glue Plywood) Modified Dry-Set Cement Mortar, or Improved Modified Dry-Set Cement Mortar; 2023.

H. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grout Epoxy; 2023.

I. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 1999 (Reaffirmed 2019).

J. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 2023.

K. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 2017 (Reaffirmed 2022).

L. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2018.

M. ANSI A108.12 - Installation of Ceramic Tile with EGP (Exterior Glue Plywood) Modified Dry-Set Mortar; 2023.

N. ANSI A108.13 - American National Standard for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2005 (Reaffirmed 2021).

O. ANSI A108.19 - American National Standard Specifications for Interior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs by the Thin-Bed Method Bonded with Modified Dry-Set Cement Mortar or Improved Modified Dry-Set Cement Mortar; 2020.

P. ANSI A108.20 - American National Standard Specifications for Exterior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs; 2020.

Q. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2019.

R. ANSI A118.7 - American National Standard Specifications for High Performance Cement Grouts for Tile Installation; 2019.

S. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2014 (Reaffirmed 2019).

T. ANSI A136.1 - American National Standard Specifications for Organic Adhesives for Installation of Ceramic Tile; 2020.

U. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2022.

V. ASTM C373 - Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products; 2018 (Reapproved 2023).

W. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2023.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by affected installers.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

C. Installer's Qualification Statement:
   1. Submit documentation of National Tile Contractors Association (NTCA) or Tile Contractors' Association of America (TCAA) accreditation.
   2. Submit documentation of completion of apprenticeship and certification programs.

D. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Tile: 1 percent of each size, color, and surface finish combination, but not less than 5 of each type.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Natural Stone Institute (NSI) Accredited Commercial B Contractor (light commercial): www.naturalstoneinstitute.org/#sle.

B. Installer Qualifications:
   1. Company specializing in performing tile installation, with minimum of five years of documented experience.

2. Installer Certification:
    a. Advanced Certifications for Tile Installers (ACT): Certification in the installation of membranes, mortar bed (mud) floors, mortar (mud) walls, shower receptors, large format tile, gauged porcelain tile/panels/slabs, and grouts.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not install solvent-based products in an unventilated environment.

B. Maintain ambient and substrate temperature above 50 degrees F and below 100 degrees F during installation and curing of setting materials.

PART 2 PRODUCTS

2.01 TILE

A. Types and Manufacturers:
1. American Olean Corporation: www.americanolean.com/#sle.
2. Dal-Tile Corporation: www.daltile.com/#sle.
3. Emser Tile, LLC: www.emser.com/#sle.
4. TileBar: www.tilebar.com#/sle..
5. Substitutions: See Section 01 6000 - Product Requirements.

B. Porcelain Floor Tile, Type PFT: ANSI A137.1 standard grade.
1. Moisture Absorption: 0.5 to 3.0 percent as tested in accordance with ASTM C373.
2. Size: 12 by 12 inch, nominal.
3. Thickness: 3/8 inch, nominal.
4. Edges: Cushioned.
5. Surface Finish: Unglazed.
6. Color(s): As indicated on drawings.
7. Products:
    a. (Basis of Design) Dal-Tile Corporation: www.daltile.com/#sle.
    b. Substitutions: See Section 01 6000 - Product Requirements.

C. Porcelain Wall Tile, Type (PWT): ANSI A137.1 standard grade.
1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
2. Size: 12 by 24 inch, nominal.
3. Thickness: 3/8 inch.
4. Edges: Interlocking shape.
5. Surface Finish: Unglazed.
6. Color(s): As indicated on drawings.

2.02 TRIM AND ACCESSORIES

A. Ceramic Trim: Matching bullnose, double bullnose, cove base, and cove ceramic shapes in sizes coordinated with field tile.
1. Manufacturers: Same as for tile.

B. Non-Ceramic Trim: Satin natural anodized extruded aluminum, style and dimensions to suit application, for setting using tile mortar or adhesive.
1. Manufacturers:
    a. Basis of Design: Schluter-Systems: www.schluter.com/#sle.
    b. Substitutions: See Section 01 6000 - Product Requirements.

C. Thresholds: 2 inches wide by full width of wall or frame opening; beveled edge on both long edges; without holes, cracks, or open seams.
1. Thickness: 1/2 inch.
2. Material: Marble, honed finish.
3. Applications:

a. At doorways where tile terminates.

2.03 SETTING MATERIALS

A. Provide setting and grout materials from same manufacturer.

B. Manufacturers:
1. ARDEX Engineered Cements: www.ardexamericas.com/#sle.
2. Bostik Inc: www.bostik-us.com/#sle.
3. Custom Building Products: www.custombuildingproducts.com/#sle.
4. Substitutions: See Section 01 6000 - Product Requirements.

C. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4.
1. Applications: Use this type of bond coat where Large and Heavy Tile (LHT) mortar is indicated.
2. Products:
a. ARDEX Engineered Cements; ARDEX X 5: www.ardexamericas.com/#sle.
b. Custom Building Products; ProLite Premium Rapid Setting Large Format Tile Mortar, with Multi-Surface Bonding Primer: www.custombuildingproducts.com/#sle.
c. H.B. Fuller Construction Products, Inc; TEC TotalFlex 110 Universal Mortar: www.tecspecialty.com/#sle.
d. Substitutions: See Section 01 6000 - Product Requirements.

D. Organic Adhesive: ANSI A136.1, thinset mastic type.
1. Use Type I in areas subject to prolonged moisture exposure.
2. Products:
a. ARDEX Engineered Cements; ARDEX D14: www.ardexamericas.com/#sle.
b. Custom Building Products; ReliaBond Ceramic Tile Adhesive - Type 1: www.custombuildingproducts.com/#sle.
c. LATICRETE International, Inc; LATICRETE 15 Premium Mastic: www.laticrete.com/#sle.
d. Substitutions: See Section 01 6000 - Product Requirements.

2.04 GROUTS

A. Provide setting and grout materials from same manufacturer.

B. Manufacturers:
1. ARDEX Engineered Cements: www.ardexamericas.com/#sle.
2. Bostik Inc: www.bostik-us.com/#sle.
3. Custom Building Products: www.custombuildingproducts.com/#sle.
4. Substitutions: See Section 01 6000 - Product Requirements.

C. High Performance Polymer Modified Grout: ANSI A118.7 polymer modified cement grout.
1. Applications: Use this type of grout where indicated and where no other type of grout is indicated.
2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
3. Color(s): As selected by Architect from manufacturer's full line.
4. Products:
a. ARDEX Engineered Cements; ARDEX FL: www.ardexamericas.com/#sle.
b. Custom Building Products; Prism Color Consistent Grout: www.custombuildingproducts.com/#sle.
c. H.B. Fuller Construction Products, Inc; TEC AccuColor Plus Grout: www.tecspecialty.com/#sle.
d. Substitutions: See Section 01 6000 - Product Requirements.

2.05 MAINTENANCE MATERIALS

A. Tile Sealant: Gunnable, silicone, siliconized acrylic, or urethane sealant; moisture and mildew resistant type.

1. Applications: Between tile and plumbing fixtures.
2. Color(s): As selected by Architect from manufacturer's full line.
3. Products:
    a. ARDEX Engineered Cements; ARDEX SX: www.ardexamericas.com/#sle.
    b. Custom Building Products; Commercial 100% Silicone Caulk: www.custombuildingproducts.com/#sle.
    c. LATICRETE International, Inc; LATICRETE LATASIL: www.laticrete.com/#sle.
    d. Substitutions: See Section 01 6000 - Product Requirements.

B. Grout Sealer: Liquid-applied, moisture and stain protection for existing or new Portland cement grout.
1. Composition: Water-based colorless silicone.
2. Products:
    a. STONETECH, a Division of LATICRETE International, Inc; STONETECH Heavy Duty Grout Sealer: www.laticrete.com/#sle.
    b. Substitutions: See Section 01 6000 - Product Requirements.

2.06 ACCESSORY MATERIALS

A. Concrete Floor Slab Crack Isolation Membrane: Material complying with ANSI A118.12; not intended as waterproofing.
1. Crack Resistance: No failure at 1/8 inch gap, minimum.
2. Fluid or Trowel Applied Type:
    a. Material: Synthetic rubber or Acrylic.
    b. Thickness: 20 mils, maximum.
    c. Products:
        1) H.B. Fuller Construction Products, Inc; TEC HydraFlex Waterproofing Crack Isolation Membrane: www.tecspecialty.com/#sle.
        2) LATICRETE International, Inc; LATICRETE FRACTURE BAN SC: www.laticrete.com/#sle.
        3) Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that subfloor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.

C. Verify that subfloor surfaces are dust free and free of substances that could impair bonding of setting materials to subfloor surfaces.

D. Cementitious Subfloor Surfaces: Verify that substrates are ready for tiling installation by testing for moisture and alkalinity (pH).
1. Test in accordance with Section 09 0561.
2. Obtain instructions if test results are not within limits recommended by tiling material manufacturer and setting material manufacturer.

E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

3.03 INSTALLATION - GENERAL

A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.20, manufacturer's instructions, and TCNA (HB) recommendations.

B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

E. Form internal angles square and external angles bullnosed.

F. Install non-ceramic trim in accordance with manufacturer's instructions.

G. Install thresholds where indicated.

H. Sound tile after setting. Replace hollow sounding units.

I. Keep control and expansion joints free of mortar, grout, and adhesive.

J. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

K. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.

L. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS

A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.

3.05 INSTALLATION - FLOORS - MORTAR BED METHODS

A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F111, with cleavage membrane, unless otherwise indicated.
   1. Where waterproofing membrane is indicated, with standard grout or no mention of grout type, install in accordance with TCNA (HB) Method F121.

B. Cleavage Membrane: Lap edges and ends.

C. Mortar Bed Thickness: 5/8 inch, unless otherwise indicated.

3.06 INSTALLATION - WALL TILE

A. Over gypsum wallboard on wood or metal studs install in accordance with TCNA (HB) Method W243, thin-set with dry-set or latex-Portland cement bond coat, unless otherwise indicated.

B. Over interior concrete and masonry install in accordance with TCNA (HB) Method W202, thin-set with dry-set or latex-Portland cement bond coat.

3.07 CLEANING

A. Clean tile and grout surfaces.

3.08 PROTECTION

A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION

SECTION 09 5100
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical units.

1.02 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

1.03 REFERENCE STANDARDS

A. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2022.

B. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.

C. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2023.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Do not install acoustical units until after interior wet work is dry.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on suspension system components and acoustical units.

C. Samples: Submit two samples 4 x 4 inch in size illustrating material and finish of acoustical units.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Acoustical Units: Quantity equal to 5 percent of total installed.

1.06 QUALITY ASSURANCE

A. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 FIELD CONDITIONS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acoustic Tiles/Panels:
   1. Basis of Design: Armstrong World Industries, Inc; School Zone Fine-Fissured AirAssure-square lay-in: www.armstrongceilings.com/#sle.
   2. Substitutions: See Section 01 6000 - Product Requirements.

B. Suspension Systems:
   1. Basis of Design: Armstrong World Industries, Inc; 15/16" Prelude XL: www.armstrongceilings.com/#sle.
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Rating: Determined in accordance with test procedures in ASTM E119 and complying with the following:

2.03 ACOUSTICAL UNITS

A. Acoustical Units - General: ASTM E1264, Class A.
   1. VOC Content: As specified in Section 01 6116.

B. Acoustical Panels, Type ACT-1: Painted mineral fiber, with the following characteristics:
   1. Classification: ASTM E1264 Type III.
      a. Form: Wet-formed mineral fiber with acoustically transparent membrane and polyethylene foam.
   2. Size: 24 by 24 inches.
   3. Thickness: 3/4 inch.
   4. Light Reflectance: 0.82 percent, determined in accordance with ASTM E1264.
   5. NRC Range: 0.70, determined in accordance with ASTM E1264.
   6. Articulation Class (AC): 170, determined in accordance with ASTM E1264.
   7. Panel Edge: Square.
   8. Color: White.
   9. Suspension System: Exposed grid.
   10. Warranty: 30-year Limited System Warranty against visible sag, mold and mildew.
   11. Products:
      a. Basis of Design: Armstrong World Industries, Inc; School Zone Fine Fissured- Air Assure: www.armstrongceilings.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

2.04 SUSPENSION SYSTEM(S)

A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips, and splices as required.
   1. Materials:

B. Exposed Suspension System: Hot-dipped galvanized steel grid with steel cap.
   1. Application(s): Seismic.
   2. Structural Classification: Intermediate-duty, when tested in accordance with ASTM C635/C635M.
   3. Profile: Tee; 15/16 inch face width.
   4. Finish: Baked enamel.
   5. Color: White.
   6. Products:
      a. Armstrong World Industries; 15/16" Prelude XL Suspension System: www.armstrongceilings.com/#sle..
      b. Substitutions: See Section 01 6000 - Product Requirements.

2.05 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Hanger Wire: 12 gauge, 0.08 inch galvanized steel wire.

C. Hold-Down Clips: Manufacturer's standard clips to suit application.

D. Perimeter Moldings: Same metal and finish as grid.

E. Metal Edge Trim for Suspension Systems or CLoud applications shown on drawings: Steel or extruded aluminum; provide attachment clips, splice plates, and preformed corner pieces for complete trim system.
   1. Trim Height: 6 inch.

2. Finish: Baked enamel.
3. Color: White.
4. Products:
    a. Basis of Design: Armstrong "Axiom" model # AX6STR- with custom painted finish to match Paint colors: PT 3,4 or 5 as indicated on drawings. www.armstrongceilings.com/#sle..
    b. Substitutions: See Section 01 6000 - Product Requirements.

F. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

3.02 PREPARATION

A. Install after major above-ceiling work is complete.

B. Coordinate the location of hangers with other work.

3.03 INSTALLATION - SUSPENSION SYSTEM

A. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

B. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
    1. Use longest practical lengths.

C. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

D. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

E. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

F. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

G. Do not eccentrically load system or induce rotation of runners.

3.04 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Fit border trim neatly against abutting surfaces.

D. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

E. Cutting Acoustical Units:
    1. Make field cut edges of same profile as factory edges.

3.05 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.06 CLEANING

A. See Section 01 7000 - Execution and Closeout Requirements for additional requirements.

B. Clean surfaces.

C. Replace damaged or abraded components.

END OF SECTION

SECTION 09 6500
RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Resilient sheet flooring.

B. Resilient tile flooring.

C. Resilient base.

D. Resilient stair accessories.

E. Installation accessories.

1.02 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 09 0561 - Common Work Results for Flooring Preparation: Removal of existing floor coverings, cleaning, and preparation.

C. Section 09 0561 - Common Work Results for Flooring Preparation: Concrete slab moisture and alkalinity testing and remediation procedures.

1.03 REFERENCE STANDARDS

A. ASTM D6329 - Standard Guide for Developing Methodology for Evaluating the Ability of Indoor Materials to Support Microbial Growth Using Static Environmental Chambers; 1998 (Reapproved 2023).

B. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2023.

C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2022.

D. ASTM F970 - Standard Test Method for Measuring Recovery Properties of Floor Coverings after Static Loading; 2022.

E. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; 2004 (Reapproved 2018).

F. ASTM F1344 - Standard Specification for Rubber Floor Tile; 2021a.

G. ASTM F1700 - Standard Specification for Solid Vinyl Floor Tile; 2020.

H. ASTM F1861 - Standard Specification for Resilient Wall Base; 2021.

I. ASTM F1913 - Standard Specification for Vinyl Sheet Floor Covering Without Backing; 2019.

J. ASTM F2169 - Standard Specification for Resilient Stair Treads; 2015 (Reapproved 2020).

K. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2023.

L. UL 2824 - GREENGUARD Certification Program Method for Measuring Microbial Resistance from Various Sources Using Static Environmental Chambers; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

C. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.

D. Verification Samples: Submit two samples, 4" by 4" inch in size illustrating color and pattern for each resilient flooring product specified.

E. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.

F. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Flooring Material: 20 square feet of each type and color.
   3. Extra Wall Base: 30 linear feet of each type and color.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing specified flooring with minimum three years documented experience.

B. Installer Qualifications: Company specializing in installing specified flooring with minimum three years documented experience.

C. Testing Agency Qualifications: Independent firm specializing in performing concrete slab moisture testing and inspections of the type specified in this section.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.

B. Store all materials off of the floor in an acclimatized, weather-tight space.

C. Maintain temperature in storage area between 55 degrees F and 90 degrees F.

D. Do not double stack pallets.

1.07 FIELD CONDITIONS

A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

PART 2 PRODUCTS

2.01 SHEET FLOORING

A. Vinyl Sheet Flooring - Type RF-1: Homogeneous without backing, with color and pattern throughout full thickness.
   1. Manufacturers:
      a. Basis of Design: Altro Classic 25; www.altro.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.
   2. Minimum Requirements: Comply with ASTM F1913.
   3. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
   4. VOC Content Limits: As specified in Section 01 6116.
   5. Thickness: 0.080 inch nominal.
   6. Sheet Width: 79 inch minimum.
   7. Static Load Resistance: 1000 psi minimum, when tested as specified in ASTM F970.
   8. Seams: Heat welded.
   9. Integral coved base with cap strip.
   10. Pattern: Classic 25.
   11. Color: As indicated on drawings.

B. Welding Rod: Solid bead in material compatible with flooring, produced by flooring manufacturer for heat welding seams, and in color matching field color.

2.02 TILE FLOORING

A. Vinyl Composition Tile - Type VCT-1: Homogeneous, with color extending throughout thickness.

1. Manufacturers:
    a. Basis of Design: Johnsonite, a Tarkett Company; VCT II: www.johnsonite.com/#sle.
    b. Substitutions: See Section 01 6000 - Product Requirements.
2. Minimum Requirements: Comply with ASTM F1066, of Class corresponding to type specified.
3. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
4. Size: 12 by 12 inch.
5. Thickness: 0.125 inch.
6. Color: To be selected by Architect from manufacturer's full range.

B. Luxury Vinyl Tile - Type LVT: Printed film type, with transparent or translucent wear layer.
1. Manufacturers:
    a. Basis of Design: Patcraft Shape "Study Series"- Graph & Planar- as shown on Material Schedule- A900.
    b. Substitutions: See Section 01 6000 - Product Requirements.
2. Minimum Requirements: Comply with ASTM F1700, of Class corresponding to type specified.
3. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
4. Mold and Microbial Resistance: Highly resistant when tested in accordance with ASTM D6329; certified in accordance with UL 2824.
5. Wear Layer Thickness: 20 mil- 0.020 inch.
6. Static Load/ASTM F970: Passes (modified) 1500 lbs.
7. Total Thickness: 2.5 mm- 0.098 inch.
8. Color: As indicated on drawings.
9. Warranty- 15-year.
10. Installation: Glue-down.

2.03 STAIR COVERING

A. Stair Treads: Rubber; full width and depth of stair tread in one piece; tapered thickness.
1. Manufacturers:
    a. Basis of Design: Johnsonite, a Tarkett Company; Color Splash: www.johnsonite.com/#sle.
    b. Substitutions: See Section 01 6000 - Product Requirements.
2. Minimum Requirements: Comply with ASTM F2169, Type TS, rubber, vulcanized thermoset.
3. Minimum Requirements: Comply with ASTM F2169, Type TP, rubber, thermoset.
4. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
5. Nominal Thickness: 0.1875 inch.
6. Nosing: Square.
7. Texture: hammered.
8. Color: As indicated on drawings.

B. Stair Treads with Integral Risers: Rubber; full height of riser, full width and depth of tread in one piece; tapered thickness.
1. Manufacturers:
    a. Basis of Design: Johnsonite, a Tarkett Company: www.johnsonite.com.
    b. Substitutions: See Section 01 6000 - Product Requirements.
2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
3. Nosing: Square.
4. Striping: 2 inch wide contrasting color abrasive strips.
5. Tread Texture: hammered.

6. Color: As indicated on drawings.

2.04 RESILIENT BASE

A. Resilient Base: ASTM F1861, Type TS, rubber, vulcanized thermoset; style as scheduled.
   1. Manufacturers:
      a. Basis of Design: Johnsonite- Baseworks Thermoset Rubber- TG2-4", a Tarkett Company: www.johnsonite.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.
   2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
   3. Height: 4 inches.
   4. Thickness: 0.125 inch.
   5. Finish: Satin.
   6. Length: Roll.
   7. Color: As indicated on drawings.

2.05 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.

B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.

C. Moldings, Transition and Edge Strips: same color as wall base..
   1. Manufacturers:
      a. Basis of Design: Johnsonite Slimline transitions; www.commercial.tarkett.com/#sle..

D. Filler for Coved Base: Plastic.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.

3.02 PREPARATION

A. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.

B. Prohibit traffic until filler is fully cured.

3.03 INSTALLATION - GENERAL

A. Starting installation constitutes acceptance of subfloor conditions.

B. Install in accordance with manufacturer's written instructions.

3.04 INSTALLATION - SHEET FLOORING

A. Lay flooring with joints and seams parallel to longer room dimensions, to produce minimum number of seams. Lay out seams to avoid widths less than 1/3 of roll width; match patterns at seams.

B. Seal seams by heat welding where indicated.

C. Coved Base: Install as detailed on drawings, using coved base filler as backing at floor to wall junction. Extend sheet flooring vertically to height indicated, and cover top edge with metal cap strip.

3.05 INSTALLATION - TILE FLOORING

A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.

3.06 INSTALLATION - RESILIENT BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Install base on solid backing. Bond tightly to wall and floor surfaces.

3.07 INSTALLATION - STAIR COVERINGS

A. Adhere over entire surface. Fit accurately and securely.

3.08 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's written instructions.

3.09 PROTECTION

A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION

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SECTION 09 6566
RESILIENT ATHLETIC FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Vinyl sheet flooring, adhesively installed.

B. Painted game lines.

1.02 RELATED REQUIREMENTS

A. Section 09 0561 - Common Work Results for Flooring Preparation: Concrete slab moisture and alkalinity testing and remediation procedures.

1.03 REFERENCE STANDARDS

A. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2016 (Reapproved 2021).

B. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2015 (Reapproved 2021).

C. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2023.

D. ASTM F2772 - Standard Specification for Athletic Performance Properties of Indoor Sports Floor Systems; 2011 (Reapproved 2019).

E. DIN EN 14904 - Surfaces for Sports Areas – Indoor Surfaces for Multi-Sports Use – Specification; 2006.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; attendance by all affected installers; review preparation and installation procedures and coordination and scheduling necessary for related work.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's printed data sheets for products specified.

C. Selection Samples: Manufacturer's color charts for flooring materials specified and game line paints, indicating full range of colors and textures available.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Flooring Material: 10 square yards matching installed flooring.

1.06 QUALITY ASSURANCE

1.07 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 7419 - Construction Waste Management and Disposal for packaging waste requirements.

B. Deliver materials to project site in unopened containers clearly labeled with manufacturer's name and identification of contents.

C. Store materials in dry and clean location until needed for installation. During installation, handle in a manner that will prevent marring and soiling of finished surfaces.

1.08 FIELD CONDITIONS

A. Maintain temperature in spaces to receive adhesively installed resilient flooring within range of 70 to 95 degrees F for not less than 48 hours before the beginning of installation and for not less than 48 hours after installation has been completed. Subsequently, do not allow temperature in installed spaces to drop below 50 degrees F or to go above 100 degrees F.

PART 2 PRODUCTS

2.01 PREFORMED ATHLETIC FLOORING

A. Manufacturers: All products by the same manufacturer.
   1. Basis of Design: Tarkett Sports Indoor; Field Turf USA, Inc.; Omnisports Multi-Use; www.tarkettsportsindoor.com/#sle..

B. Vinyl Sheet Flooring:
   1. Wearing Surface: Pure polyvinyl chloride, mechanically extruded and uniformly resilient material with uniform color throughout thickness. Single surface embossing and Extreme Three (3) layers technology (X#LT) as supplied by Tarkett with wood image on face.
   2. Cushion: XCS cushion force reduction layer of high density closed cell PVC foam with honeycomb embossing applied in one continuous manufacturing process.
   3. Sheet Thickness: Minimum .14 inch, nominal.
   4. Sheet Width: Minimum: 6'-5".
   5. Sheet Lengths: As necessary to minimize transverse seams.
   6. Tensile Strength: Minimum 1000 psi, per ASTM D412.
   7. Durometer Hardness, Type A: Minimum of 65, when tested in accordance with ASTM D2240.
   8. Seaming Method: Welding with heat or chemical.
   9. Surface Texture: Smooth.
   10. Color: As selected from manufacturer's standard range.
   11. Game Lines: Paint as approved by manufacturer of vinyl sheet flooring. Coordinate final game line layout with Owner/Architect during the submittal process.
   12. Top Coat: If required by manufacturer for additional UV protection, a clear polyurethane coating that protects game lines and wearing surface.

2.02 ACCESSORIES

A. Leveling Compound: Latex-modified cement formulation as recommended by flooring manufacturer for substrate conditions.

B. Flooring Adhesive: Waterproof; types recommended by flooring manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates for conditions detrimental to installation of athletic flooring. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of athletic flooring to substrate.

3.02 PREPARATION

A. Remove coatings that are incompatible with flooring adhesives, using methods recommended by flooring manufacturer.

B. Broom clean areas to receive athletic flooring immediately before beginning installation.

3.03 INSTALLATION

A. Starting installation constitutes acceptance of subfloor conditions.

B. Install in accordance with manufacturer's written instructions.

C. Resilient Sheet Flooring:
   1. Unroll flooring and allow to relax before beginning installation.
   2. Mix adhesive thoroughly and apply to substrate with notched trowel. Roll flooring into fresh adhesive, overlapping end seams and double cutting, butting factory edges and compression fitting.

3. Roll entire flooring surface with steel roller to assure adhesion to substrate and eliminate air bubbles.
4. Immediately remove any adhesive from flooring surface, using chemical recommended by flooring manufacturer.
5. Weld seams using techniques and equipment recommended by manufacturer.
6. Lay out game lines using tape and taping machine approved by flooring manufacturer. Apply game line paint with roller, and allow to dry before removing tape.
7. Apply transparent top coat over flooring if recommended by manufacturer, to achieve a uniform finished appearance.

3.04 CLEANING

A. Clean flooring using methods recommended by manufacturer.

3.05 PROTECTION

A. Protect finished athletic flooring from construction traffic to ensure that it is without damage upon Date of Substantial Completion.

END OF SECTION

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SECTION 09 6700
FLUID-APPLIED FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fluid-applied flooring.

1.02 RELATED REQUIREMENTS

A. Section 09 0561 - Common Work Results for Flooring Preparation: Removal of existing floor coverings, cleaning, and preparation.

B. Section 09 0561 - Common Work Results for Flooring Preparation: Concrete slab moisture and alkalinity testing and remediation procedures.

1.03 REFERENCE STANDARDS

A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2022.

B. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2023.

C. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.

D. ICRI 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair; 2013.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns and colors available.

C. Samples: Submit two samples, 4" by 4 inch in size illustrating color and pattern for each floor material for each color specified.

D. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.

E. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, and application rate for each coat.

F. Applicator's Qualification Statement.

G. Maintenance Data: Include maintenance procedures, recommended maintenance materials, procedures for stain removal, repairing surface, and suggested schedule for cleaning.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Top Coat Materials: 2 gallons.

1.05 QUALITY ASSURANCE

A. Applicator Qualifications: Company specializing in performing the work of this section.
   1. Minimum 3 years of experience.
   2. Approved by manufacturer.

B. Supervisor Qualifications: Trained by product manufacturer , under direct full time supervision of manufacturer's own foreman.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fluid-Applied Flooring:
   1. Basis of Design:Sherwin-Williams High-Performance Flooring; DuraFlex- Hybri-Flex EC: www.sherwin-williams.com/resin-flooring/#sle.

2.02 FLUID-APPLIED FLOORING SYSTEMS

A. Fluid-Applied Flooring Type EP-1, EP-2: Body Coat: Pigmented Poly-Crete SL; Chip Broadcast: Broadcast of Macro or Micro Decorative Vinyl Chips into the SL coat; Second Chip Broadcast: Clear DuraGlaze #4 with Broadcast of Macro or Micro Decorative Vinyl Chip; Grout Coat: Clear Dur-A-Glaze #4; Top Coat: Clear Armor Top..
   1. System Thickness: 1/8" to 3/16 inch, nominal, dry film thickness (DFT).
   2. Texture: Smooth.
   3. Sheen: High gloss.
   4. Texture: Slip-resistant.
   5. Impact Resistance (ASTM D-2794: less than 160.
   6. Indentation- MIL D-3134: .050 inches.
   7. Flammability -ASTM D-635: Self-Extinguishing.
   8. Critical Radiant Flux- ASTM E-648: Class II.
   9. Color: As shown on Material Schedule- A900..
   10. Products:
      a. Basis of Design: Sherwin-Williams High-Performance Flooring; Duraflex- Hybri-Flex EC: www.sherwin-williams.com/resin-flooring/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

2.03 ACCESSORIES

A. Subfloor Filler: Type recommended by fluid-applied flooring manufacturer.

B. Primer: Type recommended by fluid-applied flooring manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of materials to subfloor surfaces.

B. Cementitious Subfloor Surfaces: Verify that substrates are ready for fluid-applied flooring installation by testing for moisture and alkalinity (pH).
   1. Obtain instructions if test results are not within limits recommended by fluid-applied flooring manufacturer.

3.02 PREPARATION

A. Remove subfloor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with subfloor filler.

B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Grind irregularities above the surface level. Prohibit traffic until filler is cured.

C. Vacuum clean substrate.

D. Apply primer to surfaces required by flooring manufacturer.

3.03 INSTALLATION - FLOORING

A. Apply in accordance with manufacturer's instructions.

B. Apply each coat to minimum thickness required by manufacturer.

C. Finish to smooth level surface.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

3.05 PROTECTION

A. Prohibit traffic on floor finish for 48 hours after installation.

B. Barricade area to protect flooring until fully cured.

END OF SECTION

SECTION 09 7200
WALL COVERINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Wall covering- Dry Erase Magnetic.

1.02 RELATED REQUIREMENTS

A. Section 09 9123 - Interior Painting: Preparation and priming of substrate surfaces.

1.03 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.

B. ASTM F793/F793M - Standard Classification of Wall Coverings by Use Characteristics; 2020.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on wall covering and adhesive.

C. Samples: Submit two samples of wall covering, in size illustrating color, finish, and texture.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Wall Covering Materials: 25 linear feet of each color and pattern of wall covering; store where directed.
   3. Package and label each roll by manufacturer, color and pattern, and destination room number.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Inspect roll materials at arrival on site, to verify acceptability.

B. Protect packaged adhesive from temperature cycling and cold temperatures.

C. Do not store roll goods on end.

1.07 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the adhesive or wall covering product manufacturer.

B. Maintain these conditions 24 hours before, during, and after installation of adhesive and wall covering.

PART 2 PRODUCTS

2.01 WALL COVERINGS

A. General Requirements:
   1. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84.

B. Wall Covering - Type WC-1: Dry-Erase Magnetic Wallcovering.
   1. Total weight: 54 oz./ sq. yard.
   2. Total Thickness: 30 mils.
   3. Width: 48" wide.
   4. Backing: 100% Polyester fabric.
   5. Solvent Resistance: 1,000 double-rubs with MEK (ASTM D4752).

6. Abraisive Resistance: 20,000 double rubs (ASTM D3597).
7. ASTM-E-84: Class A.
8. Warranty: 10 year from installation date.
9. Manufacturers:
    a. Basis of Design: MDC- #DEW15303; www.mdcwall.com/#sle.
    b. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are prime painted and ready to receive work, and comply with requirements of wall covering manufacturer.

3.02 INSTALLATION

A. Apply adhesive and wall covering in accordance with manufacturer's instructions.

B. Apply adhesive to wall surface immediately prior to application of wall covering.

C. Apply wall covering smooth, without wrinkles, gaps or overlaps. Eliminate air pockets and ensure full bond to substrate surface.

D. Butt edges tightly.

E. Remove excess adhesive while wet from seam before proceeding to next wall covering sheet. Wipe clean with dry cloth.

3.03 CLEANING

A. Clean wall coverings of excess adhesive, dust, dirt, and other contaminants.

B. Reinstall wall plates and accessories removed prior to work of this section.

3.04 PROTECTION

A. Do not permit construction activities at or near finished wall covering areas.

END OF SECTION

SECTION 09 8430
SOUND-ABSORBING WALL AND CEILING UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sound-absorbing panels.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

A. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2023.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Selection Samples: Manufacturer's color charts for fabric covering, indicating full range of fabrics, colors, and patterns available.

1.05 QUALITY ASSURANCE

PART 2 PRODUCTS

2.01 FABRIC-COVERED SOUND-ABSORBING UNITS

A. Manufacturers:
   1. Basis of Design: Acoustics First Corporation- see sizes and materials/colors noted on the Material Schedule, Sheet A900: www.acousticsfirst.com/#sle.
   2. Substitutions: See Section 01 6000 - Product Requirements.

B. General:
   1. Prefinished, factory-assembled fabric-covered panels.

C. Fabric-Covered Acoustical Panels for Walls and Ceilings:
   1. Panel Core: Manufacturer's standard rigid or semi-rigid fiberglass core.
   2. Panel Size: as shown on drawings.
   3. Panel Thickness: 1 1/2" inches.
   4. Edges: Square- Perimeter edges reinforced by a formulated resin hardener.
   5. Mounting Method: Direct applied with adhesive for Music Room.
   6. Mounting Method: Spline-mounted, concealed for Gymnasium.

2.02 FABRICATION

A. Fabric Wrapped, General: Fabricate panels to sizes and configurations as indicated, with fabric facing installed without sagging, wrinkles, blisters, or visible seams.

B. Tolerances: Fabricate to finished tolerance of plus or minus 1/16 inch for thickness, overall length and width, and squareness from corner to corner.

2.03 ACCESSORIES

A. Spline-Mounting Accessories: Manufacturer's standard concealed connecting splines of extruded aluminum designed for screw attachment to walls, with coordinating moldings and trim for interior and exterior corners and miscellaneous conditions.
   1. Color of Exposed Trim: As selected from manufacturer's standards.

B. Back-Mounting Accessories: Manufacturer's standard accessories for concealed support, designed to allow panel removal:

C. Panel Adhesive: Acceptable to acoustical panel manufacturer for application as indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates for conditions detrimental to installation of acoustical units. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install acoustical units in locations as indicated, following manufacturer's installation instructions.

B. Install mounting accessories and supports in accordance with shop drawings.

C. Install acoustical units to construction tolerances of plus or minus 1/16 inch for the following:
   1. Plumb and level.
   2. Flatness.

3.03 CLEANING

A. Clean sound-absorptive panels upon completion of installation from dust and other foreign materials, following manufacturer's instructions.

3.04 PROTECTION

A. Provide protection of installed acoustical panels until Date of Substantial Completion.

B. Replace panels that cannot be cleaned and repaired to satisfaction of the Architect.

END OF SECTION

SECTION 09 9000
PAINTING AND COATING - K-12 EDUCATION FACILITY GUIDE SPECIFICATION - SHERWIN-WILLIAMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Interior painting and coating systems.

C. Exterior painting and coating systems.

D. Scope:
   1. Finish surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
      a. Exterior:
         1) Concrete: Cementitious siding, Flexboard, Transite, non-roof shingles, common brick, stucco, tilt-up concrete, precast, and cast-in-place concrete.
         2) Metal, Miscellaneous: Iron, ornamental iron, structural iron and steel, and other ferrous metal.
      b. Interior:
         1) Concrete, Walls and Ceilings: Cast-in-place concrete, precast concrete, unglazed brick, fiber cement board, tilt-up, and plaster.
         2) Concrete Ceilings: Precast concrete, fiber-cement board, cast-in-place concrete, and plaster.
         3) Concrete Masonry Units: Concrete, split face, scored, smooth, high density, low density, and fluted.
         4) Metal: Aluminum and galvanized.
         5) Metal, Galvanized: Ceilings and ductwork.
         6) Metal: Structural steel columns, joists, trusses, beams, miscellaneous and ornamental iron, structural iron, and other ferrous metal.
         7) Drywall: Walls, ceilings, gypsum board, and similar items.
         8) Concrete: Floors, non-vehicular.

1.02 RELATED REQUIREMENTS

A. Section 05 5000 - Metal Fabrications: Shop-primed items.

1.03 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. SCAQMD 1113 - Architectural Coatings; 1977, with Amendment (2016).

C. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).

D. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

E. SSPC-SP 13 - Surface Preparation of Concrete; 2018.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Product characteristics.
   2. Surface preparation instructions and recommendations.
   3. Primer requirements and finish specification.
   4. Storage and handling requirements and recommendations.

5. Application methods.
6. Clean-up information.

C. Applicator's qualification statement.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 6000 - Product Requirements for additional provisions.
2. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
3. Label each container with color in addition to manufacturer's label.

1.05 QUALITY ASSURANCE

A. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 3 years experience and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, product name, product code, color designation, VOC content, batch date, environmental handling, surface preparation, application, and use instructions.

C. Paint Materials: Store at a minimum of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.07 FIELD CONDITIONS

A. Do not apply materials when environmental conditions are outside the ranges required by manufacturer.

B. Follow manufacturer's recommended procedures for producing the best results, including testing substrates, moisture in substrates, and humidity and temperature limitations.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design Products: Subject to compliance with requirements, provide Sherwin-Williams Company (The) products indicated; www.sherwin-williams.com/#sle.

2.02 PAINTINGS AND COATINGS

A. General:
1. Provide factory-mixed coatings unless otherwise indicated.
2. Do not reduce, thin, or dilute coatings or add materials to coatings unless specifically indicated in manufacturer's instructions.

B. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

2.03 PAINT SYSTEMS - EXTERIOR

A. Concrete: Cementitious siding, Flexboard, Transite, non-roof shingles, common brick, stucco, tilt-up, precast, and poured-in-place cement.
1. Latex Systems:
a. Satin Finish:
1) 1st Coat: Sherwin-Williams Loxon Concrete and Masonry Primer Sealer LX02W50: www.sherwin-williams.com/#sle.
(a) 5.3 to 8 mils wet, 2.1 to 3.2 mils dry.
2) 2nd and 3rd Coat: Sherwin-Williams A-100 Exterior Latex Satin, A82 Series: www.sherwin-williams.com/#sle.
(a) 4 mils wet, 1.5 mils dry per coat.

B. Metal, Miscellaneous: Iron, ornamental iron, structural iron and steel, ferrous metal.
   1. Latex Systems:
   2. Alkyd Systems, Water-Based:
      a. Low Sheen Finish:
         1) 1st Coat: Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series: www.sherwin-williams.com/#sle.
         2) 2nd and 3rd Coat: Sherwin-Williams Pro Industrial Water Based Alkyd Urethane Enamel Low Sheen, B53-1250 Series: www.sherwin-williams.com/#sle.

2.04 PAINT SYSTEMS - INTERIOR

A. Concrete, Walls and Ceilings: Poured concrete, precast concrete, unglazed brick, cement board, tilt-up, cast-in-place concrete, and plaster.
   1. Latex Systems:
      a. Eg-Shel Finish High Performance (HP):
         1) 1st Coat: Sherwin-Williams Loxon Concrete and Masonry Primer Sealer, LX02W50 Series: www.sherwin-williams.com/#sle.
            (a) 8 mils wet, 3.2 mils dry per coat.
         2) 2nd and 3rd Coat: Sherwin-Williams ProMar 200 HP Zero VOC Eg-Shel, B20-1950 Series: www.sherwin-williams.com/#sle.
            (a) 4 mils wet, 1.7 mils dry per coat.

B. Concrete Ceilings: Poured concrete, precast concrete, cement board, cast-in-place concrete, and plaster.
   1. Dryfall Waterborne Topcoats:
      a. Flat Finish:
         1) 1st and 2nd Coat: Sherwin-Williams Pro Industrial Waterborne Acrylic Dryfall, B42-181 Series: www.sherwin-williams.com/#sle.

C. Masonry CMU: Concrete, split face, scored, smooth, high density, low density, and fluted.
   1. Latex Systems:
      a. Eg-Shel/Satin Finish:
         1) 1st Coat: Sherwin-Williams PrepRite Block Filler, B25W25: www.sherwin-williams.com/#sle.
            (a) 75 to 125 sq ft/gal.
         2) 2nd and 3rd Coat: Sherwin-Williams ProMar 200 Zero VOC Eg-Shel, B20-2600 Series: www.sherwin-williams.com/#sle.
            (a) 4 mils wet, 1.7 mils dry per coat.

D. Metal: Aluminum and galvanized.
   1. Latex Systems:
      a. Eg-Shel/Satin Finish:
         1) 1st Coat: Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series: www.sherwin-williams.com/#sle.
            (a) 5 mils wet, 2 mils dry per coat.
         2) 2nd and 3rd Coats: Sherwin-Williams Pro Industrial Acrylic Eg-Shel, B66-660 Series: www.sherwin-williams.com/#sle.
            (a) 2 to 4 mils dry per coat.

E. Metal, Galvanized: Ceilings and ductwork.
   1. Dryfall Waterborne Topcoats:
      a. Flat Finish:
         1) 1st and 2nd Coat: Sherwin-Williams Pro Industrial Waterborne Acrylic Dryfall, B42-181 Series: www.sherwin-williams.com/#sle.
            (a) 6 mils wet, 1.7 mils dry per coat.

F. Metal: Structural steel columns, joists, trusses, beams, miscellaneous and ornamental iron, structural iron, and ferrous metal.
   1. Latex Systems:
      a. Eg-Shel/Satin Finish:
         1) 1st Coat: Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series: www.sherwin-williams.com/#sle.
            (a) 5 mils wet, 2 mils dry per coat.
         2) 2nd and 3rd Coats: Sherwin-Williams Pro Industrial Acrylic Gloss, B66-600 Series: www.sherwin-williams.com/#sle.
            (a) 2 to 4 mils dry per coat.

G. Drywall: Walls, ceilings, gypsum board, and similar items.
   1. Latex Systems:
      a. Eg-Shel Finish:
         1) 1st Coat: Sherwin-Williams ProMar 200 Zero VOC Interior Latex Primer, B28W2600: www.sherwin-williams.com/#sle.
            (a) 4 mils wet, 1.5 mils dry per coat.
         2) 2nd and 3rd Coat: Sherwin-Williams ProMar 200 Zero VOC Eg-Shel, B20-2600 Series: www.sherwin-williams.com/#sle.
            (a) 4 mils wet, 1.7 mils dry per coat.

H. Concrete: Floors, non-vehicular.
   1. Latex Systems:
      a. Satin Finish:
         1) 1st and 2nd Coat: Sherwin-Williams Porch and Floor Enamel, A32-200 Series: www.sherwin-williams.com/#sle.
            (a) 4 mils wet, 1.5 mils dry per coat.

PART 3 EXECUTION

3.01 EXAMINATION

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove mildew from impervious surfaces by scrubbing with solution of water and bleach. Rinse with clean water and allow surface to dry.

D. Concrete:
   1. Remove release agents, curing compounds, efflorescence, and chalk.
   2. Fill bug holes, air pockets, and other voids with cement patching compound.

E. Masonry: Remove efflorescence and chalk.

F. Gypsum Board: Fill minor defects with filler compound; sand smooth and remove dust prior to painting.

G. Plaster: Fill hairline cracks, small holes, and imperfections with patching plaster. Make smooth and flush with adjacent surfaces. Treat textured, soft, porous, or powdery surfaces in accordance with manufacturer's instructions.

H. Concrete Floors and Traffic Surfaces: Prepare concrete according to SSPC-SP 13.

I. Aluminum: Remove surface contamination and oil; wash with solvent according to SSPC-SP 1.

J. Galvanized Surfaces:
   1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.

K. Ferrous Metal:
   1. Solvent clean according to SSPC-SP 1.
   2. Remove rust, loose mill scale, and other foreign substances using methods recommended by paint manufacturer and blast cleaning according to SSPC-SP 6. Protect from corrosion until coated.

3.03 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's written instructions.

C. Apply coatings at spread rate required to achieve manufacturer's recommended dry film thickness.

3.04 PRIMING

A. Apply primer to all surfaces unless specifically not required by coating manufacturer. Apply in accordance with coating manufacturer's instructions.

B. Primers specified in painting schedules may be omitted on items factory primed or factory finished items if acceptable to top coat manufacturers.

3.05 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

B. Clean surfaces immediately of overspray, splatter, and excess material.

C. After coating has cured, clean and replace finish hardware, fixtures, and fittings previously removed.

3.06 PROTECTION

A. Protect finished coatings from damage until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

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SECTION 10 1100
VISUAL DISPLAY UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Porcelain enamel steel markerboards.

B. Tackboards.

C. Tackstrips.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's data on porcelain enamel steel markerboard, tackboard, tackboard surface covering, trim, and accessories.

C. Samples: Color charts for selection of color and texture of chalkboard, porcelain enamel steel markerboard, glass markerboard, tackboard, tackboard surface covering, and trim.

D. Test Reports: Show compliance to specified surface burning characteristics requirements.

E. Maintenance Data: Include data on regular cleaning, stain removal .

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.06 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide five year warranty for markerboard to include warranty against discoloration due to cleaning, crazing or cracking, and staining.

PART 2 PRODUCTS

2.01 VISUAL DISPLAY UNITS

A. Porcelain Enamel Steel Markerboards:
   1. Manufacturer:
      a. Basis of Design: Claridge Products and Equipment, Inc; "Grain" wood-trim Whiteboard: www.claridgeproducts.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.
   2. Color: White.
   3. Core: Particleboard, manufacturer's standard thickness, laminated to face sheet.
   4. Backing: Aluminum foil, laminated to core.
   5. Size: As indicated on drawings.
   6. Frame: Solid wood , with concealed fasteners.
   7. Accessories: Provide marker tray and map rail.

B. Tackboards: Fine-grained, homogeneous natural cork.
   1. Manufacturer:
      a. Basis of Design; Claridge Products; "Edge Wrapped" Frameless Tackboard; www.claridgeproducts.com/#sle..
      b. Substitutions: See Section 01 6000 - Product Requirements.
   2. Tackable Cork Thickness: 1/8 inch.
   3. Fabric: Vinyl-coated fabric-"Fabricork".

4. Color: As selected from manufacturer's full range.
5. Backing: Hardboard, 1/4 inch thick, laminated to tack surface.
6. Surface Burning Characteristics: Flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.
7. Size: As indicated on drawings.
8. Frame: No frame with square corner wrapped edges..

C. Tackstrips: Fine-grained, homogeneous natural cork.
1. Cork Thickness: 1/8 inch.

END OF SECTION

SECTION 10 1410
EXTERIOR SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Backlit Dimensional Letter Signage.

B. Metal Dimensional Letter Signage.

1.02 SUBMITTALS

A. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.

B. Shop Drawings: Submit layout drawings including letter size, orientation, connection details and power connections.

C. Samples: Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.

D. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

E. Manufacturer's Qualification Statement.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Package signs as required to prevent damage before installation.

B. Store tape adhesive at normal room temperature.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Dimensional Letter Signs:
   1. Image360; Building Channel Letters: www.image360.com/#sle.
   2. FASTSIGNS; Backlit Signs: www.fastsigns.com/#sle.
   3. SignsNow; Illuminated Three Dimensional Signs: www.signsnow.com/#sle.

2.02 BACKLIT DIMENSIONAL LETTERS

A. Backlit Metal Letters (Type BML):
   1. Metal: Stainless steel sheet, fabricated reverse channel.
   2. Backing: Clear lexan
   3. Face: Opaque lexan
   4. Metal Thickness: 1/8 inch minimum.
   5. Letter Height:
      a. 16 inches: "F M E S"
   6. Text and Typeface:
      a. Character Font: Helvetica, Arial, or other sans serif font.
      b. Character Case: Upper case only.
   7. Finish: Brushed, satin.
   8. Mounting: Stud and spacer.
   9. Lighting: Low voltage LED strips assembled inside the letter cavity.
   10. Power: Low voltage with power supply transformer mounted under exterior soffit as furnished and installed by the Electrical Contractor.
   11. Control: Dimable with timer switch.

2.03 ACCESSORIES

A. Concealed Screws: Stainless steel, galvanized steel, chrome plated, or other non-corroding metal.
   1. Provide rubber gasket at all dissimilar materials.

B. Tape Adhesive: Double sided tape, permanent adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

B. Verify power has been provided for the lighting.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install neatly, with horizontal edges level.

C. Protect from damage until Date of Substantial Completion; repair or replace damaged items.

END OF SECTION

SECTION 10 2113.17
PHENOLIC TOILET COMPARTMENTS - ASI ACCURATE/GLOBAL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Phenolic toilet compartments.

B. Phenolic urinal screens.

1.02 RELATED REQUIREMENTS

A. Section 10 2800 - Toilet Room Accessories.

1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2023.

C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

D. ASTM A743/A743M - Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application; 2021.

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.

F. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

G. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate work with placement of support framing and anchors in walls and ceilings.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on panel construction, hardware, accessories, and finishes.

C. Shop Drawings:
   1. Indicate plans, elevations, and dimensions. Include door swings, toilet fixture centerlines, and floor drains on plans.
   2. Indicate details of wall, floor, and ceiling supports and attachments.

D. Samples:
   1. For Initial Selection: Submit color charts and samples for each type of toilet compartment material.
   2. For Verification: Submit two samples of partition materials, 3 by 3 inches in size, indicating color.

E. Manufacturer's qualification statement.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 7419 - Construction Waste Management and Disposal for packaging waste requirements.

B. Deliver, store, handle materials and products in accordance with manufacturer's instructions, recommendations, and industry standards.

1.08 FIELD CONDITIONS

A. Ambient Conditions: Maintain building temperature at minimum of 60 degrees F for 24 hours before, during, and after installation of toilet partitions.

B. Existing Conditions: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

1.09 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Black Core or Color-Thru Phenolic Finish Warranty: Provide 25-year manufacturer warranty against delamination, breakage or corrosion of black core or color-thru phenolic material properly maintained in accordance with manufacturer's recommendations.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design Manufacturer: ASI Global Partitions: www.asi-globalpartitions.com/#sle.

B. Substitutions: See Section 01 6000 - Product Requirements.
   1. Submit proposed substitutions in writing for approval by Architect minimum of 5 working days prior to bid date and make available to bidders. Accompany proposed substitutes with review of specification and ASI Group partition company specifications noting compliance on line-by-line basis.

C. Source Limitations: Furnish products produced by single manufacturer and obtained from single supplier.

2.02 PHENOLIC TOILET COMPARTMENTS

A. Toilet Compartments: Color-Thru phenolic, Standard-58, floor anchored, overhead braced.

B. Design Criteria:
   1. Accessibility: Design compartments indicated on drawings to comply with ICC A117.1 and ADA Standards.
   2. Color-Thru Phenolic Surface Burning Characteristics: Provide assemblies with flame spread index of 25 or less and smoke developed index of 450 or less, Class A, when tested in accordance with ASTM E84.

C. Fabrication:
   1. Fabricate toilet compartment components to sizes indicated.
   2. Coordinate requirements and provide cutouts for through-partition toilet accessories and solid blocking within panel where required for attachment of toilet accessories.
   3. Provide shoes and caps at pilasters and posts to conceal anchorage, supports, and leveling mechanisms.
   4. Provide manufacturer's standard corrosion-resistant supports, leveling mechanisms, anchors, and anchoring assemblies for pilasters and posts.
   5. Floor-Anchored, Overhead-Braced Units: Provide supports, leveling mechanisms, Easy-Stall shoes, and anchors at pilasters to suit floor conditions.

2.03 COMPONENTS

A. Doors, Panels, and Pilasters: Phenolic-resin impregnated, wood-based product core with melamine-impregnated decorative surface papers and transparent, protective topcoat; NEMA LD 3 Compact Laminate, Grade CGS.
   1. Finish: Matte.
   2. Color-Thru Phenolic Color: As selected from manufacturer's color card.

B. Standard Door and Panel Dimensions:
   1. Door Thickness: 3/4 inch.
   2. Door Width: 24 inches.

3. Door Width for Handicapped Use: 36 inches, outswinging.
4. Standard-58:
   a. Door Panel Height: 58 inches.
   b. Door Height above Floor: 12 inches.
5. Panel Thickness: 1/2 inch.
6. Urinal and Entrance Screen Panel Height: 48 inches.
7. Urinal and Entrance Screen Panel Height above Floor: 12 inches.

C. Standard Pilasters: 3/4 inch thick, of sizes required to suit compartment width and spacing.
1. Pilaster Height: 82 inches.
2. Easy-Stall Pilaster Shoes: Formed 20 gauge, 0.0359 inch ASTM A666 Type 304 stainless steel with No.4 finish, 3 inches high, concealing floor fastenings and leveling bolts; secured to pilaster with stainless steel tamper-resistant screws; secured to floor with concrete anchors.
3. Pilaster Anchors: Manufacturer's standard stainless steel mounting bars attached to pilaster and secured to building structure.

D. Urinal or Entrance Screen Post: Manufacturer's standard post design of square aluminum tube with satin finish 1-3/4 inches, with shoe matching pilaster shoe.

E. Standard Head Rails: Hollow anodized aluminum tube, 1-inch by 1-5/8-inch size, with anti-grip surface and aluminum wall brackets.

2.04 MATERIALS

A. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, stretcher-leveled standard of flatness.

B. Stainless Steel Castings: ASTM A743/A743M.

C. Phenolic Panels: Monolithic core of phenolic resin, reinforced with cellulose fibers, manufactured under high pressure and at high temperatures, with melamine-impregnated decorative surface papers; NEMA LD 3, Compact Laminate, Grade CGS.

2.05 HARDWARE AND ACCESSORIES

A. Brackets:
1. Stirrup Type: Brushed stainless steel.

B. Standard Door Hardware: Brushed stainless steel:
1. Hinges: Brushed stainless steel vault hinges, gravity type, adjustable for door close positioning; two per door.
2. Latch and Keeper: Brushed stainless steel Alpaco and Ultimate Privacy latch with occupancy indicator
3. Coat Hook: Manufacturer's standard coat hook with rubber bumper; one per compartment, mounted on door.
4. Door Pull: Provide door pull for outswinging doors. Provide on both sides of doors designated as accessible.
5. Door Bumper: Provide rubber-tipped door bumpers at out-swinging doors.

C. Attachments, Screws, and Bolts: Stainless steel, tamper-resistant type.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that field measurements are as indicated.

C. Verify correct spacing of and between plumbing fixtures.

D. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's written instructions.

B. Attach Easy Stall shoe system to floor with 1/4 by 2 inch screws. Insert pilaster into Easy Stall shoe and secure after height adjustment.

C. Attach panel brackets securely to walls using anchor devices.

D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster centerlines.

E. Field touch-up of scratches or damaged finish not permitted. Replace damaged or scratched materials with new materials.

3.03 TOLERANCES

A. Maximum Variation from True Position: 1/4 inch.

B. Maximum Variation from Plumb: 1/8 inch.

3.04 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.

B. Adjust adjacent components for consistency of line or plane.

3.05 CLEANING

A. Clean partition and screen surfaces with materials and cleansers in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 10 2800
TOILET ROOM ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Commercial shower and bath accessories.

B. Under-lavatory pipe supply covers.

C. Accessories for toilet rooms and showers.

D. Grab bars.

1.02 RELATED REQUIREMENTS

A. Section 10 2113.19 - Solid Plastic Toilet Compartments.

1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

C. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2022.

D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

E. ASTM C1036 - Standard Specification for Flat Glass; 2021.

F. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2018.

G. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal process.

B. Product Data: Provide data on accessories describing size, finish, details of function, attachment methods.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Toilet Accessories:
   1. Bradley Corporation: www.bradleycorp.com/#sle.
   2. Bobrick Washroom Equipment Inc.
   3. Or approved equal.
   4. Substitutions: Section 01 6000 - Product Requirements.

B. Under-Lavatory Pipe Supply Covers:
   1. Plumberex Specialty Products, Inc: www.plumberex.com/#sle.
   2. IPS Corp., Truebro.
   3. Substitutions: Section 01 6000 - Product Requirements.

C. All items of each type to be made by the same manufacturer.

2.02 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.

B. Keys: Provide 2 keys for each accessory to Owner; master key lockable accessories.

C. Stainless Steel Sheet: ASTM A666, Type 304.

D. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.

2.03 FINISHES

A. Stainless Steel: No. 4 satin brushed finish, unless otherwise noted.

2.04 TOILET ROOM ACCESSORIES

A. Mirrors: Stainless steel framed, 6 mm thick tempered glass mirror.
   1. Frame: Mitered and welded and ground corners, and tamperproof hanging system; No.4 finish.
   2. Backing: Full-mirror sized, galvanized steel sheet and nonabsorptive filler material.
   3. Product: B-2908 1836 manufactured by Bobrick Washroom Equipment, Inc.

B. Grab Bars: Stainless steel, nonslip grasping surface finish.
   1. Standard Duty Grab Bars:
      a. Push/Pull Point Load: 250 pound-force, minimum.
      b. Dimensions: 1-1/2 inch outside diameter, minimum 0.05 inch wall thickness, exposed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
      c. Lengths:
         1) 12 inches.
         2) 18 inches.
         3) 36 inches.
         4) 42 inches.
      d. Configuration: As indicated on drawings.
      e. Product:
         1) B-6806 manufactrued by Bobrick Washroom Equipment Inc..

C. Hook: Heavy-duty stainless steel, single-prong, with bumper to protect wall or partition, satin finish.
   1. Product: B-212 manufactured by Bobrick Washroom Equipment, Inc.
      a. Mount hook 48 inches above finished floor. Center hook on door.
      b. Main Building: Install on toilet partition doors.
      c. New Bus Garage: Install on toilet room doors.

2.05 COMMERCIAL SHOWER AND BATH ACCESSORIES

A. Shower Curtain Rod: Stainless steel tube, 1 inch outside diameter, 20 gauge, satin-finished, with 20 gauge satin-finished, stainless steel flanges, for installation with exposed fasteners.
   1. Length: 36 inches.
   2. Product: B-6107 manufactured by Bobrick Washroom Equipment, Inc.

B. Shower Curtain:
   1. Material: Opaque vinyl, 0.008 inch thick, matte finish, with antibacterial treatment, flameproof and stain-resistant.
   2. Size: 42 inches by 72 inches, hemmed edges.
   3. Grommets: HDPE; pierced through top hem on 6 inch centers.
   4. Color: White.
   5. Shower Curtain Hooks: Chrome-plated or stainless steel spring wire designed for snap closure.
   6. Product:
      a. Shower Curtain: 204-2 manufactured by Bobrick Washroom Equipment, Inc.
      b. Shower Curtain Hook: 204-1 manufactured by Bobrick Washroom Equipment, Inc.

C. Folding Shower Seat: Wall-mounted surface; welded tubular seat frame, structural support members, hinges, and mechanical fasteners of Type 304 stainless steel, rectangular seat.
   1. Seat: Phenolic or polymeric composite one-piece seat or seat slats, of white color.
   2. Size: 22 inches by 14-1/2 inches
   3. Product: B-5192 manufactured by Bobrick Washroom Equipment, Inc.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

C. Coordinate installation of blocking, reinforcing plates, and concealed anchors in walls and ceilings.

3.02 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

3.04 PROTECTION

A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

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SECTION 10 4400
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire extinguishers.

B. Fire extinguisher cabinets.

C. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 09 9123 - Interior Painting: Field paint finish.

1.03 REFERENCE STANDARDS

A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2023a.

B. NFPA 10 - Standard for Portable Fire Extinguishers; 2022.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Schedule: For Fire Cabinets indicate whether recessed, semi-recessed, or surface mounted. Indicate hourly fire-ratings. Coordinate final fire-protection cabinet schedule with fire-extinguishers to ensure proper fit and function. Discrepancies should be discussed with the Architect.

PART 2 PRODUCTS

2.01 FIRE EXTINGUISHERS

A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.

B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.
   1. Cartridge Operated: Spun shell.
   2. Stored Pressure Operated: Deep Drawn.
   3. Class: A:B:C type.
   4. Size: 20 pound.
   5. Size and classification as scheduled.
   6. Temperature range: Minus 65 degrees F to ___ degrees F.

2.02 FIRE EXTINGUISHER CABINETS

A. Fire Rating: Listed and labeled in accordance with ASTM E814 requirements for fire resistance rating of walls where being installed.

B. Fire Rated Cabinet Construction: One-hour fire rated.
   1. Steel; double wall or outer and inner boxes with 5/8 inch thick fire barrier material.

C. Cabinet Configuration: Recessed type.
   1. Size to accommodate accessories.

D. Door: 0.036 inch metal thickness, reinforced for flatness and rigidity with nylon catch. Hinge doors for 180 degree opening with two butt hinges.

E. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.

F. Fabrication: Weld, fill, and grind components smooth.

G. Finish of Cabinet Exterior Trim and Door: No.4 - Brushed stainless steel.

H. Finish of Cabinet Interior: White colored enamel.

2.03 ACCESSORIES

A. Lettering: FIRE EXTINGUISHER decal, or vinyl self-adhering, pre-spaced black lettering in accordance with authorities having jurisdiction (AHJ).

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.03 MAINTENANCE

A. See Section 01 7000 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.

3.04 MAINTENANCE - SELF-SERVICE FIRE EXTINGUISHERS

A. Monthly Inspections: Inspect self-service fire extinguishers on monthly basis in accordance with manufacturer’s instructions, and requirements of the authorities having jurisdiction (AHJ).

B. Annual Inspections: Inspect self-service fire extinguishers on annual basis in accordance with manufacturer’s instructions, and requirements of the authorities having jurisdiction (AHJ).

C. Inspection Certification Tag: Provide new tag indicating acceptable condition of fire extinguisher, date of inspection, and name of self-service inspector for each inspection.

END OF SECTION

SECTION 11 40 00
FOODSERVICE EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specifications Sections, apply to this Section.

1.2 SUMMARY

A. Supply, deliver and set in place all food service equipment at identified locations, and level before and after final connections by others. FEC to coordinate with authorized service agents any startup requirements called out in this written specification as well as provide prompt demonstrations to owner.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
   1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, which is current as of date of the Contract Documents.
   2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
   3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

C. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by Contract Documents. Substitutions require approval by Architect for use or implementation.
   1. Substitutions provisions are handled under Division 01 Section.

1.4 REFERENCES

A. All food service refrigeration equipment must comply with C403.10 refrigeration equipment performance equipment of the 2020 Energy Conservation code of New York State.

B. All Food Service Equipment provided and installed must comply with below agencies, state department of health and county or local laws and ordinance.

C. American Society for Testing Materials (ASTM):
   1. ASTM A167, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
   2. ASTM A446, Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
   3. ASTM C1036, Specification for Flat Glass.
   4. ASTM C1048, Specification for Heat Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass.

D. American Welding Society (AWS).

E. National Electrical Manufacturers Association (NEMA).

F. National Fire Protection Association (NFPA 96).

G. National Sanitation Foundation (NSF).

H. Underwriters Laboratories Listing (UL).

I. Reference Standard AGS Grease Hoods, ductwork and fire extinguishing system per NYSBC 904.2.1

1.5 SUBMITTALS

A. Within sixty (60) days after award of contract (before equipment is purchased) the flowing shall be submitted in accordance with Section 013300 SUBMITAL PROCEDURES. It shall be the responsibility of the FEC (Food Equipment Contractor) to confirm construction schedule with Architect and adjust the submittal process to accommodate any fast track projects.
   1. The submittal package will include the following: Product data book (cut sheet book) this product data book should account for all item numbers in this contract up to and including spare numbers and existing equipment. Product data cut sheets shall be marked up in a way that indicates model and accessories included with the item.
   2. Submittal drawings will consist of the following: Custom shop drawings (hoods, walk-ins, millwork, serving lines custom fabrication, etc.) Equipment layout drawings, Plumbing connection drawings, electrical connection drawings, HVAC layout drawings and Special condition drawings (Wall backing, floor depressions, etc.)
   3. Submittal package shall be at least 98% complete at submission unless pre-approved by architect and CKC.

B. Electronically submit (PDFs) assembly drawings, electrical and mechanical rough-in connection plans, details for plumbing, electrical, air conditioning and ventilation services for all kitchen equipment and brochures, catalog cut-sheets, specifications and operating characteristics for buy-out equipment. Clearly indicate any deviations from contract Documents, such as arrangement of piping, connections, wiring method of fabrication, manner of structural conditions, standard shop practices, or other reasons, and note in Cover Sheet accompanying submittals.

C. Drawing of fabricated equipment shall not be less than ¾" equal one-foot scale.

D. Rough-in drawings shall not be less than ¼" equal one-foot scale.

E. Product Data: Provide data on appliances; indicate configuration, sizes, materials, finishes, locations, utility connections and locations.

F. Samples: Submit samples of stainless steel and other finish materials for color selection.

G. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

H. Manufacturer's Certificate: Certify that exhaust system and tests meet or exceed specified requirements.

I. It shall be the FEC responsibility to coordinate all color selections that are not already selected with the Architect. Any color selections stated in written specifications shall be confirmed by the FEC with Architect prior to ordering

1.6 CLOSEOUT SUBMITTALS

A. Within thirty (30) days after completion of contract the following shall be submitted.
   1. Operation and Maintenance Data:
      a. Operation Data: Provide manuals with a sequence of operation and utility connection diagram explaining system operation and corresponding to actual devices. After approval, submit 2 sets of three ring binders and an electronic copy.
      b. Maintenance Data: Provide lubrication and periodic maintenance requirement schedules.
      c. Within this manual Provide serial numbers on all equipment including walk in boxes and refrigeration when manual covers more than one model, indicate model provided
   2. Warranty letter by the FEC (Foodservice Equipment Contractor) stating date of completion of installation for warranty issues.
   3. Demonstration sign in sheet listing what was demonstrated and all parties that attended this demonstration
   4. Equipment keys and spare parts list to include what was turned over and to whom.
   5. Signed by owner or owner's representative the punch list determining that all punch list items have been completed and to the owner's satisfaction.
   6. Provide documentation on all cooking equipment startups performed by an authorized service agent.

7. Documentation of startups by authorized service agent
8. Provide copy of Ansul tag and testing

1.7 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Conform to applicable State and local codes for utility requirements.
   2. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc. as suitable for the purpose specified and indicated.

B. Energy Ratings: Provide appliances with energy guide labels with energy cost analysis (annual operating costs) and efficiency information as required by Federal Trade Commission.
   1. Provide all appliances that are Energy Star Rated.

1.8 QUALIFICATIONS

A. Installer: Must have a minimum of 5 years documented installation experience with projects similar to this project.

B. Fabricator: Must specialize in manufacture of commercial food services equipment with minimum 5 years documented experience.

C. Manufacturer: Must specialize in manufacturing products specified in this section with a minimum of 5 years documented equipment manufacturing experience.

D. One qualified full-time site superintendent all be satisfactory to the Owner and Architect in all respects, and owner shall have the right to require Contractor to dismiss from the project any superintendent whose performance is not satisfactory to Owner and Architect except with another superintendent satisfactory to the Owner and Architect in all respects. At the request of the Architect, the Contractor's superintendent shall attend project meetings, whether the project meetings are prior to the start of the Contractor's work.
   1. Contractor shall provide a superintendent with experience in managing project of this size and complexity with minimum three (3) projects including projects completed on time per contract. Experience shall be documents in writing from end user and design consultant.

1.9 DELIVERY, STORAGE AND HANDLING

A. Store products clear of floor in a manner to prevent damage.

B. Coordinate size of access and route to place of equipment installation.

C. Coordinate equipment delivery and installation with all other trades.

D. Contractor takes all responsibility for equipment damage incurred before, during and after installation, until Substantial Completion has been determined by Architect.

E. One site superintendent all be satisfactory to the Owner and Architect in all respects, and

owner shall have the right to require Contractor to dismiss from the project any superintendent whose performance is not satisfactory to Owner and Architect except with another superintendent satisfactory to the Owner and Architect in all respects. At the request of the Architect, the Contractor's superintendent shall attend project meetings, whether the project meetings are prior to the start of the Contractor's work.

1. Contractor shall provide a superintendent with experience in managing project of this size and complexity with minimum three (3) projects including projects completed on time per contract. Experience shall be documents in writing from end user and design consultant.

1.10 COORDINATION

A. Coordinate existing equipment with Owner per Part 3 Existing Equipment.

B. Coordinate with other trades to ensure existing equipment is disconnected prior to removal by this contractor. Supply and install all necessary drain traps, steam traps, vents, shut-offs, valves, pipe fittings, and/or other materials to complete final plumbing and electrical or steam connections between the rough-in and the connection or connections on each piece of equipment.

C. Ductwork and ductwork connections from hoods collars to duct work provided by HVAC unless otherwise indicated.

D. Install all drain fittings, tailpieces, faucets, operating switches, and/or starters.

E. Coordinate sequencing of equipment installation with other trades prior to installing any piece of equipment.

F. Coordinate special conditions with other trades, i.e. floor depression, soda line conduit requirements, roof curbs, control wiring, etc.

1.11 WARRANTY

A. Provide a one (1) year parts and labor guarantee on all new equipment.

B. Components of equipment subject to replacement prior to one year's use and those items which may fail due to improper or inadequate periodic maintenance by the Owner/Operator are not intended to be included within the scope of warranty.

C. For all equipment that has refrigeration systems and semi-hermetic compressors, furnish an additional four (4) year warranty on all compressors.

D. Guarantee/Warranty period shall commence with the date of Substantial Completion.

E. Warranty includes all costs incurred for removal and re-installation of the replacement component or equipment.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
   1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
   2. All products shall be new. Use salvaged materials only where specifically directed to do so.
   3. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
   4. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
   5. Where products require color selection the Architect will make the selection.
   6. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
   7. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:
   1. Products:
      a. Non-restricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
   2. Manufacturers:
   3. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
   1. Evidence that the proposed product does not require revisions to the Contract Documents that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
   2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size,

durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

2.3 MATERIALS

A. Sheet Steel: ASTM A446; 1.25 ounce per square foot galvanized coating.

B. Stainless Steel: ASTM A167; Type 304 commercial grade, No. 4 finish.

C. Glass: 3/16-inch float conforming to ASTM C1036 and ASTM C1048; exposed edges ground; cut or drilled to receive hardware.

D. Plastic Laminate: NEMA LD3; 0.050-inch-thick; color as selected by Architect.

E. Laminate Backing Sheets: LD3-BK20, 0.020-inch-thick, unfinished plastic laminate.

F. Finish Hardware: Manufacturer's standard.

G. Work Surfaces: As specified.

H. Fittings: Sink drains with crumb cup and waste fittings, faucets, and electrical outlets.

I. Service Outlet Covers and Escutcheons: Stainless steel.

J. Service Accessories and Connections:
1. Provide control switch or starter on each motor-driven appliance or heating element, under provisions of UL requirements.
2. Provide internal wiring for equipment, including electrical devices, wiring controls, and switches to a common junction box.
3. Provide suitable length of 4 wire cord with plugs to match building receptacles.
4. Provide lamps for fixtures in equipment.
5. Provide equipment with connection terminals, so that connections of plumbing, gas, steam, electrical, ventilation, and refrigeration services can be made. Where receptacles are specified for custom equipment, supply cut-outs and outlet boxes set in place accessible for connections of electrical work.

2.4 EQUIPMENT

A. Provide rough-in hardware, supports and connections, attachment devices, closure panels, trim strips, and all accessories required for proper operation of equipment.

B. Standard of Comparison: The specified equipment has been established to set a standard of quality and features.

C. If substitutions require different utility/building conditions, electrical, plumbing, ventilation,

etc., from those specified, a complete list of those changes for each item shall be included with the request for substitution. Any costs associated with these changes will become the responsibility of this Contractor.

D. Verify direction of door swings.

2.5 FABRICATION

A. General Requirements:
   1. Stainless Steel Fastenings and Fittings: Bolts and screws with countersunk flat heads at interior and exterior visible or accessible surfaces. Use concealed fastenings where possible
   2. Form edges smooth. Fabricate sheet material for work surfaces, facings, shelves, and drainboards of straight length in one continuous sheet when not over 12 feet in length.
   3. Fix leg-mounted units by dowelling to floor with 1/4-inch stainless steel pins, where vibration or oscillation is anticipated.
   4. Provide legs with stainless steel adjustable feet. Fasten legs to equipment securely and rigidly.
   5. Install rubber or nylon button feet or other protective device on bearing surface of any item positioned on a finished surface.
   6. Isolate rotating or reciprocating machinery to prevent noise and vibration.
   7. Provide accommodation for installation of final connections by other trades and accessibility to components such as compressors, junction boxes, etc.…
   8. Grind welds of stainless-steel smooth and flush; polish to match adjacent surfaces.
   9. Cut and drill components for service outlets and fixtures.
   10. Provide access panels where required to access utilities.
   11. Shop assemble work where possible.

B. Load Carrying Counter Surfaces: Reinforce frame support system and surfaces so that surfaces may safely support a load of 200 pounds concentrated on one square foot in any area or surface with no indentation showing on surface, and with permanent set not exceeding 0.005 inches.

2.6 FINISHES

A. Metal (Except Stainless Steel): Degrease and phosphate etch followed by primer and minimum 2 coats factory baked epoxy enamel, color as selected by Architect from manufacturer’s full range of standard and custom colors.

B. Plastic Laminate: Color as selected by Architect from manufacturer’s full range of standard and custom colors.

C. Stainless Steel: Number 4 finish (unless indicated otherwise).

D. Bituminous Paint: Sound deaden internal surfaces of metal work and underside of metal counters and sinks.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify all existing conditions and existing equipment requirements.

B. Verify ventilation outlets, service connections, and supports are correct and in required location.

C. Verify operational condition of existing equipment.

D. Immediately upon finding Report equipment discrepancies or non-operational equipment to the Architect.

3.2 INSTALLATION

A. Pre-installation site visits are required to obtain field measurements, verify finish dimensions, examine rough in progress and to coordinate with trades on site.

B. Use anchoring devices approved by manufacture and are made with a material that will not rust and are appropriate for equipment and expected usage.

C. Verify equipment is installed in accordance with the manufacturer's recommendations and requirement.

D. Insulate to prevent electrolysis between dissimilar metals. Provide sealant to achieve clean joint without crevices.

E. Weld and grind joints in stainless steel work tight, without open seams, where necessary due to limitations of sheet sizes or installation requirements.

F. Sequence installation and erection to ensure mechanical, plumbing and electrical connections are achieved in an orderly and expeditious manner.

G. Cut, fit, and patch where necessary. Coordinate work with other trades.

H. Cut and drill tops, backs or other elements for service outlets, fixtures, and fittings.

I. Provide access panel or cutting and patching of items of this Section required for the installation or services of equipment.

J. Remove and reinstall existing equipment required under this Section. Foodservice Equipment contractor shall verify condition of existing equipment prior to removal, if being reinstalled by this contactor or reused by Owner.

K. Protect new and existing equipment during construction phase as required to prevent damage to equipment.

3.3 EXISTING EQUIPMENT

A. The Owner reserves the right to keep any existing equipment, coordinate with Owner on removal and transportation of equipment to a location of their choice. It shall be the responsibility of this contractor to salvage equipment the Owner chooses not to retain.
   1. Prior to removal from the kitchen any equipment that is labeled existing & relocate, Existing & remains or existing & reuse, the FEC shall verify that the equipment is in working order and document via photos any damage and cleanliness Any damaged or not working equipment should be reported to GC/CM or Architect prior to moving.

B. It shall be the responsibility of this contractor to salvage equipment the Owner chooses not to retain. FEC shall supply a list of salvage equipment (to include description, model, manufacture and serial number) to CM/GC/Owner for sign off prior to removal. Provide document in FSE submittal process.

C. MEP disconnections by related trades, move, store and re-install equipment, ready for utility connection.

D. Coordinate scope of work and timeline with Owner and other trades prior to removal of existing equipment.

E. Clean and re-furbish existing equipment to be re-used to “like new” condition, as noted.
   1. Prior to removal from the kitchen any equipment that is labeled existing & relocate, Existing & remains or existing & reuse, the FEC shall verify the cleanliness of existing equipment Any overly dirty/overly damaged equipment should be reported to the GC/CM or Architect prior to moving.

F. It is the responsibility of this contractor to provide storage as required until the piece of equipment is installed or re-installed.

G. It is the responsibility of this contractor to evacuate refrigerant, dismantle and remove all refrigeration equipment associated with existing walk-in cooler, freezer or equipment with remote refrigeration components (if applicable).

3.4 ADJUSTING

A. Upon completion of installation, adjust new and existing equipment and apparatus to ensure proper working order and conditions.

B. If a new piece of equipment is not functioning properly and determined to be non-repairable in the field it shall be removed and replaced with a new piece of equipment.

C. Inspect all equipment and run each piece of equipment through a complete operating cycle to verify that equipment is fully operational.

3.5 CLEANING

A. Cleaning shall be conducted prior to the turnover of the kitchen to the owner

B. Remove masking or protective covering from stainless steel and other finished surfaces. NCLUDING WALKIN PANELS/ EXHAUST HOODS, DOOR HANDLES AND TRIM STRIPS

C. Remove all packing materials and debris from jobsite.

D. Wash and clean new and existing equipment.

E. Polish glass, plastic, hardware and accessories, fixtures and fittings.

3.6 DEMONSTRATION AND TESTING

A. Demonstrations shall be coordinated by the FEC and conducted prior to the turnover of kitchen to the owner. FEC shall provide sign in sheet from the demonstration showing attendance and items demonstrated. This document to be included with closeout documents

B. Demonstrations on all new equipment shall NOT be performed by the FEC.

C. Test existing and new equipment prior to demonstration.

D. At completion of work, provide qualified and trained personnel to demonstrate operation of each item of equipment and instruct Owner in operating procedures and maintenance.

E. Individuals performing demonstration shall be fully knowledgeable of all operating and service aspects of equipment.

F. Start-up, test, and adjust new equipment. Authorized factory technicians shall start-up equipment requiring testing and balancing, i.e. hoods, pulping systems, equipment with remote components, etc. IT SHALL BE THE RESPONSIBLY OF THIS CONTRACTOR TO PAY ANY SERVICE FEES TO RETURN TO SITE TO COMPLETE ANY START UPS THAT COULD NOT BE PREFORMED ON FIRST TRIP DUE TO INCOMPLETE FINAL CONNECTIONS

G. All equipment that qualifies for factory startups will be coordinated by FEC and completed prior to equipment turn over to owner.

H. All demonstrations/training to be performed by a qualified manufactures representative. Provide to Architect attendance records for all training on all equipment

PART 4 - LISTING OF FOODSERVICE EQUIPMENT

4.1 Item 1 - Can Opener - One (1) Required

A. Edlund Model 270/115V Dimensions: 11.5(h) x 6.75(w) x 10(d) Can Opener, electric, for heavy volume, 2-speed motor, knife and gear assemblies that are removable for cleaning, recommended for up to 200 cans per day, cULus, CE, NSF certified, 115v/60/1-ph, 1.5 amp. Supply with the following:
   1. 1 ea. 3-year limited warranty

4.2 Item 2 - Worktable - One (1) Required

A. Custom Model by MARLO/EMI size and shape as shown on drawing#****. Approximately 30 X 90" X 34" high. Top to be constructed of a 14-gauge 304 stainless steel with S/S channel edge construction. "C" channel bracing cylindrical gussets and mastic sound deadening. 6" back and right-side splash at 90 degree and ¾ turn down enclosed back and ends. 1 5/8" OD stainless legs adjustable s/s flanged feet. 16-gauge under shelf the length of the table. Under Shelf to be welded to legs 10" AFF with S/S "C" Channel bracing.

B. Provide two (2) 20" X 20" stainless steel drawers as seen on drawing. Drawers to be double pan construction with HD S/S rollers bearing, integral pull handle, lock and cutting boards.

C. Provide two (2) GFI outlets in backsplash (120/1/15AMPS) as indicted on drawings for items #1 and (1) convenience outlet internally factory wired to junction box (UL certified) to a single point connection at a chase. 18-gauge S/S chase to run from table top connection to floor. Chase to have (2) removable access panels to provide access for connections ID to be approximately 2" x 4" provide 4" x 6" end flanges at floor and table top connections. FEC to seal chase to floor

D. Back to back tables to be provided with S/S back splash cap. One piece Cap is to cover both splashes from 2 ½" radius to top on both sides and cover the end cap. Coordinate with work table #3. Front legs to be adjustable flanged feet, back feet to be adjustable bullet style. To be NSF & UL approved

4.3 Item 3- Chef's Worktable W/Sink – One (1) Required

A. Custom Model by MARLO/EMI size and shape as shown on drawing#****. Approximately 30" X 90" X 34" high. Top to be constructed of a 14-gauge 304 stainless steel with S/S channel edge construction. "C" channel bracing cylindrical gussets and mastic sound deadening. 6" back and left side splash at 90 degree and ¾ turn down enclosed back and ends. 1 5/8" OD stainless legs adjustable s/s flanged feet.16-gauge under shelf the length of the table. Under Shelf to be welded to legs 10" AFF with S/S "C" Channel bracing. (excluding sink section)

B. Provide two (2) 20" X 20" stainless steel drawers as seen on drawing. Drawers to be double pan construction with HD S/S rollers bearing, integral pull handle, lock and cutting boards.

C. Provide two (2) GFI outlets inn backsplash (120/1/15AMPS) as indicted on drawings for convenience outlets internally factory wired to junction box (UL certified) to a single point connection at a chase. 18-gauge S/S chase to run from table top connection to floor. Chase to have (2) removable access panels to provide access for connections ID to be approximately 2" x 4" provide 4" x 6" end flanges at floor and table top connections. FEC to seal chase to floor

D. One (1) 20" x 20" X 10" deep coved construction prep sink with twist handle waste with bracket and overflow. Provide pre-rinse wall bracket mount area in overhead shelf. S/S flanged feet at front legs.

E. Over prep sink area provide approximately 36” single line overhead pot/pan rack. 2” x 3/16” S/S flat bar welded to 1 5/8” OD S/S Tubular sleeves. Provide eight (8) corrosion resistant s/s type pot hooks. For the remaining length of the table provide a single over shelf to be constructed of a 16-guage stainless. 2” turn up at rear, 2” down bends at sides and front. Mounted on 1 5/8” OD tubular uprights and cantilever brackets with concealed fasteners.

F. Single over shelf 12” wide X length of the table. 2” x 3/16” S/S flat bar welded to 1 5/8” OD S/S Tubular sleeves. To be constructed of a 16-guage stainless.2” turn up at rear, 2” down bends at sides and front. Mounted on 1 5/8” OD tubular uprights and cantilever brackets with concealed fasteners.

G. Back to back tables to be provided with S/S back splash cap. Cap is to cover both splashes from 2 ½” radius to top on both sides and cover the end cap. Make cap in one piece. Coordinate with work table #2. Front legs to be adjustable flanged feet, back feet to be adjustable bullet style to be NSF & UL approved. Supply the following:

1. 1 ea. T&S Brass Model B-0221-CR-KIT Pantry Faucet, double, deck mount, 8" deck mount mixing faucet with polished chrome plated brass body, 12" swing nozzle with stream regulator outlet, ceramic cartridges with check valves, lever handles, and 1/2" NPT female inlets, certified to ASME A112.18.1/CSA B125.1, NSF 61-Section 9 and NSF 372. Meets ADA ANSI/ICC A117.1 requirements.

4.4 Item 4 - Steamer (Future Item) - One (1)

A. **FUTURE ITEM** Groen Model GSSP-BL-5ES Dimensions: 58.63(h) x 21.75(w) x 30.63(d)SmartSteam Pro Convection steamer, electric, stand mounted, (5) 12" x 20" x 2-1/2" deep pans, external heating element, touch screen control, side mounted convection fan, 2.5 gallon reservoir, stainless steel interior & exterior, (1) 1-1/2" drain connection, (2) 3/4" water connections per cavity, 12kw, cUL, UL, NSF, Made in USA. Provide with the following:

1. 1 ea. Groen (1) year parts & labor, (5) year cavity warranty
2. 1 ea. Groen (K-12 School purchases only) Two-year parts and labor warranty
3. 1 ea. Groen Start-up Program, included at customer's request, water quality test and water treatment recommendation included, free start-up adds additional 1-year parts & labor warranty (See start-up request form document)
4. 1 ea. Groen 208v/60/3-ph, 12.0kw, 34.0 amps, std.
5. 1 ea. Groen Model 149100 SmartSteam™ water treatment kit
6. 1 ea. Groen Model 149101 Replacement Filter, for SmartSteam™ water treatment (1)
7. 1 ea. Groen Model 162408 Drain Tempering Valve, for 140 degree drain temperature requirement (requires 1/2" cold water connection), no electrical connection required
8. 1 ea. Groen Model 175977 Overflow Drain Cleaning Brush, for SmartSteam models
9. 1 ea. Groen Door hinged on left, std.

4.5 Item 5- Convection Oven (Existing Item #E - Relocate) - One (1)

4.6 Item 6 - Exhaust Hood w/Supply Air - One (1) Required

A. Dimensions: As shown on Halton’s Drawings# U23-826 (one section) with a typical hanging

height of 6'-8" above finished floor. Hood shall have fire cabinet mounted on left side, as shown on drawings. Panel with Fan and light switches shall be remote mounted, verify location with Architect.

1. Furnish and install a complete kitchen exhaust canopy with supply plenum. The hood shall be the “Capture-Jet” System #Q KVE SJ.
2. The installation shall be in accordance with the manufacturer’s recommendations and the canopy exposed areas and inner liner shall be 18-gauge stainless steel with a #4 hood shall be provided with a 24” wide laminar flow down discharge perforated stainless steel plenum for introduction of makeup air at low velocity in front of the hood, as shown on plans. Discharge velocity shall not exceed 135 fpm, nor affect the hood capture and containment.
3. LED light fixture with the following certifications U.L., CSA, NSF and CE for use in grease exhaust hoods in quantity sufficient to provide 50-foot candles at the cooking surface when hood is mounted 84” A.F.F. LED light fixture is complete with die cast aluminum junction box with integral fins for natural heat dissipation. Input voltage of 24V DC with a power consumption not to exceed 20 watts. The housing encases 24 LED light emitters with a brightness of 1000 lumen. Lamp body is stainless steel ring with a high temperature silicone seal. Junction box to accept standard ½” NPT fitting. Fixture shall come complete with integral power supply with an input voltage of 108VAC – 305VAC and input frequency of 50/60 Hz. Input current rating shall be 0.57A @ 120VAC. Fixture shall contain no mercury or lead.
4. The exhaust airflow will be based on the convective heat generated by the appliances underneath each canopy. Submittal shall include convective heat calculations base on the input power of the appliance served as defined by ASTM Standards F-1704-05 Capture & Containment and F-2474-05 Heat Gain to Space. Final air volume calculations shall comply with the hood listing.
5. Hood will include an active internal “Capture-Jet” System that will allow for Capture and Containment of thermal plume at specified air volumes. The Capture Jet air shall be pulled into a 1” air plenum with the Capture-Jet fan and discharged through Capture-Jet ports that are located along the inside front, side and bottom edge of the hood at discharge velocity of 1800 FPM. Slot type, passive devices or “Short-Cycle” discharge is not acceptable.
6. Hood shall be provided with Halton model MBD Manual Balancing Damper for accurate adjustment and commissioning of the hood. The balancing damper shall bear the Underwriters Laboratories U.L. label per U.L. listed range hood accessories per standard 710 and shall be fabricated in compliance with NFPA-96-2004. The damper shall be adjustable to allow for balancing airflow based on pressure differential readings from integral T.A.B. test and balance port in the Capture Jet hood. The damper outer casing shall be constructed of continuously welded 16-gauge galvanized steel including the balancing blades. Optional construction is of 18-gauge stainless steel. Adjustment of the parallel dampers (in open position) will be achieved by manually turning the locking adjustment bracket until the desired pressure reading is achieved.
7. The hood shall be equipped with model KSA multi-cyclone stainless steel grease extractors. The grease extraction efficiency is 93% on particles with a diameter of 5 microns and 98% on particles with a diameter of 15 microns or larger, based upon ASTM F-2519-05 method of test. Sound levels shall be between 40 and 55 NC.

8. The air flows through the KSA extractors and the Capture Jet air chamber are to be determined through the integral T.A.B. (Testing and Balancing) ports mounted in the hood. It is the responsibility of the air balancer to adjust the exhaust volumes after installation with a Magnahelic Gauge or Shortridge Digital Anemometer and the hood TAB ports.
9. Hood shall be provided with a thermostat to determine if appliances are energized without the exhaust fan engaged and will engage the exhaust fan as required to meet the IMC interlock requirement.
10. The Capture Jet hood will come standard with the Halton AccuFlow indicator. The AccuFlow provides a visual indicator that the system is at design exhaust air values. A pressure transducer measures design exhaust rate and this is interpreted by the AccuFlow sensor by a steady green indicator light. Should the system be below design airflow, the indicator light will blink once in sequence. Should the indicator light blink twice in sequence, the exhaust airflow is above design.
11. Performance Criterion: Other manufacturers wishing to offer an alternate to the specified manufacturer must apply for permission to do so, in writing, from the office of the specifying consultant. The consultant must receive application at least ten working days prior to the bid date. Any alternate system must meet construction and performance requirements and efficiencies as outlined in this specification. Requests for approval must include grease filtration performance data (micron size vs. extraction) for mechanical extractor and manufacturer's own exhaust airflow calculations based on convective heat load of cooking equipment beneath the hood. Efficiency comparison data to be performed in accordance with ASTM Standard F1704-96 and include results for exhaust rate for capture and containment of convective plume, Temperature rise of exhaust air and Heat Gain to the space (kBtu/h). Make up air will be calculated so that the same amount of air will be taken from the zone as is required by the specified system. An additional load cannot be placed on the kitchen HVAC system. Manufacturer must provide a written guarantee of performance, ensuring the specifying consultant that the system will perform to the consultant's satisfaction when installed and balanced according to design airflows and results of ASTM Standard F1704-96 test. (As determined by TAB ports and pressure vs. air flow curves). Consultant reserves the right to reject any system which, when installed, does not perform to ASTM Standard F1704-96 for heat gain according to the specification. Rejected system must be replaced with specified system, with all replacement costs paid by manufacturer of rejected system. Any changes in the specified sizing of power wiring or gas lines due to the use of any system other than that which is specified is the responsibility of the alternate hood manufacturer and must be coordinated by the hood manufacturer and contractors involved.
12. Supply and install S/S closure panels around perimeter of hood to finished ceiling.
13. KSA Filter Removal Tool. FEC to mount in convenient location using wall bracket included
14. Pre-pipe fire suppression system.
15. Please Note: Field verify all collar locations with structure above prior to releasing the hood for fabrication.
16. Remote control panel (verify location)

17. FEC to coordinate startup w/pre site visit

4.7 Item 7 - Fire Suppression System - One Lot (1 Lot) Required

A. Ansul R-102 Ansul Fire Protection System
   1. This item shall provide coverage for items 403, 405 Furnish a complete wet chemical fire suppression system model R102 as manufactured by “Ansul” or equal in compliance with U.L. 300 standards. The system shall include factory prepipe, all permits and test as required by the authority having jurisdiction.
   2. Automatic actuation shall be by means of fusible with no visible conduit. System shall include an electrically actuated release mechanism.
   3. System shall be furnished and installed by an Ansul certified distributor in accordance with manufacturer's instructions and the authority having jurisdiction.
   4. Microswitches shall be furnished as part of the fire protection system for tie in of building alarm and for makeup air/fire/fuel shut down.
   5. All access openings, holes, sleeves, chases, etc., in building structure necessary to permit piping and control tubing to be run between system unit, ventilator and duct work are to be provided by the General Contractor.
   6. The Building Alarm System Contractor is to furnish a control relay to detect operation of the system by connection to the microswitches supplied. The Electrical Contractor is to furnish and install all wiring required for the system specified.
   7. All exposed piping and nozzles of fire protection system shall be chrome or Stainless steel sleeved including manual pull station piping.
   8. Whenever possible coordinate with general contractor and fire suppression supplier and architect to run pull station piping recessed in wall. This will need to be completed during framing of wall.
   9. All horizontal piping is to be done on the top of the ventilator unless otherwise specified.
   10. Verify location of remote manual pull station.
   11. "Electrical contractor/ shunt trip breaker by EC
   12. 1 ea. Gas shut off valve (verify size & type).
   13. FEC to provide tag and testing documents at close out.

4.8 Item 8 - Shelving Units – One Lot (1 Lot) Required

A. Four tier Metro Model A----NK3 Super Adjustable Super Erecta® Shelf, wire, Metroseal 3 (corrosion-resistant) finish, corner release system, with Microban® antimicrobial protection, NSF.

B. Each shelving unit shall have four (4) Model 74PK3 Super Erecta® SiteSelect™ Post, 74-5/8"H, adjustable leveling bolt, posts are grooved at 1" increments & numbered at 2" increments, double grooved every 8", Metroseal 3™ epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection. Shelving shall be provided as shown on drawing (No “S” clips allowed),
   1. It shall be the responsibility of this contractor to verify and adjust shelving sizes to insure proper fit.

4.9 Item 9 - Spare Number

4.10 Item 10 -3 Compartment Sink – One (1) Required

A. Eagle Group Model FFN2754-3-24-14/3 Dimensions: 44.63(h) x 105.25(w) x 30.5(d)Spec-Master® Flush Front Sink, three compartment, 105-1/4"W x 30-1/2"D x 44-5/8"H overall size, 18"W x 27" front-to-back x 14" deep bowls, 24" drainboards on left & right, 10"H backsplash, (2) sets of splash mount faucet holes with 8" centers, includes (3) 3-1/2" basket drains, 14/304 stainless steel construction, stainless steel legs, crossrails, & adjustable bullet feet, NSF. Supply with the following:

1. 1 ea T&S Brass Model B-0133 EasyInstall Pre-Rinse Unit, wall mount mixing faucet with 8" adjustable centers, quarter-turn Eterna cartridges with spring checks, lever handles with color-coded indexes, 18" EasyInstall riser, 44" flexible stainless steel hose with heat-resistant gray handle & hold down ring, 1.15 GPM spray valve (B-0107), finger hook, polished chrome-plated brass faucet body, 1/2" NPT female inlets, CSA
2. 1 ea T&S Brass Model B-0109-01 Wall Bracket, 6"
3. 2 kt T&S Brass Model B-0230-K Installation Kit, (2) 1/2" NPT nipples, lock nuts & washers, (2) short "Ell" 1/2" NPT female x male
4. 1 ea T&S Brass Model 5AFL12 Equip Add-On Faucet, 14-7/16" long, standard, cerama cartridges, lever handle, laminar outlet, includes: 12-1/8" swivel nozzle, 3/8" male NPT, 3/8" female NPT, ADA Compliant (for pre-rinse units)
5. 1 ea T&S Brass Model B-0231 Sink Mixing Faucet, wall mount, 8" centers, 12" swing nozzle, lever handles, quarter-turn Eterna cartridges, 1/2" NPT female inlets, low lead, ADA Compliant

4.11 Item 11 – Hand Sink – One (1) Required

A. Advance Tabco Model 7-PS-62 Dimensions: 17.25(h) x 17.25(w) x 15.25(d) Hand Sink, wall mounted, 14" wide x 10" front-to-back x 5" deep bowl, Deep Drawn™ sink bowl, 20 gauge 304 stainless steel, splash mounted gooseneck faucet, knee valve, basket drain, keyhole wall mount bracket, NSF, cCSAus. Provide with the following:

1. 1 ea. Model 7-PS-10 P-trap, heavy duty, 1-1/2", 17 gauge
2. 1 ea. Model 7-PS-11 Welded Side Splash, 12"H (installed height), one side (specify side), for hand sinks with 14" wide x 10" front-to-back bowl, splash mounted faucets

4.12 Item 12 - 2 Door Freezer -(Existing Item #E – Relocate) – One (1)

4.13 Item 13 - 2 Door Refrigerator -(Existing Item #E – Relocate) – One (1)

4.14 Item 14 - One Door Refrigerator – One (1) Required

A. Continental Refrigerator Model 1RENSA Dimensions: 82.25(h) x 28.5(w) x 35.38(d)Extra-Wide Refrigerator, reach-in, 28-1/2"W, one-section, self-contained refrigeration, stainless steel exterior, aluminum interior, standard depth, full-height solid door, cylinder lock, electronic control with digital display, hi-low alarm, electric condensate evaporator, R290 Hydrocarbon refrigerant, 1/4 HP, cETLus, NSF, ENERGY STAR®. Provide with the following:

1. 1 ea. Standard warranty: 6-year parts and labor; additional 1-year compressor part

2. 1 ea. 115v/60/1-ph, 5.2 amps, cord, NEMA 5-15P, standard
3. 1 ea. Door hinged on right, standard
4. 1 ea. 5" Casters, standard

4.1 Item 15 - Warming Cabinet (Existing Item #E -Relocate) One (1)

4.2 Item 16 - Desk (Existing Item #E -Relocate) - One (1)

4.3 Item 17 - 12 Crate Milk Cooler– One (1) Required

A. Continental Refrigerator Model MC5NSSDCW Dimensions: 41.5(h) x 58(w) x 33(d)Milk Cooler, 58" long, dual access, cold wall cooling, (16) 13" x 13" x 11" or (10) 19" x 13" x 11" crate capacity, door cylinder security locks, electronic control with digital display, hi-low alarm, hi/low temperature alarm, stainless steel interior & exterior, floor drain, (4) 5" swivel casters with front locking brakes, R290 Hydrocarbon refrigerant, 1/3 HP, cETLus, NSF. Provide with the following:
   1. 1 ea. Standard warranty: 6-year parts and labor; additional 1-year compressor part
   2. 1 ea. 115v/60/1-ph, 5.6 amps, cord, NEMA 5-15P, standard
   3. Modify evaporator to allow loading from the rear.
   4. 1 ea. Custom finishes of laminate or powder coating FEC coordinate color selection with Architect

4.4 Item 18 – Spare Number

4.5 Item 19 – Mobile Utility Cart - One (1) Required

A. Piper Products/Servolift Eastern Model 6-UCS-3 Dimensions: 39.25(h) x 28(w) x 17.5(d)Utility/Delivery Cart, (3) shelf small, 600 lb. capacity, stainless steel construction, NSF. Supply with the following:
   1. I ea. 1-year warranty parts and labor

4.6 Item 20 - Breath Guard – One (1) Required

A. Premier Metal & Glass Model TM2S-A Per Drawing # 50427- 1" OD gearless adjustable food shield with top shelf, rear supports and slanted front support; 3/8" clear tempered glass with polished edges and radius corners; both end panels included (fixed); surface mounting option; no heat/light included; brushed stainless finish; approx. 60" cl length; approx. 164 lbs. ea. (2 end supports) Fully adjustable single tier to protect item 21

4.7 Item 21 - 4 Well Hot Food Unit – One (1) Required

A. Piper Products/Servolift Eastern Model 4-HF Per Drawing #7475 Dimensions: 36(h) x 60(w) x 28(d)Elite 500 Hot Food Unit, electric, 60"L x 36"H, (4) sealed wells with 1000w element with thermostatically controlled each, mobile, modular design with interlocking mechanism, 14 gauge stainless steel top, 20 gauge stainless steel front & end panels, 18 gauge stainless steel bottom shelf, manifold drains standard, 5" swivel plate casters (2 with brakes), 4kW, NSF, UL. Supply with the following:

1. 1 ea. 1-year warranty parts and labor
2. 1 ea. 208v/60/1-ph, 19.2 amps, 4000 watts, NEMA 6-30P
3. 1 ea. Manifold drains, standard
4. 1 ea. Model JC Unit to include 14-gauge stainless steel "J" channel cord chase to keep cords for interconnected wired units (IWU) off the floor
5. 1 ea. Model HD-60 Hinged doors for (4) openings Elite system
6. 1 ea. Model LD Locks, for doors for Elite system
7. 1 ea. Model FRMAD-60 Formica laminate with doors, for Elite systems
8. 1 ea. Model SCB-8-60 Cutting Board for Elite system, 8", for (4) openings - 60"W, stainless
9. 1 ea. Model SRTS-60 Tray slide for Elite system, 12" solid ribbed, heavy gauge stainless steel, for (4) openings - 60"W
10. 1 ea. Model ME Mitered end for tray slide for Elite system
11. 1 ea. Model TURN DOWN Modified turn down with special interlocks to connect 2 different height counters.
12. 1 ea. Model PG MOUNT Mounting of other manufacturer's sneeze guard.
13. ***ELECTRICAL TO EXIT OPERATOR RIGHT BACK LEG. ***
14. Item 20 Premier Metal & Glass protector guard to be provided by others and installed by Piper.

4.8 Item 22 - Breath Protector – One (1) Required

A. Premier Metal & Glass Model TMT2S-A – Per Drawing #50427 1" OD gearless adjustable two tier food shield with top shelf, rear supports and slanted front support; 3/8" clear tempered glass with polished edges and radius corners; both end panels included (fixed); surface mounting option; no heat/light included; brushed stainless finish; approx. 48" cl length; approx. 136 lbs. ea. (2 end supports) fully adjustable double tier to protect item 23
   1. FEC to ship to Piper for factory installation

4.9 Item 23 - Frost Top Unit – One (1) Required

A. Hatco Model FTB-2 Dimensions: 17.25(h) x 39(w) x 28.94(d)Drop-In Frost Top, 39"L, accommodates (2) full size sheet pans, lighted on/off rocker switch, electronic adjustable temperature control can be mounted to either side of condensing unit or remotely up to 4' from unit, auto-defrost, 1" NPT drain, self-contained refrigeration, R513a, 1/4 HP, cULus, Made in USA. Supply with the following:
   1. 1 ea. NOTE: Includes 24/7 parts & service assistance, call 414-671-6350
   2. 1 ea. One-year parts & labor warranty, standard
   3. 1 ea. CE mark not available
   4. 1 ea. 120v/60/1-ph, 300 watts, 3.8 amps, NEMA 5-15P, 1/5 HP (domestic voltage) standard
   5. FEC to ship to Piper for factory installation

4.10 Item 24 - Solid Top Unit – One (1) Required

A. Piper Products/Servolift Eastern Model 5-ST-MOD Per Drawing # 7475 Dimensions: 36(h) x

74(w) x 28(d)Elite Utility Serving Counter, 74"L x 36"H, mobile modular design with interlocking mech., 14 gauge stainless steel top, 20 gauge stainless steel front & end panels, 18 gauge stainless steel undershelf, 5" casters, NSF, MODIFIED TO 30"D. Provide with the following:

1. 1 ea. 1-year warranty parts and labor
2. 1 ea. "Petite Elite" 30" high in lieu of standard height
3. 1 ea. 120v/60/1-ph, 3.8 amps, NEMA 5-15P
4. 1 ea. Model SOUT Single Outlet, NEMA 5-15R FOR ITEM 23 HATCO FTB-2, 120/, 3.8 AMPS
5. 1 ea. Model JC Unit to include 14-gauge stainless steel "J" channel cord chase to keep cords for interconnected wired units (IWU) off the floor
6. 1 ea. Model FLP Filler Strips, for Elite systems
7. 1 ea. Model HD-74 Hinged doors for (5) openings Elite system
8. 1 ea. Model LD Locks, for doors for Elite system
9. 1 ea. Model FRMAD-74 Formica laminate with doors, for Elite systems FEC to coordinate color selections with Architect
10. 1 ea. Model SRTS-74 Tray slide for Elite system, 12" solid ribbed, heavy gauge stainless steel, for (5) openings - 74"W
11. 1 ea. Model INSTALL PACKAGE INSTALL PACKAGE - to include cut-out in the counter top, install for the drop-in provided by others, electrical hook-up, reinforced top, and louvered panels if required. ***Drop-in to be provided by FEC.***
12. Item 23 Hatco FTB-2 to be provided by others and installed by Piper.
13. 1 ea. Model PG MOUNT Mounting of other manufacturer's sneeze guard.
14. ***ELECTRICAL TO EXIT OPERATOR RIGHT BACK LEG. ***
15. Item 22 Premier Metal & Glass protector guard to be provided by others and installed by Piper.

4.11 Item 25 - Solid Top Unit - One (1) Required

A. Piper Products/Servolift Eastern Model 2-ST Per Drawing 7475 Dimensions: 36(h) x 32(w) x 28(d)Elite Utility Serving Counter, 32"L x 36"H, mobile modular design with interlocking mech., 14 gauge stainless steel top, 20 gauge stainless steel front & end panels, 18 gauge stainless steel undershelf, 5" casters, NSF. Provide with the following:

1. 1 ea. 1-year warranty parts and labor
2. 1 ea. "Petite Elite" 30" high in lieu of standard height
3. 1 ea. Model JC Unit to include 14-gauge stainless steel "J" channel cord chase to keep cords for interconnected wired units (IWU) off the floor
4. 1 ea. Model FLP Filler Strips, for Elite systems
5. 1 ea. Model HD-32 Hinged doors for (2) openings Elite system
6. 1 ea. Model LD Locks, for doors for Elite system
7. 1 ea. Model FRMAD-32 Formica laminate with doors, for Elite systems. FEC to coordinate color selections with Architect
8. 1 ea. Model SRTS-32 Tray slide for Elite system, 12" solid ribbed, heavy gauge stainless steel, for (2) openings - 32"W

4.12 Item 26 - Cashiers Station – One (1) Required

A. Piper Products/Servolift Eastern Model 2-CD Per Drawing #7475 Dimensions: 36(h) x 30(w) x 28(d)Elite Cashier's Serving Counter, 30"L x 36"H, mobile modular design with interlocking mech., 14 gauge stainless steel top with register cord hole, locking drawer, 20 gauge stainless steel front & end panels, 5" casters. Provide with the following:
   1. 1 ea. 1-year warranty parts and labor
   2. 1 ea. 120v/60/1-ph, 12 amps, NEMA 5-15P
   3. 1 ea. Model DOUT Duplex Outlet, 120V for Elite system
   4. 1 ea. Model JC Unit to include 14-gauge stainless steel "J" channel cord chase to keep cords for interconnected wired units (IWU) off the floor
   5. 1 ea. Model FLP Filler Strips, for Elite systems
   6. 1 ea. Model TFR Tubular foot rest-cashier unit, Elite systems
   7. 1 ea. Model FRMA-30 Formica laminate without doors, for Elite systems. FEC to coordinate color selections with Architect
   8. 1 ea. Model SRTS-30 Tray slide for Elite system, 12" solid ribbed, heavy gauge stainless steel, for (2) openings - 30"W
   9. 1 ea. Model TURN DOWN Modified turn down with special interlocks to connect 2 different height counters.

4.13 Existing Equipment

A. It is the responsibility of this contractor to fully remove all existing foodservice equipment from the existing Kitchen (Refer to sheet FS100), this includes walk-in cooler/freezer & refrigeration systems (electric, plumbing & HVAC disconnections by related trades). Refer to 3.3 of this specification for existing equipment requirements.

4.14 Reused Existing Equipment:

A. This Kitchen Equipment Contractor (KEC) shall be responsible for identifying, tagging and/or removing all existing equipment, which will be reused. Verify and coordinate specific equipment with these plans and specifications, and the Owner. This shall include items existing, and the associated work necessary, at the time of the signing of the Contract for the Foodservice Equipment section; and shall not include any item(s) added, changed, or damaged (by other than the Kitchen Equipment Contractor (KEC)) after the signing; except to the extent of work which would have been included with the original existing item(s).

B. Remove from existing locations, clean and renovate as noted below, store and re-install existing equipment to be reused, in the new locations as shown on plans; ready for utility connections, as appropriate. Existing equipment to be reused, with utility connections, shall be removed after disconnection as noted in below paragraph.

C. Do work in cooperation with Owner, so that normal functioning of services is minimally interrupted. Coordinate all removal and replacement scheduling with the Construction Scheduling Manager (or similar responsible party), to ensure adequate time to complete the necessary work. If adequate time to properly relocate and reset the existing items and

complete all cleaning and repair will not be available, due to continuing use of the existing item(s), or the allotted construction time; contact the Owner and obtain a written agreement as to what work is to be deleted or delayed; such as cleaning, repainting, or repairs.

D. All surface dirt, grease, oil, food residues, ingredients, extraneous matter and other soiling materials shall be removed in order to obtain minimum acceptable sanitation and food service standards. Thorough final rinsing of all cleaning agents shall be at a minimum temperature of 180 degrees F where possible without damage to equipment or controls. Otherwise, use USDA approved cleaning agents and/or cleaning agents, which are acceptable for use with commercial food service equipment. This shall include all exterior surfaces of the existing equipment to be reused, and interior work surfaces such as inside oven compartments, fryer vats, ware washers, etc.

E. All painted items with major paint blemishes shall be sanded, primed, and repainted to match the original color and type paint. Primer and paint shall be of a type approved for use with commercial food service equipment. All controls, lights, view windows, non-painted parts, etc. shall be protected as recommended by the Manufacturer. Minor paint blemishes shall be touched-up in a professional manner. This work shall be included in the Bid Submittal, as a separate line cost, at the end of the Bid Submittal.

F. Replace or repair minor broken parts to produce a cleanable and functional item, where possible. Repairs and/or parts shall be for minor required items such as control knobs, handles, pilot lamps, belts, oil changes, minor adjustments and recalibrations, etc. This shall not include addition or replacement of any wearing components such as cutters, blades, etc.; or any accessory components such as mixer beaters, hooks, whips, etc., except for presently existing accessory components which are broken and nonfunctional, or as noted in the itemized specifications.

4.15 Existing Conditions:

A. It is the responsibility of this contractor to fully review the existing conditions of the building and the new kitchen. This contractor shall be familiar with access to the kitchen location, including equipment access by elevators, stairwells, corridors, openings, including access around the exterior of the building for a crane or hoisting equipment (if required). It will be the responsibility of this contractor to coordinate equipment installation with the owner, CM, GC, etc.…

4.16 Plumbing of Equipment

A. The plumbing and food service equipment contractors are to comply with 1370-a and 1110, Subpart 67-4 of Title 10 (Health) of the Official Compilation of Codes, Rules and Regulations of

the State of New York. All outlet fixtures used for drinking or cooking shall be tested by Owner prior to being put into service. All test results in exceedance of the action level shall require the fixture to be replaced until satisfactory test results are obtained at no additional cost to Owner."

PART 5 - DETAILS OF CONSTRUCTION

5.1 DETAIL DRAWINGS

A. The following details are a part of these specifications and shall be referred to for additional design requirements: FS100, FS101, FS102, FS103, FS104 & FS105

END OF SECTION 11 40 00

SECTION 11 6623
GYMNASIUM EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Basketball backboards, goals, and support framing.

B. Floor sleeves for net and goal posts.

C. Wall mounted protection pads.

D. Volleyball nets and posts.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Concrete floor slab to receive floor sleeves and anchors.

B. Section 05 1200 - Structural Steel Framing: Structural members supporting basketball systems.

C. Section 05 5000 - Metal Fabrications: Secondary structural members supporting gymnasium equipment.

D. Section 09 6566 - Resilient Athletic Flooring: Gymnasium flooring.

E. Section 26 0583 - Wiring Connections.

1.03 REFERENCE STANDARDS

A. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).

B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Large Components: Ensure that large components can be moved into final position without damage to other construction.

B. Electrically Operated Equipment: Coordinate location and electrical characteristics of service connection.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's data showing configuration, sizes, materials, finishes, hardware, and accessories; include:
   1. Electrical characteristics and connection locations.
   2. Manufacturer's installation instructions.

C. Shop Drawings: For custom fabricated equipment indicate, in large scale detail, construction methods; method of attachment or installation; type and gauge of metal, hardware, and fittings; plan front elevation; elevations and dimensions; minimum one cross section; utility requirements as to types, sizes, and locations.

D. Erection Drawings: Detailed dimensional requirements for proper location of equipment.

E. Samples: Submit samples of pad coverings in manufacturer's available range of colors.

F. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified with minimum 5 years of experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to project site in manufacturer's original packaging with factory original labels attached.

B. Store products indoors and elevated above floor; prevent warping, twisting, or sagging.

C. Store products in accordance with manufacturer's instructions; protect from extremes of weather, temperature, moisture, and other damage.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide 25 year manufacturer warranty for basketball backstop structure.
   1. Lifetime warranty against breakage for backboards installed with goal brace.
   2. 8 year warranty for bolt-on safety edge padding.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. See drawings for sizes and locations, unless noted otherwise.

B. Provide mounting plates, brackets, and anchors of sufficient size and strength to securely attach equipment to building structure; comply with requirements of Contract Documents.

C. Hardware: Heavy duty steel hardware, as recommended by manufacturer.

D. Electrical Wiring and Components: Comply with NFPA 70; provide UL-listed equipment.

E. Structural Steel Fabrications: Welded in accordance with AWS D1.1/D1.1M, using certified welders.

2.02 BASKETBALL

A. Basketball System: Backstop assembly, backboard, and goal.

B. Wall-Mounted Backstop Assemblies: Wall-mounted steel frame assembly capable of mounting rectangular shaped backboards.
   1. Distance of Backboard From Wall: adjustable.
   2. Framing: Stationary framing.
   3. Support framework: Backstop mounted to wall at four fixed points with two welded, adjustable, rectangular side frames constructed from 2-1/2 inches diameter, 13 gage outer tube and 2-1/4 inches diameter, 14 gage inner tube.
   4. Extension adjustment: Plus or minus 6 inches.
   5. Wall anchor plates: 1/4 inch thick steel plates.
   6. Cross braces: 1-1/2 inches diameter, 11 gage steel tubes.
   7. Diagonal support chains: Two 1/4 inch welded link chains with leveling turnbuckles.
   8. Framing Color: As selected from manufacturer's standard selection.
   9. Manufacturers:
      a. Draper, Inc.; SW Stationary Wall Mounted Basketball Backstop.
      b. Substitutions: See Section 01 6000 - Product Requirements.
   10. Backboards: Wall Mounted - fan shaped.
      a. Type: Fan shaped, fiberglass, official size backboard; Model 503148 as manufactured by Draper, Inc.
      b. Overall size: 54 inches wide by 39 inches high by 1-1/2 inches thick.
      c. Construction: Molded from fiberglass. Backboard has structural ribs and a heavy outer flange to provide maximum rigidity. Backboard is completely weatherproof for indoor or outdoor use in all climates. Backboard has eight (8) 3/8"-16 x 1" deep molded in threaded steel inserts that are located for standard fan backboard (20" h x 35" w) mounting. Factory drilled goal mounting holes (4) will accept standard 5" (horizontal) x 5" (vertical) goal mounting.

d. Finish: Factory applied, white, high gloss gel finish with permanently silk screened orange border and target lines.

C. Ceiling-Suspended Backstop Assemblies: Capable of mounting both rectangular and fan-shaped backboards.
1. Framing: Center strut; side folding framing.
2. Height Adjuster: Raises or lowers assembly by 2 feet to adjust goal height.
a. Height Control System: Electric hoist that adjusts backstop with 115 volt actuator, and integral limit switches that provide automatic shut-off in both positions.
3. Framing Color: As selected from manufacturer's standard selection.
4. Manufacturers:
a. Draper, Inc; EZ Fold TB-26-B Ceiling Suspended, Side-Folding: www.draperinc.com/#sle.
b. Substitutions: See Section 01 6000 - Product Requirements.
5. Backboards: Ceiling Mounted - Tempered glass, rectangular shaped.
a. Frame: Brushed aluminum edge, steel mounting, with mitered corners. Provide steel gusset type mounting corner brackets with slots for mounting backboard to support structure.
b. Dimensions: 42 inches high by 72 inches wide
c. Thickness: 1/2 inches.
d. Markings: Permanently etch official white boarder and target area on front side of glass.
e. Provide safety padding for bottom edge of backboard.
f. Color: As selected from manufacturer's standard selection.
g. Height Adjuster:
1) Type: Mechanism for electrically adjusting height of rectangular backboard and goal.; Model 503095 Height Adjuster as manufactured by Draper, Inc.
6. Safety Edge Padding:
a. Type: Foam padding for bottom edge and corners of backboard to provide safety protection to meet NCAA and NFHS requirements; Model 5032XX Safe-Edge Padding as manufactured by Draper, Inc.
b. Construction: Molded foam, 2 inches wide and wrapping around edges 3/4 inch. Equip with molded-in steel track and bolt-on attachment system. Padding shall cover bottom edge of backboard and extend 15 inches up sides.
c. Color: As selected from manufacturers full range of colors.
7. Electric Winch:
a. Provide for each folding basketball backstop separate electric winch mechanism.
b. Type: Fully enclosed, direct drive, worm gear, electric winch designed to hold backstop at any position during raising and lowering; Model 503285 Motorized Winch as manufactured by Draper, Inc.
1) Motor: 3/4 HP, 11.5 AMP, capacitor type, 60 cycle, 115 volt, single phase with automatic thermal overload protection manufactured in compliance with NEMA specifications.
2) Hoist cable: 1/4 inch diameter, 7 by 19, galvanized aircraft cable with 7,000 pounds ultimate breaking strength.
3) Roller: Spring-load providing tensioning pressure to ensure cable tracks evenly on grooved drum.
4) Limit switches: Rotary counting up and down type, pre-wired to motor as integral part of winch.
c. Controls: Provide key lock, 3 position, momentary contact wall control switch to lower, raise, and stop backstop.
d. Provide two keys.
e. Provide with stainless steel cover plate.

D. Goals: Steel rim, mounted to backboard, with attached nylon net; complete with mounting hardware. Provide with holes and studs to secure backboard and goal directly to goal brace. Front plate provided with holes for goal attachment.
   1. Net Attachment Device: Tube-tie.
   2. Finish: Powder coat orange.
   3. Type: Breakaway goal with standard no-tie net attachment and designed to withstand shock loads from player slam dunking or hanging on rim
   4. Rim shall deflect down when 230 pounds static load is applied and return to playing position when load is removed. Breakaway point shall be adjustable from 160 to 230 pounds.
   5. Ring shall have rebound characteristics identical to those of non-moveable ring. Factory set proper flex and rebound requirements. Goal features easy-adjsut system to allow users to adjust the breakaway point form 160 pounds to 230 lbs.
   6. Ring: Fabricated from 5/8 inch diameter steel rod formed into 18 inches ring. Rigidly brace with die cut steel braces welded to rim.
   7. Mounting plate: Heavy duty steel plate bracket with mounting holes and designed to position inside of ring 6 inches from backboard.
   8. Rim shall be provided with 12 formed wire “no-tie” net attachment clips on which the net securely hooks.
   9. Anti-whip net: Top half made of durable fibers encased in nylon to prevent net from whipping up on rim. Lower half all nylon. Color white.
   10. Mounting hardware: Zinc plated.
   11. Model: 503581 Breakaway goal with standard no-tie net attachment as manufactured by Draper, Inc.

2.03 FLOOR-MOUNTED EQUIPMENT

A. Volley Ball Nets and Posts: One court system of adjustable posts, net, and tensioning winch meeting requirements for FIVB, USA Volleyball, NCAA and NFHS competition requirements.
   1. Posts:
      a. Types: Telescoping standards fabricated from Schedule 80 aluminum upper tube and 11-gauge steel bottom tube and capable of adjusting from 73 inches to 100 inches in 1 inch increments to meet all age group height settings.
         1) Standard SVS-01 500021 as manufactured by Draper, Inc.: Pair of standards, one with tensioning winch and other with adjustable cable anchoring collar. Both standards equipped with single pulley sheave on upper telescoping tube section.
         2) Center Standard System 500022: 3 Post system, center standard equipped with two pulley sheaves on upper telescoping tube section spaced to accommodate two opposing net cables. Provide adjustable cable anchor collar to accommodate two nets.
      b. Bottom tube section: 3-1/2 inches diameter with 11 gauge steel, 0.120 inch wall thickness, 72 inches high. Bottom provided with rubber foot to protect floors.
      c. Upper telescoping tube section: 2-7/8 inches diameter with 0.28 inch wall thickness.
      d. Pulley sheaves: 4 inches diameter pulley and oilite bushing attached to top of upper telescoping tube.
      e. Tensioning winch: Heavy-duty, self-locking worm-gear mechanism.
         1) Position winch on outside of bottom tube.
         2) Equip winch with [2 inches] [51 mm] wide, high tensile nylon strap with sling ring and spring-hook for connection to net cable.
      f. Winch operated by folding handle.
   2. Net: 4 inch square #36 nylon cord with vinyl coated polyester hem, double stitched around the perimeter.
      a. Size: 32 feet long by 39-3/8 inches high.
      b. Provide double stitched, vinyl coated polyester hem around perimeter of net. At net ends, provide hem with pocket containing 1/2 inch diameter fiberglass dowel.

c. Net cable: 1/8 inch diameter, 2000 pounds minimum breaking strength, galvanized aircraft cable with nylon coating. Equip ends with loops formed with heavy swaged type fittings. Run cable through top hem.
d. Rope tensioner: Provide bottom hem with 1/4 inch braided nylon rope and ratchet style tensioner.
e. Provide each net end with three 1 inch wide polypropylene tension straps with buckles for tightening net.

3. Tensioning Winch: Manual crank heavy duty, self-locking worm gear mechanism.

B. Floor Sleeves for Posts: Metal sleeve welded to steel anchor plate for casting in concrete floor to receive volleyball standard, with latch cover, cast into concrete subfloor to hold poles for nets and goals; installed flush with finish floor surface.
1. Basis of Design: Floor Sleeve 501006 as manufactured by Draper, Inc.
2. Latch Cover: Brass, round; tamper resistant lock with key.
a. Opening diameter: 4-1/8 inches.
3. Sleeve: Steel.
4. Size: 3-1/2 inches inside diameter by 8-1/2 inches tube and 4 inches square anchor plate.

2.04 WALL PADDING

A. Wall Padding: Foam filling bonded to backing board, wrapped in covering; each panel fabricated in one piece.
1. Covering: Vinyl-coated polyester fabric, mildew and rot resistant; stapled to back of board.
a. Color: As selected from manufacturer's standard range.
b. Texture: Embossed leather-look.
c. Fabric Weight: 14 oz/sq yd, minimum.
d. Breaking strength: 350 PSI.
e. Tear resistance: 65 pounds.
f. Resistant to rot, mildew, and ultraviolet light.
2. Foam: Soft, urethane or polyurethane, with 3.5 pcf nominal density.
3. Foam Thickness: 2 inches.
4. Backing Board: Plywood.
5. Manufacturers:
a. Draper, Inc; EcoVision Wall Pad: www.draperinc.com/#sle.
b. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Take field measurements to ensure proper fitting of work. If taking field measurements before fabrication will delay work, allow for adjustments within recommended tolerances.

B. Inspect areas and conditions before installation, and notify Architect in writing of unsatisfactory or detrimental conditions.

C. Do not proceed with this work until conditions have been corrected; commencing installation constitutes acceptance of work site conditions.

D. Verify that electrical services are correctly located and have proper characteristics.

3.02 INSTALLATION

A. Install in accordance with Contract Documents and manufacturer's instructions.

B. Coordinate installation of inserts and anchors that must be built in to flooring or subflooring.

C. Install equipment rigid, straight, plumb, and level.

D. Secure equipment with manufacturer's recommended anchoring devices.

E. Install wall padding securely, with edges tight to wall and without wrinkles in fabric covering.

F. Separate dissimilar metals to prevent electrolytic corrosion.

3.03 ADJUSTING

A. Verify proper placement of equipment.

B. Verify proper placement of equipment anchors and sleeves, and use actual movable equipment to be anchored if available.

C. Adjust operating equipment for proper operation; remove and replace equipment causing noise or vibration; lubricate equipment as recommended by manufacturer.

3.04 CLEANING

A. Remove masking or protective covering from finished surfaces.

B. Clean equipment in accordance with manufacturer's recommendations.

3.05 PROTECTION

A. Protect installed products until Date of Substantial Completion.

B. Replace damaged products before Date of Substantial Completion.

3.06 DEMONSTRATION

A. Demonstrate to Owner's designated representative complete operation and required maintenance for folding basketball backstops.

B. Submit operation and maintenance manuals in accordance with Section 01 7800 - Closeout Procedures.

END OF SECTION

SECTION 12 2400
WINDOW SHADES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior manual roller shades.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Concealed wood blocking for attachment of headrail brackets.

1.03 REFERENCE STANDARDS

A. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).

B. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films; 2023, with Errata.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Sequencing:
   1. Do not fabricate shades until field dimensions for each opening have been taken with field conditions in place.
   2. Do not install shades until final surface finishes and painting are complete.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets, including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.

C. Shop Drawings: Include shade schedule indicating size, location and keys to details, head, jamb and sill details, mounting dimension requirements for each product and condition, and operation direction.

D. Verification Samples: Minimum size 6 inches square, representing actual materials, color and pattern.

E. Operation and Maintenance Data: List of all components with part numbers, sources of supply, and operation and maintenance instructions; include copy of shop drawings.

F. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.

B. Installer Qualifications: Company specializing in performing work of this type with minimum 5 years of documented experience with shading systems of similar size and type.
   1. Manufacturer's authorized representative.
   2. Factory training and demonstrated experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in manufacturer's unopened packaging, labeled to identify each shade for each opening.

B. Handle and store shades in accordance with manufacturer's recommendations.

1.08 FIELD CONDITIONS

A. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Interior Manually Operated Roller Shades:
   1. Draper, Inc; Clutch Operated FlexShade: www.draperinc.com/#sle.
   2. Hunter Douglas Architectural; RB500 Manual Roller Shades: www.hunterdouglasarchitectural.com/#sle.
   3. MechoShade Systems LLC; Mecho/7 System: www.mechoshade.com/#sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ROLLER SHADES

A. General:
   1. Provide shade system components that are easy to remove or adjust without removal of mounted shade brackets.
   2. Provide shade system that operates smoothly when shades are raised or lowered.

B. Interior Roller Shades Type RS-1 - Basis of Design: Draper, Inc; Clutch Operated FlexShade: www.draperinc.com/#sle.
   1. Description: Single roller, manually operated fabric window shade system complete with mounting brackets, roller tubes, hembars, hardware, and other components necessary for complete installation.
      a. Drop Position: Regular roll.
      b. Mounting: Wall mounted.
      c. Size: As indicated on drawings.
      d. Fabric: As indicated under Shade Fabric article.
   2. Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
   3. Roller Tubes: As required for type of shade operation; designed for removal without removing mounting hardware.
      a. Material: Extruded aluminum or steel, with wall thickness and material selected by manufacturer.
      b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
   4. Hembars: Designed to maintain bottom of shade straight and flat, selected from manufacturer's standard options.
   5. Manual Operation:
      a. Clutch Operator: Manufacturer's standard material and design, permanently lubricated.
      b. Drive Chain: Continuous loop stainless steel beaded ball chain, 95 lb minimum breaking strength. Provide upper and lower limit stops.
      c. Chain Retainer:
         1) Manufacturer's standard clip.
   6. Accessories:
      a. Fascia: Extruded aluminum, size as required to conceal shade mounting, attachable to mounting end caps, without exposed fasteners; clear anodized finish.
         1) Color: TBD.
      b. End Cap Covers: Match fascia or headbox finish.
      c. Fasteners: Noncorrosive, and as recommended by shade manufacturer.

C. Interior Roller Shades Type RS-2 - Basis of Design: Draper, Inc; Manual LightBloc FlexShade: www.draperinc.com/#sle.
   1. Description: Single roller, manually operated fabric window shade system complete with mounting brackets, roller tubes, hembars, hardware, and other components necessary for complete installation.
      a. Mounting: Wall mounted.
      b. Roll Direction: Roll down, closed position is at window sill.

c. Size: As indicated on drawings.
d. Fabric: As indicated under Shade Fabric article.

2. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
3. Roller Tubes: As required for type of shade operation; designed for removal without removing mounting hardware.
   a. Material: Extruded aluminum or steel, with wall thickness and material selected by manufacturer.
   b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
4. Hembars: Designed to maintain bottom of shade straight and flat, selected from manufacturer's standard options.
   a. Style: Closed pocket; aluminum elliptical slat inside pocket with heat-sealed ends.
   b. Room-Darkening Shades: Provide a slot in bottom bar with wool-pile light seal.
5. Manual Operation:
   a. Clutch Operator: Manufacturer's standard material and design, permanently lubricated.
   b. Drive Chain: Continuous loop stainless steel beaded ball chain, 95 lb minimum breaking strength. Provide upper and lower limit stops.
   c. Shade Lift Assistance: Manufacturer's standard spring device contained in the idler end of roller tube to reduce force required to lift shades; as required based on shade weight.
   d. Chain Retainer:
      1) Manufacturer's standard clip.

2.03 SHADE FABRIC

A. Fabric - Type RS-1: Light-Filtering Shades: Nonflammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation.
   1. Manufacturers:
      a. Phifer, Inc; Style 2410 3%: www.phifer.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.
   2. Material Certificates and Product Disclosures:
   3. Performance Requirements:
      a. Flammability: Pass NFPA 701 large and small tests.
      b. Fungal Resistance: No growth when tested according to ASTM G21.
   4. Openness Factor: 3%.
   5. Weight: 14.1 ounces per square yard.
   6. Roll Width: As required.
   7. Color: As selected by Architect from manufacturer’s full range of colors.

B. Fabric- Type RS-2: Room Darkening Shades: Non-flammabel, color-fast, impervious to heat and moisture and able to retain its shape under notmal operation.
   1. Manufacturers:
      a. Phifer, Inc. SB9100, www.phifer.com/#sle.
      b. Substitutions: See Section 01 6000- Product Requirements.
   2. Material: Vinyl-Coated Fiberglas.
   3. Performance Requirements:
      a. Flammability: Passes NFPA 701 large and small tests.
      b. Fungal Resistance: No growth when tested according to ASTM G21.
      c. UV Blockage: 97%.
   4. Openness Factor 0%.
   5. Weight: 12 oz. per square yard.
   6. Roll Width: as required.
   7. Color: Manufacturer's standard color range- TBD.

3.01 ROLLER SHADE FABRICATION

A. Field measure finished openings prior to ordering or fabrication.

B. Dimensional Tolerances: Fabricate shades to fit openings within specified tolerances.
   1. Vertical Dimensions: Fill openings from head to sill with 1/2 inch space between bottom bar and window stool.
   2. Horizontal Dimensions - Inside Mounting: Fill openings from jamb to jamb.

C. Dimensional Tolerances: As recommended in writing by manufacturer.

D. At openings requiring continuous multiple shade units with separate rollers, locate roller joints at window mullion centers; butt rollers end-to-end.

PART 3 EXECUTION

4.01 EXAMINATION

A. Examine finished openings for deficiencies that may preclude satisfactory installation.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Start of installation shall be considered acceptance of substrates.

4.02 PREPARATION

A. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under the project conditions.

B. Coordinate with window installation and placement of concealed blocking to support shades.

4.03 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved shop drawings, using mounting devices as indicated.

B. Adjust level, projection, and shade centering from mounting bracket. Verify there is no telescoping of shade fabric. Ensure smooth shade operation.

4.04 CLEANING

A. Clean soiled shades and exposed components as recommended by manufacturer.

B. Replace shades that cannot be cleaned to "like new" condition.

4.05 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

4.06 PROTECTION

A. Protect installed products from subsequent construction operations.

B. Touch-up, repair, or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 12 3200
MANUFACTURED WOOD CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Manufactured standard and custom plastic laminate casework, with cabinet hardware.

B. Countertops.

1.02 RELATED REQUIREMENTS

A. Section 01 6000 - Product Requirements: Requirements for sustainably harvested wood.

B. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions: VOC limitations for adhesives and sealants.

C. Section 06 1000 - Rough Carpentry: Blocking and nailers for anchoring casework.

D. Section 09 2116 - Gypsum Board Assemblies: Reinforcements in metal-framed partitions for anchoring casework.

E. Section 09 6500 - Resilient Flooring: Resilient wall base.

F. Section 12 3600 - Countertops: Additional requirements for countertops.

1.03 DEFINITIONS

A. Exposed: Portions of casework visible when drawers and cabinet doors are closed, including end panels, bottoms of cases more than 42 inches above finished floor, tops of cases less than 72 inches above finished floor and all members visible in open cases or behind glass doors.

B. Semi-Exposed: Portions of casework and surfaces behind solid doors, tops of cases more than 72 inches above finished floor and bottoms of cabinets more than 30 inches but less than 42 inches above finished floor.

C. Concealed: Sleepers, web frames, dust panels and other surfaces not generally visible after installation and cabinets less than 30 inches above finished floor.

1.04 REFERENCE STANDARDS

A. AWI (QCP) - Quality Certification Program; Current Edition.

B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).

C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.

D. BHMA A156.9 - Cabinet Hardware; 2020.

E. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Component dimensions, configurations, construction details, joint details, attachments.

C. Shop Drawings: Indicate casework types, sizes, and locations, using large scale plans, elevations, and cross sections. Include rough-in and anchors and reinforcements, placement dimensions and tolerances, clearances required, and keying information.

D. Samples for Finish Selection: Fully finished, for color selection. Minimum sample size: 2 inches by 3 inches.
   1. Plastic laminate samples, for color, texture, and finish selection.

E. Casework Samples: Representative of types in the project.

F. Manufacturer's Installation Instructions.

G. Manufacturer's Qualification Statement.

H. Installer's Qualification Statement.

I. Maintenance Data: Manufacturer's recommendations for care and cleaning.

J. Finish touch-up kit for each type and color of materials provided.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

B. Quality Certification: Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section.
   1. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
   2. Provide designated labels on shop drawings as required by certification program.
   3. Provide designated labels on installed products as required by certification program.
   4. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.
   5. Replace, repair, or rework all work for which certification is refused.

C. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience and approved by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect items provided by this section, including finished surfaces and hardware items during handling and installation. For metal surfaces, use polyethylene film or other protective material standard with the manufacturer.

B. Acceptance at Site:
   1. Do not deliver or install casework until the conditions specified under Part 3, Examination Article of this section have been met. Products delivered to sites that are not enclosed and/or improperly conditioned will not be accepted if warping or damage due to unsatisfactory conditions occurs.

C. Storage:
   1. Store casework in the area of installation. If necessary, prior to installation, temporarily store in another area, meeting the environmental requirements specified under Part 3, "Site Verification of Conditions" Article of this section.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion, at no additional cost to Owner. Defects include, but are not limited to:
   1. Ruptured, cracked, or stained finish coating.
   2. Discoloration or lack of finish integrity.
   3. Cracking or peeling of finish.
   4. Delamination of components.
   5. Failure of adhesives.
   6. Failure of hardware.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Plastic Laminate Casework:
   1. Basis of Design: Case Systems: www.casesystems.com/#sle.
   2. Substitutions: See Section 01 6000 - Product Requirements.

B. Obtain casework from single source and manufacturer, unless otherwise indicated.

2.02 CASEWORK, GENERAL

A. Quality Standard: AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

B. Types: More than one type is required. See drawings for location of each type of casework.

C. Plastic Laminate Faced Cabinets: Custom Grade.

2.03 FABRICATION

A. Assembly: Shop assemble casework items for delivery to site in units easily handled and to permit passage through building openings.

B. Construction: As required for selected grade.

C. Structural Performance: Safely support the following minimum loads:
   1. Base Units: 500 pounds per linear foot across the cabinet ends.
   2. Suspended Units: 300 pounds static load.
   3. Drawers: 125 pounds, minimum.
   4. Hanging Wall Cases: 300 pounds.
   5. Shelves: 100 pounds, minimum.

D. Fittings and Fixture Locations: Cut and drill components for fittings and fixtures.

E. Hardware Application: Factory-machine casework members for hardware that is not surface applied.

F. Access Panels: Where indicated, for maintenance of utility service and mechanical and electrical components.

G. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.

H. Scribes and Fillers: Panels of matching construction and finish, for locations where cabinets do not fit tight to adjacent construction.

I. Countertop Panel-Type Supports: Materials similar to adjacent casework, 1-1/2 inch in width, with front-to-back and toe space dimensions matching base cabinet. Designed to be secured in a concealed fashion to countertop material. Include two leveling devices per support panel.

2.04 PLASTIC-LAMINATE-CLAD CASEWORK

A. Plastic-Laminate-Clad Casework: Solid wood and wood panel construction; each unit self-contained and not dependent on adjacent units or building structure for rigidity; in sizes necessary to avoid field cutting except for scribes and filler panels. Include adjustable levelers for base cabinets.
   1. Style: Flush overlay. Ease doors and drawer fronts slightly at edges.
   2. Cabinet Nominal Dimensions: Unless otherwise indicated, provide cabinets of widths and heights indicated on drawings, and with following front-to-back dimensions:
      a. Base Cabinets: 24 inches.
      b. Tall Cabinets: 24 inches.
      c. Wall Cabinets: 16 inches.
   3. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline.
      a. Finish: Matte or suede, gloss rating of 5 to 20.
      b. Surface Color and Pattern: As selected by Architect from manufacturer's full line.
      c. Exposed Interior Surfaces: Thermally fused laminate.
         1) Color: White.
      d. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
      e. Cap exposed plastic laminate finish edges with material of same finish and pattern.

2.05 COUNTERTOPS

A. Countertops: See Section 12 3600.

2.06 CABINET HARDWARE

A. Manufacturer's standard types, styles and finishes.

B. Comply with BHMA A156.9 requirements.

C. Shelves in Cabinets:
   1. Shelf Standards and Rests: Vertical standards with rubber button fitted rests, satin chromium plated over nickel on base material.

D. Swinging Doors: Hinges, pulls, and catches.
   1. Hinges: Concealed, number as required by referenced standards for width, height, and weight of door.
      a. Concealed Hinges: Installed in cabinet edge, and on door back, bright chromium plated over nickel on base material.
   2. Pulls: Chrome wire pulls, 4 inches wide.
   3. Catches: Magnetic.

E. Drawers: Pulls and slides.
   1. Pulls: Chrome wire pulls, 4 inches wide.
   2. Slides: Steel, full extension arms, ball bearings; self-closing; capacity as recommended by manufacturer for drawer height and width.

2.07 MATERIALS

A. Adhesives Used for Assembly: Comply with VOC requirements for adhesives and sealants; see Section 01 6116.

B. Wood-Based Materials:
   1. Solid Wood: Air-dried to 4.5 percent moisture content, then tempered to 6 percent moisture content before use.
   2. Composite Wood Panels: Containing no urea-formaldehyde resin binders.

C. Concealed Solid Wood or Plywood: Any species and without defects affecting strength or utility.

D. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications. complying with Grade requirements, and standard with the manufacturer.

E. Thermally Fused Laminate (TFL): Melamine resin, NEMA LD 3, Type VGL laminate panels.

2.08 ACCESSORIES

A. Plastic Edge Banding: Extruded PVC, flat shaped; smooth finish; self locking serrated tongue; of width to match component thickness.
   1. Color: As selected by Architect from manufacturer's standard range.
   2. Use at exposed edges.
   3. Use at exposed shelf edges.

B. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.

C. Concealed Joint Fasteners: Corrosion-resistant, standard with manufacturer.

D. Grommets: Standard plastic, painted metal, or rubber grommets for cut-outs, in color to match adjacent surface.

E. Sealant for Use in Casework Installation:
   1. Manufacturer's recommended type.

PART 3 EXECUTION

3.01 PREPARATION

A. Large Components: Ensure that large components can be moved into final position without damage to other construction.

3.02 EXAMINATION

A. Site Verification of Environmental Conditions:
   1. Do not deliver casework until the following conditions have been met:
      a. Building has been enclosed (windows and doors sealed and weather-tight).
      b. An operational HVAC system that maintains temperature and humidity at occupancy levels has been put in place.
      c. Ceiling, overhead ductwork, piping, and lighting have been installed.
      d. Installation areas do not require further “wet work” construction.

B. For Base Cabinets Installation: Examine floor levelness and flatness of installation space. Do not proceed with installation if encountered floor conditions required more than 1/2 inch leveling adjustment. When installation conditions are acceptable, for each space, establish the high point of the floor. Set and make level and plumb first cabinet in relation to this high point.

C. For Wall Cabinets Installation: Examine wall surfaces in installation space. Do not proceed with installation if the following conditions are encountered:
   1. Maximum Variation of finished gypsum board surface from true flatness: 1/8 inch in 10 feet in any direction.

D. Verify adequacy of support framing and anchors.

E. Verify that service connections are correctly located and of proper characteristics.

3.03 INSTALLATION

A. Perform installation in accordance with manufacturer's instructions.

B. Use anchoring devices to suit conditions and substrate materials encountered. Use concealed fasteners to the greatest degree possible. Use exposed fasteners only where allowed by approved shop drawings, or where concealed fasteners are impracticable.

C. Set casework items plumb and square, securely anchored to building structure.

D. Align cabinets to adjoining components, install filler and/or scribe panels where necessary to close gaps.

E. Fasten together cabinets in continuous runs, with joints flush, uniform and tight. Misalignment of adjacent units not to exceed 1/16 inch. In addition, do not exceed the following tolerances:
   1. Variation of Tops of Base Cabinets from Level: 1/16 inch in 10 feet.
   2. Variation of Faces of Cabinets from a True Plane: 1/8 inch in 10 feet.
   3. Variation of Adjacent Surfaces from a True Plane (Lippage): 1/32 inch.
   4. Variation in Alignment of Adjacent Door and Drawer Edges: 1/16 inch.

F. Secure wall and floor cabinets to concealed reinforcement at gypsum board assemblies.

G. Base Cabinets: Fasten cabinets to service space framing and/or wall substrates, with fasteners spaced not more than 16 inches on center. Bolt adjacent cabinets together with joints flush, tight, and uniform.

H. Wall Cabinets: Fasten to hanging strips, and/or wall substrates. Fasten each cabinet through back, near top, at not less than 16 inches on center.

I. Install hardware uniformly and precisely.

J. Countertops: Install countertops intended and furnished for field installation in one true plane, with ends abutting at hairline joints, and no raised edges.

K. Replace units that are damaged, including those that have damaged finishes.

3.04 ADJUSTING

A. Adjust operating parts, including doors, drawers, hardware, and fixtures to function smoothly.

3.05 CLEANING

A. Clean casework and other installed surfaces thoroughly.

3.06 PROTECTION

A. Do not permit finished casework to be exposed to continued construction activity.

B. Protect casework and countertops from ongoing construction activities. Prevent workmen from standing on, or storing tools and materials on casework or countertops.

C. Repair damage, including to finishes, that occurs prior to Date of Substantial Completion, using methods prescribed by manufacturer; replace units that cannot be repaired to like-new condition.

END OF SECTION

SECTION 12 3600
COUNTERTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Solid Surface Countertops for manufactured casework.

1.02 RELATED REQUIREMENTS

A. Section 06 4100 - Architectural Wood Casework.

B. Section 22 4000 - Plumbing Fixtures: Sinks.

1.03 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.

B. AWI (QCP) - Quality Certification Program; Current Edition.

C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).

D. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.

E. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.

F. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Specimen warranty.

C. Shop Drawings: Complete details of materials and installation ; combine with shop drawings of cabinets and casework specified in other sections.

D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.

E. Test Reports: Chemical resistance testing, showing compliance with specified requirements.

F. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.

B. Quality Certification:
   1. Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section: www.awiqcp.org/#sle.
   2. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
   3. Provide designated labels on shop drawings as required by certification program.
   4. Provide designated labels on installed products as required by certification program.
   5. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 FIELD CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 COUNTERTOPS

A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

B. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
   1. Flat Sheet Thickness: 1/2 inch, minimum.
   2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
      a. Manufacturers:
         1) Formica Corporation: www.formica.com/#sle.
         2) Wilsonart: www.wilsonart.com/#sle.
         3) Dupont Corian solid surface; www.corian.com/#sle..
         4) Durat: www.durat.fi/#sle.
         5) Substitutions: See Section 01 6000 - Product Requirements.
      b. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
      c. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
      d. Color and Pattern: As indicated on drawings.
   3. Other Components Thickness: 1/2 inch, minimum.
   4. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.
   5. Fabricate in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 11 - Countertops, Premium Grade.

2.02 ACCESSORIES

A. Fixed Top-Mounted Countertop Support Brackets:
   1. Material: Steel.
   2. Finish: Manufacturer's standard, factory-applied, textured powder coat.
   3. Products:
      a. Centerline Brackets; Front Mounting Countertop Support: www.countertopbracket.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

2.03 FABRICATION

A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
   1. Join lengths of tops using best method recommended by manufacturer.
   2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
   3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.

B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
   1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.

2. Height: 4 inches, unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.02 INSTALLATION

A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.

B. Seal joint between back/end splashes and vertical surfaces.

3.03 TOLERANCES

A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.

B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.

C. Field Joints: 1/8 inch wide, maximum.

3.04 CLEANING

3.05 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

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SECTION 14 42 16

ENCLOSURE VERTICAL PLATFORM WHEELCHAIR LIFT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Enclosed, self-contained vertical platform wheelchair lift.

1.2 RELATED SECTIONS

A. Section 03300 - Cast-In-Place Concrete: Concrete shaftway and anchor placement.

B. Section 06100 - Rough Carpentry: Blocking in framed construction for lift attachment.

C. Section 09260 - Gypsum Board Assemblies: Gypsum board shaftway.

D. Division 16 - Electrical: Dedicated telephone service and wiring connections.

E. Division 16 - Electrical: Lighting and wiring connections at top of shaft.

F. Division 16 - Electrical: Electrical power service and wiring connections.

1.3 REFERENCES

A. ASME A17.1 - Safety Code for Elevators and Escalators.

B. ASME A17.5 - Elevator and Escalator Electrical Equipment.

C. ASME A18.1 - Safety Standard for Platform Lifts and Stairway Chairlifts.

D. CSA B44 - Safety Code for Elevators and Escalators.

E. CSA B355 - Lifts for Persons with Physical Disabilities.

F. ICC/ANSI A117.1 - Accessible and Usable Buildings and Facilities.

G. NFPA 70 - National Electric Code.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 3000.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Submit manufacturer’s installation instructions, including preparation, storage and handling requirements.
   2. Include complete description of performance and operating characteristics.
   3. Show maximum and average power demands.

C. Shop Drawings:
   1. Show typical details of assembly, erection and anchorage.
   2. Include wiring diagrams for power, control, and signal systems.
   3. Show complete layout and location of equipment, including required clearances and coordination with shaftway.

D. Selection Samples: For each finished product specified, provide two complete sets of color chips representing manufacturer's full range of available colors and patterns.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firm with minimum 20 year's experience in manufacturing of vertical platform wheelchair lifts, with evidence of experience with similar installations of type specified.

B. Installer Qualifications: Licensed to install equipment of this scope, with evidence of experience with specified equipment. Installer shall maintain an adequate stock of replacement parts, have qualified people available to ensure fulfillment of maintenance and callback service without unreasonable loss of time in reaching project site.

1.6 REGULATORY REQUIREMENTS

A. Provide platform lifts in compliance with:
   1. ASME A18.1 - Safety Standard for Platform Lifts and Stairway Chairlifts.
   2. ASME A17.1 - Safety Code for Elevators and Escalators.
   3. ASME A17.5 - Elevator and Escalator Electrical Equipment.
   4. NFPA 70 - National Electric Code.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store components off the ground in a dry covered area, protected from adverse weather conditions.

1.8 PROJECT CONDITIONS

A. Do not use wheelchair lift for hoisting materials or personnel during construction period.

1.9 WARRANTY

A. Warranty: Manufacturer shall warrant the wheelchair lift materials and factory workmanship for two years following completion of installation.

B. Extended Warranty: Provide an extended manufacturer's warranty for the entire warranty period covering the wheelchair lift materials and factory workmanship for the following additional extended period beyond the initial two-year warranty. Preventive Maintenance agreement required.
   1. Five additional years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer (Basis of Design): Garaventa Lift;
United States - P.O. Box 1769, Blaine, WA 98231-1769.
Toll Free: 800-663-6556. Tel: (604) 594-0422. Fax: (604) 594-9915.
Email: productinfo@garaventalift.com Web: www.garaventalift.com

B. Requests for substitutions will be considered in accordance with provisions of Section 01 6000.

2.2 ENCLOSED VERTICAL WHEELCHAIR LIFT

A. Capacity: 750 lbs. rated capacity.

B. Mast Height:
1. Model GVL-EN-96; 99 inches maximum lifting height.

C. Nominal Clear Platform Dimensions:
1. Large: 42 inches by 60 inches.

D. Platform Configuration:
1. Straight Through Entry/Exit: Front and rear openings.

E. Landing Openings:
1. Lower Landing: Door.
2. Upper Landing: Door.

F. Doors: Doors shall be self-closing type.
1. Door Height: Flush mount, 80 inches.
2. Door Construction: Aluminum frame with:
a. Panels of 1/4 inch laminated safety glass with 16 gauge galvanized steel kick plate.
b. D-Handle Pull: 12 inch offset D-Handle.

G. Lift Components:
1. Machine Tower: Extruded aluminum.
2. Base Frame: Structural steel.
3. Platform Side Wall Panels: 42-1/8 inches high. 16-gauge galvanized steel sheet. Custom aluminum extrusion tubing frame.
4. Enclosure Panels:
a. 1/4 inch laminated safety glass.

H. Enclosure Height Above Upper landing:
1. Enclosure shall extend 83-3/4 inches above the upper landing level.

I. Infill Panel Kit: Provide 16-gauge galvanized panels and mounting hardware to cover void between side of enclosure, drive mast and adjacent wall at the following locations:
1. Lower landing.
2. Upper landing.

J. Base Mounting and Access to Lift at Lower Landing:
   1. Pit Mount: Lift to be mounted in pit with dimensions to meet manufacturers requirements for the platform size specified. Pit construction shall be in accordance to Section 03 3000.

K. Leadscrew Drive:
   1. Drive Type: Self-lubricating acme screw drive.
   2. Emergency Operation: Manual handwheel device to raise or lower platform.
   3. Battery Powered Emergency Lowering: Battery powered platform lowering device that automatically activates in the event of power failure. Allows passenger to drive platform downward to lower landing. Does not operate lift in up direction.
   4. Safety Devices:
      a. Integral safety nut assembly with safety switch.
   5. Travel Speed: 10 fpm.
   6. Motor: 2.0 hp.
   7. Power Supply:
      a. 208/240 VAC, single phase; 50 Hz on a dedicated 16-amp circuit.

L. Platform Controls: 24 VDC control circuit with the following features.
   1. Direction Control: Continuous pressure rocker switch.
   2. Keyed operation.

M. Call Station Controls: 24 VDC control circuit with the following features:
   1. Direction Control: Constant pressure rocker switch.
   2. Keyed operation.
   3. Call Station Mounting:
      a. Lower:
         1) Frame mounted.

      b. Upper:
         1) Frame mounted.

N. Safety Devices and Features:
   1. Grounded electrical system with upper, lower, and final limit switches.
   2. Tamper resistant interlock to electrically monitor that the door is in the closed position and the lock is engaged before lift can move from landing.
   3. Pit stop switch mounted on mast wall.
   4. Electrical disconnect shall shut off power to the lift.

O. Finishes
   1. Extruded aluminum electrostatically applied baked powder finish semi matte Silver Moon.
   2. Ferrous Components: Electrostatically applied baked powder finish.
      a. Color: Semi matte Silver Moon.
   3. Lift Finish: Baked powder coat finish, color as selected by the Architect from manufacturers optional RAL color chart.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until the substrates have been properly prepared.

B. Verify shaft and machine space are of correct size and within tolerances.

C. Verify required landings and openings are of correct size and within tolerances.

D. Verify electrical rough-in is at correct location.

E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install platform lifts in accordance with applicable regulatory requirements including ASME A 17.1, ASME A 18.1 and the manufacturer's instructions.

B. Install system components and connect to building utilities.

C. Accommodate equipment in space indicated.

D. Startup equipment in accordance with manufacturer’s instructions.

E. Adjust for smooth operation.

3.4 FIELD QUALITY CONTROL

A. Perform tests in compliance with ASME A17.1 or A18.1 and as required by authorities having jurisdiction.

B. Schedule tests with agencies and Architect, Owner, and Contractor present.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 22 0510
BASIC PLUMBING REQUIREMENTS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide all labor, tools, materials, accessories, parts, transportation, taxes, and related items, essential for installation of the work and necessary to make work, complete, and operational. Provide new equipment and material unless otherwise called for. References to codes, specifications and standards called for in the specification sections and on the drawings mean, the latest edition, amendment and revision of such referenced standard in effect on the date of these contract documents.

1.02 LICENSING

A. The Contractor shall hold a license to perform the work as issued by the local jurisdiction.

B. Plumbing work shall be performed by, or under, the direct supervision of a licensed master plumber if so required by the local jurisdiction.

C. The Contractor shall be responsible for reviewing the local jurisdiction requirements prior to bidding.

1.03 PERMITS

A. Apply for and obtain all required permits and inspections, pay all fees and charges including all service charges.

1.04 CODE COMPLIANCE

A. Provide work in compliance with the following:
   1. The Building Code of New York State including The Fire Code; Property Maintenance Code; Plumbing Code, Mechanical Code and Fuel Gas Code; and The Energy Code of New York.
   2. New York State Department of Labor Rules and Regulations.
   3. Occupational Safety and Health Administration (OSHA).
   4. National Electrical Code, NFPA 70.
   5. Local Codes and Ordinances.
   6. Life Safety Codes, NFPA 101 (2000).
   7. New York Board of Fire Underwriters.
   8. FGI Healthcare Guidelines.

1.05 GLOSSARY

A. AIA - American Institute of Architects

B. ANSI - American National Standards Institute

C. ASHRAE - American Society of Heating, Refrigeration, and Air Conditioning Engineers, Inc.

D. ASME - American Society of Mechanical Engineers

E. ASPE - American Society of Plumbing Engineers

F. ASTM - American Society for Testing Materials

G. NYBFU - New York Board of Fire Underwriters

H. NEC - National Electrical Code

I. NEMA - National Electrical Manufacturer’s Association

J. NESC - National Electrical Safety Code

K. NFPA - National Fire Protection Association

L. UFPO - Underground Facilities Protective Organization

M. UL - Underwriter’s Laboratories, Inc.

N. OSHA - Occupational Safety and Health Administration

O. NYS/UFPBC - New York State Uniform Fire Prevention and Building Code

1.06 DEFINITIONS

A. Acceptance - Owner acceptance of the project from Contractor upon certification by Owner's Representative.

B. Approval/Approved - Written permission to use a material or system.

C. As Called For - Materials, equipment including the execution specified/shown in the contract documents.

D. Code Requirements - Minimum requirements.

E. Concealed - Work installed in pipe and duct shafts, chases or recesses, inside walls, above ceilings, in slabs or below grade.

F. Exposed - Work not identified as concealed.

G. Equal or Equivalent - Equally acceptable as determined by Owner's Representative.

H. Furnish - Supply and deliver to installed location.

I. Furnished by Others - Receive delivery at job site or where called for and install.

J. Inspection - Visual observations by Owner's site Representative.

K. Install - Mount and connect equipment and associated materials ready for use.

L. Labeled - Refers to classification by a standards agency.

M. Make - Refers to the article, Equipment Arrangements, and the article, Substitutions.

N. Or Approved Equal - Approved equal or equivalent as determined by Owner's Representative.

O. Provide - Furnish, install, and connect ready for use.

P. Relocate - Disassemble, disconnect, and transport equipment to new locations, then clean, test, and install ready for use.

Q. Replace - Remove and provide new item.

R. Review - A general contractual conformance check of specified products.

S. Roughing - Pipe, duct, conduit, equipment layout and installation.

T. Satisfactory - As specified in contract documents.

1.07 SHOP DRAWINGS/PRODUCT DATA/SAMPLES

A. Submit Shop Drawings on all items of equipment and materials to be furnished and installed. Submission of Shop Drawings and samples shall be accompanied by a transmittal letter, stating name of project and contractor, number of drawings, titles, and other pertinent data called for in individual sections. Shop Drawings shall be dated and contain: Name of project; name of prime professional; name of prime contractor; description or names of equipment, materials and items; and complete identification of locations at which materials or equipment are to be installed. Individual piecemeal or incomplete submittals will not be accepted. Similar items, (all types specified) shall be submitted at one time. Number each submittal by trade. Indicate deviations from contract requirements on Letter of Transmittal. Shop Drawings will be given a general review only. Corrections or comments made on the Shop Drawings during the review do not relieve Contractor from compliance with requirements of the drawings and specifications. The Contractor is responsible for: confirming and correcting all quantities; checking electrical characteristics and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner.

1.08 PROTECTION OF PERSONS AND PROPERTY

A. Contractor shall assume responsibility for construction safety at all times and provide, as part of contract, all trench or building shoring, scaffolding, shielding, dust/fume protection, mechanical/electrical protection, special grounding, safety railings, barriers, and other safety feature required to provide safe conditions for all workmen and site visitors.

1.09 EQUIPMENT ARRANGMENTS

A. The contract documents are prepared on basis of one manufacturer as “design equipment,” even though other manufacturer’s names are listed as acceptable makes. If Contractor elects to use one of the listed makes other than “design equipment,” submit detailed drawings, indicating proposed installation of equipment. Show maintenance arrangement. Make required changes in the work of other trades, at no increase in any contract. Provide larger motors, feeders, breakers, and equipment, additional control devices, valves, fittings and other miscellaneous equipment required for proper operation, and assume responsibility for proper location of roughing and connections by other trades. Remove and replace door frames, access doors, walls, ceilings, or floors required to install other than design make equipment. If revised arrangement submittal is rejected, revise and resubmit specified “design equipment” item which conforms to contract documents.

1.10 CONTINUITY OF SERVICES

A. The building will be in use during construction operations. Maintain existing systems in operation within all rooms of building at all times. Refer to “General Conditions of the Contract for Construction” for temporary facilities for additional contract requirements. Schedules for various phases of contract work shall be coordinated with all other trades and with Owner’s Representative. Provide, as part of contract, temporary mechanical and plumbing connections and relocations as required to accomplish the above. Obtain approval in writing as to date, time, and location for shutdown of existing mechanical/plumbing facilities or services.

1.11 ROUGHING

A. Due to small scale of Drawings, it is not possible to indicate all offsets, fittings, changes in elevation, interferences, etc. Make necessary changes in contract work, equipment locations, etc., as part of a contract to accommodate work to obstacles and interferences encountered. Before installing, verify exact location and elevations at work site. DO NOT SCALE plans. If field conditions, details, changes in equipment or shop drawing information require an important rearrangement, report same to Owner’s Representative for review. Obtain written approval for all major changes before installing.

B. Install work so that items both existing and new are operable and serviceable. Eliminate interference with removal of coils, motors, filters, belt guards and/or operation of doors. Provide easy, safe, and code mandated clearances at controllers, motor starters, valve access, and other equipment requiring maintenance and operation. Where Contractor could not reasonably be expected to find such trade interferences due to concealment in walls, ceiling or floors, such relocations will be done by Change Order, if not, included in contract work. Contractor shall relocate existing work in way of new construction. Provide new materials, including new piping and insulation for relocated work.

C. Coordinate work with other trades and determine exact route or location of each duct, pipe, conduit, etc., before fabrication and installation. Coordinate with Architectural Drawings. Obtain from Owner’s Representative exact location of all equipment in finished areas, such as thermostat, fixture, and switch mounting heights, and equipment mounting heights. Coordinate all work with the architectural reflected ceiling plans and/or existing Architecture. Mechanical and plumbing drawings show design arrangement only for diffusers, grilles, registers, air terminals, lighting fixtures, speakers, and other items. Do not rough-in contract work without reflected ceiling location plans.

1.12 REMOVAL WORK

A. Where existing equipment removals are called for, submit complete list to Owner's Representative all items that Owner wishes to retain that do not contain asbestos or PCB Material shall be delivered to location directed by Owner. Items that Owner does not wish to retain shall be removed from site and legally disposed of. Removal and disposal of material containing asbestos and/or PCB's shall be in accordance with Federal, State, and Local law requirements. Where equipment is called for to be relocated, contractor shall carefully remove, clean and recondition, then reinstall. Removal all abandoned piping, wiring, equipment, lighting, ductwork, tubing, supports, fixtures, etc. Visit each room, crawl space, and roof to determine the total Scope of Work. The disturbance or dislocation of asbestos-containing materials causes asbestos fibers to be released into the building's atmosphere, thereby creating a health hazard to workmen and building occupants. Consistent with Industrial Code Rule 56 and the content of recognized asbestos-control work, the Contractor shall apprise all of his workers, supervisory personnel, subcontractors, Owner and Consultants who will be at the job site of the seriousness of the hazard and of proper safeguards and work procedures which must be followed, as described in New York State Department of Labor Industrial Code Rule 56.

1.13 EQUIPMENT AND MATERIAL INSTALLATION

A. Provide materials that meet the following minimum requirements:
   1. Materials shall have a flame spread rating of 25 or less and smoke developed rating of 50 or less, in accordance with NFPA 255.
   2. All equipment and material for which there is a listing service shall bear a UL label.
   3. Potable water systems and equipment shall be built according to AWWA Standards.
   4. Electrical equipment and systems shall meet UL Standards and requirements of the NEC.

1.14 CUTTING AND PATCHING

A. Each trade shall include their required cutting and patching work unless shown as part of the General Construction work on the architectural drawings. Refer to "General Conditions of the Contract for Construction," for additional requirements. Cut and drill from both sides of walls and/or floors to eliminate splaying. Patch any cut or abandoned holes left by removals of equipment, fixtures, etc. Patch adjacent existing work disturbed by installation of new work including insulation, walls and wall covering, ceiling and floor covering, other finished surfaces. Patch openings and damaged areas equal to existing surface finish. Cut openings in prefabricated construction units in accordance with manufacturer's instructions.

1.15 PAINTING

A. Include painting for patchwork with color to match adjacent surfaces. Where color cannot be adequately matched, paint entire surface. Provide one (1) coat of primer and two (2) finish coats or as called for in the Mechanical and Electrical Specifications. Refer to General Construction Specifications for additional information.

1.16 CONCEALMENT

A. Conceal all contract work above ceilings and in walls, below slabs, and elsewhere throughout building. If concealment is impossible or impractical, notify Owner's Representative before starting that part of the work and install only after his review. In areas with no ceilings, install only after Owner's Representative reviews and comments on arrangement and appearance.

1.17 CHASES

A. New Construction:
   1. Certain chases, recessed, openings, shafts, and wall pockets will be provided as part of "General Building Construction Plans and Specifications." Mechanical and Electrical Trades work shall provide all other openings required for their contract work.
   2. Check Architectural and Structural Design and Shop Drawings to verify correct size and location for all openings, recesses and chases in general building construction work.
   3. Assume responsibility for correct and final location and size of such openings.

4. Rectify improperly sized, improperly located or omitted chases or openings due to faulty or late information or failure to check final location.
5. Provide 18 gauge galvanized sleeves and inserts. Extend all sleeves 2" above finished floor. Set sleeves and inserts in place ahead of new construction, securely fastened during concrete pouring. Correct, by drilling, omitted or improperly located sleeves. Assume responsibility for all work and equipment damaged during course of drilling. Firestop all unused sleeves.
6. Provide angle iron frame where openings are required for contract work, unless provided by General Construction Contractor.

B. In Existing Buildings:
1. Drill holes for floor and/or roof slab openings.
2. Multiple pipes smaller than 1" properly spaced and supported may pass through one 6" or smaller diameter opening.
3. Seal voids in fire rated assemblies with a fire-stopping seal system to maintain the fire resistance of the assembly. Provide 18 gauge galvanized sleeves at fire rated assemblies. Extend sleeves 2" above floors.
4. In wall openings, drill or cut holes to suit. Provide 18 gauge galvanized sleeves at shafts and fire rated assemblies. Provide fire-stopping seal between sleeves and wall in drywall construction. Provide fire-stopping similar to that for floor openings.

1.18 FLASHING, SEALING, FIRE-STOPPING

A. See Specification Section 22 0515 - Plumbing Firestopping.

1.19 SUPPORTS

A. Provide required supports, beams, angles, hangers, rods, bases, braces, and other items to properly support contract work. Supports shall meet the approval of the Owner's Representative. Modify studs, add studs, add framing, or otherwise reinforce studs in metal stud walls and partitions as required to suit contract work. If necessary, in stud walls, provide special supports from floor to structure above. For Precast Panels/Planks and Metal Decks, support mechanical/electrical work as determined by manufacturer and Owner's Representative. Provide heavy gauge steel mounting plates for mounting contract work. Mounting plates shall span two or more studs. Size, gauge, and strength of mounting plates shall be sufficient for equipment size, weight, and desired rigidity.

1.20 PLUMBING EQUIPMENT CONNECTIONS

A. Contractor is responsible for draining, filling, venting, chemically treating and restarting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.

B. Provide roughing and final water, waste, vent, propane, etc. connections to all equipment. Provide loose key stops, sanitary "P" traps, tailpiece, adapters, gas cocks, and all necessary piping and fittings from roughing point to equipment. Provide installation of sinks, faucets, traps, tailpiece furnished by others. Provide continuation of piping and connection to equipment that is furnished by others. Provide relief valve discharge piping from equipment relief valves to point(s) of safe discharge.

C. Provide as part of plumbing work valved water outlet adjacent to equipment requiring same. Provide equipment type floor drains, or drain hubs, adjacent to equipment.

D. Install controls and devices furnished by others.

E. Refer to Contract Documents for roughing schedules, and equipment lists indicating scope of connections required.

F. Provide for Owner furnished and Contractor furnished equipment all valves, piping, piping accessories, traps, pressure reducing valves, gauges, relief valves, vents, drains, insulation, sheet metal work, controls, dampers, wiring as required.

1.21 STORAGE AND PROTECTION OF MATERIALS

A. Store materials on dry base, at least 6" above-ground or floor. Store so as not to interfere with other work or obstruct access to buildings or facilities. Provide waterproof/windproof covering. Remove and provide special storage for items subject to moisture damage. Protect against theft or damage from any cause. Replace items stolen or damaged, at no cost to Owner.

B. Refer to "General Conditions of the Contract for Construction."

1.22 FREEZING AND WATER DAMAGE

A. Take all necessary precautions with equipment, systems and building to prevent damage due to freezing and/or water damage. Repair or replace, at no charge in contract, any such damage to equipment, systems, and building. Perform first seasons winterizing in presence of Owner's operating staff.

1.23 LUBRICATION CHART

A. Provide lubrication chart, 8 ½" x 11" minimum size, typed in capital letters, mounted under clear laminated plastic; secure to wall in area of equipment. List all motors and equipment in contract. Obtain and list necessary information by name/location of equipment, manufacturer recommended types of lubrication and schedule. Lubricate motors as soon as installed and perform lubrication maintenance until final acceptance. Plumbing trade shall add contract items to the chart provided by the Heating trade or provide separate charts.

1.24 OWNER INSTRUCTIONS

A. Before final acceptance of the work, furnish necessary skilled labor to operate all systems by seasons. Instruct designated person on proper operation, and care of systems/equipment. Repeat instructions, if necessary. Obtain written acknowledgement from person instructed prior to final payment. Contractor is fully responsible for system until final acceptance, even though operated by Owner's personnel, unless otherwise agreed in writing. List under clear plastic, operating, maintenance, and starting precautions procedures to be followed by Owner for operating systems and equipment.

1.25 MAINTENANCE MANUALS

A. Prepare Instructions and Maintenance Portfolios. Include one copy of each of approved Shop Drawings, wiring diagrams, piping diagrams spare parts lists, as-built drawings and manufacturer's instructions. Include typewritten instructions, describing equipment, starting/operating procedures, emergency operating instructions, summer-winter changeover, freeze protection, precautions and recommended maintenance procedures. Include name, address, and telephone number of supplier manufacturer representative and service agency for all major equipment items in a three ring binder with name of project on the cover. Deliver to Owner's Representative before request for final acceptance.

1.26 RECORD DRAWINGS

A. The Contractor shall obtain at his expense one (1) set of construction Contract Drawings including non-reproducible black and white prints and one set of reproducible mylars for the purpose of recording record conditions.

B. The Contractor shall perform all survey work required for the location and construction of the work and to record information necessary for completion of the record drawings. Record drawings shall show the actual location of the constructed facilities in the same manner as was shown on the bid drawings. All elevations and dimensions shown on the drawings shall be verified or corrected so as to provide a complete and accurate record of the facilities as constructed.

C. It shall be the responsibility of the Contractor to mark each sheet of the non-reproducible drawings in pencil and to record thereon in a legible manner, any and all approved field changes and conditions as they occur. A complete file of approved field sketches, diagrams, and other changes shall also be maintained. At completion of the work, each sheet of record prints, plus all approved field sketches and diagrams shall be used in preparation of the mylar reproducible record drawings.

D. Completed reproducible mylar drawings shall be certified as reflecting record conditions and submitted to the engineer for approval.

1.27 ADDITIONAL ENGINEERING SERVICES

A. In the event that the Consultant is required to provide additional engineering services as a result of substitution of equivalent materials or equipment by the Contractor, or changes by the Contractor in dimension, weight, power requirements, etc., of the equipment and accessories furnished, or if the Consultant is required to examine and evaluate any changes proposed by the Contractor for the convenience of the Contractor, then the Consultant's expenses in connection with such additional services shall be paid by the Contractor and may be deducted from any monies owed to the Contractor.

1.28 FINAL INSPECTION

A. Upon completion of all punch list items, the Contractor shall provide a copy of the punch list back to the Engineer with each items noted as completed or the current status of the item. Upon receipt, the Engineer will schedule a final inspection.

1.29 ALL TRADES TEMPORARY HEAT

A. Refer to the Standard General Conditions of the contract for Construction and Supplemental General Conditions.

1.30 PLUMBING TEMPORARY FACILITIES

A. Refer to the Standard General Conditions of the Contract for Construction and Supplemental General Conditions.

1.31 CLEANING

A. It is the Contractor's responsibility to keep clean all equipment and fixtures provided under this contract for the duration of the project. Each trade shall keep the premises free from an accumulation of waste material or rubbish caused by his operations. The facilities require an environment of extreme cleanliness, and it is the Contractor's responsibility to adhere to the strict regulations regarding procedures on the existing premises. After all tests are made and installations completed satisfactorily:

B. Thoroughly clean entire installation, both exposed surfaces and interiors.

C. Remove all debris caused by work.

D. Remove tools, surplus, materials, when work is finally accepted.

END OF SECTION

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SECTION 22 0515
PLUMBING FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Firestopping materials.

B. Firestopping of all penetrations, openings, and interruptions to fire rated assemblies, whether indicated on drawings or not, including but not limited to piping, tubing and similar utilities passing through or penetrating fire rated walls and floor assemblies.

1.02 RELATED SECTIONS

A. Refer to "Code Compliance Drawings" for location of fire rated assemblies. At a minimum, all corridor walls and all floors between stories have a 1 hour rating.

1.03 REFERENCES

A. ASTM International:
   1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
   2. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
   3. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops.

B. National Fire Protection Association:
   1. NFPA 70 - National Electrical Code.

C. Underwriters Laboratories Inc.:
   1. UL 263 - Fire Tests of Building Construction and Materials.
   2. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
   3. UL 1479 - Fire Tests of Through-Penetration Firestops.
   4. UL - Fire Resistance Directory.

D. Plumbing and Fuel Gas Codes of New York State.

1.04 FIRE-STOP SYSTEM PERFORMANCE REQUIREMENTS

A. General: For penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration fire-stop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.
   1. Fire-resistance-rated walls including fire walls, fire partitions, fire barriers and smoke barriers.
   2. Fire-resistance-rated horizontal assemblies including floors and ceiling membranes of roof/ceiling assemblies.

1.05 SUBMITTALS

A. See Section 01 3000 - Submittal Procedures for submittal process.

B. Product Data: For each type of product indicated.

C. Shop Drawings: For each through-penetration fire-stop system, show each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item. Include fire-stop design designation of qualified testing and inspecting agency that evidences compliance with requirements for each condition indicated. Submit UL Standard detail for each penetration type proposed.

1.06 QUALITY ASSURANCE

A. Fire Testing: Provide firestopping assemblies of designs which provide the specified fire ratings when tested in accordance with methods indicated.

1. Listing in the current-year classification or certification books of UL will be considered as constituting an acceptable test report.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hilti.

B. Nelson Fire Stop Products.

C. Specified Technology.

D. 3M Fire Protection Products.

E. Approved equals meeting UL requirements.

2.02 MATERIALS

A. Sealant Firestopping:
   1. Intumescent firestop sealant designed to expand when exposed to fire.
   2. Paintable.
   3. Fire Resistance: Up to 4 hours.
   4. Curing Time: 14 to 21 days.
   5. Elongation: 5 percent.
   6. Density: 1.5 g/cm3.
   7. Product: FS-ONE Intumescent Firestop Sealant manufactured by Hilti USA.
   8. Uses: Insulated and uninsulated metal pipes, with or without sleeve and plastic pipes.

B. Silicone Sealant Firestopping:
   1. Silicone based firestop sealant that provides maximum movement in fire-rated joint applications and pipe penetrations.
   2. Not paintable.
   3. Fire Resistance: Up to 4 hours.
   4. Elongation: 25 percent.
   5. Product: CP 601S Elastomeric Firestop Sealant manufactured by Hilti USA.
   6. Uses: Joints in walls, floor to floor or fire compartments.

C. Safing Insulation:
   1. Mineral-wool type insulation.
   2. Thickness: 1 inch to 1-1/2 inches.
   3. Density: 4 to 8 pcf.
   4. Product: THERMAFIBER Safing Insulation.

D. Sleeves:
   1. Provide sleeves as required by section 1206.4 of the Mechanical Code.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify openings are ready to receive the work of this Section.

3.02 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing through-penetration fire-stop systems to comply with fire-stop system manufacturer's written instructions and with the following requirements:
   1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration fire-stop systems.

2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration fire-stop systems. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by through-penetration fire-stop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.03 INSTALLATION

A. General:
1. Install materials in manner described in UL Detail and in accordance with manufacturer's instructions, completely closing openings.

B. Installation:
1. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping and other items, requiring firestopping.
2. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.
3. Apply firestopping material in sufficient thickness to achieve required fire and smoke rating, to uniform density and texture.
4. Fire Rated Surface:
   a. Seal opening at floor, wall, partition, and roof as follows:
      1) Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.
      2) Size sleeve allowing minimum of 1 inch void between sleeve and building element.
      3) Pack void with backing material.
      4) Seal ends of sleeve with UL listed fire resistive silicone compound to meet fire rating of structure penetrated.
   b. Where plumbing piping penetrates a fire rated surface, install firestopping product in accordance with manufacturer's instructions.
5. Non-Rated Surfaces:
   a. Seal opening through non-fire rated wall, floor, ceiling, and roof opening as follows:
      1) Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.
      2) Size sleeve allowing minimum of 1 inch void between sleeve and building element.
      3) Install type of firestopping material recommended by manufacturer.
   b. Install floor plates or ceiling plate where piping penetrates non-fire rated surfaces in occupied spaces. Occupied spaces include rooms with finished ceilings and where penetration occurs below finished ceiling.
   c. Exterior wall openings below grade: Assemble rubber links of mechanical seal to size of piping and tighten in place, in accordance with manufacturer's instructions.

C. Identification:
1. Identify through-penetration fire-stop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of edge of the fire-stop systems so that labels will be visible to anyone seeking to remove penetrating items or fire-stop systems. Use mechanical fasteners for metal labels. For plastic labels, use self-adhering type with adhesives capable of permanently bonding labels to surfaces on which labels are placed and, in combination with label material, will result in partial destruction of label if removal is attempted. Include the following information on labels:
   a. The words "Warning - Through-Penetration Fire-Stop System - Do Not Disturb. Notify Building Management of Any Damage."
   b. Date of installation.
   c. Through-penetration fire-stop system manufacturer's name.

3.04 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration fire-stop system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that through-penetration fire-stop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration fire-stop systems immediately and install new materials to produce systems complying with specified requirements.

END OF SECTION

SECTION 22 0553
PLUMBING IDENTIFICATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Pipe Markers.

1.02 RELATED REQUIREMENTS

A. Section 22 1005 - Plumbing Piping.

1.03 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers; 2007.

1.04 SUBMITTALS

A. Product Data: Provide manufacturers catalog literature for each product required.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Seton Identification Products.

B. Brady Corporation

C. Emed Company.

2.02 NAMEPLATES

A. Description: Laminated three-layer plastic with engraved letters.
   1. Letter Color: White.
   2. Letter Height: 3/8 inch.
   3. Nameplate Height: 3/4 inch.
   4. Background Color: Black.

2.03 PIPE MARKERS AND ACCESSORIES

A. Snap-on Marker: One piece wrap around type constructed of precoiled acrylic plastic with clear polyester coating, integral flow arrows, legend printed in alternating directions, 3/4 inch adhesive strip on inside edge, and 360 degree visibility.

B. Strap-on Marker: Strip type constructed of precoiled acrylic plastic polyester coating, integral flow arrows, legend printed in alternating directions, factory applied grommets, and pair of stainless steel spring fasteners.

C. Stick-on Marker: Pressure sensitive adhesive backed type constructed of vinyl with clear polyester coating, and integral flow arrows for applications where flow arrow banding tape is not being used.

D. Pipe Marker Legend:
   1. Outside Diameter of Pipe or Insulation 3/4 to 1-1/4 inch:
      a. Letter size: 1/2 inch.
      b. Length of color field: 8 inches.
   2. Outside Diameter of Pipe or Insulation 1-1/2 to 2 inches:
      a. Letter size: 3/4 inch.
      b. Length of color field: 8 inches.
   3. Outside Diameter of Pipe or Insulation 2-1/2 to 6 inches:
      a. Letter size: 1-1/4 inch.
      b. Length of color field: 12 inches.
   4. Outside Diameter of Pipe or Insulation 8 inches and greater:

a. Letter size: 2-1/2 inch.
b. Length of color field: 18 inches.

E. Color: Conform to ANSI A13.1.

F. Banding Tapes: Pressure sensitive adhesive backed type constructed of vinyl with clear polyester coating.
1. Plain Tape: Unprinted type; color to match pipe marker background.
2. Flow Arrow Tape: Printed type with integral flow arrows; color to match pipe marker background.

2.04 UNDERGROUND PLASTIC PIPE MARKERS

A. Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

2.05 PIPE SERVICE IDENTIFICATION TAGS

A. Type: No. 19 B&S gage brass, with 1/4 inch high pipe service abbreviated legend on one line, over 1/2 inch high pipe size legend in inches, both deep stamped and black filled; and 3/16 inch top hole for fastener.

B. Size: 2 inch square tag.

C. Fasteners: Brass "S" hook or brass jack chain of size required for pipe to which tag attached.

2.06 VALVE SERVICE IDENTIFICATION TAGS

A. Type: No. 19 B&S gage brass, with 1/4 inch high pipe service abbreviated legend on one line, over 1/2 inch high pipe size legend in inches, both deep stamped and black filled; and 3/16 inch top hole for fastener.

B. Size: 1-1/2 inch dia. round.

C. Fasteners: Brass "S" hook or brass jack chain of size as required for valve stem or handle to which tag is attached.

2.07 VALVE SERVICE IDENTIFICATION CHART FRAMES

A. Type: Satin finished extruded aluminum frame with rigid clear plastic glazing, size to fit 8-1/2 x 11 inch valve chart.

PART 3 EXECUTION

3.01 PREPARATION

A. Complete testing, insulation, and finish painting work prior to completing the Work of this Section.

B. Clean pipe and equipment surfaces with cleaning solvents prior to installing piping identification or equipment tags.

C. Remove dust from insulation surfaces with clean clothes prior to installing piping or equipment identification.

3.02 INSTALLATION

A. Install the Work of this Section in accordance with the manufacturer's printed installation instructions, unless otherwise specified.

B. Name Plates:
1. Install plastic nameplates on properly prepared and dry surface with adhesive and ensure permanent adhesion.

C. Pipe and Valve Service Identification Tags:
1. Install tags with "S" hooks and corrosion resistant chain.

D. Stick-On Pipe Markers:
1. Install minimum of 2 markers at each specified location, 90 degrees apart on visible side of pipe.

2. Encircle ends of pipe markers around pipe or insulation with banding tape with one inch lap. Use plain banding tape on markers with integral flow arrows, and flow arrow banding tape on markers without integral flow arrows.

E. Underground Plastic Pipe Markers:
1. Install 6 to 8 inches below finished grade, directly above buried pipe.

3.03 PIPING IDENTIFICATION

A. Piping Identification Types:
1. Piping or Insulation under 3/4 inch od: Pipe identification tags.
2. Piping or Insulation 1 inch and larger: Snap-on pipe markers or stick-on pipe markers.

B. Identify exposed piping, bare or insulated, as to content and direction of flow, with the following exceptions:
1. Piping in non-walk-in tunnels or underground conduits between manholes.
2. Piping in furred spaces or suspended ceilings, except at valve access panels where valves and piping shall be identified as specified for exposed piping systems.
3. Piping exposed in finished spaces such as offices, classrooms, wards, toilet rooms, shower rooms, and corridors.

C. Locate piping identification to be visible from exposed points of observation.
1. Locate piping identification at valve locations; at points where piping enters and leaves a partition, wall, floor or ceiling, and at intervals of 20 feet on straight runs.
2. Where 2 or more pipes run in parallel, place printed legend and other markers in same relative location.

3.04 VALVE IDENTIFICATION

A. Valve Service Identifications Tags:
1. Tag control valves, except valves at equipment, with brass tag fastened to the valve handle or stem, marked to indicate service and numbered in sequence for the following applications:
a. Domestic water valves controlling mains, risers, and branch run outs.
b. Gas valves controlling mains, risers, and branch run outs.

B. Valve Service Identification Charts:
1. Provide two (2) framed valve charts for each piping system specified to be provided with valve identification tags. Type charts on 8-1/2 x 11 inch heavy white bond paper, indicating valve number, service and location.
2. Hang framed charts in main boiler/mechanical room at location as directed by Owner.

3.05 EQUIPMENT IDENTIFICATION

A. Identify uninsulated plumbing equipment by means of plastic nameplates:
1. Letter Size: 3/8 inches height.

B. Small inline pumps may be identified with tags equivalent as specified for pipe service.

C. Locations: Co-locate nameplates with manufacturer's equipment nameplates where readily visible. Where view of manufacturers nameplate is obstructed locate nameplate to be readily visible.

D. Equipment Identification Legend:
1. Equipment identification shall match tags as scheduled on drawings.

END OF SECTION

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SECTION 22 0719
PLUMBING PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping insulation.

B. Jackets and accessories.

1.02 RELATED REQUIREMENTS

A. Section 22 1005 - Plumbing Piping.

1.03 REFERENCE STANDARDS

A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

B. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019, with Editorial Revision (2023).

C. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2019).

D. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement; 2007 (Reapproved 2019).

E. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.

F. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation; 2017 (Reapproved 2023).

G. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2022a.

H. ASTM C610 - Standard Specification for Molded Expanded Perlite Block and Pipe Thermal Insulation; 2017 (Reapproved 2023).

I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.

J. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022a, with Editorial Revision (2023).

K. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.

L. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Submittal Procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than five years of documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum five years of documented experience.

C. Regulatory Requirements:

1. Insulation installed inside buildings, including laminated jackets, mastics, sealants and adhesives shall have a Fire Spread/Smoke Developed Rating of 25/50 or less based on ASTM E 84, NFPA 255, and UL 723.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.07 FIELD CONDITIONS

A. Maintain ambient conditions required by manufacturers of each product.

B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.01 PIPING INSULATION

A. Fibrous Glass (Mineral Fiber) Insulation: Composed principally of fibers manufactured from rock, slag, or glass, with or without binders, and asbestos free.
   1. Manufacturers:
      a. Johns Manville Corporation.
      b. Knauf Fiber Glass.
      c. Owens Corning Corporation.
   2. Preformed Pipe Insulation: Minimum density 3 pcf; ASTM C 547 and ASTM C 795.
      a. Class 1 (Suitable for Temperatures Up to 450 degrees F): 'K' value of 0.26 at 75 degrees F.
   3. Premolded Fitting Insulation: Minimum density 4.0 pcf, K of 0.26 at 75 degrees F; ASTM C 547, Class 1.
   4. Insulation Inserts for PVC Fitting Jackets: Minimum density 1.5 pcf, K of 0.28 at 75 degrees F; ASTM C 553, Type III.
      a. Suitable for temperatures up to 450 degrees F.

B. High Density Jacketed Insulation Inserts for Hangers and Supports:
   1. Manufacturers:
      a. Johns Manville Corporation.
      b. Knauf Fiber Glass.
      c. Owens Corning Corp.
   2. For Use with Fibrous Insulation:
      a. Cold Service Piping:
         1) Polyurethane Foam: Minimum density 4 pcf, K of 0.13 at 75 degrees F, minimum compressive strength of 125 psi.
      b. Hot Service Piping:
         1) Calcium Silicate: Minimum density of 15 pcf, K of 0.50 at 300 degrees F; ASTM C 610.
         2) Perlite: Minimum density 12 pcf, K of 0.60 at 300 degrees F; ASTM C 610.

C. Cements:
   1. Fibrous Glass Thermal Insulating Cement: Asbestos free; ASTM C 195.
   2. Fibrous Glass Hydraulic Setting Thermal Insulating and Finishing Cement: ASTM C 449/C 449M.

2.02 PLENUM WRAP FOR PVC PIPING IN RETURN AIR PLENUM SPACES

A. Manufacturers:
   1. 3M - Building and Commercial Services Division, Fire Barrier Plenum Wrap 5A+
   2. Morgan Advanced Materials, PlenumWrap+
   3. Unifrax, FyreWrap 0.5

B. General: Flexible fire-resistant wrap consisting of inorganic fiber blanket with a scrim-reinforced foil. Product provides a flexible, non-combustible enclosure for cables and pipes in return air plenums.

C. Installation shall be in strict accordance with manufacturers written instructions, as shown on the approved shop drawing submittals. Wrap shall be a high-temperature fiber blanket thermal insulation encapsulated in a fiberglass-reinforced aluminized foil. Plenum wrap shall be nominal 6 pcf and have a nominal 1/2 inch thickness. The fiber blanket shall have a continuous use limit in excess of 1,832F. Flame Spread Index and Smoke Developed Index of the foil encapsulated blanket shall be <25 / <50.

2.03 INSULATION JACKETS AND FITTING COVERS

A. Laminated Vapor Barrier Jackets for Piping Insulation: Factory applied by insulation manufacturer, conforming to ASTM C 1136, Type I.
   1. Type I: Reinforced white kraft and aluminum foil laminate with kraft facing out.
      a. Pipe Jackets: Furnished with integral 1-1/2 inch self sealing longitudinal lap, and separate 3 inch wide adhesive backed butt strips.
   2. Type II: Reinforced aluminum foil and kraft laminate with foil facing out.
   3. Laminated vapor barrier jackets are not required for flexible elastomeric foam insulation.

B. Premolded PVC Fitting Jackets:
   1. Constructed of high impact, UV resistant PVC.
      a. ASTM D 1784, Class 14253-C.
      b. Working Temperature: 0-150 degrees F.

2.04 ADHESIVES, MASTICS, AND SEALERS

A. Vapor Seal Adhesive (Fibrous Glass Insulation): Childers' CP-82, Epolux's Cadoprene 400, Foster's 85-75 or 85-20.

B. Vapor Barrier Mastic/Joint Sealer (Fibrous Glass Insulation): Childers' CP-30, Epolux's Cadalar 670, Foster's 95-44 or 30-35.

C. Adhesive (Reinforcing Membrane): Childers' Chil-Spray WB CP-56.

D. Mastic (Reinforcing Membrane): Childers' AK-CRYL CP-9.

2.05 MISCELLANEOUS MATERIALS

A. Insulation Fasteners:
   1. Acceptable Manufacturers: Duro-Dyne Corp.; Erico Fastening Systems, Inc.
   2. Type: Weld pins, complete with self-locking insulation retaining washers.

B. Pressure Sensitive Tape for Sealing Laminated Jackets:
   1. Acceptable Manufacturers: Alpha Associates, Childers, Ideal Tape, Morgan Adhesive.
   2. Type: Same construction as jacket.

PART 3 EXECUTION

3.01 PREPARATION

A. Perform the following prior to starting insulation Work:
   1. Install all hangers, supports, and appurtenances in their permanent locations.
   2. Complete testing of piping.
   3. Clean and dry all surfaces to be insulated.

3.02 INSTALLATION, GENERAL

A. Install the Work of this Section in accordance with manufacturer's printed installation instructions unless otherwise specified.

B. Provide continuous piping insulation and jacketing when passing thru interior wall, floor, and ceiling construction.
   1. At Through Penetration Firestops: Coordinate insulation densities with the requirements of approved firestop system being installed. See Section 22 0515.

a. Insulation densities required by approved firestop system may vary with the densities specified in this Section. When this occurs use the higher density insulation.

C. Individual piping runs shall have consistent insulation type.

D. Apply Insulation to completely cover entire surface of piping. Do not insulate over weld certification stamps.

3.03 INSTALLATION AT HANGERS AND SUPPORTS

A. Reset and realign hangers and supports if they are displaced during insulation installation.

B. Install high density jacketed insulation inserts at hangers and supports for insulated piping as specified.
   1. Insulation Inserts For Use with Fibrous Glass Insulation:
      a. Where clevis hangers are used, install insulation shields and high density jacketed insulation inserts between shield and pipe.
      b. Where insulation is subject to compression at points over 180 degrees apart, e.g. riser clamps, U-bolts, or trapezes, fully encircle pipe with 2 protection shields and 2 high density jacketed fibrous glass insulation inserts within supporting members.
         1) Exception: Locations where pipe covering protection saddles are specified for hot service piping, 6 inch and larger.

3.04 INSTALLATION OF FIBROUS GLASS COLD SERVICE INSULATION

A. Install insulation materials with a field or factory applied ASTM C 1136 Type I laminated vapor barrier jacket, unless otherwise specified.

B. Piping:
   1. Butt insulation joints together.
   2. Continuously seal joints with minimum 1-1/2 inch wide self-sealing longitudinal jacket laps and 3-inch wide butt adhesive backed strips, or 3 inch wide pressure sensitive sealing tape of same material as jacket.
   3. Bed insulation in a 2-inch wide band of vapor barrier mastic, and vapor seal exposed ends of insulation with vapor barrier mastic at each butt joint between pipe insulation and equipment, fittings or flanges at the following intervals:
      a. Horizontal Pipe Runs: 21 ft.
      b. Vertical Pipe Runs: 9 ft.

C. Fittings, Valves, Flanges and Irregular Surfaces:
   1. Insulate with mitre cut or pre-molded fitting insulation of same material and thickness as adjoining pipe insulation.
   2. Secure insulation in place with 16 gage wire, with ends twisted and turned down into insulation.
   3. Butt fitting, valve, and flange insulation against pipe insulation and bond with insulating cement.
   4. Insulate valves up to and including bonnets, without interfering with packing nuts.
   5. Apply leveling coat of insulating cement to smooth out insulation and cover wiring.
   6. When insulating cement has dried, seal fitting, valve and flange insulation by embedding a layer of reinforcing membrane of 4 oz. canvas jacket between 2 flood coats of vapor barrier mastic, each 1/8 inch thick wet.
   7. Lap reinforcing membrane or canvas on itself and adjoining pipe insulation at least 2 inches.
   8. Trowel, brush, or rubber glove outside coat over entire insulated surface.

D. Fittings, Valves, Flanges and Irregular Surfaces - Alternate:
   1. Apply one piece pre-molded PVC fitting covers with fibrous glass insulation inserts with galvanized coated tack fasteners. Tape circumferential joint between insulation and premolded fitting cover with 2 inch wide pressure sensitive polyvinyl tape.

a. Exception: Provide additional insulation inserts on service operating at under 45 degrees F or where insulation thickness exceeds 1-1/2 inches. Ensure that insulation is adequate to prevent PVC fitting jacket temperature from falling below 45 degrees F.

3.05 INSTALLATION OF FIBROUS GLASS HOT SERVICE INSULATION

A. Install insulation materials with field or factory applied ASTM C 1136 Type I laminated vapor barrier jacket unless otherwise specified.

B. Canvas Jackets on Piping, Fittings, Valves, Flanges, Unions, and Irregular Surfaces:
   1. For piping 2 inch size and smaller: 4 oz per sq yd unless otherwise specified.
   2. For piping over 2 inch size: 6 oz per sq yd unless otherwise specified.

C. Piping:
   1. Butt insulation joints together.
   2. Continuously seal joints with minimum 1-1/2 inch wide self-sealing longitudinal jacket laps and 3-inch wide butt adhesive backed strips, or 3 inch wide pressure sensitive sealing tape of same material as jacket.
   3. Fill voids in insulation at hanger with insulating cement.
   4. Exceptions:
      a. Piping in Accessible Shafts, Attic Spaces, Crawl Spaces, Unfinished Spaces, and Concealed Piping: Butt insulation joints together and secure with minimum 1-1/2" wide longitudinal jacket laps and 3 inch wide butt strips of same material as jacket, with outward clinching staples on maximum 4 inch centers. Fill voids in insulation at hangers with insulating cement.
      b. Piping in Tunnels: Butt insulation joints together and secure with minimum 1-1/2" wide longitudinal jacket laps and 3 inch wide butt strips, of same material as jacket, with outward clinching staples on maximum 4 inch centers and 16 gage wires a minimum of 4 loops per section. Fill voids in insulation with insulating cement.
   5. Fittings, Valves, Flanges and Irregular Surfaces:
      a. Insulate with mitre cut or pre-molded fitting insulation of same material and thickness as adjoining pipe insulation.
      b. Secure insulation in place with 16 gage wire, with ends twisted and turned down into insulation.
      c. Butt fitting, valve, and flange insulation against pipe insulation and bond with insulating cement.
      d. Insulate valves up to and including bonnets, without interfering with packing nuts.
      e. Apply leveling coat of insulating cement to smooth out insulation and cover wiring.
      f. When insulating cement has dried, coat insulated surface with lagging adhesive, and apply 4 oz. or 6 oz. canvas jacket as required by pipe size.
         1) Lap canvas jacket on itself and adjoining pipe insulation at least 2 inches.
         2) Size entire canvas jacket with lagging adhesive.
      g. Exceptions:
         1) Insulate fittings, valves, and irregular surfaces 3 inch size and smaller with insulating cement covered with 4 oz or 6 oz canvas jacket as required by pipe size. Terminate pipe insulation adjacent to flanges and unions with insulating cement, troweled down to pipe on a bevel.
         2) Sizing of canvas surface is not required on fittings, valves, flanges, and irregular surfaces in concealed piping, piping in accessible shafts, attic spaces, crawl spaces, unfinished spaces, and tunnels.
   6. Fittings, Valves, Flanges and Irregular Surfaces - Alternate:
      a. Apply one piece pre-molded PVC fitting covers with fibrous glass insulation inserts with galvanized coated tack fasteners. Tape circumferential joint between insulation and premolded fitting cover with 2 inch wide pressure sensitive polyvinyl tape.

1) Exception: Provide additional insulation inserts on service operating at over 250 degrees F or where insulation thickness exceeds 1-1/2 inches. Ensure that insulation is adequate to prevent PVC fitting jacket temperature from exceeding 150 degrees F.

3.06 SCHEDULE OF PIPING INSULATION

A. Insulate all cold service and hot service piping, and appurtenances except where otherwise specified.

B. Plumbing Piping Systems:
   1. Domestic Hot Water Supply (105 to 140 degrees F):
      a. Glass Fiber Insulation:
         1) Pipe Size Range: Up to 1-1/2 inch.
            (a) Thickness: 1 inch.
         2) Pipe Size Range: Over 1-1/2 inch.
            (a) Thickness: 2 inch.
   2. Domestic Hot Water Recirculation:
      a. Glass Fiber Insulation:
         1) Pipe Size Range: All sizes.
            (a) Thickness: 1 inch.
   3. Domestic Cold Water:
      a. Glass Fiber Insulation:
         1) Pipe Size Range: All sizes.
            (a) Thickness: 1/2 inch.
   4. Roof Drain Bodies:
      a. Glass Fiber Insulation:
         1) Thickness: 1 inch.
   5. Roof Drainage Within 10 Feet of the Exterior:
      a. Glass Fiber Insulation:
         1) Pipe Size Range: All sizes.
            (a) Thickness: 1 inch.
   6. Roof Drainage Run Horizontal at Roof Level:
      a. Glass Fiber Insulation:
         1) Pipe Size Range: All sizes.
            (a) Thickness: 1 inch.
   7. Plumbing Vents Within 10 Feet of the Exterior:
      a. Glass Fiber Insulation:
         1) Pipe Size Range: All sizes.
            (a) Thickness: 1 inch.

C. Schedule of Items Not to be Insulated:
   1. Chrome plated piping, unless otherwise specified.
   2. Water heater blow-off piping.
   3. Air vents, pressure reducing valves, pilot lines, safety valves, relief valves.
   4. Piping buried in the ground, unless otherwise specified herein.
   5. Items installed by others, unless otherwise specified herein.
   6. Sanitary drainage piping, unless otherwise specified herein.
   7. Sprinkler and standpipe piping, unless otherwise specified.

END OF SECTION

SECTION 22 1005
PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe, pipe fittings, valves, and connections for piping systems.
   1. Sanitary sewer.
   2. Domestic water.
   3. Storm water.
   4. Flanges, unions, and couplings.
   5. Pipe hangers and supports.

1.02 RELATED REQUIREMENTS

A. Section 22 0553 - Plumbing Identification.

B. Section 22 0719 - Plumbing Piping Insulation.

1.03 REFERENCE STANDARDS

A. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2021.

B. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.

C. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.

D. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings: DWV; 2021.

E. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder-Joint Drainage Fittings—DWV; 2022.

F. ASME B31.1 - Power Piping; 2022.

G. ASME B31.9 - Building Services Piping; 2020.

H. ASME BPVC-IV - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers; 2023.

I. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.

J. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2021.

K. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2023a.

L. ASTM B32 - Standard Specification for Solder Metal; 2020.

M. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2022.

N. ASTM B306 - Standard Specification for Copper Drainage Tube (DWV); 2020.

O. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2020a.

P. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2021a.

Q. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series); 2020.

R. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40; 2023.

S. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2020.

T. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2020.

U. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets; 2020.

V. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2021.

W. AWWA C651 - Disinfecting Water Mains; 2014, with Addendum (2020).

X. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2021.

Y. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2020.

Z. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).

AA. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010, with Errata .

BB. MSS SP-139 - Copper alloy gate, globe, angle and check valve for low pressure/low temperature plumbing applications; 2010.

CC. NSF 61 - 2003e Drinking water system components - Health effects.

1.04 SUBMITTALS

A. See Section 01 3000 - Submittal Procedures

B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.

1.05 QUALITY ASSURANCE

A. Valves: Manufacturer's name and pressure rating marked on valve body.

B. Welding Materials and Procedures: Conform to ASME (BPV IX) and applicable state labor regulations.

C. Welder Qualifications: Certified in accordance with ASME (BPV IX).

D. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.07 FIELD CONDITIONS

A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.01 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Cast Iron Pipe: ASTM A74 service weight.
   1. Fittings: Cast iron.
   2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C 564 neoprene gaskets.

B. PVC Pipe: ASTM D2665 or ASTM D3034.
   1. Fittings: PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.02 SANITARY SEWER PIPING, ABOVE GRADE

A. Cast Iron Pipe: ASTM A74, service weight.
   1. Fittings: Cast iron.
   2. Joint Seals: ASTM C 564 neoprene gaskets.

B. Cast Iron Pipe: CISPI 301, hubless, service weight.
   1. Fittings: Cast iron.
   2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.

C. Copper Tube: ASTM B306, DWV.
   1. Fittings: ASME B16.29, wrought copperor ASME B16.32 sovent.
   2. Joints: ASTM B32, alloy Sn50 solder.

D. PVC Pipe: ASTM D1785 Schedule 40, or ASTM D2241 SDR 26 with not less than 150 psi pressure rating.
   1. Fittings: ASTM D2466, PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.03 WATER PIPING, ABOVE GRADE

A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
   2. Joints: ASTM B32, alloy Sn95 solder.
   3. Joints: Grooved mechanical couplings.

2.04 STORM WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Cast Iron Pipe: ASTM A74 service weight.
   1. Fittings: Cast iron.
   2. Joint Seals: ASTM C 564 neoprene gaskets.

B. PVC Pipe: ASTM D2665 or ASTM D3034.
   1. Fittings: PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.05 STORM WATER PIPING, ABOVE GRADE

A. Cast Iron Pipe: ASTM A74 service weight.
   1. Fittings: Cast iron.
   2. Joint Seals: ASTM C 564 neoprene gaskets.

B. Cast Iron Pipe: CISPI 301, hubless, service weight.
   1. Fittings: Cast iron.
   2. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.

C. PVC Pipe: ASTM D2665 or ASTM D3034.
   1. Fittings: PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.06 FLANGES, UNIONS, AND COUPLINGS

A. Unions for Ferrous Pipe Sizes 3 Inches and Under:
   1. Class 150 malleable iron threaded unions.

B. Unions for Copper Tube and Pipe 2 Inches and Under:
   1. Class 150 bronze unions with soldered joints.

C. Flanges for Pipe Size Over 1 Inch:
   1. Ferrous pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.

2. Copper tube and pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.

D. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.07 PIPE HANGERS AND SUPPORTS

A. All plumbing piping shall be supported in accordance with the Plumbing Code of New York State. Hangers, anchors and supports shall support the piping and the contents of the piping. Hangers and strapping shall be of approved material that will not promote galvanic action.

B. Plumbing Piping - Drain, Waste, and Vent:
   1. Conform to ASME B31.9.
   2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
   3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
   4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
   5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
   6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
   7. Vertical Support: Steel riser clamp.
   8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
   9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

C. Plumbing Piping - Water:
   1. Conform to ASME B31.9.
   2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
   3. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
   4. Hangers for Hot Pipe Sizes 2 Inches to 4 Inches: Carbon steel, adjustable, clevis.
   5. Multiple or Trapeze Hangers: Steel channels with welded supports or spacers and hanger rods.
   6. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded supports or spacers and hanger rods, cast iron roll.
   7. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
   8. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
   9. Vertical Support: Steel riser clamp.
   10. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
   11. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, locknut, nipple, floor flange, and concrete pier or steel support.
   12. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.08 BALL VALVES

A. Manufacturers:
   1. Conbraco Industries: www.conbraco.com.
   2. Nibco, Inc: www.nibco.com.
   3. Milwaukee Valve Company: www.milwaukeevalve.com.
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Construction, 2-1/2 inch and Smaller: MSS SP-110 & MSS SP-139 low lead, Class 150, 400 psi CWP, bronze, two piece body, chrome plated brass ball, full port, teflon seats and stuffing box ring, blow-out proof stem, lever handlewith balancing stops, solder endswith union.

2.09 SWING CHECK VALVES

A. Manufacturers:
   1. Hammond Valve: www.hammondvalve.com.

2. Watts, Inc: www.watts.com.
3. Milwaukee Valve Company: www.milwaukeevalve.com.
4. Substitutions: See Section 01 6000 - Product Requirements.

B. Up to 2 Inches:
1. MSS SP-80 & MSS SP-139 low lead, Class 125, bronze body and cap, bronze swing disc with rubber seat, solder ends.

C. Over 2 Inches:
1. MSS SP-71& MSS SP-139 low lead, Class 125, iron body, bronze swing disc, renewable disc seal and seat, flanged or grooved ends.

2.10 STRAINERS

A. Manufacturers:
1. Watts.: www.watts.com.
2. Substitutions: See Section 01 6000 - Product Requirements.

B. Size 2 inch and Under:
1. Threaded brass body for 175 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
2. MSS SP-139 low lead Class 150, threaded bronze body 300 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.

C. Size 1-1/2 inch to 4 inch:
1. Class 125, flanged iron body, Y pattern with 1/16 inch stainless steel perforated screen.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

D. Install piping to maintain headroom, conserve space, and not interfere with use of space.

E. Group piping whenever practical at common elevations.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 22 0516.

G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Re fert

H. Provide access where valves and fittings are not exposed.

I. Install vent piping penetrating roofed areas to maintain integrity of roof assembly. Terminate at least 18 inches above roof.

J. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

K. Excavate in accordance with Section 31 2316.

L. Backfill in accordance with Section 31 2323.

M. Install bell and spigot pipe with bell end upstream.

N. Install valves with stems upright or horizontal, not inverted.

O. Use non-hardening pipe dope on gas piping threads, do not use thread seal tape.

P. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.

Q. Sleeve pipes passing through partitions, walls and floors.

R. Inserts:
   1. Provide inserts for placement in concrete formwork.
   2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
   3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
   4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
   5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.

S. Pipe Hangers and Supports:
   1. Support horizontal piping as scheduled.
   2. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
   3. Place hangers within 12 inches of each horizontal elbow.
   4. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
   5. Support vertical piping as scheduled.
   6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
   7. Provide copper plated hangers and supports for copper piping.
   8. Prime coat exposed steel hangers and supports. Re fert Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
   9. Provide hangers adjacent to motor driven equipment with vibration isolation; refer to Section 22 0548.
   10. Support cast iron drainage piping at every joint.

3.04 APPLICATION

A. Install unions downstream of valves and at equipment or apparatus connections.

B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

C. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

D. Install ball valves for throttling, bypass, or manual flow control services.

E. Provide lug end butterfly valves adjacent to equipment when provided to isolate equipment.

F. Provide spring loaded check valves on discharge of water pumps.

3.05 TOLERANCES

A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/4 inch per foot slope for pipes 2-1/2" diameter and less, 1/8 inch per foot slope for pipes 3" to 6" in diameter and 1/16 inch per foot slope for pipes 8" and larger in diameter.

B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points with capped drain valves.

3.06 TESTING AND INSPECTIONS

A. New plumbing systems and parts of existing systems that have been altered, extended or repaired shall be tested in accordance with the Plumbing Code of New York State or the authority having jurisdiction to disclose leaks and defects.

B. Pressure test piping systems inside buildings, at the roughing-in stage of installation, before piping is enclosed by construction Work, and at other times as directed. Perform test operations in sections as required and directed, to progress the Work in a satisfactory manner and not delay the general construction of the building. Valve or cap-off sections of piping to be tested, utilizing valves required to be installed in the permanent piping systems, or temporary valves or caps as required to perform the Work.

C. The contractor shall make the applicable tests prescribed below to determine compliance with the provisions of the Plumbing Code of New York State. The contractor shall give reasonable advance notice to the code official when the plumbing work is ready for tests. The equipment, material, power and labor necessary for the inspection and test shall be furnished by the contractor. All plumbing system piping shall be tested with either water or air. Plastic piping shall not be tested with air.

D. Piping shall be tight under test and shall not show loss in pressure or visible leaks, during test operations or after the minimum duration of time as specified. Remove piping which is not tight under test; remake joints and repeat test until no leaks occur.

E. Required Inspections:
   1. Underground inspection shall be made after trenches or ditches are excavated and bedded, piping installed, and before any backfill is put in place.
   2. Rough-in inspection shall be made of completed portions of all sanitary, storm and water distribution piping, after the framing, fireblocking, firestopping, draft-stopping and bracing for that portion is in place, and prior to the installation of wall or ceiling membranes.
   3. Final inspection shall be made after the building is completed, all plumbing fixtures are in place and properly connected, and the structure is ready for occupancy.

F. Drainage and Vent Water Test:
   1. A water test shall be applied to the drainage system either in its entirety or in sections. If applied to the entire system, all openings in the piping shall be tightly closed, except highest opening, and the system shall be filled with water to the point of overflow. If the system is tested in sections, each opening shall be tightly plugged except the highest openings of the section under test, and each section filled with water, but no section shall be tested with less than a 10-foot head of water. In testing successive sections, at least the upper 10-foot of the next proceeding section shall be tested so that no joint or pipe in the building, except the uppermost 10 feet of the system, shall have been submitted to a test of at least 10-foot head of water. Test by filling the entire system with water, and allowing to stand for 3 hours, with no noticeable loss of water.

G. Drainage and Vent Air Test:
   1. An air test shall be made by forcing air into the system until there is a uniform gauge pressure of 5 pounds per square inch (psi) or sufficient to balance a 10-inch column of mercury. This pressure shall be held for a test period of 3 hours with no noticeable loss. Any adjustments to the test pressure required because of changes in ambient temperature or the seating of gaskets shall be made prior to the beginning of the test period.

H. Drainage and Vent Final Test:
   1. After the plumbing fixtures have been set and their traps filled with water, the entire drainage system shall be submitted to final tests. The final test shall be visual and in sufficient detail to determine compliance with the provisions of the Plumbing Code of New York State.

I. Domestic Water (Potable Cold, Domestic Hot and Recirculation) Inside Buildings:

1. Before fixtures, faucets, trim and accessories are connected, perform hydrostatic test at 125 psig minimum for 4 hours.
2. After fixtures, faucets, trim and accessories are connected, perform hydrostatic retest at 75 psig for 4 hours.
3. The water utilized for the tests shall be obtained from a potable water source of supply.

J. Storm Drainage System Test:
1. Storm drainage systems within a building shall be tested by water or air.
2. A water test shall be applied to the drainage system either in its entirety or in sections. If applied to the entire system, all openings in the piping shall be tightly closed, except highest opening, and the system shall be filled with water to the point of overflow. If the system is tested in sections, each opening shall be tightly plugged except the highest openings of the section under test, and each section filled with water, but no section shall be tested with less than a 10-foot head of water. In testing successive sections, at least the upper 10-foot of the next proceeding section shall be tested so that no joint or pipe in the building, except the uppermost 10 feet of the system, shall have been submitted to a test of at least 10-foot head of water. Test by filling the entire system with water, and allowing to stand for 3 hours, with no noticeable loss of water.
3. An air test shall be made by forcing air into the system until there is a uniform gauge pressure of 5 pounds per square inch (psi) or sufficient to balance a 10-inch column of mercury. This pressure shall be held for a test period of 3 hours with no noticeable loss. Any adjustments to the test pressure required because of changes in ambient temperature or the seating of gaskets shall be made prior to the beginning of the test period.

3.07 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. New and repaired potable water systems shall be purged of deleterious matter and disinfected prior to utilization.

B. The method to be followed for the disinfection of potable water systems shall be in accordance with the applicable NYSDOH Regulations.
1. Completely fill the piping, including water storage equipment if installed, with a water solution containing 50 mg/l available chlorine and allow to stand for 24 hours. Operate all valves during this period to ensure their proper disinfection. After the 24 hour period, the chlorine residual shall be 25 mg/l or greater. If not, flush and repeat chlorination procedure.
2. After the retention period, discharge the solution into an approved waste and flush the system thoroughly with potable water until substantially all traces of chlorine are removed. Drain and flush water storage equipment if installed.

C. Collect samples for bacteriological analysis in accordance with AWWA C651.

D. Repeat procedure if bacteriological results are not satisfactory.

E. Submit bacteriological test results to the Architect/Engineer prior to placing the system in service. Prevent re-contamination of the piping during this phase of the work.

3.08 SCHEDULES

A. Pipe Hanger Spacing.
1. Cast Iron Piping
a. All Sizes:
1) Maximum Horizontal Spacing: 5 ft. (May be increased to 10 ft. where 10-foot pipe lengths are installed.)
2) Maximum Vertical Spacing: 15 ft.
2. Copper or Copper-Alloy Tubing.
a. 1-1/4" diameter and smaller:
1) Maximum Horizontal Spacing: 6 ft.
2) Maximum Vertical Spacing: 10 ft.
b. 1-1/2" diameter and larger:

1) Maximum Horizontal Spacing: 10 ft.
2) Maximum Vertical Spacing: 10 ft.

3. PVC Pipe.
   a. All Sizes:
      1) Maximum Horizontal Spacing: 4 ft.
      2) Maximum Vertical Spacing: 10 ft. (midstory guide for sizes 2" and smaller)
4. Steel Pipe.
   a. All Sizes:
      1) Maximum Horizontal Spacing: 12 ft.
      2) Maximum Vertical Spacing: 15 ft.

END OF SECTION

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SECTION 22 1006
PLUMBING PIPING SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Roof Drains.
B. Floor drains.
C. Cleanouts.
D. Hydrants.
E. Water hammer arrestors.
F. Sanitary waste interceptors.

1.02 RELATED REQUIREMENTS

A. Section 22 1005 - Plumbing Piping.
B. Section 22 4000 - Plumbing Fixtures.

1.03 REFERENCE STANDARDS

A. ASME A112.6.3 - Floor and Trench Drains; 2019.
B. NSF 61 - Drinking Water System Components - Health Effects; 2022, with Errata.
C. PDI-WH 201 - Water Hammer Arresters; 2017.

1.04 SUBMITTALS

A. See Section 01 3000 - Submittal Procedures.
B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
C. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.
D. Manufacturer's Instructions: Indicate Manufacturer's Installation Instructions: Indicate assembly and support requirements.
E. Project Record Documents: Record actual locations of equipment, cleanouts, backflow preventers, and water hammer arrestors.
F. Operation Data: Indicate frequency of treatment required for interceptors.
G. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept specialties on site in original factory packaging. Inspect for damage.

PART 2 PRODUCTS

2.01 DRAINS

A. Roof Drains, (SD-1):
   1. Assembly: ASME A112.6.4.
   2. Body: Lacquered cast iron with large sump, anchor flange and bottom outlet.
   3. Strainer: Removable polyethylene domewith vandal proof screws.
   4. Accessories: Coordinate with roofing type.
      a. Membrane flange and WEJLOC non-puncturing membrane clamp ring with integral gravel stop.
      b. Adjustable under deck clamp.
      c. Roof sump receiver.
      d. Drain extension for roof insulation to be determined by contractor.

e. Adjustable extension sleeve for roof insulation.
5. Provide drain with 3" outlet or as indicated on drawings.
6. Manufacturers:
a. Watts Model RD-100.
b. Josam Company: www.josam.com.
c. Jay R. Smith Manufacturing Company: www.jayrsmith.com.
d. Zurn Industries, Inc: www.zurn.com.
e. Substitutions: See Section 01 6000 - Product Requirements.

B. Floor Drain (FD-7):
1. 4"x4" Floor drain with an integrated bonding flange that provides a large contact area for a secure connection to the waterproofing membrane at the top of the assembly. Provide Drain with 2" or 3" outlet and trap below floor as indicated on the drawings.
2. Manufacturers:
a. Schluter Systems; Model KERDI-DRAIN: www.schluter.com
b. Substitutions: See Section 01 6000 - Product Requirements.
3. Accessories: Floor drain trap seal.
a. Manufacturers:
1) Zurn Industries, Inc: www.zurn.com.
2) Sure Seal Manufacturing; Model SS3000: www.thesureseal.com.
3) Substitutions: See Section 01 6000 - Product Requirements.

C. Floor Drain (FD-17):
1. ASME A112.6.3; epoxy coated cast iron two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable nickel-bronze strainer. Provide drain with 3" outlet and trap below floor, or as indicated on drawings.
2. Manufacturers:
a. Josam Company: www.josam.com.
b. Watts Water Technologies; Model FD-100-L: www.watts.com.
c. Zurn Industries, Inc; Model ZN-415: www.zurn.com.
d. Substitutions: See Section 01 6000 - Product Requirements.
3. Accessories: Floor drain trap seal.
a. Manufacturers:
1) Zurn Industries, Inc: www.zurn.com.
2) Sure Seal Manufacturing; Model SS3000: www.thesureseal.com.
3) Substitutions: See Section 01 6000 - Product Requirements.

2.02 CLEANOUTS

A. Manufacturers:
1. Jay R. Smith Manufacturing Company: www.jayrsmith.com/#sle.
2. Josam Company: www.josam.com/#sle.
3. Watts Water Technologies; Model RD-940: www.watts.com.
4. Zurn Industries, Inc: www.zurn.com/#sle.
5. Substitutions: See Section 01 6000 - Product Requirements.

B. Cleanouts at Interior Finished Floor Areas (FCO):
1. Round cast nickel bronze access frame and non-skid cover, coated cast iron cleanout ferrule. Tapered thread. Bronze plug.
2. Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round gasketed scored flush cover.
3. Provide wrench for plug removal.

C. Cleanouts at Interior Finished Wall Areas (WCO):
1. Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.

2.03 HYDRANTS

A. Manufacturers:
   1. Jay R. Smith Manufacturing Company: www.jayrsmith.com/#sle.
   2. Zurn Industries, Inc: www.zurn.com/#sle.
   3. Watts Water Technologies: www watts.com
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Exterior Wall Hydrants (WH-1):
   1. ASSE 1019; freeze resistant, self-draining type with nickel bronze lockable recessed box. 3/4" hose thread spout, lockshield and removable key, and integral vacuum breaker.
   2. Watts Water Technologies, Model HY-725; or approved equal.

2.04 WATER HAMMER ARRESTORS

A. Manufacturers:
   1. Precision Plumbing Products, Inc : www.pppinc.net
   2. Watts Regulator Company: www.watts.com.
   3. Zurn Industries, Inc: www.zurn.com/#sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Water Hammer Arrestors:
   1. Copper construction, piston type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range 34 to 250 degrees F and maximum 150 psi working pressure.

2.05 SANITARY WASTE INTERCEPTORS

A. Manufacturers:
   1. Jay R. Smith Manufacturing Company: www.jrsmith.com/.
   2. Zurn Industries, LLC: www.zurn.com/.
   3. Highland Tank; Model AGI-35 FM: www.highlandtank.com.
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Grease Interceptors:
   1. Construction:
      a. Rough-in: Fully recessed (shallow rough-in) with anchor flange.
      b. Cover: Steel, epoxy coated, non-skid with gasket, securing handle, and enzyme injection port, recessed for floor finish.
   2. Constructed of 304 stainless steel for maximum strength and durability
   3. Hinged non-skid deck plate cover for ease of maintenance
   4. Extra-heavy leak-proof gaskets
   5. Locking system to secure the cover to prevent accidental lid closure
   6. Automatic grease removal system featuring electrically-powered grease diskimmers
   7. Dry electric compartment with internal lid to protect the electronics and power connections
   8. Grease storage compartment with removable container with high-level alarm
   9. Integral perimeter channel to allow floor wash-down to drain into the grease interceptor
   10. Integrated flow control device
   11. Removable solids strainer basket
   12. Electrical
      a. 20 amp GFCI receptacle

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.

C. Install floor cleanouts at elevation to accommodate finished floor.

D. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to each fixture or group of fixtures.

END OF SECTION

SECTION 22 3000
PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water Heaters:
   1. Commercial electric.

B. In-line circulator pumps.

1.02 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittals procedures.

B. Product Data:
   1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
   2. Indicate pump type, capacity, power requirements.
   3. Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
   4. Provide electrical characteristics and connection requirements.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

PART 2 PRODUCTS

2.01 WATER HEATERS

A. Commercial Electric (WH-1):
   1. Type: Factory-assembled and wired, electric, vertical storage.
   2. Performance:
      a. Storage Capacity: 119 gal.
      b. Heating Element Size: 12 kW.
      c. Number of Heating Elements: 2.
      d. Maximum Working Pressure: 150 psig.
   3. Electrical Characteristics:
      a. 208 volts, three phase, 60 Hz.
   4. Tank: Welded steel ASME labeled pressure vessel; glass lining, mounted on steel channel base with lifting lugs, insulated with 2 inch glass fiber; enclosed with 16 gauge, 0.0598 inch steel jacket; baked enamel finish.
   5. Controls: Ventilated control cabinet, factory-wired with solid state progressive sequencing step controller, fuses, magnetic contactors, control transformer, pilot lights indicating main power and heating steps, control circuit toggle switch, electronic low-water (probe-type) cut-off, high temperature limit thermostat, flush-mounted temperature and pressure gauges.
   6. Heating Elements: Flange-mounted immersion elements; individual elements sheathed with Incoloy corrosion-resistant metal alloy, rated less than 75 W/sq in.

B. Commercial Electric (WH-2):
   1. Type: Factory-assembled and wired, electric, vertical storage.
   2. Performance:
      a. Storage Capacity: 6 gal.
      b. Heating Element Size: 6 kW.
      c. Number of Heating Elements: 1.
      d. Maximum Working Pressure: 150 psig.
   3. Electrical Characteristics:
      a. 208 volts, three phase, 60 Hz.

4. Tank: Welded steel ASME labeled pressure vessel; glass lining, mounted on steel channel base with lifting lugs, insulated with 2 inch glass fiber; enclosed with 16 gauge, 0.0598 inch steel jacket; baked enamel finish.
5. Controls: Ventilated control cabinet, factory-wired with solid state progressive sequencing step controller, fuses, magnetic contactors, control transformer, pilot lights indicating main power and heating steps, control circuit toggle switch, electronic low-water (probe-type) cut-off, high temperature limit thermostat, flush-mounted temperature and pressure gauges.
6. Heating Elements: Flange-mounted immersion elements; individual elements sheathed with Incoloy corrosion-resistant metal alloy, rated less than 75 W/sq in.

2.02 IN-LINE CIRCULATOR PUMPS

A. Manufacturers:
   1. Armstrong Fluid Technology: www.armstrongfluidtechnology.com/
   2. Bell & Gossett, a brand of Xylem, Inc; Model: ecocirc e3-6V: www.bellgossett.com/
   3. Substitutions: See Section 01 6000 - Product Requirements.

B. Casing: Bronze, rated for 125 psig working pressure, with stainless steel rotor assembly.

C. Impeller: Bronze.

D. Shaft: Alloy steel with integral thrust collar and two oil lubricated bronze sleeve bearings.

E. Seal: Carbon rotating against a stationary ceramic seat.

F. Drive: Flexible coupling.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.

B. Coordinate with plumbing piping and related electrical work to achieve operating system.

C. Pumps:
   1. Provide line sized isolating valve and strainer on suction and line sized soft seated check valve and balancing valve on discharge.
   2. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

END OF SECTION

SECTION 22 4000
PLUMBING FIXTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flush valve water closets.

B. Lavatories.

C. Sinks.

D. Under-lavatory pipe supply covers.

E. Bi-level, electric water coolers.

F. Mop sinks.

1.02 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. ASHRAE Std 18 - Methods of Testing for Rating Drinking-Water Coolers with Self-Contained Mechanical Refrigeration; 2008 (Reaffirmed 2013).

C. ASME A112.6.1M - Floor-Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use; 1997 (Reaffirmed 2017).

D. ASME A112.18.1 - Plumbing Supply Fittings; 2018, with Errata.

E. ASME A112.18.9 - Protectors/Insulators for Exposed Waste and Supplies on Accessible Fixtures; 2011 (Reaffirmed 2022).

F. ASME A112.19.2 - Ceramic Plumbing Fixtures; 2018, with Errata.

G. ASME A112.19.5 - Flush Valves and Spuds for Water Closets, Urinals, and Tanks; 2022.

H. ASSE 1070 - Performance Requirements for Water Temperature Limiting Devices; 2020.

I. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

J. NSF 61 - Drinking Water System Components - Health Effects; 2022, with Errata.

K. NSF 372 - Drinking Water System Components - Lead Content; 2022.

L. UL (DIR) - Online Certifications Directory; Current Edition.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

C. Manufacturer's Instructions: Indicate installation methods and procedures.

D. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Accept fixtures on-site in factory packaging. Inspect for damage.

B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.05 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Provide five year manufacturer warranty for electric water cooler.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 REGULATORY REQUIREMENTS

A. Comply with applicable codes for installation of plumbing systems.

B. Comply with UL (DIR) requirements.

C. Perform work in accordance with local health department regulations.

D. Provide certificate of compliance from Authority Having Jurisdiction indicating approval of installation.

2.03 FLUSH VALVE WATER CLOSETS (WC-1, WC-1A)

A. Water Closets:
   1. Vitreous china, ASME A112.19.2, wall hung, siphon jet flush action, china bolt caps.
   2. Flush Valve: Exposed (top spud).
   3. Flush Operation: Sensor operated.
   4. Handle Height: 44 inches or less.
   5. Manufacturers:
      a. American Standard, Inc; AFWALL: www.americanstandard-us.com/#sle.
      b. Kohler Company: www.kohler.com/#sle.
      c. Zurn Industries, LLC: www.zurn.com/#sle.
      d. Substitutions: See Section 01 6000 - Product Requirements.

B. Flush Valves:
   1. Valve Supply Size: 1 inch.
   2. Valve Outlet Size: 1-1/2 inches.
   3. Manufacturers:
      a. American Standard, Inc: www.americanstandard-us.com/#sle.
      b. Sloan Valve Company; 8111-1.28: www.sloanvalve.com/#sle.
      c. Zurn Industries, LLC: www.zurn.com/#sle.
      d. Substitutions: See Section 01 6000 - Product Requirements.
   4. Sensor-Operated:
      a. Type: ASME A112.19.5; chloramine-resistant clog-resistant dual-seat diaphragm valve complete with vacuum breaker, stops and accessories.
      b. Mechanism: Solenoid-operated piston or electronic motor-actuated operator with low-voltage powered infrared sensor, and mechanical override or override push button.
      c. Supplied Volume Capacity: 1.28 gal per flush.

C. Toilet Seats:
   1. Manufacturers:
      a. American Standard, Inc: www.americanstandard-us.com/#sle.
      b. Church Seat Company; 295CT: www.churchseats.com/#sle.
      c. Zurn Industries, LLC: www.zurn.com/#sle.
      d. Substitutions: See Section 01 6000 - Product Requirements.
   2. Plastic: Solid, white finish, enlongated shape, open front, slow-closing hinged seat cover, extended back complete with self-sustaining hinges, and brass bolts with covers.
   3. Plastic: Black finish, open front, extended back, self-sustaining hinge, brass bolts, with cover.

D. Water Closet Carriers:
   1. Manufacturers:
      a. Jay R. Smith Manufacturing Company: www.jrsmith.com/#sle.

b. Zurn Industries, LLC; Z1201-N: www.zurn.com/#sle.
c. Substitutions: See Section 01 6000 - Product Requirements.

2. ASME A112.6.1M; adjustable cast iron frame, integral drain hub and vent, adjustable spud, lugs for floor and wall attachment, threaded fixture studs with nuts and washers.

2.04 LAVATORIES (LAV-1, LAV-1A)

A. Manufacturers:
1. American Standard, Inc; Lucerne: www.americanstandard-us.com/#sle.
2. Kohler Company: www.kohler.com/#sle.
3. Zurn Industries, LLC: www.zurn.com/#sle.

B. Wall-Hung Basin:
1. Vitreous China: ASME A112.19.2; white, rectangular basin with splash lip, front overflow, soap depression, and hanger. Size as indicated on drawings with 4-inch centerset spacing.
2. Carrier:
a. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded studs for fixture hanger, bearing plate and studs.
b. Manufacturers:
1) Jay R. Smith MFG. Co: www.jrsmith.com/#sle.
2) Zurn Industries, LLC; Z1231: www.zurn.com/#sle.
3) Substitutions: See Section 01 6000 - Product Requirements.

C. Supply Faucet:
1. Deck Mounted Faucet Manufacturers:
a. American Standard, Inc: www.americanstandard-us.com/#sle.
b. Zurn Industries, LLC: www.zurn.com/#sle.
c. Chicago Faucet Co.; Model 116.976.AB.1: www.chicagofaucets.com.
2. ASME A112.18.1; chrome plated combination supply fitting with pop-up waste, water economy aerator with maximum flow of 2.2 gpm, indexed handles.

D. Sensor Operated Faucet:
1. Cast brass, chrome plated, deck mounted with sensor located on neck of spout.
2. Spout Style: Standard.
3. Power Supply:
a. Wired: 6 VDC, field-wired into dedicated or common power supply.
b. Wireless:
1) Battery: Replaceable alkaline or lithium type with 200,000 cycles, minimum.
2) Light Cell: Photovoltaic or infra-red cell that transforms both sunlight and artificial light into electrical energy for use and battery charging.
3) Low Battery Warning: Provide red or yellow colored indicator to light periodically at 30 days of remaining capacity and continuously 2 weeks prior to get fully discharged.
4. Mixing Valve: None, single line for tempered water.
5. Water Supply: 3/8 inch compression connections.
6. Aerator: Vandal resistant, 0.5 gpm, laminar flow device.
7. Finish: Polished chrome.

E. Thermostatic Mixing Valve:
1. Provide for each faucet an Anti-scalding point of use lead free adjustable thermostatic mixing valve to conform to NYS plumbing code 419.5 and ASSE 1070. Built -in check valve and low pressure drop.
a. Manufacturer: Watts. Model LFUSG-B M3
b. Substitutions: See Section01 6000-Product Requirements.

F. Accessories:

1. Chrome-plated 17 gauge, 0.0538 inch brass P-trap with clean-out plug and arm with escutcheon.

2.05 SINKS

A. Sink (SK-1)
   1. Manufacturers:
      a. American Standard, Inc: www.americanstandard-us.com/
      b. Just Manufacturing Company: www.justmfg.com
      c. Elkay; Model LRAD191965: www.elkay.com
      d. Substitutions: See Section 01 6000 - Product Requirements.
   2. Single Compartment Bowl: 19 1/2” by 19 by 6 1/2” inch outside dimensions 18 gauge, 0.05 inch thick, Type 304 stainless steel, undermount with Intgra-Drain integral drain system.
   3. Supply Faucet Manufacturers:
      a. American Standard, Inc: www.americanstandard-us.com
      b. Zurn Industries, Inc: www.zurn.com
      c. Chicago Faucet Co.; Model W8D-DB6AE35-317AB: www.chicagofaucets.com
      d. Substitutions: See Section 01 6000 - Product Requirements.
   4. Manual Operated Faucet: Cast brass, chrome plated, deck mounted with 4” wristblade handle
      a. Spout Style: Standard
      b. Water Supply: 1/2 inch compression connections.
      c. Aerator: 1.5 GPM, Softflo device.
   5. Accessories:
      a. Provide for each faucet an Anti-scalding point of use lead free adjustable thermostatic mixing valve to conform to NYS plumbing code 419.5 and ASSE 1070. Built -in check valve and low pressure drop.
         1) Manufacturer: Watts. Model LFUSG-B M3
         2) Substitutions: See Section01 6000-Product Requirements.

B. Sink (SK-2)
   1. Manufacturers:
      a. American Standard, Inc: www.americanstandard-us.com/
      b. Just Manufacturing Company: www.justmfg.com.
      c. Elkay; Model DRKAD371755RC: www.elkay.com
      d. Substitutions: See Section 01 6000 - Product Requirements.
   2. Stainless Steel 37-1/4" x 17" x 5-1/2" Double Bowl Drop-in Classroom ADA Sink Kit. Sink is manufactured from 18 gauge 304 Stainless Steel with a Lustrous Satin finish, Center drain placement, and Bottom only pads.
   3. Supply Faucet Manufacturers:
      a. Elkay; Model LKD2439C: www.elkay.com
      b. Substitutions: See Section 01 6000 - Product Requirements.
   4. Bubbler Manufacturers:
      a. Elkay; Model LK1141A: www.elkay.com
      b. Substitutions: See Section 01 6000 - Product Requirements.
   5. Accessories:
      a. 3 1/2" Drain Fitting LK35
      b. 2" Drain Fitting LK8
      c. Provide for each faucet an Anti-scalding point of use lead free adjustable thermostatic mixing valve to conform to NYS plumbing code 419.5 and ASSE 1070. Built -in check valve and low pressure drop.
         1) Manufacturer: Watts. Model LFUSG-B M3
         2) Substitutions: See Section01 6000-Product Requirements.

C. Sink (SK-3)

1. Manufacturers:
    a. American Standard, Inc: www.americanstandard-us.com/
    b. Just Manufacturing Company: www.justmfg.com.
    c. Griffin Products, inc; Model PNSU.1(56x16.5x5.5)-PS: www.griffinproducts.com
    d. Substitutions: See Section 01 6000 - Product Requirements.
2. Single Compartment Bowl: ; 16 1/2 by 56 by 5 1/2 inch outside dimensions 16 gauge, 0.0625 inch thick, Type 304 stainless steel, undermount with 3 1/2 drain hole.
    a. Drain: 3-1/2 inch crumb cup and tailpiece.
3. Supply Faucet Manufacturers (3 faucets):
    a. American Standard, Inc: www.americanstandard-us.com
    b. Zurn Industries, Inc: www.zurn.com
    c. Chicago Faucets; Model 786-GN8AE3ABCP: www.chicagofaucets.com
    d. Substitutions: See Section 01 6000 - Product Requirements.
4. Manual Faucet: 8" fixed Centers 8" rigid/swing gooseneck spout, chrome plated, deck mounted, 4" metal vandal-proof wristblade handles.
    a. Spout Style: Standard
    b. Aerator: 2.2 GPM, laminar flow device.
5. Accessories:
    a. Provide for each faucet an Anti-scalding point of use lead free adjustable thermostatic mixing valve to conform to NYS plumbing code 419.5 and ASSE 1070. Built -in check valve and low pressure drop.
        1) Manufacturer: Watts. Model LFUSG-B M3
        2) Substitutions: See Section01 6000-Product Requirements.

2.06 UNDER-LAVATORY PIPE SUPPLY COVERS

A. General:
1. Insulate exposed drainage piping including hot, cold and tempered water supplies under lavatories or sinks per ADA Standards.
2. Construction: 1/8 inch PVC with antimicrobial, antifungal and UV resistant properties.
    a. Comply with ASME A112.18.9 for covers on accessible lavatory piping.
    b. Comply with ICC A117.1.

2.07 BI-LEVEL, ELECTRIC WATER COOLERS (EWC-2)

A. Manufacturers:
1. Elkay Manufacturing Company; LZSTL8WSSK: www.elkay.com/#sle.
2. Substitutions: See Section 01 6000 - Product Requirements.

B. Water Cooler: Bi-level, electric, mechanically refrigerated; surface mounted, ADA compliant; stainless steel top, vinyl on steel body, elevated anti-squirt bubbler with stream guard, automatic stream regulator, push button, mounting bracket; integral air cooled condenser and stainless steel grille.
1. Capacity: 8 gph of 50 degrees F water with inlet at 80 degrees F and room temperature of 90 degrees F, when tested in accordance with ASHRAE Std 18.
2. Electrical: 115 VAC, 60 Hertz compressor, 6 foot cord and plug for connection to electric wiring system including grounding connector.

C. Bottle Filler: Materials to match fountain.

2.08 MOP SINKS (JS-1)

A. Manufacturers:
1. Acorn Engineering Company: www.acorneng.com/#sle.
2. FIAT; Model TSBC1610: www.fiatproducts.com.
3. Substitutions: See Section 01 6000 - Product Requirements.

B. Material: Precast terrazzo composed of marble chips cast in Portland cement.

C. Type: Rectilinear, drop front.

D. Tiling Flange Construction: Galvanized steel.

E. Grid strainer: Stainless steel; integral; removable.

F. Dimensions: As indicated on drawings.

G. Accessories:
   1. 5 feet of 1/2 inch diameter plain end reinforced plastic hose.
   2. Hose clamp hanger.
   3. Mop hanger.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.

B. Verify that electric power is available and of the correct characteristics.

C. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.02 PREPARATION

A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.03 INSTALLATION

A. Install components level and plumb.

3.04 INTERFACE WITH WORK OF OTHER SECTIONS

A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.05 CLEANING

A. Clean plumbing fixtures and equipment.

3.06 PROTECTION

A. Protect installed products from damage due to subsequent construction operations.

B. Repair or replace damaged products before Date of Substantial Completion.

3.07 SCHEDULES

A. Fixture Heights: Install fixtures to heights above finished floor as indicated.
   1. Water Closet:
      a. Standard: 15 inches to top of bowl rim.
      b. Accessible: 18 inches to top of seat.
   2. Water Closet Flush Valves:
      a. Standard: 11 inches min. above bowl rim.
   3. Lavatory:
      a. Standard: 31 inches to top of basin rim.
      b. Accessible: 34 inches to top of basin rim.
   4. Drinking Fountain:
      a. Standard Adult: 40 inches to top of basin rim.
      b. Accessible: 36 inches to top of spout.

B. Fixture Rough-In
   1. Water Closet (Flush Valve Type):
      a. Cold Water: 1 Inch.
      b. Waste: 4 Inch.
      c. Vent: 2 Inch.
   2. Lavatory:
      a. Hot Water: 1/2 Inch.

b. Cold Water: 1/2 Inch.
c. Waste: 1-1/2 Inch.
d. Vent: 1-1/4 Inch.

3. Sink:
   a. Hot Water: 1/2 Inch.
   b. Cold Water: 1/2 Inch.
   c. Waste: 1-1/2 Inch.
   d. Vent: 1-1/4 Inch.
4. Service Sink:
   a. Hot Water: 1/2 Inch.
   b. Cold Water: 1/2 Inch.
   c. Waste: 3 Inch.
   d. Vent: 1-1/2 Inch.
5. Drinking Fountain:
   a. Cold Water: 1/2 Inch.
   b. Waste: 1-1/4 Inch.
   c. Vent: 1-1/4 Inch.

END OF SECTION

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SECTION 23 0510
BASIC MECHANICAL REQUIREMENTS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide all labor, tools, materials, accessories, parts, transportation, taxes, and related items, essential for installation of the work and necessary to make work complete and operational. Provide new equipment and material unless otherwise called for. References to codes, specifications, and standards called for in the specification sections and on the drawings mean the latest edition, amendment, and revision of such referenced standard in effect on the date of these contract documents.

1.02 LICENSING

A. The Contractor shall hold a license to perform the work as issued by the local jurisdiction.

B. The Contractor shall be responsible for reviewing the local jurisdiction requirements prior to bidding.

1.03 PERMITS

A. Apply for and obtain all required permits and inspections, pay all fees and charges including all service charges.

1.04 CODE COMPLIANCE

A. Provide work in compliance with the following:
   1. The Building Code of New York State including The Fire Code; Property Maintenance Code; Plumbing Code, Mechanical Code and Fuel Gas Code; and The Energy Code of New York.
   2. New York State Department of Labor Rules and Regulations.
   3. Occupational Safety and Health Administration (OSHA).
   4. National Fuel Gas Code, NFPA 54.
   5. National Electrical Code, NFPA 70.
   6. Local Codes and Ordinances.
   7. Life Safety Codes, NFPA 101 (2003).
   8. New York Board of Fire Underwriters.
   9. New York State Education Department “Manual of Planning Standards”.
   10. Part 4 of Title 12 Rules and Regulations of the State of New York Industrial Code Rule No. 4 (12NYCRR4).

1.05 GLOSSARY

A. AGA American Gas Association

B. AIA American Institute of Architects

C. AFBMA Anti-Friction Bearing Manufacturer’s Association

D. AMCA Air Moving and Conditioning Association, Inc.

E. ANSI American National Standards Institute

F. ARI Air Conditioning and Refrigeration Institute

G. ASHRAE American Society of Heating, Refrigeration, and Air Conditioning Engineers, Inc.

H. ASME American Society of Mechanical Engineers

I. ASPE American Society of Plumbing Engineers

J. ASTM American Society for Testing Materials

K. IBR Institute of Boiler & Radiation Manufacturers

L. IEEE Institute of Electrical and Electronics Engineers

M. NYBFU New York Board of Fire Underwriters

N. NEC National Electrical Code
O. NEMA National Electrical Manufacturer's Association
P. NESC National Electrical Safety Code
Q. NFPA National Fire Protection Association
R. NYS/DEC New York State Department of Environmental Conservation
S. SMACNA Sheet Metal and Air Conditioning Contractors National Association
T. UFPO Underground Facilities Protective Organization
U. UL Underwriter's Laboratories, Inc.
V. OSHA Occupational Safety and Health Administration
W. NYS/UFPBC New York State Uniform Fire Prevention and Building Code

1.06 DEFINITIONS

A. Acceptance: Owner acceptance of the project from Contractor upon certification by Owner's Representative.
B. Approval/approved written permission to use a material or system.
C. As Called for Materials: Equipment including the execution specified/shown in the contract documents.
D. Code requirements: Minimum requirements.
E. Concealed Work: Installed in pipe and duct shafts, chases or recesses, inside walls, above ceilings, in slabs or below grade.
F. Design Equipment: Refer to the article, Equipment Arrangements, and the article, Substitutions.
G. Design Make: Refer to the articles, Equipment Arrangements, and the article, Substitutions.
H. Exposed Work not identified as concealed.
I. Equal or Equivalent: Equally acceptable as determined by Owner's Representative.
J. Furnish: Supply and deliver to installed location.
K. Furnished by Others: Receive delivery at job site or where called for and install.
L. Inspection: Visual observations by Owner's Site Representative.
M. Install: Mount and connect equipment and associated materials ready for use.
N. Labeled Refers to classification by a standards agency.
O. Make: Refers to the article, Equipment Arrangements, and the article, Substitutions.
P. Or Approved Equal: Approved equal or equivalent as determined by Owner's Representative.
Q. Owner's Representative: The Prime Professional.
R. Prime Professional: Architect or Engineer having a contract directly with the Owner for professional services.
S. Provide: Furnish, install, and connect ready for use.
T. Relocate: Disassemble, disconnect, and transport equipment to new locations, then clean, test, and install ready for use.
U. Replace: Remove and provide new item.
V. Review: A general contractual conformance check of specified products.
W. Roughing: Pipe, duct, conduit, equipment layout and installation.
X. Satisfactory: As specified in contract documents.
Y. Site Representative: Owner's inspector or "Clerk of Works" at the work site.

1.07 SHOP DRAWINGS/PRODUCT DATA/SAMPLES

A. Submit Shop Drawings on all items of equipment and materials to be furnished and installed. Submission of Shop Drawings and samples shall be accompanied by a transmittal letter, stating name of project and contractor, number of drawings, titles, and other pertinent data called for in individual sections. Shop Drawings shall be dated and contain: Name of project; name of prime professional; name of prime contractor; description or names of equipment, materials and items; and complete identification of locations at which materials or equipment are to be installed. Individual piecemeal or incomplete submittals will not be accepted. Similar items, (all types specified) shall be submitted at one time. Number each submittal by trade. Indicate deviations from contract requirements on Letter of Transmittal. Shop Drawings will be given a general review only. Corrections or comments made on the Shop Drawings during the review do not relieve Contractor from compliance with requirements of the Drawings and specifications. The Contractor is responsible for: confirming and correcting all quantities; checking electrical characteristics and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner.

B. See Specification Section 01 3000 - Administrative Requirements for submittal procedures.

1.08 PROTECTION OF PERSONS AND PROPERTY

A. Contractor shall assume responsibility for construction safety at all times and provide as part of Contract all trench or building shoring, scaffolding, shielding, dust/fume protection, mechanical/electrical protection, special grounding, safety railings, barriers, and other safety features required to provide safe conditions for all workmen and site visitors.

1.09 EQUIPMENT ARRANGEMENTS

A. The Contract Documents are prepared on basis of one (1) manufacturer as “design equipment,” even though other manufacturer’s names are listed as acceptable makes. If Contractor elects to use one (1) of the listed makes other than “design equipment,” submit detailed Drawings, indicating proposed installation of equipment. Show maintenance arrangement. Make required changes in the Work of other trades, at no increase in any Contract. Provide larger motors, feeders, breakers, and equipment, additional control devices, valves, fittings and other miscellaneous equipment required for proper operation, and assume responsibility for proper location of roughing and connections by other trades. Remove and replace door frames, access doors, walls, ceilings, or floors required to install other than design make equipment. If revised arrangement submittal is rejected, revise and resubmit specified “design equipment” item which conforms to Contract Documents.

1.10 CONTINUITY OF SERVICES

A. The building will be in use during construction operations. Maintain existing systems in operation within all rooms of building at all times. Refer to “General Conditions of the Contract for Construction” for temporary facilities for additional contract requirements. Schedules for various phases of Contract Work shall be coordinated with all other trades and with Owner’s Representative. Provide, as part of contract, temporary mechanical connections and relocations as required to accomplish the above. Obtain approval in writing as to date, time, and location for shutdown of existing mechanical facilities or associated services.

1.11 ROUGHING

A. Due to small scale of Drawings, it is not possible to indicate all offsets, fittings, changes in elevation, interferences, etc. Make necessary changes in Contract Work, equipment locations, etc., as part of a Contract to accommodate Work to obstacles and interferences encountered. Before installing, verify exact location and elevations at work site. DO NOT SCALE plans. If field conditions, details, changes in equipment or Shop Drawing information require an important rearrangement, report same to Owner’s Representative for review. Obtain written approval for all major changes before installing.

B. Install work so that items both existing and new are operable and serviceable. Eliminate interference with removal of coils, motors, filters, belt guards and/or operation of doors. Provide easy, safe, and code mandated clearances at controllers, motor starters, valve access, and other equipment requiring maintenance and operation. Where Contractor could not reasonably be expected to find such trade interferences due to concealment in walls, ceiling or floors, such relocations will be done by Change Order, if not, included in Contract Work. Contractor shall relocate existing work in way of new construction. VISIT SITE BEFORE BIDDING TO DETERMINE SCOPE OF WORK SINCE FEW OF SUCH ITEMS CAN BE SHOWN. Provide new materials, including new piping and insulation for relocated work.

C. Coordinate Work with other trades and determine exact route or location of each duct, pipe, conduit, etc., before fabrication and installation. Coordinate with Architectural Drawings. Obtain from Owner's Representative exact location of all equipment in finished areas (i.e., thermostat, fixture, and switch mounting heights, and equipment mounting heights). Coordinate all Work with the architectural reflected ceiling plans and/or existing Architecture. Mechanical Drawings show design arrangement only for diffusers, grilles, registers, air terminals, and other items. Do not rough-in Contract Work without reflected ceiling location plans.

D. Before roughing for equipment furnished by Owner or in other Contracts, obtain from Owner and other Contractors, approved Roughing Drawings giving exact location for each piece of equipment. Do not "rough in" services without Final Layout Drawings approved for construction. Cooperate with other trades to insure proper location and size of connections to insure proper functioning of all systems and equipment. For equipment and connections provided in this Contract, prepare Roughing Drawing as follows:
   1. Existing equipment: Measure the existing equipment and prepare for installation in new location.
   2. New equipment: Obtain equipment roughing drawings and dimensions, then prepare roughing-in-drawings. If such information is not available in time, obtain an acknowledgement in writing, then make space arrangements as required with Owner's Representative.

1.12 REMOVAL WORK

A. Where existing equipment removals are called for, submit complete list to Owner's Representative. All items that Owner wishes to retain that do not contain asbestos or PCB Material shall be delivered to location directed by Owner. Items that Owner does not wish to retain shall be removed from site and legally disposed of. Removal and disposal of material containing asbestos and/or PCB's shall be in accordance with Federal, State, and Local law requirements. Where equipment is called for to be relocated, Contractor shall carefully remove, clean and recondition, then re-install. Removal all abandoned piping, equipment, ductwork, tubing, supports, fixtures, etc. Visit each room, crawl space, and roof to determine the total Scope of Work. The disturbance or dislocation of asbestos-containing materials causes asbestos fibers to be released into the building's atmosphere, thereby creating a health hazard to workmen and building occupants. Consistent with Industrial Code Rule 56 and the content of recognized asbestos-control work, the Contractor shall apprise all of his workers, supervisory personnel, subcontractors, Owner and Consultants who will be at the job site of the seriousness of the hazard and of proper safeguards and work procedures which must be followed, as described in New York State Department of Labor Industrial Code Rule 56.

1.13 EQUIPMENT AND MATERIAL INSTALLATION

A. Provide materials that meet the following minimum requirements:
   1. Materials shall have a flame spread rating of 25 or less and smoke developed rating of 50 or less, in accordance with NFPA 255.
   2. All equipment and material for which there is a listing service shall bear a UL label.
   3. Mechanical and electrical equipment and systems with electrical components shall be UL Listed and meet UL Standards and requirements of the NEC.

1.14 CUTTING AND PATCHING

A. Mechanical trade shall include their required cutting and patching work unless shown as part of the General Construction Work on the Architectural Drawings. Refer to “General Conditions of the Contract for Construction,” for additional requirements. Cut and drill from both sides of walls and/or floors to eliminate splaying. Patch any cut or abandoned holes left by removals of equipment, fixtures, etc. Patch adjacent existing Work disturbed by installation of new Work including insulation, walls and wall covering, ceiling and floor covering, other finished surfaces. Patch openings and damaged areas equal to existing surface finish. Cut openings in prefabricated construction units in accordance with manufacturer’s instructions.

1.15 PAINTING

A. Include painting for patchwork with color to match adjacent surfaces. Where color cannot be adequately matched, paint entire surface. Provide one (1) coat of primer and two (2) finish coats. Refer to General Construction Specifications for additional information.

1.16 CONCEALMENT

A. Conceal all Contract Work above ceilings and in walls, below slabs, and elsewhere throughout building. If concealment is impossible or impractical, notify Owner’s Representative before starting that part of the Work and install only after his review. In areas with no ceilings, install only after Owner’s Representative reviews and comments on arrangement and appearance.

1.17 CHASES

A. New Construction:
   1. Certain chases, recessed, openings, shafts, and wall pockets will be provided as part of “General Building Construction Plans and Specifications.” Mechanical Trade Work shall provide all other openings required for their Contract Work.
   2. Check Architectural and Structural Design and Shop Drawings to verify correct size and location for all openings, recesses and chases in general building construction Work.
   3. Assume responsibility for correct and final location and size of such openings.
   4. Rectify improperly sized, improperly located or omitted chases or openings due to faulty or late information or failure to check final location.
   5. Provide 18 gauge galvanized sleeves and inserts. Extend all sleeves 2 inches above finished floor. Set sleeves and inserts in place ahead of new construction, securely fastened during concrete pouring. Correct, by drilling, omitted or improperly located sleeves. Assume responsibility for all Work and equipment damaged during course of drilling. Firestop all unused sleeves.
   6. Provide angle iron frame where openings are required for Contract Work, unless provided by General Contractor.

B. In Existing Buildings:
   1. Drill holes for floor and/or roof slab openings.
   2. Multiple Pipes Smaller than 1 Inch: Properly spaced and supported may pass through one (1) 6 inch or smaller diameter opening.
   3. Seal voids in fire rated assemblies with a fire-stopping seal system to maintain the fire resistance of the assembly. Provide 18 gauge galvanized sleeves at fire rated assemblies. Extend sleeves 2 inches above floors.
   4. In wall openings, drill or cut holes to suit. Provide 18 gauge galvanized sleeves at shafts and fire rated assemblies. Provide fire-stopping seal between sleeves and wall in drywall construction. Provide fire-stopping similar to that for floor openings.

1.18 FLASHING, SEALING, FIRE-STOPPING

A. See Specification Section 07 8400 - Firestopping.

1.19 SUPPORTS

A. Provide required supports, beams, angles, hangers, rods, bases, braces, and other items to properly support Contract Work. Supports shall meet the approval of the Owner's Representative. Modify studs, add studs, add framing, or otherwise reinforce studs in metal stud walls and partitions as required to suit Contract Work. If necessary in stud walls, provide special supports from floor to structure above. For Precast Panels/Planks and Metal Decks, support Mechanical/Electrical Work as determined by manufacturer and Owner's Representative. Provide heavy gauge steel mounting plates for mounting Contract Work. Mounting plates shall span two (2) or more studs. Size, gauge, and strength of mounting plates shall be sufficient for equipment size, weight, and desired rigidity.

1.20 ACCESS PANELS

A. Access panels shall be furnished by the Mechanical Trade and installed by General Contractor. Location and size shall be the responsibility of Mechanical Trade. Bear cost of construction changes necessary due to improper information or failure to provide proper information in ample time. Access panels over 324 square inches shall have two (2) cam locks. Contractor shall provide proper frame and door type for various wall or ceiling finishes. Access panels shall be equal to "Milcor" as manufactured by Inland Steel Products Co., Milwaukee, Wisconsin. Provide General Contractor with a set of architectural black and white prints with size and approximate locations of access panels shown.

1.21 HVAC EQUIPMENT CONNECTIONS

A. Mechanical Contractor is responsible for draining and venting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.

B. Provide for Owner furnished and Contractor furnished equipment all valves, piping, piping accessories, traps, pressure reducing valves, gauges, relief valves, vents, drains, insulation, sheet metal work, controls, dampers, as required.

C. Refer to manufacturer drawings and specifications for requirements of kitchen equipment, laboratory equipment and special equipment. Verify connection requirements before bidding.

1.22 DELIVERY

A. Accept materials delivered on site in manufacturer's packaging, labeled with manufacturer's identification and product information.

1.23 STORAGE AND PROTECTION OF MATERIALS

A. Store materials on dry base, at least 6 inches above ground or floor. Store so as not to interfere with other Work or obstruct access to buildings or facilities. Provide waterproof/windproof covering. Remove and provide special storage for items subject to moisture damage. Protect against theft or damage from any cause. Replace items stolen or damaged, at no cost to Owner.

B. Maintain ambient conditions for each product as required by each manufacturer from time of delivery. Maintain appropriate ambient conditions for installation as recommended by each manufacturer for a minimum of 24 hours prior and 24 hours after installation.

C. Refer to "General Conditions of the Contract for Construction."

1.24 FREEZING AND WATER DAMAGE

A. Take all necessary precautions with equipment, systems and building to prevent damage due to freezing and/or water damage. Repair or replace, at no charge in contract, any such damage to equipment, systems, and building. Perform first seasons winterizing in presence of Owner's operating staff.

1.25 LUBRICATION CHART

A. Provide lubrication chart, 8-1/2 inch x 11 inch minimum size, typed in capital letters, mounted under clear laminated plastic; secure to wall in area of equipment. List all motors and equipment in contract. Obtain and list necessary information by name/location of equipment, manufacturer recommended types of lubrication and schedule. Lubricate motors as soon as installed and perform lubrication maintenance until final acceptance. Plumbing trade shall add contract items to the chart provided by the heating trade or provide separate charts.

1.26 OWNER INSTRUCTIONS

A. Before final acceptance of the Work, furnish necessary skilled labor to operate all systems by seasons. Instruct designated person on proper operation and care of systems/equipment. Repeat instructions, if necessary. Obtain written acknowledgement from person instructed prior to final payment. Contractor is fully responsible for system until final acceptance, even though operated by Owner's personnel, unless otherwise agreed in writing. List under clear plastic, operating, maintenance, and starting precautions procedures to be followed by Owner for operating systems and equipment.

1.27 MAINTENANCE MANUALS

A. Prepare Instructions and Maintenance Portfolios. Include one (1) copy of each of approved Shop Drawing, wiring diagram, piping diagram spare parts lists, as-built drawings and manufacturer's instructions. Include typewritten instructions, describing equipment, starting/operating procedures, emergency operating instructions, summer-winter changeover, freeze protection, precautions and recommended maintenance procedures. Include name, address, and telephone number of supplier manufacturer representative and service agency for all major equipment items in a 3-ring binder with name of project on the cover. Deliver to Owner's Representative before request for final acceptance.

1.28 RECORD DRAWINGS

A. The Contractor shall obtain at his expense one (1) set of construction Contract Drawings including non-reproducible black and white prints and one (1) set of reproducible mylars for the purpose of recording record conditions.

B. The Contractor shall perform all survey work required for the location and construction of the work and to record information necessary for completion of the Record Drawings. Record Drawings shall show the actual location of the constructed facilities in the same manner as was shown on the Bid Drawings. All elevations and dimensions shown on the Drawings shall be verified or corrected so as to provide a complete and accurate record of the facilities as constructed.

C. It shall be the responsibility of the Contractor to mark each sheet of the non-reproducible drawings in pencil and to record thereon in a legible manner, any and all approved field changes and conditions as they occur. A complete file of approved field sketches, diagrams, and other changes shall also be maintained. At completion of the work, each sheet of record prints, plus all approved field sketches and diagrams shall be used in preparation of the mylar reproducible record drawings.

D. Completed reproducible mylar Drawings shall be certified as reflecting record conditions and submitted to the Engineer for approval.

1.29 ADDITIONAL ENGINEERING SERVICES

A. In the event that the Consultant is required to provide additional engineering services as a result of substitution of equivalent materials or equipment by the Contractor or changes by the Contractor in dimension, weight, power requirements, etc., of the equipment and accessories furnished, or if the Consultant is required to examine and evaluate any changes proposed by the Contractor for the convenience of the Contractor, then the Consultant's expenses in connection with such additional services shall be paid by the Contractor and may be deducted from any monies owed to the Contractor.

1.30 FINAL INSPECTION

A. Upon completion of all punch list items, the Contractor shall provide a copy of the punch list back to the Architect/Engineer with each items noted as completed or the current status of the item. Upon receipt, the Architect/Engineer will schedule a final inspection.

1.31 ALL TRADES TEMPORARY HEAT

A. Refer to the General Conditions of the Contract for Construction and Supplementary Conditions of the Contract for Construction.

1.32 HVAC MAINTENANCE OF SYSTEMS DURING TEMPORARY USE PERIODS

A. Provide each air handling system with a set of prefilters in addition to the permanent filters. Furnish four (4) sets of prefilters for each system for use when system is operated for temporary heating or cooling. During such use, change prefilters as often as directed by Owner's Representative. Provide necessary temporary throw away filters in all return openings to keep dust out of ductwork. Change as often as necessary. Remove all such temporary filters upon completion. Use supply units only. Do not operate return fans.

B. Blank-off outside air intake opening during temporary heating period. Install first set of permanent filters and prefilters.

C. Adjust dampers on supply system.

D. Do not install any grilles or diffusers at room terminal ends of ducts until permission is given.

E. Assume responsibility for systems and equipment at all times, even though used for temporary heat or ventilating. Repair or replace all dented, scratched or damaged parts of systems prior to final acceptance.

F. Remove concrete, rust, paint spots, other blemishes, then clean.

G. Just prior to final acceptance, remove used final filter. Deliver all unused sets of prefilters to the Owner and obtain written receipt. Properly lubricate system bearings before and during temporary use. Maintain thermostats, freeze stats, overload devices, and all other safety controls in operating condition.

1.33 CLEANING

A. It is the Contractor's responsibility to keep clean all equipment and fixtures provided under this Contract for the duration of the project. Each trade shall keep the premises free from an accumulation of waste material or rubbish caused by his operations. The facilities require an environment of extreme cleanliness, and it is the Contractor's responsibility to adhere to the strict regulations regarding procedures on the existing premises after all tests are made and installations completed satisfactorily:

B. Thoroughly clean entire installation, both exposed surfaces and interiors.

C. Remove all debris caused by work.

D. Remove tools, surplus, materials, when work is finally accepted.

1.34 SYSTEM START-UP AND TESTING

A. All new heating and ventilating shall be started up and operated at normal operating temperature for a period of 24 hours to "bake-off" the equipment. The associated ventilation system shall run on 100 percent outside air during the bake-off for an additional 8 hours to purge the building. This Work shall be completed prior to building occupancy or if the Work is not completed in time for summer "bake-off" on a Saturday with the Contractor responsible for being on-site during the entire purge and bake-off operation.

B. Work of any Contract which includes system "bake-off", system start-up, system cut-over or staff training shall not be done 1 week prior to and 1 week after the opening of the building/addition except upon written approval by the Owner.

C. Start-up of testing of HVAC systems shall occur while the building is not occupied by Owner and only after notice to the Project Inspector is made at least 24 hours in advance. The Mechanical Contractor shall be responsible for providing temporary filter media over all supply air registers and diffusers during the HVAC system start-up procedure. The Mechanical Contractor shall provide airtight plastic covers over all supply and return air openings prior to the start of construction by any Contractor. The plastic shall be maintained airtight throughout the project construction and removed only with the approval of the Project Inspector.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 23 0553
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Adhesive-backed duct markers.

D. Stencils.

E. Pipe markers.

F. Ceiling tacks.

1.02 RELATED REQUIREMENTS

A. Section 09 9123 - Interior Painting: Identification painting.

1.03 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2020.

B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2017.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

C. Product Data: Provide manufacturers catalog literature for each product required.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. Roof Top Units: Nameplates.

B. Control Panels: Nameplates.

C. Dampers: Ceiling tacks, where located above lay-in ceiling.

D. Ductwork: Nameplates.

E. Heat Transfer Equipment: Nameplates.

F. Piping: Tags.

G. Valves: Tags and ceiling tacks where located above lay-in ceiling.

2.02 NAMEPLATES

A. Manufacturers:
   1. Advanced Graphic Engraving, LLC: www.advancedgraphicengraving.com/#sle.
   2. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
   3. Seton Identification Products, a Tricor Direct Company: www.seton.com/#sle.

B. Letter Color: White.

C. Letter Height: 1/4 inch.

D. Background Color: Black.

E. Plastic: Comply with ASTM D709.

2.03 TAGS

A. Manufacturers:
   1. Advanced Graphic Engraving: www.advancedgraphicengraving.com/#sle.

2. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
3. Seton Identification Products, a Tricor Company: www.seton.com/#sle.

B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

C. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.04 STENCILS

A. Stencils: With clean cut symbols and letters of following size:
1. 3/4 to 1-1/4 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 1/2 inch high letters.
2. Ductwork and Equipment: 2-1/2 inch high letters.

B. Stencil Paint: As specified in Section 09 9123, semi-gloss enamel, colors complying with ASME A13.1.

2.05 PIPE MARKERS

A. Manufacturers:
1. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
2. Seton Identification Products, a Tricor Company: www.seton.com/#sle.

B. Color: Comply with ASME A13.1.

C. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

E. Color code as follows:
1. Heating and Cooling: Green with white letters.

2.06 CEILING TACKS

A. Description: Steel with 3/4 inch diameter color coded head.

B. Color code as follows:
1. HVAC Equipment: Yellow.
2. Fire Dampers and Smoke Dampers: Red.
3. Heating/Cooling Valves: Blue.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

B. Prepare surfaces in accordance with Section 09 9123 for stencil painting.

3.02 INSTALLATION

A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install tags with corrosion resistant chain.

C. Apply stencil painting in accordance with Section 09 9123.

D. Install plastic pipe markers in accordance with manufacturer's instructions.

E. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

F. Use tags on piping 3/4 inch diameter and larger.
1. Identify service, flow direction, and pressure.
2. Install in clear view and align with axis of piping.

3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

G. Install ductwork with plastic nameplates. Identify with roof top unit identification number and area served. Locate identification at roof top unit, at each side of penetration of structure or enclosure, and at each obstruction.

H. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

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SECTION 23 0593
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Testing, adjustment, and balancing of air systems.

B. Testing, adjustment, and balancing of refrigerating systems.

C. Measurement of final operating condition of HVAC systems.

D. Commissioning activities.

1.02 RELATED REQUIREMENTS

A. Section 01 9113 - General Commissioning Requirements: Commissioning requirements that apply to all types of work.

B. Section 23 0800 - Commissioning of HVAC.

1.03 REFERENCE STANDARDS

A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition; 2016.

B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2008, with Errata (2019).

C. NEBB (TAB) - Procedural Standard for Testing Adjusting and Balancing of Environmental Systems; 2019.

D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing; 2002.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Installer Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.

C. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
   1. Include at least the following in the plan:
      a. List of all air flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
      b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
      c. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
      d. Final test report forms to be used.
      e. Procedures for formal deficiency reports, including scope, frequency and distribution.

D. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
   1. Revise TAB plan to reflect actual procedures and submit as part of final report.
   2. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
   3. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
   4. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
   5. Units of Measure: Report data in I-P (inch-pound) units only.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. Perform total system balance in accordance with one of the following:
   1. AABC (NSTSB), AABC National Standards for Total System Balance.
   2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
   3. SMACNA (TAB).

B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.

C. TAB Agency Qualifications:
   1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
   2. Certified by one of the following:
      a. AABC, Associated Air Balance Council: www.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.
      b. NEBB, National Environmental Balancing Bureau: www.nebb.org/#sle.
      c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org/#sle.

D. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

3.02 EXAMINATION

A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
   1. Systems are started and operating in a safe and normal condition.
   2. Temperature control systems are installed complete and operable.
   3. Proper thermal overload protection is in place for electrical equipment.
   4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
   5. Duct systems are clean of debris.
   6. Fans are rotating correctly.
   7. Fire and volume dampers are in place and open.
   8. Air coil fins are cleaned and combed.
   9. Access doors are closed and duct end caps are in place.
   10. Air outlets are installed and connected.
   11. Duct system leakage is minimized.
   12. Service and balance valves are open.

B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.

3.03 PREPARATION

A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect to facilitate spot checks during testing.

3.04 ADJUSTMENT TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.

B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

C. Minimum Outside Air: Adjust to provide the minimum quantity shown on the contract plans.

3.05 RECORDING AND ADJUSTING

A. Ensure recorded data represents actual measured or observed conditions.

B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

E. Check and adjust systems approximately six months after final acceptance and submit report.

3.06 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.

B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.

C. Measure air quantities at air inlets and outlets.

D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.

I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

K. Where modulating dampers are provided, take measurements and balance at extreme conditions.

3.07 COMMISSIONING

A. See Sections 01 9113 - General Commissioning Requirements and 23 0800 for additional requirements.

B. Perform prerequisites prior to starting commissioning activities.

C. Fill out Prefunctional Checklists for:
   1. Air side systems.

D. Furnish to the Commissioning Authority, upon request, any data gathered but not shown in the final TAB report.

E. Re-check minimum outdoor air intake flows and maximum and intermediate total airflow rates for 20 percent of the air handlers plus a random sample equivalent to 10 percent of the final TAB report data as directed by Commissioning Authority.
   1. Original TAB agency shall execute the re-checks, witnessed by the Commissioning Authority.
   2. Use the same test instruments as used in the original TAB work.

3. Failure of more than 10 percent of the re-checked items of a given system shall result in the rejection of the system TAB report; rebalance the system, provide a new system TAB report, and repeat random re-checks.
4. For purposes of re-check, failure is defined as follows:
    a. Air Flow of Supply and Return: Deviation of more than 10 percent of instrument reading.
    b. Minimum Outside Air Flow: Provide and balance the minimum air flow to the values indicated on the contract drawings.
    c. Temperatures: Deviation of more than one degree F.
    d. Air Pressures: Deviation of more than 10 percent of full scale of test instrument reading.
    e. Sound Pressures: Deviation of more than 3 decibels, with consideration for variations in background noise.
5. For purposes of re-check, a whole system is defined as one in which inaccuracies will have little or no impact on connected systems; for example, the air distribution system served by one air handler or the hydronic chilled water supply system served by a chiller or the condenser water system.

F. In the presence of the Commissioning Authority, verify that:
1. Final settings of all valves, splitters, dampers and other adjustment devices have been permanently marked.
2. The air system is being controlled to the lowest possible static pressure while still meeting design loads, less diversity; this shall include a review of TAB methods, established control setpoints, and physical verification of at least one leg from fan to diffuser having all balancing dampers wide open and that during full cooling of all terminal units taking off downstream of the static pressure sensor, the terminal unit on the critical leg has its damper 90 percent or more open.
3. The water system is being controlled to the lowest possible pressure while still meeting design loads, less diversity; this shall include a review of TAB methods, established control setpoints, and physical verification of at least one leg from the pump to the coil having all balancing valves wide open and that during full cooling the cooling coil valve of that leg is 90 percent or more open.

3.08 SCOPE

A. Test, adjust, and balance the following:
1. Packaged Roof Top Heating/Cooling Units.
2. Unit Air Conditioners.
3. Air Coils.
4. Terminal Heat Transfer Units.
5. Fans.
6. Air Filters.
7. Air Inlets and Outlets.

3.09 MINIMUM DATA TO BE REPORTED

A. Electric Motors:
1. Manufacturer.
2. Model/Frame.
3. HP/BHP.
4. Phase, voltage, amperage; nameplate, actual, no load.
5. RPM.
6. Service factor.
7. Starter size, rating, heater elements.
8. Sheave Make/Size/Bore.

B. Cooling Coils:

1. Identification/number.
2. Location.
3. Service.
4. Manufacturer.
5. Air flow, design and actual.
6. Entering air DB temperature, design and actual.
7. Entering air WB temperature, design and actual.
8. Leaving air DB temperature, design and actual.
9. Leaving air WB temperature, design and actual.
10. Saturated suction temperature, design and actual.
11. Air pressure drop, design and actual.

C. Heating Coils:
1. Identification/number.
2. Location.
3. Service.
4. Manufacturer.
5. Air flow, design and actual.
6. Entering air temperature, design and actual.
7. Leaving air temperature, design and actual.
8. Air pressure drop, design and actual.

D. Electric Duct Heaters:
1. Manufacturer.
2. Identification/number.
3. Location.
4. Model number.
5. Design kW.
6. Number of stages.
7. Phase, voltage, amperage.
8. Test voltage (each phase).
9. Test amperage (each phase).
10. Air flow, specified and actual.
11. Temperature rise, specified and actual.

E. Air Moving Equipment:
1. Location.
2. Manufacturer.
3. Model number.
4. Serial number.
5. Arrangement/Class/Discharge.
6. Air flow, specified and actual.
7. Return air flow, specified and actual.
8. Outside air flow, specified and actual.
9. Total static pressure (total external), specified and actual.
10. Inlet pressure.
11. Discharge pressure.
12. Sheave Make/Size/Bore.
13. Number of Belts/Make/Size.
14. Fan RPM.

F. Return Air/Outside Air:
1. Identification/location.
2. Design air flow.

3. Actual air flow.
4. Design return air flow.
5. Actual return air flow.
6. Design outside air flow.
7. Actual outside air flow.
8. Return air temperature.
9. Outside air temperature.
10. Required mixed air temperature.
11. Actual mixed air temperature.
12. Design outside/return air ratio.
13. Actual outside/return air ratio.

G. Exhaust Fans:
1. Location.
2. Manufacturer.
3. Model number.
4. Serial number.
5. Air flow, specified and actual.
6. Total static pressure (total external), specified and actual.
7. Inlet pressure.
8. Discharge pressure.
9. Sheave Make/Size/Bore.
10. Number of Belts/Make/Size.
11. Fan RPM.

H. Duct Traverses:
1. System zone/branch.
2. Duct size.
3. Area.
4. Design velocity.
5. Design air flow.
6. Test velocity.
7. Test air flow.
8. Duct static pressure.
9. Air temperature.
10. Air correction factor.

I. Duct Leak Tests:
1. Description of ductwork under test.
2. Duct design operating pressure.
3. Duct design test static pressure.
4. Duct capacity, air flow.
5. Maximum allowable leakage duct capacity times leak factor.
6. Test apparatus:
    a. Blower.
    b. Orifice, tube size.
    c. Orifice size.
    d. Calibrated.
7. Test static pressure.
8. Test orifice differential pressure.
9. Leakage.

J. Terminal Unit Data:
1. Manufacturer.

2. Type, constant, variable, single, dual duct.
3. Identification/number.
4. Location.
5. Model number.
6. Size.
7. Minimum static pressure.
8. Minimum design air flow.
9. Maximum design air flow.
10. Maximum actual air flow.
11. Inlet static pressure.

END OF SECTION

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SECTION 23 0713
DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Duct insulation.

B. Insulation jackets.

1.02 RELATED REQUIREMENTS

A. Section 23 0553 - Identification for HVAC Piping and Equipment.

B. Section 23 3100 - HVAC Ducts and Casings: Glass fiber ducts.

1.03 REFERENCE STANDARDS

A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.

B. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2023.

C. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013 (Reapproved 2019).

D. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014 (Reapproved 2019).

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.

F. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022a, with Editorial Revision (2023).

G. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

H. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER, FLEXIBLE

A. Manufacturer:
   1. CertainTeed Corporation: www.certainteed.com/#sle.
   2. Johns Manville: www.jm.com/#sle.
   3. Knauf Insulation: www.knaufinsulation.com/#sle.

B. Insulation: ASTM C553; flexible, noncombustible blanket.
   1. K value: 0.36 at 75 degrees F, when tested in accordance with ASTM C518.

2. Maximum Service Temperature: 250 degrees F.
3. Maximum Water Vapor Absorption: 5.0 percent by weight.

C. Vapor Barrier Jacket:
1. Kraft paper with glass fiber yarn and bonded to aluminized film.
2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
3. Secure with pressure sensitive tape.

D. Vapor Barrier Tape:
1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

2.03 GLASS FIBER, RIGID

A. Manufacturer:
1. CertainTeed Corporation: www.certainteed.com/#sle.
2. Johns Manville: www.jm.com/#sle.
3. Knauf Insulation: www.knaufinsulation.com/#sle.

B. Insulation: ASTM C612; rigid, noncombustible blanket.
1. K Value: 0.24 at 75 degrees F, when tested in accordance with ASTM C518.
2. Maximum Service Temperature: 450 degrees F.
3. Maximum Water Vapor Absorption: 5.0 percent.
4. Maximum Density: 8.0 lb/cu ft.

C. Vapor Barrier Jacket:
1. Kraft paper with glass fiber yarn and bonded to aluminized film.
2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
3. Secure with pressure sensitive tape.

D. Vapor Barrier Tape:
1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Insulated Ducts Conveying Air Below Ambient Temperature:
1. Provide insulation with vapor barrier jackets.
2. Finish with tape and vapor barrier jacket.
3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
4. Insulate entire system, including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.

C. Insulated Ducts Conveying Air Above Ambient Temperature:
1. Provide with or without standard vapor barrier jacket.
2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.

D. Ducts Exposed in Mechanical Equipment Rooms or Finished Spaces (below 10 feet above finished floor): Finish with canvas jacket sized for finish painting.

3.03 SCHEDULES

A. Exhaust Ducts within 10 Feet of Exterior Openings:
1. Flexible Blanket: Ducts up to 18" wide.

a. Minimum Thickness: 2 inch.
b. Minimum R value: R-6.
c. Jacket Type: Vapor Barrier.

2. Rigid Board: Ducts over 18" wide.
a. Minimum Thickness: 1-1/2 inches.
b. Minimum R value: R-6.
c. Jacket Type: Vapor Barrier.

B. 100% Outside Air Ducts:
1. Concealed inside building envelope in unconditioned spaces:
a. Flexible Blanket: Ducts up to 18" wide.
1) Minimum Thickness: 2 inches.
2) Minimum R value: R-6.
3) Jacket Type: Vapor Barrier.
b. Rigid Board: Ducts over 18" wide.
1) Minimum Thickness: 1-1/2 inches.
2) Minimum R value: R-6.
3) Jacket Type: Vapor Barrier.
2. Exposed inside building envelope:
a. Rigid Board
1) Minimum Thickness: 1-1/2 inches.
2) Minimum R value: R-6.
3) Jacket Type: Vapor Barrier.

C. Air Conditioning Supply and Return; Heating Supply and Return:
1. Concealed inside building envelope in unconditioned spaces:
a. Flexible Blanket: Ducts up to 18" wide.
1) Minimum Thickness: 2 inches.
2) Minimum R value: R-6.
3) Jacket Type: Vapor Barrier.
b. Rigid Board: Ducts over 18" wide.
1) Minimum Thickness: 1-1/2 inches.
2) Minimum R value: R-6.
3) Jacket Type: Vapor Barrier.
2. Exposed inside building envelope in unconditioned spaces and mechanical rooms:
a. Rigid Board
1) Minimum Thickness: 1-1/2 inches.
2) Minimum R value: R-6.
3) Jacket Type: Vapor Barrier.
3. Exposed inside building envelope in conditioned spaces served by that ductw:
a. Uninsulated unless otherwise indicated on Drawings.
4. Inside building envelope, exposed to outside air (i.e., ventilated attic):
a. Flexible Blanket: Ducts up to 18" wide.
1) Minimum Thickness: 4 inches.
2) Minimum R value: R-12.
3) Jacket Type: Vapor Barrier.
b. Rigid Board: Ducts over 18" wide.
1) Minimum Thickness: 3 inches.
2) Minimum R value: R-12.
3) Jacket Type: Vapor Barrier.

END OF SECTION

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SECTION 23 0719
HVAC PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping insulation.

B. Jackets and accessories.

C. Engineered wall outlet seals and refrigerant piping insulation protection.

1.02 RELATED REQUIREMENTS

A. Section 23 2300 - Refrigerant Piping: Placement of inserts.

1.03 REFERENCE STANDARDS

A. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2023.

B. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation; 2022.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.06 FIELD CONDITIONS

A. Maintain ambient conditions required by manufacturers of each product.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER, RIGID

A. Manufacturers:
   1. CertainTeed Corporation: www.certainteed.com/#sle.
   2. Johns Manville Corporation: www.jm.com/#sle.
   3. Knauf Insulation: www.knaufinsulation.com/#sle.

B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
   1. K Value: ASTM C177, 0.24 at 75 degrees F.
   2. Maximum Service Temperature: 850 degrees F.
   3. Maximum Moisture Absorption: 0.2 percent by volume.

C. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.

D. Vapor Barrier Lap Adhesive: Compatible with insulation.

E. Indoor Vapor Barrier Finish:
   1. Cloth: Untreated; 9 oz/sq yd weight.

F. Outdoor Vapor Barrier Mastic: Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.

2.03 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

A. Manufacturer:
   1. Aeroflex USA, Inc; Aerocel Ultra-Low Perm (ULP): www.aeroflexusa.com/#sle.
   2. Armacell LLC; AP Armaflex: www.armacell.us/#sle.
   3. K-Flex USA LLC; K-Flex Titan: www.kflexusa.com/#sle.

B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
   1. Minimum Service Temperature: Minus 40 degrees F.
   2. Maximum Service Temperature: 180 degrees F.
   3. Connection: Waterproof vapor barrier adhesive.

C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

2.04 JACKETS

A. PVC Plastic.
   1. Manufacturers:
      a. Johns Manville Corporation: www.jm.com/#sle.
   2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
      a. Minimum Service Temperature: 0 degrees F.
      b. Maximum Service Temperature: 150 degrees F.
      c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
      d. Thickness: 10 mil.
      e. Connections: Brush on welding adhesive.
   3. Covering Adhesive Mastic: Compatible with insulation.

B. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
   1. Thickness: 0.016 inch sheet.
   2. Finish: Embossed.
   3. Joining: Longitudinal slip joints and 2 inch laps.
   4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
   5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

PART 3 EXECUTION

3.01 EXAMINATION

A. Test piping for design pressure, liquid tightness, and continuity prior to applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Exposed Piping: Locate insulation and cover seams in least visible locations.

C. Insulated Pipes Conveying Fluids Below Ambient Temperature:
   1. Insulate entire system, including fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.

D. Glass Fiber Insulated Pipes Conveying Fluids Below Ambient Temperature:
   1. Provide vapor barrier jackets, factory-applied or field-applied; secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
   2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

E. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.

F. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.

G. Glass Fiber Insulated Pipes Conveying Fluids Above Ambient Temperature:
   1. Provide standard jackets, with or without vapor barrier, factory-applied, or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples.
   2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.

H. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 8400.

I. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with PVC jacket and fitting covers.

J. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping. Provide two coats of UV resistant finish for flexible elastomeric cellular insulation without jacketing.

3.03 SCHEDULE

A. Cooling Systems:
   1. Condensate Drains from Cooling Coils:
   2. Refrigerant Suction:
   3. Refrigerant Hot Gas:

END OF SECTION

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SECTION 23 0923
DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. This specification is intended for reference only. The Owner will furnish all Invensys Climate Control (aka Schneider Electric: IA Series), control devices and wiring that is included in this section by OGS/GSA contract. The Mechanical Contractor will be responsible for contracting with the temperature controls provider for wiring, programming, commissioning, etc. The Mechanical Contractor shall also be responsible for installing control components in the piping and duct work systems, such as but not excluding the following: Automatic Control Dampers, Automatic Control Valves, Temperature Sensing Thermal Wells and Pressure Control Sensing Taps The Temperature Controls Contractor (TCC) shall be a factory trained and authorized Invensys Climate Control, Dealer Office. (Stark "TBS Controls")

1. This project is a design make Invensys Climate Control System. See section 2.1 of this specification for Acceptable Manufacturers.
2. Furnish all labor, materials, equipment, and service necessary to provide a complete and operating temperature control system. System shall use Direct Digital Controls, electronic interfaces and actuation devices, as shown on the drawings and as described herein. Control sequences are specified in this section.
    a. All actuation of valves and dampers shall be electric unless specifically called out elsewhere in the specifications or drawings.
3. The Building Automation System (BAS) shall have the following capabilities as described in these specifications:
    a. The Network Control Units (NCU)(s) and Computer(s) shall be connected directly to the Owners Ethernet Network.
    b. If existing, off site access for Owner’s personnel shall be extended to include new work herein. Identical graphical displays shall be provided for offsite access to match the displays at the on-site Operator Workstation. Connection to the site shall be via a high speed Ethernet connection. The contractor shall coordinate with the Owners IT professionals for high speed system access and shall comply with Owners requirements to maintain the level of security required by the Owner.
    c. The BMS network controller shall integrate into the existing Invensys Climate Control server.
    d. All system variables in the BMS system shall be Microsoft variables allowing them to be display and manipulated in other Microsoft products.
    e. Network controllers shall all be flash upgradeable and not require changing chips for upgrades.
    f. Short term logging of historical data shall be provided for every DDC input and output in the system. Each point shall be logged for a minimum of 2 weeks.

B. QUALITY ASSURANCE

1. All labor, material, equipment and software necessary to meet the functional intent of the system, as specified herein and as shown on the drawings, shall be provided by one of the manufacturers listed in Part 2 - Products. Equipment and labor not specifically referred to herein or on the plans, which are required to meet the functional intent, shall be provided without additional cost to the Owner. This contractor also is responsible for all costs of changes in the work required by substitute equipment.
2. The Building Management System (BMS) Contractor must have been in business for not less than 10 years, and providing BMS systems must be the Contractors primary business. BMS Contractor must be an authorized dealer office of the manufacturers specified. BMS Contractor must have a trained staff of application engineers, project managers, software engineers, commissioning staff, and service staff experienced in the configuration, programming and service of the automation system.

3. The BMS Contractor shall have a training facility with regularly scheduled training as outlined in Section 1.4 so as to provide ongoing regularly scheduled application training.
4. Manufacturer: A firm regularly engaged in manufacture of microprocessor temperature control equipment, of types and sizes which are similar to required equipment, and which have been in satisfactory use for not less than 10 years, in similar service.
5. Electrical standards: Provide electrical products that comply with the following agency approvals:
    a. UL-916; Energy Management Systems for BAS components and ancillary equipment
    b. UL-873; Temperature Indication and Regulating Equipment
    c. FCC, Part 15, Subpart J, Class A Computing Devices
6. All products shall be labeled with the appropriate approval markings. System installation shall comply with NFPA, NEMA, Local and National codes.

C. SCOPE OF WORK
1. Except as otherwise noted, the control system shall consist of all Ethernet Network Controllers, Standalone Digital Control Units, workstations, software, sensors, transducers, relays, valves, dampers, damper operators and other accessory equipment, along with a complete system of electrical interlocking wiring as required to fill the intent of the specification and provide for a complete and operable system. Except as otherwise specified, provide operators for equipment such as dampers if the equipment manufacturer does not provide these. Coordinate requirements with the various Contractors.
2. The BAS contractor shall review and study all HVAC drawings and the entire specification to familiarize himself with the equipment and system operation and to verify the quantities and types of dampers, operators, alarms, etc. to be provided.
3. All interlocking, wiring and installation of control devices associated with the equipment listed below shall be provided under this Contract. When the BAS system is fully installed and operational, the BAS Contractor shall review and check out the system. At that time, the BAS contractor shall demonstrate the operation of the system to the Owner and prove that it complies with the intent of the drawings and specifications.
    a. The Contractor shall furnish and install a complete building automation system including all necessary hardware and all operating and applications software necessary to perform the control sequences of operation as called for in this specification.
4. Provide services and manpower necessary for commissioning of system in coordination with the HVAC Contractor, Balancing Contractor and Owner’s representative. Commissioning reports showing the testing of each DDC point on the system shall be submitted to the Engineer for review and approval upon completion of the commissioning process. See Section 3.6 Commissioning and System Startup section for detail.
5. All work performed under this section of the specifications shall comply with all codes, laws and governing bodies. If the drawings and/or specifications are in conflict with governing codes, the Contractor shall submit a proposal with appropriate modifications to the project for code compliance. If this specification and associated drawings exceed governing code requirements, the specification shall govern. The Contractor shall obtain and pay for all necessary construction permits and licenses.
6. All 120V power circuitry required for control devices shall be by the BAS contractor in accordance with DIVISION 26 specifications.

D. TRAINING
1. The BAS Contractor shall provide both on-site and classroom training to the Owner’s representative and maintenance personnel per the following description:
    a. On-site training shall consist of a minimum of (4) hours of hands-on instruction geared at the operation and maintenance of the systems. The curriculum shall include:
        1) System Overview

2) System Software and Operation
   (a) System access
   (b) Software features overview
   (c) Changing setpoints and other attributes
   (d) Scheduling
   (e) Editing programmed variables
   (f) Displaying color graphics
   (g) Running reports
   (h) Workstation maintenance
   (i) Application programming
3) Operational sequences including start-up, shutdown, adjusting and balancing.
4) Equipment maintenance.

2. Classroom training shall include a minimum of (1) training slot for two days of course material covering workstation operation and controller programming. The cost for travel and lodging shall be included in this contract if Training Center is more than 150 miles from the Project Site.
3. The training facility shall have the capability to a provide hands on training experience for all applications that can be run on the Invensys Climate Controls application.

E. SYSTEM DESCRIPTION
1. The Building Automation System (BAS) shall consist of existing PC-based workstation and microcomputer controllers of modular design providing distributed processing capability, and allowing future expansion of both input/output points and processing/control functions.
2. For this project the system shall consist of the following components:
   a. Ethernet-based Network Controller(s): The BAS Contractor shall furnish (1 or more) Ethernet-based network controllers as described in Part 2 of the specification. If the existing controller is sufficient to include the new work, a new controller is not required. These controllers shall connect directly to the Operator Workstation over Ethernet, provide communication to the Standalone Digital Control Units and/or other Input/Output Modules and serve as a gateway to equipment furnished by others (if applicable).
   b. Standalone Digital Control Units (SDCUs): Provide the necessary quantity and types of SDCUs to meet the requirements of the project for mechanical equipment control including air handlers, central plant control, and terminal unit control. Each SDCU shall operate completely standalone, containing all of the I/O and programs to control its associated equipment.
   c. A high speed Ethernet connection to the school shall be furnished by the school district. BMS contractor shall coordinate with the Owners IT professionals and comply with the Owner's IT professionals requirements.

F. WORK BY OTHERS
1. The BAS Contractor shall cooperate with other contractors performing work on this project necessary to achieve a complete and neat installation. To that end, each contractor shall consult the drawings and specifications for all trades to determine the nature and extent of others' work.
2. The BAS Contractor shall furnish all control valves, sensor wells, flow meters and other similar equipment specified in this section for installation by the Mechanical Contractor.
3. The BAS Contractor shall provide field supervision to the designated contractor for the installation of the following:
   a. Automatic Control Dampers
   b. Automatic Control Valves.
   c. Temperature Sensing Thermal Wells
   d. Pressure Control Sensing Taps

G. WARRANTY AND ACCEPTANCE

1. The microprocessor temperature control contractor shall warrant the control system installed in this contract to be free from defects in material and workmanship, except for damages from other causes, for a period of one year after final acceptance from the owner. The microprocessor temperature control contractor shall be responsible for all necessary revisions to the software required for a workable system performance through the first year of operation. Any changes in the software shall be transmitted immediately to the owner. The software responsibility is for a complete and workable system as described in the control cycle description of the specification. The software shall become the property of the owner.
2. Updates to the manufacturer's software shall be provided at no charge during the warranty period, unless otherwise purchased by the District under a service agreement.
3. All equipment required to maintain operation of the temperature control system for the project shall be stocked in the microprocessor temperature control contractor's local facility. It shall be immediately available in the event of component failure. A spare or loaner piece of equipment shall be installed immediately when a failure occurs and the equipment shall be returned to the factory for repair.

H. SUBMITTALS
1. Shop drawings shall include a riser diagram depicting locations of all controllers and workstations, with associated network wiring. Also included shall be individual schematics of each mechanical system showing all connected points with reference to their associated controller. Typical schematics will be allowed where appropriate.
   a. Each drawing containing an equipment schematic shall contain a table indicating what equipment is covered by this drawing (i.e. equipment "tag #") and which drawing in the Construction Document set this piece of equipment is shown on.
2. Submittal data shall contain manufacturer's data on all hardware and software products required by the specification. Valve, damper and airflow station schedules shall indicate size, configuration, capacity and location of all equipment.
3. Software submittals shall contain narrative descriptions of sequences of operation, program listings, point lists, and a complete description of the graphics, reports, alarms and configuration to be furnished with the workstation software. Information shall be bound or in a three ring binder with an index and tabs.
4. Submit five (5) copies of submittal data and shop drawings to the Engineer for review prior to ordering or fabrication of the equipment. Prior to submitting, the Contractor shall check all documents for accuracy.
5. The Engineer will make corrections, if required, and return to the Contractor. The Contractor shall then resubmit with the corrected or additional data. This procedure shall be repeated until all corrections are made to the satisfaction of the Engineer and the submittals are fully approved.
6. Each point in the system shall be tested for both hardware and software functionality. In addition, each mechanical and electrical system under control of the BAS shall be tested against the appropriate sequence of operation specified herein. Successful completion of the system test shall constitute the beginning of the warranty period. A written report shall be submitted to the owner indicating that the installed system functions in accordance with the plans and specifications.
7. The BAS contractor shall commission and set in operating condition all major equipment and systems, such as the hot water and all air handling systems, in the presence of the equipment manufacturer's representatives, as applicable, and the Owner and Architect's representatives. See Section 3.6 for detail required in Commissioning the system.
8. The BAS Contractor shall provide all manpower and engineering services required to assist the HVAC Contractor and Balancing Contractor in testing, adjusting, and balancing all systems in the building. The BAS Contractor shall have a trained technician available on request during the balancing of the systems. The BAS Contractor shall coordinate all requirements to provide a complete air balance with the Balancing Contractor and shall include all labor and materials in his contract.

I. OPERATING AND MAINTENANCE MANUALS
   1. The operation and maintenance manuals shall contain all information necessary for the operation, maintenance, replacement, installation, and parts procurement for the entire BAS. This documentation shall include specific part numbers and software versions and dates. A complete list of recommended spare parts shall be included with the lead-time and expected frequency of use of each part clearly identified.
   2. Following project completion and testing, the BAS contractor shall submit as-built drawings reflecting the exact installation of the system. The as-built documentation shall also include a copy of all application software in written form.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturer - Provide the following microprocessor control system:
   1. Schneider Electric IA Series. All control devices shall be purchased by the Owner and installed by the Temperature Controls Contractor (TCC). The TCC shall be a factory trained and authorized Invensys Climate Control, factory dealer office.

B. SYSTEM ARCHITECTURE
   1. The Building Management System (BMS) shall consist of Network Area Controllers (NACs), a family of Local Controllers, Existing Operator Workstations (OWs), and a File Server to support system configurations where more than three operator workstations are required. The BMS shall provide control, alarm detection, scheduling, reporting and information management for the entire facility, and Wide Area Network (WAN) if applicable, from a single ODBC-compliant SQL database. The system shall be designed with a top-level 10/100bT Ethernet network, using ISO 8802-3 data link/physical layer. A sub-network using the RS-485 token passing protocol, with a minimum of 19.2kb speed, shall connect the local, stand-alone controllers with Ethernet-level controller/routers.
   2. Level 1 Network Description: Level 1, the main backbone of the system, shall be an ISO 8802-3, 10/100bT LAN/WAN, using Ethernet as the communications protocol. Network Area Controllers, Operator Workstations, and Servers shall connect directly to this network without the need for Gateway devices.
   3. Level 2 Network Description: Level 2 of the system shall consist of one or more local Controllers. Minimum speed shall be 19.2kbps. The Level 2 field bus consists of an RS485, BACnet MSTP bus that supports 40-60 Local Controllers to operate HVAC equipment, lighting, power metering and monitoring, fuel tank monitoring, UPS battery and generator monitoring, smoke and fire detection, water leak detection, and video surveillance and access control.
   4. BMS LAN Segmentation: The BMS shall be capable of being segmented, through software, into multiple local area networks (LANs) distributed over a wide area network (WAN), sharing a single file server. This enables workstations to manage a single LAN (or building), and/or the entire system with all devices being assured of being updated by and sharing the most current database. In the case of a single workstation system, the workstation shall contain the entire database – with no need for a separate file server.
   5. Standard Network Support: All NACs, Workstations and Servers shall be capable of residing directly on the owner's Ethernet TCP/IP LAN/WAN with no required gateways. Furthermore, the NACs, Workstations and Servers shall be capable of using standard, commercially available, off-the-shelf Ethernet infrastructure components such as routers, switches and hubs. With this design the owner may utilize the investment of an existing or new enterprise network or structured cabling system. This also allows the option of the maintenance of the LAN/WAN to be performed by the owner's Information Technology (IT) Department as all devices utilize standard TCP/IP components.

6. System Expansion: The BMS shall be scalable and expandable at all levels using the same software interface and the same Level 1 and Level 2 controllers. Systems that require replacement of either the workstation software or field controllers in order to expand the system shall not be acceptable.
    a. The BMS shall be expandable to include Video Surveillance and Access Control functions at any time in the future without requiring additional workstations, or Level 1 controllers. Biometric readers, keypads or proximity card access controllers shall be able to be added to the existing Level 1 network, to perform security and access control applications. In this way, an owner's existing investment in wiring infrastructure may be leveraged and the cost and inconvenience of adding new field bus wiring can be minimized.
    b. Additional web-based operator licenses shall be added in the field through an upgrade of the web server's security key, with no re-programming required.
7. Support for Open Systems Protocols: The BMS design must include solutions to integrate the following open system protocols: BACnet, Modbus, and digital data communication to third party microprocessors such as chiller controllers, smoke, fire and life safety panels and variable frequency drives (VFDs) – as required to complete the work.

C. NETWORK CONTROL UNITS (NCUs) – Invensys Climate Control, controllers are basis of design
1. General: Upgrade existing NCU's to the latest version and software revision.

D. LOCAL CONTROLLERS – Invensys Climate Control, controllers are basis of design.
1. General: Local Controllers shall provide control of HVAC, CRAC units, lighting, power metering, electrical monitoring, UPS, and leak detection. This may include air handling units, rooftop units, variable air volume boxes, unit ventilators, smoke, fire and life safety systems, and other mechanical equipment. Each controller shall be fully programmable, contain its own control programs and will continue to operate in the event of a failure or communication loss to its associated NAC.
2. Hardware Specification:
    a. Memory: Both the operating system of the controller, plus the application program for the controller, shall be stored in non-volatile, flash memory. Controllers shall contain enough memory for the current application, plus required history logging, plus a minimum of 20% additional free memory.
    b. Communication Ports: Local Controllers shall have a RS-485 communication port field bus, operating at a speed of at least 19.2kbps.
    c. Input/Output: Each local Controller shall have enough inputs and outputs to meet the application's required point count. Each local controller shall support universal inputs, whereas any input may be software-defined as:
        1) Digital Inputs for status/alarm contacts
        2) Counter Inputs for summing pulses from meters.
        3) Thermistor Inputs for measuring temperatures in space, ducts and thermowells.
        4) Analog inputs for pressure, humidity, flow and position measurements.
    d. Local controllers must support both digital and analog output types:
        1) Digital Outputs for on/off equipment control.
        2) Analog Outputs for valve and damper position control, and capacity control of primary equipment.
    e. Expandability: For larger controllers (16 base inputs and up), provide input and output expansion through the use of plug-in modules. At least two I/O modules must be capable of being added to the base Local Controller.
    f. Networking: Each local controller will be able to exchange information on a peer to peer basis with other Interoperable Digital Controller. Each local controller shall be capable of storing and referencing global variables (on the LAN) with or without any workstations online. Each local controller shall be able to have its program viewed and/or enabled/disabled through a workstation connected to an NAC.

g. Indicator Lamps: Local Controllers will have as a minimum, LED indication of CPU status, and field bus status.
h. Real Time Clock (RTC): All Local Controllers shall have a real time clock in either hardware or software. The accuracy shall be within 10 seconds per day. The RTC shall provide the following information: time of day, day, month, year, and day of week. Each Local Controller shall receive a signal, every hour, over the network from the NAC, which synchronizes all Local Controllers real time clocks.
i. Automatic Restart after Power Failure: Upon restoration of power, the Local Controller shall automatically and without human intervention, update all monitored functions, resume operation based on current, synchronized time and status, and implement special start-up strategies as required.
j. Battery Back Up: All Local Controllers shall store all programming in non-volatile flash memory. All Local Controllers except terminal controllers shall include an on-board lithium battery to back up the controller's RAM memory. The battery shall have a shelf life of over 10 years, and provide accumulated backup of all RAM and clock functions for at least 3 years. In the case of a power failure, the Local Controller shall first try to restart from the RAM memory. If that memory is corrupted or unusable, then the Local Controller shall restart itself from its application program stored in its flash memory.

3. Software Specification:
   a. General: The Local Controller shall contain flash memory to store both the resident operating system AND the application software. There will be no restrictions placed on the type of application programs in the system. Each Local Controller shall be capable of parallel processing, executing all control programs simultaneously. Any program may affect the operation of any other program. Each program shall have the full access of all I/O facilities of the processor. This execution of control function shall not be interrupted due to normal user communications including interrogation, program entry, printout of the program for storage, etc.
   b. User Programming Language:
      1) The application software shall be user programmable. Controllers should be freely programmable. Fixed function controllers will not be accepted.
      2) Control Software, Mathematical Functions, and Energy Management Applications must be identical to that which is provided with the Network Area Controller.
   c. History Logging: Each controller shall be capable of locally logging any input, output, calculated value or other system variable over user defined time intervals ranging from 1 second to 1440 minutes. Any system can be logged in history. A minimum of 1000 values shall be stored in each log. Each log can record either the instantaneous, average, minimum or maximum value of the point. Logged data shall be downloadable to the Operator Workstation for long term archiving based upon user-defined time intervals, or manual command.
   d. Alarm Management:
      1) For each system point, alarms can be created based on high/low limits or conditional expressions. All alarms will be tested each scan of the Local Controllers and can result in the display of one or more alarm messages or reports.
      2) Up to 8 alarms can be configured for each point in the controller.
      3) Alarms will be generated based on their priority. A minimum of 255 priority levels shall be provided.
      4) If communication with the Operator Workstation is temporarily interrupted, the alarm will be time-stamped and buffered in the controller. When communications return, the alarm will be transmitted to the Operator Workstation if the point is still in the alarm condition.
4. Air Handler Controllers

a. AHU Controllers shall be capable of meeting the requirements of the sequence of operation found in the Execution portion of this specification and for future expansion.
b. AHU Controllers shall support all the necessary point inputs and outputs as required by the sequence and operate in a standalone fashion.
c. AHU Controllers shall be fully user programmable to allow for modification of the application software.

5. Unitary Controllers – Invensys Controllers
   a. Unitary Controllers shall support, but not be limited to, control of the following systems as described in the Execution portion of this specification, and for future expansion:
      1) Packaged Rooftops
   b. The I/O of each Unitary Controller shall contain sufficient quantity and types, as required, to meet the sequence of operations found in the Execution portion of this specification. In addition, each controller shall have the capability for local time of day scheduling, occupancy mode control, after hour operation, lighting control, alarming, and trending.

E. COMMUNICATIONS TO 3RD PARTY DEVICES
1. General: Where required, provide a Gateway to interface to that equipment that uses the Modbus protocol, or other proprietary or open protocols.
2. Communication Ports: In addition to its on-board Ethernet port, the Gateway shall have at least two serial communications ports for interfaces to third-party systems.
3. Memory: The Gateway shall have enough RAM memory to store all point configuration data, plus required history logging and alarm buffering. Minimum RAM shall be 8MB. The operating system of the gateway must be stored in flash non-volatile memory.
4. User Programming Language:
   a. The Gateway shall employ the same user programmable application software that NACs and Local Controllers use.
   b. Control Software, Mathematical Functions, and Energy Management Applications must be identical to that which is provided with the Network Area Controller. Gateways that do not have an application programming language will not be accepted.
5. History Logging: Each Gateway shall be capable of locally logging any input, output, calculated value or other system variable over user defined time intervals ranging from 1 second to 1440 minutes. Any system can be logged in history. A minimum of 1000 values shall be stored in each log. Each log can record either the instantaneous, average, minimum or maximum value of the point. Logged data shall be downloadable to the Operator Workstation for long term archiving based upon user-defined time intervals, or manual command.

F. WORKSTATIONS AND SOFTWARE – Upgrade Existing Invensys Climate Control as Required

G. DDC SENSORS AND POINT HARDWARE
1. General: Where indicated on the drawings, schedules or sequence of operations, provide equipment that conforms to the following specifications:
2. Temperature Sensors:
   a. All temperature devices shall use precision thermistors accurate to +/- 0.36°F over a range of –30 to 230°F.
   b. Standard space sensors shall be provided in an off white enclosure for mounting on a standard electrical box.
   c. Where manual override of unoccupied mode of control is indicated on the drawings or sequence of operation, provide a push button for selecting after hours operation.
   d. Duct temperature sensors shall incorporate a thermistor bead embedded at the tip of a stainless steel tube. Probe style duct sensors shall be used in air handling applications where the air stream temperature is consistent and is not stratified.

e. Averaging sensors shall be employed in all mixing plenum applications and in any other application where the temperature might otherwise be stratified. The averaging sensor tube shall contain at least four thermistor sensors.
f. Immersion sensors shall be employed for measurement of temperature in all chilled water, hot water and glycol applications. Thermal wells shall be brass or stainless steel for non-corrosive fluids below 250 degrees F and 300 series stainless steel for all other applications.

3. Pressure Sensors:
   a. Air pressure or differential air pressure measurements in the range of 0 to 10" water column shall be accurate to +/- 1% of range using a solid-state sensing element. The range of the instrument selected shall be 2 times the operating pressure of the sensed variable. Acceptable manufacturer shall be Setra model C-264.
   b. Liquid pressure or differential liquid pressure measurements shall be accurate to +/- 0.25% of range using a solid-state sensing element. The range of the instrument selected shall be 2 times the operating pressure of the sensed variable. Unit shall be provided with isolation and bypass manifold for start-up and maintenance operations. Acceptable manufacturer shall be Setra model C-230.
4. Low Limit Thermostats:
   a. Safety low limit thermostats shall be vapor pressure type with a 20 foot minimum element. Element shall respond to the lowest temperature sensed by any one foot section. Provide one thermostat for each 25 square foot of coil area.
   b. Low limit thermostat shall be manual reset and shall be double pole so as to provide input capability for alarm at the BAS.
5. Current Sensing Status Switches
   a. Current status switches shall be used to monitor the run status of fans, pumps, motors and electrical loads. Acceptable manufacturer is Veris or approved equal.
6. Control Valves
   a. Provide automatic control valves suitable for the specified controlled media (water or glycol). Provide valves that mate and match the material of the connected piping.
   b. Control valves shall meet the heating and cooling loads specified, and close off against the differential pressure conditions within the application. Valves should be sized to operate accurately and with stability from 10 to 100% of the maximum design flow. Valves shall be selected to provide an initial pressure drop of not more than 4 psig for water applications. For low pressure steam application, the pressure drop shall be equal to the supply pressure minus the heating element design inlet pressure.
   c. Normal position of both heating and cooling valves shall be open. Three Way valves shall be piped to fail open to both heating and cooling.
   d. Electric Bi-Directional actuators are acceptable on VAV Terminal Units and Reheat coil valve control if so noted.
   e. All electric actuators for applications other than VAV terminal units and Reheat Coil valve Control shall be Proportional analog 4-20Ma or 0-10Vdc input and shall be positioned to reflect the output value of the computer control system and shall be spring return to normal position.
   f. Belimo or equal
7. Dampers
   a. Automatic dampers, furnished by the Building Automation Contractor shall be single or multiple blade as required. Dampers shall be installed by the HVAC Contractor under the supervision of the BAS Contractor. All blank-off plates and conversions necessary to install smaller than duct size dampers are the responsibility of the Sheet Metal Contractor.
   b. Damper frames shall be hat shaped channel, 4" deep constructed of 16 gauge galvanized steel. Stainless steel side seals, and sintered bronze, oil-impregnated bearings shall also be provided.

c. Damper blades shall be 16 gauge galvanized steel and shall be 6” on center. Provide vinyl-grip seals on blades.
d. Provide damper linkage that consists of 0.50” diameter steel, cadmium plated and chromate treated pivots. Provide a ¼-20 set-screw with a locking-patch to lock the pivots to a 0.31 diameter aluminum rod. Pivots shall rotate in a Celcon bearing. Blade brackets shall be 12 gauge cadmium plated steel. Blades shall be individually factory adjusted for maximum shut off.
e. Provide axles that are steel, 0.350” diameter cadmium plated and driveshafts that are ½” diameter cadmium plated steel, extendable 6”.
f. For high performance applications, control dampers shall meet or exceed the UL Class I leakage rating.
g. Control dampers shall be Ruskin, Arrow or approved equal.
h. Unless otherwise noted, provide opposed blade dampers for modulating applications and parallel blade for two-position control.

PART 3 - EXECUTION

3.01 CONTRACTOR RESPONSIBILITIES

A. Demolition: Remove controls which do not remain as part of the building automation system, including all associated abandoned wiring, conduit, and pneumatic tubing within visible area of the new controls, up-to 10 feet away. The Owner will inform the Contractor of any equipment that is to be removed that will remain the property of the Owner. This equipment shall be handled with care so as not to damage it. All other equipment that is removed shall be disposed of by the Contractor.

B. Cleanup: At the completion of the work, all equipment pertinent to this section shall be checked and thoroughly cleaned, and all other areas shall be cleaned around equipment provided under this section. Clean the exposed surfaces of tubing, hangers, and other exposed metal of grease, plaster, or other foreign materials.

C. Wiring, Conduit and Cable
1. ALL wiring (high voltage, 50 volts and greater) and conduit is to be installed in accordance with local and national electrical codes and Division 26 (Electrical Division) specification. Power circuitry shall originate from the nearest available 120V panel.
a. All temperature control cable less than 50 volts is to be considered low voltage.
b. All low voltage cable is to be run in conduit in any non-accessible concealed space and up to 10 ft. above floor level within mechanical rooms. Wiring above 10 ft or within accessible areas (ceilings, crawl spaces, between furred walls, enclosed chases) may be run exposed with proper support with bridle rings. Wiring is to be run parallel and perpendicular to building lines in a neat and workmanlike manner and bundled with nylon tie wraps.
c. Sensors and wiring on or in concrete or block walls for low voltage cable shall be surface mounted and enclosed in metallic wire-mold.
d. All low voltage cable shall be run separate from high voltage cable. All microprocessor communications cable shall be run separate from any low or high voltage cable.
e. Any cable running in plenum rated areas shall be plenum rated cable.
f. Wires and tubing shall be installed a minimum of three (3) inches from hot water, steam, or condensate piping.
g. A true earth ground shall be available in the building. Ground shall be run from the source electrical panel ground to each temperature control panel or controller.
h. Metallic surface raceway may be used in finished areas on non accessible masonry walls. All surface raceway in finished areas shall be color matched to the existing finish within the limitations of standard manufacturers’ colors.

D. HARDWARE INSTALLATION
1. Installation Practices for Field Devices

a. Actuators shall be firmly mounted to give positive movement, and linkage shall be adjusted to give smooth continuous movement throughout 100 percent of the actuator stroke.
b. Actuators shall be stroked ~5%, tightened and returned to normal position to give a positive seal.
c. Relay outputs shall include transient suppression across all coils. Suppression devices shall limit transients to 150% of the rated coil voltage.
d. Water line mounted sensors shall be removable without shutting down the system in which they are installed.
e. For duct static pressure sensors, the high pressure port shall be connected to a metal static pressure probe inserted into the duct pointing upstream. The low pressure port shall be left open to the plenum area at the point that the high pressure port is tapped into the ductwork.
f. For building static pressure sensors, the high pressure port shall be inserted into the space via a metal tube. The low pressure port shall be piped to the outside of the building.

2. Enclosures:
a. For all I/O requiring field interface devices, these devices where practical shall be mounted in a field interface panel (FIP). The Contractor shall provide an enclosure that protects the device(s) from dust and moisture, and conceals integral wiring and moving parts.
b. FIPs shall contain power supplies for sensors, interface relays and contactors, safety circuits, and I/P transducers.
c. The FIP enclosure shall be of steel construction with baked enamel finish, NEMA 1 rated with a hinged door and keyed lock. All locks shall be keyed identically.
d. All outside mounted enclosures shall meet the NEMA-4 rating.

E. SOFTWARE INSTALLATION
1. General: The Contractor shall provide all labor necessary to install, initialize, start-up and debug all system software as described in this section. This includes any operating system software or other third party software necessary for successful operation of the system.
2. Database Configuration: The Contractor shall provide all labor to configure those portions of the database that are required by the point list and sequence of operation.
3. Color Graphic Slides: Unless otherwise directed by the owner, the Contractor shall provide color graphic displays as depicted in the schematic drawings for each system and floor plan. For each system or floor plan, the display shall contain the associated points identified in the point list and allow for setpoint changes as required by the owner.

F. COMMISSIONING AND SYSTEM STARTUP
1. Point to Point Checkout: Each I/O device (both field mounted and those located in FIPs) shall be inspected and verified for proper installation and functionality. A checkout sheet itemizing each device shall be filled out, dated and approved by the Project Manager for submission to the owner or owner’s representative.
2. Controller and Workstation Checkout: A field checkout of all controllers and front-end equipment (computers, printers, modems, etc.) shall be conducted to verify proper operation of both hardware and software. A checkout sheet itemizing each device and a description of the associated tests shall be prepared and submitted to the owner or owner’s representative by the completion of the project.
3. System Acceptance Testing:
a. All application software shall be verified and compared against the sequences of operation. Control loops shall be exercised by inducing a setpoint shift of at least 10% and observing whether the system successfully returns the process variable to setpoint. Record all test results and attach to the Test Results Sheet.

b. Test each alarm in the system and validate that the system generates the appropriate alarm message, that the message appears at all prescribed destinations (workstations or printers), and that any other related actions occur as defined (i.e. graphic panels are invoked, reports are generated, etc.). Submit a Test Results Sheet to the owner.
c. Perform an operational test of each unique graphic display and report to verify that the item exists, that the appearance and content are correct, and that any special features work as intended. Submit a Test Results Sheet to the owner.
d. Perform an operational test of each third party interface that has been included as part of the automation system. Verify that all points are properly polled, that alarms have been configured, and that any associated graphics and reports have been completed. If the interface involves a file transfer over Ethernet, test any logic that controls the transmission of the file, and verify the content of the specified information.

END OF SECTION

SECTION 23 2300
REFRIGERANT PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping.

B. Refrigerant.

C. Moisture and liquid indicators.

D. Valves.

E. Strainers.

F. Filter-driers.

G. Expansion valves.

H. Flexible connections.

1.02 RELATED REQUIREMENTS

A. Section 08 3100 - Access Doors and Panels.

B. Section 22 0719 - Plumbing Piping Insulation.

C. Section 23 0719 - HVAC Piping Insulation.

1.03 REFERENCE STANDARDS

A. AHRI 750 - Thermostatic Refrigerant Expansion Valves; 2007.

B. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2022, with Errata (2023).

C. ASHRAE Std 34 - Designation and Safety Classification of Refrigerants; 2022, with Errata (2023).

D. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.

E. ASME B31.5 - Refrigeration Piping and Heat Transfer Components; 2022.

F. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service; 2020.

G. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2019.

H. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).

I. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide general assembly of specialties, including manufacturers catalogue information. Provide manufacturers catalog data including load capacity.

C. Shop Drawings: Indicate schematic layout of system, including equipment, critical dimensions, and sizes.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store piping and specialties in shipping containers with labeling in place.

B. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installation.

C. Dehydrate and charge components such as piping and receivers, seal prior to shipment, until connected into system.

PART 2 PRODUCTS

2.01 PIPING

A. Copper Tube: ASTM B280, H58 hard drawn or O60 soft annealed.
   1. Fittings: ASME B16.22 wrought copper.
   2. Joints: Braze, AWS A5.8M/A5.8 BCuP silver/phosphorus/copper alloy.

B. Pipe Supports and Anchors:
   1. Provide hangers and supports that comply with MSS SP-58.
      a. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
   2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron adjustable swivel, split ring.
   3. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
   4. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
   5. Vertical Support: Steel riser clamp.
   6. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
   7. Hanger Rods: Galvanized threaded both ends, threaded one end, or continuous threaded.
   8. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.02 REFRIGERANT

A. Refrigerant: Use only refrigerants that have ozone depletion potential (ODP) of zero and global warming potential (GWP) of less than 50.

B. Refrigerant: R-410A as defined in ASHRAE Std 34.

2.03 MOISTURE AND LIQUID INDICATORS

A. Indicators: Single port type, UL listed, with copper or brass body, flared or solder ends, sight glass, color coded paper moisture indicator with removable element cartridge and plastic cap; for maximum temperature of 200 degrees F and maximum working pressure of 500 psi.

2.04 VALVES

A. Diaphragm Packless Valves:
   1. UL listed, globe or angle pattern, forged brass body and bonnet, phosphor bronze and stainless steel diaphragms, rising stem and handwheel, stainless steel spring, nylon seat disc, solder or flared ends, with positive backseating; for maximum working pressure of 500 psi and maximum temperature of 275 degrees F.

B. Packed Angle Valves:
   1. Forged brass or nickel plated forged steel, forged brass seal caps with copper gasket, rising stem and seat with backseating, molded stem packing, solder or flared ends; for maximum working pressure of 500 psi and maximum temperature of 275 degrees F.

C. Service Valves:
   1. Forged brass body with copper stubs, brass caps, removable valve core, integral ball check valve, flared or solder ends, for maximum pressure of 500 psi.

2.05 STRAINERS

A. Straight Line or Angle Line Type:
   1. Brass or steel shell, steel cap and flange, and replaceable cartridge, with screen of stainless steel wire or monel reinforced with brass; for maximum working pressure of 430 psi.

2.06 FILTER-DRIERS

A. Performance:
   1. Flow Capacity - Liquid Line: As indicated in schedule, minimum, rated in accordance with AHRI 710.

2. Pressure Drop: 2 psi, maximum, when operating at full connected evaporator capacity.
3. Design Working Pressure: 350 psi, minimum.

B. Cores: Molded or loose-fill molecular sieve desiccant compatible with refrigerant, activated alumina, activated charcoal, and filtration to 40 microns, with secondary filtration to 20 microns; of construction that will not pass into refrigerant lines.

C. Construction: UL listed.
1. Connections: As specified for applicable pipe type.

2.07 EXPANSION VALVES

A. Angle or Straight Through Type: AHRI 750; design suitable for refrigerant, brass body, internal or external equalizer, bleed hole, adjustable superheat setting, replaceable inlet strainer, with non-replaceable capillary tube and remote sensing bulb and remote bulb well.

B. Selection: Evaluate refrigerant pressure drop through system to determine available pressure drop across valve. Select valve for maximum load at design operating pressure and minimum 10 degrees F superheat. Select to avoid being undersized at full load and excessively oversized at part load.

2.08 FLEXIBLE CONNECTORS

A. Corrugated stainless steel hose with single layer of stainless steel exterior braiding, minimum 9 inches long with copper tube ends; for maximum working pressure of 500 psi.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

A. Install refrigeration specialties in accordance with manufacturer's instructions.

B. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient.

C. Install piping to conserve building space and avoid interference with use of space.

D. Group piping whenever practical at common elevations and locations. Slope piping one percent in direction of oil return.

E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

F. Inserts:
1. Provide inserts for placement in concrete formwork.
2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
3. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
4. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.

G. Pipe Hangers and Supports:
1. Install in accordance with ASME B31.5.
2. Support horizontal piping as indicated.
3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
4. Place hangers within 12 inches of each horizontal elbow.
5. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.

6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
7. Provide copper plated hangers and supports for copper piping.

H. Arrange piping to return oil to compressor. Provide traps and loops in piping, and provide double risers as required. Slope horizontal piping 0.40 percent in direction of flow.

I. Provide clearance for installation of insulation and access to valves and fittings.

J. Provide access to concealed valves and fittings. Co ordi

K. Flood piping system with nitrogen when brazing.

L. Where pipe support members are welded to structural building frame, brush clean, and apply one coat of zinc rich primer to welding.

M. Insulate piping and equipment; refer to Section and Section 22 0716.

N. Follow ASHRAE Std 15 procedures for charging and purging of systems and for disposal of refrigerant.

O. Provide replaceable cartridge filter-driers, with isolation valves and valved bypass.

P. Fully charge completed system with refrigerant after testing.

3.03 SCHEDULES

A. Hanger Spacing for Copper Tubing.
1. 1/2 inch, 5/8 inch, and 7/8 inch OD: Maximum span, 5 feet; minimum rod size, 1/4 inch.
2. 1-1/8 inch OD: Maximum span, 6 feet; minimum rod size, 1/4 inch.

END OF SECTION

SECTION 23 3100
HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal ductwork.

B. Kitchen hood ductwork.

1.02 RELATED REQUIREMENTS

A. Section 23 0593 - Testing, Adjusting, and Balancing for HVAC.

B. Section 23 0713 - Duct Insulation: External insulation and duct liner.

C. Section 23 3300 - Air Duct Accessories.

D. Section 23 3700 - Air Outlets and Inlets.

1.03 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

D. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

E. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.

G. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2018, with Editorial Revision (2020).

H. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2017, with Editorial Revision (2020).

I. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

J. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

K. SMACNA (KVS) - Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines; 2001.

L. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual; 2012.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for duct materials.

C. Shop Drawings:
   1. Prepare 1/4 inch scale or larger drawings within 30 days after contract award for all areas.
      a. Incorporate dimensions of actual equipment used. (Including light fixtures, structural steel etc.)
      b. Show adequate sections, elevations and plan views.
      c. Indicate all dampers and other required accessories.
      d. indicate size, type, and location of all access doors.
      e. Include size and location of all floor, wall and roof openings.
      f. Indicate elevation above floor and ceiling height for each room.
      g. Indicate SMACNA pressure class reuired for all duct.
   2. Identify in writing, any deviations from contract Drawings and Specifications.

a. Highlight all changes from plans required by obstructions and job conditions.
b. If shop standards do not conform in detail to specifications, submit for approval annotated shop standards showing upgrades as required for conformance.
c. Call to Architect's attention, in writing by separate letter along with samples for clarification, any proposed deviations from contract plans and specifications.

1.05 FIELD CONDITIONS

A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.

PART 2 PRODUCTS

2.01 DUCT ASSEMBLIES

A. Regulatory Requirements: Construct ductwork to comply with NFPA 90A standards.

B. Ducts: Galvanized steel, unless otherwise indicated.

C. Low Pressure Supply (Heating Systems): 2 inch w.g. pressure class, galvanized steel.

D. Return and Relief: 1 inch w.g. pressure class, galvanized steel.

E. General Exhaust: 1 inch w.g. pressure class, galvanized steel.

F. Toilet Room Exhaust: 1 inch w.g. pressure class, aluminum.

G. Kitchen Hood Grease Exhaust: 1 inch w.g. pressure class, stainless steel.
1. Construct of 18 gage, 0.0500 inch stainless steel.
2. Construction:
a. Liquid tight with continuous external weld for all seams and joints.
b. Where ducts are not self draining back to equipment, provide low point drain pocket with copper drain pipe to sanitary sewer.
3. Access Doors:
a. Provide for duct cleaning inside horizontal duct at drain pockets, every 20 feet and at each change of direction.
b. Use same material and thickness as duct with gaskets and sealants rated 1500 degrees F for grease tight construction.

H. Outside Air Intake: 1 inch w.g. pressure class, galvanized steel.

2.02 MATERIALS

A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.

B. Aluminum for Ducts: ASTM B209 (ASTM B209M); aluminum sheet, alloy 3003-H14. Aluminum Connectors and Bar Stock: Alloy 6061-T651 or of equivalent strength.

C. Stainless Steel for Ducts: ASTM A666, Type 304.

D. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
2. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.

E. Gasket Tape: Provide butyl rubber gasket tape for a flexible seal between transfer duct connector (TDC), transverse duct flange (TDF), applied flange connections, and angle rings connections.

F. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

G. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.

2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.

2.03 DUCTWORK FABRICATION

A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.

B. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

C. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide air foil turning vanes of perforated metal with glass fiber insulation.

D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

E. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).

F. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

2.04 MANUFACTURED DUCTWORK AND FITTINGS

A. Spiral Ducts: Round spiral lockseam duct with galvanized steel outer wall.
   1. Manufacture in accordance with SMACNA (DCS).

B. Round Ducts: Round lockseam duct with galvanized steel outer wall.
   1. Manufacture in accordance with SMACNA (DCS).

C. Flexible Ducts: Black polymer film supported by helically wound spring steel wire.
   1. UL labeled.
   2. Insulation: Fiberglass insulation with polyethylene vapor barrier film.
   3. Pressure Rating: 4 inches WG positive and 0.5 inches WG negative.
   4. Maximum Velocity: 1000 fpm.
   5. Temperature Range: Minus 20 degrees F to 175 degrees F.

D. Transverse Duct Connection System: SMACNA "E" rated rigidly class connection, interlocking angle and duct edge connection system with sealant, gasket, cleats, and corner clips in accordance with SMACNA (DCS).

E. Round Duct Connection System: Interlocking duct connection system in accordance with SMACNA (DCS).

PART 3 EXECUTION

3.01 INSTALLATION

A. Install, support, and seal ducts in accordance with SMACNA (DCS).

B. Install in accordance with manufacturer's instructions.

C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

D. Kitchen Hood Exhaust: Provide residue traps at base of vertical risers with provisions for clean out.

E. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.

F. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

G. Connect diffusers to low pressure ducts directly or with 5 feet maximum length of flexible duct held in place with strap or clamp.

END OF SECTION

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SECTION 23 3300
AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air turning devices/extractors.

B. Backdraft dampers - metal.

C. Combination fire and smoke dampers.

D. Duct access doors.

E. Fire dampers.

F. Flexible duct connectors.

G. Volume control dampers.

1.02 RELATED REQUIREMENTS

A. Section 23 3100 - HVAC Ducts and Casings.

1.03 REFERENCE STANDARDS

A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

C. UL 33 - Safety Heat Responsive Links for Fire-Protection Service; Current Edition, Including All Revisions.

D. UL 555 - Standard for Fire Dampers; Current Edition, Including All Revisions.

E. UL 555S - Standard for Smoke Dampers; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.01 AIR TURNING DEVICES/EXTRACTORS

A. Multi-blade device with blades aligned in short dimension; steel construction; with individually adjustable blades, mounting straps.

2.02 BACKDRAFT DAMPERS - METAL

A. Multi-Blade, Parallel Action Gravity Balanced Backdraft Dampers: Galvanized steel, with center pivoted blades of maximum 6 inch width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.

2.03 BACKDRAFT DAMPERS - FABRIC

A. Fabric Backdraft Dampers: Factory-fabricated.
   1. Blades: Neoprene coated fabric material.
   2. Birdscreen: 1/2 inch nominal mesh of galvanized steel or aluminum.
   3. Maximum Velocity: 1000 fpm (5 mps) face velocity.

2.04 COMBINATION FIRE AND SMOKE DAMPERS

A. Fabricate in accordance with NFPA 90A, UL 555, UL 555S, and as indicated.

B. Provide factory sleeve and collar for each damper.

C. Multiple Blade Dampers: Fabricate with 16 gage, 0.0598 inch galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, stainless steel jamb seals, 1/8 by 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock, and 1/2 inch actuator shaft.

D. Operators: UL listed and labelled spring return electric type suitable for 120 volts, single phase, 60 Hz. Provide end switches to indicate damper position. Locate damper operator on interior of duct and link to damper operating shaft.

E. Electro Thermal Link: Fusible link melting at 165 degrees F; 120 volts, single phase, 60 Hz; UL listed and labeled.

2.05 DUCT ACCESS DOORS

A. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ducts, install minimum 1 inch thick insulation with sheet metal cover.
   1. Less Than 12 inches Square: Secure with sash locks.
   2. Up to 18 inches Square: Provide two hinges and two sash locks.
   3. Up to 24 by 48 inches: Three hinges and two compression latches with outside and inside handles.
   4. High Temperature Duct Access Doors:
      a. Comply with NFPA 96.
      b. Comply with UL 1978.

B. Access doors with sheet metal screw fasteners are not acceptable.

2.06 FIRE DAMPERS

A. Manufacturers:
   1. Louvers & Dampers, Inc, a brand of Mestek, Inc: www.louvers-dampers.com/#sle.
   2. Nailor Industries, Inc: www.nailor.com/#sle.
   3. Ruskin Company: www.ruskin.com/#sle.

B. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.

C. Horizontal Dampers: Galvanized steel, 22 gage, 0.0299 inch frame, stainless steel closure spring, and lightweight, heat retardant non-asbestos fabric blanket.

D. Curtain Type Dampers: Galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations. Configure with blades out of air stream except for 1.0 inch pressure class ducts up to 12 inches in height.

E. Fusible Links: UL 33, separate at 160 degrees F with adjustable link straps for combination fire/balancing dampers.

2.07 FLEXIBLE DUCT CONNECTORS

A. Fabricate in accordance with SMACNA (DCS) and as indicated.

B. Flexible Duct Connections: Fabric crimped into metal edging strip.
   1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq yd.

2.08 VOLUME CONTROL DAMPERS

A. Fabricate in accordance with SMACNA (DCS) and as indicated.

B. Splitter Dampers:
   1. Material: Same gage as duct to 24 inches size in either direction, and two gages heavier for sizes over 24 inches.
   2. Blade: Fabricate of single thickness sheet metal to streamline shape, secured with continuous hinge or rod.
   3. Operator: Minimum 1/4 inch diameter rod in self aligning, universal joint action, flanged bushing with set screw .

C. Single Blade Dampers:
   1. Fabricate for duct sizes up to 6 by 30 inch.
   2. Blade: 24 gage, 0.0239 inch, minimum.

D. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 by 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
   1. Blade: 18 gage, 0.0478 inch, minimum.

E. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon, thermoplastic elastomer, or sintered bronze bearings.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 3100 for duct construction and pressure class.

B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

C. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Provide minimum 8 by 8 inch size for hand access, size for shoulder access, and as indicated. Provide 4 by 4 inch for balancing dampers only. Review locations prior to fabrication.

D. Provide fire dampers and combination fire and smoke dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by Authorities Having Jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

E. Install smoke dampers and combination smoke and fire dampers in accordance with NFPA 92.

F. Demonstrate re-setting of fire dampers to Owner's representative.

G. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.

H. Use splitter dampers only where indicated.

I. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

END OF SECTION

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SECTION 23 3700
AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Diffusers:
   1. Rectangular ceiling diffusers.
   2. Round ceiling diffusers.

B. Registers/grilles:
   1. Ceiling-mounted, egg crate return register/grilles.
   2. Ceiling-mounted, exhaust and register/grilles.
   3. Ceiling-mounted, supply diffusers.
   4. Wall-mounted, supply register/grilles.
   5. Wall-mounted, ereturn register/grilles.

C. Duct-mounted supply and return registers/louvers.

D. Louvers:
   1. Stationary louvers.

E. Goosenecks.

1.02 REFERENCE STANDARDS

A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

B. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Krueger-HVAC: www.krueger-hvac.com.

B. Price Industries: www.price-hvac.com.

C. Ruskin Company: www.ruskin.com.

D. Titus, a brand of Air Distribution Technologies: www.titus-hvac.com/.

2.02 SUPPLY AIR OUTLETS

A. Type 'S2':
   1. Model: Titus OMNI-AA.
   2. Description: Aluminum - Square ceiling diffuser with round neck and plaque face. Back cone shall be one piece seamless construction and corporate a round inlet collar of sufficient length for connecting, rigid or flexible duct.
   3. Diffuser shall integrate with all duct sizes shown on plans without affecting face size or appearance.
   4. Provide factory insulated R-6 foil backed insulation on outside of back cone.
   5. Border: Provide appropriate border to accommodate mounting per ceiling type.
   6. Ensure optimal performance to 30% of design air flow in VAV Systems.
   7. Finish: #26 White.

B. Type 'S6':
   1. Model: Titus TMRA-AA.

2. Description: Aluminum - Adjustable round ceiling diffuser.
3. Uniform 360 degree discharge pattern. The discharge pattern can be adjusted in 3 fixed cone positions from horizontal to vertical throw.
4. Border: Heavy extruded aluminum construction.
5. Finish: #26 White.

C. Type 'S7':
1. Model: Titus S300FL.
2. Description: Aluminum - Duct mounted supply register. Roll formed aluminum blades.
3. Double deflection with aluminum opposed blade damper.
4. Border: Rolled formed aluminum welded with counter sunk screw holes.
5. Finish: #26 White.

D. Type 'S11':
1. Model: Titus 300 FL
2. Description: Aluminum - Double deflection supply, 3/4" blade spacing, front blades parallel to long dimension.
3. Front and rear blades are to be individually adjustable.
4. Opposed blade damper shall have agjustment accessible through face of register.
5. Border: Register border Type #1, shall be heavy duty extruded aluminum construction with precise welded mitered corners. Surface mount to side wall.
6. Finish: #26 White.

2.03 RETURN AIR INLETS

A. Type 'R1':
1. Model: Titus 50 F.
2. Description: Aluminum 1/2"x1/2"x1" grids (egg crate core) with extruded aluminum border. Sized per schedule on drawings.
3. Border: Type 3 for lay-in installation, Type 1 for surface mount. Panel mounting shall not be allowed.
4. Provide with factory fabricated square to round adapter for connection to ductwork.
5. Finish: #26 White.

B. Type 'R4':
1. Model: Titus 350 RL.
2. Description: Aluminum - Return grille with 35 degree deflection blades spaced at 3/4" on center. Outlet core shall have extruded aluminum blades mechanically locked into a heavy extruded aluminum border. Blades shall run parallel to long dimension of grille.
3. Border: Grille border Type #1, shall be extruded aluminum construction with precise welded mitered corners. Surface mount to side wall.
4. Finish: #26 White.

2.04 EXHAUST AIR INLETS:

A. Type 'E1':
1. Model: Titus 350FL.
2. Description: Aluminum - Return grille with 35 degree deflection blades spaced at 3/4" on center. Outlet core shall have extruded aluminum blades mechanically locked into a heavy extruded aluminum border. Blades shall run parallel to long dimension of grille.
3. Border: Grille border Type #1, shall be extruded aluminum construction with precise welded mitered corners. Surface mount to ceiling.
4. Finish: #26 White.

2.05 LOUVERS

A. Manufacturers:
1. Ruskin Company: www.ruskin.com/#sle.
2. Greenheck: www.greenheck.com

B. Type: 4 inch deep frame with drainable blades, heavy channel frame, 1/2 inch square mesh screen over intake or exhaust end.

C. Fabrication: 16 gage, 0.0598 inch (1.52 mm) thick galvanized steel thick galvanized steel welded assembly, with factory prime coat finish.

D. Color: To be selected by Architect from manufacturer's full range.

E. Mounting: Furnish with masonry strap anchors for installation.

2.06 GOOSENECKS

A. Fabricate in accordance with SMACNA (DCS) of minimum 18 gage, 0.0598 inch galvanized steel.

B. Goose neck duct to penetrate roof through a 18 inch high insulated roof curb. Provide curb cap and a weather tight boot to secure duct through curb cap to ensure water tight installation.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Comply with SMACNA (ASMM) for flashing/counter-flashing of roof penetrations and supports for roof curbs and roof mounted equipment.

C. Check location of outlets and inlets and make necessary adjustments in position to comply with architectural features, symmetry, and lighting arrangement.

D. Install diffusers to ductwork with air tight connection.

E. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.

F. Paint ductwork visible behind air outlets and inlets matte black. Refer to Section 09 9123.

END OF SECTION

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SECTION 23 7200
AIR-TO-AIR ENERGY RECOVERY EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Energy recovery ventilators.

1.02 RELATED REQUIREMENTS

A. Section 23 0548 - Vibration and Seismic Controls for HVAC.

B. Section 23 0923 - Direct-Digital Control System for HVAC.

C. Section 25 1500 - Integrated Automation Software: BAS, BMS, or SCADA.

D. Section 26 0583 - Wiring Connections.

1.03 REFERENCE STANDARDS

A. AHRI 1060 (I-P) - Performance Rating of Air-to-Air Exchangers for Energy Recovery Ventilation Equipment; 2018.

B. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2017, with Addendum (2022).

C. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. ASHRAE Std 135 - A Data Communication Protocol for Building Automation and Control Networks; 2020, with Errata (2023).

E. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings; 2019 (Reapproved 2022).

F. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

I. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's installation instructions, product data, and engineering calculations.

C. Closeout Submittals: Submit manufacturer's operation and maintenance instructions.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements for additional provisions.
   2. Extra Stock Materials: One set of filters.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least five years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.06 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide 1-year manufacturer warranty for equipment including parts, materials, workmanship, and operation commencing on date of Substantial Completion. Complete forms in Owner's name and register with manufacturer.

C. Energy Cube Warranty: Provide 5-year manufacturer warranty.

PART 2 PRODUCTS

2.01 ENERGY RECOVERY VENTILATOR

A. Manufacturers:
1. Greenheck; Model ECV: www.greenheck.com
2. RenewAire: www.renewaire.com
3. Ruskin Company: www.ruskin.com
4. Substitutions: See Section 01 6000 - Product Requirements.

B. Manufactured Units:
1. Unit shall be fully assembled at the factory and consist of an insulated metal cabinet, energy core, motorized intake damper, motorized return damper, sensors, service receptacle, frost control, economizer control, bypass damper filter assembly for intake and exhaust air, supply air blower assembly, exhaust air blower assembly and an electrical control center. All specified components and internal accessories factory installed and tested and prepared for single-point high voltage connection.

C. Cabinet:
1. Materials: Formed single wall insulated metal cabinet, fabricated to permit access to internal components for maintenance.
   a. Outside casing: 18 gauge, galvanized (G90) steel meeting ASTM A653 for components that do not receive a painted finish.
   b. Internal assemblies: 24 gauge, galvanized (G90) steel. Direct drive motor provided with a fabricated belly band for motor support.
2. Access doors shall be hinged.
3. Shall have factory-installed duct flanges on all duct openings
4. Cabinet Insulation: Comply with NFPA 90A and NFPA 90B and erosion requirements of UL 181.
   a. Materials: Fiberglass insulation. If insulation other than fiberglass is used, it must also meet the Fire Hazard Classification shown below.
      1) Thickness: 1 inch (25 mm)
      2) Fire Hazard Classification: Maximum flame spread of 25 and smoke developed of 50, when tested in accordance with ASTM C 411.
      3) Location and application: Full coverage of entire cabinet exterior to include walls, roof, and floor of unit. Insulation shall be of semi-rigid type and installed between inner and outer shells of all cabinet exterior components.
5. Energy Core: Energy core shall be of total enthalpy and shall be removable from the cabinet. The core media shall be a corrugated fiber membrane in a galvanized steel framework and can be removable for servicing. The energy core is to have a five-year warranty. Performance criteria are to be as specified in AHRI Standard 1060.
6. Supply Air and Exhaust Air blower assemblies: Blower assemblies consist of an electric motor and a direct driven blower. Assembly shall be mounted on heavy gauge galvanized rails and further mounted on 1.125-inch-thick neoprene vibration isolators.
7. Control panel /connections: Energy Core Ventilator shall have an electrical control center where all high and low voltage connections are made. Control center shall be constructed to permit single-point high voltage power supply connections
8. Frost control: Timed Exhaust.
9. Timed exhaust shall be provided for frost control of the energy core
10. Economizer Control: Bypass Damper

11. Motorized Dampers: Motorized dampers of insulated low leakage type and leakage rate of 3 CFM/ft^2 @ 1 in. wg shall be factory installed.

D. Blower:
   1. Blower section construction, Supply Air and Exhaust Air: Direct drive motor and blower shall be assembled with neoprene vibration isolation devices.
   2. Blower assemblies: Shall be statically and dynamically balanced and designed for continuous operation at maximum rated fan speed and horsepower.
   3. Centrifugal blower housing: Formed and reinforced steel panels to make curved scroll housing with shaped cutoff.
   4. Forward curved blower (fan) wheels: Galvanized or aluminum construction with inlet flange and shallow blades curved forward in direction of airflow. Mechanically attached to shaft with set screws.
   5. Blower performance shall be factory tested for flow rate, pressure, power, air density, rotation speed and efficiency. Ratings are to be established in accordance with AMCA 210, “Laboratory Methods of Testing Fans for Rating”.

E. Unit Controls:
   1. The unit shall be constructed so that it can be controlled by a factory-supplied controller or it can be monitored and controlled by a Building Management System (BMS). This unit shall be controlled by a factory-installed microprocessor programmable controller (DDC) that is connected to various optional sensors.

F. Filters:
   1. 2” MERV 13 disposable pleated filters shall be provided in the intake air stream and 2” MERV 8 filters in the exhaust air stream.

G. Accessories:
   1. provide with service outlet - 120V GFCI Service Outlet, Shipped Loose

H. ERV Equipment Construction Requirements:
   1. Energy Recovery Exchanger Type: Membrane plate.
   2. Supply and Return Duct Connection Orientation: As indicated on drawings.
   3. Casing and Frame:
      a. Frame: Galvanized steel body or welded extruded aluminum tubular frame capable of supporting components and casings including integral base lifting holes.
      b. Double Wall Panels: Minimum of 18 gauge, 0.040 inch galvanized steel.
      c. Doors: Construct doors of same construction and thickness as wall panels. Include p-shaped extruded neoprene gasket, prop rod, chain with spring, exterior handle, and interior 3-point latching device. Label each door to identify equipment located within.
      d. Insulation Requirements:
         1) Mold Resistance: "Pass" when tested in accordance with ASTM C1338.
         2) Fungal Resistance: No growth when tested in accordance with ASTM G21.
         3) Bacteria Resistance: No growth when tested in accordance with UL 181.
         4) Flame spread index of 25 or less and maximum smoke developed index of 50.
      e. Isolation and Sealing: Form continuous, thermally isolated, weathertight seal between inner wall of panels and structural framing with closed cell PVC foam gasketing and seal seams to prevent job site caulking.
      f. Access Panels: Provide access to components through a large, tightly sealed and easily removable hinged or screwed access panel.
      g. Finish: Polyurethane enamel over weather-protected, corrosion-resistant assembly.
      h. Nameplate: Permanent name plate listing manufacturer, model number, serial number, voltage with tolerance, and amp ratings mounted inside door near electrical panel.
   4. Supply and Exhaust Fans:

a. Provide separate non-overloading, statically and dynamically balanced, draw-through, forward curved centrifugal fan or fan-array for each air stream.
b. Fan Motor: Constant Speed, high efficiency, load matched, belt-driven, open drip proof, thermal overload protected TEFC motor with variable-sheave belt drive, and adjustable-removable motor-slide base. Size drives to 150 percent of load, minimum.
c. Belt Guards: Full sized, hinged, painted with high-visibility safety color, and accessible with standard tools.
d. Motor Bearings: Permanently lubricated sealed ball bearings rated for not less than 200,000 hours of operation with accessible greased fittings.

5. Filter Sections:
   a. Outdoor-Intake and Exhaust Sides: 2 inch thick, pleated, MERV 13 filters, ASHRAE Std 52.2.
   b. Filter Racks: Bolt-on rack constructed of aluminum with minimum size of 1/12 inch thick. Include hinged side access door and snap fasteners.
6. Roof Curbs:
   a. Curbs: Provide full perimeter, watertight, sloped, weight-supporting roof curb fabricated from minimum of 10 gauge, 0.1345 inch aluminized steel.
   b. Isolation Rails: Provide factory-installed, 12 gauge, 0.1046 inch aluminized steel angles top and bottom, connected with flexible, outdoor rated membrane and factory-installed vibration isolation springs.
   c. Gaskets: Provide closed cell PVC foam, field installed top of curb.
7. Vibration Isolation: Provide corrosion-resistant vibration isolation products for internal motors and other revolving parts. See Section 23 0548.
8. Electrical:
   a. 480 VAC, 3-phase with single-point power connection to nonfused main disconnect interlocked with control panel and other components.
   b. Install internal wiring in accordance with NFPA 70 within flexible, liquid tight steel conduit.
9. Controls and Local Control Panel:
   a. Unit Controls: Factory supplied DDC with sensors, limit switches, and frost control.
   b. Provide fused disconnect within local control panel with power supplies, transformers, terminal strip or terminal blocks for interface of field installed components.
   c. Service Status: Provide both local and remote indication of sensor readings and status of safeties and other status items including power on, wheel-rotation alarm, outside-air loaded filter and exhaust-air loaded filter.
   d. Provide temperature, humidity, dewpoint temperature, CO2, and wheel rotation sensors.
   e. Freeze Protection Thermostat: Provide and configure to stop unit when outdoor air intake temperature drops below 38 degrees F, adjustable.
10. BAS, SCADA, or other Integrated Automation Link: ASHRAE Std 135 BACnet MS/TP.
11. Configuration: Adjust listed requirements in conformance with ASHRAE Std 90.1 I-P.
12. Certification: AHRI 1060 (I-P) labeled, include copy of published ratings for operating conditions.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install equipment in accordance with manufacturer's written installation instructions.

B. Do not obstruct maintenance access to equipment piping, electrical conduit, or any other utility.

C. Vibration Isolation: Provide corrosion-resistant equipment isolation products; see Section 23 0548.

D. Coordinate installation and fire alarm system interface of system compatible duct-mounted smoke detectors and other appurtenances following NFPA 90A guidelines.

E. Start system and adjust controls and equipment for satisfactory operation.

F. Coordinate hardwired or software interfacing links to enable coordinate as minimum start-stop, occupied, unoccupied functions as well as specific schedules and setpoints functions with other DDC controls onboard airside systems serving common spaces; see Section 23 0923.

G. Coordinate BAS, BMS, or Integrated Automation linking between unit controller(s).

3.02 SYSTEM STARTUP

A. Provide services of manufacturer's authorized representative to provide start up of unit.

3.03 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals for additional submittals.

B. See Section 01 7900 - Demonstration and Training for additional requirements.

C. Demonstrate proper operation of equipment to Owner's designated representative.

D. Training: Train Owner's personnel on operation and maintenance of system.

1. Training Reference: Operation and maintenance manual and additional training materials as required.
2. Provide minimum of two hours of training.

END OF SECTION

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SECTION 23 7413
PACKAGED ROOF-TOP UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Packaged roof top unit.

B. Unit operating controls.

C. Roof mounting curb and base.

D. Electrical power connections.

E. Operation and maintenance service.

1.02 RELATED SECTIONS

A. Section 23 0553 - Mechanical Identification.

B. Section 23 0593 - Testing, Adjusting, and Balancing for HVAC.

C. Section 23 0713 - Ductwork Insulation.

D. Section 23 3100 - Ductwork.

E. Section 26 0583 - Wiring Connections.

1.03 REFERENCE STANDARDS

A. AHRI 210/240 - Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2023.

B. AHRI 270 - Sound Performance Rating of Outdoor Unitary Equipment; 2015, with Addendum (2016).

C. ARI 360 - Commercial and Industrial Unitary Air Conditioning Equipment testing and rating standard.

D. ARI 370 - Sound Rating of Large Outdoor Refrigerating and Air Conditioning Equipment.

E. ANSI/ASHRAE 15 - Safety Code for Mechanical Refrigeration.

F. ANSI/ASHRAE 37 - Testing Unitary Air Conditioning and Heat Pump Equipment.

G. ANSI/ASHRAE 90.1-2004 - Energy Standard for New Buildings Except Low-Rise Residential Buildings.

H. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

I. NFPA 90B - Standard for the Installation of Warm Air Heating and Air Conditioning Systems; 2002.

J. UL 1995 - Heating and Cooling Equipment; Underwriters Laboratories Inc.; 2005.

1.04 SUBMITTALS

A. Shop Drawings: Submit shop drawings indicating overall dimensions as well as installation, operation, and service clearances. Indicate lift points and recommendations and center of gravity. Indicate unit shipping, installation, and operating weights. Include shop drawings for each size of factory fabricated roof curb.

B. Product Data: Manufacturer's catalog sheets, brochures, performance charts, standard schematic drawings, specifications, and installation instructions for each size unit. Include specifications for all options and accessories.

C. Contract Closeout Submittals:
   1. Operation and Maintenance Data: Deliver 2 copies, covering the installed products, to the Owner's Representative.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.

1.05 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Unit shall conform to ANSI Z21.47/UL1995 for construction of packaged air conditioners.
   2. Unit shall be factory tested, with design, construction and installation in accordance with the following: ARI Standard 210, NFPA, UL, ASHRAE 15 Safety Code for Mechanical Refrigeration, and all State or Local codes or regulations having jurisdiction.
   3. Rate cooling capacities in accordance with ARI Standard 210.
   4. Electrical components shall be UL listed.

1.06 WARRANTY

A. Provide a full parts and labor warranty for one year from start-up or 18 months from shipment, whichever occurs first.

B. Provide a five year manufacturer's warranty to include parts coverage for refrigeration compressors.

C. Provide a ten year manufacturer's warranty to include parts coverage for heat exchangers.

PART 2 PRODUCTS

2.01 PACKAGED ROOF-TOP UNITS

A. Manufacturers:
   1. Daikin Applied
   2. The Trane Company.
   3. Aaon.

B. General Description:
   1. Furnish as shown on plans, Daikin Applied Rebel Single zone Heating and Cooling Unit(s) model DPS. Unit performance and electrical characteristics shall be per the job schedule.
   2. Configuration: Fabricate as detailed on prints and drawings:
      a. Return plenum / economizer section
      b. Filter section
      c. Heat Pump Heating/Cooling coil section
      d. Auxilary Electric Heating coil section
      e. Supply fan section
      f. Heat recovery section
      g. Condensing Heat Pump unit section
   3. The complete unit shall be cETLus listed.
   4. The unit shall be ASHRAE 90.1-2016 compliant and labeled.
   5. Each unit shall be specifically designed for outdoor rooftop application and include a weatherproof cabinet. Each unit shall be completely factory assembled and shipped in one piece. Packaged units shall be shipped fully charged with R-410 Refrigerant and oil.
   6. The unit shall undergo a complete factory run test prior to shipment. The factory test shall include a refrigeration circuit run test, a unit control system operations checkout, a unit refrigerant leak test and a final unit inspection.
   7. All units shall have decals and tags to indicate caution areas and aid unit service. Unit nameplates shall be fixed to the main control panel door. Electrical wiring diagrams shall be attached to the control panels. Installation, operating and maintenance bulletins and start-up forms shall be supplied with each unit.
   8. Performance: All scheduled EER, IEER, capacities and face areas are minimum accepted values. All scheduled amps, kW, and HP are maximum accepted values that allow scheduled capacity to be met.
   9. Warranty: The manufacturer shall provide 12-month parts only warranty. Defective parts shall be repaired or replaced during the warranty period at no charge. The warranty period shall commence at startup or six months after shipment, whichever occurs first.

C. Cabinet, Casing, and Frame:

1. Panel construction shall be double-wall construction for all panels. All floor panels shall have a solid galvanized steel inner liner on the air stream side of the unit to protect insulation during service and maintenance. Insulation shall be a minimum of 2" thick with an R-value of 13.0, and shall be 2 part injected foam. Panel design shall include no exposed insulation edges. Unit cabinet shall be designed to operate at total static pressures up to 5.0 inches w.g.
2. Exterior surfaces shall be constructed of pre-painted galvanized steel for aesthetics and long term durability. Paint finish to include a base primer with a high quality, polyester resin topcoat of a neutral beige color. Finished panel surfaces to withstand a minimum 1000-hour salt spray test in accordance with ASTM B117 standard for salt spray resistance.
3. Service doors shall be provided on the fan section, filter section, control panel section, and heating vestibule in order to provide user access to unit components. All service access doors shall be mounted on multiple, stainless steel hinges and shall be secured by a latch system. Removable service panels secured by multiple mechanical fasteners are not acceptable.
4. The unit base shall overhang the roof curb for positive water runoff and shall seat on the roof curb gasket to provide a positive, weathertight seal. Lifting brackets shall be provided on the unit base to accept cable or chain hooks for rigging the equipment.

D. Outdoor / Return Air Section:
1. Unit shall be provided with an outdoor air economizer section. The economizer section shall include outdoor, return, and exhaust air dampers. The economizer operation shall be fully integral to the mechanical cooling and allow up to 100% of mechanical cooling if needed to maintain the cooling discharge air temperature. The outdoor air hood shall be factory installed and constructed from galvanized steel finished with the same durable paint finish as the main unit. The hood shall include moisture eliminator filters to drain water away from the entering air stream. The outside and return air dampers shall be sized to handle 100% of the supply air volume. The dampers shall be parallel blade design. Damper blades shall be gasketed with side seals to provide an air leakage rate of 1.5 cfm / square foot of damper area at 1” differential pressure in according with testing defined in AMCA 500. A barometric exhaust damper shall be provided to exhaust air out of the back of the unit. A bird screen shall be provided to prevent infiltration of rain and foreign materials. Exhaust damper blades shall be lined with vinyl gasketing on contact edges. Control of the dampers shall be by a factory installed direct coupled actuator. Damper actuator shall be of the modulating, spring return type. A comparative enthalpy control shall be provided to sense and compare enthalpy in both the outdoor and return air streams to determine if outdoor air is suitable for “free” cooling. If outdoor air is suitable for “free” cooling, the outdoor air dampers shall modulate in response to the unit’s temperature control system.
2. Unit shall be provided with a 100% outdoor air hood. The 100% outdoor air hood shall allow outdoor air to enter from the back of the unit, at the draw-through filter section. The outdoor air hood shall be factory installed and constructed from galvanized steel finished with the same durable paint finish as the main unit. The hood shall include a bird screen to prevent infiltration of foreign materials and a rain lip to drain water away from the entering air stream.
3. Daikin Applied UltraSeal low leak dampers shall be provided. Damper blades shall be fully gasketed and side sealed and arranged vertically in the hood. Damper leakage shall be less than 1.5 CFM/Sq. Ft. of damper area at 1.0 inch static pressure differential. Leakage rate to be tested in accordance with AMCA Standard 500. Damper blades shall be operated from multiple sets of linkages mounted on the leaving face of the dampers. Control of the dampers shall be from a factory installed actuator.
4. Control of the outdoor dampers shall be by a factory installed actuator. Damper actuator shall be of the modulating type. Damper to open when when supply fan starts, and close when supply fan stops.

E. Energy Recovery:

1. The rooftop unit shall be provided with an AHRI certified rotary wheel air-to-air heat exchanger in a cassette frame complete with seals, drive motor and drive belt. The energy recovery wheel shall be an integral part of the rooftop unit with unitary construction and does not require field assembly. Bolt-on energy recovery units that require field assembly and section to section gasketing and sealing are not acceptable.
2. The wheel capacity, air pressure drop and effectiveness shall be AHRI certified per AHRI Standard 1060. Thermal performance shall be certified by the manufacturer in accordance with ASHRAE Standard 84, Method of Testing Air-to-Air Heat Exchangers and AHRI Standard 1060, Rating Air-to-Air Heat Exchangers For Energy Recovery Ventilation Equipment.
3. The rooftop unit shall be designed with a track so the entire energy recovery wheel cassette can slide out from the rooftop unit to facilitate cleaning.
4. The unit shall have 2" Merv 7 filters for the outdoor air before the wheel to help keep the wheel clean and reduce maintenance. Filter access shall be by a hinged access door with ¼ turn latches.
5. The matrix design shall have channels to reduce cross contamination between the outdoor air and the exhaust air. The layers shall be effectively captured in aluminum and stainless steel segment frames that provide a rigid and self-supporting matrix. All diameter and perimeter seals shall be provided as part of the cassette assembly and shall be factory set. Drive belt(s) of stretch urethane shall be provided for wheel rim drive without the need for external tensioners or adjustment.
6. The total energy recovery wheel shall be coated with silica gel desiccant permanently bonded without the use of binders or adhesives, which may degrade desiccant performance. The substrate shall be lightweight polymer and shall not degrade nor require additional coatings for application in marine or coastal environments. Coated segments shall be washable with detergent or alkaline coil cleaner and water. Desiccant shall not dissolve nor deliquesce in the presence of water or high humidity.
7. Wheels shall be provided with removable energy transfer matrix. Wheel frame construction shall be a welded hub, spoke and rim assembly of stainless, plated and/or coated steel and shall be self-supporting without matrix segments in place. Segments shall be removable without the use of tools to facilitate maintenance and cleaning.
8. Wheel bearings shall be selected to provide an L-10 life in excess of 400,000 hours. Rim shall be continuous rolled stainless steel. Wheels shall be connected to the shaft by means of taper lock hubs.
9. The exhaust air fan shall be a direct drive SWSI plenum fan. The exhaust fan shall be sized for the airflow requirements per the construction schedule. The unit controller shall control the exhaust fan to maintain building pressure. A VFD shall be provided for the exhaust fan motor or the exhaust fan motor shall be an ECM motor.The rooftop unit shall have single point electrical power connection and shall be ETL listed.
10. The rooftop unit with the energy recovery wheel shall incorporate the economizer operation. The energy recovery wheel shall have a bypass damper. When the unit is in the economizer mode of operation the energy recovery wheel shall stop and the bypass dampers shall be opened. The outdoor air shall be drawn through the bypass dampers to reduce the pressure drop of the outdoor airstream.
11. When the outside air is below 32F (adjustable) the bypass damper will open for 5 minutes (adjustable) every 60 minute period (adjustable). Exhaust air continues to run though the core during this time to remove frost buildup.
12. The ERV core shall transfer both sensible and latent energy between the incoming fresh air stream and the exhaust stale air stream.
13. E. The ERV core shall be in either a cross-flow or counter cross-flow orientation and have no moving parts.
14. The ERV core shall be certified by AHRI under its Standard 1060 for Energy Recovery Ventilators. Products not currently AHRI certified will not be accepted.
15. The ERV core shall achieve the minimum effectiveness value as indicated in the schedule.

16. The fresh air stream must have complete separation from the stale air stream to prevent cross contamination.
17. The ERV core shall have Exhaust Air Transport Ratio of 0.5% as tested to AHRI 1060 (EATR) to prevent cross-over of gases, contaminants or odors.
18. The ERV core's Outdoor Air Correction Factor (OACF) shall not exceed 1.0 as tested to AHRI 1060 (OACF) Standard.
19. The ERV core shall not be degraded or promote the growth of mold and bacteria with a rating of zero in testing according to ISO846 A and C.
20. The ERV core must be able to tolerate freezing temperatures of -30°C (-22°F and not have an increase in EATR or decrease in performance after being frozen.
21. The ERV core must be able to tolerate high temperatures of +60°C and not have an increase in EATR or decrease in performance at these elevated temperatures.
22. The ERV core must be freeze tolerant tested to 40 freeze thaw cycles from -20¬o C to +20o C while maintaining the energy recovery effectiveness and EATR rating of 0.5%.
23. The ERV core must be water washable to remove dust and contaminants.
24. The ERV core must be flame proof and comply with UL 723 with a flame spread index that shall not be over 25 and a smoke index that shall not be over 50.
25. The ERV cores should have particulate filters positioned before the incoming air streams.
26. Accepted manufacturer: CORE Energy Recovery Solutions or approved equal, subject to compliance with requirements

F. Exhaust Fan:
1. Exhaust fan shall be a single width, single inlet (SWSI) airfoil centrifugal fan. The fan wheel shall be Class II construction with aluminum fan blades that are continuously welded to the hub plate and end rim. The exhaust fan shall be a direct drive fan mounted to the motor shaft. Belts and sheaves are not acceptable due to the additional maintenance.
2. The fan motor shall be a totally enclosed EC motor that is speed controlled by the rooftop unit controller. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase. Motors shall be premium efficiency.
3. The unit DDC controller shall provide building static pressure control. The unit controller shall provide proportional control of the exhaust fans from 25% to 100% of the supply air fan designed airflow to maintain the adjustable building pressure setpoint. The field shall mount the required sensing tubing from the building to the factory mounted building static pressure sensor.

G. Filters:
1. Unit shall be provided with a draw-through filter section. The filter rack shall be designed to accept a 2" prefilter and a 4" final filter. The unit design shall have a hinged access door for the filter section. The manufacturer shall ship the rooftop unit with 2" MERV 8 and 4" MERV 14 filters.

H. Heat Pump Heating/Cooling Coil:
1. The indoor coil section shall be installed in a draw through configuration, upstream of the supply air fan. The coil section shall be complete with a factory piped cooling coil and an ASHRAE 62.1 compliant double sloped drain pan.
2. The direct expansion (DX) heating/cooling coils shall be fabricated of seamless high efficiency copper tubing that is mechanically expanded into high efficiency aluminum plate fins. Coils shall be a multi-row, staggered tube design with a minimum of 3 rows. All cooling coils shall have an interlaced coil circuiting that keeps the full coil face active at all load conditions. All coils shall be factory leak tested with high pressure air under water.
3. The cooling coil shall have an electronic controlled expansion valve. The unit controller shall control the expansion valve to maintain liquid subcooling and the superheat of the refrigerant system.
4. Provide a reversing valve for heat pump operation.

5. The refrigerant suction lines shall be fully insulated from the expansion valve to the compressors.
6. The drain pan shall be stainless steel and positively sloped. The slope of the drain pan shall be in two directions and comply with ASHRAE Standard 62.1. The drain pan shall have a minimum slope of 1/8" per foot to provide positive draining. The drain pan shall extend beyond the leaving side of the coil. The drain pan shall have a threaded drain connection extending through the unit base.

I. Hot Gas Reheat:
1. Unit shall be equipped with a fully modulating hot gas reheat coil with hot gas coming from the unit condenser
2. Hot gas reheat coil shall be a Micro Channel design. The aluminum tube shall be a micro channel design with high efficiency aluminum fins. Fins shall be brazed to the tubing for a direct bond. The capacity of the reheat coil shall allow for a 20°F temperature rise at all operating conditions.
3. The modulating hot gas reheat systems shall allow for independent control of the cooling coil leaving air temperature and the reheat coil leaving air temperature. The cooling coil and reheat coil leaving air temperature setpoints shall be adjustable through the unit controller. During the dehumidification cycle the unit shall be capable of 100% of the cooling capacity. The hot gas reheat coil shall provide discharge temperature control within +/- 2°F.
4. Each coil shall be factory leak tested with high-pressure air under water.

J. Supply Fan:
1. Supply fan shall be a single width, single inlet (SWSI) airfoil centrifugal fan. The fan wheel shall be Class II construction with fan blades that are continuously welded to the hub plate and end rim. The supply fan shall be a direct drive fan mounted to the motor shaft. Belts and sheaves are not acceptable due to the additonal maintenance.
2. All fan assemblies shall employ solid steel fan shafts. Heavy-duty pillow block type, self-aligning, grease lubricated ball bearings shall be used. Bearings shall be sized to provide a L-50 life at 250,000 hours. The entire fan assembly shall be isolated from the fan bulkhead with a flexible collar and mounted on 1” spring isolators.
3. All fan assemblies shall be statically and dynamically balanced at the factory, including a final trim balance, prior to shipment.
4. Supply fan and motor assembly combinations larger than 8 hp or 22” diameter shall be internally isolated on 1” deflection, spring isolators and include removable shipping tie downs.
5. The fan motor shall be a totally enclosed EC motor that is speed controlled by the rooftop unit controller. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase. Motors shall be premium efficiency.
6. The supply fan shall be capable of airflow modulation from 30% to 100% of the scheduled designed airflow. The fan shall not operate in a state of surge at any point within the modulation range.

K. Auxilary Electric Heating Section:
1. The rooftop unit shall include an electrical heating section. The electric coil design shall be one electric heating module factory installed downstream of the supply air fan in the heat section. Electrical coil to incorporate SCR control of heating output.

L. Condensing Heat Pump Section:
1. Outdoor coils shall have seamless copper tubes, mechanically bonded into aluminum plate-type fins. The fins shall have full drawn collars to completely cover the tubes. A sub-cooling coil shall be an integral part of the main outdoor air coil. Each outdoor air coil shall be factory leak tested with high-pressure air under water.
2. Outdoor air coils shall be protected from incidental contact to coil fins by a coil guard. Coil guard shall be constructed of cross wire welded steel with PVC coating.

3. Fan motors shall be an ECM type motor for proportional control. The unit controller shall proportionally control the speed of the condenser fan motors to maintain the head pressure of the refrigerant circuit from ambient condition of 25~120°F. Mechanical cooling shall be provided to 25º F. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase.
4. The condenser fan shall be low noise blade design. Fan blade design shall be a dynamic profile for low tip speed. Fan blade shall be of a composite materia
5. The unit shall have scroll compressors. One of the compressors shall be an inverter compressor providing proportional control. The unit controller shall control the speed of the compressor to maintain the discharge air temperature. The inverter compressor shall have a separate oil pump and an oil separator for each compressor that routes oil back to the compressor instead of through the discharge line. A refrigeration capacity-control device will not be accepted as an equal to inverter scroll compressors
6. Pressure transducers shall be provided for the suction pressure and head pressure. Temperature sensor shall be provided for the suction temperature and the refrigerant discharge temperature of the compressors. All of the above devices shall be an input to the unit controller and the values be displayed at the unit controller.
7. Each circuit shall be dehydrated and factory charged with R-410A Refrigerant and oil.

M. Electrical:
1. Unit wiring shall comply with NEC requirements and with all applicable UL standards. All electrical components shall be UL recognized where applicable. All wiring and electrical components provided with the unit shall be number and color-coded and labeled according to the electrical diagram provided for easy identification. The unit shall be provided with a factory wired weatherproof control panel. Unit shall have a single point power terminal block for main power connection. A terminal board shall be provided for low voltage control wiring. Branch short circuit protection, 115-volt control circuit transformer and fuse, system switches, and a high temperature sensor shall also be provided with the unit. Each compressor and condenser fan motor shall be furnished with contactors and inherent thermal overload protection. Supply fan motors shall have contactors and external overload protection. Knockouts shall be provided in the bottom of the main control panels for field wiring entrance.
2. A GFI receptacle shall be unit mounted that is field powered.
3. A single non-fused disconnect switch shall be provided for disconnecting electrical power at the unit. Disconnect switches shall be mounted internally to the control panel and operated by an externally mounted handle.

N. Controls:
1. Provide a microprocessor based system to control all refrigeration functions including compressor speed, condenser fan function, unit safety protection, including compressor minimum run and minimum off times, and diagnostics. This system shall operate the unit at peak efficiency utilizing variable head pressure control and electronic expansion valve while maintaining the cooling, or heating in heat pump operation, call per third party control. The microprocessor control shall consist of only direct expansion required temperature sensors, pressure sensors, controller and keypad/display operator interface. Refrigeration sensors and controller shall be factory mounted, wired and tested.
2. The microprocessor controls shall be solely dependent on communications with any on-site or remote PC or master control panel for proper unit operation. The microprocessor memory shall be protected from voltage fluctuations as well as any extended power failures. No commissioning settings shall be lost, even during extended power shutdowns
3. The microprocessor controls shall be dependent on starting and stopping of the unit via terminal strip control and logic. The control system shall be capable of providing a remote alarm indication. The microprocessor show provide compressor capacity & status, defrost status (heat pump only), condensate overflow alarm, and dirty filter alarm.

4. All digital and analog inputs and outputs shall be protected against damage from transients or incorrect voltages. All field wiring shall be terminated at a separate, clearly marked terminal strip.
5. The keypad interface shall allow convenient navigation and access to the commissioning functions. The unit keypad/display character format shall be 4 lines x 20 characters. All control settings shall be password protected against unauthorized changes. For ease of service, the display format shall be English language readout. Coded formats with look-up tables will not be accepted. The user interaction with the display shall provide the following information as a minimum:
    a. Supply and exhaust fan speed control.
    b. Refrigeration alarm details.

O. Roof Curb:
1. A prefabricated heavy gauge galvanized steel, mounting curb shall be provided for field assembly on the roof decking prior to unit shipment. The roof curb shall be a full perimeter type with complete perimeter support of the air handling section and condensing section. The curb shall be a minimum of 18" high and include a nominal 2" x 4" wood nailing strip. Gasket shall be provided for field mounting between the unit base and roof curb.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that roof is ready to receive work and opening dimensions are as indicated on shop drawings.

B. Verify that proper power supply is available.

3.02 INSTALLATION

A. Roof Curbs: Furnish roof curbs to Roofing/General Contractor for installation.

B. Install packaged units on roof curbs in complete accordance with the manufacturer's printed instructions and as indicated.

C. Provide all piping, electrical, and ductwork connections to units through factory furnished and installed, or factory furnished and field installed through the base openings.

D. Mount units on factory built roof mounting curb providing watertight enclosure to protect ductwork and utility services. Install roof mounting curb level.

3.03 SYSTEM STARTUP

A. Prepare and start equipment. Adjust for proper operation.

3.04 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

B. See Section 01 7900 - Demonstration and Training, for additional requirements.

C. Demonstrate operation to Owner's maintenance personnel.

3.05 MAINTENANCE

A. Provide two separate service offerings (spring and fall) for preventive service and maintenance (in addition to start-up of systems) of packaged roof top units.
1. Furnish the following Cooling Cycle service and maintenance of package for the roof top units during the Spring period within one year from Date of Substantial Completion, including but not limited to the following:
    a. Report in with the Customer Representative
    b. Record and report abnormal conditions, measurements taken, etc.
    c. Review customer logs with the customer for operational problems and trends.
    d. General Assembly Inspection
        1) Inspect for leaks and report leak check results.
        2) Repair minor leaks as required (e.g. valve packing, flare nuts).

3) Calculate refrigerant loss rate and report to the customer.
4) Check the sheaves and pulleys for wear and alignment.
5) Check the belts for tension, wear, cracks, and/or glazing.
6) Verify proper damper operation.
7) Check mechanical linkages for wear, tightness, and clearances.
8) Verify clean condenser and evaporator.
9) Verify clean evaporator fan.
10) Verify clean air filters.
11) Verify the operation of the crankcase oil heater(s), if applicable.

e. Controls and Safeties Inspection
1) Verify the operation of the discharge air temperature control device, if applicable.
2) Verify the operation of the outside air temperature control device.
3) Verify the operation of the mixed air temperature control device.
4) Test the operation of the high condenser pressure safety device. Calibrate, if necessary, and record setting.
5) Test the operation of the low temperature safety device. Calibrate, if necessary, and record setting.
6) Test the operation of the low pressure safety device(s). Calibrate, if necessary, and record setting.

f. Lubrication
1) Lubricate motor bearings, if applicable.
2) Lubricate fan bearings.
3) Check oil level in the compressor(s), if applicable.

g. Motor and Starter
1) Clean the starter and cabinet.
2) Inspect wiring and connections for tightness and signs of overheating and discoloration.
3) Check the contactors for free and smooth operation.
4) Meg the compressor motor(s) and record readings.
5) Verify the tightness of the compressor motor terminal connections.
6) Verify the operation of the crankcase oil heater(s), if applicable.

h. Startup and Checkout Procedure
1) Start the unit.
2) Verify the starter operation.
3) Verify the smooth operation of the compressors and fans.
4) Log operating conditions of the unit after the system has stabilized.
5) Review operating procedures with operating personnel.
6) Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.

i. Provide written report to Owner.

2. Furnish the following Heating Cycle service and maintenance of package for the roof top units during the Fall period within one year from Date of Substantial Completion, including but not limited to the following:
a. Perform the heating inspection/maintenance procedure applicable to the unit (steam/hot water, electric, gas).
b. Verify smooth operation of the fans.
c. Check the belts for tension, wear, cracks, and glazing.
d. Verify clean air filters.
e. Electric Heat Option
1) Inspect wiring and connections for tightness and signs of overheating and discoloration.
2) Check and calibrate operating and safety controls, if applicable.

3) Verify the operation of the heating elements.
4) Check voltage and amperage and compare readings with the watt rating on the heater.
5) Startup/Checkout Procedure
   (a) Verify smooth operation of the fans.
   (b) Check the belts for tension, wear, cracks, and glazing.
   (c) Verify clean air filters.
   (d) Verify proper operation of the heating section.
   (e) Verify the operation of the temperature controls.

f. Provide written report to Owner.

END OF SECTION

SECTION 23 8129
VARIABLE REFRIGERANT FLOW HVAC SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air-source outdoor units.

B. Refrigerant piping.

C. Refrigerant branch units.

D. Indoor units.

1.02 RELATED REQUIREMENTS

A. Section 23 0800 - Commissioning of HVAC.

1.03 REFERENCE STANDARDS

A. AHRI 210/240 - Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2023.

B. AHRI 1230 - Performance Rating of Variable Refrigerant Flow (VRF) Multi-Split Air-Conditioning and Heat Pump Equipment; 2021.

C. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

D. ASHRAE Std 135 - A Data Communication Protocol for Building Automation and Control Networks; 2020, with Errata (2023).

E. ITS (DIR) - Directory of Listed Products; Current Edition.

F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. UL 1995 - Heating and Cooling Equipment; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Submit manufacturer's standard data sheets showing the following for each item of equipment, marked to correlate to equipment item markings indicated in Contract Documents:

1. Outdoor Units:
    a. Refrigerant Type and Size of Charge.
    b. Output and Input Cooling Capacity: Btu/h.
    c. Output and Input Heating Capacity: Btu/h.
    d. Operating Temperature Range, Cooling and Heating.
    e. Fan Capacity: Flow in cfm with respective fan curves.
    f. External Static Pressure (ESP): In-wc.
    g. Sound Pressure Level: dB(A).
    h. Electrical Data: Complete including motor size.
    i. Maximum number of indoor units that can be served.
    j. Maximum refrigerant piping run from outdoor unit to indoor unit(s).
    k. Maximum height difference between outdoor unit to Indoor unit(s), both above and below.
2. Indoor Units:
    a. Output and Input Cooling Capacity: Btu/h.
    b. Output and Input Heating Capacity: Btu/h.
    c. Fan Capacity: Flow in cfm with respective fan curves.

d. External Static Pressure (ESP): In-wc.
e. Electrical Data: Complete including motor size.
f. Maximum Lift of Built-in Condensate Pump.

3. Control Panels: Complete data of controllers, input-output points, and zones.

C. Operating and Maintenance Data:
1. Manufacturer's complete standard instructions for each unit of equipment and control panel.
2. Custom-prepared system operation, troubleshooting, and maintenance instructions and recommendations.
3. Identification of replaceable parts and local source of supply.

D. Warranty: Executed warranty, made out in Owner's name.

1.05 DELIVERY, STORAGE AND HANDLING

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Daikin; Model Aurora HR: www.daikinac.com

B. LG Electronics U.S.A., Inc: www.lghvac.com

C. Mitsubishi Electric Trane HVAC US, LLC: www.metahvac.com

D. Substitutions: Systems manufactured by other manufacturers will not be considered.

2.02 VARIABLE REFRIGERANT FLOW SYSTEM

A. Minimum System Requirements:
1. System Testing, Capacity Rating, and Performance:
a. AHRI 1230 when cooling capacity is equal or greater than 65,000 Btu/h.
b. AHRI 210/240 when cooling capacity is below 65,000 Btu/h.
2. Safety Certification: Bear UL 1995 tested and ITS (DIR) listed certification label.
3. Outdoor Units: Furnish installation and surface support hardware products in accordance with ASCE 7 for wind restraint.
4. Cooling Mode Interior Performance:
a. Daytime Setpoint: 72 degrees F, plus or minus 2 degrees F.
b. Setpoint Range: 57 degrees F to 77 degrees F.
c. Night Setback: 78 degrees F.
d. Interior Relative Humidity: 20 percent, maximum.
5. Heating Mode Interior Performance:
a. Setpoint: 68 degrees F, plus or minus 2 degrees F.
b. Setpoint Range: 59 to 80 degrees F.
c. Night Setback: 60 degrees F.
d. Minimum Interior Relative Humidity: 10 percent RH.

2.03 AIR-SOURCE OUTDOOR UNITS

A. Heat Pump Type:
1. DX refrigeration unit piped to one or more compatible indoor units either directly or indirectly through one or more intermediate refrigeration branch units.

B. Unit Cabinet:
1. Capable of being installed with wiring and piping to the left, right, rear or bottom.
2. Designed to allow side-by-side installation with minimum spacing and vibration isolation.
3. Weatherproof and corrosion resistant; rust-proofed mild steel panels coated with baked enamel finish.
4. Sound Pressure Level: 55 dB measured at 3 feet from front of unit.

C. Heat Sink Side:

1. Condenser Fans:
    a. Provide minimum of 2 fans for each condenser within the outdoor unit.
    b. Minimum External Static Pressure: Factory set at 0.12 in-wc.
    c. Fan Type: Vertical discharging, direct-driven propeller type with variable speed operation using DC-controlled ECM motors mechanically connected using permanently lubricated bearings having whole assembly protected with fan guards.
2. Condenser Coils:
    a. Copper tubes expanded into aluminum fins to form mechanical bond; waffle louver fin and rifled bore tube design to ensure high efficiency performance.

D. Refrigeration Side:
1. Factory assembled and wired with instrumentation, switches, and controller(s) to handle unit specifics with direct coordination of remote controller(s) from indoor unit(s).
2. Refrigeration Circuit: ECM driven dual scroll compressors, fans, condenser heat sink coil, expansion valves, solenoid valves, distribution headers, capillaries, filters, shutoff valves, oil separators, service ports, and refrigerant regulator.
3. Refrigerant: R-410a factory charged. Controller to alarm when charge is below capacity.
4. Variable Volume Control: Modulate compressed refrigerant capacity automatically to maintain constant suction and condensing pressures under varying refrigerant volume required to handle remote loads. Include defrost control.
5. Provide refrigerant subcooling to ensure the liquid refrigerant does not flash when supplying to use indoor units.
6. Capable of heating operation at low end of operating range as specified, without additional low ambient controls or auxiliary heat source; during heating operation, reverse cycle, oil return, or defrost is not permitted due to potential reduction in space temperature.
7. Power Failure Mode: Automatically restarts operation after power failure without loss of programmed settings.
8. Safety Devices: High pressure sensor with cut-out switch, low pressure sensor with cut-out switch, control circuit fuses, crankcase heaters, fusible plug, overload relay, inverter overload protector, thermal protectors for compressor and fan motors, overcurrent protection for the inverter and antirecycling timers.
9. Oil Recovery Cycle: Automatic, occurring 2 hours after start of operation and then every 8 hours of operation; maintain continuous heating during oil return operation.

E. Local Controls:
1. Include factory-wired instruments, sensors, switches, and safeties for unit control.
2. Configured to coordinate internal unit operation with remote indoor units and with built-in capacity to coordinate other manifolded outdoor units and remote refrigerant branch unit(s).
3. Include screen and button interface to setup operating schedules, setpoints, alarms, and remote unit setpoint coordination. Also used for system troubleshooting.
4. Self diagnostic, auto-check functions to detect malfunctions and display the type and location.

F. BAS, SCADA, or other Integrated Automation Link: ASHRAE Std 135 BACnet IP.

G. Power:
1. Electrical Requirement: Refer to Drawing Unit Schedule.
2. Outdoor Mounted: Provide fused NEMA 250 Type 4X disconnect switch.

2.04 REFRIGERANT PIPING

A. Two-Pipe Run: Provide low-pressure vapor and high-pressure vapor gas pipes for each indoor unit selected for seasonal heating or cooling service.

B. Three-Pipe Run: Provide low-pressure vapor, high-pressure vapor gas, and liquid pipes for each indoor unit selected for off-season heating and cooling changeover service.

C. Refrigerant Flow Balancing: Provide refrigerant piping joints and headers specifically designed to ensure proper refrigerant balance and flow for optimum system capacity and performance; T-style joints are prohibited.

2.05 REFRIGERANT BRANCH UNITS

A. Outdoor unit interface to handle two or more indoor units required to do automatic off-season heating and cooling changeover.

B. Concealed box consisting internally-piped refrigeration loops, subcooling heat exchanger, and other devices coordinated by electronic valves to facilitate off-season load management between outdoor and indoor units.

C. Minimum Requirements:
   1. Control direction of refrigerant flow using electronic expansion valves; use of solenoid valves for changeover and pressure equalization is not permitted due to refrigerant noise; use of multi-port branch selector boxes is not permitted unless spare ports are provided for redundancy.
   2. Provide one electronic expansion valve for each downstream indoor unit served except when multiple indoor units are connected, provide balancing joints in downstream piping to keep total capacity within branch unit capacity.
   3. Energize subcooling heat exchanger during simultaneous heating and cooling service.
   4. Casing: Galvanized steel sheet with flame and heat resistant foamed polyethylene sound and thermal insulation.
   5. Refrigerant Connections: Braze type.
   6. Condensate Drainage: Provide unit that does not require condensate drainage.

2.06 INDOOR UNITS

A. Manufacturers:
   1. 3 by 3 ft, 4-way, Ceiling-Recessed Cassette, Indoor Units:
      a. Daikin AC: www.daikinac.com/#sle.
      b. LG Electronics U.S.A., Inc: www.lghvac.com/#sle.
      c. Mitsubishi Electric Trane HVAC US, LLC: www.metahvac.com/#sle.
   2. 2 by 2 ft, 4-way, Ceiling-Recessed Cassette, Indoor Units:
      a. Daikin AC: www.daikinac.com/#sle.
      b. LG Electronics U.S.A., Inc: www.lghvac.com/#sle.
      c. Mitsubishi Electric Trane HVAC US, LLC: www.metahvac.com/#sle.

B. Minimum Unit Requirements:
   1. DX Evaporator Coil:
      a. Copper tubes expanded into aluminum fins to form a mechanical bond; waffle louver fin and high heat exchange, rifled bore tube design; factory tested.
      b. 2-, 3-, or 4-row cross fin design with 14 to 17 fins per inch and flare end-connections.
      c. Provide thermistor on liquid and gas lines wired into local controller.
      d. Refrigerant circuits factory-charged with dehydrated air for field charging.
   2. Fan Section:
      a. Variable or three-speed ECM fan with automatic airflow adjustment; external static pressure selectable during commissioning.
      b. Thermally protected, direct-drive motor with statically and dynamically balanced fan blades.
      c. Minimum-adjustable external static pressure 0.32 in-wc; provide for mounting of field-installed ducts.
   3. Local Unit Controls:
      a. Temperature Control: Return air control using thermistor tied to computerized Proportional-Integral-Derivative (PID) control of superheat.
      b. Temperature Zones:

1) Single Indoor Unit: Set served space(s) as the local temperature zone.
2) Multiple Indoor Units: For large zones, group and coordinate related indoor units with served spaces as the local temperature zone with each indoor unit as sub-zone.

4. Return Air Filter:
   a. Manufacturer's standard, monitored with adjustable static pressure switch.
5. Condensate:
   a. Built-in condensate drain pan with PVC drain connection for drainage.
   b. Units With Built-In Condensate Pumps: Provide condensate safety shutoff and alarm.
   c. Units Without Built-In Condensate Pump: Provide built-in condensate float switch and wiring connections.
6. Cabinet Insulation: Sound absorbing foamed polystyrene and polyethylene insulation.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install refrigerant piping in accordance with equipment manufacturer's instructions.

C. Perform wiring in accordance with NFPA 70, National Electric Code (NEC).

D. Coordinate with installers of systems and equipment connecting to this system.

3.02 SYSTEM STARTUP

A. Provide manufacturer's field representative to perform system startup.

B. Prepare and start equipment and system in accordance with manufacturer's instructions and recommendations.

C. Adjust equipment for proper operation within manufacturer's published tolerances.

3.03 COMMISSIONING

A. See Section 01 9113 - General Commissioning Requirements for additional requirements.

B. Execute mechanical system commissioning as indicated on Section 23 0800.

C. Replace components not functioning properly.

3.04 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals for additional submittals.

B. Demonstrate proper operation of equipment to Owner's designated representative.

C. Demonstration: Demonstrate operation of system to Owner's personnel.
   1. Use operation and maintenance data as reference during demonstration.
   2. Briefly describe function, operation, and maintenance of each component.

D. Training: Train Owner's personnel on operation and maintenance of system.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
   2. Provide minimum of two hours of training.

END OF SECTION

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SECTION 23 8216
AIR COILS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electric coils.

1.02 RELATED REQUIREMENTS

A. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide coil and frame configurations, dimensions, materials, rows, connections, and rough-in dimensions.

C. Warranty: Submit manufacturer's warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect coil fins from crushing and bending by leaving in shipping cases until installation, and by storing indoors.

B. Protect coils from entry of dirt and debris with pipe caps or plugs.

PART 2 PRODUCTS

2.01 ELECTRIC COILS

A. Manufacturers:
   1. Greenheck; Model IDHB: www.greenheck.com.
   2. Substitutions: See Section 01 6000 - Product Requirements.

B. Assembly: UL listed and labelled, with terminal control box and hinged cover, splice box, coil, casing, and controls.

C. Coil: Enclosed copper tube, aluminum finned element of coiled nickel-chrome resistance wire centered in tubes and embedded in refractory material.

D. Casing: Die formed channel frame of 16 gauge, 0.0598 inch galvanized steel with 3/8 inch mounting holes on 3 inch centers. Provide tube supports for coils longer than 36 inches.

E. Controls: Automatic reset thermal cut-out, built-in magnetic contactors, control circuit transformer and fuse, manual reset thermal cut-out, air flow proving device, fused disconnect, load fuses.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's written instructions.

B. Install in ducts and casings in accordance with SMACNA (DCS).
   1. Provide airtight seal between coil and duct or casing.

C. Electric Duct Coils: Wire in accordance with NFPA 70. Refer to Section 26 0583.

END OF SECTION

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SECTION 26 0505
SELECTIVE DEMOLITION FOR ELECTRICAL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical demolition.

1.02 RELATED REQUIREMENTS

A. Section 01 7000 - Execution and Closeout Requirements: Additional requirements for alterations work.

1.03 ADMINISTRATIVE REQUIREMENTES:

A. Survey and document all equipment and componenets scheduled for removal. Provide listing to Owner for review. Contractor is to deliver all items identified by Owner to be retained over to Owner . All other equipment and associated components shall become the Contractor's property. Contractor is responsible for prompt removal of equipment from project site in accordance with applicable federal, state, and local regulations.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that abandoned wiring and equipment serve only abandoned facilities.

B. Demolition drawings are based on casual field observation and existing record documents.

C. Report discrepancies to Architect before disturbing existing installation.

D. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

A. Disconnect electrical systems in walls, floors, and ceilings to be removed.

B. Coordinate utility service outages with utility company.

C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

D. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Minimize outage duration.
   1. Notify Owner before partially or completely disabling system.
   2. Notify local fire service.
   3. Make notifications at least 24 hours in advance.
   4. Make temporary connections to maintain service in areas adjacent to work area.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Perform work for removal and disposal of equipment and materials containing toxic substances regulated under the Federal Toxic Substances Control Act (TSCA) in accordance with applicable federal, state, and local regulations. Applicable equipment and materials include, but are not limited to:
   1. Mercury-containing lamps and tubes, including fluorescent lamps, high intensity discharge (HID), arc lamps, ultra-violet, high pressure sodium, mercury vapor, ignitron tubes, neon, and incandescent.

B. Remove, relocate, and extend existing installations to accommodate new construction.

C. Remove abandoned wiring to source of supply.

D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.

F. Disconnect and remove abandoned panelboards and distribution equipment.

G. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

H. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.

I. Repair adjacent construction and finishes damaged during demolition and extension work.

J. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.

K. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

3.04 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment that remain or that are to be reused.

B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

C. Luminaires: Remove existing luminaires for cleaning. Use mild detergent to clean all exterior and interior surfaces; rinse with clean water and wipe dry. Replace lamps, ballasts and broken electrical parts.

END OF SECTION

SECTION 26 0510
BASIC ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical Requirements

1.02 RELATED REQUIREMENTS

A. Refer to Section 01 0000 - General Requirements.

1.03 REFERENCE STANDARDS

A. The following standards shall govern and shall constitute minimum requirements as approved. If the requirements of this specification exceed those of the standards mentioned, this specification shall govern.
   1. Local Building Codes.
   2. Underwriters Laboratories, Inc., (UL) approved or listed: All materials shall be UL approved or third party certified.
   3. Local Electric Utility: Standards in effect on bidding date.
   4. Local Telephone Utility: Standards in effect on bidding date for service entrance.
   5. National Electrical Manufacturer's Association, NEMA: Equipment enclosures, mountings and connections.
   6. America National Standards Institute, ANSI: Where mentioned herein.
   7. American Institute of Electronic and Electrical Engineers, IEEE: Power equipment.
   8. National Electrical Safety Code, NESC: Outdoor and overhead work for temporary service.
   9. Occupational Safety and Health Act, OSHA: Requirements for safety and health of employees.
   10. National Fire Prevention Association, NFPA:
      a. 70, National Electric Code, NEC.
      b. 101, Life Safety Code.
   11. Building Code of New York State.
   12. Fire Code of New York State.
   13. Energy Conservation Construction Code of New York State.
   14. New York State Department of Labor Rules and Regulations.
   15. New York State Education Department "Manual of Planning Standards".

B. References to codes, specifications, and standards called for in the specification sections and on the drawings mean, the latest edition, amendment and revision adopted by the authority have jurisdiction in effect on the date of these contract documents.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Provide all labor, items, articles, materials, operations, methods, or equipment listed, mentioned, indicated, or scheduled on the drawings and specified herein, and required to complete the electrical work.

B. Electrical trade shall include their required cutting and patching work unless shown as part of the General Construction work on the architectural drawings.

C. Cost of fees shall be included in the bid as follows:
   1. Construction permits.
   2. Inspections and tests as described in this section.

D. Contract drawings and specifications are complementary and must be so construed to determine the full scope of work.

E. Drawings:

1. Contract Drawings are, in part, diagrammatic and are intended to convey the scope of the work and indicate the general arrangement of the equipment. Follow these Drawings in laying out the work. Consult all drawings to become familiar with all conditions affecting the Work and to verify spaces in which the work will be installed.
2. Reasonable changes required by job conditions (including offsetting of conduits around beams, etc.) shall be made, after obtaining the Engineer's approval, at no additional cost to the Owner .

F. Definitions:
1. The term "provide" shall have the same meaning as "furnish and install". All materials so implied either on the drawings or in these specifications shall be furnished and installed unless specifically noted otherwise.
2. The term “circuitry” shall have the same meaning as “conductors, pathway, and all associated components required for a complete circuit”.

1.05 SUBMITTALS

A. Reference Section 01 3000 - Administrative Requirements for submittal process.

1.06 QUALITY ASSURANCE

A. Licensing
1. The Contractor shall hold a license to perform the work as issued by the local jurisdiction.
2. Electrical Contract Work shall be performed by, or under, the direct supervision of a Licensed Electrician.

B. Underwriters' Certificate: Prior to submittal of Request for Final Payment, an electrical inspection certificate shall be obtained and submitted for approval. List of approved 3rd party inspecting underwriters is listed below:
1. Commonwealth of Pennsylvania Inspectors, Mike Kieff (315-408-5709).
2. Electrical Underwriters of NY, LLC (845-569-1759).
3. Inspections on Time (845-233-6711)
4. Other Underwriters are not restricted, however credentials shall be provided for Engineer approval prior to Inspection.

1.07 FIELD CONDITIONS

A. Prior to commencement of work, the Contractor(s) effecting such system shall survey all building electrical systems and components, including fire alarm, intrusion, communications, clock and computer; make written notice to the Owner regarding existing damages, missing items and incomplete systems. Prior to the conclusion of this project, the Contractor shall verify with the Project Representative that all building systems have been returned to their original conditions.

B. Any discrepancies shall be called to the attention of the Engineer before bids are taken. Bids shall be based on code and functional adequacy. Failure of the Contractor in this respect shall not relieve him of responsibility for a fully adequate installation at no increase in cost.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Provide new equipment and material unless otherwise called for.

B. All equipment and/or materials shall be new and shall carry the label of Underwriter's Laboratories Inc., whenever UL requirements are applicable.

C. Materials of same general type, such as wiring devices and luminaries, shall be of the same make throughout the building so that appearance and operation are uniform.

PART 3 EXECUTION

3.01 CLEANING AND REPAIR

A. Cutting and Patching

1. Refer to “General Conditions of the Contract for Construction,” for additional requirements. Cut and drill from both sides of walls and/or floors to eliminate splaying. Patch any cut or abandoned holes left by removals of equipment, fixtures, etc. Patch adjacent existing work disturbed by installation of new work including insulation, walls and wall covering, ceiling and floor covering, other finished surfaces. Patch openings and damaged areas equal to existing surface finish. Cut openings in prefabricated construction units in accordance with manufacturer’s instructions.

B. Contractor shall at all times keep the project free from accumulation of waste material or rubbish caused by his operation.

C. When directed, just prior to final acceptance, clean all equipment under contract including, but not limited to the following:
   1. Lighting fixtures, panelboards, control centers, clocks, receptacles, and switch plates.
   2. All equipment to be painted, removing all rust, etc., and leave ready for painting.
   3. Building, by removing all debris, leftover conduits, wire insulation, cartons, etc., left because of this work.

END OF SECTION

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SECTION 26 0519
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single conductor building wire.

B. Metal-clad cable.

C. Wiring connectors.

D. Electrical tape.

E. Heat shrink tubing.

F. Oxide inhibiting compound.

G. Wire pulling lubricant.

H. Cable ties.

I. Firestop sleeves.

1.02 RELATED REQUIREMENTS

A. Section 07 8400 - Firestopping.

B. Section 26 0505 - Selective Demolition for Electrical: Disconnection, removal, and/or extension of existing electrical conductors and cables.

C. Section 26 0526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.

D. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013 (Reapproved 2018).

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2023.

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010, with Editorial Revision (2020).

D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2020).

E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2017.

F. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes; 2020.

G. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

H. NECA 120 - Standard for Installing Armored Cable (AC) and Type Metal-Clad (MC) Cable; 2018.

I. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2021.

J. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems; 2021.

K. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

L. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.

M. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.

N. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.

O. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.

P. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.

Q. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.

R. UL 1569 - Metal-Clad Cables; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
   3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.

C. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

C. Nonmetallic-sheathed cable is not permitted.

D. Underground feeder and branch-circuit cable is not permitted.

E. Service entrance cable is not permitted.

F. Armored cable is not permitted.

G. Metal-clad cable is permitted only as follows:
   1. Where not otherwise restricted, may be used:
      a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
         1) Maximum Length: 6 feet.

H. Manufactured wiring systems are not permitted.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Provide new conductors and cables manufactured not more than one year prior to installation.

D. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

E. Comply with NEMA WC 70.

F. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

G. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

H. Conductor Material:
   1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
   2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
   3. Tinned Copper Conductors: Comply with ASTM B33.

I. Minimum Conductor Size:
   1. Branch Circuits: 12 AWG.
      a. Exceptions:
         1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
         2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.

J. Conductor Color Coding:
   1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
   2. Color Coding Method: Integrally colored insulation.
      a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
   3. Color Code:
      a. 480Y/277 V, 3 Phase, 4 Wire System:
         1) Phase A: Brown.
         2) Phase B: Orange.
         3) Phase C: Yellow.
         4) Neutral/Grounded: Gray.
      b. 208Y/120 V, 3 Phase, 4 Wire System:
         1) Phase A: Black.

2) Phase B: Red.
3) Phase C: Blue.
4) Neutral/Grounded: White.

c. Equipment Ground, All Systems: Green.

d. For modifications or additions to existing wiring systems, comply with existing color code when existing code complies with NFPA 70 and is approved by the authority having jurisdiction.

e. For control circuits, comply with manufacturer's recommended color code.

2.03 SINGLE CONDUCTOR BUILDING WIRE

A. Manufacturers:
1. Copper Building Wire:
a. Cerro Wire LLC: www.cerrowire.com/#sle.
b. Encore Wire Corporation: www.encorewire.com/#sle.
c. General Cable Technologies Corporation: www.generalcable.com/#sle.
d. Service Wire Co: www.servicewire.com/#sle.
e. Southwire Company: www.southwire.com/#sle.

B. Description: Single conductor insulated wire.

C. Conductor Stranding:
1. Feeders and Branch Circuits:
a. Size 10 AWG and Smaller: Solid.
b. Size 8 AWG and Larger: Stranded.

D. Insulation Voltage Rating: 600 V.

E. Insulation:
1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
a. Size 4 AWG and Larger: Type XHHW-2.
b. Installed Underground: Type XHHW-2.
c. Fixture Wiring Within Luminaires: Type TFFN/TFN for luminaires with labeled maximum temperature of 90 degrees C; Approved suitable type for luminaires with labeled maximum temperature greater than 90 degrees C.

2.04 METAL-CLAD CABLE

A. Manufacturers:
1. AFC Cable Systems Inc: www.afcweb.com/#sle.
2. Encore Wire Corporation: www.encorewire.com/#sle.
3. Service Wire Co: www.servicewire.com/#sle.
4. Southwire Company: www.southwire.com/#sle.

B. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.

C. Conductor Stranding:
1. Size 10 AWG and Smaller: Solid.
2. Size 8 AWG and Larger: Stranded.

D. Insulation Voltage Rating: 600 V.

E. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.

F. Grounding: Full-size integral equipment grounding conductor.

G. Armor: Steel, interlocked tape.

2.05 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Connectors for Grounding and Bonding: Comply with Section 26 0526.

C. Wiring Connectors for Splices and Taps:
   1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
   2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.

D. Wiring Connectors for Terminations:
   1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
   2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
   3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
   4. Provide motor pigtail connectors for connecting motor leads in order to facilitate disconnection.
   5. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
   6. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.
   7. Conductors for Control Circuits: Use crimped terminals for all connections.

E. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.

F. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.

G. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
   1. Manufacturers:
      a. 3M: www.3m.com/#sle.
      b. Ideal Industries, Inc: www.idealindustries.com/#sle.
      c. NSI Industries LLC: www.nsiindustries.com/#sle.

H. Mechanical Connectors: Provide bolted type.
   1. Manufacturers:
      a. Burndy LLC: www.burndy.com/#sle.
      b. Ilsco: www.ilsco.com/#sle.
      c. Thomas & Betts Corporation: www.tnb.com/#sle.

I. Compression Connectors: Provide circumferential type or hex type crimp configuration.
   1. Manufacturers:
      a. Burndy LLC: www.burndy.com/#sle.
      b. Ilsco: www.ilsco.com/#sle.
      c. Thomas & Betts Corporation: www.tnb.com/#sle.

J. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.
   1. Manufacturers:
      a. Burndy LLC: www.burndy.com/#sle.
      b. Ilsco: www.ilsco.com/#sle.

c. Thomas & Betts Corporation: www.tnb.com/#sle.

2.06 ACCESSORIES

A. Electrical Tape:
   1. Manufacturers:
      a. 3M: www.3m.com/#sle.
      b. Plymouth Rubber Europa: www.plymouthrubber.com/#sle.
   2. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
   3. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
   4. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil; suitable for continuous temperature environment up to 194 degrees F and short-term 266 degrees F overload service.
   5. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil; suitable for continuous temperature environment up to 176 degrees F.
   6. Varnished Cambric Electrical Tape: Cotton cambric fabric tape, with or without adhesive, oil-primed and coated with high-grade insulating varnish; minimum thickness of 7 mil; suitable for continuous temperature environment up to 221 degrees F.
   7. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil.

B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.
   1. Manufacturers:
      a. 3M: www.3m.com/#sle.
      b. Burndy LLC: www.burndy.com/#sle.
      c. Thomas & Betts Corporation: www.tnb.com/#sle.

C. Oxide Inhibiting Compound: Listed; suitable for use with the conductors or cables to be installed.
   1. Manufacturers:
      a. Burndy LLC: www.burndy.com/#sle.
      b. Ideal Industries, Inc: www.idealindustries.com/#sle.
      c. Ilsco: www.ilsco.com/#sle.

D. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
   1. Manufacturers:
      a. 3M: www.3m.com/#sle.
      b. American Polywater Corporation: www.polywater.com/#sle.
      c. Ideal Industries, Inc: www.idealindustries.com/#sle.

E. Cable Ties: Material and tensile strength rating suitable for application.
   1. Manufacturers:
      a. Burndy LLC: www.burndy.com/#sle.

F. Sealing Systems for Roof Penetrations: Premanufactured components and accessories as required to preserve integrity of roofing system and maintain roof warranty; suitable for cables and roofing system to be installed; designed to accommodate existing penetrations where applicable.
   1. Products:
      a. Menzies Metal Products; Electrical Roof Stack and Cap: www.menzies-metal.com/#sle.

b. Menzies Metal Products; Electrical Retro Box: www.menzies-metal.com/#sle.

G. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.
   1. Products:
      a. HoldRite, a brand of Reliance Worldwide Corporation; HydroFlame Pro Series/HydroFlame Custom Built: www.holdrite.com/#sle.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that field measurements are as indicated.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

A. Circuiting Requirements:
   1. Unless dimensioned, circuit routing indicated is diagrammatic.
   2. When circuit destination is indicated without specific routing, determine exact routing required.
   3. Arrange circuiting to minimize splices.
   4. Include circuit lengths required to install connected devices within 10 ft of location indicated.
   5. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
   6. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is not permitted.

B. Install products in accordance with manufacturer's instructions.

C. Perform work in accordance with NECA 1 (general workmanship).

D. Install metal-clad cable (Type MC) in accordance with NECA 120.

E. Installation in Raceway:
   1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
   2. Pull all conductors and cables together into raceway at same time.
   3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
   4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

F. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

G. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.

1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.

H. Terminate cables using suitable fittings.
   1. Metal-Clad Cable (Type MC):
      a. Use listed fittings.
      b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.

I. Install conductors with a minimum of 12 inches of slack at each outlet.

J. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

K. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

L. Make wiring connections using specified wiring connectors.
   1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
   2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
   3. Do not remove conductor strands to facilitate insertion into connector.
   4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
   5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
   6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

M. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
   1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
      a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
   2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
      a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
      b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.
   3. Wet Locations: Use heat shrink tubing.

N. Insulate ends of spare conductors using vinyl insulating electrical tape.

O. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.

P. Identify conductors and cables in accordance with Section 26 0553.

Q. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.

R. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.

1. Disconnect surge protective devices (SPDs) prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPDs connected.

D. Branch circuits 200 amp and larger shall be tested during installation for continuity and identification and pass operational tests to determine that all circuits perform the function for which they are designed. For all feeder wiring rated 600 volts or less, provide 1,000 volt "Megger" insulation test prior to energizing feeders. Use 1,000 volt motor driven megger for all tests. Test voltage shall be applied until readings reach a constant value, and until three (3) equal readings, each one (1) minute apart, are obtained. Minimum megger reading shall be 45megohms for feeder conductors. Documents test results are submitted for approval prior to energizing conductors.

E. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

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SECTION 26 0526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Grounding and bonding requirements.

B. Conductors for grounding and bonding.

C. Connectors for grounding and bonding.

D. Ground bars.

1.02 RELATED REQUIREMENTS

A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
   1. Includes oxide inhibiting compound.

B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

B. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems; 2021.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Field quality control test reports.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.

B. Do not use products for applications other than as permitted by NFPA 70 and product listing.

C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

E. Bonding and Equipment Grounding:
   1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
   2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
   3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
   4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
   5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
   6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.

F. Communications Systems Grounding and Bonding:
   1. Provide intersystem bonding termination at service equipment or metering equipment enclosure and at disconnecting means for any additional buildings or structures in accordance with NFPA 70.
   2. Provide bonding jumper in raceway from intersystem bonding termination to each communications room or backboard and provide ground bar for termination.
      a. Bonding Jumper Size: 6 AWG, unless otherwise indicated or required.
      b. Raceway Size: 3/4 inch trade size unless otherwise indicated or required.
      c. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.

2.02 GROUNDING AND BONDING COMPONENTS

A. General Requirements:
   1. Provide products listed, classified, and labeled as suitable for the purpose intended.
   2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 0526:
   1. Use insulated copper conductors unless otherwise indicated.
      a. Exceptions:
         1) Use bare copper conductors where installed underground in direct contact with earth.
         2) Use bare copper conductors where directly encased in concrete (not in raceway).

C. Connectors for Grounding and Bonding:

1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
4. Manufacturers - Mechanical and Compression Connectors:
   a. Advanced Lightning Technology (ALT): www.altfab.com/#sle.
   b. Burndy LLC: www.burndy.com/#sle.
   c. Harger Lightning & Grounding: www.harger.com/#sle.
   d. Thomas & Betts Corporation: www.tnb.com/#sle.
5. Manufacturers - Exothermic Welded Connections:
   a. Burndy LLC: www.burndy.com/#sle.
   b. Cadweld, a brand of Erico International Corporation: www.erico.com/#sle.
   c. thermOweld, subsidiary of Continental Industries; division of Burndy LLC: www.thermoweld.com/#sle.

D. Ground Bars:
1. Description: Copper rectangular ground bars with mounting brackets and insulators.
2. Size: As indicated.
3. Holes for Connections: As indicated or as required for connections to be made.
4. Manufacturers:
   a. Advanced Lightning Technology (ALT): www.altfab.com/#sle.
   b. Erico International Corporation: www.erico.com/#sle.
   c. Harger Lightning & Grounding: www.harger.com/#sle.
   d. thermOweld, subsidiary of Continental Industries; division of Burndy LLC: www.thermoweld.com/#sle.

E. Oxide Inhibiting Compound: Comply with Section 26 0519.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that work likely to damage grounding and bonding system components has been completed.

B. Verify that field measurements are as indicated.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Make grounding and bonding connections using specified connectors.
1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

D. Identify grounding and bonding system components in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Inspect and test in accordance with NETA ATS except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.13.

D. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.

E. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

END OF SECTION

SECTION 26 0529
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Concrete equipment pads.

B. Section 26 0533.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.

C. Section 26 0533.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.

D. Section 26 5100 - Interior Lighting: Additional support and attachment requirements for interior luminaires.

E. Section 26 5600 - Exterior Lighting: Additional support and attachment requirements for exterior luminaires.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.

D. MFMA-4 - Metal Framing Standards Publication; 2004.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
   2. Coordinate the work with other trades to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 3000.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.

1.06 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with applicable building code.

C. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
   2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
   3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of _____. Include consideration for vibration, equipment operation, and shock loads where applicable.
   4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
   5. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
   6. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
      a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
      b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
      c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
      d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
   1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
   2. Conduit Clamps: Bolted type unless otherwise indicated.
   3. Manufacturers:
      a. Cooper Crouse-Hinds, a division of Eaton Corporation: www.cooperindustries.com/#sle.
      b. Erico International Corporation: www.erico.com/#sle.
      c. HoldRite, a brand of Reliance Worldwide Corporation: www.holdrite.com/#sle.
      d. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
      e. Thomas & Betts Corporation: www.tnb.com/#sle.

C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.

1. Manufacturers:
    a. Cooper Crouse-Hinds, a division of Eaton Corporation: www.cooperindustries.com/#sle.
    b. Erico International Corporation: www.erico.com/#sle.
    c. HoldRite, a brand of Reliance Worldwide Corporation: www.holdrite.com/#sle.
    d. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
    e. Thomas & Betts Corporation: www.tnb.com/#sle.

D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
    1. Comply with MFMA-4.

E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
    1. Minimum Size, Unless Otherwise Indicated or Required:
        a. Equipment Supports: 1/2 inch diameter.
        b. Busway Supports: 1/2 inch diameter.
        c. Single Conduit up to 1 inch (27 mm) trade size: 1/4 inch diameter.
        d. Single Conduit larger than 1 inch (27 mm) trade size: 3/8 inch diameter.
        e. Trapeze Support for Multiple Conduits: 3/8 inch diameter.
        f. Outlet Boxes: 1/4 inch diameter.
        g. Luminaires: 1/4 inch diameter.

F. Anchors and Fasteners:
    1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
    2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
    3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
    4. Hollow Masonry: Use toggle bolts.
    5. Hollow Stud Walls: Use toggle bolts.
    6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
    7. Sheet Metal: Use sheet metal screws.
    8. Wood: Use wood screws.
    9. Plastic and lead anchors are not permitted.
    10. Powder-actuated fasteners are not permitted.
    11. Hammer-driven anchors and fasteners are not permitted.
    12. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
        a. Comply with MFMA-4.
        b. Channel Material: Use galvanized steel.
        c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.
    13. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.
    14. Manufacturers - Mechanical Anchors:
        a. Hilti, Inc: www.us.hilti.com/#sle.
        b. ITW Red Head, a division of Illinois Tool Works, Inc: www.itwredhead.com/#sle.
        c. Powers Fasteners, Inc: www.powers.com/#sle.
        d. Simpson Strong-Tie Company Inc: www.strongtie.com/#sle.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive support and attachment components.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

D. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

E. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

F. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

G. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

H. Equipment Support and Attachment:
   1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
   2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
   3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
   4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

I. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.

J. Secure fasteners according to manufacturer's recommended torque settings.

K. Remove temporary supports.

L. Identify independent electrical component support wires above accessible ceilings (only where specifically indicated or permitted) with color distinguishable from ceiling support wires in accordance with NFPA 70.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Inspect support and attachment components for damage and defects.

C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

D. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

SECTION 26 0533.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).

B. PVC-coated galvanized steel rigid metal conduit (RMC).

C. Flexible metal conduit (FMC).

D. Liquidtight flexible metal conduit (LFMC).

E. Electrical metallic tubing (EMT).

F. Rigid polyvinyl chloride (PVC) conduit.

G. Conduit fittings.

H. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 07 8400 - Firestopping.

B. Section 26 0526 - Grounding and Bonding for Electrical Systems.

C. Section 26 0529 - Hangers and Supports for Electrical Systems.

D. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2020.

B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S); 2020.

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

D. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2020.

E. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); 2017.

F. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.

G. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Metal Conduit and Intermediate Metal Conduit; 2018.

H. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2020.

I. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2021.

J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

K. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.

L. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.

M. UL 360 - Liquid-Tight Flexible Metal Conduit; Current Edition, Including All Revisions.

N. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

O. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.

P. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

Q. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
   4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
   5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.

C. Project Record Documents: Record actual routing for conduits installed underground, conduits embedded within concrete slabs, and conduits 2 inch (53 mm) trade size and larger.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.

C. Underground:
   1. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.
   2. Where rigid polyvinyl (PVC) conduit larger than 2 inch (53 mm) trade size is provided, use galvanized steel rigid metal conduit elbows for bends.

D. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).

E. Concealed Within Hollow Stud Walls: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).

F. Concealed Above Accessible Ceilings: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).

G. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit.

H. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).

I. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit.
   1. Locations subject to physical damage include, but are not limited to:
      a. Where exposed below 8 feet, except within electrical and communication rooms or closets.
      b. Where exposed below 20 feet in warehouse areas.

J. Exposed, Exterior: Use galvanized steel rigid metal conduit or PVC-coated galvanized steel rigid metal conduit.

K. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit.

L. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.
   1. Maximum Length: 6 feet.

M. Connections to Vibrating Equipment:
   1. Dry Locations: Use flexible metal conduit.
   2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
   3. Maximum Length: 6 feet unless otherwise indicated.
   4. Vibrating equipment includes, but is not limited to:
      a. Motors.

2.02 CONDUIT REQUIREMENTS

A. Existing Work: Where existing conduits are indicated to be reused, they may be reused only where they comply with specified requirements, are free from corrosion, and integrity is verified by pulling a mandrel through them.

B. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.

C. Provide products listed, classified, and labeled as suitable for the purpose intended.

D. Minimum Conduit Size, Unless Otherwise Indicated:
   1. Branch Circuits: 1/2 inch (16 mm) trade size.
   2. Branch Circuit Homeruns: 3/4 inch (21 mm) trade size.
   3. Control Circuits: 1/2 inch (16 mm) trade size.
   4. Flexible Connections to Luminaires: 3/8 inch (12 mm) trade size.
   5. Underground, Interior: 3/4 inch (21 mm) trade size.
   6. Underground, Exterior: 1 inch (27 mm) trade size.

E. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Manufacturers:
   1. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.com/#sle.
   2. Nucor Tubular Products: www.nucortubular.com/#sle.
   3. Western Tube, a division of Zekelman Industries: www.westerntube.com/#sle.
   4. Wheatland Tube, a division of Zekelman Industries: www.wheatland.com/#sle.

B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

C. Fittings:
   1. Manufacturers:
      a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.

b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
c. Thomas & Betts Corporation: www.tnb.com/#sle.

2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.
4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Manufacturers:
1. Thomas & Betts Corporation; _____: www.tnb.com/#sle.
2. Robroy Industries; _____: www.robroy.com/#sle.

B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.

C. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil.

D. PVC-Coated Fittings:
1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
2. Non-Hazardous Locations: Use fittings listed and labeled as complying with UL 514B.
3. Hazardous (Classified) Locations: Use fittings listed and labeled as complying with UL 1203 for the classification of the installed location.
4. Material: Use steel or malleable iron.
5. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil.

E. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil.

2.05 FLEXIBLE METAL CONDUIT (FMC)

A. Manufacturers:
1. AFC Cable Systems, Inc: www.afcweb.com/#sle.
2. Electri-Flex Company: www.electriflex.com/#sle.
3. International Metal Hose: www.metalhose.com/#sle.

B. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.

C. Fittings:
1. Manufacturers:
a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
c. Thomas & Betts Corporation: www.tnb.com/#sle.
2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.

2.06 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Manufacturers:
1. AFC Cable Systems, Inc: www.afcweb.com/#sle.
2. Electri-Flex Company: www.electriflex.com/#sle.
3. International Metal Hose: www.metalhose.com/#sle.

B. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.

C. Fittings:
1. Manufacturers:
a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.

b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
c. Thomas & Betts Corporation: www.tnb.com/#sle.

2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.

2.07 ELECTRICAL METALLIC TUBING (EMT)

A. Manufacturers:
1. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.com/#sle.
2. Nucor Tubular Products: www.nucortubular/#sle.
3. Western Tube, a division of Zekelman Industries: www.westerntube.com/#sle.
4. Wheatland Tube, a division of Zekelman Industries: www.wheatland.com/#sle.

B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

C. Fittings:
1. Manufacturers:
a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
c. Thomas & Betts Corporation: www.tnb.com/#sle.
2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.
4. Connectors and Couplings: Use compression (gland) or set-screw type.
a. Do not use indenter type connectors and couplings.
5. Damp or Wet Locations (where permitted): Use fittings listed for use in wet locations.

2.08 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

A. Manufacturers:
1. Cantex Inc: www.cantexinc.com/#sle.
2. Carlon, a brand of Thomas & Betts Corporation: www.carlon.com/#sle.
3. JM Eagle: www.jmeagle.com/#sle.

B. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.

C. Fittings:
1. Manufacturer: Same as manufacturer of conduit to be connected.
2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.09 ACCESSORIES

A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil.

B. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.

C. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.

D. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force.

E. Sealing Compound for Sealing Fittings: Listed for use with the particular fittings to be installed.

F. Modular Seals for Conduit Penetrations: Rated for minimum of 40 psig; Suitable for the conduits to be installed.

G. Sealing Systems for Roof Penetrations: Premanufactured components and accessories as required to preserve integrity of roofing system and maintain roof warranty; suitable for conduits and roofing system to be installed; designed to accommodate existing penetrations where applicable.
   1. Products:
      a. Menzies Metal Products; Electrical Roof Stack and Cap: www.menzies-metal.com/#sle.
      b. Menzies Metal Products; Electrical Retro Box: www.menzies-metal.com/#sle.

H. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.
   1. Manufacturers:
      a. Quickflash Weatherproofing Products, Inc: www.quickflashproducts.com/#sle.

I. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.
   1. Products:
      a. HoldRite, a brand of Reliance Worldwide Corporation; HydroFlame Pro Series/HydroFlame Custom Built: www.holdrite.com/#sle.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive conduits.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.

D. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by the manufacturer.

E. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.

F. Conduit Routing:
   1. Unless dimensioned, conduit routing indicated is diagrammatic.
   2. When conduit destination is indicated without specific routing, determine exact routing required.
   3. Conceal all conduits unless specifically indicated to be exposed.
   4. Conduits in the following areas may be exposed, unless otherwise indicated:
      a. Electrical rooms.
      b. Within joists in areas with no ceiling.
   5. Unless otherwise approved, do not route conduits exposed:
      a. Across floors.
      b. Across roofs.
      c. Across top of parapet walls.
      d. Across building exterior surfaces.
   6. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
   7. Arrange conduit to maintain adequate headroom, clearances, and access.

8. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
9. Arrange conduit to provide no more than 150 feet between pull points.
10. Route conduits above water and drain piping where possible.
11. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
12. Maintain minimum clearance of 12 inches between conduits and hot surfaces. This includes, but is not limited to:
    a. Heaters.
    b. Hot water piping.
    c. Flues.
13. Group parallel conduits in the same area together on a common rack.

G. Conduit Support:
1. Secure and support conduits in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
4. Use conduit strap to support single surface-mounted conduit.
    a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
5. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.
6. Use conduit clamp to support single conduit from beam clamp or threaded rod.
7. Use trapeze hangers assembled from threaded rods and metal channel (strut) with accessory conduit clamps to support multiple parallel suspended conduits.
8. Use non-penetrating rooftop supports to support conduits routed across rooftops (only where approved).
9. Use of spring steel conduit clips for support of conduits is not permitted.
10. Use of wire for support of conduits is not permitted.

H. Connections and Terminations:
1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
3. Use suitable adapters where required to transition from one type of conduit to another.
4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
6. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
7. Secure joints and connections to provide maximum mechanical strength and electrical continuity.

I. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
2. Make penetrations perpendicular to surfaces unless otherwise indicated.
3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
4. Conceal bends for conduit risers emerging above ground.
5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.

6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
8. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.

J. Underground Installation:
1. Minimum Cover, Unless Otherwise Indicated or Required:
a. Underground, Exterior: 24 inches.
b. Under Slab on Grade: 12 inches to bottom of slab.
2. Provide underground warning tape in accordance with Section 26 0553 along entire conduit length for service entrance where not concrete-encased.

K. Hazardous (Classified) Locations: Where conduits cross boundaries of hazardous (classified) locations, provide sealing fittings located as indicated or in accordance with NFPA 70.

L. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
3. Where conduits are subject to earth movement by settlement or frost.

M. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
1. Where conduits pass from outdoors into conditioned interior spaces.
2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

N. Provide pull string in all empty conduits and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.

O. Provide grounding and bonding in accordance with Section 26 0526.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

C. Where coating of PVC-coated galvanized steel rigid metal conduit (RMC) contains cuts or abrasions, repair in accordance with manufacturer's instructions.

D. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING

A. Clean interior of conduits to remove moisture and foreign matter.

3.05 PROTECTION

A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION

SECTION 26 0533.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.

B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.

C. Boxes and enclosures for integrated power, data, and audio/video.

D. Boxes for hazardous (classified) locations.

E. Floor boxes.

F. Underground boxes/enclosures.

G. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 08 3100 - Access Doors and Panels: Panels for maintaining access to concealed boxes.

B. Section 26 0529 - Hangers and Supports for Electrical Systems.

C. Section 26 0533.13 - Conduit for Electrical Systems:
   1. Conduit bodies and other fittings.
   2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.

D. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

E. Section 26 2726 - Wiring Devices:
   1. Wall plates.
   2. Floor box service fittings.
   3. Additional requirements for locating boxes for wiring devices.

F. Section 27 1000 - Structured Cabling: Additional requirements for communications systems outlet boxes.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.

D. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.

E. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013 (Reaffirmed 2020).

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. SCTE 77 - Specifications for Underground Enclosure Integrity; 2023.

H. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

I. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

J. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.

K. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

L. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
   2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
   4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
   5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
   6. Coordinate the work with other trades to preserve insulation integrity.
   7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
   8. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, boxes for hazardous (classified) locations, floor boxes, and underground boxes/enclosures.

C. Project Record Documents: Record actual locations for outlet and device boxes, pull boxes, cabinets and enclosures, floor boxes, and underground boxes/enclosures.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Keys for Lockable Enclosures: Two of each different key.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 BOXES

A. General Requirements:
   1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
   2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
   3. Provide products listed, classified, and labeled as suitable for the purpose intended.
   4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
   1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
   2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
   3. Use cast iron boxes or cast aluminum boxes where exposed galvanized steel rigid metal conduit is used.
   4. Use suitable concrete type boxes where flush-mounted in concrete.
   5. Use suitable masonry type boxes where flush-mounted in masonry walls.
   6. Use raised covers suitable for the type of wall construction and device configuration where required.
   7. Use shallow boxes where required by the type of wall construction.
   8. Do not use "through-wall" boxes designed for access from both sides of wall.
   9. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
   10. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
   11. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
   12. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
   13. Minimum Box Size, Unless Otherwise Indicated:
      a. Wiring Devices (Other Than Communications Systems Outlets): 4 inch square by 1-1/2 inch deep (100 by 38 mm) trade size.
      b. Communications Systems Outlets: Comply with Section 27 1000.
      c. Ceiling Outlets: 4 inch octagonal or square by 1-1/2 inch deep (100 by 38 mm) trade size.
   14. Wall Plates: Comply with Section 26 2726.
   15. Manufacturers:
      a. Cooper Crouse-Hinds, a division of Eaton Corporation: www.cooperindustries.com/#sle.
      b. Hubbell Incorporated; Bell Products: www.hubbell-rtb.com/#sle.
      c. Hubbell Incorporated; RACO Products: www.hubbell-rtb.com/#sle.
      d. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
      e. Thomas & Betts Corporation: www.tnb.com/#sle.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
   1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
   2. NEMA 250 Environment Type, Unless Otherwise Indicated:
      a. Indoor Clean, Dry Locations: Type 1, painted steel.
      b. Outdoor Locations: Type 3R, painted steel.
   3. Junction and Pull Boxes Larger Than 100 cubic inches:
      a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
   4. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:
      a. Provide lockable hinged covers, all locks keyed alike unless otherwise indicated.
      b. Back Panels: Painted steel, removable.
   5. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
   6. Manufacturers:
      a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com/#sle.

b. Hoffman, a brand of Pentair Technical Products: www.hoffmanonline.com/#sle.
c. Hubbell Incorporated; Wiegmann Products: www.hubbell-wiegmann.com/#sle.

D. Boxes and Enclosures for Integrated Power, Data, and Audio/Video: Size and configuration as indicated or as required with partitions to separate services; field-connected gangable boxes may be used.
1. Manufacturers:
a. Hubbell Incorporated: www.hubbell.com/#sle.

E. Boxes for Hazardous (Classified) Locations: Listed and labeled as complying with UL 1203 for the classification of the installed location.
1. Manufacturers:
a. Appleton, a brand of Emerson Electric Co: www.emerson.com/#sle.
b. Cooper Crouse-Hinds, a division of Eaton Corporation: www.cooperindustries.com/#sle.
c. Hubbell Incorporated; Killark Products: www.hubbell-killark.com/#sle.

F. Floor Boxes:
1. Description: Floor boxes compatible with floor box service fittings provided in accordance with Section 26 2726; with partitions to separate multiple services; furnished with all components, adapters, and trims required for complete installation.
2. Manufacturer: Same as manufacturer of floor box service fittings.

G. Underground Boxes/Enclosures:
1. Description: In-ground, open bottom boxes furnished with flush, non-skid covers with legend indicating type of service and stainless steel tamper resistant cover bolts.
2. Size: As indicated on drawings.
3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 12 inches.
4. Provide logo on cover to indicate type of service.
5. Applications:
a. Sidewalks and Landscaped Areas Subject Only to Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77 Tier 8 load rating.
b. Parking Lots, in Areas Subject Only To Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77 Tier 15 load rating.
c. Do not use polymer concrete enclosures in areas subject to deliberate vehicular traffic.
6. Polymer Concrete Underground Boxes/Enclosures: Comply with SCTE 77.
a. Manufacturers:
1) Hubbell Incorporated; Quazite Products: www.hubbellpowersystems.com/#sle.
2) MacLean Highline: www.macleanhighline.com/#sle.
3) Oldcastle Precast, Inc: www.oldcastleprecast.com/#sle.
b. Combination fiberglass/polymer concrete boxes/enclosures are acceptable.
c. Product(s):
1) MacLean Highline PHA Series: Straight wall, all-polymer concrete splice box/pull box; available Tier 8, Tier 15, and Tier 22 load ratings.
2) MacLean Highline CHA Series: Fiberglass/polymer concrete splice box/pull box; available Tier 8 and Tier 15 load ratings.
3) MacLean Highline CVA Series: Fiberglass/polymer concrete splice vault; available Tier 8, Tier 15, and Tier 22 load ratings.

2.02 ACCESSORIES

A. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for boxes and facade materials to be installed.
1. Manufacturers:

a. Quickflash Weatherproofing Products, Inc: www.quickflashproducts.com/#sle.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive boxes.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide separate boxes for emergency power and normal power systems.

E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.

F. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.

G. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.

H. Box Locations:
   1. Locate boxes to be accessible. Provide access panels in accordance with Section 08 3100 as required where approved by the Architect.
   2. Unless dimensioned, box locations indicated are approximate.
   3. Locate boxes as required for devices installed under other sections or by others.
      a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 26 2726.
      b. Communications Systems Outlets: Comply with Section 27 1000.
   4. Locate boxes so that wall plates do not span different building finishes.
   5. Locate boxes so that wall plates do not cross masonry joints.
   6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
   7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
   8. Acoustic-Rated Walls: Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches horizontal separation.
   9. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
      a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.
      b. Do not install flush-mounted boxes with area larger than 16 square inches or such that the total aggregate area of openings exceeds 100 square inches for any 100 square feet of wall area.
   10. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 26 0533.13.
   11. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:
      a. Concealed above accessible suspended ceilings.
      b. Within joists in areas with no ceiling.
      c. Electrical rooms.

d. Mechanical equipment rooms.

I. Box Supports:
   1. Secure and support boxes in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
   2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
   3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
   4. Use far-side support to secure flush-mounted boxes supported from single stud in hollow stud walls. Repair or replace supports for boxes that permit excessive movement.

J. Install boxes plumb and level.

K. Flush-Mounted Boxes:
   1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
   2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
   3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.

L. Install boxes as required to preserve insulation integrity.

M. Underground Boxes/Enclosures:
   1. Install enclosure on gravel base, minimum 6 inches deep.
   2. Install additional bracing inside enclosures in accordance with manufacturer's instructions to minimize box sidewall deflections during backfilling. Backfill with cover bolted in place.

N. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

O. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.

P. Close unused box openings.

Q. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

R. Provide grounding and bonding in accordance with Section 26 0526.

S. Identify boxes in accordance with Section 26 0553.

3.03 CLEANING

A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.04 PROTECTION

A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

SECTION 26 0533.23
SURFACE RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface raceway systems.

B. Wireways.

1.02 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems.

B. Section 26 0529 - Hangers and Supports for Electrical Systems.

C. Section 26 0533.13 - Conduit for Electrical Systems.

D. Section 26 0533.16 - Boxes for Electrical Systems.

E. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

F. Section 26 2726 - Wiring Devices: Receptacles.

G. Section 27 1000 - Structured Cabling: Voice and data jacks.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. NEMA PRP 5 - Installation Guidelines for Surface Nonmetallic Raceway; 2021.

D. UL 5 - Surface Metal Raceways and Fittings; Current Edition, Including All Revisions.

E. UL 5A - Nonmetallic Surface Raceways and Fittings; Current Edition, Including All Revisions.

F. UL 870 - Wireways, Auxiliary Gutters, and Associated Fittings; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the placement of raceways with millwork, furniture, equipment, etc. installed under other sections or by others.
   2. Coordinate rough-in locations of outlet boxes provided under Section 26 0533.16 and conduit provided under Section 26 0533.13 as required for installation of raceways provided under this section.
   3. Verify minimum sizes of raceways with the actual conductors and components to be installed.
   4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install raceways until final surface finishes and painting are complete.
   2. Do not begin installation of conductors and cables until installation of raceways is complete between outlet, junction and splicing points.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets including dimensions, knockout sizes and locations, materials, fabrication details, finishes, service condition requirements, and accessories.

1. Surface Raceway Systems: Include information on fill capacities for conductors and cables.

C. Shop Drawings:
1. Wireways: Provide dimensioned plan and elevation views including adjacent equipment with all required clearances indicated.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 RACEWAY REQUIREMENTS

A. Provide all components, fittings, supports, and accessories required for a complete raceway system.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Do not use raceways for applications other than as permitted by NFPA 70 and product listing.

2.02 SURFACE RACEWAY SYSTEMS

A. Manufacturers:
1. Hubbell Incorporated: www.hubbell.com/#sle.
2. Legrand North America, Inc: www.legrand.us/#sle.
3. MonoSystems, Inc: www.monosystems.com/#sle.

B. Surface Metal Raceways: Listed and labeled as complying with UL 5.

C. Surface Nonmetallic Raceways: Listed and labeled as complying with UL 5A.

2.03 WIREWAYS

A. Manufacturers:
1. Eaton Corporation: www.eaton.com/#sle.
2. Enduro Composites: www.endurocomposites.com/#sle.
3. nVent: www.nvent.com/#sle.
4. Schneider Electric: www.se.com/#sle.

B. Description: Lay-in wireways and wiring troughs with removable covers; listed and labeled as complying with UL 870.

C. Wireway Type, Unless Otherwise Indicated:

D. Where wireway size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.04 SOURCE QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Factory test each production unit for pre-wired surface raceway systems to verify proper wiring.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes and conduit terminations are installed in proper locations and are properly sized in accordance with NFPA 70 to accommodate raceways.

C. Verify that mounting surfaces are ready to receive raceways and that final surface finishes are complete, including painting.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Surface Nonmetallic Raceways: Install in accordance with NEMA PRP 5.

D. Install raceways plumb and level.

E. Arrange wireways and associated raceway connections to comply with NFPA 70, including but not limited to requirements for deflected conductors and wireways used as pullboxes. Increase size of wireway where necessary.

F. Secure and support raceways in accordance with Section 26 0529 at intervals complying with NFPA 70 and manufacturer's requirements.

G. Close unused raceway openings.

H. Provide grounding and bonding in accordance with Section 26 0526.

I. Identify raceways in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Inspect raceways for damage and defects.

C. Correct wiring deficiencies and replace damaged or defective raceways.

3.04 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.05 PROTECTION

A. Protect installed raceways from subsequent construction operations.

END OF SECTION

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SECTION 26 0553
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical identification requirements.

B. Identification nameplates and labels.

C. Wire and cable markers.

D. Voltage markers.

E. Underground warning tape.

F. Floor marking tape.

G. Warning signs and labels.

1.02 RELATED REQUIREMENTS

A. Section 09 9113 - Exterior Painting.

B. Section 09 9123 - Interior Painting.

C. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

D. Section 26 2726 - Wiring Devices - Lutron: Device and wallplate finishes; factory pre-marked wallplates.

E. Section 27 1000 - Structured Cabling: Identification for communications cabling and devices.

1.03 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

B. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.

B. Sequencing:

1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
2. Do not install identification products until final surface finishes and painting are complete.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

1.07 FIELD CONDITIONS

A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

A. Identification for Equipment:

1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
    a. Panelboards:
        1) Identify ampere rating.
        2) Identify voltage and phase.
        3) Identify power source and circuit number. Include location when not within sight of equipment.
        4) Identify main overcurrent protective device. Use identification label for panelboards with a door. For power distribution panelboards without a door, use identification nameplate.
        5) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
        6) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
    b. Enclosed switches, circuit breakers, and motor controllers:
        1) Identify voltage and phase.
        2) Identify power source and circuit number. Include location when not within sight of equipment.
        3) Identify load(s) served. Include location when not within sight of equipment.
    c. Busway:
        1) Identify ampere rating.
        2) Identify voltage and phase.
        3) Identify power source and circuit number. Include location when not within sight of equipment.
        4) Provide identification at maximum intervals of 40 feet.
        5) Use identification nameplate to identify load(s) served for each plug-in unit. Include location when not within sight of equipment.
    d. Time Switches:
        1) Identify load(s) served and associated circuits controlled. Include location.
2. Use identification nameplate to identify disconnect location for equipment with remote disconnecting means.
3. Use identification label or handwritten text using indelible marker on inside of door at each fused switch to identify required NEMA fuse class and size.
4. Use identification label or handwritten text using indelible marker on inside of door at each motor controller to identify nameplate horsepower, full load amperes, code letter, service factor, voltage, and phase of motor(s) controlled.
5. Use identification label to identify overcurrent protective devices for branch circuits serving fire alarm circuits. Identify with text "FIRE ALARM CIRCUIT".
6. Use field-painted floor markings, floor marking tape, or warning labels to identify required equipment working clearances where indicated or where required by the authority having jurisdiction.
    a. Field-Painted Floor Markings: Alternating black and white stripes, 3 inches wide, painted in accordance with Section 09 9123 and 09 9113.
7. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70 including but not limited to the following.
    a. Service equipment.
    b. Industrial control panels.
    c. Motor control centers.
    d. Elevator control panels.
    e. Industrial machinery.

B. Identification for Conductors and Cables:
    1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 0519.
    2. Identification for Communications Conductors and Cables: Comply with Section 27 1000.

3. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
4. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
    a. At each source and load connection.
    b. Within boxes when more than one circuit is present.
    c. Within equipment enclosures when conductors and cables enter or leave the enclosure.
5. Use underground warning tape to identify direct buried cables.

C. Identification for Raceways:
1. Use voltage markers to identify highest voltage present for accessible conduits at maximum intervals of 20 feet.
2. Use voltage markers or color-coded bands to identify systems other than normal power system for accessible conduits at maximum intervals of 20 feet.
    a. Color-Coded Bands: Use field-painting or vinyl color coding electrical tape to mark bands 3 inches wide.
        1) Color Code:
            (a) Emergency Power System: Red.
            (b) Fire Alarm System: Red.
        2) Field-Painting: Comply with Section 09 9123 and 09 9113.
        3) Vinyl Color Coding Electrical Tape: Comply with Section 26 0519.
3. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify circuits enclosed for accessible conduits at wall penetrations, at floor penetrations, at roof penetrations, and at equipment terminations when source is not within sight.
4. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify spare conduits at each end. Identify purpose and termination location.
5. Use underground warning tape to identify underground raceways.
6. Use voltage markers to identify highest voltage present for wireways at maximum intervals of 20 feet.

D. Identification for Boxes:
1. Use voltage markers to identify highest voltage present.
2. Use voltage markers or color coded boxes to identify systems other than normal power system.
    a. Color-Coded Boxes: Field-painted in accordance with Section 09 9123 and 09 9113 per the same color code used for raceways.
3. Use identification labels or handwritten text using indelible marker to identify circuits enclosed.
    a. For exposed boxes in public areas, use only identification labels.

E. Identification for Devices:
1. Identification for Communications Devices: Comply with Section 27 1000.
2. Wiring Device and Wallplate Finishes: Comply with Section 26 2726.
3. Use identification label to identify fire alarm system devices.
4. Use identification label or engraved wallplate to identify serving branch circuit for all receptacles.
    a. For receptacles in public areas or in areas as directed by Architect, provide identification on inside surface of wallplate.
5. Use identification label or engraved wallplate to identify load controlled for wall-mounted control devices controlling loads that are not visible from the control location and for multiple wall-mounted control devices installed at one location.
6. Use identification label to identify receptacles protected by upstream GFI protection, where permitted.

F. Identification for Luminaires:
   1. Use permanent red dot on luminaire frame to identify luminaires connected to emergency power system.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:
   1. Manufacturers:
      a. Brimar Industries, Inc: www.brimar.com/#sle.
      b. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
      c. Seton Identification Products: www.seton.com/#sle.
   2. Materials:
      a. Indoor Clean, Dry Locations: Use plastic nameplates.
      b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
   3. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
      a. Exception: Provide minimum thickness of 1/8 inch when any dimension is greater than 4 inches.
   4. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
   5. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
   6. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.

B. Identification Labels:
   1. Manufacturers:
      a. Brady Corporation: www.bradyid.com/#sle.
      b. Brother International Corporation: www.brother-usa.com/#sle.
      c. Panduit Corp: www.panduit.com/#sle.
   2. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
      a. Use only for indoor locations.
   3. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:
   1. Minimum Size: 1 inch by 2.5 inches.
   2. Legend:
      a. System designation where applicable:
         1) Emergency Power System: Identify with text "EMERGENCY".
         2) Fire Alarm System: Identify with text "FIRE ALARM".
      b. Equipment designation or other approved description.
   3. Text: All capitalized unless otherwise indicated.
   4. Minimum Text Height:
      a. System Designation: 1 inch.
      b. Equipment Designation: 1/2 inch.
   5. Color:
      a. Normal Power System: White text on black background.
      b. Emergency Power System: White text on red background.

D. Format for General Information and Operating Instructions:
   1. Minimum Size: 1 inch by 2.5 inches.
   2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.

3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 1/4 inch.
5. Color: Black text on white background unless otherwise indicated.
    a. Exceptions:
        1) Provide white text on red background for general information or operational instructions for emergency systems.
        2) Provide white text on red background for general information or operational instructions for fire alarm systems.

E. Format for Caution and Warning Messages:
1. Minimum Size: 2 inches by 4 inches.
2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 1/2 inch.
5. Color: Black text on yellow background unless otherwise indicated.

F. Format for Receptacle Identification:
1. Minimum Size: 3/8 inch by 1.5 inches.
2. Legend: Power source and circuit number or other designation indicated.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 3/16 inch.
5. Color: Black text on clear background.

G. Format for Control Device Identification:
1. Minimum Size: 3/8 inch by 1.5 inches.
2. Legend: Load controlled or other designation indicated.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 3/16 inch.
5. Color: Black text on clear background.

H. Format for Fire Alarm Device Identification:
1. Minimum Size: 3/8 inch by 1.5 inches.
2. Legend: Designation indicated and device zone or address.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 3/16 inch.
5. Color: Red text on white background.

2.03 WIRE AND CABLE MARKERS

A. Manufacturers:
1. Brady Corporation: www.bradyid.com/#sle.
2. HellermannTyton: www.hellermanntyton.com/#sle.
3. Panduit Corp: www.panduit.com/#sle.

B. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.

C. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.

D. Legend: Power source and circuit number or other designation indicated.

E. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
1. Do not use handwritten text.

F. Minimum Text Height: 1/8 inch.

G. Color: Black text on white background unless otherwise indicated.

2.04 VOLTAGE MARKERS

A. Manufacturers:
   1. Brady Corporation: www.bradyid.com/#sle.
   2. Brimar Industries, Inc: www.brimar.com/#sle.
   3. Seton Identification Products: www.seton.com/#sle.

B. Markers for Conduits: Use factory pre-printed self-adhesive vinyl, self-adhesive vinyl cloth, or vinyl snap-around type markers.

C. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.

D. Minimum Size:
   1. Markers for Equipment: 1 1/8 by 4 1/2 inches.
   2. Markers for Conduits: As recommended by manufacturer for conduit size to be identified.
   3. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches.
   4. Markers for Junction Boxes: 1/2 by 2 1/4 inches.

E. Legend:
   1. Markers for Voltage Identification: Highest voltage present.
   2. Markers for System Identification:
      a. Emergency Power System: Text "EMERGENCY".
      b. Other Systems: Type of service.

F. Color: Black text on orange background unless otherwise indicated.

2.05 UNDERGROUND WARNING TAPE

A. Manufacturers:
   1. Brady Corporation: www.bradyid.com/#sle.
   2. Brimar Industries, Inc: www.brimar.com/#sle.
   3. Seton Identification Products: www.seton.com/#sle.

B. Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.

C. Non-detectable Type Tape: 6 inches wide, with minimum thickness of 4 mil.

D. Legend: Type of service, continuously repeated over full length of tape.

E. Color:
   1. Tape for Buried Power Lines: Black text on red background.
   2. Tape for Buried Communication, Alarm, and Signal Lines: Black text on orange background.

2.06 FLOOR MARKING TAPE

A. Floor Marking Tape for Equipment Working Clearance Identification: Self-adhesive vinyl or polyester tape with overlaminate, 3 inches wide, with alternating black and white stripes.

2.07 WARNING SIGNS AND LABELS

A. Manufacturers:
   1. Brimar Industries, Inc: www.brimar.com/#sle.
   2. Clarion Safety Systems, LLC: www.clarionsafety.com/#sle.
   3. Insite Solutions, LLC: www.stop-painting.com/#sle.
   4. Seton Identification Products: www.seton.com/#sle.

B. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

C. Warning Signs:
   1. Materials:
      a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.

b. Outdoor Locations: Use factory pre-printed rigid aluminum signs.
2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.
3. Minimum Size: 7 by 10 inches unless otherwise indicated.

D. Warning Labels:
1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
a. Do not use labels designed to be completed using handwritten text.
2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
3. Minimum Size: 2 by 4 inches unless otherwise indicated.

PART 3 EXECUTION

3.01 PREPARATION

A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
1. Surface-Mounted Equipment: Enclosure front.
2. Flush-Mounted Equipment: Inside of equipment door.
3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
4. Elevated Equipment: Legible from the floor or working platform.
5. Branch Devices: Adjacent to device.
6. Interior Components: Legible from the point of access.
7. Conduits: Legible from the floor.
8. Boxes: Outside face of cover.
9. Conductors and Cables: Legible from the point of access.
10. Devices: Outside face of cover.

C. Install identification products centered, level, and parallel with lines of item being identified.

D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.

E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

F. Install underground warning tape above buried lines with one tape per trench at 3 inches below finished grade.

G. Secure rigid signs using stainless steel screws.

H. Mark all handwritten text, where permitted, to be neat and legible.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION

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SECTION 26 0923
LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Occupancy sensors.

B. Time switches.

C. Daylighting controls.

1.02 RELATED REQUIREMENTS

A. Section 26 0529 - Hangers and Supports for Electrical Systems

B. Section 26 0533.16 - Boxes for Electrical Systems.

C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

D. Section 26 2726 - Wiring Devices: Devices for manual control of lighting, including wall switches, wall dimmers, and fan speed controllers.
   1. Includes finish requirements for wall controls specified in this section.

1.03 REFERENCE STANDARDS

A. 47 CFR 15 - Radio Frequency Devices; current edition.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

C. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.

D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.

E. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; 2023.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 916 - Energy Management Equipment; Current Edition, Including All Revisions.

H. UL 917 - Clock-Operated Switches; Current Edition, Including All Revisions.

I. UL 1472 - Solid-State Dimming Controls; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the placement of lighting control devices with millwork, furniture, equipment, etc. installed under other sections or by others.
   2. Coordinate the placement of wall switch occupancy sensors with actual installed door swings.
   3. Coordinate the placement of occupancy sensors with millwork, furniture, equipment or other potential obstructions to motion detection coverage installed under other sections or by others.
   4. Coordinate the placement of photo sensors for daylighting controls with windows, skylights, and luminaires to achieve optimum operation. Coordinate placement with ductwork, piping, equipment, or other potential obstructions to light level measurement installed under other sections or by others.
   5. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

B. Sequencing:
   1. Do not install lighting control devices until final surface finishes and painting are complete.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
   1. Occupancy Sensors: Include detailed motion detection coverage range diagrams.

C. Shop Drawings:
   1. Occupancy Sensors: Provide lighting plan indicating location, model number, and orientation of each occupancy sensor and associated system component.
   2. Daylighting Controls: Provide lighting plan indicating location, model number, and orientation of each photo sensor and associated system component.

D. Field Quality Control Reports.

E. Project Record Documents: Record actual installed locations and settings for lighting control devices.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND PROTECTION

A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

1.08 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturer warranty for all occupancy sensors.

C. Provide two year manufacturer warranty for all daylighting controls.

PART 2 PRODUCTS

2.01 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.

C. Products for Switching of Electronic Ballasts/Drivers: Tested and rated to be suitable for peak inrush currents specified in NEMA 410.

2.02 OCCUPANCY SENSORS

A. Manufacturers:
   1. Hubbell Incorporated: www.hubbell.com/#sle.
   2. Lutron Electronics Company, Inc: www.lutron.com/#sle.
   3. Sensor Switch Inc: www.sensorswitch.com/#sle.
   4. WattStopper: www.wattstopper.com/#sle.
   5. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.

B. All Occupancy Sensors:

1. Description: Factory-assembled commercial specification grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small desktop level movements, according to published coverage areas, for automatic control of load indicated.
2. Sensor Technology:
    a. Passive Infrared (PIR) Occupancy Sensors: Designed to detect occupancy by sensing movement of thermal energy between zones.
    b. Passive Infrared/Acoustic Dual Technology Occupancy Sensors: Designed to detect occupancy using a combination of both passive infrared and audible sound sensing technologies.
3. Provide LED to visually indicate motion detection with separate color LEDs for each sensor type in dual technology units.
4. Operation: Unless otherwise indicated, occupancy sensor to turn load on when occupant presence is detected and to turn load off when no occupant presence is detected during an adjustable turn-off delay time interval.
5. Dual Technology Occupancy Sensors: Field configurable turn-on and hold-on activation with settings for activation by either or both sensing technologies.
6. Turn-Off Delay: Field adjustable, with time delay settings up to 30 minutes.
7. Sensitivity: Field adjustable.
8. Compatibility (Non-Dimming Sensors): Suitable for controlling incandescent lighting, low-voltage lighting with electronic and magnetic transformers, fluorescent lighting with electronic and magnetic ballasts, and fractional motor loads, with no minimum load requirements.
9. Load Rating for Line Voltage Occupancy Sensors: As required to control the load indicated on drawings.
10. Where wired sensors are indicated, wireless sensors are acceptable provided that all components and wiring modifications necessary for proper operation are included.
11. Wireless Sensors:
    a. RF Range: 30 feet through typical construction materials.
    b. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of 47 CFR 15, for Class B application.
    c. Power: Battery-operated with minimum ten-year battery life.

C. Wall Switch Occupancy Sensors:
1. All Wall Switch Occupancy Sensors:
    a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated manual control capability, and no leakage current to load in off mode.
    b. Operation: Field selectable to operate either as occupancy sensor (automatic on/off) or as vacancy sensor (manual-on/automatic off).
    c. Manual-Off Override Control: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.
    d. Finish: Match finishes specified for wiring devices in Section 26 2726, unless otherwise indicated.
2. Passive Infrared (PIR) Wall Switch Occupancy Sensors: Capable of detecting motion within an area of 900 square feet.
    a. Products:
        1) Lutron Maestro Series; www.lutron.com/#sle.
3. Passive Infrared/Ultrasonic Dual Technology Wall Switch Occupancy Sensors: Capable of detecting motion within an area of 900 square feet.
    a. Products:
        1) Lutron Maestro Series; www.lutron.com/#sle.
        2) Substitutions: See Section 01 6000 - Product Requirements.

D. Wall Dimmer Occupancy Sensors:

1. General Requirements:
    a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated dimming control capability , and no leakage current to load in off mode.
    b. Dimmer: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, and listed as complying with UL 1472; type and rating suitable for load controlled.
    c. Provide field adjustable dimming preset for occupied state.
    d. Provide fade-to-off operation to notify occupant of impending load turn-off.
    e. Finish: Match finishes specified for wiring devices in Section 26 2726, unless otherwise indicated.
2. Passive Infrared (PIR) Wall Dimmer Occupancy Sensors: Capable of detecting motion within an area of 900 square feet.
    a. Products:
        1) Lutron Maestro C.L Sensor Dimmer Series; www.lutron.com/#sle.
        2) Lutron Maestro 0-10V Dimmer Sensor Series; www.lutron.com/#sle.

E. Ceiling Mounted Occupancy Sensors:
1. All Ceiling Mounted Occupancy Sensors:
    a. Description: Low profile occupancy sensors designed for ceiling installation.
    b. Occupancy sensor to be field selectable as either manual-on/automatic-off or automatic on/off.
    c. Finish: White unless otherwise indicated.
2. Passive Infrared (PIR) Ceiling Mounted Occupancy Sensors:
    a. Standard Range Sensors: Capable of detecting motion within an area of 450 square feet at a mounting height of 9 feet, with a field of view of 360 degrees.
        1) Products:
            (a) Lutron LOS-CIR Series; www.lutron.com/#sle.
            (b) Lutron Radio Powr Savr Wireless Sensors; www.lutron.com/#sle.
3. Passive Infrared/Ultrasonic Dual Technology Ceiling Mounted Occupancy Sensors:
    a. Standard Range Sensors: Capable of detecting motion within an area of 450 square feet at a mounting height of 9 feet, with a field of view of 360 degrees.
        1) Products:
            (a) Lutron LOS-CDT Series; www.lutron.com/#sle.
4. Passive Infrared/Acoustic Dual Technology Ceiling Mounted Occupancy Sensors:
    a. Standard Range Sensors: Capable of detecting motion within an area of 450 square feet at a mounting height of 9 feet, with a field of view of 360 degrees.

F. Power Packs for Wireless Occupancy Sensors:
1. Description: Plenum rated, self-contained relay compatible with specified wireless occupancy sensors for switching of line voltage loads.
2. Input Supply Voltage: Dual rated for 120/277 V ac.
3. Load Rating: As required to control the load indicated on drawings.

G. Accessories:
1. Provide heavy duty coated steel wire protective guards compatible with specified occupancy sensors where indicated.

2.03 TIME SWITCHES

A. Manufacturers:
1. Intermatic, Inc: www.intermatic.com/#sle.
2. Tork, a division of NSI Industries LLC: www.tork.com/#sle.
3. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.

B. Digital Electronic Time Switches:

1. Description: Factory-assembled solid state programmable controller with LCD display, listed and labeled as complying with UL 916 or UL 917.
2. Program Capability:
   a. Astronomic Time Switches: Single channel, capable of different schedule for each day of the week with additional holiday schedule available to override normal schedule for selected days and field-configurable astronomic feature to automatically adjust for seasonal changes in sunrise and sunset times.
3. Schedule Capacity: Not less than 16 programmable on/off operations.
4. Provide automatic daylight savings time and leap year compensation.
5. Provide power outage backup to retain programming and maintain clock.
6. Manual override: Capable of overriding current schedule both permanently and temporarily until next scheduled event.
7. Input Supply Voltage: As indicated on the drawings.
8. Output Switch Configuration: As required to control the load indicated on drawings.
9. Output Switch Contact Ratings: As required to control the load indicated on drawings.
10. Provide lockable enclosure; environmental type per NEMA 250 as specified for the following installation locations:

2.04 DAYLIGHTING CONTROLS

A. Manufacturers:
   1. Lutron Electronics Company, Inc: www.lutron.com/#sle.
   2. Sensor Switch Inc: www.sensorswitch.com/#sle.
   3. WattStopper: www.wattstopper.com/#sle.
   4. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.

B. System Description: Control system consisting of photo sensors and compatible control modules and power packs, contactors, or relays as required for automatic control of load indicated according to available natural light; capable of integrating with occupancy sensors and manual override controls.

C. Daylighting Control Photo Sensors: Low voltage class 2 photo sensor units with output signal proportional to the measured light level and provision for zero or offset based signal.
   1. Sensor Type: Filtered silicon photo diode.
   2. Sensor Range:
      a. Indoor Photo Sensors: 5 to 100 footcandles.
   3. Finish: White unless otherwise indicated.
   4. Where wired sensors are indicated, wireless sensors are acceptable provided that all components and wiring modifications necessary for proper operation are included.
   5. Wireless Daylighting Control Photo Sensors:
      a. RF Range: 30 feet through typical construction materials.
      b. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of 47 CFR 15, for Class B application.
      c. Power: Battery-operated with minimum ten-year battery life.
      d. Products:
         1) Lutron Radio Powr Savr Wireless Sensors; www.lutron.com/#sle.

D. Dimming Photo Sensors: Photo sensor units with integral controller compatible with specified dimming ballasts, for direct continuous dimming of up to 50 ballasts.

E. Daylighting Control Switching Modules for Low Voltage Sensors: Low voltage class 2 control unit compatible with specified photo sensors, for switching of compatible power packs, contactors, or relays in response to changes in measured light levels according to selected settings.
   1. Operation: Unless otherwise indicated, load to be turned on when light level is below selected low set point and load to be turned off when light level is above selected high set point, with a no switching dead band between set points to prevent unwanted cycling.

2. Input Delay: To prevent unwanted cycling due to intermittent light level fluctuations.
3. Control Capability:

F. Daylighting Control Dimming Modules for Low Voltage Sensors: Low voltage class 2 control unit compatible with specified photo sensors and with specified dimming ballasts, for both continuous dimming of compatible dimming ballasts and switching of compatible power packs, contactors, or relays in response to changes in measured light levels according to selected settings.
1. Operation: Unless otherwise indicated, specified load to be continuously brightened as not enough daylight becomes available and continuously dimmed as enough daylight becomes available.
2. Control Capability: Capable of controlling up to three separately programmable channels, with up to 50 ballasts per channel.
3. Dimming and Fade Rates: Adjustable from 5 to 60 seconds.
4. Cut-Off Delay: Selectable and adjustable from 0 to 20 minutes.

G. Accessories:
1. Where indicated, provide compatible accessory wall switches for manual override control.
2. Where indicated, provide compatible accessory wireless controls for manual override control.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.

C. Verify that openings for outlet boxes are neatly cut and will be completely covered by devices or wall plates.

D. Verify that final surface finishes are complete, including painting.

E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to lighting control devices.

F. Verify that the service voltage and ratings of lighting control devices are appropriate for the service voltage and load requirements at the location to be installed.

G. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Install lighting control devices in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of lighting control devices provided under this section.
1. Mounting Heights: Unless otherwise indicated, as follows:
a. Wall Switch Occupancy Sensors: 48 inches above finished floor.
b. In-Wall Time Switches: 48 inches above finished floor.
c. In-Wall Interval Timers: 48 inches above finished floor.
2. Orient outlet boxes for vertical installation of lighting control devices unless otherwise indicated.
3. Locate wall switch occupancy sensors on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.

C. Install lighting control devices in accordance with manufacturer's instructions.

D. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

E. Install lighting control devices plumb and level, and held securely in place.

F. Where required and not furnished with lighting control device, provide wall plate in accordance with Section 26 2726.

G. Provide required supports in accordance with Section 26 0529.

H. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

I. Identify lighting control devices in accordance with Section 26 0553.

J. Occupancy Sensor Locations:
   1. Location Adjustments: Locations indicated are diagrammatic and only intended to indicate which rooms or areas require devices. Provide quantity and locations as required for complete coverage of respective room or area based on manufacturer's recommendations for installed devices.
   2. Locate ultrasonic and dual technology passive infrared/ultrasonic occupancy sensors a minimum of 4 feet from air supply ducts or other sources of heavy air flow and as per manufacturer's recommendations, in order to minimize false triggers.

K. Daylighting Control Photo Sensor Locations:
   1. Location Adjustments: Locations indicated are diagrammatic and only intended to indicate which rooms or areas require devices. Provide quantity and locations as required for proper control of respective room or area based on manufacturer's recommendations for installed devices.
   2. Unless otherwise indicated, locate photo sensors for closed loop systems to accurately measure the light level controlled at the designated task location, while minimizing the measured amount of direct light from natural or artificial sources such as windows or pendant luminaires.
   3. Unless otherwise indicated, locate photo sensors for open loop systems to accurately measure the level of daylight coming into the space, while minimizing the measured amount of lighting from artificial sources.

L. Lamp Burn-In: Operate lamps at full output for minimum of 100 hours or prescribed period per manufacturer's recommendations prior to use with any dimming controls. Replace lamps that fail prematurely due to improper lamp burn-in.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Inspect each lighting control device for damage and defects.

C. Test occupancy sensors to verify proper operation, including time delays and ambient light thresholds where applicable. Verify optimal coverage for entire room or area. Record test results in written report to be included with submittals.

D. Test time switches to verify proper operation.

E. Test daylighting controls to verify proper operation, including light level measurements and time delays where applicable. Record test results in written report to be included with submittals.

F. Correct wiring deficiencies and replace damaged or defective lighting control devices.

3.05 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

B. Adjust occupancy sensor settings to minimize undesired activations while optimizing energy savings, and to achieve desired function as indicated or as directed by Architect.

C. Where indicated or as directed by Architect, install factory masking material or adjust integral blinders on passive infrared (PIR) and dual technology occupancy sensor lenses to block undesired motion detection.

D. Adjust time switch settings to achieve desired operation schedule as indicated or as directed by Architect. Record settings in written report to be included with submittals.

E. Adjust daylighting controls under optimum lighting conditions after all room finishes, furniture, and window treatments have been installed to achieve desired operation as indicated or as directed by Architect. Record settings in written report to be included with submittals. Readjust controls calibrated prior to installation of final room finishes, furniture, and window treatments that do not function properly as determined by Architect.

3.06 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.07 COMMISSIONING

A. See Section 01 9113 - General Commissioning Requirements for commissioning requirements.

3.08 CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate proper operation of lighting control devices to Architect, and correct deficiencies or make adjustments as directed.

B. Training: Train Owner's personnel on operation, adjustment, programming, and maintenance of lighting control devices.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
   2. Provide minimum of two hours of training.
   3. Instructor: Qualified contractor familiar with the project and with sufficient knowledge of the installed lighting control devices.
   4. Location: At project site.

END OF SECTION

SECTION 26 2416
PANELBOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Power distribution panelboards.

B. Lighting and appliance panelboards.

C. Overcurrent protective devices for panelboards.

1.02 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems.

B. Section 26 0529 - Hangers and Supports for Electrical Systems.

C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; 2013e, with Amendments (2022).

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

C. NECA 407 - Standard for Installing and Maintaining Panelboards; 2015.

D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.

E. NEMA PB 1 - Panelboards; 2011.

F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 1000 Volts or Less; 2023.

G. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems; 2021.

H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

K. UL 67 - Panelboards; Current Edition, Including All Revisions.

L. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.

M. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
   2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
   4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
   5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.

C. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.

D. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Panelboard Keys: Two of each different key.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.

B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

1.08 FIELD CONDITIONS

A. Maintain ambient temperature within the following limits during and after installation of panelboards:
   1. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. ABB/GE: www.electrification.us.abb.com/#sle.

B. Eaton Corporation: www.eaton.com/#sle.

C. Schneider Electric; Square D Products: www.schneider-electric.us/#sle.

D. Siemens Industry, Inc: www.usa.siemens.com/#sle.

E. Source Limitations: Furnish panelboards and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 PANELBOARDS - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:

1. Altitude: Less than 6,600 feet.
2. Ambient Temperature:
    a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.
    b. Panelboards Containing Fusible Switches: Between -22 degrees F and 104 degrees F.

C. Short Circuit Current Rating:
1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.

D. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.

E. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.

F. Bussing: Sized in accordance with UL 67 temperature rise requirements.
1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.

G. Conductor Terminations: Suitable for use with the conductors to be installed.

H. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
    a. Indoor Clean, Dry Locations: Type 1.
    b. Outdoor Locations: Type 3R.
2. Boxes: Galvanized steel unless otherwise indicated.
    a. Provide wiring gutters sized to accommodate the conductors to be installed.
    b. Provide painted steel boxes for surface-mounted panelboards where indicated, finish to match fronts.
3. Fronts:
    a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
    b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
    c. Finish for Painted Steel Fronts: Manufacturer's standard grey unless otherwise indicated.
4. Lockable Doors: All locks keyed alike unless otherwise indicated.

I. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

J. Load centers are not acceptable.

K. Provide the following features and accessories where indicated or where required to complete installation:
1. Feed-through lugs.
2. Sub-feed lugs.

2.03 POWER DISTRIBUTION PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
2. Main and Neutral Lug Type: Mechanical.

C. Bussing:

1. Phase and Neutral Bus Material: Aluminum.
2. Ground Bus Material: Aluminum.

D. Circuit Breakers:
1. Provide bolt-on type or plug-in type secured with locking mechanical restraints.

E. Enclosures:
1. Provide surface-mounted enclosures unless otherwise indicated.
2. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
3. Provide clear plastic circuit directory holder mounted on inside of door.

2.04 LIGHTING AND APPLIANCE PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
2. Main and Neutral Lug Type: Mechanical.

C. Bussing:
1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
2. Phase and Neutral Bus Material: Aluminum.
3. Ground Bus Material: Aluminum.

D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.

E. Enclosures:
1. Provide surface-mounted or flush-mounted enclosures as indicated.
2. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
3. Provide clear plastic circuit directory holder mounted on inside of door.

2.05 OVERCURRENT PROTECTIVE DEVICES

A. Molded Case Circuit Breakers:
1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
2. Interrupting Capacity:
a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
3. Conductor Terminations:
a. Provide mechanical lugs unless otherwise indicated.
b. Lug Material: Copper, suitable for terminating copper conductors only.
4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
a. Provide field-adjustable magnetic instantaneous trip setting for circuit breaker frame sizes 225 amperes and larger.
b. Provide interchangeable trip units where indicated.
5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.

6. Provide the following circuit breaker types where indicated:
    a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
7. Do not use tandem circuit breakers.
8. Do not use handle ties in lieu of multi-pole circuit breakers.
9. Provide multi-pole circuit breakers for multi-wire branch circuits as required by NFPA 70.

2.06 SOURCE QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Factory test panelboards according to NEMA PB 1.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive panelboards.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.

D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

E. Provide required support and attachment in accordance with Section 26 0529.

F. Install panelboards plumb.

G. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.

H. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.

I. Provide minimum of six spare 1 inch trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling and below floor.

J. Provide grounding and bonding in accordance with Section 26 0526.
    1. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on isolated/insulated ground bus.

K. Install all field-installed branch devices, components, and accessories.

L. Multi-Wire Branch Circuits: Group grounded and ungrounded conductors together in the panelboard as required by NFPA 70.

M. Provide filler plates to cover unused spaces in panelboards.

N. Identify panelboards in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1. Tests listed as optional are not required.

D. Ground Fault Protection Systems: Test in accordance with manufacturer's instructions as required by NFPA 70.

E. Test GFCI circuit breakers to verify proper operation.

F. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.04 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

B. Adjust alignment of panelboard fronts.

C. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 20 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

3.05 CLEANING

A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 26 2726
WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall switches.

B. Wall dimmers.

C. Receptacles.

D. Wall plates.

E. Floor box service fittings.

1.02 RELATED REQUIREMENTS

A. Section 26 0533.16 - Boxes for Electrical Systems.

B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

C. Section 27 1000 - Structured Cabling: Voice and data jacks.

1.03 REFERENCE STANDARDS

A. FS W-C-596 - Connector, Electrical, Power, General Specification for; 2014h, with Amendments (2017).

B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification); 2014g, with Amendment (2017).

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

D. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.

E. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2020).

F. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2021.

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.

I. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.

J. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.

K. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

L. UL 1472 - Solid-State Dimming Controls; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
   2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
   3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
   4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
   5. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

B. Sequencing:
   1. Do not install wiring devices until final surface finishes and painting are complete.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

C. Project Record Documents: Record actual installed locations of wiring devices.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Products: Listed, classified, and labeled as suitable for the purpose intended.

E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND PROTECTION

A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 PRODUCTS

2.01 WIRING DEVICE APPLICATIONS

A. Provide wiring devices suitable for intended use and with ratings adequate for load served.

B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.

C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.

D. Provide GFCI protection for receptacles installed within 6 feet of sinks.

E. Provide GFCI protection for receptacles installed in kitchens.

F. Provide GFCI protection for receptacles serving electric drinking fountains.

G. Unless noted otherwise, do not use combination switch/receptacle devices.

H. For flush floor service fittings, use tile rings for installations in tile floors.

2.02 WIRING DEVICE FINISHES

A. Provide wiring device finishes as described below unless otherwise indicated.

B. Wiring Devices, Unless Otherwise Indicated: White with white nylon wall plate.

C. Wiring Devices Installed in Finished Spaces: White with white nylon wall plate.

D. Wiring Devices Installed in Unfinished Spaces: Gray with galvanized steel wall plate.

E. Wiring Devices Installed in Wet or Damp Locations: White with specified weatherproof cover.

F. Flush Floor Box Service Fittings: Gray wiring devices with aluminum cover and ring/flange.

2.03 WALL SWITCHES

A. Manufacturers:
   1. Hubbell Incorporated; _____: www.hubbell.com/#sle.
   2. Leviton Manufacturing Company, Inc; _____: www.leviton.com/#sle.
   3. Pass & Seymour, a brand of Legrand North America, Inc; _____: www.legrand.us/#sle.

B. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.

C. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

2.04 WALL DIMMERS

A. Manufacturers:
   1. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
   2. Lutron Electronics Company, Inc; Maestro Series: www.lutron.com/#sle.
   3. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.

B. Wall Dimmers - General Requirements: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 1472; types and ratings suitable for load controlled as indicated on the drawings.

C. Power Rating, Unless Otherwise Indicated or Required to Control the Load Indicated on the Drawings:

2.05 RECEPTACLES

A. Manufacturers:
   1. Hubbell Incorporated: www.hubbell.com/#sle.
   2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
   3. Lutron Electronics Company, Inc; Designer Style: www.lutron.com/#sle.
   4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.

B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
   2. NEMA configurations specified are according to NEMA WD 6.

C. Convenience Receptacles:
   1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
   2. Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.
   3. Tamper Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; single or duplex as indicated on the drawings.
   4. Tamper Resistant and Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.

D. GFCI Receptacles:
   1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
      a. Provide test and reset buttons of same color as device.

2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
    a. Products:
        1) Hubbell Incorporated: www.hubbell.com/#sle.
3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.
4. Tamper Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type.
5. Tamper Resistant and Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

2.06 WALL PLATES

A. Manufacturers:
1. Hubbell Incorporated: www.hubbell-wiring.com/#sle.
2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
3. Lutron Electronics Company, Inc: www.lutron.com/#sle.
4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
5. Substitutions: See Section 01 6000 - Product Requirements.
6. Source Limitations: Where wall controls are furnished as part of lighting control system, provide accessory matching receptacles and wallplates by the same manufacturer in locations indicated.

B. Wall Plates: Comply with UL 514D.
1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
2. Size: Standard.
3. Screws: Metal with slotted heads finished to match wall plate finish.

C. Nylon Wall Plates: Smooth finish, high-impact thermoplastic.

D. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.

E. Weatherproof Covers for Damp Locations: Gasketed, cast aluminum, with self-closing hinged cover and corrosion-resistant screws; listed as suitable for use in wet locations with cover closed.

F. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

2.07 FLOOR BOX SERVICE FITTINGS

A. Manufacturers:
1. Hubbell Incorporated: www.hubbell.com/#sle.
2. Thomas & Betts Corporation: www.tnb.com/#sle.
3. Wiremold, a brand of Legrand North America, Inc: www.legrand.us/#sle.

B. Description: Service fittings compatible with floor boxes provided under Section 26 0533.16 with components, adapters, and trims required for complete installation.

C. Flush Floor Service Fittings:
1. Single Service Flush Convenience Receptacles:
    a. Cover: Rectangular.
    b. Configuration: One standard convenience duplex receptacle(s) with duplex flap opening(s).
2. Single Service Flush Communications Outlets:
    a. Cover: Rectangular.

b. Configuration: _____.
c. Voice and Data Jacks: As specified in Section 27 1000.

3. Single Service Flush Furniture Feed:
   a. Cover: Rectangular.
   b. Configuration: One 2-1/8 inch by 3/4 inch combination threaded opening(s).
4. Dual Service Flush Combination Outlets:
   a. Cover: Rectangular.
   b. Configuration:
      1) Power: One standard convenience duplex receptacle(s) with duplex flap opening(s).
      2) Communications: _____.
      3) Voice and Data Jacks: As specified in Section 27 1000.
5. Dual Service Flush Furniture Feed:
   a. Cover: Rectangular.
   b. Configuration:
      1) Power: One 2-1/8 inch by 3/4 inch combination threaded opening(s).
      2) Communications: One 2-1/8 inch by 1 inch combination threaded opening(s).
6. Accessories:
   a. Tile Rings: Finish to match covers; configuration as required to accommodate specified covers.
   b. Carpet Flanges: Finish to match covers; configuration as required to accommodate specified covers.
7. Products:
   a. Hubbell Incorporated: www.hubbell.com/#sle.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.

C. Verify that wall openings are neatly cut and will be completely covered by wall plates.

D. Verify that final surface finishes are complete, including painting.

E. Verify that floor boxes are adjusted properly.

F. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

G. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of wiring devices provided under this section.
   1. Mounting Heights: Unless otherwise indicated, as follows:
      a. Wall Switches: 48 inches above finished floor.
      b. Wall Dimmers: 48 inches above finished floor.
      c. Receptacles: 18 inches above finished floor or 6 inches above counter.
   2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.

3. Where multiple receptacles, wall switches, or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
4. Locate wall switches on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.
5. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.

C. Install wiring devices in accordance with manufacturer's instructions.

D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.

F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.

G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.

I. Install wiring devices plumb and level with mounting yoke held rigidly in place.

J. Install wall switches with OFF position down.

K. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.

L. Do not share neutral conductor on branch circuits utilizing wall dimmers.

M. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.

N. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

O. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

P. Identify wiring devices in accordance with Section 26 0553.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Inspect each wiring device for damage and defects.

C. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.

D. Test each receptacle to verify operation and proper polarity.

E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.

F. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.05 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

3.06 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION

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SECTION 26 2816.16
ENCLOSED SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Enclosed safety switches.

1.02 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems.

B. Section 26 0529 - Hangers and Supports for Electrical Systems.

C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.

C. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); 2013.

D. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems; 2021.

E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

G. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

H. UL 98 - Enclosed and Dead-Front Switches; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and within working clearances for electrical equipment required by NFPA 70.
2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for enclosed switches and other installed components and accessories.

C. Project Record Documents: Record actual locations of enclosed switches.

D. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to enclosed switch internal components, enclosure, and finish.

1.08 FIELD CONDITIONS

A. Maintain ambient temperature between -22 degrees F and 104 degrees F during and after installation of enclosed switches.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. ABB/GE: www.electrification.us.abb.com/#sle.

B. Eaton Corporation: www.eaton.com/#sle.

C. Schneider Electric; Square D Products: www.schneider-electric.us/#sle.

D. Siemens Industry, Inc: www.usa.siemens.com/#sle.

E. Substitutions: See Section 01 6000 - Product Requirements.

F. Source Limitations: Furnish enclosed switches and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 ENCLOSED SAFETY SWITCHES

A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy duty; ratings, configurations, and features as indicated on the drawings.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
   1. Altitude: Less than 6,600 feet.
   2. Ambient Temperature: Between -22 degrees F and 104 degrees F.

D. Horsepower Rating: Suitable for connected load.

E. Voltage Rating: Suitable for circuit voltage.

F. Short Circuit Current Rating:
   1. Provide enclosed safety switches, when protected by the fuses or supply side overcurrent protective devices to be installed, with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.

G. Provide with switch blade contact position that is visible when the cover is open.

H. Conductor Terminations: Suitable for use with the conductors to be installed.

I. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.

J. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
   1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
      a. Indoor Clean, Dry Locations: Type 1.

b. Outdoor Locations: Type 3R.

K. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.

L. Heavy Duty Switches:
1. Comply with NEMA KS 1.
2. Conductor Terminations:
a. Provide mechanical lugs unless otherwise indicated.
b. Lug Material: Copper, suitable for terminating copper conductors only.
3. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that the ratings of the enclosed switches are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive enclosed safety switches.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide required support and attachment in accordance with Section 26 0529.

E. Install enclosed switches plumb.

F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.

G. Provide grounding and bonding in accordance with Section 26 0526.

H. Identify enclosed switches in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.

D. Correct deficiencies and replace damaged or defective enclosed safety switches or associated components.

3.04 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.05 CLEANING

A. Clean dirt and debris from switch enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

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SECTION 26 5100
INTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior luminaires.

B. Emergency lighting units.

C. Exit signs.

D. Ballasts and drivers.

E. LED retrofit luminaire conversion kits.

F. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 26 0529 - Hangers and Supports for Electrical Systems.

B. Section 26 0533.16 - Boxes for Electrical Systems.

C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

D. Section 26 0923 - Lighting Control Devices.

E. Section 26 2726 - Wiring Devices: Manual wall switches and wall dimmers.

1.03 REFERENCE STANDARDS

A. IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products; 2019.

B. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources; 2021.

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

D. NECA/IESNA 500 - Standard for Installing Indoor Lighting Systems; 2006.

E. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.

F. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; 2023.

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. UL 844 - Luminaires for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.

J. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.

K. UL 1598 - Luminaires; Current Edition, Including All Revisions.

L. UL 1598C - Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits; Current Edition, Including All Revisions.

M. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.

2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
4. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
   1. LED Luminaires:
      a. Include estimated useful life, calculated based on IES LM-80 test data.

C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.

D. Project Record Documents: Record actual connections and locations of luminaires and any associated remote components.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND PROTECTION

A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.

B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.08 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

A. Furnish products as indicated in luminaire schedule included on the drawings.

2.02 LUMINAIRES

A. Manufacturers:
   1. Acuity Brands, Inc: www.acuitybrands.com/#sle.
   2. Alloy LED; www.alloyled.com/#sle.
   3. California Accent Lighting, Inc; www.calilighting.com/#sle.
   4. Cooper Lighting, a division of Cooper Industries: www.cooperindustries.com/#sle.
   5. Electro-Matic Visual, Inc; www.empvisual.com/#sle.
   6. Hubbell Lighting, Inc: www.hubbelllighting.com/#sle.
   7. Lutron Electronics Company, Inc; www.lutron.com/#sle.
   8. Philips Lighting North America Corporation; www.lightingproducts.philips.com/#sle.

B. Provide products that comply with requirements of NFPA 70.

C. Provide products that are listed and labeled as complying with UL 1598, where applicable.

D. Provide products listed, classified, and labeled as suitable for the purpose intended.

E. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

F. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.

G. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

H. Recessed Luminaires:
   1. Ceiling Compatibility: Comply with NEMA LE 4.
   2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.

I. Hazardous (Classified) Location Luminaires: Listed and labeled as complying with UL 844 for the classification of the installed location.

J. LED Luminaires:
   1. Components: UL 8750 recognized or listed as applicable.
   2. Tested in accordance with IES LM-79 and IES LM-80.
   3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

K. Luminaires Mounted in Continuous Rows: Provide quantity of units required for length indicated, with all accessories required for joining and aligning.

2.03 EMERGENCY LIGHTING UNITS

A. Manufacturers:
   1. Acuity Brands, Inc: www.acuitybrands.com/#sle.
   2. Cooper Lighting, a division of Cooper Industries: www.cooperindustries.com/#sle.
   3. Hubbell Lighting, Inc: www.hubbelllighting.com/#sle.

B. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.

C. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.

D. Battery:
   1. Size battery to supply all connected lamps, including emergency remote heads where indicated.

E. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.

F. Provide low-voltage disconnect to prevent battery damage from deep discharge.

G. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status.

H. Where indicated, provide units with integral time delay to maintain emergency illumination for 15 minutes after restoration of normal power source.

I. Accessories:
   1. Provide compatible accessory mounting brackets where indicated or required to complete installation.
   2. Provide compatible accessory high impact polycarbonate vandal shields where indicated.

3. Provide compatible accessory wire guards where indicated.
4. Where indicated, provide emergency remote heads that are compatible with the emergency lighting unit they are connected to and suitable for the installed location.

2.04 EXIT SIGNS

A. Description: Exit signs complying with NFPA 101 and applicable state and local codes, and listed and labeled as complying with UL 924.
   1. Number of Faces: Single- or double-face as indicated or as required for installed location.
   2. Directional Arrows: As indicated or as required for installed location.

B. Powered Exit Signs: Internally illuminated with LEDs unless otherwise indicated.
   1. Manufacturers:
      a. Acuity Brands, Inc: www.acuitybrands.com/#sle.
      b. Cooper Lighting, a division of Cooper Industries: www.cooperindustries.com/#sle.
      c. Hubbell Lighting, Inc: www.hubbelllighting.com/#sle.
      d. Philips Lighting North America Corporation; www.lightingproducts.philips.com/#sle.
   2. Self-Powered Exit Signs:
      a. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
      b. Battery: Sealed, maintenance-free, nickel cadmium unless otherwise indicated.
      c. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
      d. Provide low-voltage disconnect to prevent battery damage from deep discharge.
      e. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status.

C. Accessories:
   1. Provide compatible accessory high-impact polycarbonate vandal shields where indicated.
   2. Provide compatible accessory wire guards where indicated.

2.05 BALLASTS AND DRIVERS

A. Manufacturers:
   1. Alloy LED; www.alloyled.com/#sle.
   2. California Accent Lighting, Inc; www.calilighting.com/#sle.
   3. General Electric Company/GE Lighting: www.gelighting.com/#sle.
   4. Lutron Electronics Company, Inc; www.lutron.com/#sle.
   5. OSRAM Sylvania, Inc: www.osram.us/ds/#sle.
   6. Philips Lighting North America Corporation; www.usa.lighting.philips.com/#sle.

B. Ballasts/Drivers - General Requirements:
   1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
   2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.

C. Dimmable LED Drivers:
   1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.
   2. Control Compatibility: Fully compatible with the dimming controls to be installed.
      a. Wall Dimmers: See Section 26 2726.
      b. Daylighting Controls: See Section 26 0923.

2.06 LED RETROFIT LUMINAIRE CONVERSION KITS

A. Manufacturers:

1. OSRAM Sylvania, Inc: www.osram.us/ds/#sle.

B. Description: Light-emitting diode (LED) retrofit luminaire conversion kits, including but not limited to LED lamps and arrays, control modules, drivers, power supplies, wiring, lampholders, brackets, wire connectors, reflectors, and diffusers, intended for replacement of existing light sources in existing luminaires; listed as complying with UL 1598C; suitable for installation in luminaire to be converted.

2.07 ACCESSORIES

A. Stems for Suspended Luminaires: Steel tubing, minimum 1/2" size, factory finished to match luminaire or field-painted as directed.

B. Threaded Rods for Suspended Luminaires: Zinc-plated steel, minimum 1/4" size, field-painted as directed.

C. Provide accessory plaster frames for luminaires recessed in plaster ceilings.

D. Fire-Rated Luminaire Enclosures:
   1. Manufacturers:
      a. Fire Rated Product Specialties Corp: www.frpsonline.com/#sle.
      b. Specialty Products & Insulation (SPI); SafeLite: www.spi-co.com/#sle.
      c. Substitutions: See Section 01 6000 - Product Requirements.
   2. Provide as required to preserve fire resistance rating of building elements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.

C. Verify that suitable support frames are installed where required.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of luminaires provided under this section.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install products in accordance with manufacturer's instructions.

D. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).

E. Provide required support and attachment in accordance with Section 26 0529.

F. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

G. Suspended Ceiling Mounted Luminaires:
   1. Do not use ceiling tiles to bear weight of luminaires.
   2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
   3. Secure surface-mounted and recessed luminaires to building structure.
   4. Secure pendant-mounted luminaires to building structure.

5. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
6. In addition to ceiling support wires, provide two galvanized steel safety wire(s), minimum 12 gauge, connected from opposing corners of each recessed luminaire to building structure.
7. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.

H. Recessed Luminaires:
1. Install trims tight to mounting surface with no visible light leakage.
2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.
3. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.

I. Suspended Luminaires:
1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
3. Provide minimum of two supports for each luminaire equal to or exceeding 4 feet nominal length, with no more than 4 feet between supports.
4. Install canopies tight to mounting surface.
5. Unless otherwise indicated, support pendants from swivel hangers.

J. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.

K. Install accessories furnished with each luminaire.

L. Bond products and metal accessories to branch circuit equipment grounding conductor.

M. Emergency Lighting Units:
1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.

N. Exit Signs:
1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.

O. Identify luminaires connected to emergency power system in accordance with Section 26 0553.

P. Install lamps in each luminaire.

Q. Lamp Burn-In: Operate lamps at full output for prescribed period per manufacturer's recommendations prior to use with any dimming controls. Replace lamps that fail prematurely due to improper lamp burn-in.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Inspect each product for damage and defects.

C. Operate each luminaire after installation and connection to verify proper operation.

D. Test self-powered exit signs and emergency lighting units to verify proper operation upon loss of normal power supply.

E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.05 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.

B. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Architect or authority having jurisdiction.

C. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect or authority having jurisdiction.

3.06 CLEANING

A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.07 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

B. See Section 01 7900 - Demonstration and Training, for additional requirements.

C. Demonstration: Demonstrate proper operation of luminaires to Architect, and correct deficiencies or make adjustments as directed.

D. Just prior to Substantial Completion, replace all lamps that have failed.

3.08 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

END OF SECTION

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SECTION 26 5600
EXTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Exterior luminaires.

B. Ballasts.

C. Luminaire accessories.

1.02 RELATED REQUIREMENTS

A. Section 26 0529 - Hangers and Supports for Electrical Systems.

B. Section 26 0533.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

A. ANSI O5.1 - American National Standard for Wood Poles: Specifications and Dimensions; 2022.

B. IEEE C2 - National Electrical Safety Code(R) (NESC(R)); 2023.

C. IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products; 2019.

D. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources; 2021.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

F. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems; 2000 (Reaffirmed 2006).

G. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; 2023.

H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. UL 1598 - Luminaires; Current Edition, Including All Revisions.

J. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate placement of poles and associated foundations with utilities, curbs, sidewalks, trees, walls, fences, striping, etc. installed under other sections or by others. Coordinate elevation to obtain specified foundation height.
   2. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.
   1. LED Luminaires:
      a. Include estimated useful life, calculated based on IES LM-80 test data.

C. Project Record Documents: Record actual connections and locations of pole foundations, luminaires, and any pull or junction boxes.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.

B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

C. Receive, handle, and store wood poles in accordance with ANSI O5.1.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide three year manufacturer warranty for all LED luminaires, including drivers.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

A. Furnish products as indicated in luminaire schedule included on the drawings.

2.02 LUMINAIRES

A. Manufacturers:
   1. Acuity Brands, Inc: www.acuitybrands.com/#sle.
   2. Alloy LED; www.alloyled.com/#sle.
   3. California Accent Lighting, Inc; www.calilighting.com/#sle.
   4. Cooper Lighting, a division of Cooper Industries: www.cooperindustries.com/#sle.
   5. Electro-Matic Visual, Inc; www.empvisual.com/#sle.
   6. Hubbell Lighting, Inc: www.hubbelllighting.com/#sle.
   7. Philips Lighting North America Corporation; www.lightingproducts.philips.com/#sle.

B. Provide products that comply with requirements of NFPA 70.

C. Provide products that are listed and labeled as complying with UL 1598, where applicable.

D. Provide products listed, classified, and labeled as suitable for the purpose intended.

E. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

F. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.

G. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

H. Recessed Luminaires:
   1. Ceiling Compatibility: Comply with NEMA LE 4.

I. LED Luminaires:
   1. Components: UL 8750 recognized or listed as applicable.
   2. Tested in accordance with IES LM-79 and IES LM-80.

3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

2.03 BALLASTS AND DRIVERS

A. Manufacturers:
   1. California Accent Lighting, Inc; www.calilighting.com/#sle.
   2. General Electric Company/GE Lighting: www.gelighting.com/#sle.
   3. OSRAM Sylvania, Inc: www.osram.us/ds/#sle.
   4. Philips Lighting North America Corporation; www.usa.lighting.philips.com/#sle.

B. Ballasts/Drivers - General Requirements:
   1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
   2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.

C. Dimmable LED Drivers:
   1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.
   2. Control Compatibility: Fully compatible with the dimming controls to be installed.

2.04 ACCESSORIES

A. Stems for Suspended Luminaires: Steel tubing, minimum 1/2" size, factory finished to match luminaire or field-painted as directed.

B. Threaded Rods for Suspended Luminaires: Zinc-plated steel, minimum 1/4" size, field-painted as directed.

C. Provide accessory plaster frames for luminaires recessed in plaster ceilings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.

C. Verify that suitable support frames are installed where required.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of luminaires provided under this section.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install products in accordance with manufacturer's instructions.

D. Install luminaires in accordance with NECA/IESNA 501.

E. Provide required support and attachment in accordance with Section 26 0529.

F. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

G. Recessed Luminaires:
   1. Install trims tight to mounting surface with no visible light leakage.

H. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.

I. Pole-Mounted Luminaires:
   1. Maintain the following minimum clearances:
      a. Comply with IEEE C2.
      b. Comply with utility company requirements.
   2. Grounding:
      a. Bond luminaires, metal accessories, metal poles, and foundation reinforcement to branch circuit equipment grounding conductor.
   3. Install separate service conductors, 12 AWG copper, from each luminaire down to handhole for connection to branch circuit conductors.

J. Install accessories furnished with each luminaire.

K. Bond products and metal accessories to branch circuit equipment grounding conductor.

L. Install lamps in each luminaire.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Inspect each product for damage and defects.

C. Operate each luminaire after installation and connection to verify proper operation.

D. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.05 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.

3.06 CLEANING

A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.07 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

B. See Section 01 7900 - Demonstration and Training, for additional requirements.

C. Demonstration: Demonstrate proper operation of luminaires to Architect, and correct deficiencies or make adjustments as directed.

D. Just prior to Substantial Completion, replace all lamps that have failed.

3.08 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

END OF SECTION

SECTION 27 1500
HORIZONTAL CABLING - CAT 6

PART 1 - GENERAL

1.01 SUMMARY

A. Horizontal (distribution) communications wiring and connecting hardware from the Telecommunications Room (MDF, IDF) to Telecommunication Outlets / Network Jacks throughout the site.

B. Cat 6A cabling and associated jacks shall be used for all network devices, IP Cameras, IP Phones, Wireless Access Points, Door Access Controllers, IP Sound System equipment, analog phone lines and as further shown on the drawings.

C. All Horizontal Station wiring shall be Plenum Rated (CMP).

1.02 RELATED DOCUMENTS

A. This Section shall be used in conjunction with the following other specifications and related Contract Documents to establish the total general requirements for the project communications systems and equipment:
   1. Contract Documents.
   2. Division 00 – Procurement & Contracting Requirements.
   3. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.03 REFERENCES

A. All work shall be performed in accordance with the following codes and industry standards, unless noted otherwise:
   1. NFPA 70 – National Electrical Code, current version adopted by local or State AHJ.
   2. TIA/EIA-568-B – Commercial Building Telecommunications Cabling Standard, current version.
   3. TIA/EIA-569-B – Commercial Building Standard for Telecommunications Pathways and Spaces, current version.
   4. TIA/EIA-606-A – Administration Standard for Commercial Telecommunications Infrastructure, current version.
   5. J-STD-607-A – Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications, current version.
   6. IEEE 241 - IEEE Recommended Practice for Electric Power Systems in Commercial Buildings pertaining to communication systems.

1.04 SYSTEM DESCRIPTION

A. The horizontal distribution subsystem refers to all intra-building twisted-pair and fiber optic communications cabling connecting Telecommunication Rooms (MTR, ITR's) to telecommunication outlets / network jacks located at individual work areas.

B. Horizontal cabling may consist of a combination of the following types of cable:
   1. Category 6A, (100 Ohm, 4-pair, unshielded twisted pair) cables.

C. The Horizontal System includes cables, jacks, patch panels, connecting blocks, patch cords, fiber connectors and jumpers as well as the necessary support systems, such as cable managers and faceplates.

D. Cables may be routed through conduit, cable trays, spaces below raised floors, open ceiling areas, non-ventilated spaces above ceiling tile, and through plenum air-handling spaces above ceiling tile. Coordinate with General Contractor (GC).
   1. Furnish and install all materials necessary for a complete and working system.

E. All Horizontal Station wiring shall be Plenum Rated (CMP).

1.05 WARRANTY

A. The telecommunications contractor must be an approved certified installer of the cabling manufacturer. The Telecommunications contractor is responsible for workmanship and installation practices in accordance with the cabling manufacturer's guidelines. The certified contractor shall have 30% of their technicians trained on copper & fiber installations and testing by the cabling manufacturer.

B. The copper warranty should guarantee installed static channel (Includes patch cords) performance above the TIA/EIA Standards for Cat 6A cabling systems. The static channel performance tests shall be performed in the field with an approved certification tester in the channel test configuration.

C. Warranty period shall be for one (1) year.

PART 2 PRODUCTS

2.01 APPROVALS AND SUBSTITUTIONS

A. All products shall be provided as specified, unless an approved equal is provided.

B. Non-compliant products installed as a part of this Contract shall be removed and replaced and all costs for removal and replacement shall be borne solely by the Contractor(s).

C. All products shall be "NEW".

2.02 STATION CABLING

A. Category 6A unshielded twisted pair
   1. 100 ohm, Category 6A, 22AWG, 4-pair unshielded twisted pair, CMP rated.
      a. Maximum insertion loss of 2.0 dB/100M at 1 MHz, 19.7 dB/100M at 100 MHz, 32.6 dB/100M at 250 MHz and 48.6 dB/100M at 500 MHz.
      b. NEXT, PSNEXT, ELFEXT, PSELFEXT margin greater than 5 dB better than ANSI/TIA/EIA category 6 standards requirement
      c. Cable balance: LCL/TCL greater than 50 dB @ 100 m at 1 MHz, 30.0 dB @ 100m at 100 MHz and 26.0 dB @ 250 MHz. EL TCTL greater than 30 dB @ 100m at 1 MHz, and 5.5 dB @ 100m at 31.25 MHz
      d. Electrical characteristics must be characterized to 550 MHz.
      e. Each pair in the cable must be insulated with FEP
      f. Cable must be third party verified by ETL.
      g. Superior Essex DataGain Category 6+, Part No. 66-246-xB.
      h. Color Coding of Cables / Jacks and Patch Cables to be coordinated with Owner prior to ordering. Base pricing on colors listed below

2.03 MODULAR JACKS

A. Category 6A Jacks: Provide 8 position – 8 conductor keyed, wired in accordance with ANSI/TIA T568B PIN configuration standard to terminate Category 6A UTP cables as specified herein.
   1. 8-position modular jack, Category 6A, IDC terminals, T568A/B wiring scheme
   2. Each jack must be stamped or have icons to identify it as CAT 6A.
      a. Color Coding of Jacks:
         1) Blue: Standard Network Devices

2.04 FACE PLATES

A. Single gang face plate for modular RJ-45 inserts with built in labeling window. Color – Off White Ivory. Panduit Mini-Com Executive Series Faceplates
   1. Panduit #CFPE1-WY, 1 port
   2. Panduit #CFPE2-WY, 2 port
   3. Panduit #CFPE3-WY, 3 port
   4. Panduit #CFPE4-WY, 4 port

B. Blank Inserts – Provide Modular Inserts for any unused face plate opening.

2.05 FIELD TERMINATABLE RJ45

A. Directly attached to Cat 6 cable for direct plug into IP Classroom Speaker Module
   1. Panduit Part No. FP6X88MTG

B. Provide a cable label on Cat 6 cable to identify IDF patch panel port.

2.06 BISCUIT BLOCKS

A. Two Port Keystone Surface Mount Blocks
   1. 2 port, label field, surface mount, Accepts Panduit Mini-Com TX6 Plus Jacks
      a. Panduit #CBXQ2

2.07 PATCH PANELS

A. Modular patch panels
   1. 24 port, 8-position modular jack flat panel, high density, Panduit Mini-Com, TX6A Plus Modular jacks, Strain Relief bar (#SRBS19BL-XY), 1U.
      a. Panduit #CPPL24WBLY
   2. 48 port, 8-position modular jack flat panel, high density, Panduit Mini-Com, TX6A Plus Modular jacks, Strain Relief bar (#SRBS19BL-XY), 2U.
      a. Panduit #CPPL48WBLY

2.08 PATCH CORDS/JUMPERS

A. Category 6A modular patch cords
   1. Factory terminated double ended, 8-position to 8-position, modular, stranded conductors, Category 6A, 4 pair.
      a. Panduit UTPSP1BUY (1 Feet):
         1) Blue
         2) Provide 30. (IP End Points & Switch connections)
      b. Panduit UTPSP3BUY (3 Feet): Slimline Booted, Use in Telecom Closets
         1) Blue
         2) Provide 20
      c. Panduit UTPSP6BUY (6 Feet): Slimline Booted, Use in Telecom Closets
         1) Blue
         2) Provide 20
      d. IP Sound System: EC shall coordinate with Owner when patching into Ethernet network switches.

PART 3 EXECUTION

3.01 GENERAL

A. Horizontal cabling includes cables, jacks, patch panels, connecting blocks, and patch cords, as well as the necessary support systems, such as cable managers and faceplates.

B. Contractor shall furnish and install all materials necessary for a complete and working system.

C. Contractor must be a certified manufacturer installer prior to, during, and through completion of the system installation.
   1. Field terminated copper and fiber optic patch cords and jumpers shall not be allowed. All patch cords shall be pre-terminated by the manufacturer.

D. All work shall be performed in a professional manner.

E. Install cable after interior of building has been physically protected from the weather and all mechanical work likely to damage cabling has been completed.

F. Before installing cabling, ensure all cable pathways are completely and thoroughly cleaned:

G. Inspect conduit, wireway, cable trays, and innerduct installed by others.

H. Clean any additional enclosed raceway and innerduct systems furnished.

I. Provide protection for exposed cables where subject to damage.

J. Provide abrasion protection for any cable or wire bundles, which pass through holes or across edges of sheet metal. Protective bushings shall be used to protect cables.

K. Cable ties and other cable management clamps shall be no more than hand tightened and shall fit snugly, but not compress, crimp, or otherwise change the physical characteristics of the cable jacket or distort the placement of twisted-pair components. Replace any cable exhibiting stresses due to over tightening of cable management devices. Plenum spaces require Plenum rated cable ties.

L. Where possible, route cables in overhead cable trays and inside wire management systems attached to the equipment cabinets and racks. Use plastic ties or ducts to restrain cabling installed outside of wire management systems on racks or in cabinets. Cable trays shall not exceed 50% fill.

M. A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.

N. Cable raceways shall not be filled greater than the TIA/EIA-569-A maximum fill for the particular raceway type.

O. If a J-hook or trapeze system is used to support cable bundles all horizontal cables shall be supported at a maximum of 48 to 60-inch (1.2 to 1.5 meter) intervals. At no point shall cable(s) rest on acoustic ceiling grids, plumbing pipes, and electrical conduits.

P. Horizontal distribution cables shall be bundled in groups of no more than the amount of cables designed for by the cable support manufacturer recommends based on cable OD and weight. Cable shall be installed above fire-sprinkler systems and shall not be attached to the system or any ancillary equipment or hardware. The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.

Q. Cables shall not be attached to ceiling grid or lighting fixture wires. Where support for horizontal cable is required, the contractor shall install appropriate carriers to support the cabling.

R. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the contractor prior to final acceptance at no cost to the Owner.

S. All Conduit Sleeves and wire way trays penetrating fire walls shall have 3M Fire Barrier Pillows installed. Contractor is responsible to place fire barrier pillows on all existing penetrations that will be reused to run new cable and all new penetrations required for the new cable installation. Fire barrier Pillows shall be placed per manufacturer's recommendation to create a 2-hour fire barrier.

3.02 UNSHIELDED TWISTED PAIR CABLE INSTALLATION PRACTICES

A. Cable shall be installed in accordance with manufacturer recommendations and best industry practices.

B. Cables shall be installed in continuous lengths from origin to destination (no splices) except for transition points, or consolidation points.

C. Where transition points or consolidation points are allowed, they shall be located in accessible locations and housed in an enclosure intended and suitable for the purpose.

D. The cable's minimum bend radius and maximum pulling tension shall not be exceeded Bend radius for UTP = 4 X Cable OD, FTP = 8 X Cable OD.

E. Unshielded twisted pair cable shall be installed so that there are no bends smaller than four times the cable outside diameter at any point in the run and at the termination field.

F. Pulling tension on 4-pair UTP cables shall not exceed 25-lbf for a four-pair UTP cable. Separation from Power Lines:

G. Provide the following minimum separation distances between pathways for copper communications cables and power wiring of 480 volts or less:

H. Open or Nonmetal Communications Pathways:

1. 12 inches from electric motors, fluorescent light fixtures, and unshielded power lines carrying up to 3 kVA.
2. 36 inches from electrical equipment and unshielded power lines carrying more than 5 kVA.
3. 48 inches from large electrical motors or transformers.

I. Grounded Metal Conduit Communications Pathways:
1. 2 1/2 inches from electrical equipment and unshielded power lines carrying up to 2 kVA.
2. 6 inches from electrical equipment and unshielded power lines carrying from 2 kVA to 5 kVA.
3. 12 inches from electrical equipment and unshielded power lines carrying more than 5 kVA.
4. 3 inches from power lines enclosed in a grounded metal conduit (or equivalent shielding) carrying from 2 kVA to 5 kVA.
5. 6 inches from power lines enclosed in a grounded metal conduit (or equivalent shielding) carrying more than 5 kVA.

3.03 UNSHIELDED TWISTED PAIR TERMINATION

A. Cables shall be coiled to house the cable coil without exceeding the manufacturers bend radius. In hollow wall installations where box-eliminators are used, excess wire can be stored in the wall. No more than 12” of UTP and 36” of fiber slack shall be stored; Excess slack shall be loosely coiled and stored in the ceiling above each drop location when there is not enough space present in the outlet box to store slack cable.

B. Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA/EIA-568-B.1 document, manufacturer's recommendations and best industry practices.

C. All 4 pair cables shall be terminated on the jack and patch panels using T568-B wiring scheme.

D. Pair untwist at the termination shall not exceed 12 mm (one-half inch).

E. Bend radius of the horizontal cable shall not be less than 4 times the outside diameter of the UTP cable. 8 times for FTP cables.

F. The cable jacket shall be maintained to within 25mm (one inch) of the termination point.

G. Pair untwist at the termination shall not exceed 13 mm (0.5 inch).

H. Cables shall be neatly bundled and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

I. The cable jacket shall be maintained as close as possible to the termination point. Cable shall not have more than 1.0” removed.

3.04 TESTING PROCEDURES

A. All cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance under installed conditions according to the requirements of ANSI/TIA/EIA-568-B. All pairs of each installed cable shall be verified prior to system acceptance. Any defect in the cabling system installation including but not limited to cable, connectors, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors in all cables installed.

B. All cables shall be tested in accordance with this document, the ANSI/TIA/EIA standards, the manufacturer’s procedures and best industry practice. If any of these are in conflict, the Contractor shall bring any discrepancies to the attention of the project team for clarification and resolution.

C. Cables, jacks, connecting blocks, and patch panels shall be in their final position with the building energized.

D. All Unshielded Twisted Pair cables shall be tested as follows:

1. All twisted-pair copper cable links shall be tested for continuity, pair reversals, shorts, opens and performance as indicated below. Additional testing is required to verify Category performance. Horizontal cabling shall be tested using an approved certification tester (Fluke or Agilent) for category 6 performance compliance as specified in ANSI/TIA/EIA-568-B.2-1.
2. Follow the Standards requirements established in ANSI/TIA/EIA-568-B .1, B.2-1.
3. Testing shall be accomplished with an approved certification tester (Fluke or Agilent)
4. The basic tests required are:
    a. Wire Map
    b. Length (feet)
    c. Insertion Loss (dB) (Formerly Attenuation)
    d. NEXT (Near end crosstalk) (dB)
    e. Return Loss (dB)
    f. ELFEXT (dB)
    g. Propagation Delay (ns)
    h. Delay skew (ns)
    i. PSNEXT (Power sum near-end crosstalk loss) (dB)
    j. PSELFEXT (Power sum equal level far-end crosstalk loss) (dB)
5. Cat 6 shall be tested to a Cat 6 auto test to 250 Hz.
6. All test results shall be provided in the approved certification testers original software format on a CD, with the following minimum information per cable:
    2.05.1.1.1.1.1 Circuit ID
    2.05.1.1.1.1.2 All information from 3.4D.4 above.
    2.05.1.1.1.1.3 Test result, “Pass” or “Fail”
    2.05.1.1.1.1.4 Date and Time of test
    2.05.1.1.1.1.5 Project Name
    2.05.1.1.1.1.6 NVP
    2.05.1.1.1.1.7 Version of software
    Note: No asterisk * will be accepted. These results shall be retested and submitted after a PASS is received.

E. A software copy of the test results, in the original tester software format, shall be provided to the Owner and manufacturer.

F. Contractor shall provide a fully functional version of the tester software for use by the Owner in reviewing the test results.

G. Any failed test results that cannot be remedied through re-termination (as in the case of reversed or split pairs), must be reported in writing to the Owner immediately, along with a copy of the test results.

3.05 LABELING

A. All horizontal cables are to be labeled using a machine printed label at each end of the cable at approximately 12 inches of the termination point, and again at approximately 48 inches from the termination point. Handwritten labels shall not be used.

B. All patch panel ports and telecommunication outlet ports shall be labeled with the cable identifier.

C. The labels shall denote the Telecommunications outlet ID, as well as the unique cable number for that Telecom Outlet, i.e. A-001-A for cable number 1, A-001-B for cable number 2, and so forth. Owner may provide specific labeling requirements coordinate with owner.

D. Note all labeling information on the as-built drawings.

END OF SECTION

SECTION 27 5015
ANALOG / IP SOUND SYSTEM & AUTOMATED LOCKDOWN

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The drawings and general provisions of the Contract Documents apply to this Section.

1.02 SUMMARY

A. Modify the existing Analog / IP Sound & Clock System. Existing Singlewire Informacast Advanced software that controls the Analog / IP Sound & Clock System shall also be modified to provided more license and reprogrammed as required for relocation of existing equipment.

B. Existing Singlewire Informacast Advanced software that controls the Lockdown strobe lights for Automated Lockdown System will continue to be used. New or Relocated Strobe lights shall be installed and wired to the existing Lockdown Strobe lighting circuit that supports this are of the building. Associated NAC Panels that power the Lockdown Strobes are typically located in the respective data closet for that wiring zone in the facility.

C. Corridor Speakers and exterior horns are analog devices that are connected to speaker circuits. These speaker Circuits are connected to multi-channel Amplifiers in Data Closets. Maintain these speaker circuits and modify wiring as required to relocate or add speakers and horns.

D. Provide all analog sound system components and IP Zone controllers as specified in Part 2 – Products.

1.03 SUBMITTALS

A. Product data for each component.

B. Shop Drawings: Prior to proceeding with the work: Provide detailed equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components, and location of each field connection, and a complete schedule of all equipment and materials with associated manufacturers cuts sheets which are to be used.

1. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring. Identify terminals to facilitate installation, operation, and maintenance. Include a single-line diagram showing cabling interconnection of components and levels throughout system and impedances.
2. Drawings and lists indicating proposed nameplate nomenclature and arrangements for control panels and plug panels prior to fabrication reflecting equipment used.
3. Each drawing shall have a descriptive title and all sub-parts of each drawing shall be labeled. All drawings shall have the name and locations of the project, Systems Contractor’s name in the title block.
4. Details and descriptions of any other aspect of the system, which must differ from the contract documents due to field conditions or equipment, furnished.

C. FCC Approval: The system shall be approved for direct interconnection to the telephone utility under Part 68 of FCC rules and regulations. Systems, which are not FCC approved or utilize an intermediary device for connection, will not be considered. Provide the FCC registration number of the system being proposed as part of the submittal process.

D. Product Certificates: Signed by manufacturers of equipment certifying that products furnished comply with specified requirements.

E. Installer Certificates: Signed by manufacturer certifying that installers comply with requirements.

F. Manufacturer Certificates: Signed by manufacturers certifying that they comply with requirements.

G. Field Test Reports: Indicate and interpret test results for compliance with performance requirements. Include record of final matching transformer-tap settings, and signal ground-resistance measurement certified by Installer.

H. Maintenance Data: For equipment to be included in maintenance manuals specified in Division
   1. Record of Owners equipment-programming option decisions.
   2. All instructions necessary for proper operation and manufacturer's instructions.
   3. "Proof of Performance" information.
   4. Manufacturer's maintenance information.
   5. Copies of non-proprietary computer programs and system set up disks documenting all programmable features of the installed system.

I. Record Drawings: Prior to final acceptance, provide two complete sets of drawings indicating all cable numbers and construction details in accordance with the actual system installation. Revise all shop drawings to represent actual installation conditions. These Record Drawings will be used during "Final Acceptance Testing".

J. System Training: Submit the following information describing the training programs and system trainers.
   1. Include with the submittal a preliminary staff development training program in outline form for review and approval by the owner's representative.
   2. Include with the submittal a current copy of the trainer's certification from the manufacturer that certifies and identifies the trainer(s) who are eligible to provide training and support for the project.
   3. Include with the submittal a current copy of trainer's need's assessment form which will be reviewed with the owner's designated representative for the system's preliminary system programming and configuration.
   4. Include with the submittal copies of all documentation used to identify for the owner those participants attending and completing the training programs.

K. A copy of the manufacturer's standard statement of warranty proving all equipment provided for the school communications network is covered with the required one-year equipment warranty shall be included with the project submittal. This statement of warranty shall be provided on the manufacturer's stationary.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is an authorized representative of equipment manufacturer for both installation and maintenance of equipment required for this Section. Provide the following with in thirty (30) days after notification to proceed.

B. Provide a list of installations that the Installer has specifically installed for verification by the Owner. The Installer, not its employees, must meet these qualifications.

C. The Installer shall demonstrate to the satisfaction of the Owner or his representative that he has:
   1. Adequate plant and equipment to pursue the work properly and expeditiously.
   2. Adequate staff and technical experience to implement the work.
   3. Technically capable and factory trained service personnel at a local service facility to provide routine and emergency service for all products used in this project.

D. Any Contractor, who intends to bid on this work and does not meet the requirements of the "Quality Assurance" paragraph(s), shall employ the services of a "Installer" who does meet the requirements and who shall provide the equipment, make all connections and continuously supervise the installation. A subcontractor so employed as the "Installer" must be acceptable to the Architect/ Engineer. The "Installer" shall be identified within thirty (30) days of notification to proceed for acceptance by the Architect/Engineer

E. Each major component of equipment shall have the manufacturers name, address and model number on a plate securely affixed in a conspicuous place. NEMA code ratings, UL Label, or other data that is die-stamped into the surface of the equipment shall be easily visible.

F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

G. Comply with NFPA 70

H. Comply with NEMA Standard SB-40 for Emergency Communications in K-12 schools.

I. Comply with UL 60950.

1.05 WARRANTY

A. Provide a manufacturer's one-year warranty of the school communications network equipment against defects in material and workmanship. This warranty will cover all electronic equipment, as well as speakers. If any defects are found within the warranty period, the defective equipment shall be replaced at no cost (equipment only); a one-year warranty shall be provided for labor.

B. A copy of the manufacturer's standard statement of warranty proving all equipment provided for the school communications network is covered with the required one-year warranty shall be included with the project submittal. This statement of warranty shall be provided on the manufacturer's stationary. The standard one-year warranty is an important element in establishing a standard in quality.

1.06 MANUFACTURERS

A. Base Bid Manufacturers:
   1. Analog Speakers: Rauland or Equal
   2. IP Sound System Software: Singlewire Informacast Advanced
   3. IP Clock & Speaker units: Atlas IED or Equal

PART 2 PRODUCTS

2.01 ANALOG SPEAKERS AND RELATED EQUIPMENT

A. Analog Ceiling mounted speaker assemblies
   1. Ceiling speaker assemblies shall consist of an 8 in. round coaxial speaker with integral 25-volt transformer, an insulated metal backbox, and a 2X2 Lay-in frame. The ceiling speaker shall incorporate the following components, functions, and features:
   2. Speaker shall be 8 in. round coaxial design pre-assembled with integral 25/70 volt transformer and white circular grille.
   3. Frequency range shall be 65Hz to 17kHz.
   4. Power rating shall be 8 watts RMS.
   5. Sensitivity shall be 93 dB @ 4 ft. with 1 watt input.
   6. Magnet shall be 5.0 oz. ceramic.
   7. Voice coil impedance shall be 8 ohms.
   8. Transformer taps for 25/70 v. shall be 5/16, 5/8, 1 ¼, 2 ½, and 5 watts.
   9. Speaker assembly shall be a model CSD2X2L(U) by Bogen.

B. Analog Wall mounted speaker assemblies
   1. Wall mounted speaker assemblies shall consist of an 8 in. diameter speaker housed in a prefabricated metal housing with a metal grille. The speaker shall be provided from the factory with a 25/70V transformer and the entire assembly shall come from the manufacturer pre-assembled.
   2. Speaker Type: 8 inch (20.3 cm) Permanent Magnet, with "Whizzer" cone for extended high-frequency response.
   3. Power Rating: 8 watts RMS
   4. Sensitivity: 93 dB @ 1 meter with 1 Watt input

5. Frequency Response: 65 to 17,000 Hertz
6. Magnet: 5 oz. (141.7 g) ceramic
7. Voice Coil Impedance: 8 ohms
8. Voice Coil Diameter: 0.75 inches (1.9 cm)
9. Transformer: 25V/70V
10. Taps at 5/16, 5/8, 1-1/4, 2-1/2, and 5 Watts
11. Baffle: ACC1003 – 22-gauge cold-rolled steel, acoustically correct
12. Baffle Size: Square 111/2" (29.2 cm)
13. Housing and Baffle Finish: Textured Off-White Epoxy Semi-Gloss
14. Dimensions: 11-5/8 in. wide, 5-1/2 in. deep at top, 3-1/8 in. deep at bottom, 11-3/8 in. high
15. Weight: 4 lbs., 2 oz.
16. Wall mount Speaker Assemblies shall be a model MB8TSL by Bogen.

C. Analog Paging Horn Speaker Assemblies
1. Paging horns shall be a wide-angle paging projector consisting of an integrated driver assembly combined with a double re-entrant, non-resonant heavy-duty ABS resin horn.
2. Paging horns shall contain a built-in, weatherproofed 25- and 70-volt line matching transformer and shall be provided with a screwdriver adjustable impedance wattage switch.
3. Power taps shall be available as follows: 1.8, 3.7, 7.5, and 15 watts on 25 volt lines.
4. The loudspeaker driver assembly shall have a heavy-duty magnet, and a self-aligning, field replaceable diaphragm.
5. Power handling capacity shall be 30 watts at full range and produce 107dB at 1 meter on axis with 1-watt input.
6. Frequency response shall be 225 to 14,000 Hz.
7. Dispersion shall be no less than 120° horizontal and no greater than 60° vertical.
8. The assembly shall include a die-cast universal mounting bracket permitting single locking pin adjustment on vertical or horizontal planes.
9. Termination to the device shall be by means of screw terminals, protected by an environmental cover, and having an integral cable strain relief.
10. The unit shall be totally weatherproof, with horn and reflex cone construction of heavy-duty high-impact ABS resin.
11. The driver and transformer housing and mounting bracket shall be weatherproof heavy die-cast aluminum. All exposed parts and hardware
12. shall be entirely impervious to weather.
13. Finish shall be gray.
14. Dimensions shall not exceed 14-1/4" wide, 6" high, 13-11/16" deep.
15. Paging horn speaker assemblies shall be a model SPT30A by Bogen.

D. Override Relays: Provide IP to Analog override relays at local sound systems for Auditoriums, Gymnasiums and Cafeterias.

E. Cat 6 Cables and Patch Panels – Refer to Specification Section 271500.

F. Wire Guards shall be provided for all surface speakers mounted in Gymnasiums

2.02 BLUE LOCKDOWN STROBES

A. Amber Lenses have been tested to meet UL 1971 light distribution

B. Strobe lens color to be utilized is BLUE.

C. Field selectable candela settings of 15/30/75/95cd or high intensity models with 115/177cd settings

D. Indoor 24VDC models with UL “Regulated Voltage” at 16-33 VDC using filtered DC or unfiltered FWR input voltage

E. Multitone appliance

F. Strobes can be synchronized with Wheelock's DSM sync modules or SAFEPATHTM4 power supplies

G. Combination speaker/strobes available for voice messages with visual alerting

H. Mount to standard electrical boxes

I. High quality designs from the leader in fire notification alarms

J. Exterior shall be weather proof and include surface mount box

K. Design Make: Interior: Wheelock -RSSB-24MCW-NW, Exterior Wheelock -RSSWPB-24MCCH-NW with WBB-W Backbox.

2.03 SINGLEWIRE INFORMACAST SOFTWARE

A. Software Allowance: Provide $5,0000 Allowance in contract for Districts to purchase Singlewire Informacast Advanced Licenses and associated Resiliency Licenses.

2.04 IP ENDPOINTS

A. Recessed, Hard-lid Ceiling or Wall Mounted IP Speaker with Microphone:

1. Indoor wall/ceiling mount IP loudspeaker. Speaker shall mount flush in gypsum ceiling or either surface/flush mounted on walls with an enclosure.
2. The PoE+ Indoor IP Endpoint Speaker System shall include factory assembled speaker, IP addressable PCB amplifier/control, metal baffle, and integrated microphone.
3. The speaker shall be an 8" Coaxial driver with low-frequency reproducer cone shall be a full 8" (203mm) in diameter and the high frequency reproducer cone shall be 3" (76mm) in diameter. The woofer shall have a 10oz. (260g) ceramic magnet; the tweeter shall have a 2.35oz. (67g) ceramic magnet. The two reproducer sections shall be coupled through a built-in crossover network.
4. The crossover frequency shall be at 2800Hz. The speaker dispersion shall be 105° and Frequency response range shall be 70Hz – 15.5kHz, (±5dB). Sensitivity shall be 98dB at 1 Watt/1 meter. Voice coil impedance shall be 8Ω. Low frequency voice coil diameter shall be 1" (25mm) and operate in a magnet field of at least 10,600 gauss. The maximum depth of the loudspeaker shall not exceed 2-7/8"(73mm).
5. The amplifier/control board shall receive announcements and messages using dynamically routed data on a standard Ethernet Network. It shall include a Single-Channel Class D Topology amplifier with Primary and Secondary Outputs capable of producing 25-watts RMS when using an IEEE 802.3at compatible PoE+ switch or 24VDC local power supply and 12-watts RMS when used with an IEEE 802.3af compliant PoE switch. Interconnect shall be via female RJ-45 connector mounted to the PCB.
6. The amplifier/control board shall include (2) logic inputs, (1) relay output, (1) Auxiliary Unbalanced line level audio input and (1) Unbalanced line level audio output. The Auxiliary Line Level input shall include an auto mute function that is activated when a broadcast is sensed from the control application.
7. The amplifier/control board shall include a Graphical User Interface (GUI) for SIP configuration. The SIP implementation shall support standards G.711, G.722 and RTP protocols. The Graphical User Interface (GUI) shall configure and manage logic inputs, relay outputs, and Auxiliary audio input.
8. The unit shall incorporate an integrated microphone to allow full duplex talkback communication functionality based upon chosen software platform.
9. All control functionality shall be determined via software. It shall be compatible with AtlasIED's GCK, Syn-Apps' SA-Announce, Singlewire's InformaCast software platforms and SIP standalone operation. The PoE+ Indoor IP Endpoint Speaker System overall dimensions shall be 11.5" (292mm) x 11.5" (292mm) x 2.84" (72.14mm). Finish shall be neutral white electrostatic powder coat metal baffle.
10. Manufacturer: AtlasIED IP-8SM or equal.
11. Optional Mounting Hardware Shall Include:

a. Flush Mount Enclosure: AtlasIED IP-FEST-S
b. Surface Mount Enclosure: AtlasIED IP-SEST-S
c. Angled Wall Mount Enclosure: AtlasIED IP-SEA-S
d. Tile Bridge with Enclosure: IP-STBE

12. Slave Speaker shall be analog speaker as described below.

B. Exterior & Interior Wall Mounted IP Speaker:
1. Vandal proof, weather resistant, wall mount IP loudspeaker.
2. The PoE+ vandal-proof outdoor IP Endpoint Speaker System shall include factory assembled horn, IP addressable PCB amplifier/control, and cast aluminum alloy baffle.
3. The horn shall be a double re-entrant type with a 3.8" high-output compression driver mounted within weather-resistant housing. The impedance shall be 8 ohm and a voice coil diameter of 1.25" (31.75mm). Frequency response shall be 600-14,000 Hz (nominal), 700-5500 Hz (± 5dB). Sound pressure level shall be 114dB (15W/1M), 104dB (1W/1M), and max peak output at 1W/1m shall be 120dB SPL. Sound dispersion angle shall be 95˚. The Horn dimensions shall be Dia-5-5/8" x D 3-7/16" x Dia Flange 6-15/16 ".
4. The amplifier/control board shall receive announcements and messages using dynamically routed data on a standard Ethernet Network. It shall include a Single-Channel Class D Topology amplifier with Primary and Secondary Outputs capable of producing 25-watts RMS when using an IEEE 802.3at compatible PoE+ switch or 24VDC local power supply and 12-watts RMS when used with an IEEE 802.3af compliant PoE switch. Interconnect shall be via female RJ-45 connector mounted to the PCB.
5. The amplifier/control board shall include (2) logic inputs, (1) relay output, (1) Auxiliary Unbalanced line level audio input and (1) Unbalanced line level audio output. The Auxiliary Line Level input shall include an auto mute function that is activated when a broadcast is sensed from the control application.
6. The amplifier/control board shall include a Graphical User Interface (GUI) for SIP configuration. The SIP implementation shall support standards G.711, G.722 and RTP protocols. The Graphical User Interface (GUI) shall configure and manage logic inputs, relay outputs, and Auxiliary audio input.
7. All control functionality shall be determined via software. It shall be compatible with AtlasIED's GCK, Syn-Apps' SA-Announce, Singlewire's InformaCast software platforms and SIP standalone operation. The PoE+ Outdoor IP Endpoint Speaker System overall dimensions shall be 10.75" (273mm) x 10.75" (273mm) x 4.49" (114mm). The vandal-proof grill shall be cast from self-aging aluminum alloy with a tensile strength of 44,000 P.S.I with a textured white epoxy finish.
8. Manufacturer: AtlasIED IP-HVP or equal.
9. Optional Mounting Hardware Shall Include:
a. Flush Mount Enclosure: AtlasIED IP-FEST-IH
b. Surface Mount Enclosure: AtlasIED IP-SEST-IH

C. Wall Mounted Clock / Speaker with LCD Display, Microphone and LED Flasher
1. Indoor wall mount IP loudspeaker with LCD display, microphone and flasher. IP Speaker shall mount flush or surface mounted on walls with an enclosure.
2. The PoE+ Indoor IP Endpoint Speaker System shall include factory assembled speaker, IP addressable PCB amplifier/control, plastic baffle, integrated microphone, LCD Display, and LED Multi-color Flasher.
3. The speaker shall be an 8" Coaxial driver with low-frequency reproducer cone shall be a full 8" (203mm) in diameter and the high frequency reproducer cone shall be 3" (76mm) in diameter. The woofer shall have a 10oz. (260g) ceramic magnet; the tweeter shall have a 2.35oz. (67g) ceramic magnet. The two reproducer sections shall be coupled through a built-in crossover network.

4. The crossover frequency shall be at 2800Hz. The speaker dispersion shall be 105° and Frequency response range shall be 70Hz – 15.5kHz, (±5dB). Sensitivity shall be 98dB at 1 Watt/1 meter. Voice coil impedance shall be 8Ω. Low frequency voice coil diameter shall be 1" (25mm) and operate in a magnet field of at least 10,600 gauss. The maximum depth of the loudspeaker shall not exceed 2-7/8" (73mm).
5. The amplifier/control board shall receive announcements and messages using dynamically routed data on a standard Ethernet Network. It shall include a Single-Channel Class D Topology amplifier with Primary and Secondary Outputs capable of producing 25-watts RMS when using an IEEE 802.3at compatible PoE+ switch or 24VDC local power supply and 12-watts RMS when used with an IEEE 802.3af compliant PoE switch. Interconnect shall be via female RJ-45 connector mounted to the PCB.
6. The amplifier/control board shall include (2) logic inputs, (1) relay output, (1) Auxiliary Unbalanced line level audio input and (1) Unbalanced line level audio output. The Auxiliary Line Level input shall include an auto mute function that is activated when a broadcast is sensed from the control application.
7. The amplifier/control board shall include a Graphical User Interface (GUI) for SIP configuration. The SIP implementation shall support standards G.711, G.722 and RTP protocols. The Graphical User Interface (GUI) shall configure and manage logic inputs, relay outputs, and Auxiliary audio input.
8. The unit shall incorporate an integrated microphone to allow full duplex talkback communication functionality based upon chosen software platform.
9. The unit shall incorporate a High-Resolution Back-Lit color LCD display with viewable dimensions of 8.66" (220.88mm) wide x 2.23" (56.72mm) high. It shall receive visual notifications by AtlasIED's GCK, Syn-Apps' SA-Announce, Singlewire's InformaCast software platforms. It shall display time when in standby mode from AtlasIED's GCK, Syn-Apps' SA-Announce, Singlewire's InformaCast software platforms or by NTP. The display shall produce 1900 cd/m^2 lux brightness and display text and/or time
10. The unit shall incorporate a LED flasher with viewable dimensions of .5" (12mm) height x 3.5" (89mm) wide. The LEDs shall be able to produce RGB color spectrum with brightness of 310-lux (Red), 348-lux (Green), 352-lux (Blue). It shall have the capability of multi-speed flash rate and will be software controllable
11. All control functionality shall be determined via software. It shall be compatible with AtlasIED's GCK, Syn-Apps' SA-Announce, Singlewire's InformaCast software platforms and SIP standalone operation. The PoE+ Indoor IP Endpoint Speaker System overall dimensions shall be 14.38" (365mm) x 12.88" (327mm) x 2.77" (70.36mm). Finish shall be neutral white electrostatic powder coat micro perforated grill with plastic trim ring.
12. Manufacturer: AtlasIED IP-SDMF or equal.
13. Optional Mounting Hardware Shall Include:
    a. Flush Mount Enclosure: AtlasIED IP-FEST-SD
    b. Surface Mount Enclosure: AtlasIED IP-SEST-SD
    c. Angled Wall Mount Enclosure: AtlasIED IP-SEA-SD

D. IP Horns for Interior & Exterior Use
1. ALGO 8186 SIP Horn
2. Freq Response 350 – 9000 hx (-10dB)
3. Suitable for outdoor and wet environments
4. Color: Gray

2.05 IP VISUAL DISPLAY REQUIRMENTS

A. Type DDS – IP Dual Sided LCD Display with Loudspeakers and Flasher:

1. The PoE+ Indoor IP Endpoint Visual System shall consist of a factory assembled double sided wall or ceiling mount enclosure containing 2 LCD displays that can display time as well as scrolling text and IP addressable PCB amplifier/control with amplified output to drive small analog loudspeaker zones. The model shall also feature LED flashers located below the display can be used to alert room occupants of an incoming scrolling text message in accordance with ADA compliance. The unit shall incorporate loudspeaker drivers on each side of the display.
2. The speakers shall be an 3" (76.2mm) in diameter full range transducer each mounted next to LCD display on opposite sides within the metal housing. The speaker dispersion shall be 135° and Frequency response range shall be 800Hz – 4kHz, (±5dB). Sensitivity shall be 92dB at 1 Watt/1 meter. Voice coil impedance shall be 8Ω.
3. The amplifier/control board shall receive announcements and messages using dynamically routed data on a standard Ethernet Network. It shall include a Single-Channel Class D Topology amplifier with Primary and Secondary Outputs capable of producing 25-watts RMS when using an IEEE 802.3at compatible PoE+ switch or 24VDC local power supply and 12-watts RMS when used with an IEEE 802.3af compliant PoE switch. Interconnect shall be via female RJ-45 connector mounted to the PCB.
4. The amplifier/control board shall include (2) logic inputs, (1) relay output, (1) Auxiliary Unbalanced line level audio input and (1) Unbalanced line level audio output. The Auxiliary Line Level input shall include an auto mute function that is activated when a broadcast is sensed from the control application.
5. The amplifier/control board shall include a Graphical User Interface (GUI) for SIP configuration. The SIP implementation shall support standards G.711, G.722 and RTP protocols. The Graphical User Interface (GUI) shall configure and manage logic inputs, relay outputs, and Auxiliary audio input.
6. The unit shall incorporate a High-Resolution Back-Lit color LCD display with viewable dimensions of 8.66" (220.88mm) wide x 2.23" (56.72mm) high. It shall receive visual notifications by AtlasIED's GCK, Syn-Apps' SA-Announce, Singlewire's InformaCast software platforms. It shall display time when in standby mode from AtlasIED's GCK, Syn-Apps' SA-Announce, Singlewire's InformaCast software platforms or by NTP. The display shall produce 1900 cd/m^2 lux brightness and display text and/or time.
7. The unit shall incorporate a LED flasher with viewable dimensions of .5" (12mm) height x 3.5" (89mm) wide. The LEDs shall be able to produce RGB color spectrum with brightness of 310-lux (Red), 348-lux (Green), 352-lux (Blue). It shall have the capability of multi-speed flash rate and will be software controllable.
8. All control functionality shall be determined via software. It shall be compatible with AtlasIED's GCK, Syn-Apps' SA-Announce, Singlewire's InformaCast software platforms and SIP standalone operation. The Indoor IP Endpoint Visual System overall dimensions shall be 9.9" (251mm) x 19.94" (506.5mm) x 7" (177mm) HxWxD.
9. Manufacturer: AtlasIED IP-DDS or equal.

B. Type DD – IP Dual Sided LCD Display with Flasher:
1. The PoE+ Indoor IP Endpoint Visual System shall consist of a factory assembled double sided wall or ceiling mount enclosure containing 2 LCD displays that can display time as well as scrolling text and IP addressable PCB amplifier/control with amplified output to drive small analog loudspeaker zones. The model shall also feature LED flashers located below the display can be used to alert room occupants of an incoming scrolling text message in accordance with ADA compliance.
2. The amplifier/control board shall receive announcements and messages using dynamically routed data on a standard Ethernet Network. It shall include a Single-Channel Class D Topology amplifier with Primary and Secondary Outputs capable of producing 25-watts RMS when using an IEEE 802.3at compatible PoE+ switch or 24VDC local power supply and 12-watts RMS when used with an IEEE 802.3af compliant PoE switch. Interconnect shall be via female RJ-45 connector mounted to the PCB.

3. The amplifier/control board shall include (2) logic inputs, (1) relay output, (1) Auxiliary Unbalanced line level audio input and (1) Unbalanced line level audio output. The Auxiliary Line Level input shall include an auto mute function that is activated when a broadcast is sensed from the control application.
4. The amplifier/control board shall include a Graphical User Interface (GUI) for SIP configuration. The SIP implementation shall support standards G.711, G.722 and RTP protocols. The Graphical User Interface (GUI) shall configure and manage logic inputs, relay outputs, and Auxiliary audio input.
5. The unit shall incorporate a High-Resolution Back-Lit color LCD display with viewable dimensions of 8.66" (220.88mm) wide x 2.23" (56.72mm) high. It shall receive visual notifications by AtlasIED's GCK, Syn-Apps' SA-Announce, Singlewire's InformaCast software platforms. It shall display time when in standby mode from AtlasIED's GCK, Syn-Apps' SA-Announce, Singlewire's InformaCast software platforms or by NTP. The display shall produce 1900 cd/m^2 lux brightness and display text and/or time.
6. The unit shall incorporate a LED flasher with viewable dimensions of .5" (12mm) height x 3.5" (89mm) wide. The LEDs shall be able to produce RGB color spectrum with brightness of 310-lux (Red), 348-lux (Green), 352-lux (Blue). It shall have the capability of multi-speed flash rate and will be software controllable.
7. All control functionality shall be determined via software. It shall be compatible with AtlasIED's GCK, Syn-Apps' SA-Announce, Singlewire's InformaCast software platforms and SIP standalone operation. The Indoor IP Endpoint Visual System overall dimensions shall be 9.9" (251mm) x 19.94" (506.5mm) x 7" (177mm) HxWxD.
8. Manufacturer: AtlasIED IP-DD or equal.

C. Type DM – IP Single Sided LCD Display with Microphone:
1. The PoE+ Indoor IP Endpoint Visual System shall consist of a factory assembled wall mountable LCD display that can show time as well as scrolling text and IP addressable PCB amplifier/control with amplified output to drive small analog loudspeaker zones. The unit shall incorporate an integrated microphone to allow full duplex talkback communication functionality based upon chosen software platform.
2. The amplifier/control board shall receive announcements and messages using dynamically routed data on a standard Ethernet Network. It shall include a Single-Channel Class D Topology amplifier with Primary and Secondary Outputs capable of producing 25-watts RMS when using an IEEE 802.3at compatible PoE+ switch or 24VDC local power supply and 12-watts RMS when used with an IEEE 802.3af compliant PoE switch. Interconnect shall be via female RJ-45 connector mounted to the PCB.
3. The amplifier/control board shall include (2) logic inputs, (1) relay output, (1) Auxiliary Unbalanced line level audio input and (1) Unbalanced line level audio output. The Auxiliary Line Level input shall include an auto mute function that is activated when a broadcast is sensed from the control application.
4. The amplifier/control board shall include a Graphical User Interface (GUI) for SIP configuration. The SIP implementation shall support standards G.711, G.722 and RTP protocols. The Graphical User Interface (GUI) shall configure and manage logic inputs, relay outputs, and Auxiliary audio input.
5. The unit shall incorporate an integrated microphone to allow full duplex talkback communication functionality based upon chosen software platform.
6. The unit shall incorporate a High-Resolution Back-Lit color LCD display with viewable dimensions of 8.66" (220.88mm) wide x 2.23" (56.72mm) high. It shall receive visual notifications by AtlasIED's GCK, Syn-Apps' SA-Announce, Singlewire's InformaCast software platforms. It shall display time when in standby mode from AtlasIED's GCK, Syn-Apps' SA-Announce, Singlewire's InformaCast software platforms or by NTP. The display shall produce 1900 cd/m^2 lux brightness and display text and/or time.

7. All control functionality shall be determined via software. It shall be compatible with AtlasIED's GCK, Syn-Apps' SA-Announce, Singlewire's InformaCast software platforms and SIP standalone operation. The Indoor IP Endpoint Visual System overall dimensions shall be 14.38" (365mm) x 12.88" (327mm) x 2.77" (70.36mm) HxWxD. Finish shall be neutral white electrostatic powder coat.
8. Manufacturer: AtlasIED IP-DM or equal.
9. Optional Mounting Hardware Shall Include:
    a. Flush Mount Enclosure: AtlasIED IP-FEC-DM
    b. Surface Mount Enclosure: AtlasIED IP-SEC-DM

PART 3 – EXECUTION

3.01 GENERAL

A. EXAMINATION: Examine conditions, with the Installer present, for compliance with requirements and other conditions affecting the performance of the School Communications and School Safety Network. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General: Install system in accordance with NFPA 70 and other applicable codes. Install equipment in accordance with manufacturer's written instructions.

B. Furnish and install all material, devices, components and equipment for a complete operational system.

C. Impedance and Level Matching: Carefully match input and output impedance's and signal levels at signal interfaces. Provide matching networks where required.

D. Control Circuit Wiring: Install control circuits in accordance with NFPA 70 and as indicated. Provide number of conductors as recommended by system manufacturer to provide control functions indicated or specified.

E. All housings are to be located as indicated.

F. The contractor shall provide necessary transient protection on the AC power feed, all copper station lines leaving or entering the building, and all central office trunks. All protection shall be as recommended by the equipment supplier and referenced to earth ground.

G. Wiring within Enclosures: Provide adequate length of conductors. Bundle, lace, and train the conductors to terminal points with no excess. Provide and use lacing bars.

H. Provide physical isolation from speaker-microphone, telephone, line-level wiring, and power wiring. Run in separate raceways, or where exposed or in same enclosure, provide 12 inch minimum separation between conductors to speaker-microphones, telephone wiring and adjacent parallel power. Provide physical separation as recommended by equipment manufacturer for other system conductors.

I. Identification of Conductors and Cables: Use color coding of conductors and apply wire and cable marking tape to designate wires and cables so all media are identified in coordination with system wiring diagrams.

J. Weatherproofing: Provide weatherproof enclosures for items to be mounted outdoors or exposed to weather.

K. All IP Devices shall be labeled with the Cable ID label attached to the exterior of the device. Coordinate with Owner on label type and location.

3.03 GROUNDING

A. Provide equipment grounding connections for Integrated Electronic Communications Network systems as indicated. Tighten connections to comply with tightening torques specified in UL Standard 486A to assure permanent and effective grounds.

B. Ground equipment, conductor, and cable shields to eliminate shock hazard and to minimize to the greatest extent possible, ground loops, common mode returns, noise pickup, cross talk, and other impairments. Provide 5-ohm ground at main equipment location. Measure, record, and report ground resistance.

C. Provide all necessary transient protection on the AC power feed and on all copper station lines leaving or entering the building. Note in system drawings, the type and location of these protection devices as well as all wiring information.

3.04 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Provide services of a duly factory authorized service representative for this project location to supervise the field assembly and connection of components and the pre-testing, testing, and adjustment of the system.

B. Inspection: Make observations to verify that units and controls are properly labeled and interconnecting wires and terminals are identified. Provide a list of final tap settings of paging speaker line matching transformers.

C. Testing: Rectify deficiencies indicated by tests and completely re-test work affected by such deficiencies at Contractor's expense. Verify by the system test that the total system meets the Specifications and complies with applicable standards.

3.05 FINAL ACCEPTANCE TESTING

A. The Final Acceptance Testing shall be provided to the Owner or the Owners designated representative only. Final acceptance testing to any other trade or service provider for the project will not comply with the requirements of this section.

B. The contractor will provide a Final Acceptance Test record document signed by both the contractor and the Owner or designated Owner’s Representative establishing the “In Warranty” date. The warranty period will not commence until the Final Acceptance Test is completed.

C. Be prepared to verify the performance of any portion of the installation by demonstration, listening and viewing test, and instrumented measurements. Make additional adjustments within the scope of work and which are deemed necessary by the Owner because of the acceptance test.

3.06 COMMISSIONING

A. The contractor shall train the Owner's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventative maintenance of the system. This training will be in accordance with the training as outlined in Section 1.5 of these specifications. In addition to the Training Materials provided, the contractor will also furnish Operators Manuals and Users Guides at the time of this training.

B. Schedule training with Owner through the owner’s representative, with at least seven days advance notice.

3.07 OCCUPANCY ADJUSTMENTS

A. The contractor shall provide Occupancy Adjustments. A response scenario amenable to both the owner and the contractor will be established and followed for the first year of service.

3.08 CLEANING AND PROTECTION

A. Prior to final acceptance, the contractor shall vacuum and clean all system components and protect them from damage and deterioration. All blank spaces in equipment cabinets will be covered with blank panels. Top and side panels, and all cabinet doors will be installed. All general areas within and around all equipment rack/cabinets in the facility will be swept, vacuumed, and cleaned up. No cabinets will be left unlocked and all cabinet keys will be turned over to the owner or designated owner’s representative.

END OF SECTION

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SECTION 27 5120
GYM SOUND SYSTEM

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes
   1. Complete operating system (racks, equipment, loudspeakers, mounting hardware, wiring, connectors, terminations, raceways and required accessories) for the pickup, amplification, distribution, recording and reproduction of voice and/or other audio program material. Equipment and installation material required to fulfill the above shall be furnished and installed whether or not called for in this specification or shown on the drawings.
   2. All necessary interconnecting cable and connections.
   3. System programming, equalization and training.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.03 SUBMITTALS

A. Shop Drawings: Submit complete drawings showing entire system, components, point-to-point wiring and field connections.

B. Product Data: Submit manufacture's data for each item and list of where each item is located. Submit in brochure form.

1.04 QUALITY ASSURANCE SUBMITTALS

A. To ensure a quality project and proper warranty coverage for the system specified, the Contractor must submit the following:
   1. Provide evidence that the Contractor who will furnish and install the equipment has been in the business of installing commercial sound systems for at least five (5) years.
   2. Provide references of at least three (3) installations of comparable scope performed by the Contractor, including location, system description and names, addresses and telephone numbers of the Architects, Consultants and Owners, with contact names for each.
   3. Provide written proof that Contractor’s personnel are properly trained and certified to install rigging.
   4. Provide written proof that Contractor’s personnel are properly trained and certified to test and program digital signal processors (DSP’s).
   5. Provide evidence of the ability and intent to meet the guarantee and service requirements included in this specification.
   6. Provide documentation that Contractor who will furnish and install system maintains service facilities and will have service personnel available on-site within 24 hours.
   7. Contractor who will furnish and install system must be a factory authorized dealer for all products submitted and must submit such proof in writing or in the form of authorized agreements with the various manufacturers.
   8. If Contractor cannot supply the aforementioned certifications and references, the Contractor shall be deemed unqualified to furnish and/or install the sound system.

1.05 MAINTENANCE

A. Service: Completely service entire system for (1) year after final acceptance and offer yearly service contract.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Specification information and quantities listed for each product are provided for convenience and indicate partial requirements for the sound system and associated equipment. Substitute products and products deemed to be equal must meet or exceed the specified manufacturers published specification for the products listed herein. The Contractor is responsible for obtaining the published specifications of the specified products to assure substitute or equal products meet all of the requirements of this specification.

B. Provide certification and labels where applicable. All electronic equipment must bear the UL label.

C. Furnish and install equipment that is standard, new and of the latest model. Contractor may not modify any equipment unless approved by the Manufacturer.

2.02 GYMNASIUM SOUND SYSTEM

A. System Description:
   1. Sound system will consist of a distributed system, utilizing loudspeakers mounted in roof structure as shown on the drawings. Automatic mixers will operate the sound system.
   2. Announcers will be provided with wireless, handheld microphones.

B. Components:
   1. Rack: Provide wall mounted rach with 16 U spaces.
   2. Amplifiers: Yamaha PX5 Power Amplifier. Quantity (1)
   3. Mixer: Rolls RM67 Mixer. Quantity (1).
   4. Media Player: Tascam Media Player with Bluetooth receiver. Part No. CD-400U. Quantity (1).
   5. Loudspeaker: Electro-Voice Sx300PI 2-Way Loudspeakers with Mounting Brackets. Quantity (4)
   6. SS Wire Rope: Octasound, Two 3/16-inch Stainless Steel Wire Ropes with 4 shackles, 10ft length. Part No. SPH2L-SS-10, Quantity (4)
   7. Wireless Mic System: Sennheiser EW 135 G3 Handheld Wireless Microphone System Quantity (1).
   8. Handheld Microphone: Shure SM48S Vocal Microphone Quantity (1).
   9. Voice Activated Relay: Bogen Voice Activated Relay. Part No. VAR1, Quantity (1)
   10. Speaker Cabling: West Penn 12/2 Stranded, Plenum rated. Part No. 227, Quantity – as required.
   11. Rack Screws: As Required.

C. Equipment Locations:
   1. Equipment to be located in the fixed equipment rack.
   2. Coordinate exact location of fixed equipment rack with Owner.
   3. Furnish and install necessary cabling between fixed equipment rack and speakers and microphones, including wall plates, connectors and patch cables.

2.03 ELECTRO-VOICE SX300PI 2-WAY LOUDSPEAKERS WITH MOUNTING BRACKETS

A. Ring-Mode Decoupling (RMDTM) for increased intelligibility

B. Durable structural-foam enclosure with integral handles and stand mount

C. DL12Sx 12-inch woofer and DH2010A compression driver for great sound and reliable performance

D. Molded-in constant-directivity 65° x 65° high-frequency horn

E. Stand mountable and arrayable

F. Molded-in attachment points for secure suspension with optional brackets

G. Dual Neutrik Speakon® high-current connectors (Sx300E) or 1/4-in. phone jacks (Sx300P)

2.04 ROLLS RM67 MIXER

A. Three XLR mic inputs with switchable phantom power and input padding
B. Clip LEDs for each Mic input
C. Mute jack, contact closure to ground main output mute
D. Master Level control
E. Remote Volume jack (connects to an optional 100K ohm potentiometer)
F. Stereo Record Out
G. Priority ducking/talk-over for microphone paging, and jukebox
H. Mic Insert jack for adding signal processing to the Mic Inputs
I. Four stereo RCA line/consumer level inputs
J. Master Bass and Treble controls (sources only)
K. SPX effect processors provide you with a comprehensive suite of 24 effects

2.05 YAMAHA PX5 STEREO POWER AMPLIFIER

A. Amplifier Power 2 x 300W (THD+N < 0.04%, 1kHz, 4 - 8Ω, 70/100V)
B. 2x 500W at 8Ω
C. 2x 800W at 4Ω
D. Newly developed Class-D amplifier engine with a custom LSI
E. Flexible onboard PEQ, crossover, filters, delay, and limiter functions
F. Yamaha Speaker presets
G. Utlities for safe and secure operation

2.06 SENNHEISER EW 135 G3 HANDHELD WIRELESS MICROPHONE SYSTEM

A. Sturdy metal housing (transmitter and receiver
B. 42 MHz bandwidth: 1680 tunable UHF frequencies for interference-free reception
C. Enhanced frequency bank system with up to 12 compatible frequencies
D. High-quality true diversity reception
E. Pilot tone squelch for eliminating RF interference when transmitter is turned off
F. Automatic frequency scan feature searches for available frequencies
G. Enhanced AF frequency range
H. Increased range for audio sensitivity
I. Wireless synchronization of transmitters via infrared interface
J. User-friendly menu operation with more control options
K. Illuminated graphic display (transmitter and receiver)
L. Auto-Lock function avoids accidental changing of settings
M. HDX compander for crystal-clear sound
N. Transmitter feature battery indicatation in 4 steps, also shown on receiver display
O. Handheld transmitter with easy-exchangeable microphone modules from evolution series
P. Integrated Equalizer and Soundcheck mode
Q. Contacts for recharging BA 2015 accupack directly in the transmitter
R. Wide range of accessories adapts the system to any requirement

2.07 SHURE SM48S VOCAL MICROPHONE

A. Cardioid pickup pattern rejects off-axis sound and provides superior gain before feedback

B. Frequency response tailored for vocals, with brightened mid-range and bass rolloff to control proximity effect

C. Shock-mounted cartridge for exceptional ruggedness and reduced handling noise

D. Built-in "pop" filter that reduces explosive breath sounds and wind noise

E. Supplied stand adapter and carrying/storage bag

F. Lockable On/Off switch (Model SM48S only)

G. Legendary Shure quality and ruggedness

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Examine conditions under which sound system is to be installed in coordination with Installer of materials and components specified in this Section and notify affected Prime Contractors and Architect in writing of any conditions detrimental to proper and timely installation. Do not proceed with installation until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

B. When Installer confirms conditions as acceptable to ensure proper and timely installation and to ensure requirements for applicable warranty or guarantee can be satisfied, submit to Architect written confirmation from applicable Installer. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to Installer.

3.02 INSTALLATION

A. Wireless Systems Frequency and Antenna:
   1. Utilize antenna distribution systems and remote antennas and locate per the manufacturer’s recommendations and to achieve maximum performance.
   2. Select frequencies for the site based on standard FCC criteria. Verify HDTV stations and new channel assignments for the area before ordering equipment. Verify wireless frequencies of any organizations within 1,000 feet of the site that use wireless equipment. Contractor is responsible for correcting frequency problems if encountered.
   3. Contractor responsible to secure any licensing required for wireless equipment.

B. General Grounding:
   1. Take all necessary precautions to guard against electromagnetic and electrostatic hum and RF noise.
   2. All equipment provided shall have chassis ground lifts or shall be mounted with ground lift isolation washers.
   3. Grounding of shields and chassis shall adhere to accepted industry standards.
   4. All equipment grounding (electronics and racks) shall terminate to a single point within the rack. Ground this point to an appropriate main service ground. If ground noise problems exist, provide an isolation transformer.

C. Wiring:
   1. Use barrier strips or Phoenix connectors where available, followed by XLR type connectors. When no other means is available, balanced 1/4 in. is to be used.
   2. All wiring (with the exception of AC power) entering or leaving the rack shall be connected via terminal strips or a direct connection to the equipment terminals or connectors. No in-line connectors are acceptable. Use appropriate connectors and crimps; no wire nuts may be used in any sound system wiring (with the exception of AC power.) Properly support all connections.
   3. No equipment or terminal strips will be mounted to the sides, doors, top or bottom of the racks and tie down bars shall be provided for neat wiring, adhering to industry standard practices.

4. Separate wiring paths shall be maintained for microphone level, line level, AC power and speaker level signals. Additionally, all wiring shall be neatly tie-wrapped and bundled with wires run parallel and perpendicular to equipment rack sides and back. Provide pull strings in all conduits after all wires have been pulled. All wiring outside of equipment racks shall be installed in metallic conduit and raceway. Wherever possible, conceal conduit within walls and ceilings and underground.
5. All switches, cables, wire and outlets shall be permanently marked during installation. Cables shall be marked at both ends. Dymo labels, tape or other materials subject to degradation shall not be used.
6. Wire size and types as recommended by manufacturer except power supply wiring to be minimum 12 AWG.
7. Install cut out relay to interrupt local gym sound system when building Public Address system pages into the Gymnasium.

D. Rigging:
1. All equipment not described as portable shall be supported by three points, plus a backup. Each point must be rated to carry the entire load with a safety margin of at least (10) times the rated load. All methods must incorporate an independent safety backup with a safety margin of at least (10) times the rated maximum load as installed in case of failure of any rigging component.
2. Loudspeakers may not be field modified by the contractor for installation by suspension. Speaker hanging and mounting hardware must be supplied by an approved rigging hardware manufacturer and/or the loudspeaker manufacturer.
3. All rigging and related fastening methods must be treated as permanent. All threads must be treated with vibration compounds per manufacturer's recommendations. Provide Unistrut as required and attach to existing building roof structure. Submit structural attachment details as part of submittals.
4. All rigging hardware must be load rated, with the load rating or approval stamped on each piece of hardware.
5. Chain of any type, plastic or fabric will not be acceptable for the hanging or backup support of any equipment.
6. Stainless steel rope shall not be secured with threaded compression type fittings alone. Compression type closures such as Nicopress shall be utilized. Each closure must have a backup closure. All wire rope shall have strain relief thimbles installed. Neatly tape down all loose ends after Nicopress is installed and crimped.
7. Contractor shall have personnel properly trained to install rigging. Documentation must be supplied to verify proper training.

E. Digital Signal Processor (DSP) setup:
1. Provide loudspeaker equalization for high intelligibility and good music reproduction, including output limiters to prevent system overload as required by the gain structure of the system. Provide compression and auto leveling for ADA systems. Provide gates for all inputs to eliminate background hiss when no signal is present.
2. Provide three (3) system presets: all loudspeakers on, Home bleachers only and presets as directed by Owner.
3. Coordinate location of DSP remote preset panel with Owner.

F. Reuse existing 120V, 20A branch circuit for the fixed equipment rack.

G. Furnish and install all necessary boxes, hardware, support equipment, etc., for a complete and workable system.

H. Install and aim loudspeakers to ensure maximum coverage and per manufacturers recommendations.

I. Complete and mail all warranty information for owner.

J. Mount a copy of the finished one-line riser diagram in a clear plastic enclosure to the door of the equipment rack.

3.03 TESTING

A. Verify that the system is free from RF pickup, hum and spurious oscillation with no input, at normal operating levels and at full amplifier output.

B. Check each loudspeaker with a phase measuring device for proper polarity.

C. Adjust gain controls for optimum signal to noise of the system relative to performance requirements of this specification and accepted industry standards. Adjust all inputs, equalizers, limiters, etc. to provide equal relative loudness of music and voice sources with typical input levels.

D. Equalize system for feedback control per accepted industry standards.

E. Verify all system inputs, outputs, equipment and functions.

F. Verify that all loudspeaker line impedance values are within +/- 10% of the value calculated for that line. Correct any discrepancies.

G. Eliminate noise produced by the operation of any equipment controls.

3.04 TRAINING

A. Provide Owner's designated staff with (4) hours, exclusive of travel time, instruction in the proper use and preventive maintenance of the system. Training shall be conducted in (2) hour blocks with scheduling determined by the Owner. Training shall be by manufacturer's authorized service representatives. Training shall include all operating modes and functions.

B. Provide up to (4) hours support to tune the sound systems, after training is complete.

C. Provide a shortcut manual (graphic documentation) indicating the position of all system settings to achieve owner-designated configurations (i.e. speech reinforcement during events, program material, etc.).

3.05 CLOSEOUT DOCUMENTATION

A. Provide (2) copies of all of the following:
   1. System manual (bound) containing the following items:
      a. Table of contents
      b. Specification sheets and technical manuals for all equipment
      c. Maintenance procedures for all installed equipment
      d. Color-coded wiring diagrams, indicating all wiring types, connections and paths;
      e. 30 in. by 42 in. as-built drawings indicating location of all equipment and wiring, color-coded to match installation
      f. Shortcut tuning documentation as described under Training.
      g. List of serial numbers of all equipment installed.
      h. Copies of warranty cards for all equipment.
      i. List of frequencies used for wireless equipment and copies of licenses.
      j. Lists of consumable
   2. Copy of the software presets and any operating software.

3.06 FIELD QUALITY CONTROL

A. Submit written test report from authorized representative of equipment manufacturer that system has been tested and is in working order prior to final inspection by Architect/Engineer.

END OF SECTION

SECTION 28 4600.02
FIRE DETECTION, ALARM, AND COMMUNICATION SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Furnish and install new, non-proprietary open source digital-protocol analog addressable fire alarm system with emergency communications, and all associated components for complete and fully functioning system.
   2. Remove existing fire alarm system, circuitry, and associated components in it's entirety.
   3. Coordinate installation where existing system is functional until the new system has been installed.

1.02 REFERENCES

A. The fire alarm equipment and installation shall comply with the current provisions of the following standards and shall be listed for its intended purpose and be compatibility listed to ensure integrity of the complete system:
   1. New York State Uniform Fire Prevention & Building Code
   2. National Fire Protection Association Standards:
      a. NFPA 70 - National Electrical Code
      b. NFPA 72 - National Fire Alarm Code
      c. NFPA 90A - Installation of Air Conditioning and Ventilating Systems
      d. NFPA 101 – Life Safety Code
      e. NFPA 720 - Standard for the Installation of CO Detection
      f. U.S. Department of Justice - American Disabilities Act
   3. Provide system and components listed by Underwriters Laboratories Inc. (UL) for use in fire protective signaling system under following standards as applicable:
      a. UL 864 - UOJZ, APOU Control Units for Fire Protective Signaling Systems.
      b. UL 268 - Smoke Detectors for Fire Protective Signaling Systems.
      c. UL 268A - Smoke Detectors for Duct Applications.
      d. UL 521 - Heat Detectors for Fire Protective Signaling Systems.
      e. UL 228 - Door Holders for Fire Protective Signaling Systems.
      f. UL 464 - Audible Signaling Appliances.
      g. UL 1971 - Visual Signaling Appliances.
      h. UL1711 - Amplifiers for Fire Protection Signaling Systems
      i. UL 38 - Manually Activated Signaling Boxes.
      j. UL 346 - Waterflow Indicators for Fire Protective Signaling Systems.
      k. UL 1481 - Power Supplies for Fire Protective Signaling Systems.

1.03 SYSTEM DESCRIPTION

A. Design Requirements
   1. Provide complete non-proprietary open source, analog addressable, digital multi-processor based fire alarm control system, including (but not limited to) all control equipment, power supplies (primary and secondary), initiating devices, synchronized audible and visual notification appliances, emergency communications, amplifiers, speakers, conduit, wiring, fittings and all other accessories necessary to provide complete and operable system.
      a. Provide all components necessary to connect and operate all building fire protection system interfaces including (but not limited to):
         1) Automatic sprinkler water flow alarms.
         2) Automatic sprinkler tamper alarms.
         3) Carbon monoxide alarms.
         4) Elevator recall and shutdown.

5) Fan shutdown operations.
6) Building energy management systems for programmed fan re-start.
7) Automatic door release.
8) Automatic fire extinguishing systems.
9) Fire pump operations.
10) Smoke/fire hatch release.
11) Smoke/fire shutter release.
12) Area of Rescue Assistance system(s)
13) Theatrical lighting system to full-on status (if system is in operation).
14) Notification of alarm to central station monitoring agency.

b. Sequence of Operation – Fire Alarm:
   1) Operation of fire alarm manual station or automatic activation of any fire alarm initiation device activates following system responses:
      (a) All audible indicating appliances sound in temporal time pattern and all visual indicating appliances to flash.
      (b) Automatic shutdown of all air moving equipment throughout building.
      (c) Automatic release of all magnetically held open doors.
      (d) Indication of alarm location on main fire alarm panel LCD display, and remote LCD display(s). (NOTE: EC shall coordinate system addresses with Owner prior to final programming to assure correct room numbering. Room numbering shall match door numbers upon completion of project.)
      (e) Notification of alarm to central station monitoring agency.
      (f) Activation of all fire protection system interfaces specified in this Section or indicated on Drawings.

c. Sequence of Operation - Carbon Monoxide:
   1) Automatic activation of any carbon monoxide initiation device activates following system responses:
      (a) Alarm notification via activated detector(s)/sounder base and adjacent space sounder base. Carbon monoxide alarm shall utilize a separate and distinct audio cadence pattern than fire alarm pattern. Alarm shall operate continuously until acknowledged.
      (b) Identify alarm condition at the FACP and remote annunciators.
      (c) Transmit a trouble alarm signal to the remote alarm receiving station.
      (d) Record events in the system memory.
      (e) Record events by the system printer.

1.04 PERFORMANCE REQUIREMENTS

A. Fire Alarm System: Provide individual multiplex data address indicating building zone and room number for each manual pull station, smoke detector, heat detector, duct smoke detector, addressable monitor module and addressable control module with fire alarm control panel capable of supporting up to system total of 159 detector addresses and 159 analog addressable modules. The system shall be expandable to 1,110 analog addressable points per control panel.

B. Fire Alarm Control System: Provides Class A, Style E (NFPA-72) analog addressable data communications circuits to provide connection of, and communication with, addressable devices.
   1. Each addressable data communications circuit provides capability of communicating with up to 159 addressable devices.
   2. Each circuit; connect up to maximum 70 percent capacity to permit future additional addressable devices and capable of communicating with addressable device up to 2,500 ft. distant.
   3. Circuits support 100 percent of addressable devices in alarm or operated at same time during both primary and secondary power supply conditions.

C. Addressable Monitor Modules - Provides individually-addressed alarm-initiating, supervisory or status monitoring circuits complying with requirements for minimum of 1 Class A, Style E (NFPA-72) supervised circuit for following non-addressable devices (NOTE: EC shall coordinate system addresses with Owner prior to final programming to assure correct room numbering.)
   1. Kitchen Hood Extinguishing Systems: 1 alarm initiating circuit for each hood extinguishing system.
   2. Sprinkler Water Flow Alarm Switches: 1 alarm initiating circuit for each sprinkler water flow alarm switch.
   3. Sprinkler Valve Tamper Switches: 1 supervisory initiating circuit for each sprinkler valve tamper switch.
   4. Boiler Room: 1 alarm initiating circuit for all 200 deg. F fixed temperature non-addressable heat detectors located in Boiler Room.
   5. Kitchen: 1 alarm initiating circuit for all 200 deg. F fixed temperature non-addressable heat detectors located in Kitchen.
   6. Carbon Monoxide: 1 alarm initiating circuit for all carbon monoxide detectors.

D. Addressable Control Modules: Provided with relays with at least 1 SPDT control contact to provide fire alarm system control of following remote equipment (NOTE: EC shall coordinate system addresses with Owner prior to final programming to assure correct room numbering):
   1. Air Moving Equipment: Provide 1 shutdown contact for each air-moving unit.
   2. Elevator Control Panels: Provide 2 elevator recall contacts for each elevator control panel.
   3. Kitchen Gas Valve: Provide 1 shutoff contact for each kitchen gas valve.
   4. Science Room Gas Valve: Provide 1 shutoff contact for each Science Room gas valve.

E. Fire Alarm Control System:
   1. Provide each of following types of alarm sounding, indicating or communicating devices with Class B, Style Y (NFPA-72) supervised, alarm indicating appliance and/or communicating circuits:
      a. Horn Indicating Appliance: Provide minimum 1 circuit for each floor, with no more than 20 horns connected to each circuit.
      b. Alarm Strobe Indicating Appliance: Provide minimum of 1 strobe light circuit for each floor, with no more than 20 strobe lights to each circuit.
   2. Provides relays for connection to and control of associated equipment, as follows:
      a. Central Station Agency Connections: Provide 3 SPDT contacts (system alarm condition, system supervisory off-normal condition, and system trouble condition) for connection to central station agency transmitter.
      b. Magnetic Door Holders: Provide minimum 1 circuit for each floor, control contact for magnetic door holders.

F. Emergency Communications System:
   1. The audio amplifiers shall be capable of expansion to a minimum of 384 total amps via bus connected expander modules that supervise low battery, loss off AC and loss of communication.
   2. The system must contain at least one amplifier and shall be expandable from 50 to 500 watts utilizing up to 3 additional amplifiers. The amplifiers shall be able to support a 4-zone splitter to distribute the audio information to different locations in the facility or facilities. The system shall have the capability of controlling up to 32 notification zones. The amplifiers must contain the capability of being remotely located through a four-wire communications circuit and a two-wire voice circuit. The system shall have the capability of adding up to 4 local operating emergency communication control consoles.
   3. The emergency communication system must have the capability of downloading fifteen (15) 60 second messages and utilize DSP technology for higher audio intelligibility.

4. The emergency communication system shall be capable of operating at 25vrms or 70.7vrms and must be field selectable at the amplifier level. Systems that require additional modules for voltage conversion shall not be accepted.

1.05 SUBMITTALS

A. Comply with requirements of SECTION 01 3300 – Submittal Procedures (and as modified below);
   1. Submit all submittal documentation specified in this Section no later than 30 calendar days after Award of Contract.
   2. Obtain Architect's acceptance of submittals in accordance with General and Supplementary Conditions and SECTION 01 3300 before ordering any components or equipment in proposed fire alarm system.

B. Product Data: Submit manufacturer's documentation for all components of proposed fire alarm system required to demonstrate compliance with specified requirements, including (but not limited to) type, size rating, style, catalog number, manufacturer name, photograph, and catalog data sheet for each component.

C. Shop Drawings: Submit following diagrams in both hard copy as well as computer disk format with supporting software to display diagrams on standard PC compatible computer.
   1. Submit complete one-line riser diagrams showing all equipment locations and sizes, and point-by-point wiring diagram with type and number of all conductors. Indicate device identification on one-line diagram.
   2. Submit detailed drawing of Fire Control Panel(s) including all module/component locations and panel point-to-point wiring diagrams including all field circuit termination points. (NOTE: Installer shall coordinate system addresses with Owner prior to final programming to assure correct building zone and room numbering.)
   3. Submit floor plan layout of Graphic Display Panel indicating building zones, room numbers, and "You Are Here" location.

D. Quality Control Submittals
   1. Design Data
      a. Submit calculations indicating size of standby batteries submitted for each panel and or power supply to provide minimum of 24 hours of standby power with additional 15 minutes of alarm at the end of the 24 hour period.
      b. Submit calculations for signal circuit and power supply loading indicating amount of devices per circuit, alarm current per circuit, and alarm current per power supply output.
      c. Submit complete list of all system points to be monitored and controlled as related to individual fire alarm control panel's initiating, signaling and control circuits.
   2. Contract Closeout Submittals: Comply with requirements of SECTION 017800, including submission of operating and maintenance instructions as item in "Operating and Maintenance Data" manual described in that section.
      a. Deliver 2 copies of following documentation to Architect within 15 days after date of system acceptance:
         1) Installation and programming manuals covering installed systems.
         2) Point-to-point diagrams of entire systems as installed including number of all conductors with indications of all terminations and splices. Diagram shall include system address and locations of all devices. (NOTE: Installer shall coordinate system addresses with Owner prior to final programming to assure correct building zone and room numbering.)
         3) Complete control panel generated and printed system sensitivity report showing all sensors with their address, associated sensitivity levels, current obscuration values, number of times device alarm verification has occurred, and current at time of acceptance.

4) Full acceptance test report of inspection as provided to Architect and Fire Subcode Official as specified in “Acceptance Testing” in Field Quality Control in Part 3 below.

1.06 SEQUENCING AND SCHEDULING

A. Do not interrupt existing fire alarm system while building is occupied. Coordinate and schedule all system interruptions with Owner’s authorized representatives.

1.07 WARRANTY

A. The Contractor shall warrant the completed fire alarm system wiring and equipment to be free from inherent mechanical and electrical defects for a period of two year from date of final acceptance by Owner or Architect. If any defects in materials or workmanship or operational failure under normal usage are experienced within warranty period, promptly correct at no expense to Owner.

1.08 MAINTENANCE

A. Maintenance Service: Provide complete maintenance service for entire system for 1 year after final acceptance of system.

B. The contractor shall make available to the Owner a maintenance contract proposal to provide a minimum of two inspections and tests per year in compliance with NFPA-72 guidelines.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. For convenience, details and specifications have been based on products by Notifier.

B. Other manufacturers offering similar acceptable products include:
   1. Fire-Lite Alarms
   2. Potter
   3. Gamewell-FCI

2.02 COMPONENTS

A. Main Control Panel
   1. System Cabinet Enclosure: “Dead-front”, 16-gauge cold rolled steel, surface or semi-flush construction (as shown on Drawings) with red finish and consisting of back box, back plate, and door. Cabinet shall house the system’s microprocessor and related system circuitry. Cabinet door shall be equipped with door lock system consisting of 2 locks accepting 2 different keys with 1 key allowing dead front access to module displays for all operator functions and other allowing access to all control panel electronics without further dismantling of cabinet, control unit, or wiring.
   2. Power Supply Unit: 120 VAC main power transformer-converted to low voltage, rectified and filtered 24 VDC nominal for system operation and eliminating possibility of line voltage being present on any internal panel components. System contains integral, filtered, nominal 24 VDC at 6 Amps power supply, complying with U.L. Standard 864 for power-limited operation.
   3. Battery Charger: Power supply contains battery charger with maximum average charging current of 1.0 Amp (sufficient to maintain system batteries at full charge) and capable of charging up to 34-ampere/hour capacity, either lead-acid or vented nickel-cadmium (Ni-Cad) batteries.
      a. If system loses AC power, “System Trouble” alert occurs.
      b. Charger output supervised and fused.
   4. Batteries: Sufficient capacity to provide power for entire system upon loss of normal 120 VAC power for at least 24 hours, with 15 minutes of alarm signaling at end of 24 hour period as required by NFPA 72.
   5. Microprocessor:

a. Executes all supervisory programming to detect and report failure or disconnection of any module or peripheral device with isolated "watchdog" circuit monitoring microprocessor and activating system trouble circuits upon failure.
b. Non-proprietary system program, stored in non-volatile EEPROM memory, for all control-by-event functions Ensures system program will not be lost upon failure of both primary and secondary power.
c. Common RS-485 communication bus network ties microprocessor on-line with all other microprocessors within multiprocessor network, affording rapid response to all alarm or trouble conditions within system. The main communication bus shall be capable of class A or class B configuration with a total length of 6,000 feet
d. Trouble dry contacts (form A or form B; jumper selectable) rated at 2 Amps at 24 VDC (resistive) provided and capable of transferring whenever system trouble occurs.
e. Alarm dry contacts (form C) rated at 2 Amps at 24 VDC (resistive) provided and capable of transferring whenever system alarm occurs.
f. Detector Sensitivity Adjustment: Manipulation of controls at the FACP causes the selection of specific addressable smoke detectors for adjustment, displays of their current status and sensitivity settings, and controls changes in those settings. Provide ability of using the same controls to program repetitive scheduled changes in sensitivity of specific detectors.
g. The processor shall have drift compensation sensitivity capabilities on detectors. The communication protocol on the SLC loop must be digital.
h. The FACP must automatically test the smoke detectors in compliance with NFPA standards to ensure that they are within listed sensitivity parameters and be listed with Underwriters Laboratories for this purpose.
i. The FACP must compensate for the accumulation of contaminants that affect detector sensitivity. The FACP must have day/night sensitivity adjustments, maintenance alert feature (differentiated from trouble condition), detector sensitivity selection, auto-programming mode (Jumpstart) and the ability to upgrade the core programming software on site or over the telephone.
j. The FACP must have the ability to upgrade the software revisions from a laptop where the FACP is installed.

6. Keyboard Display Unit - Individual status LEDs provided for following functions:
   a. ALARM (red)
   b. Supervisory (yellow)
   c. System Trouble (yellow)
   d. Trouble Notification 1 (yellow)
   e. Trouble Notification 2 (yellow)
   f. Ground Fault (yellow)
   g. Trouble Municipal (yellow)
   h. Signal Silence (yellow)
   i. Program 1 (yellow) - to be programmed as needed for project application
   j. Program 2 (yellow) - to be programmed as needed for project application
   k. Degrade (yellow)
   l. Integral160 character LCD display
7. Digital Communicator (DACT):
   a. Digital communication device to send alarm signals to [local fire department], [central station monitoring service] [Owner designated alarm responding agency] and having supervision capability to switch over to alternate telephone line if voltage is not present on main line.
      1) Connect to two POTS telephone lines.
      2) Coordinate exact requirements with Owner and telephone utility company.

b. The DACT shall be an UL approved IP and digital communicator with the option of adding a cellular module for cellular communications.
c. The DACT must allow local and remote up/downloading of system operating options, event history, and detector sensitivity data.

8. Real-Time Clock: FACP to include a real-time clock capable of monitoring all real-time programming and all-time control functions.

B. System Circuitry:
1. The Signaling Line Circuit (SLC) and Data Communication Bus (SBUS) shall be wired with standard NEC 760 compliant wiring. No twisted, shielded or mid capacitance wiring is required for standard installations. All FACP screw terminals shall be able to accept 14-18 AWG wire. All system wiring shall be in accordance with the requirements of NFPA 70, the National Electrical Code (NEC), and also comply with article 760 of the NEC.
a. Each SLC shall be capable of a wiring distance of 5,000 feet from the SLC driver module (6815) and be able to support127 addressable module devices. The communication protocol to SLC devices must be digital. Any SLC loop device, which goes into alarm, must interrupt the polling cycle for priority response from the FACP. The FACP must respond consistently to a device that goes into alarm on an SLC in under 10 seconds. The auxiliary 6815 SLC loop module must be capable of being located up to 6000 feet from the FACP on an RS-485 bus, which is separate from the SLC bus. The SLC shall be capable of functioning in a class A or class B configuration.

2. SLC loop Devices: Devices supported must include photoelectric smoke detectors, heat detectors, combination fire and CO detectors, contact monitoring modules and relay output modules. There is to be no limit to the number of any particular device type, up to the maximum of 159 detectors and 159 modules that can be connected to the SLC.
3. The FACP shall support six programmable circuits that are capable of being programmed as supervised reverse polarity notification circuits or supervised auxiliary power circuits that can be programmed as continuous, resettable or door holder power. The circuits shall also be programmable as input circuits in Class A or B configurations to support dry contact or compatible two wire smoke detectors

C. Detectors
1. Combination Fixed Temperature/Rate-of-Rise Heat Detectors: Addressable combination fixed temperature/rate-of-rise heat detector including thermistor heat sensor and operating at fixed temperature and predetermined temperature rise.
a. Continually monitors temperature of air in surroundings to minimize thermal lag to time required to process alarm.
b. Integral microprocessor determines if alarm condition exists and initiates alarm based on analysis of data.
c. Addressable heat detector has nominal fixed temperature rating of 135 deg. F (57 deg. C) and rate of rise rating of 15 deg. F (9 deg. C)/minute.

2. Fixed Temperature Heat Detectors: Non-addressable 200 degree fixed temperature heat detector provided in all areas where rapid rise in temperature may be expected as normal operating conditions.
a. Detectors operate when temperature of center disk rises to rated temperature and element activates.
b. Detector is non-restorable and when activated, must be replaced.
c. Where non-addressable detector is used, provide addressable monitor module as specified.

3. Smoke Detectors: Addressable photoelectric type with sensor having software defined sensitivity of 0.5 percent/ft to 3.0 percent/ft. and signal-to-noise ratio of 2.0 nominal.
a. Visual indication of alarm provided by latching LED on detector that periodically pulses to indicate power is being supplied to detector.
b. LED feature user-defined.

c. Visible alarm signal capable of being remotely annunciated.

4. Duct Smoke Detectors: Equipped with addressable solid state ionization smoke detector heads capable of detecting visible and invisible products of combustion, capable of operating with variations in duct air velocity between 400 and 4000 fpm, and listed by Underwriters Laboratories, Inc. under current standards for duct smoke detectors to allow remote functional testing without generating smoke.
   a. Enclosed in housing suitable for mounting to air duct, with sampling tube extending into air stream.
   b. Each unit provided with remote mounted key operated Alarm Indicator/Test Switch.
5. Beam Smoke Detectors: Each receiver and transmitter addressable, acting as its own system, and reporting alarm and trouble conditions to fire alarm control panel.
   a. Operates between 18 to 32 VDC and contains electronics for automatic synchronization.
   b. Operates in either short range of 30 to 100 ft. or long range of 100 to 300 ft.
   c. Features automatic gain control to compensate for gradual signal deterioration from dirt accumulation on lenses.
   d. Each unit provided with remote mounted key operated Alarm Indicator/Test Switch.
6. Carbon Monoxide Detection:
   a. Provide non-addressable CO detection device and equip with an addressable monitor module that shall supervise the onboard contact closure.
   b. CO detector shall be UL 2075 listed.
   c. Suitable for wall and/or ceiling mounting.
   d. Shall be equipped with End of Life Alerting.
   e. FACP Programming:
      1) Program FACP to annunciate a supervisory condition when CO has been detected.
      2) Equipment shall also be self-sounding and shall utilize the Temporal 4 signal style.

D. Manual Pull Station: Addressable, non-coded double action type, requiring outer door to be lifted to expose actuator door. Upon pulling forward actuator door, unit locks into readily observable "alarm" position.
   1. Manual station constructed of aluminum.
   2. Each manual station requires key to reset actuated station; key same as key opening Fire Alarm Control Panel.

E. Visual Alarm Signaling Appliances: Provide synchronized strobe light units in wall mount configuration, UL listed for fire protection service and producing field selectable 30, 75, 100 candela (CD) in accordance with ADA and 15 candela in accordance with UL 1971 and providing minimum flash rate of 0.33 HZ and 3 HZ maximum.
   1. Provides 0.2 seconds pulse duration with maximum duty cycle of 40 percent and time interval between initial and final points of 10 percent of maximum signal.
   2. All strobes shall be synchronized and conform to applicable provisions of Americans with Disabilities Act (ADA), UL standard 1971, NFPA 72, and ANSI A117.1 for light intensity and distribution and integrated with fire alarm system.
   3. Provide layout, design and candela ratings for common areas complying with provisions of NFPA-72 -2002.

F. Audible Horn - Alarm Signaling Devices
   1. Audible Horn Multi-Tone Electronic Signals: Offer choice of 8 nationally and internationally recognized alerting sounds with each synchronized audible horn appliance having 2 user-selective sound output levels: Standard DBA and High DBA.
      a. Separate input terminals available and shunt wires provided to enable both tone and strobe to operate simultaneously from single output.

b. Audible signals UL listed for indoor use, ceiling and wall mount, under UL Test Standard 464 for Audible Signal Appliances.

G. Speaker-Visual Strobe Signaling Appliance
   1. The speaker strobe shall be equal to: System Sensor L-Series Model SPSCRL. The appliance shall be listed to UL 1971 and UL 1480 and be approved for fire protective signaling systems.
      a. Speaker: Dual-voltage transformer speaker strobe capable of operation at 25.0 or 70.7 nominal Vrms. The speaker shall have a frequency range of 400 to 4,000 Hz and shall have an operating temperature between 32°F and 120°F. The speaker shall have power taps (from ¼ watt to 2 watts) and voltage that are selected by rotary switches. All models have a maximum sound output of 86dB at 10 feet and shall incorporate an open back construction.
      b. Visual Strobe: The strobe shall have field-selectable candela settings including 15, 30, 75, 95, 110, 135, 185 for wall mounted units and 15, 30, 75, 95, 115, 150, 177 for ceiling mounted units. The strobe light shall consist of a xenon flash tube and associated lens/reflector system and operate on either 12V or 24V. The strobe shall comply with NFPA 72 and the Americans with Disabilities Act requirement for visible signaling appliances, flashing at 1 Hz over the strobe's entire operating voltage range. All notification appliances shall be backward compatible.

H. Supplementary Relay Controls
   1. Fire alarm control unit incorporate necessary alarm activated relays as pilot control for fan shutdown, door release, etc., as specified.
   2. Shutdown of designated HVAC units through auxiliary contacts of fire alarm control panel after alarm condition initiated from any initiating device as shown on Drawings.
   3. Auxiliary relay controls provided in elevator machine room to interface elevator lobby smoke detector alarm signals with designated and alternative recall options of elevator controller. Refer to Elevator Detection Wiring Diagram on Drawings.

I. Magnetic Door Holders: Consists of on-armature contact plate with adjustable pivot mounting for installation in door and heavy-duty electromagnet mounted on wall or floor behind door.
   1. Wired for failsafe operation with power failure releasing door to close.
   2. Capable of 35 to 40 pounds of holding power and has maximum magnetic field density of 5.6 oersteds at 1 meter.

J. Remote Annunciator Panel (FAA): Provides all system operation controls at remote location from main fire alarm control panel with each remote control panel containing supervised, backlit, liquid crystal display (LCD).
   1. Includes key-switch enabled reset, alarm silence, trouble silence and drill/all call switches.
   2. Fully capable completing of all program and control programming functions and providing regenerative functions in event of communications failure.
   3. Includes capability to connect printer direct via dedicated RS-232 port.

K. Graphic Display Panel: Provides easy identification of building layout and location of fire events on custom floor plan display.
   1. Full color image printed on the reverse side of a .12 mil thick polycarbonate film, fire rated class A ASTM E84, matte finish.
   2. Standard white background with colored image line work.
   3. Rigid 1/4" ABS back plate
   4. Architecturally designed low profile aluminum frame with natural aluminum matte finish
   5. Continuous 1/2" inlay accent trim (reflective red, reflective blue, reflective black, beige or custom color).
   6. Concealed hardware, eliminating tampering.
   7. Size: 24" x 24"

2.03 ADDITIONAL FIRE ALARM DEVICES

A. Provide the following fire alarm devices in the BASE BID which are above and beyond the scope of work shown on the contract documents,. Device installation, wiring and programming of devices to be included. Included in the price to be 175 feet of fire alarm cabling per device. Devices can be installed at AE or owners direction at a time up to and including final inspection of the completed system work.
   1. (6) Duct Smoke Detectors incluting (6) remote reset switches located 50 feet from Duct Detector.
   2. (4) Fire Alarm Fan Shut Down Relays andf wiring into motor starter controls.
   3. (6) Smoke Detectors.
   4. (4) Heat Detectors.
   5. (4) Fire Alarm Pull Stations.
   6. (6) Fire Alarm Voice Strobes.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions (by Installer): Examine conditions under which fire alarm system is to be installed in coordination with system supplier. Notify Architect / Engineer, in writing, of any conditions detrimental to proper and timely installation. Do not proceed with installation until unsatisfactory conditions have been corrected in a manner acceptable to Installer.
   1. When Installer confirms conditions as acceptable to ensure proper and timely installation and to ensure requirements for applicable warranty or guarantee can be satisfied, submit to Architect written confirmation from applicable Installer. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to Installer.

3.02 PREPARATION

A. Protection: Provide manufactured dust covers on all detectors in the proximity of active work during construction. (Loose plastic cling-wrap styled coverings shall not be permitted).

3.03 INSTALLATION

A. Install fire alarm system in accordance with applicable provisions of NEC, NFPA-70, Article 760 - Fire Protective Signaling Systems.
   1. Contractor performing fire alarm system work shall have NYCET certification or shall be a licensed fire alarm contractor. Contractor shall provide Fire Alarm Certification at time of permit application.
   2. Where existing fire alarm systems are being replaced, Contractor performing fire alarm system work shall comply with the requirements of the local Fire Marshall concerning the fire alarm system shutdown plans, procedures, and fire watch plans that will be implemented for system interruptions during construction. All existing fire alarm devices shall remain active until new cabling and devices are installed. Temporary interruptions are allowed while work is being done on the system. Work shall be coordinated so that system is fully functional at the end of the workday. If system is not fully functional at end of workday, Contractor shall provide personnel for fire watch as required by local Fire Marshall. and shall be responsible for all associated costs.
   3. Provide all labor, materials, equipment and services to perform all operations required for complete installation of fire alarm system and related construction as shown on Drawings and specified in this Section.
   4. Completely check, program and adjust all new and existing equipment on each system.
   5. Label each addressable device with label indicating device's unique address. Label shall comply with Specification Section 26 0553. Labels shall be installed so that they are visible without removing device from mounting base.

B. Wiring

1. All fire alarm cable shall be (initiating and notification circuit wiring), shall be Type FPLP plenum rated, sized in accordance with manufacturer's recommendations, regardless of environmental conditions.
2. All FA cable located above accessible ceilings shall be bundled and tie-wrapped at 5 foot intervals and hung in saddle rings or J-hooks, supported to structure at 5 foot intervals. Cable shall not be considered properly supported by laying over top of conduits, piping, or building supports or bracing, approved saddle rings or J-hooks must be used.
3. For wall mounted devices in finished spaces, or existing construction, where wiring cannot be concealed; all wiring shall be installed in surface metallic raceway, from device location to accessible ceiling space.
4. Install all wiring in approved red finish EMT conduit in the following locations:
    a. Unfinished areas (above ceilings, accessible attics, accessible crawl spaces, accessible basements, mechanical rooms, electric rooms, etc…)
    b. Exposed, open joist spaces (storage rooms, shops, upper gymnasiums, upper stage, etc…)
    c. Where otherwise subject to damage.

C. Install all devices on exterior of building in weatherproof enclosures supplied by device manufacturer.

D. In existing construction, install all interior surface mounted devices on surface mounted back boxes supplied by device manufacturer. In new construction, install all devices flush or semi-flush mounted, unless otherwise authorized by Owner.

E. Connect alarm signaling circuits (SLC) so that signaling circuit or power supply output does not exceed 70 percent of rated capacity and install circuits with appropriately sized cable, sized per 100 percent of rated circuit capacity, in accordance with manufacturer=s requirements.

F. Install 200 deg. F. fixed temperature heat detectors in Kitchen and Boiler Room. Install 135 deg. F. fixed temperature heat detectors in areas where sudden temperature changes can be anticipated (near overhead doors, heating units, etc.).

G. Install beam type smoke detectors, consisting of receiver and transmitter units, in direct line of sight and in accordance with spacing & placement requirements outlined in the National Fire Alarm Code, NFPA-72 2002 and its latest revisions. Contractor shall be responsible for the final coordination of all ceiling hung equipment, including, but not limited to, duct work, fixed and movable equipment, etc., to ensure complete unrestricted operation of beam detectors.

H. Provide fan shut-down of all HVAC equipment having 1000CFM (or greater) air movement capacity. Locate relay within 36 inches of units power disconnect, ahead of all controls.

I. Provide duct smoke detectors in the supply and return air ductwork of all HVAC systems having 2000 CFM (or greater) air movement capacity. Install the supply duct detector downstream of the air filters and ahead of any branch connections. Install the return duct detector between the air handling unit and any re-circulation or fresh air inlet connections. Provide fan shut-down relay on power home run circuits, ahead of all controls.

J. Install all fire alarm pull stations at 48 inches AFF, to conform to ADA requirements.
1. In locations where new device is replacing existing, contractor shall coordinate removal/replacement to allow re-use of existing backbox/conduits if possible.
2. In existing construction all devices shall be flush mounted with circuit wiring concealed within wall.
3. In locations where building construction prohibits flush-mounted installations, provide surface raceway device similar to "The Relocator" by L.E.D. Products, Wilmington, North Carolina. At such locations obtain written authorization from Owner's representative or Architect prior to providing surface raceway device.
4. Provide vandal resistant lexan shield (LS) in all Gymnasiums and Industrial Technology Shops / labs or as otherwise directed.

K. Locate audible/visible signaling devices in strict accordance with requirements of Americans with Disabilities Act (ADA).
   1. In locations where new device is replacing existing, contractor shall coordinate removal/replacement so that existing backbox/conduits can be re-used.
   2. In existing construction all devices shall be flush mounted with circuit wiring concealed within wall.
   3. In locations where building construction prohibits flush-mounted installations, provide surface raceway. At such locations obtain written authorization from Owner's representative or Architect prior to providing surface raceway device.
   4. Where combination audible/visible units used, place strobe light lens 80 inches minimum and 96 inches maximum above floor level.
   5. In locations where ceiling height is less than 90 inches AFF, place strobe light lens 6 inches below ceiling.

L. In areas where detection and notification devices may be subject to physical damage, devices shall have protective wire guards as manufactured by Safety Technology International (www.sti-usa.com). All guards shall be listed for the fire alarm system devices and appliances protected.

M. Locate Graphic Display Panel adjacent to each remote annunciator and FACP. Confirm quantities and locations indicated on plans.

N. Install Magnetic Hold-Opens in collaboration with Contractor responsible for door installations.

O. Install remote-test-switch devices associated with duct smoke detection or beam detection devices at accessible locations, (while standing at floor level). Clearly identify associated duct detector location and HVAC unit monitored on switch.

P. Surface mount detection devices / notification appliances on FA manufacturer provided red finished surface mount box. Generic surface raceway / surface mount boxes will not be permitted.

Q. Upon acceptance of new fire detection and alarm system, Contractor shall disconnect and remove abandoned system in it's entirety, inclusive of all circuitry, conduits, cabinets, and associated equipment.

3.04 FURNISH & INSTALL EXTRA MATERIALS

A. As part of bid price, include labor and materials required to fully install and connect the following equipment. Installation shall be as directed by the Engineer and/or Owner during construction. All extra materials not used shall be turned over to the Owner at substantial completion.

B. Lamps for Strobe Units: Quantity equal to 10 percent of amount installed but not less than four (4) units.

C. Notification Appliances: Furnish quantity equal to 5 percent of each type and number of units installed, but not less than five (5) of each type appliance with 50 LF notification appliance circuitry for each appliance.

D. Detector / Sensor Heads: (inclusive of smoke detectors, heat detectors, CO detectors): Furnish quantity equal to 5 percent of each type and number of units installed but not less than two (2) (one of each type).

E. Detector or Sensor Bases (where applicable): Furnish quantity equal to 5 percent of each type and number of units installed but not less than ten (10) of each type with 200 LF FA circuitry cable each base.

F. Duct Smoke Detectors, Enclosures, and Associated Remote Reset/Test Switch: Furnish four (4) extra with 200 LF notification FA cable each device for use during construction where directed by the Engineer and/or Field Project Representative.

G. Fuses: Four (4) of each type installed in the system.

H. Relays (Including Addressable Modules, Relay Modules, Control Modules and Contact Closure Modules): Furnish quantity equal to 5 percent of each type and number of units installed, but not less than three (3) of each type.

3.05 QUALITY CONTROL

A. All fire alarm system equipment shall be new, unused, UL listed for its intended purpose, and be fully compatible to assure the integrity of the complete system.

B. Acceptance Testing:
   1. Perform 100 percent inspection and testing of all system devices.
      a. Provide complete panel real-time printout as documentation of device, date and time. Any acceptance test not accompanied by real-time printout requires retesting of entire system by Contractor, including both alarm activation tests and tests of supervisory circuit at each device.
      b. Provide inspection complying with requirements of applicable NFPA standards.
      c. Provide to Owner and Fire Subcode Official complete typed list of every initiation, signaling, control, supervisory and auxiliary device with specific information regarding system address of device, location of device, date tested, manufacturer's model number, serial number of all analog components, status of device and zone or point as related to system. Obtain from owner the owner's room names/numbers that are to be assigned to each device.
      d. Complete NFPA 72 Record of Completion document.
   2. Provide complete set of battery test results for panels including:
      a. Charger output voltage under normal conditions
      b. Charger output current under normal conditions
      c. Open battery voltage
      d. Supply voltage and current under primary power failure
      e. Supply voltage and current under primary power failure and system alarm that has activated all of panel's audible, visual and control circuits.
      f. Calculations using battery test data obtained to determine minimum battery capacity of 24 hours under normal conditions and 5-minute alarm condition.
   3. Take voltage readings at end of line of each alarm signal circuit to insure minimum operational levels.
      a. If voltage drop exceeds maximum of 3.4 volts from power supply to end of line under full circuit load, rewire circuits with appropriately heavier gage wire as required to comply with specified requirements.

3.06 ADJUSTING / CLEANING

A. Completely clean all smoke detectors, as instructed by authorized factory representative, when system is substantially complete and accepted by Owner.

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SECTION 31 0000
EARTHWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Clearing and grubbing
B. Removal of topsoil
C. Underground utilities
D. Excavation
E. Dewatering
F. Settlement detection
G. Placing engineering fabric
H. Placing fill and backfill
I. Placing fill to support structures
J. Compaction
K. Rough grading
L. Subgrade surface for walks and pavement
M. Finish grading
N. Maintenance and restoration
O. Disposal of excess and unstable materials
P. Field quality control
Q. Protection

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 31 1000 - Site Clearing
B. Section 31 2317 - Site Trenching
C. Section 32 1216 - Asphalt Paving
D. Section 03 3001 - Concrete Sidewalks, Crubs and Exterior Concrete Flatwork
E. Section 32 9200 - Lawns and Grasses
F. Section 33 4000 - Storm Drainage Utilities

1.03 DEFINITIONS

A. The following terms shall have the meanings ascribed to them in this Article, wherever they appear in this Section.
    1. Earth Excavation: The removal of all surface and subsurface material not classified as rock (as defined below).
    2. Materials which can be loosened with a pick or backhoe, frozen materials, soft laminated shale or hardpan, pavements, curbs, and similar materials shall be classified as earth excavation. Refer to drawings for additional information.
    3. Unclassified Earth Excavation: The excavation and disposal of all surface and subsurface materials of any description necessary to perform the work of this contract. This shall include:
        a. All soil deposits of any description both above and below groundwater levels. These may be naturally deposited or placed by previous construction operations.

b. Ledge rock of all quality. (Limestone, sandstone, shale, granite and similar materials in solid beds or masses in its original or stratified position which can only be removed by drilling, wedging, use of pneumatic tools or heavy ripping equipment.) Blasting operations will not be permitted to loosen any ledge rock necessary to be removed in this contract without prior written permission from the Project Designer and the Owner's Representative. Refer to drawings for additional information.
c. Any materials of man-made origin.

4. Subgrade Surface: Surface upon which gravel base or topsoil is placed.
5. Base: Select granular material which is placed immediately beneath pavement or concrete slabs.
6. Fill: Placement of specified fill materials, in layers, above ground surface to required elevations.
7. Backfill: Placement of specified backfill material, in layers, in excavations to required subgrade elevations.
8. Foundation Bearing Grade: Grade/elevation at which the bottom-of-footings are constructed.
9. Maximum Density: The dry unit weight in pounds per cubic foot of the soil at "Optimum Moisture Content" when determined by ASTM D 698 (Standard Proctor), or ASTM D 1557 (Modified Proctor).
10. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
11. Landscaped Areas: Areas not covered by structures, walks, roads, paving, or parking.
12. Unauthorized Excavation: The removal of material below required elevations indicated on the Drawings or beyond lateral dimensions indicated or specified without specific written direction by the Owner's Representative.

1.04 SUBMITTALS

A. Comply with requirements of Section 01 3000 and as modified as below.
1. Samples: Submit samples as follows. At the owner's discretion, take the samples in the presence of the Owner's Representative, and submit to the Owner's Representative the laboratory test results for gradation, proctors and soundness tests, when required. These tests shall be performed in accordance with ASTM standards, shall be performed and signed by a certified soils laboratory, and shall be submitted as part of the original submittal. At a minimum, the samples taken shall be of the following quantities:
a. General Fill: Imported Select Type 1 Granular Material: 40 - 50 lbs.
b. Select Granular Fill: Type 2 Subbase Course: 40 - 50 lbs.
c. Underdrain Filter: 40- 50 lbs, mixed to specification.
d. Engineering Fabric: 12" X 12" sample.
e. Drainage Fabric: 12" X 12" sample.
2. Quality Control Submittals:
a. Base Materials: Name and location of source and the DOT Source Number. If the material is not being taken from an approved DOT Source, the results of the gradation and soundness tests performed by an ASTM certified soils laboratory will be required.
b. Other Aggregates: Name and location of source and soil laboratory test results.
c. Excavation Procedure: Submit a lay out drawing or detailed outline of intended excavation procedure for the Owner's information. This submittal will not relieve the Contractor of responsibility for the successful performance of intended excavation methods.
3. Closeout Procedures: Comply with the requirements of Section 01 7800.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect filter fabric from sunlight during transportation and storage.

1.06 PROJECT CONDITIONS

A. Protect existing trees and plants during performance of the Work unless otherwise indicated. Box trees and plants indicated to remain within the grading limit line with temporary fencing or solidly constructed wood barricades as required. Protect root systems from smothering. Do not store excavated material or allow vehicular traffic or parking within the branch drip line. Restrict foot traffic to prevent excessive compaction of soil over root systems.

B. Cold Weather Requirements:
   1. Excavation: When freezing temperatures are anticipated, do not excavate to final required elevations for concrete work unless concrete can be placed immediately.
   2. Backfilling: If backfill is being placed during freezing temperatures, the backfilling operations shall be monitored by the Owner's Representative and the following procedures shall be followed:
      a. Frozen ground shall be removed in its entirety from beneath and five (5) feet beyond the area of fill placement.
      b. The fill material placed shall consist of Selected Fill and shall be free of all frozen chunks that exceed four (4) inches in size. The material transported to the project site shall only consist of material excavated from below the frost depth.
      c. At the end of the work day, the area of fill placement shall be covered with insulated blankets, or left unprotected. Other means of protection (hay, wood chips etc.) may also be used for protection provided it is approved by the Owner's Representative.
      d. Following work day - Remove the insulated blankets and/or strip the area of all frozen material as specified previously.
      e. Upon establishing the subgrade elevations, protect the grades with insulated blankets or place additional material that will adequately insulate the exposed earth surface from frost. This additional fill or protective material shall be stripped just prior to pouring concrete.

C. Subsurface Information/Site Investigation Reports: Site investigation reports including soil boring logs and similar data included in the project documents are intended to represent only conditions found at locations indicated at time investigations were conducted. Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or of continuity of such conditions. The Owner will not be responsible for interpretation or conclusions drawn by the contractor.
   1. The contractor may perform additional test borings and other exploratory operations at no additional cost to the Owner upon approval of the project designer.

D. Land Survey Information: Field verify provided existing boundary and topographic information prior to beginning site work. Immediately report any discrepancies in boundary locations or topographic elevations affecting site construction to the Owner's Representative. Provide profile information on existing site conditions and verification of existing topographic information to the Owner's Representative prior to beginning site construction. Beginning site work construction without this profile information and written notification indicates Contractor's acceptance of existing land survey data indicated on the drawings as accurate. Adjustments to the contract will not be made for discrepancies brought to the Owner's attention after site construction has begun.

PART 2 PRODUCTS

2.01 MATERIALS

A. General Fill: Subsoil excavated from project site and/or supply stockpiled, sound, durable, sand, gravel, stone, or blends of these materials, free from organic and other deleterious materials. Comply with New York State Department of Transportation gradation and material requirements for Select Type 1 as specified below:

Sieve Size	Size Opening (mm)	Percent Passing
3 inch	76.2	100
2 inch	50.8	90-100

1/4 inch	6.35	30-65
No. 40	0.425	5-40
No. 200	0.075	0-10

Sieve Size	Size Opening (mm)	Percent Passing
2 inch	50.8	100
1/4 inch	6.35	30-65
No. 40	0.425	5-40
No. 200	0.075	0.7

B. Select Granular Fill Base Course Type 2 Crushed Stone: Where indicated supply stockpiled, crushed ledge rock or approved blast furnace slag. Comply with New York State Department of transportation gradation and material requirements modified below:

Sieve Size	Size opening (mm)	Percent Passing
2 inch	50.8	100
1/4 inch	6.35	25-60
No. 40	0.425	5-40
No. 200	0.075	0-7

C. Underdrain Filter: Equal blend of No.1 and No. 2 washed crushed or uncrushed stone used as drainage fill.

1. No. 1 Coarse Aggregate:

Sieve Size	Size opening (mm)	Percent Passing
1 inch	25.4	100
1/2	12.7	90-100
1-4	6.35	0-15

2. No. 2 Coarse Aggregate:

Sieve Size	Size opening (mm)	Percent Passing
1-1/2 inch	38.1	100
1 inch	25.4	90-100
1/2 inch	12.7	0-15

D. Rip Rap: Light Stone Filling that complies with DOT Article 620-2.02 for stone filling and Figure 620-1 Stone Filling Gradation Requirements.

Size Designation	% Mixture by Weight
Smaller than 8”	90 – 100%
Larger than 3”	50 – 100%
Smaller than No. 8 Sieve	0 – 10%

E. Engineering Fabric: Fabric composed of high tenacity polypropylene yarns woven into a stable network. The fabric is to be inert to biological degradation and resistant to naturally encountered chemicals, alkalis and acids complying with the following mechanical and physical properties:

Mechanical Properties	Test Method	Unit	Minimum. Average Roll Value
Wide Width Tensile Strength	ASTM D 4595	kN/m m^2	MD 17.6 (100)/CD 21.0 (120)
Grab Tensile Strength	ASTM D 4632	kN (lbs)	MD 0.9 (200)/ CD 0.9 (200)
Grab Tensile Elongation	ASTM D 4632	%	MD 15/CD 10
Trapezoid Tear Strength	ASTM D 4533	kN (lbs)	MD 0.33 (75)/CD 0.33 (75)

Mullen Burst Strength	ASTM D 3786	kPa (psi)	2756 (400)
Puncture Strength	ASTM D 4833	kN (lbs)	0.4 (90)
Percent Open Area	COE-02215-86	%	1
Apparent Opening Size (AOS)	ASTM D 4751	mm (US Sieve)	0.300 (50)
Permittivity	ASTM D 4491	sec^{-1}	0.05
Flow Rate	ASTM D 4491	$l/min/m^2$ ($gal/min/ft^2$)	200 (5.0)
UV Resistance (at 500 Hours)	ASTM D 4355	% strength retained	70

Physical Properties	Test Method	Unit	Typical Value
Weight	ASTM D 5261	g/m^2 (oz/ydm^2)	136 (4.0)
Thickness	ASTM D 5199	mm (mils)	0.51 (20)
Roll Dimensions (Width X Length)	-----	m (ft)	3.8 X 132 or 5.3 X 94.2 (12.5 X 432) or (17.5 X 309)
Roll Area	-----	m2 (yd2)	502 (600)
Estimated Roll Weight	-----	kg (lb)	95 (210)

1. Manufacturer: For convenience, details have been based on Mirafi 500X as manufactured by Ten Cate/Mirafi, Pendergrast, GA (Tel. #706-693-2226).

F. Drainage Fabric: Non-woven geotextile fabric composed of polypropylene fibers formed into a stable network such that the fibers retain their relative position. The fabric is to be inert to biological degradation, resisting naturally encountered chemicals, alkalis and acids complying with the following mechanical and physical properties:

Mechanical Properties	Test Method	Unit	Minimum. Average Roll Value
Grab Tensile Strength	ASTM D 4632-91	kN (lbs)	MD 0.53 (120)/ CD 0.53 (120)
Grab Tensile Elongation	ASTM D 4632-91	%	MD 50/CD 50
Trapezoid Tear Strength	ASTM D 4533-91	kN (lbs)	MD 0.22 (50)/CD 0.22 (50)
Mullen Burst Strength	ASTM D 3786-87	kPa (psi)	1550 (225)
Puncture Strength	ASTM D 4833-00	kN (lbs)	0.3 (65)
Apparent Opening Size (AOS)	ASTM D 4751-99A	mm (US Sieve)	0.212 (70)
Permittivity	ASTM D 4491-99A	sec^{-1}	1.8
Permeability	ASTM D 4491-99A	cm/sec^{-1}	0.21
Flow Rate	ASTM D	$l/min/m^2$	5500 (135)

	4491-99A	(gal/min/ft^2)	
UV Resistance (at 500 Hours)	ASTM D 4355-02	% strength retained	70

Physical Properties	Test Method	Unit	Typical Value
Weight	ASTM D 5261	g/m^2 (oz/ydm^2)	163 (4.8)
Thickness	ASTM D 5199	mm (mils)	1.4 (55)
Roll Dimensions (Width X Length)	-----	m (ft)	3.8 X 110 or 4.5 X 110 (12.5 X 360) or (15 X 360)
Roll Area	-----	m2 (yd2)	502 (600)
Estimated Roll Weight	-----	kg (lb)	89 (197)

1. Manufacturer: For convenience, details have been based on Mirafi 140N as manufactured by Ten Cate/Mirafi, Pendergrast, GA (Tel. #706-693-2226).

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Examine conditions under which earthwork is to be accomplished in coordination with the installer of materials and components specified in this Section and notify affected Prime Contractors, Owner's Representative and the Project Designer in writing of any conditions detrimental to proper and timely accomplishment. Do not proceed with earthwork until unsatisfactory conditions have been corrected in a manner acceptable to the installer.
   1. When the installer confirms conditions as acceptable to ensure proper and timely installation and to ensure requirements for applicable warranty or guarantee can be satisfied, submit to the Project Designer written confirmation from the applicable installer. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to the installer.

3.02 PREPARATION

A. Protection
   1. Use of explosives: Do not bring explosives onto the site or use in the project without prior written permission from the Project Designer and the Owner's Representative. The Contractor remains solely responsible for the handling, storage and use of explosive materials when permitted. Use explosives in strict compliance with State, Local and OSHA regulations.
   2. Protection of Persons and Property
      a. Barricade open excavations and post with warning lights for safety of persons. Operate warning lights during hours from dusk to dawn each day.
      b. Protect structures, utilities, sidewalks, pavements and other facilities immediately adjacent to excavations from damage caused by settlement, lateral movement, undermining, washout and other hazards.
      c. Take precautions and provide necessary bracing and shoring to guard against movement and settlement of existing improvements or new construction. Contractor remains entirely responsible for strength and adequacy of bracing and shoring, and for safety and support of construction from damage or injury caused by lack of adequate protection or by movement or settlement.

3.03 CLEARING AND GRUBBING

A. Clear and grub the site within the grading limit lines of trees, shrubs, brush, other prominent vegetation, debris, and obstructions except for those items indicated to remain. Completely remove stumps and roots protruding through the ground surface.

1. Use only hand methods for grubbing inside the drip line of trees indicated to be left standing.
2. Where roots and branches of trees indicated to be saved interfere with new construction, carefully and cleanly cut them back to point of branching.

B. Fill depressions caused by the clearing and grubbing operations in accordance with the requirements for filling and backfilling, unless further excavation is indicated.

3.04 REMOVAL OF TOPSOIL

A. Remove existing topsoil from areas within the grading limit lines where excavation or fill is required.

B. Stockpile approved topsoil where directed until required for use. Place, grade, and shape stockpiles for proper drainage.
1. Topsoil shall be tested prior to stockpiling. Stockpile only quantities of topsoil approved in writing for re-use.

3.05 UNDERGROUND UTILITIES

A. Locate existing underground utilities prior to commencing excavation work. Determine exact utility locations by hand excavated test pits. Support and protect utilities to remain in place.

B. Do not interrupt existing utilities that are in service until temporary or new utilities are installed and operational.

C. Utilities to remain in service shall be re-routed as shown on the Contract Drawings.

D. Utilities abandoned beneath and five (5) feet laterally beyond a structure's proposed footprint shall be removed in their entirety. Excavations required for their removal shall be backfilled and compacted as specified herein.

E. Unless otherwise noted in the Contract Documents, utilities extending outside the limit specified above (5 feet) may be abandoned in place provided their ends are adequately plugged as described below.
1. Permanently close open ends of abandoned underground utilities exposed by excavations, which extend outside the limits of the area to be excavated.
2. Close open ends of metallic conduit and pipe with threaded galvanized metal caps or plastic plugs or other approved method for the type of material and size of pipe. Do not use wood plugs.
3. Close open ends of concrete and masonry utilities with concrete or flow-able fill.

F. Coordinate with other Prime Contractors or with local utility companies, as applicable, for shutoff service if lines are active.

G. Coordinate scheduling of removal to accommodate relocation of lines when necessary.

H. Demolish and remove or relocate additional uncharted underground utilities conflicting with construction operations as directed by the Project Designer. Measure additional removal and relocations as directed by the Project Designer and paid for by the Owner as a Change Order.

3.06 EXCAVATION

A. Excavate earth as required for the work. Remove and dispose of all materials encountered to obtain required subgrade elevations. Remove from property and legally dispose of all excess fill material.

B. Install and maintain all erosion and sedimentation controls during all earthwork operations as specified on the Contract Drawings or as directed by local officials.

C. Maintain sides and slopes of excavations in a safe condition until completion of backfilling. Comply with Code of Federal Regulations Title 29 - Labor, Part 1926 (OSHA).
1. Trenches: Deposit excavated material on one side of trench only. Trim banks of excavated material to prevent cave-ins and prevent material from falling or sliding into trench. Keep a clear footway between excavated material and trench edge. Maintain areas to allow free drainage of surface water.

D. Stockpile excavated materials classified as suitable material where directed, until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage as approved by the Owner's Representative.

E. Excavation for Structures: Conform to elevations, lines, and limits indicated. Excavate to a vertical tolerance of plus or minus 1 inch. Extend excavation a sufficient lateral distance to provide clearance to execute the work.

F. Footings and Foundations: The foundation bearing grade shall be established just prior to constructing the concrete foundations when concrete is to bear on undisturbed soil.
   1. Stepping Footings: Cut sloping surfaces under footings, foundations, steps, and where required for other work as indicated.

G. Slabs and Floors: Excavate to depths below bottom of concrete for addition of select granular material as indicated on the drawings:

H. Pipe Trenches: Refer to Section 31 2317.

I. Open Ditches: Cut ditches to cross sections and grades indicated.

J. Pavement: Excavate to subgrade surface elevation as indicated on the drawings.

K. Unauthorized Excavations: Unless otherwise directed, backfill unauthorized excavation under footings, foundation bases, and retaining walls with compacted select granular Type 1 material without altering the required footing elevation. Elsewhere, backfill and compact unauthorized excavation as specified for authorized excavation of the same classification, unless otherwise directed by the Owner's Representative.
   1. Unauthorized excavations under structural work such as footings, foundation bases, and retaining walls shall be reported immediately to the Owner's Representative before any concrete or backfilling work commences.

L. Notify the Owner's Representative upon completion of excavation operations. Do not proceed with the work until the excavation is inspected and approved.

M. Removal of Unsuitable Material Beneath Structures and Other Improvements: Excavate encountered unsuitable materials, which extend below required elevations, to additional depth as directed by the Owner's Representative. Have cross sections taken, under the supervision of an independent Land Surveyor, to determine the quantity of such excavation. Do not backfill this excavation prior to quantity measurement.
   1. Such additional excavation and backfilling, not due to error, fault or neglect of the Contractor and exceeding the numeric quantities indicated on the Drawings, will be paid for at a pre-negotiated or pre-established unit price by Change Order.

3.07 DEWATERING

A. Refer to subsurface logs included in the Contract Documents for information regarding subsurface conditions. The Owner shall not be liable for Change Orders resulting from the Contractor's inability to properly dewater the site.

B. Prior to the performance of any excavations provide dewatering methods such that the groundwater table is maintained at an elevation that is beneath the excavated depth.

C. Prevent surface and subsurface water from flowing into excavations and trenches and from flooding the site and surrounding area.

D. Do not allow water to accumulate in excavations or trenches. Remove water from all excavations immediately to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to the stability of subgrades and foundations. Furnish and maintain pumps, sumps, suction and discharge piping systems, and other system components necessary to convey the water away from the Site.

E. Convey water removed from excavations, and rain water, to collecting or run-off area. Cut and maintain temporary drainage ditches and provide other necessary diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches.

F. Provide temporary controls to restrict the velocity of discharged water as necessary to prevent erosion and siltation of receiving areas.

3.08 SETTLEMENT DETECTION

A. Excavating beneath the bearing grades of an existing structure: Establish a settlement detection method approved by the Owner's Representative for structures subject to settlement from excavation, sheeting or sheet piling operations. Maintain surveillance to detect any settlement.

B. Surcharging: Establish a settlement monitoring plan to accurately determine the settlements that have occurred and the rate that they occurred to adequately determine when settlement caused by surcharge is complete.

3.09 PLACING ENGINEERING FABRIC

A. Place and overlap engineering fabric in accordance with the manufacturer's installation instructions, unless otherwise shown.

B. Cover tears and other damaged areas with additional engineering fabric layer extending 3 feet beyond the damage.

C. Do not permit traffic or construction equipment directly on engineering fabric.

D. Backfill immediately over engineering fabric. Backfill in accordance with the fabric manufacturer's instructions and in a manner to prevent damage to the fabric.

3.10 PLACING FILL AND BACKFILL

A. Surface Preparation of Fill Areas: Strip topsoil, remaining vegetation, and other deleterious materials prior to placement of fill. Refer to Section 31 1000 - Site Clearing for additional information.
   1. Remove all asphalt pavement in its entirety from areas requiring the placement of fill.
   2. After topsoil is stripped and other improvements specifically indicated to be removed on the Contract Documents are removed, proof roll the site with a ten ton vibratory compactor (minimum six overlapping passes required) or similar equipment. Excavate soft or loose soils identified during rolling and replace with properly compacted select Type 1 granular material as directed by the Owner's Representative or the Project Designer. Measure additional excavation and backfill as directed by the Owner's Representative or the Project Designer and paid for by the Owner as a Change Order.
   3. Plow, strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill materials bond with the existing surface.

B. Excavations: Backfill as promptly as work permits, but not until completion of the following:
   1. Acceptance by the Owner's Representative of construction below finish grade including, where applicable, dampproofing, waterproofing, perimeter insulation, and bearing capacity of supporting soil.
   2. Inspection, testing, approval, and recording locations of underground utilities.
   3. Removal of concrete formwork.
   4. Removal of temporary sheeting (or sheet piling) and backfilling of voids caused by removals.
   5. Cutting off top of permanent sheeting (or sheet piling).
   6. Removal of trash and debris.
   7. Installation of permanent or temporary bracing on horizontally supported walls.

C. Place backfill and fill materials in layers not more than 8 inches thick in loose depth unless otherwise specified. Before compaction, moisten or aerate each layer as necessary to facilitate compaction to the required density. Do not place backfill or fill material on surfaces that are muddy, frozen, or covered with ice.
   1. Place fill and backfill against foundation walls and in confined areas (such as trenches) not easily accessible by larger compaction equipment, in maximum 6 inch thick (loose depth) layers.

2. For large fill areas, the layer thickness may be modified by the Owner's Representative, at the Contractor's written request, if in the Owner's Representative's judgment, the equipment used is capable of compacting the fill material in a greater layer thickness. This request shall include the type and specifications of compaction equipment intended for use.

D. Prevent wedging action of backfill against structures by placing backfill uniformly around structure to approximately same elevation in each layer. Place backfill against walls of structures containing basements or crawl spaces only after the first floor structural members are in place.

E. Under interior concrete slabs, utilize the following fill materials:
   1. Type 1 granular material from subgrade to within 6" of the building slab.
   2. Select Type 2 granular material for the next 6".
   3. Provide vapor barrier above select Type 2 material as indicated on the drawings.

F. Under Pavements and Walks:
   1. Utilize select granular fill as indicated on the construction drawings and in the applicable specification sections in the Project Manual.

G. Landscaped Areas: Place suitable material when required to complete fill or backfill areas up to subgrade surface elevation. Do not use material containing rocks over 4 inches in diameter within the top 12 inches of suitable material.

3.11 ADDITIONAL REQUIREMENTS FOR PLACING FILL TO SUPPORT STRUCTURES

A. Place fill at the perimeter of the structure to be constructed as follows:
   1. Strip the area in accordance with the requirements for Surface Preparation of Fill Areas.
   2. Compact the stripped surface to 95 percent of maximum density.
   3. Place fill in horizontal layers not exceeding 8 inches loose depth and compact layers as specified.

B. Place fill within the perimeter of the structure to be constructed as follows:
   1. Strip the area in accordance with the requirements for Surface Preparation of Fill Areas.
   2. Proof roll the stripped surface with at least 5 passes of a vibratory drum compactor having a minimum unsprung drum weight of 7 tons unless specifically indicated otherwise in the Contract Documents. Notify the Owner's Representative of the proposed date for beginning proof rolling at least 2 working days prior to commencing proof rolling.
   3. Excavate unsuitable materials (soft and unstable earth) disclosed by the proof rolling operation and replace with compacted selected Type 1 granular material.
   4. Place fill in horizontal layers not exceeding 8 inches loose depth and compact layers as specified.

C. Obtain written approval of fill area compaction before excavating for footing.

D. Excavate for footing width plus 1 foot on each side.

E. Excavate 1 foot below footing elevations where bottom of footings are 2 feet or less above or 4 feet or less below original ground surface.
   1. Compact footing bottom and place a 1 foot bed of select granular material. Compact select granular material in 6 inch layers.
   2. Omit excavation and select granular material below bottom of footings where footing elevations are more than 2 feet above or more than 4 feet below original ground surface.

3.12 COMPACTION

A. Compact each layer of fill and backfill for the following area classifications to the percentage of maximum density specified below and at a moisture content suitable to obtain the required densities, but at not less than 3 percent drier or more than 2 percent wetter than the optimum content as determined by ASTM D 698 (Standard Proctor) or ASTM D 1557 (Modified Proctor).
   1. Structures (entire area within 10 feet outside perimeter): Compact subgrade and each layer of backfill or fill material to 95 percent.

2. Concrete Slabs and Steps: Compact subgrade and each layer of backfill or fill material to 95 percent.
3. Landscaped Areas: Compact the top 2'-0" to a maximum of 85% and compact all subgrade areas beneath the upper 2'-0" to 95%.
4. Pavements and Walks: Compact subgrade and each layer of backfill or fill material to 95 percent.
5. Pipes and Tunnels: Compact subgrade and each layer of backfill or fill material to 95 percent.
6. Pipe Bedding: Compact subgrade and each layer of backfill or fill material to 95 percent.

B. Compaction Equipment:
1. Provide compaction equipment of suitable size and number and in satisfactory working condition to complete construction on schedule.
2. Use sheepsfoot rollers, pneumatic tired rollers, vibrating tampers, or other compaction equipment capable of obtaining required density throughout the entire layer being compacted.

C. When the existing ground surface to be compacted has a density less than that specified for the particular area classification, break up and pulverize, and moisture condition to facilitate compaction to the required percentage of maximum density.

D. Moisture Control:
1. Where fill or backfill must be moisture conditioned before compaction, uniformly apply water to the surface and to each layer of fill or backfill. Prevent ponding or other free water on surface subsequent to, and during compaction operations.
2. Remove and replace, or scarify and air dry, soil that is too wet to permit compaction to specified density. Soil that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing, until moisture content is reduced to a value which will permit compaction to the percentage of maximum density specified.

E. If a compacted layer fails to meet the specified percentage of maximum density, the layer shall be recompacted and retested. If compaction cannot be achieved the material/layer shall be removed and replaced. No additional material may be placed over a compacted layer until the specified density is achieved.

3.13 ROUGH GRADING

A. Interior Grading: Trim unexcavated spaces within the building to levels indicated.
1. Subgrade for Interior Slabs: Compact as specified to receive fill material. Finish subgrade surface within 1 inch above or below level specified for fill required.

B. Exterior Grading: Trim and grade area within the grading limits of the Contract Documents and excavations outside the limits, required by this Contract, to a level of 6 inches below the finish grades indicated unless otherwise specified herein or where greater depths are indicated. Provide a smooth uniform transition to adjacent areas.
1. Grade areas outside building lines for each structure to drain away from structures and to prevent ponding of water. Finish surfaces free from irregular surface changes, large stones.
2. Landscaped Areas: Provide uniform subgrade surface within 1 inch of required level to receive topsoil thickness specified. Compact fill as specified to within 2 inches of subgrade surface. Remove objectionable material detrimental to proper compaction or to placing full depth of topsoil. If the top 4 inches of subgrade has become compacted before placement of topsoil, harrow or otherwise loosen rough graded surface to receive topsoil to a depth of 4 inches immediately prior to placing topsoil.

3.14 SUBGRADE SURFACE FOR WALKS AND PAVEMENT

A. Shape and grade subgrade surface as follows:

1. Walks: Shape the surface of areas under walks to required line, grade and cross section, with the finish surface not more than ½ inch above or below the required subgrade surface elevation.
2. Pavements: Shape the surface of areas under pavement to required line, grade and cross section, with the finish surface not more than ½ inch above or below the required subgrade surface elevation.

B. Grade Control: During construction, maintain lines and grades including crown and cross-slope of subbase course.

C. Thoroughly compact subgrade surface for walks and pavement by mechanical rolling, tamping, or with vibratory equipment as approved to the density specified.

D. Shoulders: Place shoulders along edges of filled subgrades to prevent lateral movement. Construct shoulders of specified fill material, placed in such quantity to compact to thickness of each subgrade course layer. Compact and roll at least a 1'-0" wide additional layer of each subgrade course.

3.15 FINISH GRADING

A. Uniformly grade rough graded areas within the grading limits to finish grade elevations indicated.

B. Grade and compact to smooth finished surface within tolerances specified, and to uniform levels or slopes between points where finish elevations are indicated or between such points and existing finished grade.

C. Grade areas adjacent to building lines so as to drain away from structures and to prevent ponding.

D. Finish surfaces free from irregular surface changes, and as follows:
1. Grassed Areas: Finish areas to receive topsoil to within 1 inch above or below the required subgrade surface elevations.
2. Walks: Place and compact base material as specified. Shape surface of areas under walks to required line, grade and cross section, with the finish surface not more than ½ inch above or below the required subbase elevation.
3. Pavements: Place and compact base material as specified. Shape surface of areas under pavement to required line, grade and cross section, with the finish surface not more than ½ inch above or below the required subbase elevation.
4. Building Slabs: Grade base material smooth and even, free of voids, compacted as specified, and to required subbase elevation. Finish final grades within a tolerance of ¼ inch when tested with a 10 foot straightedge.
5. Surfaces To Receive Vapor Barrier: Provide smooth surfaces graded, tamped and/or rolled, entirely free of obstructions or protruding objects.

E. Spread topsoil directly upon prepared subgrade surface to a depth measuring a minimum of 6 inches after natural settlement of the topsoil has occurred in areas to be seeded or to receive sod unless specifically indicated otherwise within the Contract Documents. Place to greater depth when necessary to adjust grades to required elevations.
1. Only approved existing topsoil within the grading limits may be used. Provide additional topsoil from outside sources as required.

F. Finish topsoil surface free of depressions which will trap water, free of stones over ½ inch in any dimension, and free of debris.

3.16 MAINTENANCE AND RESTORATION

A. Restore grades to indicated levels where settlement or damage due to performance of the work has occurred. Correct conditions contributing to settlement. Remove and replace improperly placed or poorly compacted fill materials.

B. Restore pavements, walks, curbs, lawns, and other exterior surfaces damaged during performance of the work to match the appearance and performance of existing corresponding surfaces as closely as practicable.

C. Topsoil and seed damaged lawn areas inside and outside the indicated grading limits. Water as required until lawn areas are accepted by the Owner's Representative.

3.17 DISPOSAL OF EXCESS AND UNSUITABLE MATERIALS

A. Remove from the work site and dispose of excess and unsuitable materials, including materials resulting from clearing and grubbing and removal of existing improvements.

B. If acceptable to the Owner's Representative, transport excess and unsuitable materials, including materials resulting from clearing and grubbing and removal of existing improvements, to spoil areas on the project site designated by the Owner's Representative, and dispose of such materials as directed.

C. Transport excess topsoil to areas on the project site designated by the Owner's Representative. Smooth grade deposited topsoil.

3.18 FIELD QUALITY CONTROL

A. Tests: The Owner may provide soil testing and inspection services during earthwork operations. The Owner reserves the right to test and approve all subgrades and fill layers before construction proceeds.

1. Compaction Testing: Provide the Owner's Representative adequate notice for all phases of filling and backfilling operations. Compaction testing will be performed by the Owner's Testing Agency to ascertain the compacted density of the fill and backfill materials. Compaction testing will be performed on certain layers of the fill and backfill as determined by the Owner's Representative and the Testing Agency. If a compacted layer fails to meet the specified percentage of maximum density, the layer shall be recompacted and retested. No additional material may be placed over a compacted layer until the specified density is achieved.
2. Tests of subgrades and fill layers may, at the Owner's option, include:
    a. Observation of proof rolling procedures.
    b. Observation and or inspection of unsuitable soil material.
    c. Footing subgrades, for each strata of soil for which footings will be placed, at least one plate bearing test and field density test may be conducted if the subgrade is non-cohesive, or unconfined compression test may be conducted if the subgrade is cohesive, to verify design bearing capacities shown on the drawings. Subsequent verification and approval of each footing subgrade may be based on visual comparison of each subgrade with tested strata when acceptable to the Project Designer.
    d. Paved areas and building subgrade areas, at least one field density test of subgrade for every 2000 square feet of paved area or building slab, but not less than three tests may be made. In addition, in each compacted fill layer, at least one field density test of subgrade for every 2000 square feet of paved area or building slab, but not less than three tests may be made.
    e. Foundation wall backfill, field density tests at locations and elevations as directed may be made, with at least one test made for every 50 feet of wall.
    f. Fill under footings, in each compacted fill layer; one compaction test for every 30 LF of wall may be taken. One compaction test may be made under each individual footing.
3. If in the opinion of the Project Designer and based on reports of the testing service, completed subgrades or fills are below the specified density, provide additional compaction and testing at no additional expense to the Owner.

3.19 PROTECTION

A. Protect graded areas from traffic and erosion and keep them free of trash and debris.

B. Repair and re-establish grades and seeding in settled and rutted areas to specified tolerances.

END OF SECTION

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SECTION 31 1000
SITE CLEARING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Clearing and protection of vegetation.

B. Removal of existing debris.

1.02 RELATED REQUIREMENTS

A. Section 01 1000 - Summary - Multi Contract: Sequencing and staging requirements.

B. Section 01 5000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

C. Section 01 5713 - Temporary Erosion and Sediment Control.

1.03 SUBMITTALS

A. See Section 01 3000 for submittal procedures.

B. Site Plan: Showing:
   1. Areas for temporary construction and field offices.

1.04 QUALITY ASSURANCE

A. Clearing Firm: Company specializing in the type of work required.
   1. Minimum of 5 years of documented experience.

PART 2 PRODUCTS

2.01 MATERIALS

A. Fill Material: As specified in Section 31 0000 - Earthwork.

PART 3 EXECUTION

3.01 SITE CLEARING

A. Comply with other requirements specified in Section 01 7000.

B. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

3.02 EXISTING UTILITIES AND BUILT ELEMENTS

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Protect existing structures and other elements that are not to be removed.

3.03 VEGETATION

A. Scope: Remove trees, shrubs, brush, and stumps in areas to be covered by building structure, paving, playing fields, lawns, and planting beds.

B. Do not remove or damage vegetation beyond the limits indicated on drawings.

C. Install substantial, highly visible fences at least 3 feet high to prevent inadvertent damage to vegetation to remain:
   1. Around trees to remain within vegetation removal limits; locate no closer to tree than at the drip line.
   2. Around other vegetation to remain within vegetation removal limits.

D. Vegetation Removed: Do not burn, bury, landfill, or leave on site, except as indicated.
   1. Trees: Sell if marketable; if not, treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches.

2. Existing Stumps: Treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches.
3. Fill holes left by removal of stumps and roots, using suitable fill material, with top surface neat in appearance and smooth enough not to constitute a hazard to pedestrians.

E. Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction operations, replace at no cost to Owner.

3.04 DEBRIS

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 31 2317
SITE TRENCHING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Trench excavation, backfill and compaction of underground piping and underdrainage.

1.02 RELATED SECTIONS

A. Section 31 0000 - Earthwork

B. Division 33 4000 - Storm Drainage Utilities

1.03 SUBMITTALS

A. Comply with the requirements of Section 01 3000 and as modified below.

B. Backfill Product Data: Submit test reports for each type of gravel and/or stone specified for backfill naming the source of each material. Submit evidence that each backfill material complies with Department of Transportation standard specifications for the materials specified.

C. Quality Control Submittals
   1. Experience Listing: Submit a list of completed projects similar to this project, including owner's contact information and telephone number for each project.

D. Closeout Procedures: Comply with the requirements of Section 01 7800.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements: Obtain written permission from applicable agencies prior to the start of construction. Submit one copy of the permit as specified in "Submittals-Quality Control Submittals" above.

1.05 PROJECT CONDITIONS

A. Field Measurements: Establish and maintain required lines and elevations for grade control.

1.06 SEQUENCING AND SCHEDULING

A. Proceed with and complete trenching operations as rapidly as portions of the site become available, working within seasonal limitations for the work required.

PART 2 PRODUCTS

2.01 MATERIALS

A. Excavated Material: Utilize on-site excavated materials consisting of loam, clay, sand, gravel or other material suitable for backfilling as approved by the Project Designer when the type of backfill material is not indicated on the Contract Documents.

B. Sand: Natural bank sand complying with the following gradation requirements:
   1. 100% passing the ¾" sieve
   2. Less than 5% passing the Number 200 sieve.

C. Select Granular Fill: Tpe 2 Fill. Refer to 31 0000 - Earthwork.

D. Pipe Bedding Material: Unless otherside indication on drawings, provide a mixture of 50% No. 1 and 50% No. 2 stone complying with the following New York State Department of Transportation Standard Specifications:
   1. No. 1 Stone Gradation Requirements

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
1 inch	25.4	100
1/2 inch	12.70	90-100
1/4 inch	6.35	0-15
No. 200	0.075	0-1

2. No. 2 Stone Gradation Requirements

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
1 ½ inch	38.1	100
1 inch	25.4	90-100
1/2 inch	12.7	30-65
No. 200	0.075	0-10

PART 3 EXECUTION

3.01 EXAMINATION

A. Installer Verification of Conditions: Examine conditions under which trenching operations are to occur with the materials and components specified in this section. Affected Prime Contractors, the Owner's Representative and the Project Designer shall be notified in writing of any conditions detrimental to the proper and timely installation of the work.
   1. When the installer confirms conditions as being acceptable to ensure proper and timely installation of the work and to ensure requirements of applicable warranties or guarantees can be satisfied, submit written confirmation to the Project Designer. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to the installer.

3.02 EXCAVATION

A. Excavate trenches to line and depth as indicated on the Contract Documents. Provide consistent, uniform support for the bottom quadrant of each section of piping, fittings and associated materials.
   1. Excavate no more than length of trench that can receive infrastructure installation and backfill.
   2. Brace and drain trenches as required. Accumulations of groundwater or storm runoff shall be immediately discharged by dewatering pumps to siltation basins or protected channels, drains or storms sewers.
   3. Provide adequate trench width to permit successful laying and joining of pipe, proper placement of backfill and clearance of at least 8" on either side of the pipe barrel.
   4. Prepare the finish grade of the trench bottom with hand tools. Where elevations are not shown on the Contract Documents, excavate the trench to place a minimum of 18" of fill above the top of the pipe. Provide "bell holes" at each pipe joint for proper joining to eliminate point bearing. Stones of 2" or greater in any dimension or as recommended by the pipe manufacturer, whichever is smaller, shall be removed to avoid point bearing.
   5. Where trench excavation is carried below the specified elevation as a result of Contractor error or negligence, backfill the trench with Select Type 1 Granular Material and compact to required densities at no cost to the Owner.
   6. When trenching is required within the dripline of trees, tunnel under or around roots by hand digging. Do not cut tap roots or main lateral roots.

B. Excavated Materials
   1. Materials satisfactory for backfilling shall be stockpiled in an orderly manner at a distance from the banks of the trench sufficient to avoid overloading and to prevent slides and cave-ins.
   2. Adequate drainage shall be provided for the stockpiles and surrounding areas by means of ditches, dikes and other approved methods.
   3. Stockpiles shall be protected from contamination with unsatisfactory excavated material or other material that destroy the quality and fitness of the stockpiled material. If the Contractor fails to protect the stockpiles and any material becomes unsatisfactory as a result, such material shall be removed and replaced with satisfactory on site or imported materials from approved sources at no additional cost to the Owner.

4. Excavated material not required or not satisfactory for backfill shall be removed from the site.

3.03 BACKFILLING

A. Trench Backfill: Trenches shall be backfilled to grade upon completion of required testing work.

B. Bedding and Initial Backfill: Bedding shall be of the type and thickness as indicated on the Contract Documents or as recommended by the pipe manufacturer.
   1. Initial backfill material shall be placed in layers of a maximum of 6” loose thickness and compacted with approved tampers to the density of the adjacent in-situ soil, and to a height of at least one foot above the utility pipe, conduit or other infrastructure item. The backfill shall be brought up evenly on both sides of the pipe for the full length of the pipe.
   2. Care shall be taken to ensure thorough compaction of the fill under the haunches of the pipe.

C. Final Backfill: The remainder of the trench shall be backfilled with satisfactory material removed from the trench. Backfill material shall be deposited and compacted as follows:
   1. Under building slabs, roads, walks, parking lots and other structural areas, backfill shall be deposited in maximum 8” loose thickness layers and compacted to 95% maximum dry density at +/-2% of optimum moisture content.
   2. Under general landscape and natural turf playfield areas, backfill shall be deposited in maximum 12” loose thickness layers and compacted to 95% maximum dry density at +/-2% of optimum moisture content.

3.04 FIELD QUALITY CONTROL

A. Testing
   1. The Owner may provide soil testing and inspection services during the backfill of trenches as outlined in Project Manual Section 01 4000 - Quality Requirements.
   2. Prime Contractors shall employ the services of an independent testing agent to observe and test backfill operations performed by other Prime Contractors that may affect their work. An independent testing laboratory shall certify that the backfill is suitable for finish construction to be installed over trenches.
   3. Prime Contractors shall submit copies of testing laboratory reports to the Owner’s Representative and the Project Designer for information only.
   4. The General Work and Site Work Prime Contractors shall accept in writing any trench backfill and compaction by other prime contractors before installing the remaining finish construction over trench work.

END OF SECTION

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SECTION 32 1216
ASPHALT PAVING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Aggregate base for asphalt paving

B. Asphalt paving installation over aggregate base

C. Installation of asphalt topcourse over existing paving

D. Joining new asphalt pavement to adjacent construction

E. Traffic marking of asphalt pavement

F. Field quality control

1.02 RELATED SECTIONS

A. Section 31 0000 - Eathwork

1.03 SUBMITTALS

A. Comply with the requirements of Section 01 3000 Administrative Reuirements and as modified below.

B. Product Data: Submit manufacturer's name, specifications and installation instructions for each item specified.

C. Job Mix Formulas: Submit job mix formulas for asphalt paving indicating compliance with the requirements of each asphalt type specified including the name and location of the supplier.

D. Quality Control Submittals
   1. Certificates: Submit one copy of all permits obtained from local regulatory agencies and the New York State Department of Transportation.
   2. Qualifications Certification: Submit written certification or similar documentation signed by the applicable subcontractor, prime contractor and/or manufacturer (where applicable) indicating compliance with the requirements specified below in the "Quality Assurance" section of this specification.
   3. Experience Listing: Submit a list of completed projects using the products proposed for this project, including owner's contact information and telephone number for each project, demonstrating compliance with applicable requirements specified in the "Quality Assurance" section of this specification.

E. Closeout Procedures: Comply with the requirements of Section 01 7000.

1.04 QUALITY ASSURANCE

A. Asphalt Producer Qualifications: Use only materials furnished by bulk asphalt producer regularly engaged in the production of hot-mix, hot laid asphalt.

B. Regulatory Requirements
   1. Conform to the requirements of local regulatory agencies, or if applicable, the New York State Department of Transportation, which ever is more stringent for methods and materials in work areas subject to applicable agency's review and approval. Provide materials complying with referenced New York State Department of Transportation Standard Specifications where indicated.
   2. Obtain written permission from applicable agencies prior to the start of construction. Submit one copy of the permit as specified in "Submittals-Quality Control Submittals" above.

1.05 PROJECT CONDITIONS

A. Environmental Requirements:

1. Do not apply tack coats when ambient temperature is below 50 degrees F., and when the temperature has not been above 35 degrees for 12 hours immediately prior to the application. Do not apply a tack coat when an asphalt base is wet or contains an excess of moisture.
2. Do not construct asphalt surface courses when the atmospheric temperature is below 40 degrees F., and when base material is not dry. Asphalt may only be placed when air temperatures are a minimum of 40 degrees F. and rising.

B. Field Measurements: Establish and maintain required lines and elevations for grade control.

PART 2 PRODUCTS

2.01 MATERIALS

A. Asphalt Pavement: Paving materials shall comply with the New York State Department of Transportation Standard Specification. Section 400 for the materials indicated.
1. Binder Course: Hot plant mixed asphalt, complying with the New York State Department of Transportation Standard Specification, Section 401 and 403 for Asphalt - Type 3 Binder.

Sieve Size	Sieve Size (mm)	General Limits	Job Limit Tol. %
1 ½"	37.5	100	-
1"	25.0	95 – 100	-
½"	12.5	70 – 90	+/-6
¼"	6.3	48 – 74	+/-7
No. 6 Sieve	3.2	32 – 62	+/-7
No. 20 Sieve	.850	15 – 39	+/-7
No. 40 Sieve	.425	8 – 27	+/-7
No. 80 Sieve	.180	4 – 16	+/-4
No. 200 Sieve	.075	2 – 8	+/-2

a. The PGB content shall be 4.5 - 6.5%, +/-0.4%.
b. The mixing and placement temperature range shall be 120 - 165 degrees C.

2. Topcourse: Hot plant mixed asphalt, complying with the New York State Department of Transportation Standard Specification, Section 401 and 403 for Asphalt - Type 6 Topcourse.

Sieve Size	Sieve Size (mm)	General Limits	Job Limit Tol. %
1"	25.0	100	-
½"	12.5	95 - 100	-
¼"	6.3	65 - 85	+/-7
No. 6 Sieve	3.2	36 - 65	+/-7
No. 20 Sieve	.850	15 –39	+/-7
No. 40 Sieve	.425	8 – 27	+/-7
No. 80 Sieve	.180	4 – 16	+/-4
No. 200 Sieve	.075	2 – 6	+/-2

a. The PGB content shall be 5.4 - 7.0%.
b. The mixing and placement temperature range shall be 120 - 165 degrees C.

B. Coatings: Comply with the New York State Department of Transportation Standard Specification, Section 702 for material designations indicated.
1. Tack Coat: Emulsified asphalt, slow setting type, New York State Department of Transportation designation 702-3601 (SS-1h) or 702-4501 (CSS-1h).
2. Asphalt Cement Filler: New York State Department of Transportation Designation 702-05.

C. Pavement Marking Paint: Utilize pavement marking paint complying with the New York State Department of Transportation Standard Specification for White, or Yellow, and Blue Marking Paints.
   1. Manufacturer: For convenience, specifications have been based on “Setfast Acrylic Latex Traffic Paint” by Sherwin Williams, Co., Cleveland, OH (Tel. #216-566-2902).

2.02 EQUIPMENT

A. Paving Equipment: Spreading, self propelled asphalt paving machines capable of maintaining the line, grade and minimum surface thickness specified. Spreader boxes may be used in areas where specifically approved by the Project Designer.

B. Compacting Equipment: Self-propelled tandem roller with a minimum 10 ton weight. Hand held vibrator compactor may be used in areas not accessible to rollers when specifically approved by the Project Designer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Installer Verification of Conditions: Examine conditions under which pavement is to be constructed with the materials and components specified in this section. Affected Prime Contractors, the Owner’s Representative and the Project Designer shall be notified in writing of any conditions detrimental to the proper and timely installation of the work.
   1. When the installer confirms conditions as being acceptable to ensure proper and timely installation of the work and to ensure requirements of applicable warranties or guarantees can be satisfied, submit written confirmation to the Project Designer. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to the installer.

3.02 PREPARATION

A. Final Preparation of Subgrades: Upon completion of preparation of subgrades as specified in Section 31 0000, thoroughly scarify the entire area to be paved and compact by rolling to smooth, hard, even surface. Finish to required grades with allowance for pavement courses above.

3.03 INSTALLATION

A. Asphalt Paving: Pave finished surface free from depressions that may collect water. The Contractor shall remove any depressions at their own expense over 1/8” deep when tested with a six foot straight edge without evidence of patching.
   1. Pave over aggregate base in two courses, topcourse over binder course. Comply with the New York State Department of Transportation Standard Specification, paragraph 401-3 and paragraph 403-3 for asphalt types specified.

B. Installation of Topcourse over Existing Paving
   1. Surface Preparation: Condition existing paving in accordance with the New York State Department of Transportation Standard Specification, Section 633, prior to applying tack coat.
      a. Tack Coat: Spray tack coat to the surface of the existing paving in accordance with the New York State Department of Transportation Standard Specification, paragraph 407-3. Apply tack coat ahead of paving equipment to allow for proper “breaking” of the material prior to the application of the new asphalt topcourse. Spray only the amount of tack coat that can be paved over in one day.
   2. Paving Topcourse: Pave topcourse graded to existing drainage basins. The thickness of the topcourse may vary to 3” to provide a smooth, evenly graded surface, but shall never be less than minimum thicknesses stated on plans. Topcourse paving shall comply with the New York State Department of Transportation Standard Specification, paragraph 401-3 and paragraph 403-3 for the asphalt type specified.

C. Joining New Asphalt Pavement to Adjacent Construction

1. Carefully construct joints between old and new pavements, or between successive days work to ensure continuous bond between adjoining paving. Construct joints with the same texture, density and smoothness as adjacent sections of asphalt courses. Clean sand, dirt and other deleterious material from contact surfaces and apply tack coat.
2. Offset traverse joints a minimum of 24” between succeeding courses. Cut back pavement to the edge of previously placed courses to expose an even, vertical surface for the full course thickness.
3. Offset longitudinal joints a minimum of 6” between succeeding courses. When edges of longitudinal joints are irregular, honeycombed or inadequately compacted, cut back all unsatisfactory sections to expose an even, vertical surface for the full course thickness.
4. In horizontal joints between the binder and the topcourse, clean all contact surfaces and spray a tack coat prior to the installation of the topcourse if the binder has been in place for longer than seven days or if the pavement is determined to be excessively dirty by the Project Designer.
5. Seal joints with the application of asphalt cement filler, a minimum of 2” to each side of the joint.

D. Traffic Marking: Apply pavement marking paint in accordance with the manufacturer’s recommended procedures and in accordance with the New York State Department of Transportation Standard Specification, paragraph 640-3.

3.04 FIELD QUALITY CONTROL

A. Flood Tests: Perform a flood test in the presence of the Owner’s Representative or the Project Designer utilizing a water tank truck. If a depression ponding water more than 1/8” in depth is found, provide corrective measures to provide proper drainage.

END OF SECTION

SECTION 32 3113
CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Concrete anchorage for posts

B. Installation of black PVC coated chain link fences

1.02 RELATED SECTIONS

A. Section 32 1216 - Asphalt Paving

1.03 REFERENCES

A. Comply with ASTM A 53 for requirements of Schedule 40 piping.

1.04 DEFINITIONS

A. Height of Fence: Distance measured from the top of the concrete footing to the top of the fabric.

1.05 SUBMITTALS

A. Comply with the requirements of Section 01 3000 - Administrative Requirements and as modified below.

B. Product Data: Submit manufacturer's name, specifications and installation instructions for each item specified.

C. Shop Drawings: Complete detailed drawings for each height and style of fence and gate required. Include separate schedule for each, listing all materials required and technical data such as size, weight and finish to ensure conformance to the specifications.

D. Quality Control Submittals
   1. Qualifications Certification: Submit written certification or similar documentation signed by the applicable subcontractor, prime contractor and/or manufacturer (where applicable) indicating compliance with the "Qualifications" requirements specified below in the "Quality Assurance" section of this specification.
   2. Experience Listing: Submit a list of completed projects using the products proposed for this project, including owner's contact information and telephone number for each project, demonstrating compliance with applicable "Qualifications" requirements specified in the "Quality Assurance" section of this specification.

E. Closeout Procedures: Comply with the requirements of Section 01 7800.

1.06 QUALITY ASSURANCE

A. Comply with the standards of the Chain Link Fence manufacturer's Institute, including (unless otherwise indicated):
   1. Specification for Metallic Coated Steel Chain Link Fence Fabric
   2. Industrial Steel Specification for Fence Rails, Posts, Gates and Accessories
   3. ASTM F-567 - Standard Practice for Installation of Chain Link Fence for installation unless otherwise indicated on the Contract Documents.

B. Qualifications
   1. Provide metal fences and gates as a complete unit produced by a single manufacturer, including necessary erection accessories, fitting and fasteners. Products shall be provided by a company specializing in commercial quality chain link fencing with at least five years experience.

C. Regulatory Requirements
   1. Obtain written permission from applicable agencies prior to the start of construction. Submit one copy of the permit as specified in "Submittals-Quality Control Submittals" above.

1.07 PROJECT CONDITIONS

A. Field Measurements: Establish and maintain required lines and elevations for grade control.

1.08 SEQUENCING AND SCHEDULING

A. Proceed with and complete chain link fence and gate installation as rapidly as portions of the site become available, working within seasonal limitations for the work required.

PART 2 PRODUCTS

2.01 MATERIALS

A. Framework Standards
   1. Steel Pipe: Cold rolled steel pipe meeting the requirements of ASTM F 1043 with a minimum yield strength of 50,000 psi.
   2. Interior Coating: In line applied zinc rich coating with zinc powder loading of a minimum 90% by weight applied after fabrication conforming to ASTM B 6 high grade and Special High Grade Zinc.
   3. Exterior Coatings
      a. Base Coat: Minimum .9 ounces zinc per square foot.
      b. Intermediate Coat: Minimum 15 microgram chromate conversion per square inch.
      c. Top Coat: Minimum 0.3 mil cross link polyurethane acrylic exterior coating.
      d. PVC exterior coating: Fusion bonded polyvinyl chloride similar to Brighton Colorbond Fence System by Merchant Metals, Brighton, Michigan. Color to be black unless specifically noted otherwise on the Contract Documents.
   4. Size of Pipe: As indicated.
   5. Similar to SS-40 Pipe with Flo-Coat by Allied Tube and Conduit Corporation, Harvey, Illinois.

B. Framework and Footings for Fences Up To 8'-0" High
   1. End Posts, Corner Posts and Pull Posts.
      a. Pipe: 3.00" O.D.
      b. Set pull posts at the midway point of all lines 500 feet or longer and at all changes of direction or grade of 15 degrees or more. Place pull posts at each radius point within the curved line where the internal angle is 30 degrees or more.
      c. Footing Size: 12" O.D. by 5'-0" deep.
   2. Line Posts
      a. Pipe: 2.50" O.D.
      b. Space line posts at a maximum of 10 feet on center unless specifically noted otherwise on the contract documents.
      c. Footing Size: 12" O.D. by 5'-0" deep.

C. Post Brace: Provide manufacturer's standard adjustable brace at gate posts and at both sides of corner and pull posts, with a horizontal brace located at the mid-height of the fabric.
   1. Unless otherwise specified, provide PVC coating to match color of adjacent fence components.

D. Top, Intermediate, and Bottom Rails: 1.66" O.D. pipe, weighing 1.84 pounds per linear foot. Install rails in the manufacturer's longest lengths utilizing expansion couplings, approximately 6" long at each joint. Provide means for attaching the top rail securely to each gate post, corner post, pull post and end post.
   1. Unless otherwise specified, provide PVC coating to match color of adjacent fence components.

E. Chain Link Fabric
   1. PVC Coated Fabric: Unless otherwise specified, provide 2" mesh, 9 gauge steel wires, with one piece fabric widths for fencing up to 12 feet high. The PVC coating is to be fused and adhered to galvanized wire in accordance with Federal Specification RR-F-191 H/ID, ASTM F-668 Class 2B, and ASTM F934. Coating thickness to be 7 mils.

a. Manufacturer: Brighton Colorbond Fence System by Merchant Metals, Brighton, Michigan or similar.
b. Color to be black unless specifically noted otherwise on the Contract Documents.

2. Selvages: Top and bottom selvages to be knuckled unless specifically noted otherwise on the Contract Documents.
   a. Unless otherwise specified, provide PVC coating to match color of adjacent fence components.

F. Post Caps:
1. Weather tight closure cap, one cap per post.
2. Furnish caps with openings to permit passage of rail.
3. Fasteners: Tamper resistant cadmium plated steel screws.
4. PVC Coated: Complying with the requirements of Brighton Colorbond Fence System by Merchant Metals, Brighton, Michigan.

G. Stretcher Bars: One piece equal to the full length of the fabric, minimum cross section 3/16" by ¾".

H. Metal Bands (for securing stretcher bars): Steel, wrought iron or malleable iron.

I. Hardware: Self locking bands, tie wires and similar accessories. All hardware ends to pipe rails and other fence components must be of solid construction that prevents access to wasps and similar insects.
1. PVC Coated Hardware: Complying with the requirements of Brighton Colorbond Fence System by Merchant Metals, Brighton, Michigan to match color of adjacent fence components.

J. Tension Wire: Manufacturer's standard 7 gauge coiled spring steel wire.

K. Wire Ties:
1. For tying fabric to line posts, rails, and braces: 9 gauge steel wire installed at 12" O.C.
2. For tying tension wire to fabric: 11 gauge steel hog rings at 24" O.C.

L. Truss Rods: 3/8" diameter.

M. Bolts and Nuts: ASTM A 307, Grade A.

N. Concrete: Portland cement concrete having a minimum compressive strength of 3000 psi at 28 days.

PART 3 EXECUTION

3.01 EXAMINATION

A. Installer Verification of Conditions: Examine conditions under which chain link fences and gates are to be constructed with the materials and components specified in this section. Affected Prime Contractors, the Owner's Representative and the Project Designer shall be notified in writing of any conditions detrimental to the proper and timely installation of the work.
1. When the installer confirms conditions as being acceptable to ensure proper and timely installation of the work and to ensure requirements of applicable warranties or guarantees can be satisfied, submit written confirmation to the Project Designer. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to the installer.

3.02 PREPARATION

A. Clear and grub plant material along the fence line as required to eliminate growth interfering with the fence alignment. Remove all debris from the project property.

B. Do not begin installation of the fence until finish grading in area has been completed.

3.03 INSTALLATION

A. Space posts equidistant in the fence line at a maximum of 10 feet on center unless specifically noted otherwise on the Contract Documents.

B. Located corner posts at corners and at changes in direction. Use pull posts at all abrupt changes in grade and at intervals no greater than 500 feet. On runs over 500 feet, space pull posts evenly between corner or end posts. On long curves, space pull posts so that the strain of the fence will not bend line posts.

C. Install top rail continuously through post tops or extension arms, bending to radius for curved runs. Install expansion couplings as recommended by the fencing manufacturer.

D. Install intermediate rails in one piece between posts and flush with the post on the fabric side using special offset fittings where necessary.

E. Brace corner posts, pull posts, end posts and gate posts to adjacent line posts with horizontal rails.

F. Diagonally brace corner posts, pull posts, end posts and gate posts to adjacent line posts with truss rods and turnbuckles.

G. Attach the fabric to the active playfield or security side of the fence. Maintain a 1 inch clearance above the finished grade except where indicated otherwise. Thread stretcher bars through the fabric using one bar for each gate and end post and two for each corner and pull post. Pull fabric tight so that the maximum deflection of the fabric is 2 inches when a 30 pound pull is exerted perpendicular to the center of a panel.
   1. Maintain tension by securing stretcher bars to posts with metal bands spaced at 15” O.C.
   2. Fasten fabric to steel framework with wire ties spaced 12” O.C. for line posts and 24” O.C. for rails and braces. Bend back wire ends to prevent injury.
   3. Tighten stretcher bar bands, wire ties and other fasteners securely.
   4. When the fabric height exceeds 12’, overlap horizontal splices 6”at the intermediate rail and secure with wire ties spaced at 12” O.C.

H. Position bolts for securing metal bands and hardware so nuts are located opposite the fabric side of the fence. Tighten nuts and cut off excess threads so no more than 1/8” is exposed. Peen ends to prevent loosening or removal of nuts. Secure post tops and extension arms with tamper resistant screws.

I. Wire brush and repair welded and abraded areas with one coat of cold galvanizing compound.

J. Restore disturbed ground areas to their original condition. Topsoil and seed to match adjacent areas.

3.04 ADJUSTING AND CLEANING

A. Repairs and Protection of chain link fences and gates.
   1. Repair or replace broken or defective chain link fences and gates as directed by the Project Designer.
   2. Protect chain link fences and gates from damage until acceptance of the fencing construction.

END OF SECTION

SECTION 32 9200
LAWNS AND GRASSES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Subsoil preparation
B. Placement of topsoil
C. Seeding and application of soil amendments and fertilizers
D. Mulching
E. Protection of seeded areas
F. Turf maintenance during warranty period
G. Cleanup and protection
H. Inspections and final acceptance

1.02 RELATED SECTIONS

A. Section 31 0000 - Earthwork

1.03 SUBMITTALS

A. Comply with the requirements of Section 01 3000 Administrative Requirements and as modified below.
B. Quality Control Submittals
    1. Experience Listing: Submit a list of completed projects including owner's contact information and telephone number for each project, demonstrating compliance with applicable "Qualifications" requirements specified in the "Quality Assurance" section of this specification.
    2. Topsoil Analysis Report: Submit topsoil analysis report for on-site stockpiled or imported topsoil. Do not mix or utilize topsoil until a soil analysis report is approved by the Project Designer.
        a. Provide required representative samples of topsoil and organic or inorganic amendment materials proposed for use in the project to the independent testing agency noted below for analysis and recommended treatment. The Contractor shall pay for all costs incurred for testing and analysis of the soil material. Test reports shall be from current year.
            1) All soil samples and proposed amendments shall be sent to the Owner's Testing Agent:
                (a) Hummel & Company, Inc.
                (b) 35 King Street
                (c) Trumansburg, New York 14886
                (d) Telephone Number: 607-387-5694
        b. All reports shall be sent to the Project Designer for approval.
        c. Samples of imported topsoil to be brought to the site must be approved prior to delivery.
        d. Deficiencies in the topsoil shall be corrected by the Contractor, as directed by the Project Designer, after review of the testing agency report.
        e. Ensure test reports include specific recommendations regarding exact types, times and rates of application of soil additives and fertilizers based upon soil test results and type of seed mix to be planted. Follow soil additive recommendations before and during topsoil respread operations. Include the following in the topsoil analysis:
            1) pH factor
            2) Percent organic matter as determined by a Loss on Ignition or Walkey/Black Test (ASTM F-1647.
            3) Proctor testing per ASTM D698.

4) Chemical analysis testing nitrogen, phosphorus, potassium, calcium, magnesium, cation exchange capacity, base saturation percentages, micronutrients and acidity (pH).
5) Particle size analysis of the topsoil as determined by ASTM F-1632, performed and compared to the USDA Soil Classification System.

f. Include in the recommendations the type, composition, rate and means of application of soil amendments and fertilizer necessary to establish the required pH factor, organic matter content and supply of nutrients satisfactory for planting.

g. All materials and procedures regarding soil amendments and fertilizers specified in this section are approximate; adjust all soil amendments to comply with the test reports.

3. Submit seed vendor's certified statement for each grass seed mixture required, stating botanical and common name, percentage by weight, and percentages of purity, germination, and weed seed for each grass seed species.

C. Contract Closeout Submittals: Comply with the requirements of Section 01 7800.

1.04 QUALITY ASSURANCE

A. Worker's Qualifications: The person's performing the planting and their direct supervisor shall be personally experienced in the construction and caring of lawn areas. On site supervisory personnel shall have been employed by the company engaged in the installation and care of lawn areas for a minimum of five years. All other individuals on the landscape crew must have a minimum of six months experience in the landscape contracting industry.

1.05 DELIVERY, STORAGE AND HANDLING

A. Packing and Shipping: Ship seed and associated materials with certificates of inspection required by governing authorities.

B. Do not make substitutions. If specified seed material is not obtainable, submit to the Project Designer proof of non-availability and a proposal for use of equivalent material.

C. Store all seed at the site in a cool, dry place as approved by the Owner's Representative. Replace any seed damaged during storage.

D. Deliver seed in vendor's unopened packages bearing labels showing the vendor's name and seed analysis by weight.

E. Deliver fertilizer in the manufacturer's standard sized bags showing the weight, analysis, and manufacturer's name. Store all fertilizer under a waterproof cover or in a dry place as approved by the Owner's Representative.

1.06 PROJECT CONDITIONS

A. Water: If available on the site, water will be supplied for the purpose of watering newly planted lawn areas at no cost to the contractor. If water is not available on site, the contractor shall supply water at their own cost as required to maintain the health of the newly planted material.

B. Provide irrigation materials capable of adequately watering new lawn areas until acceptance.

1.07 PESTICIDE APPLICATIONS

A. Any contractor applying pesticides must notify the Owner's designated pesticide representative and all property neighbors not less than 48 hours in advance of any pesticide application including herbicides, insecticides and fungicides in accordance State Regulations and the School Pesticide Neighbor Notification Law, Section 409-H of the New York State Education Law and Commissioner's Regulation 155.24.

1.08 SEQUENCING AND SCHEDULING

A. Proceed with and complete lawn planting as rapidly as portions of the site become available, working within seasonal limitations for the work required.

B. Seed lawn areas during a period between August 15 and October 1. Seeding during unseasonable conditions must be reviewed and approved with the Project Designer at the sole risk of Contractor.

C. The Contractor shall complete a minimum of three mowings before requesting the Project Designer review for acceptance of seeding work.

PART 2 PRODUCTS

2.01 SEED

A. Grass seed shall be certified “Blue Tag” seed composed of a blend of varieties mixed in proportion by weight and tested for minimum percentages of purity and germination. Submit the proposed mixture to the Project Designer for approval.
   1. Seed blend shall consist of 80% Kentucky Bluegrass and 20% Perennial Ryegrass on a weight basis.
   2. The seed shall contain a blend of at least two Kentucky Bluegrass varieties.
   3. The Perennial Ryegrass shall have a minimum germination percentage of 85%.
   4. The percentage of weed seed shall not exceed 1% and other crop seed shall not exceed 0.5% by weight of the mixture.
   5. Any variety substitutions or deviations from these specifications must be approved by the Project Designer.

2.02 TOPSOIL

A. Use either approved topsoil imported to the project site, or approved on-site topsoil stripped, stockpiled and amended to meet these required specifications.
   1. On-site topsoil shall be from existing stockpiles stripped from the project site, tested by the Contractor, and amended to meeting these specifications.
   2. Where quantity of topsoil required exceeds that available from on-site stockpiles, provide imported topsoil from local sources or from areas having similar soil characteristics to that found on the project site which are producing or have produced fair to good yield farm crops without unusual fertilization for a minimum period of ten years or from arable or cultivable areas supplied with good natural drainage. Do not obtain topsoil from bogs or marshes or from farmland that has utilized “Atrizine” or similar herbicide within the past five years.

B. Provide topsoil conforming to the following:
   1. Original loam topsoil, well drained homogeneous texture and of uniform grade, without the admixture of subsoil material and entirely free of dense material, hardpan, sod, or any other objectionable foreign material.
   2. Containing not less than four percent nor more than 20 percent organic matter in that portion of a sample passing a ¼” sieve when determined by the wet combustion method on a sample dried at 105 degrees F.
   3. Containing a pH value within the range of 6.3 and 7.0 on that portion of the sample which passes a ¼” sieve.
   4. On-site and imported topsoil shall be mechanically screened prior to respreading to comply with the following gradation:

SIEVE DESIGNATION	PERCENT PASSING
¾ inch	100
¼ inch	97 – 100
No. 200	20 - 65

2.03 FERTILIZER

A. Mixed commercial fertilizers containing total nitrogen, available phosphoric acid and soluble potash in the ratio of 10-6-4 (50% N/UF). 50% of the total nitrogen shall be derived from a urea form furnishing a minimum of 3.5% water insoluble nitrogen (3.5% WIN). The balance of the nitrogen shall be present as methylene urea, water soluble urea, nitrate and ammoniacal compounds.

2.04 LIME

A. Dolomitic Limestone: Approved agricultural dolomitic limestone containing no less than 50% of total carbonates and 25% total magnesium with a neutralizing value of at least 100%. The material shall be ground to such a fineness that 40% will pass through a number 100 U.S. standard sieve, and 98% will pass through a number 20 U.S. standard sieve. The lime shall be uniform in composition, dry and free flowing and shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis. Any lime which becomes caked or otherwise damaged making it unsuitable for use will be rejected.

B. Calcitic Limestone: Approved agricultural calcitic limestone containing a minimum of 86% calcium carbonate expressed as CaCO3. The material shall be ground to such a fineness that 40% will pass through a number 100 U.S. standard sieve, and 98% will pass through a number 20 U.S. standard sieve. The lime shall be uniform in composition, dry and free flowing and shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis. Any lime which becomes caked or otherwise damaged making it unsuitable for use will be rejected.

2.05 MULCH

A. Dry Application Straw: Stalks of oats, wheat, rye or other approved crops which are free from noxious weeds. Weight shall be based on 15% moisture.

B. Hydro-Application: Colored wood cellulose fiber product specifically designed for use as a hydro-mechanical applied mulch.
   1. For convenience, details and specifications have been based on the following manufacturers and their products:
      a. Conwed Hydro Mulch as manufactured by Conwed Fibers, Hickory NC.

PART 3 EXECUTION

3.01 EXAMINATION

A. Installer Verification of Conditions: Examine conditions under which lawn installation is to be completed with the materials and components specified in this section. Affected Prime Contractors, the Owner's Representative and the Project Designer shall be notified in writing of any conditions detrimental to the proper and timely installation of the work.
   1. When the installer confirms conditions as being acceptable, to ensure proper and timely installation of the work and to ensure requirements of applicable warranties or guarantees can be satisfied, submit written confirmation to the Project Designer. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to the installer.

3.02 PREPARATION

A. Strip and stockpile full depth of existing topsoil. Screen topsoil to comply with gradation specifications prior to respread of the material.

B. Perform earthwork operations to accomplish design elevations as indicated on the Contract Documents. Loosen subgrade of lawn areas to a minimum depth of four inches. Remove stone and any other deleterious matter encountered over 1½" in any dimension within the subgrade.

C. Respread screened topsoil in lawn areas to a minimum depth of six inches as required to meet lines, grades, and elevations shown after light rolling and settlement.

D. Provide lime or sulfur as required to adjust pH of the screened topsoil to be 6.3 to 7.0. Apply lime or sulfur materials at a rate of 80 pounds per 1000 square feet (final application rate to be determined by the soil test report). Cultivate soil amendments to a four inch depth.

E. Grade lawn areas to a smooth even surface with loose, uniformly fine texture. Roll, rake, remove ridges and fill depressions as required to meet finish grades. Limit fine grading operations to areas which can be planted immediately after grading.

F. Moisten prepared lawn areas before seeding if soil is dry. Water thoroughly and allow surface moisture to dry before planting lawns. Do not create a muddy soil condition.

G. Restore lawn areas to specified condition if eroded or otherwise disturbed after fine grading and prior to seeding.

H. Preparation of Unchanged Grades: Where lawns are to be seeded in areas that have not been altered or disturbed by excavating, grading, or stripping operations, prepare the soil bed for lawn planting as follows:
   1. Prior to preparation of unchanged grades, remove existing grass, vegetation and turf. Dispose of such material outside of the Owner's property; do not turn over into the soil being prepared for lawns unless specifically indicated to do so on the Contract Drawings.
   2. Till soil to a depth of not less than six inches.
   3. Apply soil amendments and initial fertilizers as recommended.
   4. Remove high areas and fill in depressions.
   5. Till soil to a homogeneous mixture of fine texture, free of lumps, clods, stones, roots and other extraneous matter.

3.03 SEEDING

A. Do not use wet seed or seed which is moldy or otherwise damaged in transit or storage.

B. Application Rate: Six pounds of seed per 1000 square feet.

C. Dry Mechanical Application of Seed: Sow seed with Brillion seeder with notched rollers in three passes, second pass at 90 degrees to the first and the third at 45 degrees to the second. Sow at a rate of two pounds per 1000 square feet for each pass for a total of six pounds per thousand square feet. Incorporate the seed into the upper one inch of the prepared soil bed and water with a fine spray.

D. Hydroseeding
   1. Apply seeding material with an approved hydroseeder.
   2. Fill tank with water and agitate while adding seeding materials. Use sufficient fertilizer, mulch and seed to obtain the specified application rate. Maintain constant agitation to keep the contents in a homogeneous suspension. Prolonged delays in application or agitation that may cause injury to the seed will be the basis for rejection of the material remaining in the tank.
   3. Distribute uniformly a slurry mixture of water, seed, fertilizer and mulch at a minimum rate of 57 gallons per 1000 square feet. (2500 gallons per acre).The Owner's Representative may order the amount of water increased if distribution of seeding materials is not uniform.

3.04 MULCHING

A. Dry Application: Immediately following seeding operations cover seeded areas with a uniform blanket of shredded straw mulch mechanically blown at a rate of 100 pounds per 1000 square feet of seeded area.

B. Hydro Application: Apply approved mulch in accordance with the manufacturer's written instructions and recommended rates of application.

3.05 PROTECTION OF SEEDED AREAS

A. Where grade is less than 3:1, mechanically spread mulch material and crimp into soil utilizing approved disc type machinery with rows at a 6" spacing.

B. Where grade is 3:1 or greater, cover seeded areas with jute matting and roll matting down over the slopes without stretching or pulling.
   1. Lay the jute matting smoothly on the soil surface, burying the top end of each section in a narrow six inch trench. Leave a 12 inch overlap from the top roll over the bottom roll. Leave a four inch overlap over the adjacent section.
   2. Staple outside edges and overlaps at 36 inch intervals.
   3. Lightly dress slopes with topsoil to ensure close contact between the matting and the soil layer below.
   4. In ditches, unroll matting in the direction of flow. Overlap ends of strips six inches with the upstream section on the top.

3.06 MAINTENANCE

A. Begin maintenance immediately after seeding. If seeded in the fall, continue maintenance the following spring until acceptable lawn conditions are established.

B. Water to ensure proper seed germination and to keep the surface of the seed bed damp. Continue watering new seeding until acceptance by the Owner. Apply water slowly so that the surface of the soil will not puddle or crust.

C. Cut grass for the first time when it reaches a height of 2½" and maintain a minimum height of 2". Do not cut more than 1/3 of the blade at any one mowing. Remove clippings.

D. Apply herbicide as soon as weeds germinate, during calm weather when the air temperature is above 50 degrees F. using a licensed applicator to apply the herbicide. When using herbicides, apply in accordance with the manufacturer's instructions.

E. Replant damaged grass areas showing root growth failure, deterioration, bare spots and eroded areas.

F. Refertilize newly seeded areas 28 days after the initial seeding. Apply a minimum of one pound of nitrogen per 1000 square feet of athletic field area. Use a complete fertilizer with a 2-1-1 ratio or as recommended by soil test results.

3.07 CLEANUP AND PROTECTION

A. During landscape construction work, keep pavements clean and the project area in an orderly condition.

B. Protect landscape construction and materials from damage due to landscape operations, operations by other contractors, trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair or replace damaged landscape construction as directed.

3.08 INSPECTIONS AND FINAL ACCEPTANCE

A. When seeding work and lawn establishment is completed, (including maintenance), request the Project Designer to make an inspection to determine acceptability. Final acceptance of lawn areas will be granted when a uniform stand of acceptable grass is obtained with a minimum of 95% coverage.

B. Where inspected lawn installation does not comply with the requirements of the Contract Documents, repair rejected work. The Contractor's maintenance responsibility shall continue until reinspected by the Project Designer and found acceptable. Maintenance responsibilities shall include refertilization, overseeding, watering and mowing of seeded areas.

END OF SECTION

SECTION 33 4000
STORM DRAINAGE UTILITIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Drainage pipe

B. Drainage structures

C. Frames, grates and covers

D. Filter fabric

E. Warning tape

1.02 RELATED SECTIONS

A. Section 31 0000 – Earthwork

B. Section 31 2317 – Trenching

1.03 REFERENCE STANDARDS

A. ASTM C478/C478M - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections

B. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics.

C. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications

D. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings

E. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.

F. ASTM D3786/D3786M - Standard Test Method for Bursting Strength of Textile Fabrics—Diaphragm Bursting Strength Tester Method.

G. ASTM D4491/D4491M - Standard Test Methods for Water Permeability of Geotextiles by Permittivity.

H. ASTM D4533/D4533M - Standard Test Method for Trapezoid Tearing Strength of Geotextiles.

I. ASTM D4632/D4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

J. ASTM D4751 - Standard Test Methods for Determining Apparent Opening Size of a Geotextile

K. ASTM D4833/D4833M - Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products

L. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

M. AASHTO M 252 - Standard Specification for Corrugated Polyethylene Drainage Pipe

N. AASHTO M 294 - Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter

1.04 SUBMITTALS

A. Comply with the requirements of Section 01 3000 – Administrative Requirements and as modified below.

B. Product Data: Submit manufacturer’s name, specifications and installation instructions for each item specified.

C. Shop Drawings: Submit details of all underground structures including catch basins, drop inlets, storm manholes, drywells, trench drains, headwalls, outlet structures, frames and grates, frames and covers, culvert end sections and similar items indicated on the Contract Documents.

D. Closeout Procedures: Comply with the requirements of Section 01 7800.

1.05 QUALITY ASSURANCE

A. Regulatory Requirements: Obtain written permission from applicable agencies prior to the start of construction. Submit one copy of the permit to the Owner's Representative.

B. Comply with applicable municipal regulations. Coordinate connections into existing municipal sewers with appropriate town/village/county/city or state representatives. Pay for all fees associated the connection to municipal sewer system.

1.06 PROJECT CONDITIONS

A. Field Measurements: Establish and maintain required lines and elevations for grade control.

1.07 SEQUENCING AND SCHEDULING

A. Proceed with and complete storm drainage installation as rapidly as portions of the site become available, working within seasonal limitations for the work required.

PART 2 PRODUCTS

2.01 PIPING

A. Polyvinyl Chloride Pipe (PVC): SDR 35 pipe, 4" diameter and larger complying with ASTM D 3034.

B. High Density Polyethylene Pipe (HDPE): Solid or perforated double wall smooth interior pipe complying with the following:
   1. 4" to 10" diameter pipe to conform to AASHTO M 252. 12" to 36" diameter pipe to conform to AASHTO M 294.
   2. Coefficient of Roughness (Interior Pipe Surface): 0.012 maximum (Manning Formula)
   3. Classification: Type S
   4. Minimum Pipe Stiffness Values
      a. 4" – 12" Diameter: 50 psi
         1) 15" Diameter: 42 psi
         2) 18" Diameter: 40 psi
         3) 24" Diameter: 34 psi
         4) 30" Diameter: 28 psi
         5) 36" Diameter: 22 psi
   5. Joint Couplings: Polyethylene, bell and spigot type couplers utilizing an elastrometric gasket conforming to ASTM F 477. Snap on type or split collar through 24" diameter, screw on type where applicable.
      1) Corrugated to match pipe corrugations, width not less than one half the pipe diameter.
      2) Split couplings shall engage an equal number of corrugations on each side of the joint
   6. Fittings: Either molded or fabricated, high density polyethylene components meeting the properties specified for, and designed specifically for the pipe manufactured by the pipe manufacturer.
   7. Perforated Pipe: Conform to AASHTO M-252 or AASHTO M-294, Type SP with Class I perorations.
   8. Specifications have been based on products manufactured by Advanced Drainage Systems, Inc, Columbus, Ohio (Tel. #614-457-3051) or Hancor, Inc., Findlay, Ohio (Tel. #800-847-5880).
      a. Corrugated Polyethylene Piping: Solid and perforated piping complying with the following:
   9. Pipe Classification: AASHTO M252, Type S
   10. Material Classification: ASTM D 3350
   11. Property Description: Cell Class 324420C
   12. Pipe Size: As indicated on the Contract Documents

13. Perforation Size: 9/16” by 1/16” slots with a minimum inlet area of 2.4” per lineal foot of pipe.
14. Joint Couplings: External snap couplers with gaskets for solid wall and external snap couplers without gaskets for perforated pipe
15. Specifications have been based on products manufactured by Advanced Drainage Systems, Inc, Columbus, Ohio (Tel. #614-457-3051) or Hancor, Inc., Findlay, Ohio (Tel. #800-847-5880).

2.02 DRAINAGE STRUCTURES

2.03 FILTER FABRIC

A. Continuous filament fabric consisting of polypropylene fibers and heat bonded nylon sheathed polypropylene fibers.
   1. Specifications have been based on “Mirafi 140N” manufactured by Mirafi Construction Products, Pendergrass, Georgia (Tel. #706-693-2226).

2.04 WARNING TAPE

A. Standard, 4 mil polyethylene, 3” wide tape, purple, detectable type tape, imprinted with the words “CAUTION BURIED STORM SEWER” in black letters.

PART 3 EXECUTION

3.01 EXAMINATION

A. Installer Verification of Conditions: Examine conditions under which storm drainage is to be installed with the materials and components specified in this section. Affected Prime Contractors, the Owner’s Representative and the Project Designer shall be notified in writing of any conditions detrimental to the proper and timely installation of the work.
   1. When the installer confirms conditions as being acceptable to ensure proper and timely installation of the work and to ensure requirements of applicable warranties or guarantees can be satisfied, submit written confirmation to the Project Designer. Failure to submit written confirmation and subsequent installation will be assumed to indicate conditions are acceptable to the installer.

3.02 PREPARATION

A. Excavation of trenches and for appurtenances and backfilling for storm drains shall be in accordance with the applicable portions of Project Manual Sections in Division 31.

B. Inspect all pipe and fittings prior to installation. Remove defective pipe and fittings from the site.

3.03 INSTALLATION

A. Pipe Installation
   1. Lay pipes true to line and grade. Gravity flow storm drainage systems shall be laid with bells facing upgrade.
   2. Do not lay pipe on unsuitable material, in wet trenches or when a trench and weather conditions are unsuitable for the work.
   3. Support the pipe on compacted bedding material.
   4. Clean interior of all pipe thoroughly before installation.
   5. Lower pipe in to trench carefully and bring to the proper line, grade and joint. After joining, the interior of each pipe shall be thoroughly wiped or swabbed to remove any dirt, trash or excess jointing materials.
   6. Do not walk on pipe in trenches until covered by layers of backfill to a minimum depth of 12” over the crown of the pipe.
   7. Install gravity sewer pipe to comply with the manufacturer’s specifications.
   8. Warning tape shall be continuously placed 12” above the storm sewer piping.

3.04 ADJUSTING AND CLEANING

A. Deflection Tests: Provided by the Prime Contractor in accordance with the requirements of Project Manual Section 01 4000 – Quality Requirements.

B. Upon completion of the installation, leave all components of the storm drainage system completely free from silt, debris and other obstructions.

C. Repairs and Protection of Storm Drainage Infrastructure
   1. Repair or replace broken or defective storm drainage components as directed by the Project Designer.
   2. Protect storm drainage from damage until acceptance of the infrastructure construction.

END OF SECTION

APPENDIX A

Limited Hazardous Material Pre-Renovation Survey Report
C&S Companies – October 2023

C&S Engineers, Inc.
499 Col. Eileen Collins Blvd
Syracuse, New York 13212

Limited Hazardous Material Pre-Renovation Survey Report

Highland Falls-Fort Montgomery Central School District
Elementary School
895 Rte. 9W
Fort Montgomery, N.Y. 10922

Prepared for:
Mr. Christopher Kirwan-Director of Facilities
Highland Falls-Fort Montgomery CSD
21 Morgan Road
Highland Falls, N.Y. 10928

October 2023
C&S Project # AH4.001.001

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Appendices

1.0 Introduction

C&S Companies (C&S) was retained by the Highland Falls-Fort Montgomery Central School District (HFFM CSD) to complete a limited hazardous material pre-renovation survey of the Elementary School, located at 895 Rte. 9W, Fort Montgomery, New York. The survey was limited to areas to be impacted by the upcoming project, as identified on design development drawings prepared by BCA Architects & Engineers, dated 9/19/23.

2.0 Scope of Services

The survey was conducted for the purpose of investigating and/or sampling asbestos-containing materials (ACMs), presumed asbestos-containing materials (PACMs), lead-based paints (LBPs), polychlorinated biphenyls (PCBs) in caulk, and suspect "universal" items that may potentially contain hazardous waste.

3.0 Records Review

The HFFM CSD provided access to the US Environmental Protection Agency (USEPA) Asbestos Hazard Emergency Response Act (AHERA) report in preparation for the project. Records indicate ACM flooring was abated from the gymnasium/cafeteria in 2010. The 2019 Surveillance Report indicates the following ACMs have been identified and continue to be managed in the building:

ACMS

Mudded Fittings above ceilings

J.C. Broderick & Associates, Inc. prepared a Summary of Environmental Sampling Report, dated September 15, 2023, the sampling was associated with interior building materials that were impacted by recent water damage. Results indicate the following materials were confirmed NON-ACMs:

NON-ACM

Wall Plaster (Skim & Base Coat)
Boiler Gaskets
Block Wall
Gypsum Board and Joint Compound
12" Blue Vinyl Floor Tile
Associated Yellow Floor Tile Mastic
Cove Base and Associated Mastic

4.0 Asbestos Survey

C&S Companies' New York State Department of Labor (NYSDOL) Certified Asbestos Building Inspectors Randy Arnold and Bridget Ruane conducted the survey for suspect ACMs and presumed asbestos-containing materials (PACMs). The investigation included the collection, identification, assessment, plotting location and quantification of all identified ACMs and PACMs within the renovation area.

4.1 Asbestos Sampling Methodologies

Suspect building materials were investigated/sampled. Samples of homogenous areas/materials were submitted in a series (A, B, C) for analysis, laboratory results are reported as percent (%) by weight and type of

asbestos present. Friable and non-friable bulk samples were analyzed for asbestos content in accordance with the following regulations:

- National Emission Standards for Hazardous Air Pollutants (NESHAPS)
- New York State Department of Labor Industrial Code Rule 56 (ICR-56)
- Occupational and Health Administration (OSHA) Regulation 29 CFR 1910.1001 and 29 CFR 1926.1101.

4.2 Asbestos Laboratory Methodologies

Suspect building material samples were sent to AmeriSci New York, (an accredited and licensed laboratory), analysis was conducted in accordance with New York State Department of Health (NYSDOH) Environmental Laboratory Program (ELAP) and National Voluntary Laboratory Accreditation Program (NVLAP). Analysis was conducted in accordance with the following methodologies:

- Polarized Light Microscopy (PLM) and Dispersion Staining Techniques (198.1 methodology)
- Non-Friable Organically Bound (NOB) (198.6 and 198.4 methodology)

4.3 Suspect Asbestos Materials Sampled

The following table includes sample identification, material description, sample location and laboratory results for the material, ACMs are identified in bold font.

Table 1: Asbestos Bulk Sample Summary

SAMPLE IDENTIFICATION	MATERIAL DESCRIPTION	SAMPLE LOCATION(S)	ASBESTOS CONTENT
PLB-001A,B,C	Rough Plaster Ceiling	1930-Basement-Boiler Room	NAD
PLS-002A,B,C	Smooth Plaster Ceiling	1930-Basement-Boiler Room	NAD
TB-003A,B	Black/Gray Gasket @ Tank	1930 Basement-Tank Room	NAD
PLB-004A,B,C	Smooth Plaster Wall/Ceiling Plaster	1930 Basement-Stairwell	NAD
EC-005A,B	White Endcap Sealant at Fiberglass Insulation	1930-Basement-Boiler Room	NAD
FP-006A,B	Pink/Red Fire Putty	1930 Basement-Stairwell	NAD
CT-007A,B	2'x 4' Pinhole/Fissured Ceiling Tile	1960-1st Floor Hall	NAD
CT-008A,B	2' x 4' Textured Ceiling Tile	1990-1st Flr. 104/2nd Flr. 204	NAD
SR-009A,B	Sheetrock Walls/Soffits	1990-1st Flr. 104/2nd Flr. 204	NAD
JC-010A,B	Joint Compound	1990-1st Flr. 104/2nd Flr. 204	NAD

Table 1: Asbestos Bulk Sample Summary

SAMPLE IDENTIFICATION	MATERIAL DESCRIPTION	SAMPLE LOCATION(S)	ASBESTOS CONTENT
SM-011A,B	Gray Sink Mastic	1990-2nd Flr. 204	NAD
FT-012A,B	12" x 12" Blue Floor Tile	1990-2nd Flr. 204	NAD
FTM-013A,B	Yellow Floor Tile Mastic (on concrete)	1990-2nd Flr. 204	NAD
CBM-014A,B	Yellow Cove Base Mastic	1990-2nd Flr. 204/1st Flr. 104	NAD
SPF-015A,B,C	Gray Spray-On Fireproofing	1990-2nd Flr. 204	NAD
CWTG-016A,B	White Ceramic Wall Tile Grout	1990-2nd Flr. 204	NAD
CWM-017A,B	Dark Brown Wall Tile Mastic	1990-2nd Flr. Toilet 204-2	NAD
FT-018A,B	Gray Streaked Floor Tile Debris (under UV)	1990-2nd Flr. 206	NAD
FTM-019A,B	Black Floor Tile Mastic (under UV)	1990-2nd Flr. 206	NAD
SPF-020A,B,C	Gray Spray-On Fireproofing	1990-2nd Floor Hall	NAD
FT-021A,B	12" Brown Streaked Floor Tile	1960-1st Flr. 110	NAD
FTM-022A,B	**Black Floor Tile Mastic (on concrete)**	**1960-1st Flr. 110**	**1.7% Chrysotile**
PLS-025A,B,C,D,E	Plaster (Skim Coat)	1930-1st Flr. Throughout	NAD
PLB-026A,B,C,D,E	Plaster (Base Coat)	1930-1st Flr. Throughout	NAD
FT-027A,B	12" White with Red, Blue, Yellow Accent Floor Tile (on underlayment)	1930-1st Flr. Rm. 120/Hall	NAD
FT-028A,B	12" Gray Floor Tile (on wood)	1960-1st Floor Stage	NAD
CFTG-029A,B	Gray Grout at 1" x 1" Ceramic Floor Tile	1930-1st Flr. Bath 120-1	NAD
FT-030A,B	12" Dark Gray Floor Tile	1930-1st Flr. Rm. 127	NAD
CFTT-031A,B	Gray Thin Set/Mud Bed	1930-1st Flr. Bath 120-1	NAD
CWM-032A,B	Yellow Ceramic Wall Tile Mastic	1930-1st Flr. Bath 120-1	NAD

Table 1: Asbestos Bulk Sample Summary

SAMPLE IDENTIFICATION	MATERIAL DESCRIPTION	SAMPLE LOCATION(S)	ASBESTOS CONTENT
CWG-033A,B	White Grout @ 4" Ceramic Wall Tile	1930-1st Flr. Bath 120-1	NAD
FTM-034A,B	Yellow Floor Tile Mastic (on wood)	1930-1st Flr. Classroom 127	NAD
CT-035A,B	12" x 12" Pinhole Ceiling Tile	1960-1st Flr. Bath 111	NAD
FT-036A,B	12" x 12" Gray Floor Tile (under 027/034)	1960-1st Flr. Nurse's Office 117	NAD
FTM-037A,B	Dark Brown Floor Tile Mastic	1960-1st Flr. Nurse's Office 117	NAD
DJ-038A,B	Black Mastic on White Canvas Duct Jacketing	1960-Gym HVAC Rm. 115-1	NAD
VD-039A,B	White Fabric Vibration Dampener	1960-Gym HVAC Rm. 115-1	NAD
WP-040A,B	**Black Waterproofing @ Brick Walls**	**1930-Attic**	**9.5% Chrysotile**
BINS-041A,B,C	White Blown-in Insulation	1930-Attic	NAD
LS-042A,B	Black Lap Sealant	1930-Roof	NAD
GYP-043A,B	Gypsum Deck	1930-Roof	NAD
TP-044A,B	**Black Tar Paper (on Wood Deck)**	**1930-Roof Field**	**5.7% Chrysotile**
MORTAR-045A,B	Gray Mortar at Termination Bar	1960-Roof (East)	NAD
SGL-046A,B	Gray Granulated Shingle	1930-Roof (Gable Ends)	NAD
VB-047A,B	Black Vapor Barrier/Tar Paper (Under Shingles)	1930-Roof	NAD
DS-048A,B	Gray Duct Sealant	1930-Attic	NAD
SC-049A,B	Gray Skylight Caulk	1960-Roof	NAD
ISO-050A,B	Black Paper Backing on Iso	1960-Roof	NAD
TAR-051A,B	Black Tar on Metal Deck	1960-Roof Field Core	NAD
EP-052A,B	Stucco EPHIS Panels	1990-Walls	NAD

Table 1: Asbestos Bulk Sample Summary

SAMPLE IDENTIFICATION	MATERIAL DESCRIPTION	SAMPLE LOCATION(S)	ASBESTOS CONTENT
EPC-053A,B	Gray Caulk at EPHIS Panel	1960/1990 @ Wall Panels	NAD
CF-054A,B	**Black Flashing Tar @ Skylight**	**1960 Skylight Curbs**	**2.9% Chrysotile**
TD-055A,B	Tectum Deck	1960 Gym/Cafeteria Roof	NAD
PL-056A,B	Pearlite Insulation	1960 Gym/Cafeteria Roof	NAD
MORTAR-057A,B	Gray Brick Mortar	1990-Rear/N	NAD
TWF-058A,B	Black Thru Wall Flashing	1990-Rear/N	NAD
CLK-059A,B	Gray Door/Window Caulk	1990-Rear/N	NAD
CLK-060A,B	Gray EPHIS/Foundation Caulk	1990-Rear/N	NAD
GAS-061A,B	Black Gasket at Glass Block Windows	1960-Gym/Café. W	NAD
TM-062A,B	Yellow Stair Tread Mastic	1930-Stairs @ Corridor C3-1	NAD
SM-063A,B	Gray Stair Treads	1930-Stairs @ Corridor C3-1	NAD
SM-064A,B	Dark Yellow Stud Mastic	1930-Women's Bath 118	NAD
MFITT-065A,B,C	Gray Mudded Fitting	1960-Corridor C2-1/Toilet 106	NAD

Table Notes
NAD = No Asbestos Detected
TRACE = Less Than 1% Asbestos

4.4 Asbestos Bulk Sampling Summary

The following table summarizes ACMS, as identified by laboratory analysis during the pre-renovation survey. Asbestos laboratory reports and chain of custodies are included in Appendix B of this report.

Table 2: Asbestos-Containing Materials

ACM DESCRIPTION	ACM LOCATION	ESTIMATED QUANITY	MATERIAL CONDITION
Black Floor Tile Mastic	**1960 Wing-Classrooms 110 & 106**	1,400 SF	NF, Intact
Black Wall Mastic	**1930 Wing-Perimeter of Ext. Walls (1st Floor & Attic)**	6,000 SF	NF, Intact

Table 2: Asbestos-Containing Materials

ACM DESCRIPTION	ACM LOCATION	ESTIMATED QUANITY	MATERIAL CONDITION
Thermal System Insulation	**1960 Wing-Bathrooms & Nurse's Office**	20 LF	F, Presumed
Black Tar Paper	**1930 Wing-Roof Field (Under EPDM, Gypsum on Wood Deck)**	5,400 SF	NF, Intact
Black Curb Flashing	**1960 Wing @ Curbs**	56 SF	NF, Intact
Presumed Thermal System Insulation	**1960 Wing-(walls/ceilings/chases)**	160 LF	F, Presumed
Presumed Floor Tile/Mastic	**Under Univents Classrooms 105, 122, 127 Offices 120, 119 and Library 123**	240 SF	NF, Intact
Presumed Electrical Components	**1930 Wing-Basement Boiler Room & Stairwell**	30 SF	NF, Presumed

Table Notes:
LF= Lineal Feet, SF = Square Feet
F= Friable, NF= Non-Friable

4.5 Materials Containing Trace Asbestos

It should be noted that the Occupational Safety & Health Administration (OSHA) Asbestos Standard (29 CFR 1926.1101) has a definition for both "asbestos" and "asbestos-containing material." Under OSHA Asbestos Standard, the definition of asbestos covers all building materials containing any detectable concentration of asbestos, including those with concentrations less than or equal to one percent asbestos. Although work operations conducted in areas where a material contains less than or equal to one percent asbestos is an "unclassified" operation, the employer still must follow the requirements of 29 CFR 1926.1101(g)(1) [except (g)(1)(i)], (g)(2) and (g)(3) that describe engineering and work practice controls operations to prevent unnecessary asbestos exposures to their employees (i.e. worker protection regulations).

4.6 Asbestos-Containing Materials Report Notifications

- The completed asbestos survey shall be submitted to the appropriate Asbestos Control Bureau District office (as per Subpart 56-11.5).
- One copy of the completed ACM survey shall be sent by the owner or their agent to the local government entity charged with issuing a permit for demolition, renovation, remodeling or repair work under applicable State or local laws.
- The completed asbestos survey shall be kept at the construction site throughout the duration of the demolition, renovation, remodeling or repair work.

4.7 Asbestos Recommendations

Building materials, not specifically identified in this report, which are identified during the project shall be "presumed" asbestos-containing materials and handled accordingly. These materials must be examined by a New York State Department of Labor Certified Asbestos Building Inspector, collection of samples and analysis

must be performed. In accordance with both state and federal regulations, ACMs and PACMs must be handled and disposed of by a licensed NYSDOL asbestos abatement contractor prior to any renovation or demolition-related activities.

5.0 Lead-Based Paint Inspection

During the pre-renovation survey, C&S building inspectors Randy Arnold and Bridget Ruane collected representative samples of paint applications from accessible building components, for the analysis of lead. Bulk samples were analyzed by EPA 7000b series analysis method.

5.1 Lead-Based Paint Laboratory Accreditations & Methodology

Paint chip samples were sent to Schneider Laboratories Global, Inc. (an accredited and licensed laboratory):

- New York State Department of Health (NYSDOH)
- National Environmental Laboratory Accreditation Conference Standards for the category Environmental Analyses Solid and Hazardous Waste
- Environmental Laboratory Program (ELAP) ISO-17025 certified
- National Lead Laboratory Approval Program (NLLAP)
- AIHA-LAP, LLC accreditation for the analysis of lead-based paint chips

5.2 Suspect Lead-Based Paint(s) Sampled

The following table includes sample identification, material description, sample location and laboratory results of the material:

Table 3: Suspect Lead-Based Paint(s) Sampled

SAMPLE NUMBER	MATERIAL DISCRIPTION	SAMPLE LOCATION	LEAD CONTENT
PAINT-001	White Fascia Wood Trim	1930 Wing-Roof (S)	0.402%
PAINT-002	Silver RTU Paint	1960 Wing-Roof (S)	<0.00303%
PAINT-003	Brown Stair Components	1960 Wing-Stage	0.441%
PAINT-004	White Bar Joists/Columns	1960 Wing-Café/Gym	0.205%
PAINT-005	Maroon Radiator Covers	1960 Wing-Café/Gym (W)	0.0231%
PAINT-006	**Gray Cove Base Paint**	**1930 Wing-Classroom 127 (W)**	**1.68%**
PAINT-007	White Wall/Trim Paint	1930 Wing-Classroom 127	0.094%
PAINT-008	**White Ductwork**	**1960 Wing-Nurse's Office**	**0.748%**
PAINT-009	**White Plaster Ceiling Paint**	**1930 Wing-Corridor**	**1.86%**
PAINT-010	**White/Yellow Ceiling Metal Deck Paint**	**1960 Wing-Classroom 105**	**0.537%**
PAINT-011	White/Cream Block Wall Paint	1960 Wing-Classroom 105	0.0608%
PAINT-012	White/Cream Sheetrock/Plast. Wall Paint	1960 Wing-Classroom 110	0.106%

Table Notes: Lead content is reported in percent by weight

5.3 Lead-Based Paint Sampling Summary

By regulatory definition, LBP is defined as any paint containing a minimum of 0.5% lead by weight. Four (4) of the paint applications (PAINT-006,008,009,010) sampled during this survey were determined to be LBP, by laboratory analysis. It should be noted that the remaining eight (8) paint applications are considered lead-containing materials (LCMs), as defined by OSHA. By regulatory definition, a LCM contains any amount of lead, even concentrations less than 0.5%. As such, certain worker protection regulations (OSHA) and waste disposal regulations (NYSDEC) shall apply during the handling and disposal of the LBPs and LCMs identified at the project site. The laboratory analysis report for the paint chip sampling has been included in Appendix C.

6.0 PCB Caulk Inspection

During the pre-renovation survey, C&S inspectors, Randy Arnold and Bridget Ruane collected one (1) sample of suspect building caulk from for polychlorinated biphenyls (PCBs) The sample was submitted for analysis in accordance with the EPA 8082a series analysis methodology.

6.1 PCB Laboratory Accreditations & Methodology

PCB bulk samples were submitted to Schneider Laboratories Global, Inc. (an accredited and licensed laboratory) for analysis in accordance with EPA 8082A series method.

- New York State Department of Health (NYSDOH)
- National Environmental Laboratory Accreditation Conference Standards for the category Environmental Analyses Solid and Hazardous Waste
- Environmental Laboratory Program (ELAP) ISO-17025 certified

6.2 Suspect PCB Caulks Sampled

The following table includes sample identification, material description, sample location and laboratory results.

Table 4: Suspect PCB Caulks Sampled

SAMPLE IDENTIFICATION	MATERIAL DESCRIPTION	SAMPLE LOCATION	PCB CONTENT
SC-048P	Gray Skylight Caulk	1960 Wing-Roof (S)	0.736 ppm

Table Notes:
BRL = Below Reporting Limit

6.3 PCB Caulk Sampling Summary

By regulatory definition, a PCB-containing bulk material is defined as any building material containing at least 50 parts per million (ppm) PCBs. The bulk sample collected during this pre-renovation survey does not exceed 50 ppm and does not require special handling or disposal considerations. The laboratory analysis report has been included in Appendix D of this report.

7.0 Universal Waste

During the pre-renovation survey, C&S inspectors Randy Arnold and Bridget Ruane performed a visual assessment of the areas of the building scheduled to be impacted by the project for items that may potentially be classified as universal waste. These items include but are not limited to: fluorescent lamps, thermostats, batteries, cleaning chemicals, etc., all of which may require special handling and disposal considerations.

7.1 Universal Waste Inventory

The following table includes item identification, item location, estimated quantities, presumed hazardous material associated with the item and item condition:

Table 5: Universal Waste Inventory

ITEM IDENTIFICATION	ITEM LOCATION	ESTIMATED QUANTITY	PRESUMED HAZ MATERIAL	ITEM CONDITION
Fluorescent Light Bulbs	Basement-1930 Wing 1st Floor-1930/1960 Wing 2nd Floor-1990 Wing	30 300 260	Mercury	Intact
Light Ballasts	Basement-1930 Wing 1st Floor-1930/1960 Wing 2nd Floor-1990 Wing	7 128 70	PCBs	Intact
Interior Emergency Flood Light Batteries	1st Floor-1930/1960 Wing 1st Floor-1990 Wing 2nd Floor-1990 Wing	6 2 4	Lead	Intact
Fire Extinguishers	Throughout	10	Compressed Gas / Chemicals	Intact
Exit Signs (Bulbs & Batteries)	1st Floor-1930/1960 Wing 1st Floor-1990 Wing 2nd Floor-1990 Wing	6 2 4	Mercury & Lead	Intact
Transformer	Basement	1	PCB Oil	Intact

Additional investigation into the status of these materials may be performed to prove that hazardous materials are not present. However, without conducting this additional investigation / sampling, these materials must be presumed to contain potentially hazardous materials and handled / disposed of in accordance with all applicable state, federal, and local regulations.

This report was produced exclusively for the Highland Falls-Fort Montgomery Central School District., no other party is entitled to distribute or use this report without prior written consent of HFFM CSD or C&S Companies.

Sincerely,

Randy Arnold
Sr. Project Environmental Scientist
C&S Companies

Bridget Ruane
Project Environmental Scientist
C&S Companies

Appendix A

NYSDOL Company License, Personnel Certifications & Lab Certifications

WE ARE YOUR DOL

NEW YORK STATE | Department of Labor

DIVISION OF SAFETY & HEALTH LICENSE AND CERTIFICATE UNIT, STATE OFFICE CAMPUS, BLDG. 12, ALBANY, NY 12226

ASBESTOS HANDLING LICENSE

C & S Engineers, Inc.
499 Col. Eileen Collins Blvd., Syracuse, NY, 13212

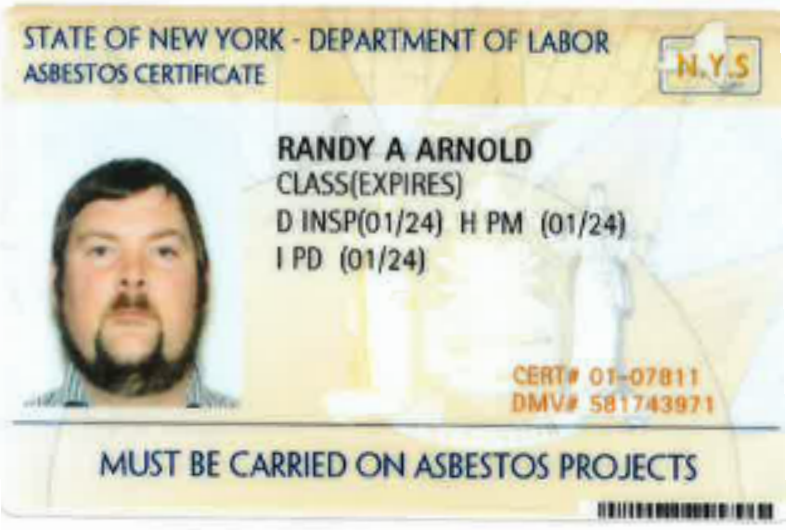
License Number: 29004
License Class: RESTRICTED
Date of Issue: 01/24/2023
Expiration Date: 01/31/2024
Duly Authorized Representative: Aileen Maguire Meyer

This license has been issued in accordance with applicable provisions of Article 30 of the Labor Law of New York State and of the New York State Codes, Rules and Regulations (12 NYCRR Part 56). It is subject to suspension or revocation for a (1) serious violation of state, federal or local laws with regard to the conduct of an asbestos project, or (2) demonstrated lack of responsibility in the conduct of any job involving asbestos or asbestos material.

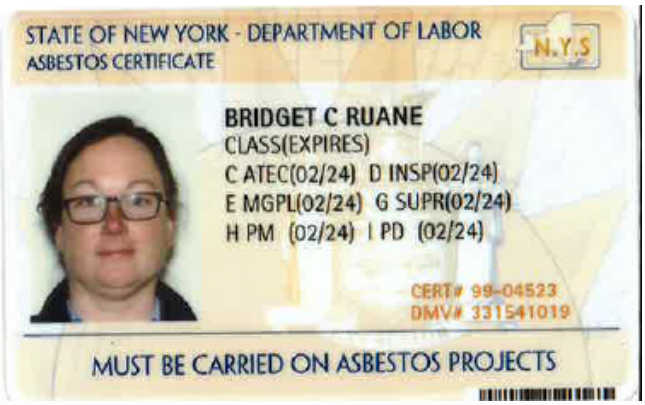
This license is valid only for the contractor named above and this license or a photocopy must be prominently displayed at the asbestos project worksite. This license verifies that all persons employed by the licensee on an asbestos project in New York State have been issued an Asbestos Certificate, appropriate for the type of work they perform, by the New York State Department of Labor.

Amy Phillips, Director
For the Commissioner of Labor

ASBESTOS CERTIFICATION



ASBESTOS CERTIFICATION



NEW YORK STATE OF OPPORTUNITY. Department of Health

KATHY HOCHUL
Governor

JAMES V. McDONALD, M.D., M.P.H.
Acting Commissioner

MEGAN E. BALDWIN
Acting Executive Deputy Commissioner

LAB ID: 11480

March 30, 2023

MS. KAROL H. LU
AMERICA SCIENCE TEAM NEW YORK, INC
117 EAST 30TH ST
NEW YORK, NY 10016

Certificate Expiration Date:
April 01, 2024

Dear Ms. Lu,

Enclosed are certificate(s) of approval issued to your environmental laboratory for the current permit year. The certificate(s) supersede(s) any previously issued one(s) and is(are) in effect through the expiration date listed. Please carefully examine the certificate(s) to insure that the categories, subcategories, analytes, and methods for which your laboratory is approved are correct. In addition, verify that your laboratory's name, address, lead technical director, and identification number are accurate.

Pursuant to NYCRR Subpart 55-2.2, original certificates must be posted conspicuously in the laboratory and copies shall be made available to any client of the laboratory upon request.

Pursuant to NYCRR Subpart 55-2.6, any misrepresentation of the fields of accreditation (category - method - analyte) for which your laboratory is approved may result in denial, suspension, or revocation of your certification. Any use of the Environmental Laboratory Approval Program (ELAP) or National Environmental Laboratory Accreditation Program (NELAP) name, reference to the laboratory's approval status, and/or using the NELAP logo in any catalogs, advertising, business solicitations, proposals, quotations, laboratory analytical reports, or other materials must include the laboratory's ELAP identification number and distinguish between testing for which the laboratory is approved and testing for which the laboratory is not approved.

If you have any questions, please contact us at the Environmental Laboratory Approval Program, Wadsworth Center, New York State Department of Health, Empire State Plaza, Albany NY, 12237; by phone at (518) 485-5570; by facsimile at (518) 485-5568; and by email at elap@health.ny.gov.

Sincerely,

Amy J. Steuerwald

Amy J. Steuerwald, Ph.D.
Director, Environmental Laboratory Approval Program

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2024
Issued April 01, 2022
Revised March 30, 2023

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. KAROL H. LU
AMERICA SCIENCE TEAM NEW YORK, INC
117 EAST 30TH ST
NEW YORK, NY 10016

NY Lab Id No: 11480

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES POTABLE WATER
All approved analytes are listed below:

Miscellaneous

Asbestos	EPA 100.2

Serial No.: 66401

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

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Revised March 30, 2023

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117 EAST 30TH ST
NEW YORK, NY 10016

NY Lab Id No: 11480

is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved subcategories and/or analytes are listed below:

Miscellaneous

Asbestos in Friable Material	Item 198.1 of Manual
	EPA 600/M4/82/020
Asbestos in Non-Friable Material-PLM	Item 198.6 of Manual (NOB by PLM)
Asbestos in Non-Friable Material-TEM	Item 198.4 of Manual

Serial No.: 66402

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WADSWORTH CENTER

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117 EAST 30TH ST
NEW YORK, NY 10016

NY Lab Id No: 11480

is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES AIR AND EMISSIONS
All approved subcategories and/or analytes are listed below:

Miscellaneous

Asbestos	40 CFR 763 APX A No. III
	YAMATE,AGARWAL GIBB
	NIOSH 7402
Fibers	NIOSH 7400 A RULES

Serial No.: 66403

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

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CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

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MR. FAYEZ ABOUZAKI
SCHNEIDER LABORATORIES GLOBAL, INC
2512 WEST CARY STREET
RICHMOND, VA 23220-5117

NY Lab Id No: 11413

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES POTABLE WATER
All approved analytes are listed below:

Metals I

Lead, Total	EPA 200.9 Rev. 2.2

Serial No.: 66373

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

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Revised March 30, 2023

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2512 WEST CARY STREET
RICHMOND, VA 23220-5117

NY Lab Id No: 11413

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Metals I

Barium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
Cadmium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
Calcium, Total	EPA 6010D
Chromium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
Copper, Total	EPA 6010D
Iron, Total	EPA 6010D
Lead, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
	EPA 7000B
	EPA 200.9 Rev. 2.2 (1994)
Magnesium, Total	EPA 6010D
Manganese, Total	EPA 6010D
Nickel, Total	EPA 6010D
Potassium, Total	EPA 6010D
Silver, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
Sodium, Total	EPA 6010D

Metals II

Aluminum, Total	EPA 6010D
Antimony, Total	EPA 6010D
Arsenic, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
Beryllium, Total	EPA 6010D
Mercury, Total	EPA 245.1, Rev. 3.0 (1994)

Serial No.: 66374

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

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2512 WEST CARY STREET
RICHMOND, VA 23220-5117

NY Lab Id No: 11413

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All approved analytes are listed below:

Metals II

Mercury, Total	EPA 7470A
Selenium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D
Vanadium, Total	EPA 6010D
Zinc, Total	EPA 6010D

Metals III

Cobalt, Total	EPA 6010D
Molybdenum, Total	EPA 6010D
Thallium, Total	EPA 6010D
Tin, Total	EPA 6010D
Titanium, Total	EPA 6010D

Sample Preparation Methods

	EPA 3010A
	EPA 3005A
	EPA 3020A

Serial No.: 66374

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

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2512 WEST CARY STREET
RICHMOND, VA 23220-5117

NY Lab Id No: 11413

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Characteristic Testing

TCLP	EPA 1311

Metals I

Barium, Total	EPA 6010D
Cadmium, Total	EPA 6010D
Calcium, Total	EPA 6010D
Chromium, Total	EPA 6010D
Copper, Total	EPA 6010D
Iron, Total	EPA 6010D
Lead, Total	EPA 6010D
	EPA 7000B
Magnesium, Total	EPA 6010D
Manganese, Total	EPA 6010D
Nickel, Total	EPA 6010D
Potassium, Total	EPA 6010D
Silver, Total	EPA 6010D
Sodium, Total	EPA 6010D

Metals II

Aluminum, Total	EPA 6010D
Antimony, Total	EPA 6010D
Arsenic, Total	EPA 6010D
Beryllium, Total	EPA 6010D
Chromium VI	EPA 7196A
Mercury, Total	EPA 7471B
Selenium, Total	EPA 6010D
Vanadium, Total	EPA 6010D
Zinc, Total	EPA 6010D

Serial No.: 66375

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WADSWORTH CENTER

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NY Lab Id No: 11413

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All approved analytes are listed below:

Metals III

Cobalt, Total	EPA 6010D
Molybdenum, Total	EPA 6010D
Thallium, Total	EPA 6010D
Tin, Total	EPA 6010D
Titanium, Total	EPA 6010D

Miscellaneous

Boron, Total	EPA 6010D

Polychlorinated Biphenyls

Aroclor 1016 (PCB-1016)	EPA 8082A
Aroclor 1221 (PCB-1221)	EPA 8082A
Aroclor 1232 (PCB-1232)	EPA 8082A
Aroclor 1242 (PCB-1242)	EPA 8082A
Aroclor 1248 (PCB-1248)	EPA 8082A
Aroclor 1254 (PCB-1254)	EPA 8082A
Aroclor 1260 (PCB-1260)	EPA 8082A
Aroclor 1262 (PCB-1262)	EPA 8082A
Aroclor 1268 (PCB-1268)	EPA 8082A

Sample Preparation Methods

	EPA 3010A
	EPA 3050B
	EPA 3550C

Serial No.: 66375

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2024
Issued April 01, 2022
Revised March 30, 2023

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. FAYEZ ABOUZAKI
SCHNEIDER LABORATORIES GLOBAL, INC
2512 WEST CARY STREET
RICHMOND, VA 23220-5117

NY Lab Id No: 11413

is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved subcategories and/or analytes are listed below:

Miscellaneous

Asbestos in Friable Material	EPA 600/M4/82/020
Asbestos in Non-Friable Material-PLM	Item 198.6 of Manual (NOB by PLM)
Lead in Dust Wipes	EPA 7000B
Lead in Paint	EPA 7000B

Sample Preparation Methods

EPA 3050B
ASTM E-1979-17
ME-003-20-002

Serial No.: 66376

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2024
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ENVIRONMENTAL ANALYSES AIR AND EMISSIONS
All approved subcategories and/or analytes are listed below:

Metals I

Lead, Total	NIOSH 7082

Miscellaneous

Fibers	NIOSH 7400 A RULES

Sample Preparation Methods

ME-006-20-002

Serial No.: 66377

Appendix B

Asbestos Bulk Sample Laboratory Reports

Table I
Summary of Bulk Asbestos Analysis Results

Highland Falls - Fort Montgomery CSD - Fort Montgomery ES; 895 Rte. 9W, Fort Montgomery, NY

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
01	PLB-001A	001	----	----	----	----	NAD	NA
Location:	1930 - Bsmt. - Boiler / Tank Rm - Rough Plast. Ceil							
02	PLB-001B	001	----	----	----	----	NAD	NA
Location:	1930 - Bsmt. - Boiler / Tank Rm - Rough Plast. Ceil							
03	PLB-001C	001	----	----	----	----	NAD	NA
Location:	1930 - Bsmt. - Boiler / Tank Rm - Rough Plast. Ceil							
04	PLS-002A	002	----	----	----	----	NAD	NA
Location:	1930 - Bsmt. - Stairwell - Smooth Plaster Wall & Ceiling (Skim)							
05	PLS-002B	002	----	----	----	----	NAD	NA
Location:	1930 - Bsmt. - Stairwell - Smooth Plaster Wall & Ceiling (Skim)							
06	PLS-002C	002	----	----	----	----	NAD	NA
Location:	1930 - Bsmt. - Stairwell - Smooth Plaster Wall & Ceiling (Skim)							
07	TB-003A	003	0.181	62.9	20.4	16.8	NAD	NAD
Location:	1930 Bsmt Tank - Black / Gray Gasket / Base							
08	TB-003B	003	0.212	63.9	16.5	19.5	NAD	NAD
Location:	1930 Bsmt Tank - Black / Gray Gasket / Base							
09	PLB-004A	004	----	----	----	----	NAD	NA
Location:	1930 Bsmt - Stair / Storage - Smooth Plaster Wall & Ceiling (Base)							
10	PLB-004B	004	----	----	----	----	NAD	NA
Location:	1930 Bsmt - Stair / Storage - Smooth Plaster Wall & Ceiling (Base)							
11	PLB-004C	004	----	----	----	----	NAD	NA
Location:	1930 Bsmt - Stair / Storage - Smooth Plaster Wall & Ceiling (Base)							
12	EC-005A	005	0.154	42.3	7.1	50.6	NAD	NAD
Location:	1930 - Bsmt - Boiler Rm - White End Cap Sealant @ FG							
13	EC-005B	005	0.197	40.1	39.1	20.8	NAD	NAD
Location:	1930 - Bsmt - Boiler Rm - White End Cap Sealant @ FG							
14	FP-006A	006	0.289	41.3	23.9	34.8	NAD	NAD
Location:	1930 Bsmt - Stair / Boiler - Pink Fire Putty							
15	FP-006B	006	0.280	41.6	22.3	36.1	NAD	NAD
Location:	1930 Bsmt - Stair / Boiler - Pink Fire Putty							
16	CT-007A	007	0.183	15.6	23.7	60.7	NAD	NAD
Location:	1960 - 1st Flr. Hall - 2'x4' Pinhole & Fiss. C. Tile							

See Reporting notes on last page

Table I
Summary of Bulk Asbestos Analysis Results

Highland Falls - Fort Montgomery CSD - Fort Montgomery ES; 895 Rte. 9W, Fort Montgomery, NY

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
17	CT-007B	007	0.237	15.0	28.2	56.7	NAD	NAD
Location: 1960 - 1st Flr. Hall - 2'x4' Pinhole & Fiss. C. Tile								
18	CT-008A	008	0.206	31.7	2.2	66.1	NAD	NAD
Location: 1990 - 2nd Flr 204 / 1st Flr 104 - 2'x4' Textured C. Tile								
19	CT-008B	008	0.157	32.7	3.1	64.2	NAD	NAD
Location: 1990 - 2nd Flr 204 / 1st Flr 104 - 2'x4' Textured C. Tile								
20	SR-009A	009	----	----	----	----	NAD	NA
Location: 1990 - 2nd Flr 204 / 1st Flr 104 - Sheetrock Walls / Soffits								
21	SR-009B	009	----	----	----	----	NAD	NA
Location: 1990 - 2nd Flr 204 / 1st Flr 104 - Sheetrock Walls / Soffits								
22	JC-010A	010	----	----	----	----	NAD	NA
Location: 1990 - 2nd Flr 204 / 1st Flr 104 - Joint Compound (White)								
23	JC-010B	010	----	----	----	----	NAD	NA
Location: 1990 - 2nd Flr 204 / 1st Flr 104 - Joint Compound (White)								
24	SM-011A	011	1.176	4.6	88.9	6.5	NAD	NAD
Location: 1990 - 2nd Flr Rm 204 - Gray Sink Mastic								
25	SM-011B	011	0.144	30.9	21.7	47.5	NAD	NAD
Location: 1990 - 2nd Flr Rm 204 - Gray Sink Mastic								
26	FT-012A	012	0.246	12.3	83.9	3.9	NAD	NAD
Location: 1990 - 2nd Flr Rm 204 - 12"x12" Blue Floor Tile								
27	FT-012B	012	0.228	16.2	79.4	4.4	NAD	NAD
Location: 1990 - 2nd Flr Rm 204 - 12"x12" Blue Floor Tile								
28	FTM-013A	013	0.149	71.4	10.6	18.0	NAD	NAD
Location: 1990 - 2nd Flr 204 / 1st 104 - Yellow Floor Tile Mastic								
29	FTM-013B	013	0.178	72.3	13.1	14.6	NAD	NAD
Location: 1990 - 2nd Flr 204 / 1st 104 - Yellow Floor Tile Mastic								
30	CBM-014A	014	0.094	34.4	55.2	10.4	NAD	NAD
Location: 1990 2nd Flr Office 204-3 / 1st Flr - Yellow Cove Base Mastic								
31	CBM-014B	014	0.217	35.0	54.1	10.8	NAD	NAD
Location: 1990 2nd Flr Office 204-3 / 1st Flr - Yellow Cove Base Mastic								
32	SPF-015A	015	----	----	----	----	NAD	NA
Location: 1990 - 2nd Flr 204 / 1st Flr 104-3 - Gray Spray-On Fireproofing								

See Reporting notes on last page

Table I
Summary of Bulk Asbestos Analysis Results

Highland Falls - Fort Montgomery CSD - Fort Montgomery ES; 895 Rte. 9W, Fort Montgomery, NY

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
33	SPF-015B	015	----	----	----	----	NAD	NA
Location:	1990 - 2nd Flr 204 / 1st Flr 104-3 - Gray Spray-On Fireproofing							
34	SPF-015C	015	----	----	----	----	NAD	NA
Location:	1990 - 2nd Flr 204 / 1st Flr 104-3 - Gray Spray-On Fireproofing							
35	CWTG-016A	016	----	----	----	----	NAD	NA
Location:	1990 - 2nd Flr - White Cer. Wall Tile Grout							
36	CWTG-016B	016	----	----	----	----	NAD	NA
Location:	1990 - 2nd Flr - White Cer. Wall Tile Grout							
37	CWM-017A	017	0.092	30.0	64.6	5.4	NAD	NAD
Location:	1990 - 2nd Flr Toilet 204-2 - Dk. Brown Ceramic Wall Tile Mastic							
38	CWM-017B	017	0.122	20.1	64.4	15.5	NAD	NAD
Location:	1990 - 2nd Flr Toilet 204-2 - Dk. Brown Ceramic Wall Tile Mastic							
39	FT-018A	018	0.237	19.4	66.8	13.8	NAD	NAD
Location:	1960 Wing - 2nd Flr E206 - Gray Streaked Floor Tile (Under UVS)							
40	FT-018B	018	0.263	18.9	51.8	29.3	NAD	NAD
Location:	1960 Wing - 2nd Flr E206 - Gray Streaked Floor Tile (Under UVS)							
41	FTM-019A	019	0.049	73.0	16.7	10.3	NAD	NAD
Location:	1960 Wing - 2nd Flr E206 - Black Floor Tile Mastic (Under UVS)							
42	FTM-019B	019	0.069	53.8	35.4	10.8	NAD	NAD
Location:	1960 Wing - 2nd Flr E206 - Black Floor Tile Mastic (Under UVS)							
43	SPF-020A	020	----	----	----	----	NAD	NA
Location:	1960 Wing - 2nd Flr Hall - Gray Spray-On Fireproofing							
44	SPF-020B	020	----	----	----	----	NAD	NA
Location:	1960 Wing - 2nd Flr Hall - Gray Spray-On Fireproofing							
45	SPF-020C	020	----	----	----	----	NAD	NA
Location:	1960 Wing - 2nd Flr Hall - Gray Spray-On Fireproofing							
46	FT-021A	021	0.241	13.4	83.3	3.3	NAD	NAD
Location:	1960 - 1st Flr Rm E110 Floor - 12" Brown Streaked Floor Tile							
47	FT-021B	021	0.251	12.2	84.3	3.5	NAD	NAD
Location:	1960 - 1st Flr Rm E110 Floor - 12" Brown Streaked Floor Tile							
48	FTM-022A	022	0.141	49.0	22.2	28.8	NAD	NA
Location:	1960 - 1st Floor Rm E110 Floor - Floor Tile Mastic (Black)							

See Reporting notes on last page

Table I
Summary of Bulk Asbestos Analysis Results

Highland Falls - Fort Montgomery CSD - Fort Montgomery ES; 895 Rte. 9W, Fort Montgomery, NY

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
49	FTM-022B	022	0.265	66.8	21.6	9.9	Chrysotile 1.7	NA

Location: 1960 - 1st Floor Rm E110 Floor - Floor Tile Mastic (Black)

Analyzed by: Karol H. Lu
Date: 9/28/2023

Reviewed by: Karol H. Lu

**Quantitative Analysis (Semi/Full); Bulk Asbestos Analysis - PLM by Appd E to Subpt E, 40 CFR 763 or NYSDOH ELAP 198.1 for New York friable samples or NYSDOH ELAP 198.6 for New York NOB samples; TEM (Semi/Full) by EPA 600/R-93/116 (or NYSDOH ELAP 198.4; for New York samples). Analysis using Hitachi, Model H600-Noran 7 System, Microscope, Serial #: 600-27-6. NAD = no asbestos detected during a quantitative analysis; NA = not analyzed; Trace = <1%; (SOF-V) = Sprayed On Fireproofing containing Vermiculite; (SM-V) = Surfacing Material containing Vermiculite; Quantitation for beginning weights of <0.1 grams should be considered as qualitative only; Qualitative Analysis: Asbestos analysis results of "Present" or "NVA = No Visible Asbestos" represents results for Qualitative PLM or TEM Analysis only (no accreditation coverage available from any regulatory agency for qualitative analyses): NVLAP (PLM) 200546-0, NYSDOH ELAP Lab 11480, NJ Lab ID #NY031.

Warning Note: PLM limitation, only TEM will resolve fibers <0.25 micrometers in diameter. TEM bulk analysis is representative of the fine grained matrix material and may not be representative of non-uniformly dispersed debris for which PLM evaluation is recommended (i.e. soils and other heterogenous materials).

AmeriSci New York
117 EAST 30TH ST.
NEW YORK, NY 10016
TEL: (212) 679-8600 • FAX: (212) 679-3114

PLM Bulk Asbestos Report

C&S Engineers, Inc.
Attn: Randy Arnold
499 Col. Eileen Collins Blvd.

Syracuse, NY 13212

Date Received 09/23/23
Date Examined 09/28/23
ELAP # 11480

AmeriSci Job # 223092689
P.O. #
Page 1 **of** 9

RE: Highland Falls - Fort Montgomery CSD - Fort Montgomery ES; 895 Rte. 9W, Fort Montgomery, NY

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
PLB-001A 001	223092689-01 **Location:** 1930 - Bsmt. - Boiler / Tank Rm - Rough Plast. Ceil	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material **Asbestos Types:** **Other Material:** Cellulose Trace, Non-fibrous 100%			
PLB-001B 001	223092689-02 **Location:** 1930 - Bsmt. - Boiler / Tank Rm - Rough Plast. Ceil	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
PLB-001C 001	223092689-03 **Location:** 1930 - Bsmt. - Boiler / Tank Rm - Rough Plast. Ceil	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material **Asbestos Types:** **Other Material:** Cellulose 1%, Non-fibrous 99%			
PLS-002A 002	223092689-04 **Location:** 1930 - Bsmt. - Stairwell - Smooth Plaster Wall & Ceiling (Skim)	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
PLS-002B 002	223092689-05 **Location:** 1930 - Bsmt. - Stairwell - Smooth Plaster Wall & Ceiling (Skim)	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			

See Reporting notes on last page

PLM Bulk Asbestos Report

Highland Falls - Fort Montgomery CSD - Fort Montgomery ES;
895 Rte. 9W, Fort Montgomery, NY

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
PLS-002C 002	223092689-06 **Location:** 1930 - Bsmt. - Stairwell - Smooth Plaster Wall & Ceiling (Skim)	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
TB-003A 003	223092689-07 **Location:** 1930 Bsmt Tank - Black / Gray Gasket / Base	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Black/Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 16.8%			
TB-003B 003	223092689-08 **Location:** 1930 Bsmt Tank - Black / Gray Gasket / Base	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Black/Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 19.5%			
PLB-004A 004	223092689-09 **Location:** 1930 Bsmt - Stair / Storage - Smooth Plaster Wall & Ceiling (Base)	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
PLB-004B 004	223092689-10 **Location:** 1930 Bsmt - Stair / Storage - Smooth Plaster Wall & Ceiling (Base)	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
PLB-004C 004	223092689-11 **Location:** 1930 Bsmt - Stair / Storage - Smooth Plaster Wall & Ceiling (Base)	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			

See Reporting notes on last page

PLM Bulk Asbestos Report

Highland Falls - Fort Montgomery CSD - Fort Montgomery ES;
895 Rte. 9W, Fort Montgomery, NY

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
EC-005A 005	223092689-12 **Location:** 1930 - Bsmt - Boiler Rm - White End Cap Sealant @ FG	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 50.6%			
EC-005B 005	223092689-13 **Location:** 1930 - Bsmt - Boiler Rm - White End Cap Sealant @ FG	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 20.8%			
FP-006A 006	223092689-14 **Location:** 1930 Bsmt - Stair / Boiler - Pink Fire Putty	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Pink, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 34.8%			
FP-006B 006	223092689-15 **Location:** 1930 Bsmt - Stair / Boiler - Pink Fire Putty	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Pink, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 36.1%			
CT-007A 007	223092689-16 **Location:** 1960 - 1st Flr. Hall - 2'x4' Pinhole & Fiss. C. Tile	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 60.7%			
CT-007B 007	223092689-17 **Location:** 1960 - 1st Flr. Hall - 2'x4' Pinhole & Fiss. C. Tile	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 56.7%			

See Reporting notes on last page

PLM Bulk Asbestos Report

Highland Falls - Fort Montgomery CSD - Fort Montgomery ES;
895 Rte. 9W, Fort Montgomery, NY

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
CT-008A 008	223092689-18 **Location:** 1990 - 2nd Flr 204 / 1st Flr 104 - 2'x4' Textured C. Tile	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 66.1%			
CT-008B 008	223092689-19 **Location:** 1990 - 2nd Flr 204 / 1st Flr 104 - 2'x4' Textured C. Tile	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 64.2%			
SR-009A 009	223092689-20 **Location:** 1990 - 2nd Flr 204 / 1st Flr 104 - Sheetrock Walls / Soffits	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
SR-009B 009	223092689-21 **Location:** 1990 - 2nd Flr 204 / 1st Flr 104 - Sheetrock Walls / Soffits	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
JC-010A 010	223092689-22 **Location:** 1990 - 2nd Flr 204 / 1st Flr 104 - Joint Compound (White)	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
JC-010B 010	223092689-23 **Location:** 1990 - 2nd Flr 204 / 1st Flr 104 - Joint Compound (White)	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			

See Reporting notes on last page

PLM Bulk Asbestos Report

Highland Falls - Fort Montgomery CSD - Fort Montgomery ES;
895 Rte. 9W, Fort Montgomery, NY

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
SM-011A 011	223092689-24 **Location:** 1990 - 2nd Flr Rm 204 - Gray Sink Mastic	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 6.5%			
SM-011B 011	223092689-25 **Location:** 1990 - 2nd Flr Rm 204 - Gray Sink Mastic	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 47.5%			
FT-012A 012	223092689-26 **Location:** 1990 - 2nd Flr Rm 204 - 12"x12" Blue Floor Tile	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Blue, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 3.9%			
FT-012B 012	223092689-27 **Location:** 1990 - 2nd Flr Rm 204 - 12"x12" Blue Floor Tile	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Blue, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 4.4%			
FTM-013A 013	223092689-28 **Location:** 1990 - 2nd Flr 204 / 1st 104 - Yellow Floor Tile Mastic	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 18%			
FTM-013B 013	223092689-29 **Location:** 1990 - 2nd Flr 204 / 1st 104 - Yellow Floor Tile Mastic	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 14.6%			

See Reporting notes on last page

PLM Bulk Asbestos Report

Highland Falls - Fort Montgomery CSD - Fort Montgomery ES;
895 Rte. 9W, Fort Montgomery, NY

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
CBM-014A 014	223092689-30 **Location:** 1990 2nd Flr Office 204-3 / 1st Flr - Yellow Cove Base Mastic	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 10.4%			
CBM-014B 014	223092689-31 **Location:** 1990 2nd Flr Office 204-3 / 1st Flr - Yellow Cove Base Mastic	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 10.8%			
SPF-015A 015	223092689-32 **Location:** 1990 - 2nd Flr 204 / 1st Flr 104-3 - Gray Spray-On Fireproofing	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Fibrous glass 65%, Non-fibrous 35%			
SPF-015B 015	223092689-33 **Location:** 1990 - 2nd Flr 204 / 1st Flr 104-3 - Gray Spray-On Fireproofing	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Fibrous glass 65%, Non-fibrous 35%			
SPF-015C 015	223092689-34 **Location:** 1990 - 2nd Flr 204 / 1st Flr 104-3 - Gray Spray-On Fireproofing	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Fibrous glass 65%, Non-fibrous 35%			
CWTG-016A 016	223092689-35 **Location:** 1990 - 2nd Flr - White Cer. Wall Tile Grout	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			

See Reporting notes on last page

PLM Bulk Asbestos Report

Highland Falls - Fort Montgomery CSD - Fort Montgomery ES;
895 Rte. 9W, Fort Montgomery, NY

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
CWTG-016B 016	223092689-36 **Location:** 1990 - 2nd Flr - White Cer. Wall Tile Grout	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
CWM-017A 017	223092689-37 **Location:** 1990 - 2nd Flr Toilet 204-2 - Dk. Brown Ceramic Wall Tile Mastic	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Dark Brown, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 5.4%			
CWM-017B 017	223092689-38 **Location:** 1990 - 2nd Flr Toilet 204-2 - Dk. Brown Ceramic Wall Tile Mastic	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Dark Brown, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 15.5%			
FT-018A 018	223092689-39 **Location:** 1960 Wing - 2nd Flr E206 - Gray Streaked Floor Tile (Under UVS)	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 13.8%			
FT-018B 018	223092689-40 **Location:** 1960 Wing - 2nd Flr E206 - Gray Streaked Floor Tile (Under UVS)	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 29.3%			
FTM-019A 019	223092689-41 **Location:** 1960 Wing - 2nd Flr E206 - Black Floor Tile Mastic (Under UVS)	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 10.3%			

See Reporting notes on last page

PLM Bulk Asbestos Report

Highland Falls - Fort Montgomery CSD - Fort Montgomery ES;
895 Rte. 9W, Fort Montgomery, NY

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
FTM-019B 019	223092689-42 **Location:** 1960 Wing - 2nd Flr E206 - Black Floor Tile Mastic (Under UVS)	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 10.8%			
SPF-020A 020	223092689-43 **Location:** 1960 Wing - 2nd Flr Hall - Gray Spray-On Fireproofing	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Fibrous glass 65%, Non-fibrous 35%			
SPF-020B 020	223092689-44 **Location:** 1960 Wing - 2nd Flr Hall - Gray Spray-On Fireproofing	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Fibrous glass 65%, Non-fibrous 35%			
SPF-020C 020	223092689-45 **Location:** 1960 Wing - 2nd Flr Hall - Gray Spray-On Fireproofing	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Fibrous glass 65%, Non-fibrous 35%			
FT-021A 021	223092689-46 **Location:** 1960 - 1st Flr Rm E110 Floor - 12" Brown Streaked Floor Tile	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Brown, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 3.3%			
FT-021B 021	223092689-47 **Location:** 1960 - 1st Flr Rm E110 Floor - 12" Brown Streaked Floor Tile	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Brown, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 3.5%			

See Reporting notes on last page

PLM Bulk Asbestos Report

Highland Falls - Fort Montgomery CSD - Fort Montgomery ES;
895 Rte. 9W, Fort Montgomery, NY

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
FTM-022A 022	223092689-48 **Location:** 1960 - 1st Floor Rm E110 Floor - Floor Tile Mastic (Black)	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 28.8%			
FTM-022B 022	223092689-49 **Location:** 1960 - 1st Floor Rm E110 Floor - Floor Tile Mastic (Black)	***Yes***	1.7% (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** Chrysotile 1.7 % **Other Material:** Non-fibrous 9.9%			

Reporting Notes:

Analyzed by: Kensen Caro
Date: 9/28/2023

Reviewed by: Karol H. Lu

*NAD/NSD =no asbestos detected; NA =not analyzed; NA/PS=not analyzed/positive stop, (SOF-V) = Sprayed On Fireproofing containing Vermiculite; (SM-V) = Surfacing Material containing Vermiculite; PLM Bulk Asbestos Analysis using Olympus, Model BH-2 Pol Scope, Microscope, Serial #: 229003, by Appd E to Subpt E, 40 CFR 763 quantified by either CVES or 400 pt ct as noted for each analysis (NVLAP 200546-0), ELAP PLM Method 198.1 for NY friable samples, which includes the identification and quantitation of vermiculite, or ELAP 198.6 for NOB samples, or EPA 400 pt ct by EPA 600-M4-82-020 (NY ELAP Lab 11480); Note:PLM is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. NAD or Trace results by PLM are inconclusive, TEM is currently the only method that can be used to determine if this material can be considered or treated as non asbestos-containing in NY State (also see EPA Advisory for floor tile, FR 59,146,38970,8/1/94) National Institute of Standards and Technology Accreditation requirements mandate that this report must not be reproduced except in full without the approval of the lab.This PLM report relates ONLY to the items tested. RI Cert AAL-094, CT Cert PH-0186, Mass Cert AA000054, NJ Lab ID #NY031.

_____END OF REPORT_____

223092689

ASBESTOS BULK SAMPLE CHAIN OF CUSTODY

Samples Collected By: R. Arnold/B.Ruane	Sample Date: 9/20/23
Relinquished To/Shipped By: Fed-Ex	Sent Date: 9/22/23
Received By Lab: C←D	Received Date: 9/23/23 1115
Results e-mailed By:	E-mail Date:

C&S Project Number:	Sample Turn Around Time: 5 day
Client: Highland Falls-Fort Montgomery CSD - Fort Montgomery ES	E-Mail Results To: Rarnold@cscos.com, bruane@cscos.com
Site Address: 895 Rte. 9W, Fort Montgomery, NY	Verbal Results To:
Site Description:	Additional Instructions:

Special Instructions:

- Determine Method Of Analysis for PLM - 198.1 or 198.6
- If PLM NOB Result Is Equal To Or Greater Than 1% Asbestos - Testing Is Complete
- If PLM NOB Result Is Less Than 1% Asbestos - Please Analyze Via TEM
- When Submitted In Series (A, B, C) - Please Stop At First Positive.
- Report Results As % Asbestos

Sample ID	Material Description	Sample Location
PLB-001ABC	~~1930 - BSMT~~ ROUGH PLAST. CEIL.	1930 - BSMT. - BOILER/TANK RM
PLS-002ABC	SMOOTH PLASTER CEILING (WALL + SKIM)	1930 - BSMT. - STAIRWELL
TB-003AB	BLACK/GRAY GASKET/BASE	1930 BSMT TANK
PLB-004ABC	SMOOTH PLASTER CEILING (WALL BASE)	1930 - BSMT. - STAIR / STORAGE
EC-005AB	WHITE ENDCAP SEALANT @ FG	1930 - BSMT - BOILER RM.
FP-006AB	PINK FIRE PUTTY	1930 BSMT - STAIR/BOILER
CT-007AB	2' x 4' Pinhole & Fiss. C. TILE	1960 - 1ST FLR. HALL
CT-008AB	2' x 4' TEXTURED C. TILE	1990 - 2nd FLR 204/1ST FLR 104
SR-009AB	SHEETROCK WALLS/SOFFITS	1990 - 2nd FLR 204/1ST FLR 104
JC-010AB	JOINT COMPOUND (WHITE)	↓ ↓ ↓
SM-011AB	GRAY SINK MASTIC	1990 - 2nd FLR RM. 204
FT-012AB	12" x 12" BLUE FLOOR TILE	1990 - 2nd FLR RM. 204
FTM-013AB	YELLOW FLOOR TILE MASTIC	1990 - 2nd FLR 204/1ST 104
CBM-014AB	YELLOW COVE BASE MASTIC	1990 - 2nd FLR OFFICE 204-3/1ST FLR 104
SPF-015ABC	GRAY SPRAY-ON FIREPROOFING	1990 - 2nd FLR 204/1ST FLR 104-3
CWTG-016AB	WHITE CER. WALL TILE GROUT	1990 - 2nd FLR
CWM-017AB	DK. BROWN CERAMIC WALL TILE MASTIC	1990 - 2nd FLR TOILET 204-2
FT-018AB	GRAY STREAKED FLOOR TILE (UNDER LVT)	1960 Wing - 2nd FLR E206
FTM-019AB	BLACK FLOOR TILE MASTIC (UNDER LVT)	1960 Wing - 2nd FLR E206
SPF-020ABC	GRAY SPRAY-ON FIRE PROOFING	1960 Wing - 2nd FLR HALL

C&S COMPANIES®

223092689

ASBESTOS BULK SAMPLE CHAIN OF CUSTODY

Samples Collected By: R. Arnold/B.Ruane	Sample Date: 9/20/23
Relinquished To/Shipped By: Fed-Ex	Sent Date: 9/22/23
Received By Lab: CF	Received Date: 9/20/23 1115
Results e-mailed By:	E-mail Date:

C&S Project Number:	Sample Turn Around Time: 5 day
Client: Highland Falls-Fort Montgomery CSD - FORT MONTGOMERY ES	E-Mail Results To: Rarnold@cscos.com, bruane@cscos.com
Site Address: 895 RTE. 9W, FORT MONTGOMERY, N.Y.	Verbal Results To:
Site Description:	Additional Instructions:

Special Instructions:

- Determine Method Of Analysis for PLM - 198.1 or 198.6
- If PLM NOB Result Is Equal To Or Greater Than 1% Asbestos - Testing Is Complete
- If PLM NOB Result Is Less Than 1% Asbestos - Please Analyze Via TEM
- When Submitted In Series (A, B, C) - Please Stop At First Positive.
- Report Results As % Asbestos

Sample ID	Material Description	Sample Location E1
FT-021AB	12" BROWN STREAKED FLOOR TILE	1960-1st FLR Rm E1 flr
FTM-022A,B	Floor tile mastic (BLACK)	1960-1st flr Rm E1 flr

Table I
Summary of Bulk Asbestos Analysis Results

AH4.001.001; Highland Falls-Fort Montgomery CSD - Fort Montgomery ES; 895 RTE. 9W, Fort Montgomery, N.Y.

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
01	PLS-025A	025	----	----	----	----	NAD	NA
Location: 1930 - 1st Flr. - Throughout - Plaster (Skim)								
02	PLS-025B	025	----	----	----	----	NAD	NA
Location: 1930 - 1st Flr. - Throughout - Plaster (Skim)								
03	PLS-025C	025	----	----	----	----	NAD	NA
Location: 1930 - 1st Flr. - Throughout - Plaster (Skim)								
04	PLS-025D	025	----	----	----	----	NAD	NA
Location: 1930 - 1st Flr. - Throughout - Plaster (Skim)								
05	PLS-025E	025	----	----	----	----	NAD	NA
Location: 1930 - 1st Flr. - Throughout - Plaster (Skim)								
06	PLB-026A	026	----	----	----	----	NAD	NA
Location: 1930 - 1st Flr. - Throughout - Plaster (Base)								
07	PLB-026B	026	----	----	----	----	NAD	NA
Location: 1930 - 1st Flr. - Throughout - Plaster (Base)								
08	PLB-026C	026	----	----	----	----	NAD	NA
Location: 1930 - 1st Flr. - Throughout - Plaster (Base)								
09	PLB-026D	026	----	----	----	----	NAD	NA
Location: 1930 - 1st Flr. - Throughout - Plaster (Base)								
10	PLB-026E	026	----	----	----	----	NAD	NA
Location: 1930 - 1st Flr. - Throughout - Plaster (Base)								
11	FT-027A	027	0.306	21.4	39.4	39.2	NAD	NAD
Location: 1930 - 1st Flr. 120 / Hall (N) - 12" White W/ R, B, Y Accent Floor Tile								
12	FT-027B	027	0.299	16.5	38.1	45.4	NAD	NAD
Location: 1930 - 1st Flr. 120 / Hall (N) - 12" White W/ R, B, Y Accent Floor Tile								
13	FT-028A	028	0.261	14.1	62.0	23.9	NAD	NAD
Location: 1960 - 1st Flr. Stage - 12" Gray Floor Tile								
14	FT-028B	028	0.227	14.0	63.1	22.9	NAD	NAD
Location: 1960 - 1st Flr. Stage - 12" Gray Floor Tile								
15	CFTG-029A	029	----	----	----	----	NAD	NA
Location: 1930 - 1st Flr. 120-1 Bath - 1" x 1" Ceramic Floor Tile Grout (Gray)								
16	CFTG-029B	029	----	----	----	----	NAD	NA
Location: 1930 - 1st Flr. 120-1 Bath - 1" x 1" Ceramic Floor Tile Grout (Gray)								

See Reporting notes on last page

Table I
Summary of Bulk Asbestos Analysis Results

AH4.001.001; Highland Falls-Fort Montgomery CSD - Fort Montgomery ES; 895 RTE. 9W, Fort Montgomery, N.Y.

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
17	FT-030A	030	0.197	15.3	43.9	40.8	NAD	NAD
Location: 1930 - 1st Flr. - Rm 127 - 12" Dark Gray Floor Tile								
18	FT-030B	030	0.308	16.5	34.9	48.5	NAD	NAD
Location: 1930 - 1st Flr. - Rm 127 - 12" Dark Gray Floor Tile								
19	CFTT-031A	031	----	----	----	----	NAD	NA
Location: 1930 - 1st Flr. 120-1 Bath - Gray Thinset / Mud Bed								
20	CFTT-031B	031	----	----	----	----	NAD	NA
Location: 1930 - 1st Flr. 120-1 Bath - Gray Thinset / Mud Bed								
21	CWM-032A	032	0.167	34.8	38.9	26.2	NAD	NAD
Location: 1930 - 1st Flr. 120-1 Bath - Yellow Ceramic Wall Tile Mastic								
22	CWM-032B	032	0.202	49.2	4.4	46.5	NAD	NAD
Location: 1930 - 1st Flr. 120-1 Bath - Yellow Ceramic Wall Tile Mastic								
23	CWG-033A	033	----	----	----	----	NAD	NA
Location: 1930 - 1st Flr. 120-1 Bath - White Ceramic Wall Tile (4 x 4) Grout								
24	CWG-033B	033	----	----	----	----	NAD	NA
Location: 1930 - 1st Flr. 120-1 Bath - White Ceramic Wall Tile (4 x 4) Grout								
25	FTM-034A	034	0.153	68.7	11.5	19.8	NAD	NAD
Location: 1930 - 1st Flr. Clrm. 127 - Yellow Floor Tile Mastic (@ Wood)								
26	FTM-034B	034	0.429	19.1	75.5	5.5	NAD	NAD
Location: 1930 - 1st Flr. Clrm. 127 - Yellow Floor Tile Mastic (@ Wood)								
27	CT-035A	035	0.317	74.3	9.5	16.2	NAD	NAD
Location: 1960 - 1st Flr. Toilet 117-1 - 12" x 12" Pinholed Ceiling Tile (Splined)								
28	CT-035B	035	0.246	75.8	8.7	15.5	NAD	NAD
Location: 1960 - 1st Flr. Toilet 117-1 - 12" x 12" Pinholed Ceiling Tile (Splined)								
29	FT-036A	036	0.205	10.6	82.1	7.3	NAD	NAD
Location: 1960 - 1st Flr. - Nurse's Office 117 - 12" x 12" Gray Floor Tile (Under 027)								
30	FT-036B	036	0.284	45.8	46.0	8.2	NAD	NAD
Location: 1960 - 1st Flr. - Nurse's Office 117 - 12" x 12" Gray Floor Tile (Under 027)								
31	FTM-037A	037	0.166	19.5	63.5	17.0	NAD	NAD
Location: 1960 - 1st Flr. - Nurse's Off. 117 - Dk. Brown Floor Tile Mastic								
32	FTM-037B	037	0.184	32.2	59.2	8.7	NAD	NAD
Location: 1960 - 1st Flr. - Nurse's Off. 117 - Dk. Brown Floor Tile Mastic								

See Reporting notes on last page

Table I
Summary of Bulk Asbestos Analysis Results

AH4.001.001; Highland Falls-Fort Montgomery CSD - Fort Montgomery ES; 895 RTE. 9W, Fort Montgomery, N.Y.

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
33	DJ-038A	038	0.149	89.8	1.1	9.0	NAD	NAD
Location:	1960 - Gym HVAC Rm 115-1 - Black Mastic @ Canvas Jacket							
34	DJ-038B	038	0.165	83.9	8.1	8.1	NAD	NAD
Location:	1960 - Gym HVAC Rm 115-1 - Black Mastic @ Canvas Jacket							
35	VD-039A	039	----	----	----	----	NAD	NA
Location:	1960 - Gym HVAC Rm 115-1 - White Fabric Vib. Dampener							
36	VD-039B	039	----	----	----	----	NAD	NA
Location:	1960 - Gym HVAC Rm 115-1 - White Fabric Vib. Dampener							
37	WP-040A	040	0.219	47.0	10.3	33.2	Chrysotile 9.5	NA
Location:	1930 Wing - Attic @ Ext. Perimeter - Black Waterproofing @ Brick							
38	WP-040B	040	1.355	12.1	76.4	11.5	NA/PS	NA
Location:	1930 Wing - Attic @ Ext. Perimeter - Black Waterproofing @ Brick							
39	BINS-041A	041	----	----	----	----	NAD	NA
Location:	1930 Wing Attic - White Insulation							
40	BINS-041B	041	----	----	----	----	NAD	NA
Location:	1930 Wing Attic - White Insulation							
41	BINS-041C	041	----	----	----	----	NAD	NA
Location:	1930 Wing Attic - White Insulation							

Analyzed by: John P. Koubiadis 

Reviewed by: John P. Koubiadis 

Date: 9/28/2023

**Quantitative Analysis (Semi/Full); Bulk Asbestos Analysis - PLM by Appd E to Subpt E, 40 CFR 763 or NYSDOH ELAP 198.1 for New York friable samples or NYSDOH ELAP 198.6 for New York NOB samples; TEM (Semi/Full) by EPA 600/R-93/116 (or NYSDOH ELAP 198.4; for New York samples). Analysis using Hitachi, Model H7000-Noran 7 System, Microscope, Serial #: 747-05-06. NAD = no asbestos detected during a quantitative analysis; NA = not analyzed; Trace = <1%; (SOF-V) = Sprayed On Fireproofing containing Vermiculite; (SM-V) = Surfacing Material containing Vermiculite; Quantitation for beginning weights of <0.1 grams should be considered as qualitative only; Qualitative Analysis: Asbestos analysis results of "Present" or "NVA = No Visible Asbestos" represents results for Qualitative PLM or TEM Analysis only (no accreditation coverage available from any regulatory agency for qualitative analyses): NVLAP (PLM) 200546-0, NYSDOH ELAP Lab 11480, NJ Lab ID #NY031.

Warning Note: PLM limitation, only TEM will resolve fibers <0.25 micrometers in diameter. TEM bulk analysis is representative of the fine grained matrix material and may not be representative of non-uniformly dispersed debris for which PLM evaluation is recommended (i.e. soils and other heterogenous materials).

AmeriSci New York
117 EAST 30TH ST.
NEW YORK, NY 10016
TEL: (212) 679-8600 • FAX: (212) 679-3114

PLM Bulk Asbestos Report

C&S Engineers, Inc.
Attn: Randy Arnold
499 Col. Eileen Collins Blvd.

Syracuse, NY 13212

Date Received 09/23/23
Date Examined 09/28/23
ELAP # 11480

AmeriSci Job # 223092688
P.O. #
Page 1 **of** 8

RE: AH4.001.001; Highland Falls-Fort Montgomery CSD - Fort Montgomery ES; 895 RTE. 9W, Fort Montgomery, N.Y.

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
PLS-025A 025	223092688-01 **Location:** 1930 - 1st Flr. - Throughout - Plaster (Skim)	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
PLS-025B 025	223092688-02 **Location:** 1930 - 1st Flr. - Throughout - Plaster (Skim)	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
PLS-025C 025	223092688-03 **Location:** 1930 - 1st Flr. - Throughout - Plaster (Skim)	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
PLS-025D 025	223092688-04 **Location:** 1930 - 1st Flr. - Throughout - Plaster (Skim)	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
PLS-025E 025	223092688-05 **Location:** 1930 - 1st Flr. - Throughout - Plaster (Skim)	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			

See Reporting notes on last page

PLM Bulk Asbestos Report

AH4.001.001; Highland Falls-Fort Montgomery CSD - Fort Montgomery ES; 895 RTE. 9W, Fort Montgomery, N.Y.

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
PLB-026A 026	223092688-06 **Location:** 1930 - 1st Flr. - Throughout - Plaster (Base)	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
PLB-026B 026	223092688-07 **Location:** 1930 - 1st Flr. - Throughout - Plaster (Base)	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
PLB-026C 026	223092688-08 **Location:** 1930 - 1st Flr. - Throughout - Plaster (Base)	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
PLB-026D 026	223092688-09 **Location:** 1930 - 1st Flr. - Throughout - Plaster (Base)	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
PLB-026E 026	223092688-10 **Location:** 1930 - 1st Flr. - Throughout - Plaster (Base)	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
FT-027A 027	223092688-11 **Location:** 1930 - 1st Flr. 120 / Hall (N) - 12" White W/ R, B, Y Accent Floor Tile	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 39.2%			

See Reporting notes on last page

PLM Bulk Asbestos Report

AH4.001.001; Highland Falls-Fort Montgomery CSD - Fort Montgomery ES; 895 RTE. 9W, Fort Montgomery, N.Y.

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
FT-027B 027	223092688-12 **Location:** 1930 - 1st Flr. 120 / Hall (N) - 12" White W/ R, B, Y Accent Floor Tile	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 45.4%			
FT-028A 028	223092688-13 **Location:** 1960 - 1st Flr. Stage - 12" Gray Floor Tile	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 23.9%			
FT-028B 028	223092688-14 **Location:** 1960 - 1st Flr. Stage - 12" Gray Floor Tile	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 22.9%			
CFTG-029A 029	223092688-15 **Location:** 1930 - 1st Flr. 120-1 Bath - 1" x 1" Ceramic Floor Tile Grout (Gray)	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
CFTG-029B 029	223092688-16 **Location:** 1930 - 1st Flr. 120-1 Bath - 1" x 1" Ceramic Floor Tile Grout (Gray)	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
FT-030A 030	223092688-17 **Location:** 1930 - 1st Flr. - Rm 127 - 12" Dark Gray Floor Tile	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Dark Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 40.8%			

See Reporting notes on last page

PLM Bulk Asbestos Report

AH4.001.001; Highland Falls-Fort Montgomery CSD - Fort Montgomery ES; 895 RTE. 9W, Fort Montgomery, N.Y.

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
FT-030B 030	223092688-18 **Location:** 1930 - 1st Flr. - Rm 127 - 12" Dark Gray Floor Tile	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Dark Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 48.5%			
CFTT-031A 031	223092688-19 **Location:** 1930 - 1st Flr. 120-1 Bath - Gray Thinset / Mud Bed	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
CFTT-031B 031	223092688-20 **Location:** 1930 - 1st Flr. 120-1 Bath - Gray Thinset / Mud Bed	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
CWM-032A 032	223092688-21 **Location:** 1930 - 1st Flr. 120-1 Bath - Yellow Ceramic Wall Tile Mastic	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 26.2%			
CWM-032B 032	223092688-22 **Location:** 1930 - 1st Flr. 120-1 Bath - Yellow Ceramic Wall Tile Mastic	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 46.5%			
CWG-033A 033	223092688-23 **Location:** 1930 - 1st Flr. 120-1 Bath - White Ceramic Wall Tile (4 x 4) Grout	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			

See Reporting notes on last page

PLM Bulk Asbestos Report

AH4.001.001; Highland Falls-Fort Montgomery CSD - Fort Montgomery ES; 895 RTE. 9W, Fort Montgomery, N.Y.

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
CWG-033B 033	223092688-24 **Location:** 1930 - 1st Flr. 120-1 Bath - White Ceramic Wall Tile (4 x 4) Grout	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
FTM-034A 034	223092688-25 **Location:** 1930 - 1st Flr. Clrm. 127 - Yellow Floor Tile Mastic (@ Wood)	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 19.8%			
FTM-034B 034	223092688-26 **Location:** 1930 - 1st Flr. Clrm. 127 - Yellow Floor Tile Mastic (@ Wood)	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 5.5%			
CT-035A 035	223092688-27 **Location:** 1960 - 1st Flr. Toilet 117-1 - 12" x 12" Pinholed Ceiling Tile (Splined)	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Brown, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 16.2%			
CT-035B 035	223092688-28 **Location:** 1960 - 1st Flr. Toilet 117-1 - 12" x 12" Pinholed Ceiling Tile (Splined)	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Brown, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 15.5%			
FT-036A 036	223092688-29 **Location:** 1960 - 1st Flr. - Nurse's Office 117 - 12" x 12" Gray Floor Tile (Under 027)	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 7.3%			

See Reporting notes on last page

PLM Bulk Asbestos Report

AH4.001.001; Highland Falls-Fort Montgomery CSD - Fort Montgomery ES; 895 RTE. 9W, Fort Montgomery, N.Y.

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
FT-036B 036	223092688-30 **Location:** 1960 - 1st Flr. - Nurse's Office 117 - 12" x 12" Gray Floor Tile (Under 027)	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 8.2%			
FTM-037A 037	223092688-31 **Location:** 1960 - 1st Flr. - Nurse's Off. 117 - Dk. Brown Floor Tile Mastic	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Brown, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 17%			
FTM-037B 037	223092688-32 **Location:** 1960 - 1st Flr. - Nurse's Off. 117 - Dk. Brown Floor Tile Mastic	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Brown, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 8.7%			
DJ-038A 038	223092688-33 **Location:** 1960 - Gym HVAC Rm 115-1 - Black Mastic @ Canvas Jacket	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 9%			
DJ-038B 038	223092688-34 **Location:** 1960 - Gym HVAC Rm 115-1 - Black Mastic @ Canvas Jacket	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 8.1%			
VD-039A 039	223092688-35 **Location:** 1960 - Gym HVAC Rm 115-1 - White Fabric Vib. Dampener	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: Beige, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Cellulose 95%, Non-fibrous 5%			

See Reporting notes on last page

PLM Bulk Asbestos Report

AH4.001.001; Highland Falls-Fort Montgomery CSD - Fort Montgomery ES; 895 RTE. 9W, Fort Montgomery, N.Y.

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
VD-039B 039	223092688-36 **Location:** 1960 - Gym HVAC Rm 115-1 - White Fabric Vib. Dampener	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: Beige, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Cellulose 95%, Non-fibrous 5%			
WP-040A 040	223092688-37 **Location:** 1930 Wing - Attic @ Ext. Perimeter - Black Waterproofing @ Brick	***Yes***	9.5% (by NYS ELAP 198.6) by Kensen Caro on 09/28/23
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** Chrysotile 9.5 % **Other Material:** Non-fibrous 33.2%			
WP-040B 040	223092688-38 **Location:** 1930 Wing - Attic @ Ext. Perimeter - Black Waterproofing @ Brick		NA/PS
Analyst Description: Bulk Material **Asbestos Types:** **Other Material:**			
BINS-041A 041	223092688-39 **Location:** 1930 Wing Attic - White Insulation	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: White, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Fibrous glass 90%, Non-fibrous 10%			
BINS-041B 041	223092688-40 **Location:** 1930 Wing Attic - White Insulation	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: White, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Fibrous glass 90%, Non-fibrous 10%			
BINS-041C 041	223092688-41 **Location:** 1930 Wing Attic - White Insulation	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 09/28/23
Analyst Description: White, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Fibrous glass 90%, Non-fibrous 10%			

See Reporting notes on last page

PLM Bulk Asbestos Report

AH4.001.001; Highland Falls-Fort Montgomery CSD - Fort Montgomery ES; 895 RTE. 9W, Fort Montgomery, N.Y.

Reporting Notes:

Analyzed by: Kensen Caro
Date: 9/28/2023

Reviewed by: John P. Koubiadis

*NAD/NSD =no asbestos detected; NA =not analyzed; NA/PS=not analyzed/positive stop, (SOF-V) = Sprayed On Fireproofing containing Vermiculite; (SM-V) = Surfacing Material containing Vermiculite; PLM Bulk Asbestos Analysis using Olympus, Model BH-2 Pol Scope, Microscope, Serial #: 229003, by Appd E to Subpt E, 40 CFR 763 quantified by either CVES or 400 pt ct as noted for each analysis (NVLAP 200546-0), ELAP PLM Method 198.1 for NY friable samples, which includes the identification and quantitation of vermiculite, or ELAP 198.6 for NOB samples, or EPA 400 pt ct by EPA 600-M4-82-020 (NY ELAP Lab 11480); Note:PLM is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. NAD or Trace results by PLM are inconclusive, TEM is currently the only method that can be used to determine if this material can be considered or treated as non asbestos-containing in NY State (also see EPA Advisory for floor tile, FR 59,146,38970,8/1/94) National Institute of Standards and Technology Accreditation requirements mandate that this report must not be reproduced except in full without the approval of the lab.This PLM report relates ONLY to the items tested. RI Cert AAL-094, CT Cert PH-0186, Mass Cert AA000054, NJ Lab ID #NY031.

_____END OF REPORT_____

C&S COMPANIES®

2230926 88

ASBESTOS BULK SAMPLE CHAIN OF CUSTODY

Samples Collected By: R. Arnold/B.Ruane	Sample Date: 9/20/23
Relinquished To/Shipped By: Fed-Ex	Sent Date: 9/22/23
Received By Lab: EL OJ	Received Date: 9/23/23 1115
Results e-mailed By:	E-mail Date:

C&S Project Number: AH4.001.001	Sample Turn Around Time: 5 day
Client: Highland Falls-Fort Montgomery CSD - Fort Montgomery ES	E-Mail Results To: Rarnold@cscos.com, bruane@cscos.com
Site Address: 895 RTE. 9W, FORT MONTGOMERY, N.Y.	Verbal Results To:
Site Description:	Additional Instructions:

Special Instructions:

- Determine Method Of Analysis for PLM - 198.1 or 198.6
- If PLM NOB Result Is Equal To Or Greater Than 1% Asbestos - Testing Is Complete
- If PLM NOB Result Is Less Than 1% Asbestos - Please Analyze Via TEM
- When Submitted In Series (A, B, C) - Please Stop At First Positive.
- Report Results As % Asbestos

Sample ID	Material Description	Sample Location
PLS-025ABCDE	PLASTER (SKIM)	1930-1st FLR-Throughout
PLB-026ABCDE	PLASTER (BASE)	1930-1st FLR-Throughout
FT-027AB	12" WHITE w/ R,B,Y ACCENT FLOOR TILE	1930-1st FLR 120/HALL(N)
FT-028AB	12" gray FLOOR TILE	1960-1st FLR. STAGE
CFTG-029AB	1"x1" CERAMIC FLOOR TILE GROUT (GRAY)	1930-1st FLR 120-1 BATH
FT-030AB	12" DARK GRAY FLOOR TILE	1930-1st FLR-RM 127
CFTT-031AB	GRAY THIN SET/MUD BED	1930-1st FLR 120-1 BATH
CWM-032AB	Yellow ceramic wall tile MASTIC	1930-1st FLR 120-1 BATH
CWG-033AB	WHITE CERAMIC WALL TILE (4x4) GROUT	↓ ↓ ↓
FTM-034AB	yellow FLOOR TILE MASTIC (@ WOOD)	1930-1st FLR CLRM 127
CT-035AB	12"x12" Pinholed CEILING TILE (splined)	1960-1st FLR. ~~NURSES OFFICE~~ Toilet 117-1
FT-036AB	12"x12" GRAY FLOOR TILE (UNDER 027)	1960-1st FLR-NURSES OFFICE 117
FTM-037AB	DK. BROWN FLOOR TILE MASTIC	1960 1st FLR, NURSES OFF 117
DJ-038AB	BLACK MASTIC @ CANVAS JACKET	1960-GYM HVAC RM 115-1
VD-039AB	WHITE FABRIC VIB. DAMPENER	1960-GYM HVAC RM 115-1
WP-040AB	BLACK WATERPROOFING @ BRICK	1930 WING-ATTIC @ EXT. Perimeter
BINS-041ABC	WHITE INSULATION	1930 WING ATTIC

Table I
Summary of Bulk Asbestos Analysis Results

AH4.; Highland Falls-Fort Montgomery CSD; Fort Mont. Elem. School - 895 Rte. 9W, Fort Montgomery, NY

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
01	LS-042A	042	0.211	65.6	22.5	11.9	NAD	NAD
Location: 1930 Field - Black Lap Seal								
02	LS-042B	042	0.140	66.1	25.3	8.7	NAD	NAD
Location: 1930 Field - Black Lap Seal								
03	GYP-043A	043	----	----	----	----	NAD	NA
Location: 1930 Field - Gypsum Deck @ Wood Deck								
04	GYP-043B	043	----	----	----	----	NAD	NA
Location: 1930 Field - Gypsum Deck @ Wood Deck								
05	TP-044A	044	0.347	56.1	5.3	32.8	Chrysotile 5.7	NA
Location: 1930 Field - Black Tar Paper On Wood Deck								
06	TP-044B	044	0.396	52.8	8.7	38.5	NA/PS	NA
Location: 1930 Field - Black Tar Paper On Wood Deck								
07	MORTAR-045A	045	----	----	----	----	NAD	NA
Location: 1990 / 1960 - Gray Mortar @ Term Bar								
08	MORTAR-045B	045	----	----	----	----	NAD	NA
Location: 1990 / 1960 - Gray Mortar @ Term Bar								
09	SGL-046A	046	0.408	22.0	37.2	40.8	NAD	NAD
Location: 1930 Gables - Gray Granulated Shingle								
10	SGL-046B	046	0.514	22.0	35.8	42.2	NAD	NAD
Location: 1930 Gables - Gray Granulated Shingle								
11	VB-047A	047	0.101	52.1	11.0	36.9	NAD	NAD
Location: 1930 - Black Rubber (Under Shingle)								
12	VB-047B	047	0.221	38.4	7.1	54.5	NAD	NAD
Location: 1930 - Black Rubber (Under Shingle)								
13	DS-048A	048	0.269	41.5	52.9	5.6	NAD	NAD
Location: 1930 Attic - Gray Duct Sealant								
14	DS-048B	048	0.268	40.8	53.0	6.2	NAD	NAD
Location: 1930 Attic - Gray Duct Sealant								
15	SC-049A	049	0.243	31.9	17.3	50.9	NAD	NAD
Location: 1960 - Gray Skylight Caulk								
16	SC-049B	049	0.228	32.3	18.5	49.2	NAD	NAD
Location: 1960 - Gray Skylight Caulk								

See Reporting notes on last page

Table I
Summary of Bulk Asbestos Analysis Results

AH4.; Highland Falls-Fort Montgomery CSD; Fort Mont. Elem. School - 895 Rte. 9W, Fort Montgomery, NY

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
17	ISO-050A	050	0.057	80.5	13.1	6.5	NAD	NAD
Location: 1960 Field Core - Black Paper Backing @ Iso								
18	ISO-050B	050	0.105	80.7	12.0	7.3	NAD	NAD
Location: 1960 Field Core - Black Paper Backing @ Iso								
19	TAR-051A	051	0.062	91.6	6.8	1.6	NAD	NAD
Location: 1960 Field Core - Black Tar @ Metal Deck								
20	TAR-051B	051	0.143	88.7	11.2	0.1	NAD	NAD
Location: 1960 Field Core - Black Tar @ Metal Deck								
21	EP-052A	052	----	----	----	----	NAD	NA
Location: 1990 Walls - Stucco EIFS Panel								
22	EP-052B	052	----	----	----	----	NAD	NA
Location: 1990 Walls - Stucco EIFS Panel								
23	EPC-053A	053	0.323	65.9	27.9	6.3	NAD	NAD
Location: 1990 / 1960 - Gray Caulk @ EIFS Panel								
24	EPC-053B	053	0.367	62.4	28.6	9.0	NAD	NAD
Location: 1990 / 1960 - Gray Caulk @ EIFS Panel								
25	CF-054A	054	0.321	44.3	39.7	13.1	Chrysotile 2.9	NA
Location: 1990 Skylight Curb - Black Flashing Tar @ Skylight								
26	CF-054B	054	0.362	39.2	42.4	18.4	NA/PS	NA
Location: 1990 Skylight Curb - Black Flashing Tar @ Skylight								
27	TD-055A	055	----	----	----	----	NAD	NA
Location: 1960 Field Core - Tectum Deck								
28	TD-055B	055	----	----	----	----	NAD	NA
Location: 1960 Field Core - Tectum Deck								
29	PL-056A	056	----	----	----	----	NAD	NA
Location: 1990 Field Core (EPDM, Iso, PL, Metal) - Perlite Insulation								
30	PL-056B	056	----	----	----	----	NAD	NA
Location: 1990 Field Core (EPDM, Iso, PL, Metal) - Perlite Insulation								
31	MORTAR-057A	057	----	----	----	----	NAD	NA
Location: 1990, Rear (N) - Gray Brick Mortar @ Red Brick								
32	MORTAR-057B	057	----	----	----	----	NAD	NA
Location: 1990, Rear (N) - Gray Brick Mortar @ Red Brick								

See Reporting notes on last page

Table I
Summary of Bulk Asbestos Analysis Results

AH4.; Highland Falls-Fort Montgomery CSD; Fort Mont. Elem. School - 895 Rte. 9W, Fort Montgomery, NY

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
33	TWF-058A	058	0.196	61.9	21.6	16.6	NAD	NAD
Location: 1990 (N/E) - Black Thru Wall Flash / VB @ Brick								
34	TWF-058B	058	0.444	60.7	13.4	25.9	NAD	NAD
Location: 1990 (N/E) - Black Thru Wall Flash / VB @ Brick								
35	CLK-059A	059	0.239	63.0	23.1	13.9	NAD	NAD
Location: 1990 (N/E) - Gray Door / Window Caulk								
36	CLK-059B	059	0.316	63.4	23.2	13.4	NAD	NAD
Location: 1990 (N/E) - Gray Door / Window Caulk								
37	CLK-060A	060	0.183	60.6	36.9	2.5	NAD	NAD
Location: 1990 (N/E) - Gray EIFS / Foundation Caulk								
38	CLK-060B	060	0.268	60.8	36.1	3.1	NAD	NAD
Location: 1990 (N/E) - Gray EIFS / Foundation Caulk								
39	GAS-061A	061	0.160	93.3	5.3	1.4	NAD	NAD
Location: 1960, W Wall - Black Gasket @ Glass Block Windows								
40	GAS-061B	061	0.143	94.9	5.0	0.1	NAD	NAD
Location: 1960, W Wall - Black Gasket @ Glass Block Windows								
41	TM-062A	062	0.175	43.1	45.8	11.1	NAD	NAD
Location: 1930, Stairs @ Corridor C3-1 - Yellow Stair Tread Mastic								
42	TM-062B	062	0.235	48.5	45.7	5.8	NAD	NAD
Location: 1930, Stairs @ Corridor C3-1 - Yellow Stair Tread Mastic								
43	T-063A	063	0.289	32.5	8.5	59.0	NAD	NAD
Location: 1930, Stairs @ Corridor C3-1 - Gray Stair Treads								
44	T-063B	063	0.256	33.3	12.8	53.9	NAD	NAD
Location: 1930, Stairs @ Corridor C3-1 - Gray Stair Treads								
45	SM-064A	064	0.203	37.0	31.4	31.6	NAD	NAD
Location: 1930, Women's Bath 118 - Dark Yellow Stud Mastic								
46	SM-064B	064	0.222	37.7	32.4	29.8	NAD	NAD
Location: 1930, Women's Bath 118 - Dark Yellow Stud Mastic								
47	MFITT-065A	065	----	----	----	----	NAD	NA
Location: 1960, Corridor C2-1 / Toilet 106-1 - Gray Mudded Fitting (Residual) @ FG								
48	MFITT-065B	065	----	----	----	----	NAD	NA
Location: 1960, Corridor C2-1 / Toilet 106-1 - Gray Mudded Fitting (Residual) @ FG								

See Reporting notes on last page

Table I
Summary of Bulk Asbestos Analysis Results

AH4.; Highland Falls-Fort Montgomery CSD; Fort Mont. Elem. School - 895 Rte. 9W, Fort Montgomery, NY

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
49	MFITT-065C	065	----	----	----	----	NAD	NA

Location: 1960, Corridor C2-1 / Toilet 106-1 - Gray Mudded Fitting (Residual) @ FG

Analyzed by: Feyza Gungor 

Date: 10/17/2023

Reviewed by: Feyza Gungor 

**Quantitative Analysis (Semi/Full); Bulk Asbestos Analysis - PLM by Appd E to Subpt E, 40 CFR 763 or NYSDOH ELAP 198.1 for New York friable samples or NYSDOH ELAP 198.6 for New York NOB samples; TEM (Semi/Full) by EPA 600/R-93/116 (or NYSDOH ELAP 198.4; for New York samples). Analysis using Hitachi, Model H7000-Noran 7 System, Microscope, Serial #: 747-05-06. NAD = no asbestos detected during a quantitative analysis; NA = not analyzed; Trace = <1%; (SOF-V) = Sprayed On Fireproofing containing Vermiculite; (SM-V) = Surfacing Material containing Vermiculite; Quantitation for beginning weights of <0.1 grams should be considered as qualitative only; Qualitative Analysis: Asbestos analysis results of "Present" or "NVA = No Visible Asbestos" represents results for Qualitative PLM or TEM Analysis only (no accreditation coverage available from any regulatory agency for qualitative analyses): NVLAP (PLM) 200546-0, NYSDOH ELAP Lab 11480, NJ Lab ID #NY031.

Warning Note: PLM limitation, only TEM will resolve fibers <0.25 micrometers in diameter. TEM bulk analysis is representative of the fine grained matrix material and may not be representative of non-uniformly dispersed debris for which PLM evaluation is recommended (i.e. soils and other heterogenous materials).

AmeriSci New York
117 EAST 30TH ST.
NEW YORK, NY 10016
TEL: (212) 679-8600 • FAX: (212) 679-3114

PLM Bulk Asbestos Report

C&S Engineers, Inc.
Attn: Randy Arnold
499 Col. Eileen Collins Blvd.

Syracuse, NY 13212

Date Received 10/11/23
Date Examined 10/17/23
ELAP # 11480

AmeriSci Job # 223101864
P.O. #
Page 1 **of** 9

RE: AH4.; Highland Falls-Fort Montgomery CSD; Fort Mont. Elem. School - 895 Rte. 9W, Fort Montgomery, NY

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
LS-042A 042	223101864-01 **Location:** 1930 Field - Black Lap Seal	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 11.9%			
LS-042B 042	223101864-02 **Location:** 1930 Field - Black Lap Seal	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 8.7%			
GYP-043A 043	223101864-03 **Location:** 1930 Field - Gypsum Deck @ Wood Deck	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 10/17/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Cellulose 2%, Non-fibrous 98%			
GYP-043B 043	223101864-04 **Location:** 1930 Field - Gypsum Deck @ Wood Deck	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 10/17/23
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Cellulose 2%, Non-fibrous 98%			
TP-044A 044	223101864-05 **Location:** 1930 Field - Black Tar Paper On Wood Deck	***Yes***	5.7% (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** Chrysotile 5.7 % **Other Material:** Non-fibrous 32.8%			

See Reporting notes on last page

PLM Bulk Asbestos Report

AH4.; Highland Falls-Fort Montgomery CSD; Fort Mont. Elem.
School - 895 Rte. 9W, Fort Montgomery, NY

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
TP-044B 044	223101864-06 **Location:** 1930 Field - Black Tar Paper On Wood Deck		NA/PS
Analyst Description: Bulk Material **Asbestos Types:** **Other Material:**			
MORTAR-045A 045	223101864-07 **Location:** 1990 / 1960 - Gray Mortar @ Term Bar	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 10/17/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
MORTAR-045B 045	223101864-08 **Location:** 1990 / 1960 - Gray Mortar @ Term Bar	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 10/17/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
SGL-046A 046	223101864-09 **Location:** 1930 Gables - Gray Granulated Shingle	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 40.8%			
SGL-046B 046	223101864-10 **Location:** 1930 Gables - Gray Granulated Shingle	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 42.2%			
VB-047A 047	223101864-11 **Location:** 1930 - Black Rubber (Under Shingle)	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 36.9%			

See Reporting notes on last page

PLM Bulk Asbestos Report

AH4.; Highland Falls-Fort Montgomery CSD; Fort Mont. Elem. School - 895 Rte. 9W, Fort Montgomery, NY

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
VB-047B 047	223101864-12 **Location:** 1930 - Black Rubber (Under Shingle)	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 54.5%			
DS-048A 048	223101864-13 **Location:** 1930 Attic - Gray Duct Sealant	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 5.6%			
DS-048B 048	223101864-14 **Location:** 1930 Attic - Gray Duct Sealant	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 6.2%			
SC-049A 049	223101864-15 **Location:** 1960 - Gray Skylight Caulk	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 50.9%			
SC-049B 049	223101864-16 **Location:** 1960 - Gray Skylight Caulk	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 49.2%			
ISO-050A 050	223101864-17 **Location:** 1960 Field Core - Black Paper Backing @ Iso	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 6.5%			

See Reporting notes on last page

PLM Bulk Asbestos Report

AH4.; Highland Falls-Fort Montgomery CSD; Fort Mont. Elem. School - 895 Rte. 9W, Fort Montgomery, NY

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
ISO-050B 050	223101864-18 **Location:** 1960 Field Core - Black Paper Backing @ Iso	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 7.3%			
TAR-051A 051	223101864-19 **Location:** 1960 Field Core - Black Tar @ Metal Deck	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 1.6%			
TAR-051B 051	223101864-20 **Location:** 1960 Field Core - Black Tar @ Metal Deck	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 0.1%			
EP-052A 052	223101864-21 **Location:** 1990 Walls - Stucco EIFS Panel	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 10/17/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
EP-052B 052	223101864-22 **Location:** 1990 Walls - Stucco EIFS Panel	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 10/17/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
EPC-053A 053	223101864-23 **Location:** 1990 / 1960 - Gray Caulk @ EIFS Panel	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 6.3%			

See Reporting notes on last page

PLM Bulk Asbestos Report

AH4.; Highland Falls-Fort Montgomery CSD; Fort Mont. Elem. School - 895 Rte. 9W, Fort Montgomery, NY

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
EPC-053B 053	223101864-24 **Location:** 1990 / 1960 - Gray Caulk @ EIFS Panel	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 9%			
CF-054A 054	223101864-25 **Location:** 1990 Skylight Curb - Black Flashing Tar @ Skylight	***Yes***	2.9% (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Black, Heterogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** Chrysotile 2.9 % **Other Material:** Non-fibrous 13.1%			
CF-054B 054	223101864-26 **Location:** 1990 Skylight Curb - Black Flashing Tar @ Skylight		NA/PS
Analyst Description: Bulk Material **Asbestos Types:** **Other Material:**			
TD-055A 055	223101864-27 **Location:** 1960 Field Core - Tectum Deck	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 10/17/23
Analyst Description: Brown, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Cellulose 80%, Non-fibrous 20%			
TD-055B 055	223101864-28 **Location:** 1960 Field Core - Tectum Deck	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 10/17/23
Analyst Description: Brown, Homogeneous, Non-Fibrous, Cementitious, Bulk Material **Asbestos Types:** **Other Material:** Cellulose 80%, Non-fibrous 20%			
PL-056A 056	223101864-29 **Location:** 1990 Field Core (EPDM, Iso, PL, Metal) - Perlite Insulation	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 10/17/23
Analyst Description: Brown, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Cellulose 85%, Non-fibrous 15%			

See Reporting notes on last page

PLM Bulk Asbestos Report

AH4.; Highland Falls-Fort Montgomery CSD; Fort Mont. Elem. School - 895 Rte. 9W, Fort Montgomery, NY

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
PL-056B 056	223101864-30 **Location:** 1990 Field Core (EPDM, Iso, PL, Metal) - Perlite Insulation	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 10/17/23
Analyst Description: Brown, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Cellulose 85%, Non-fibrous 15%			
MORTAR-057A 057	223101864-31 **Location:** 1990, Rear (N) - Gray Brick Mortar @ Red Brick	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 10/17/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
MORTAR-057B 057	223101864-32 **Location:** 1990, Rear (N) - Gray Brick Mortar @ Red Brick	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 10/17/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 100%			
TWF-058A 058	223101864-33 **Location:** 1990 (N/E) - Black Thru Wall Flash / VB @ Brick	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 16.6%			
TWF-058B 058	223101864-34 **Location:** 1990 (N/E) - Black Thru Wall Flash / VB @ Brick	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 25.9%			
CLK-059A 059	223101864-35 **Location:** 1990 (N/E) - Gray Door / Window Caulk	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 13.9%			

See Reporting notes on last page

PLM Bulk Asbestos Report

AH4.; Highland Falls-Fort Montgomery CSD; Fort Mont. Elem. School - 895 Rte. 9W, Fort Montgomery, NY

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
CLK-059B 059	223101864-36 **Location:** 1990 (N/E) - Gray Door / Window Caulk	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 13.4%			
CLK-060A 060	223101864-37 **Location:** 1990 (N/E) - Gray EIFS / Foundation Caulk	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 2.5%			
CLK-060B 060	223101864-38 **Location:** 1990 (N/E) - Gray EIFS / Foundation Caulk	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 3.1%			
GAS-061A 061	223101864-39 **Location:** 1960, W Wall - Black Gasket @ Glass Block Windows	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 1.4%			
GAS-061B 061	223101864-40 **Location:** 1960, W Wall - Black Gasket @ Glass Block Windows	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 0.1%			
TM-062A 062	223101864-41 **Location:** 1930, Stairs @ Corridor C3-1 - Yellow Stair Tread Mastic	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 11.1%			

See Reporting notes on last page

PLM Bulk Asbestos Report

AH4.; Highland Falls-Fort Montgomery CSD; Fort Mont. Elem. School - 895 Rte. 9W, Fort Montgomery, NY

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
TM-062B 062	223101864-42 **Location:** 1930, Stairs @ Corridor C3-1 - Yellow Stair Tread Mastic	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 5.8%			
T-063A 063	223101864-43 **Location:** 1930, Stairs @ Corridor C3-1 - Gray Stair Treads	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 59%			
T-063B 063	223101864-44 **Location:** 1930, Stairs @ Corridor C3-1 - Gray Stair Treads	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 53.9%			
SM-064A 064	223101864-45 **Location:** 1930, Women's Bath 118 - Dark Yellow Stud Mastic	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Tan, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 31.6%			
SM-064B 064	223101864-46 **Location:** 1930, Women's Bath 118 - Dark Yellow Stud Mastic	***No***	NAD (by NYS ELAP 198.6) by Kensen Caro on 10/17/23
Analyst Description: Tan, Homogeneous, Non-Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Non-fibrous 29.8%			
MFITT-065A 065	223101864-47 **Location:** 1960, Corridor C2-1 / Toilet 106-1 - Gray Mudded Fitting (Residual) @ FG	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 10/17/23
Analyst Description: Gray, Homogeneous, Fibrous, Bulk Material **Asbestos Types:** **Other Material:** Fibrous glass 15%, Non-fibrous 85%			

See Reporting notes on last page

PLM Bulk Asbestos Report

AH4.; Highland Falls-Fort Montgomery CSD; Fort Mont. Elem. School - 895 Rte. 9W, Fort Montgomery, NY

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
MFITT-065B 065	223101864-48	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 10/17/23

Location: 1960, Corridor C2-1 / Toilet 106-1 - Gray Mudded Fitting (Residual) @ FG

Analyst Description: Gray, Homogeneous, Fibrous, Bulk Material
Asbestos Types:
Other Material: Fibrous glass 15%, Non-fibrous 85%

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
MFITT-065C 065	223101864-49	***No***	NAD (by NYS ELAP 198.1) by Kensen Caro on 10/17/23

Location: 1960, Corridor C2-1 / Toilet 106-1 - Gray Mudded Fitting (Residual) @ FG

Analyst Description: Gray, Homogeneous, Fibrous, Bulk Material
Asbestos Types:
Other Material: Fibrous glass 15%, Non-fibrous 85%

Reporting Notes:

Analyzed by: Kensen Caro
Date: 10/17/2023

Reviewed by: Feyza Gungor

*NAD/NSD =no asbestos detected; NA =not analyzed; NA/PS=not analyzed/positive stop, (SOF-V) = Sprayed On Fireproofing containing Vermiculite; (SM-V) = Surfacing Material containing Vermiculite; PLM Bulk Asbestos Analysis using Olympus, Model BH-2 Pol Scope, Microscope, Serial #: 229915, by Appd E to Subpt E, 40 CFR 763 quantified by either CVES or 400 pt ct as noted for each analysis (NVLAP 200546-0), ELAP PLM Method 198.1 for NY friable samples, which includes the identification and quantitation of vermiculite, or ELAP 198.6 for NOB samples, or EPA 400 pt ct by EPA 600-M4-82-020 (NY ELAP Lab 11480); Note:PLM is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. NAD or Trace results by PLM are inconclusive, TEM is currently the only method that can be used to determine if this material can be considered or treated as non asbestos-containing in NY State (also see EPA Advisory for floor tile, FR 59,146,38970,8/1/94) National Institute of Standards and Technology Accreditation requirements mandate that this report must not be reproduced except in full without the approval of the lab.This PLM report relates ONLY to the items tested. RI Cert AAL-094, CT Cert PH-0186, Mass Cert AA000054, NJ Lab ID #NY031.

_____END OF REPORT_____

C&S COMPANIES®

ASBESTOS BULK SAMPLE CHAIN OF CUSTODY

Samples Collected By: R. Arnold/B.Ruane	Sample Date: 10/9/23
Relinquished To/Shipped By: Fed-Ex	Sent Date: 10/9/23
Received By Lab:	Received Date: 10/11/23 1100
Results e-mailed By:	E-mail Date:

C&S Project Number: AH4	Sample Turn Around Time: 5 day
Client: Highland Falls-Fort Montgomery CSD - FORT MONT. ELEM SCHOOL	E-Mail Results To: Rarnold@cscos.com, bruane@cscos.com
Site Address: 895 RTE 9W, FORT MONTGOMERY, NY	Verbal Results To:
Site Description:	Additional Instructions:

Special Instructions:

- Determine Method Of Analysis for PLM - 198.1 or 198.6
- If PLM NOB Result Is Equal To Or Greater Than 1% Asbestos - Testing Is Complete
- If PLM NOB Result Is Less Than 1% Asbestos - Please Analyze Via TEM
- When Submitted In Series (A, B, C) - Please Stop At First Positive.
- Report Results As % Asbestos

Sample ID	Material Description	Sample Location
LS-042AB	~~1930 Wing ROOF~~ BRICK LAP SEAL	1930 FIELD
GYP-043AB	gypsum Deck @ WOOD DECK	1930 FIELD
TP-044AB	BLACK TAR PAPER on WOOD DECK	1930 FIELD
MORTAR RS-045AB	GRAY MORTAR @ TERM BAR	1980/1960
SGL-046AB	GRAY GRANULATED SHINGLE	1930 - GABLES
VB-047AB	Black Rubber (under shingle)	1930
DS-048AB	Gray Duct Sealant	1930 - Attic
SC-049AB	Gray SKYLIGHT CAULK	1960
ISO-050AB	Black Paper Backing @ ISO	1960 - FIELD CORE
TAR-051AB	BLACK TAR @ METAL DECK	1960 - FIED CORE
EP-052AB	STUCCO EPHIS PANEL	1990 WALLS
EPC-053AB	GRAY CAULK @ EPHIS PANEL	1990/1960
CF-054AB	BLACK FLASHING TAR @ SKYLIGHT	1990 - SKYLIGHT CURB
TD-055AB	TECTUM DECK	1960 - FIELD CORE
PL-056 AB	Pearlite INSULATION	1990 - FIELD CORE (EPDM, ISO, PL, METAL)
MORTAR-057AB	GRAY BRICK MORTAR @ RED BRICK	1990 - REAR/N
TWF-058AB	BLACK THRU WALL FLASH/VB @ BRICK	1990 - N/E
CLK-059AB	gray DOOR/WINDOW CAULK	1990 - N/E
CLK-060AB	Gray EPHIS/FOUNDATION CAULK	1990 - N/E
GAS-061AB	Black GASKET @ GLASS BLOCK WINDOWS	1960 - IN WALL

223101864

C&S COMPANIES®

ASBESTOS BULK SAMPLE CHAIN OF CUSTODY

Samples Collected By: R. Arnold/B.Ruane	Sample Date: 10/9/23
Relinquished To/Shipped By: Fed-Ex	Sent Date: 10/9/23
Received By Lab:	Received Date: 10/11/23 1100
Results e-mailed By:	E-mail Date:

C&S Project Number:	Sample Turn Around Time: 5 day
Client: Highland Falls-Fort Montgomery CSD - FORT MONTGOMERY ES	E-Mail Results To: Rarnold@cscos.com, bruane@cscos.com
Site Address: ~~895~~ RTE 9W, FORT MONTGOMERY, NY	Verbal Results To:
Site Description:	Additional Instructions:

Special Instructions:

- Determine Method Of Analysis for PLM - 198.1 or 198.6
- If PLM NOB Result Is Equal To Or Greater Than 1% Asbestos - Testing Is Complete
- If PLM NOB Result Is Less Than 1% Asbestos - Please Analyze Via TEM
- When Submitted In Series (A, B, C) - Please Stop At First Positive.
- Report Results As % Asbestos

Sample ID	Material Description	Sample Location
TM-062AB	Yellow stair tread MASTIC	1930-STAIRS@ CORRIDOR C3-1
T-063AB	GRAY STAIR TREADS	1930-STAIRS @ CORRIDOR C3-1
SM-064AB	Dark yellow STUD MASTIC	1930 Womens BATH 118
MFITT-065ABC	gray MUDDED FITTING (RESIDUAL)@ FD	1960 - CORRIDOR C2-1/TOILET 106-1
		223101864

Appendix C

Lead Bulk Sample Laboratory Reports

Analysis Report

Schneider Laboratories Global, Inc

2512 W. Cary Street • Richmond, Virginia • 23220-5117
804-353-6778 • 800-785-LABS (5227) • Fax 804-359-1475

Customer: C+S Engineers, Inc. (5185)
Address: 499 Col Eileen Collins Blvd
Syracuse, NY 13212

Attn:

Project:
Location: Highland Falls Ft Montgomery
Number: A44.001.001

Order #: 535554

Matrix	Paint
Received	10/11/23
Analyzed	10/13/23
Reported	10/13/23

PO Number:

Sample ID / Parameter	Cust. Sample ID	Location / Method	Sample Date	Weight / Total µg	% / Wt.	Conc.	RL*
535554-001	Paint-001	White Fascia Wood Trim		329 mg			
Lead		EPA 7000B		1320 µg	0.402 %	4020 mg/kg	152 mg/kg
535554-002	Paint-002	Silver Paint @ RTU		330 mg			
Lead		EPA 7000B		<10.0 µg	<0.00303 %	<30.3 mg/kg	30.3 mg/kg
535554-003	Paint-003	Brown Stair Components		308 mg			
Lead		EPA 7000B		1360 µg	0.441 %	4410 mg/kg	162 mg/kg
535554-004	Paint-004	White Joists/Columns		342 mg			
Lead		EPA 7000B		699 µg	0.205 %	2050 mg/kg	58.5 mg/kg
535554-005	Paint-005	Maroon Radiator Covers		302 mg			
Lead		EPA 7000B		69.7 µg	0.0231 %	231 mg/kg	33.1 mg/kg
535554-006	Paint-006	Gray Cove Base Paint		343 mg			
Lead		EPA 7000B		5770 µg	1.68 %	16800 mg/kg	583 mg/kg
535554-007	Paint-007	White Wall/Trim		218 mg			
Lead		EPA 7000B		1970 µg	0.904 %	9040 mg/kg	229 mg/kg
535554-008	Paint-008	White Ductwork		303 mg			
Lead		EPA 7000B		2270 µg	0.748 %	7480 mg/kg	165 mg/kg
		MS failed due to high concentrate of analyte.					
535554-009	Paint-009	White Ceiling Paint		337 mg			
Lead		EPA 7000B		6250 µg	1.86 %	18600 mg/kg	593 mg/kg
535554-010	Paint-010	White/Yellow Ceil Paint		331 mg			
Lead		EPA 7000B		1780 µg	0.537 %	5370 mg/kg	151 mg/kg
535554-011	Paint-011	White/Cream Block Wall		310 mg			
Lead		EPA 7000B		188 µg	0.0608 %	608 mg/kg	32.3 mg/kg
535554-012	Paint-012	White/Cream Wall Paint		324 mg			
Lead		EPA 7000B		344 µg	0.106 %	1060 mg/kg	30.9 mg/kg

Minimum reporting limit: 10.0 µg. All internal QC parameters were met. Unusual sample conditions, if any, are described. Do not reproduce this report except in full. Values are reported to three significant figures. PPM = mg/kg | PPB = µg/kg. The test results apply to the sample as received. AIHA LAP, LLC accredited for Lead (Lab ID 100527).

Analysis Report

Schneider Laboratories Global, Inc

2512 W. Cary Street • Richmond, Virginia • 23220-5117
804-353-6778 • 800-785-LABS (5227) • Fax 804-359-1475

Customer: C+S Engineers, Inc. (5185)
Address: 499 Col Eileen Collins Blvd
Syracuse, NY 13212

Attn:

Project:
Location: Highland Falls Ft Montgomery
Number: A44.001.001

Order #: 535554

Matrix Paint
Received 10/11/23
Analyzed 10/13/23
Reported 10/13/23

PO Number:

Sample ID	Cust. Sample ID	Location	Sample Date	Weight			
Parameter		Method		Total µg	% / Wt.	Conc.	RL*

Analyst: AI
535554-10/13/23 12:57 PM

Reviewed By: **Ahmed Elnasseh**
Analyst

Federal Lead Paint Statute as of 9/1/2023

Location	Level	Unit
Lead in paint by wt.	0.50	%
Lead in paint PPM	5000	mg/kg

Minimum reporting limit: 10.0 µg. All internal QC parameters were met. Unusual sample conditions, if any, are described. Do not reproduce this report except in full. Values are reported to three significant figures. PPM = mg/kg | PPB = µg/kg. The test results apply to the sample as received. AIHA LAP, LLC accredited for Lead (Lab ID 100527).

C&S COMPANIES®

LEAD SAMPLE CHAIN OF CUSTODY

535554
V:\535\535554
dparker 10/11/2023 9:19:52 AM
Federal Express 818156338847

Samples Collected By: B. Ruane/R. Arnold	**Sample Date:**
Relinquished To/Shipped By: UPS	**Relinquish Date:**
Received By Lab:	**Received Date:**
Results e-mailed By:	**E-mail Date:**

C&S Project Number: AH4.001.001	**Sample Turn Around Time:** 5 DAY
C&S Client:	**E-Mail Results To:** rarnold@cscos.com, bruane@cscos.com
Site Address: Highland Falls-Fort Montgomery CSD - FORT MONT. ELEM.	**Verbal Results To:**
Site Description: 895 RTE. 9W, FORT MONTGOMERY, NY	**Additional Instructions:**

Sample Material Matrix (circle): Paint-Chip Bulk Soil Wipe Air Waste-Water Ground-Water

Sample ID	Material Description	Sample Location
PAINT-001	WHITE FASCIA WOOD TRIM	1930 - FRONT
PAINT-002	Silver paint @ RTU	1930 - FRONT
PAINT-003	BROWN STAIR COMPONENTS	1960 - STAGE STAIR COMPONENTS
PAINT-004	WHITE JOISTS/COLUMNS	1960 - GYMNASIUM
PAINT-005	MAROON RADIATOR COVERS	1960 - GYM - W WALL
PAINT-006	gray COVE BASE PAINT	1930 - CLASSRM 127 - W
PAINT-007	WHITE WALL/TRIM	1930 - CLASSROOM WALLS/TRIM
PAINT-008	White DUCTWORK	1960 - Nurse's Suite
PAINT-009	White ceiling PAINT	1930 Wing
PAINT-010	WHITE/yellow CEILING PAINT @ deck	1960 wing - CLASSROOM 105
PAINT-011	WHITE/CREAM BLOCK WALL PAINT	1960 WING - CLASSROOM 105
PAINT-012	WHITE/CREAM WALL PAINT (SR/PLAST)	1960 WING - CLASSROOM 110

Appendix D

PCB Bulk Sample Laboratory Report

Analysis Report

Schneider Laboratories Global, Inc

2512 W. Cary Street • Richmond, Virginia • 23220-5117
804-353-6778 • 800-785-LABS (5227) • Fax 804-359-1475

Customer: C+S Engineers, Inc. (5185)
Address: 499 Col Eileen Collins Blvd
Syracuse, NY 13212

Attn:

Project: Fort Montgomery Elem School
Location: 895 RTE 9W Fort Montgomery NY
Number: AH4.001.001

Order #: 535553

Matrix Bulk
Received 10/11/23
Reported 10/18/23

PO Number:

Sample ID / Parameter	Cust. Sample ID	Location / Method	Result	RL*	Units	Analysis Date	Analyst
535553-001	SC-048P	1960 - Front/s Roof					
Semi-volatile Organic Compounds							
Aroclor - 1016		SW846 8082A	**<736**	735	µg/kg	10/11/23	NM
Aroclor - 1221		SW846 8082A	**<736**	735	µg/kg	10/11/23	NM
Aroclor - 1232		SW846 8082A	**<736**	735	µg/kg	10/11/23	NM
Aroclor - 1242		SW846 8082A	**<736**	735	µg/kg	10/11/23	NM
Aroclor - 1248		SW846 8082A	**<736**	735	µg/kg	10/11/23	NM
Aroclor - 1254		SW846 8082A	**<736**	735	µg/kg	10/11/23	NM
Aroclor - 1260		SW846 8082A	**<736**	735	µg/kg	10/11/23	NM
Aroclor - 1262		SW846 8082A	**<736**	735	µg/kg	10/11/23	NM
Aroclor - 1268		SW846 8082A	**<736**	735	µg/kg	10/11/23	NM

535553-10/18/23 03:49 PM

Reviewed By: **Kelly Muncy**
Manager

Surrogate Recoveries

535553-001 - PCB

DCB	MI
TCMX	89%

All internal QC parameters were met. Unusual sample conditions, if any, are described. Surrogate Spike results designated with "D" indicate that the analyte was diluted out. "MI" indicates matrix interference. Concentration and *Reporting Limit (RL) based on areas provided by client. Values are reported to three significant figures. Solid PPM = mg/kg | PPB = µg/kg and Water PPM = mg/L | PPB = µg/L. The test results apply to the sample as received.

Analysis Report

Schneider Laboratories Global, Inc

2512 W. Cary Street • Richmond, Virginia • 23220-5117
804-353-6778 • 800-785-LABS (5227) • Fax 804-359-1475

Customer: C+S Engineers, Inc. (5185)
Address: 499 Col Eileen Collins Blvd
Syracuse, NY 13212

Attn:

Project: Fort Montgomery Elem School
Location: 895 RTE 9W Fort Montgomery NY
Number: AH4.001.001

Order #: 535553

Matrix Bulk
Received 10/11/23
Reported 10/18/23

PO Number:

Sample ID / Parameter	Cust. Sample ID / Method	Result	RL*	Units	Analysis Date	Analyst

State Certifications

Method	Parameter	New York	Virginia
SW846 8082A	Aroclor - 1016	ELAP Certified	VELAP Certified
SW846 8082A	Aroclor - 1221	ELAP Certified	VELAP Certified
SW846 8082A	Aroclor - 1232	ELAP Certified	VELAP Certified
SW846 8082A	Aroclor - 1242	ELAP Certified	VELAP Certified
SW846 8082A	Aroclor - 1248	ELAP Certified	VELAP Certified
SW846 8082A	Aroclor - 1254	ELAP Certified	VELAP Certified
SW846 8082A	Aroclor - 1260	ELAP Certified	VELAP Certified
SW846 8082A	Aroclor - 1262	ELAP Certified	VELAP Certified
SW846 8082A	Aroclor - 1268	ELAP Certified	VELAP Certified

State	Certificate Number
New York	ELAP 66375
Virginia	VELAP 12299

All internal QC parameters were met. Unusual sample conditions, if any, are described. Surrogate Spike results designated with "D" indicate that the analyte was diluted out. "MI" indicates matrix interference. Concentration and *Reporting Limit (RL) based on areas provided by client. Values are reported to three significant figures. Solid PPM = mg/kg | PPB = µg/kg and Water PPM = mg/L | PPB = µg/L. The test results apply to the sample as received.

C&S COMPANIES®

PCB BULK SAMPLE CHAIN OF CUSTODY

535553
V:\535\535553
dparker 10/11/2023 9:19:52 AM
Federal Express 818156338847

S 1

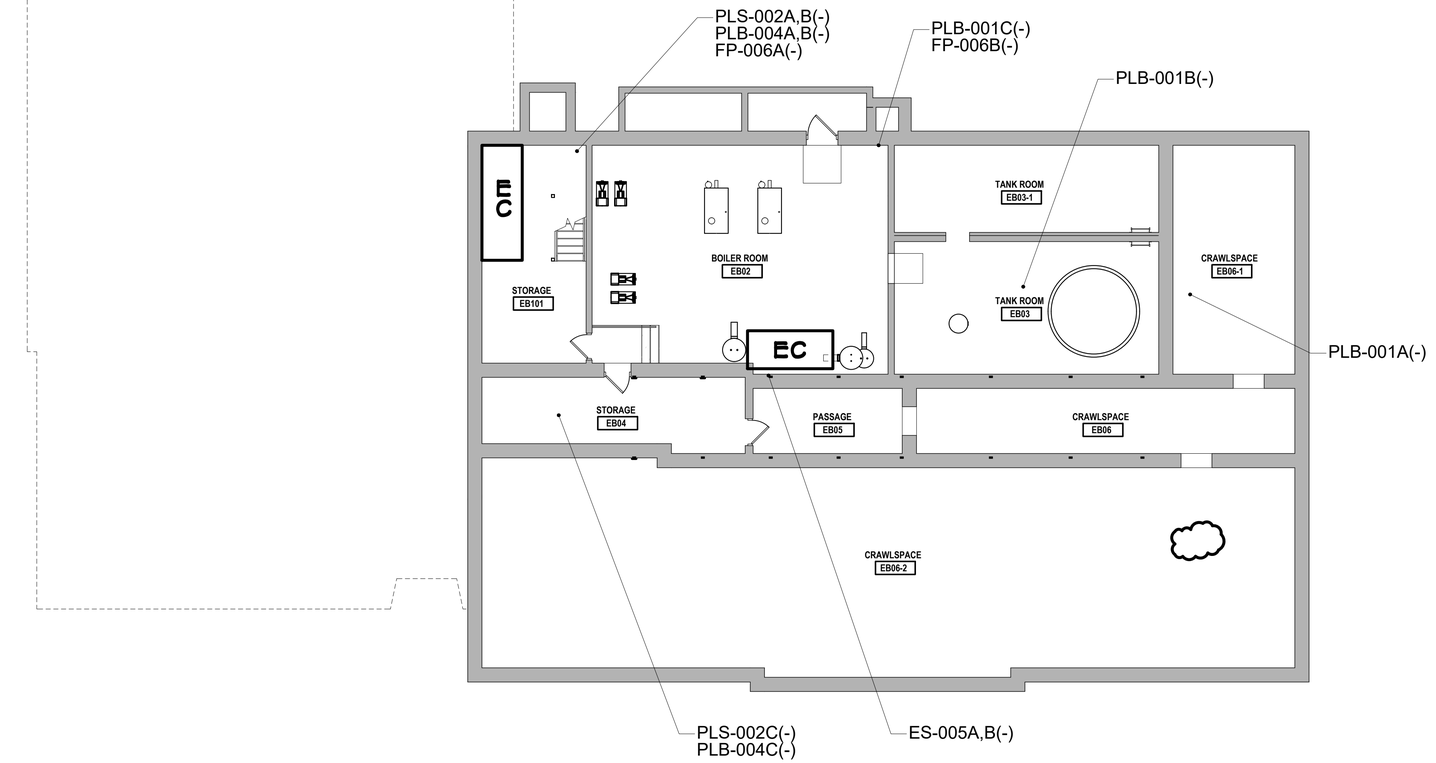
Samples Collected By: B. Ruane/R. Arnold	**Sample Date:** 10/9/23
Relinquished To/Shipped By: UPS	**Relinquish Date:** 10/9/23
Received By Lab:	**Received Date:**
Results e-mailed By:	**E-mail Date:**

C&S Project Number: AH4.001.001	**Method of Analysis Required: EPA 8082s PCB**
C&S Client: Highland Falls-Fort Montgomery CSD	**Sample Turn Around Time: 5 DAY**
Site Address: 895 RTE 9W, FORT MONTGOMERY, NY	**E-Mail Results To: rarnold@cscos.com/bruane@cscos.com**
Site Description: FORT MONTGOMERY ELEM. SCHOOL	**Verbal Results To:**

Sample ID	Material Description	Sample Location
SC-048P	gray skylight caulk	1960 - FRONT/S ROOF

Appendix E

Figures 1-7



LEGEND:

PRESUMED ASBESTOS-CONTAINING THERMAL SYSTEM INSULATION

EC — PRESUMED ASBESTOS-CONTAINING ELECTRICAL COMPONENTS

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Fax: 315-455-9667
www.cscos.com

CERTIFICATE OF AUTHORIZATION #: 0018122

PRELIMINARY NOT FOR CONSTRUCTION

FORT MONTGOMERY ELEMENTARY SCHOOL
895 ROUTE 9W
FORT MONTGOMERY, NEW YORK 10922
HAZARDOUS MATERIAL PRE-RENOVATION SURVEY

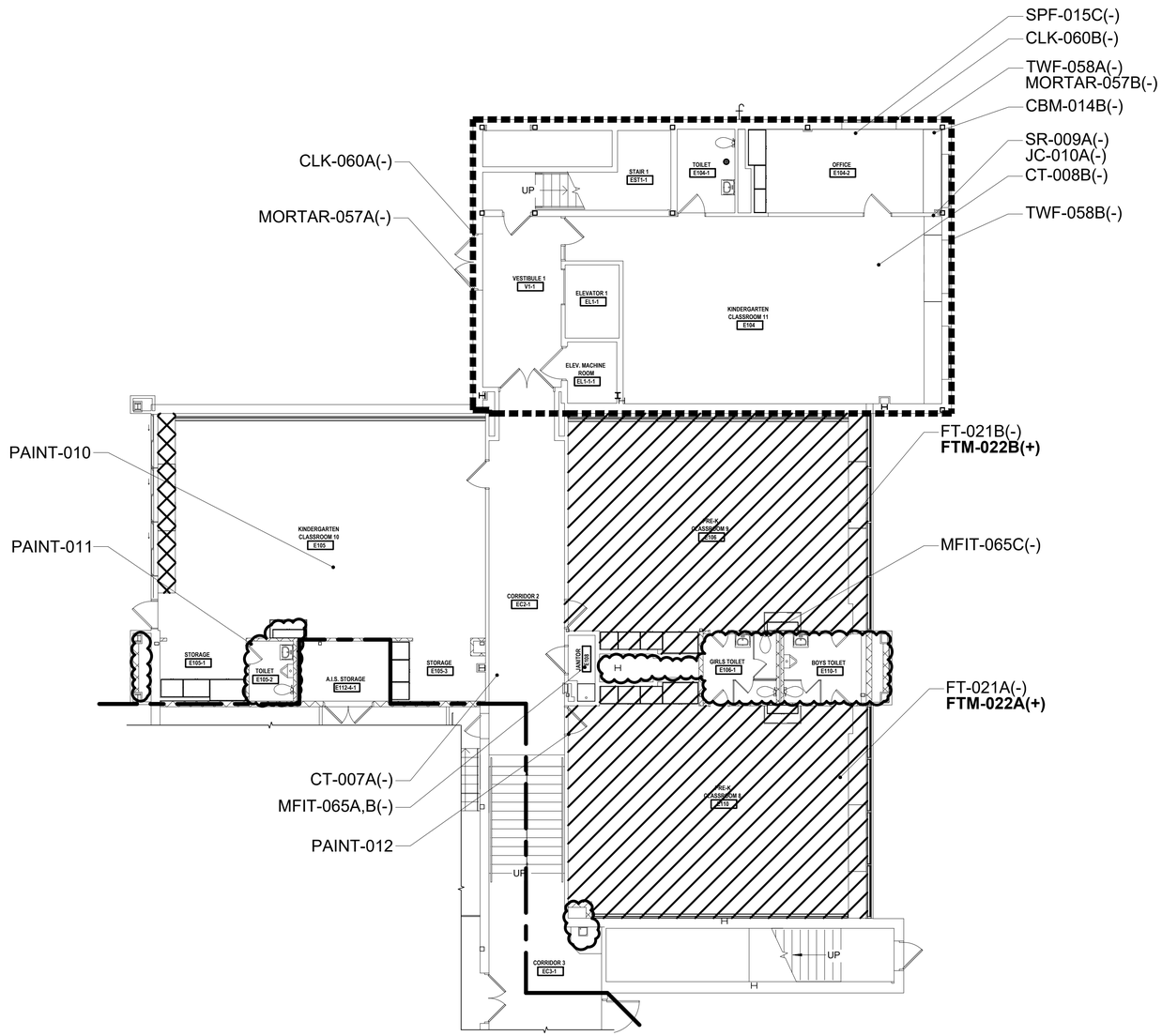
MARK	DATE	DESCRIPTION

REVISIONS

PROJECT NO:	AH4.001.001
DATE:	OCTOBER 2023
DRAWN BY:	N. COULOMBE
DESIGNED BY:	
CHECKED BY:	B. RUANE

MATERIAL AND SAMPLE LOCATION
BASEMENT FLOOR PLAN
"AREA A"

FIGURE 1



LEGEND:

- ASBESTOS-CONTAINING FLOOR TILE MASTIC
- PRESUMED ASBESTOS-CONTAINING FLOOR TILE AND FLOOR TILE MASTIC (UNDER UNIT VENTILATORS AND CABINETRY)
- PRESUMED ASBESTOS-CONTAINING THERMAL SYSTEM INSULATION
- PRESUMED ASBESTOS-CONTAINING FOUNDATION MASTIC

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PRELIMINARY
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FORT MONTGOMERY ELEMENTARY SCHOOL
895 ROUTE 9W
FORT MONTGOMERY, NEW YORK 10922
HAZARDOUS MATERIAL PRE-RENOVATION SURVEY

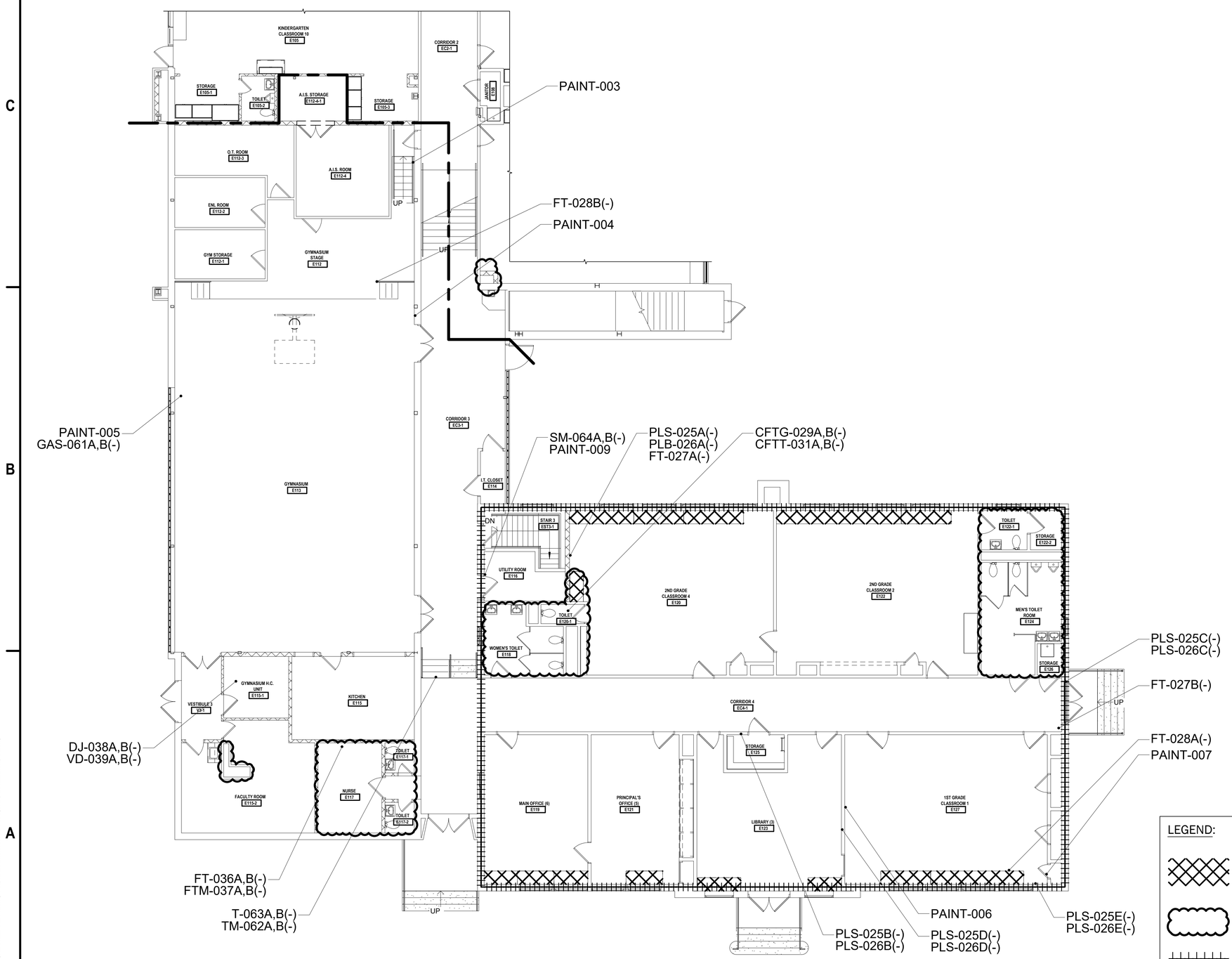
MARK	DATE	DESCRIPTION

REVISIONS

PROJECT NO:	AH4.001.001
DATE:	OCTOBER 2023
DRAWN BY:	N. COULOMBE
DESIGNED BY:	
CHECKED BY:	B. RUANE

MATERIAL AND SAMPLE LOCATION
PARTIAL FIRST FLOOR PLAN
"AREA A"

FIGURE 2



LEGEND:

- PRESUMED ASBESTOS-CONTAINING FLOOR TILE AND FLOOR TILE MASTIC (UNDER UNIT VENTILATORS AND CABINETRY)
- PRESUMED ASBESTOS-CONTAINING THERMAL SYSTEM INSULATION
- ASBESTOS-CONTAINING INTERIOR WALL MASTIC

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PRELIMINARY NOT FOR CONSTRUCTION

FORT MONTGOMERY ELEMENTARY SCHOOL
895 ROUTE 9W
FORT MONTGOMERY, NEW YORK 10922
HAZARDOUS MATERIAL PRE-RENOVATION SURVEY

MARK	DATE	DESCRIPTION

REVISIONS

PROJECT NO:	AH4.001.001
DATE:	OCTOBER 2023
DRAWN BY:	N. COULOMBE
DESIGNED BY:	
CHECKED BY:	B. RUANE

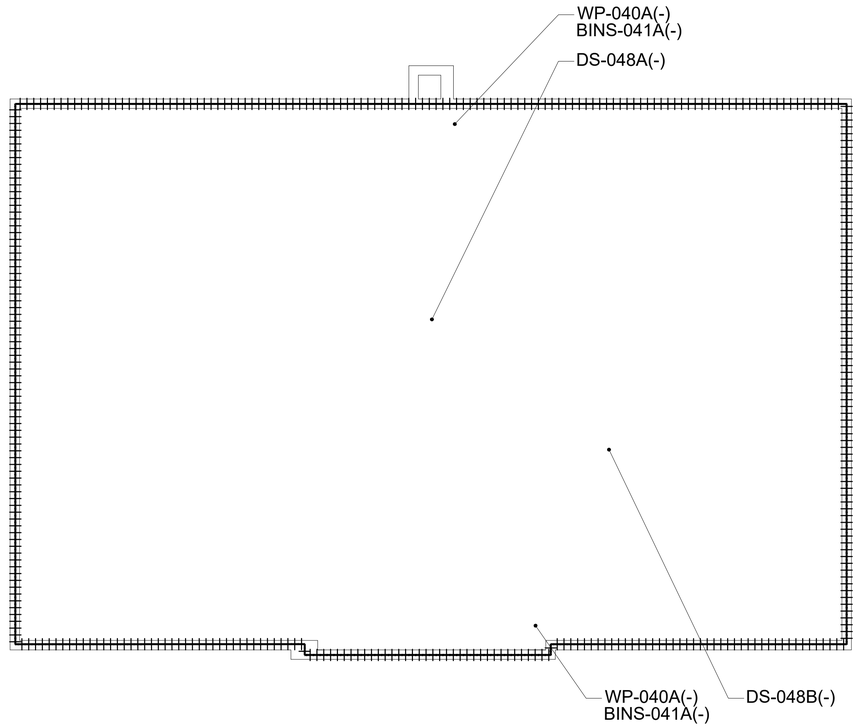
MATERIAL AND SAMPLE LOCATION

PARTIAL FIRST FLOOR PLAN

"AREA B"

FIGURE 3

Oct 25, 2023 - 11:00am
F:\Projects\AH4 - Highland Hills CSD\Planning-Study\CADD\Sheet Files\Fort Montgomery ES Haz Survey Set.dwg



LEGEND:

ASBESTOS-CONTAINING INTERIOR WALL MASTIC

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PRELIMINARY
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FORT MONTGOMERY ELEMENTARY SCHOOL
895 ROUTE 9W
FORT MONTGOMERY, NEW YORK 10922
HAZARDOUS MATERIAL PRE-RENOVATION SURVEY

MARK	DATE	DESCRIPTION

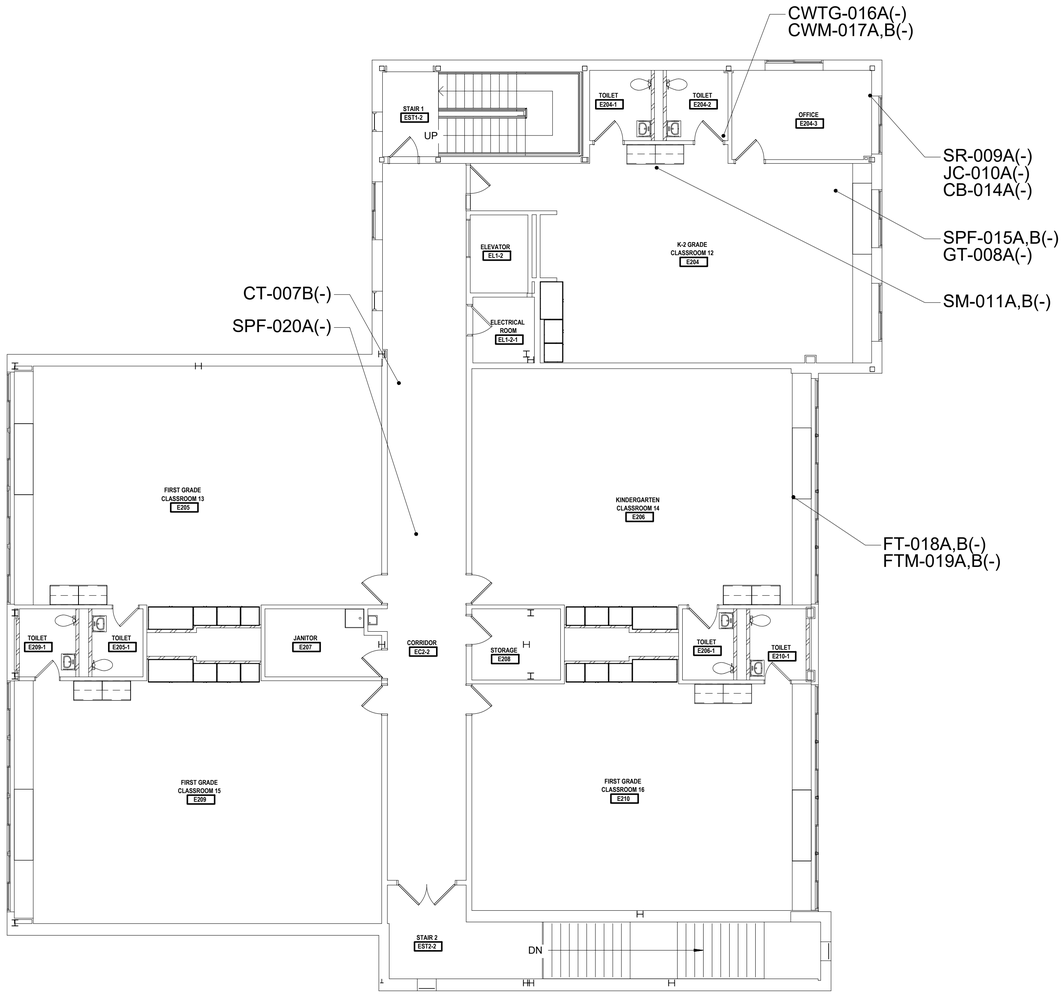
REVISIONS

PROJECT NO:	AH4.001.001
DATE:	OCTOBER 2023
DRAWN BY:	N. COULOMBE
DESIGNED BY:	
CHECKED BY:	B. RUANE

MATERIAL AND SAMPLE LOCATION
ATTIC FLOOR PLAN
"AREA B"

FIGURE 4

Oct 25, 2023 - 11:09am
F:\Projects\AH4 - Highland Falls CSD\Planning-Study\CADD\Sheet Files\Fort Montgomery ES Haz Survey Set.dwg



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PRELIMINARY
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FORT MONTGOMERY ELEMENTARY SCHOOL
895 ROUTE 9W
FORT MONTGOMERY, NEW YORK 10922
HAZARDOUS MATERIAL PRE-RENOVATION SURVEY

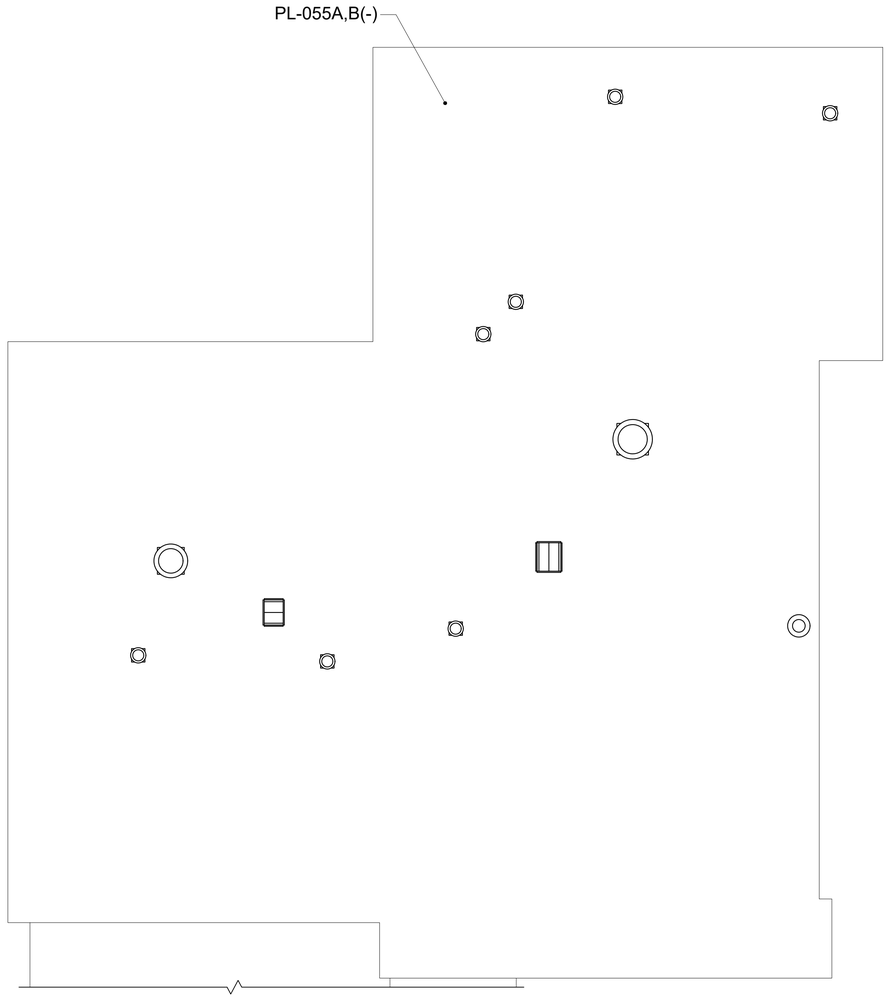
MARK	DATE	DESCRIPTION

REVISIONS

PROJECT NO:	AH4.001.001
DATE:	OCTOBER 2023
DRAWN BY:	N. COULOMBE
DESIGNED BY:	
CHECKED BY:	B. RIJANE

MATERIAL AND SAMPLE LOCATION
PARTIAL SECOND FLOOR PLAN
"AREA C"

FIGURE 5



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895 ROUTE 9W
FORT MONTGOMERY, NEW YORK 10922
HAZARDOUS MATERIAL PRE-RENOVATION SURVEY

MARK	DATE	DESCRIPTION

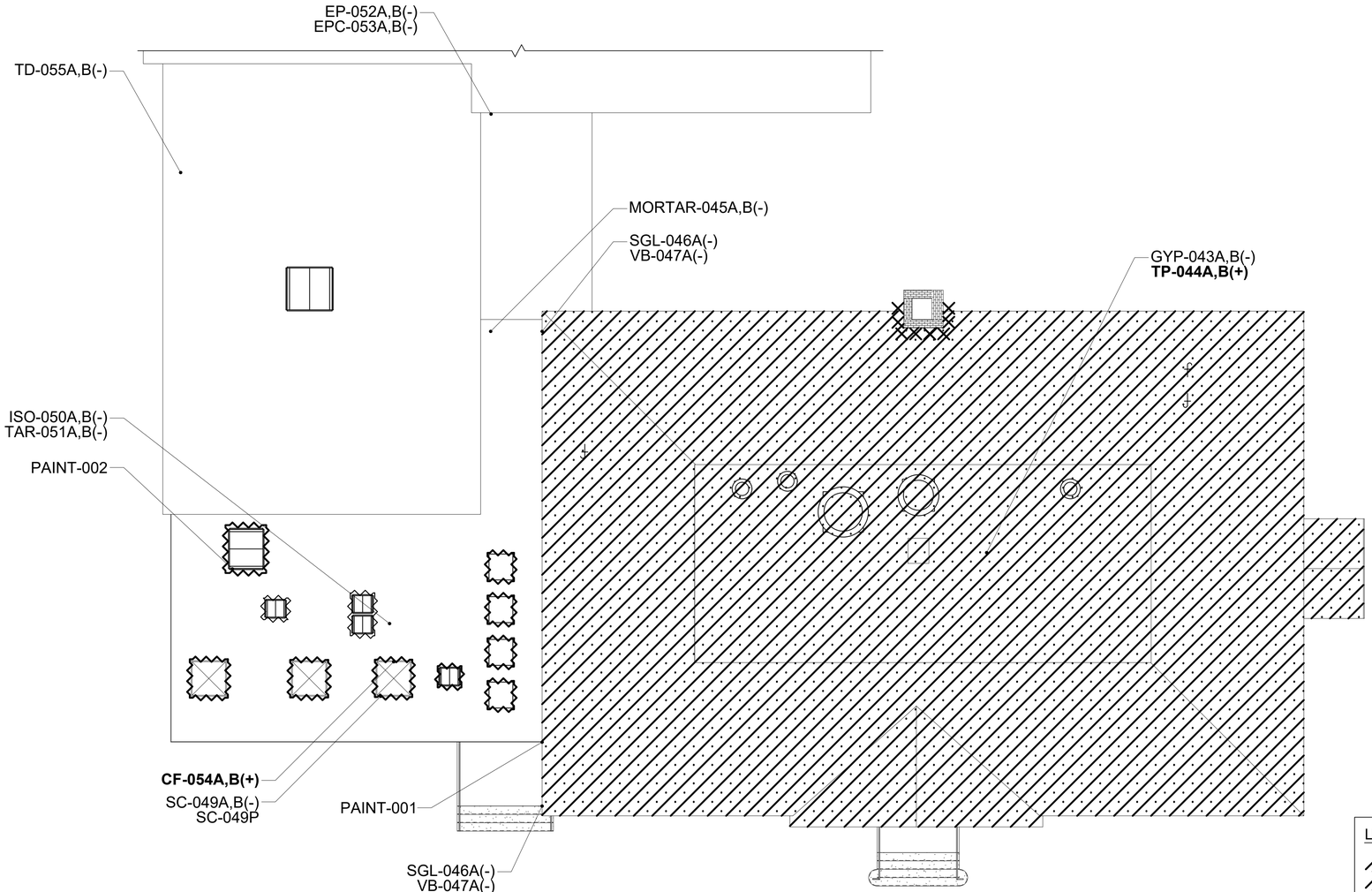
REVISIONS

PROJECT NO:	AH4.001.001
DATE:	OCTOBER 2023
DRAWN BY:	N. COULOMBE
DESIGNED BY:	
CHECKED BY:	B. RUANE

MATERIAL AND SAMPLE LOCATION
PARTIAL ROOF PLAN
"AREA A"

FIGURE 6

Oct 25, 2023 - 11:50am
F:\Projects\AH4 - Highland Falls CSD\Planning Study\CADD\Sheet Files\Fort Montgomery ES Haz Survey Set.dwg



LEGEND:

- ASBESTOS-CONTAINING ROOFING TAR PAPER (ON WOOD DECK)
- ASBESTOS-CONTAINING CURB FLASHING (ALL LAYERS OF FELTS, TARS, MOPS, VAPOR BARRIERS, CEMENTS, ETC. TO SUBSTRATE)
- PRESUMED ASBESTOS-CONTAINING CHIMNEY FLASHING (ALL LAYERS OF FELTS, TARS, MOPS, VAPOR BARRIERS, CEMENTS, ETC. TO SUBSTRATE)

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FORT MONTGOMERY ELEMENTARY SCHOOL
895 ROUTE 9W
FORT MONTGOMERY, NEW YORK 10922
HAZARDOUS MATERIAL PRE-RENOVATION SURVEY

MARK	DATE	DESCRIPTION

REVISIONS

PROJECT NO:	AH4.001.001
DATE:	OCTOBER 2023
DRAWN BY:	N. COULOMBE
DESIGNED BY:	
CHECKED BY:	B. RUANE

MATERIAL AND SAMPLE LOCATION

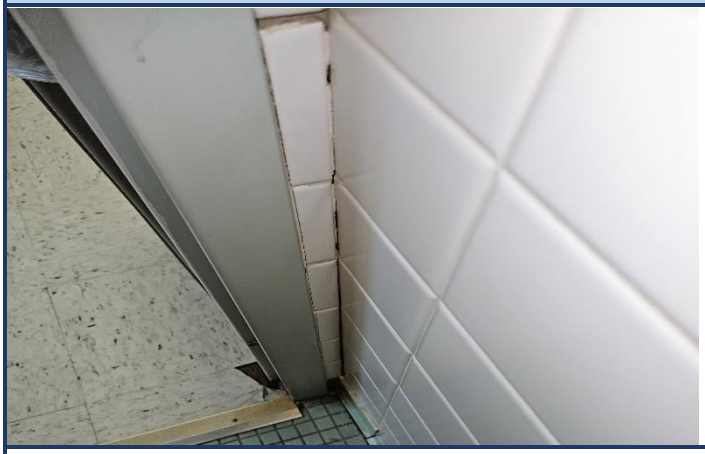
PARTIAL ROOF PLAN

"AREA B"

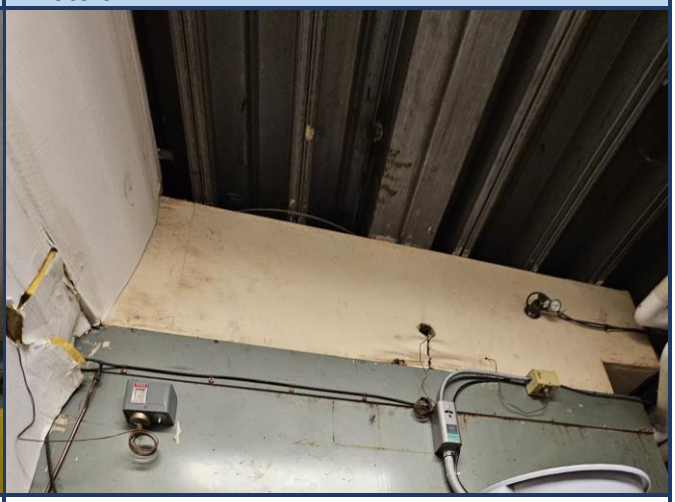
FIGURE 7

Appendix F

Photo Log

Photo 1	Photo 2
	
1930/1960 Wings-NON-ACM Ceramic Wall/Floor Tile Grout/Mastic And Thin Set Applications	1930 Wing-NON-ACM Floor Tile/Mastic On Wood Subfloor. Presumed ACM Floor Tile/Mastic @ UVs
Photo 3	**Photo 4**
	
1930 Wing-Basement NO ACM Identified In Tanks/Piping. Presumed ACM Electrical Components	1930 Wing-Fiberboard Underlayment/Wood Subfloor
Photo 5	**Photo 6**
	
1930 Wing-ACM Black Mastic/Weatherproofing Tar Behind Plaster, Applied To Brick Perimeter Walls	1930 Wing-1st Floor Men's Bathroom-ACM Wall Black Wall Mastic (Behind Plaster)

C&S COMPANIES®	C&S Engineers, Inc. 499 Col. Eileen Collins Blvd. Syracuse, New York 13212	**Photographic Log** HFFM CSD Elementary School 895 Rte. 9W Fort Montgomery, N.Y.	PR# AH4.001.001 Date: 10/23/23 Limited Hazardous Material Pre-Renovation Survey

Photo 7	Photo 8
	
1960 Wing-Gymnasium (E113) Non-Acm Black Gasket	1960 Wing-Gym Hvac Closet (E115-1) No Acms Identified Associated With Piping Or Ductwork
Photo 9	**Photo 10**
	
1960 Wing-1st Floor Classrooms Previously Identified ACM Mudded Fittings (Above Ceilings)	1960 Wing-1st Floor Clsrm. (E110) NON-ACM 12" Floor Tile With ACM Black Mastic (Presumed @ Uvs Throughout)
Photo 11	**Photo 12**
	
Area B-1960 Roof (@ Front Entrance) ACM Curb Flashing At Skylights	Area B (Gymnasium E113) Roof Core-All NON-ACM Tectum, Pearlite, Iso, EPDM

C&S COMPANIES®	C&S Engineers, Inc. 499 Col. Eileen Collins Blvd. Syracuse, New York 13212	**Photographic Log** HFFM CSD- Elementary School 895 Rte. 9W Fort Montgomery, N.Y.	PR# AH4.001.001 Date: 10/23/23 Limited Hazardous Material Pre-Renovation Survey

APPENDIX B

Subsurface Investigation Report
Elwyn & Palmer Consulting Engineers, PLLC – July 2023

Elwyn & Palmer
CONSULTING ENGINEERS, PLLC

Subsurface Investigation Report

for

Proposed New Addition and Site Improvements
Fort Montgomery Elementary School
895 Route 9W
Fort Montgomery, NY

Prepared for:

John Sokol, PA
Principal
BCA Architects and Engineers
jsokol@thebcgroup.com

Provided By:
Elwyn & Palmer Consulting Engineers PLLC
213 E. Seneca Street
Ithaca, New York 14850
Phone 607.272.5060
www.ElwynPalmer.com

July 2023

Subsurface Investigation Report

for

Proposed New Addition and Site Improvements
Fort Montgomery Elementary School
895 Route 9W
Fort Montgomery, NY

Prepared for:

John Sokol, PA
Principal
BCA Architects and Engineers
jsokol@thebcgroup.com

A. INTRODUCTION

We have completed a subsurface investigation for the proposed new addition and sitework at Fort Montgomery Elementary School. The work was done in accordance with our proposal of June 19, 2022 that was authorized by John Sokol of BCA. This report will summarize the findings of the subsurface investigation that was performed during the period of July 6-7, 2023. This report includes a description of the work performed, a discussion of the findings, and our recommendations for foundation design.

B. SCOPE OF WORK

The scope of work included advancing six site borings to a maximum depth of 15 ft to provide information needed for the sitework. Four infiltration tests were performed immediately adjacent to four of the site borings. Three structural borings to a maximum depth of 20 ft were advanced in the footprint of proposed addition to obtain information needed for design of the new building foundation.

Boring and infiltration test locations and depths for the site work were selected by BCA. Elwyn & Palmer selected the boring locations for the proposed addition. Locations were based on the proposed footprint of the new building that we received from BCA. A boring location plan showing the boring and infiltration test locations is included in the Appendix.

C. PROJECT and SITE DESCRIPTION

We understand the project consists of construction of a new addition to the western side of the existing elementary school. The proposed finished floor of the new addition will match that of the current rear of the building at Elevation 167.3 ft. The project also includes expansion of parking areas located west (behind) and east (front) of the building.

The site is located on the west side of Route 9W. The first floor elevation of the elementary school is located approximately 10-15 ft above Route 9W. The building site slopes upward to the west. We are not aware of any proposed significant grade changes.

D. SUBSURFACE INVESTIGATION

Soil borings were advanced using 3 ¼ inch inside diameter hollow stem augers. Standard Penetration Tests were performed and split-spoon soil samples were taken using a 2 inch outside diameter split spoon sampler in accordance with ASTM D1586. In all borings, samples were taken continuously (2 ft intervals) to 12 ft or the bottom of boring. Below 12 ft samples were taken at 5 foot or "standard" intervals. All boring holes were backfilled with cuttings from the borings and on-site soils.

Samples were classified in the field by the driller with select samples being classified by the engineer in the field. A site plan showing the boring locations is attached. Logs for each of the borings are attached. The attached boring logs contain soil classifications and standard penetration test results.

E. SUBSURFACE FINDINGS

This section provides a description of the subsurface conditions encountered at the site. It is important to note that each boring is just a snapshot of the subsurface conditions at that location and that subsurface conditions will vary across each site.

Borings B1 and B2 were advanced from the upper western parking area. The borings encountered 1.25-2.5 inches of asphalt pavement underlain by 3-5 inches of subbase. The subbase was underlain by fine sand and silt. Auger refusal was reached at 2.1 ft in B1 and at 3.7 ft in B2. We anticipate this was on rock but it may have been on a large boulder. No groundwater was encountered in these borings.

Boring B3 was advanced near the existing playground area. The boring encountered 5 inches of topsoil underlain by dense fill to 4 ft. The fill consisted of primarily sand with trace amounts of asphalt pavement. Below the fill, dense sand with lesser amounts of gravel and occasional cobbles were encountered to 4.2 ft. Weathered bedrock was encountered at 4.2 ft and auger refusal at 4.6 ft. No groundwater was encountered.

Borings B4-B6 were advanced in the area of the new addition. Boring B4 encountered 6 inches of weathered pavement underlain by pavement subbase to a depth of 1 ft. The subbase was underlain by dense sand and gravel with trace amounts of silt and occasional cobbles to 9.3 ft where auger refusal was reached. The soil was noted as "wet" on the logs beginning at 6 ft below grade. No groundwater was encountered.

B5 encountered 12 inches of topsoil that was underlain by similar sand and gravel to 4.5 ft where auger refusal was reached. A rock core was obtained from 4.6 to 9.6 ft. The underlying rock is lightly weathered granite with a Rock Quality Designation (RQD) of 73. The RQD is a metric used to describe rock cores and is calculated by summing the lengths of all pieces of the rock core that are greater than 4 inches in length and dividing by the total length of the core. An RQD value of 73 indicates that most of the core pieces were 4 inches or

longer. Due to the hardness of the granite and the thick bedding, a hoe ram will be needed for any required rock excavation. No groundwater was encountered.

B6 encountered one inch of asphalt pavement underlain by fill to a depth of 2 ft. The fill consisted of old pavement, sand, gravel, silt, and trace amounts of coal ash. Below the fill was dense sand and gravel similar to that encountered in B4 and B5. Auger refusal was reached at 4.5 ft. No groundwater was encountered.

The following table summarizes the elevations of rock in the proposed addition area:

Boring	Approx. Ground Elevation	Approx. Rock Elevation	Depth to Rock (ft)
B4	169.0	159.7	9.3
B5	166.0	161.5	4.5
B6	167.0	162.2	4.8

Borings B7 encountered 2.5 inches of topsoil underlain by medium dense sand and gravel with occasional cobbles to auger refusal at 5 ft. No groundwater was encountered.

Borings B8 and B9 were advanced from the lawn area in from of the school. The borings encountered 1.25 to 2.5 inches of topsoil. In B8, the topsoil was underlain by loose to medium dense fill to 7 ft. The fill consisted of sand, gravel, occasional cobbles, and trace amounts of brick. Below the fill was medium dense sand and gravel to 8.5 ft where rock was encountered. The augers were advanced into the rock until auger refusal was reached at 9.6 ft. In B9, the topsoil was underlain by loose fine sand and silt to 4.5 ft where rock was encountered. Auger refusal was reached at 4.7 ft. No groundwater was encountered in these borings.

F. INFILTRATION TEST RESULTS

Infiltration tests were conducted at four locations. BCA selected the locations and the test parameters. Test locations are shown on the attached plan. Tests were performed adjacent to site borings. Test results are summarized in the table below.

Infiltration test holes were pre-soaked for 24 hours prior to the test per NYSDEC guidelines. Detailed test results are shown on the boring log for the boring adjacent to the test.

Test Location	GWT Depth (ft)	Test Depth (ft)	Infiltration Rate	Adjacent Boring
I1	Not found	3.6	0 ft/hr	B3
I2	Not found	4.0	0.09 ft/hr	B7
I3	Not found	4.0	2 ft in 15 min	B8
I4	Not found	4.0	0 ft/hr	B9

G. GEOTECHNICAL ENGINEERING ANALYSIS

We have completed an analysis of the soils at the site for the proposed new addition. Based on our review we believe the proposed structure can be supported on conventional shallow foundations and the proposed concrete floor slab may be constructed as a concrete slab-on-grade provided they are constructed in accordance with the recommendations detailed below.

Foundations for the new addition shall bear on sound natural subgrade that is approved by the Engineer or a qualified representative or on or properly placed and compacted structural fill. All footing subgrades must be approved by the Engineer or a qualified representative that is in communication with the Engineer. All soft material that is obviously fill or is not possible to be densified by compaction will need to be removed and replaced with compacted structural fill that is placed in accordance with the recommendation included later in this report. Based on our findings, we don't anticipate rock excavation being required in the main footprint of the addition. However, if a walkway is extended to the upper parking area from the new addition, rock excavation will likely be required since rock was encountered at shallow depths in the upper parking area. We are anticipating that the majority of the foundations will be bearing on the native sandy soils at the site.

Foundations for the proposed new addition that bear on the existing sound natural material or compacted structural fill can be sized using an allowable bearing pressure of 3000 psf. Recommendations for the slab-on-grade design are included later in this report.

No standing groundwater was encountered in the borings. As stated previously, in boring B4 the samples were noted as "wet" beginning at 6.0. Based on that information, we don't anticipate groundwater being a significant consideration during construction. However, groundwater levels can fluctuate. Water infiltration into the excavations during periods of wet weather may be problematic and will need to be directed away from and out of the excavation. Dewatering of the excavation may be required to maintain a dry working area during construction of the foundations.

H. PAVEMENT ANALYSIS AND DESIGN

Based on our review of the subsurface conditions encountered in the borings and anticipated traffic loading for this type of facility we are providing two pavement sections for new pavements; one standard duty and one heavy duty.

The heavy duty section should be used in areas subjected to repeated bus or truck traffic. The standard duty section can be used in areas designated for car parking or for areas that are subjected to only occasional heavy traffic.

We have provided recommendations for preparation of the subgrade that are important. The subgrade should be sloped at a pitch at least equal to the pavement surface slope to promote drainage to low points to prevent water accumulation on the subgrade. We recommend that underdrains be installed at all low points to convey this water to appropriate drainage.

We recommend the following pavement sections:

Standard Section

Top	1.5 inches
Binder	2 inches
Subbase	8 inches
Mirafi 600X geotextile	

Heavy Duty Section

Top	1.5 inches
Binder	3 inches
Subbase	12 inches
Mirafi 600X geotextile	

The top and binder courses should conform to NYSDOT specifications for Type 6 or Type 7 top and Type 3 binder, respectively. The subbase material should conform to NYSDOT specification 304.14 and 733.0404 Subbase Course, Type 4. Subbase material should be placed in lifts and compacted to 95% of the Modified Proctor maximum dry density as determined in accordance with ASTM D1557.

Prior to placement of the subbase layer the subgrade should be proofrolled in the presence of a qualified observer using a self-propelled roller weighing at least 30,000 lbs. Soft or uncompactable areas should be over-excavated and replaced with approved select fill material.

Underdrains shall be located to convey water away from pavements and into drainage structures or ditches. We recommend 4 inch diameter perforated drains be placed in 2 ft square trenches that are filled with drainage stone and wrapped in filter fabric and located to pick up any water that is moving along the interface between the subgrade and subbase layers. Underdrains should be located at all valleys, low or flat points, and along any curbed edge. These are all areas where water could collect and both soften the subgrade and contribute to frost action.

I. SEISMIC DESIGN

Based on the soils encountered in the borings, the sites can be classified as Seismic Site Class B according to the current edition of the Building Code of New York State. The subsurface exploration did not reveal soils vulnerable to liquefaction or collapse under seismic loading. Based on the location of the site and the site class, we determined a value for the maximum considered earthquake spectral response acceleration for short periods, (S_{MS}) of 0.244g, and at 1-second period (S_{M1}) of 0.048g. A seismic design report showing site specific seismic data is included in the Appendix

J. RECOMMENDATIONS

Based on the results of the subsurface investigation and engineering analyses, we have the following recommendations:

Site Preparation, Excavation, and Support of Excavation

1. Clear, grub, and strip topsoil and remove significant root structures within new construction areas. Remove any remnants of any existing structures encountered from within the new footprint.
2. In areas where fill is required, compact subgrade before placing fill by making at least 4 overlapping passes in perpendicular directions with a self-propelled roller weighing at least 30,000 lbs. Soft or uncompactable areas should be excavated and replaced with granular structural fill approved by the Engineer. The structural fill should be placed to at least 95% of the maximum dry density as determined in accordance with ASTM D1557.
3. All excavation should be performed in accordance with all OSHA and other applicable safety standards.
4. Dewatering operations should be configured to route surface runoff and groundwater away from site and out of the excavation. Operations shall conform to applicable environmental regulations.
5. When structural fill is required beneath foundations it shall consist of an engineered mix of crushed ledge rock conforming to the following gradation:

Sieve Size	Percent Passing
2”	100
1”	80-95
½”	45-75
#4	30-60
#40	10-40
#200	0-7

Foundation Design and Construction

1. The foundations for the proposed new addition should be supported on a conventional shallow foundation system. Foundations supported on the sound natural material that or on properly compacted structural fill that is approved by the Engineer or the Engineer’s representative may be sized using an allowable bearing pressure of 3000 psf.
2. The floor slab may be designed as a slab on grade and shall be placed on 8 inches of compacted select material. The subgrade below the select material shall be proofrolled in accordance with the above recommendations on Site Preparation. The slab should be reinforced against cracking in accordance with ACI design standards. Concrete slab-on-grade shall be designed using a modulus of subgrade reaction of 150 pci.

3. Select granular fill for beneath the slab shall be clean bank run gravel conforming to the following gradation:

Sieve Size	Percent Passing
2”	100
¼””	35-65
#200	0-10

Pavement Recommendations

1. Pavement subgrade to be proofrolled in the presence of the Engineer’s representative as described above.
2. Proofrolling to consist of at least 4 passes in each of two perpendicular directions with a self-propelled roller weighing at least 30,000 pounds. Proofrolling will compact and seal the subgrade and identify areas of soft or uncompactable subgrade requiring repair prior to placing subbase.
3. Repair unstable areas identified by proofrolling by over-excavating and replacing with compacted, stable subbase material.
4. Recommended pavement sections were provided previously in this report.

K. CLOSING

Elwyn & Palmer has prepared this report based on our interpretation of the subsurface conditions at the project sites and our understanding of the proposed project. Changes in scope, location, structure type, or loads should be brought to our attention for review to allow us to make changes as necessary to the recommendations provided.

Elwyn & Palmer has performed these services in a manner consistent with the standard methods and level of care exercised by members of the geotechnical engineering profession. No warranty, expressed or implied, is made in connection with the providing of geotechnical engineering services.

We appreciate the opportunity to be of service on this project. Please call if you have any questions or require additional information.

Sincerely,

ELWYN & PALMER CONSULTING ENGINEERS PLLC

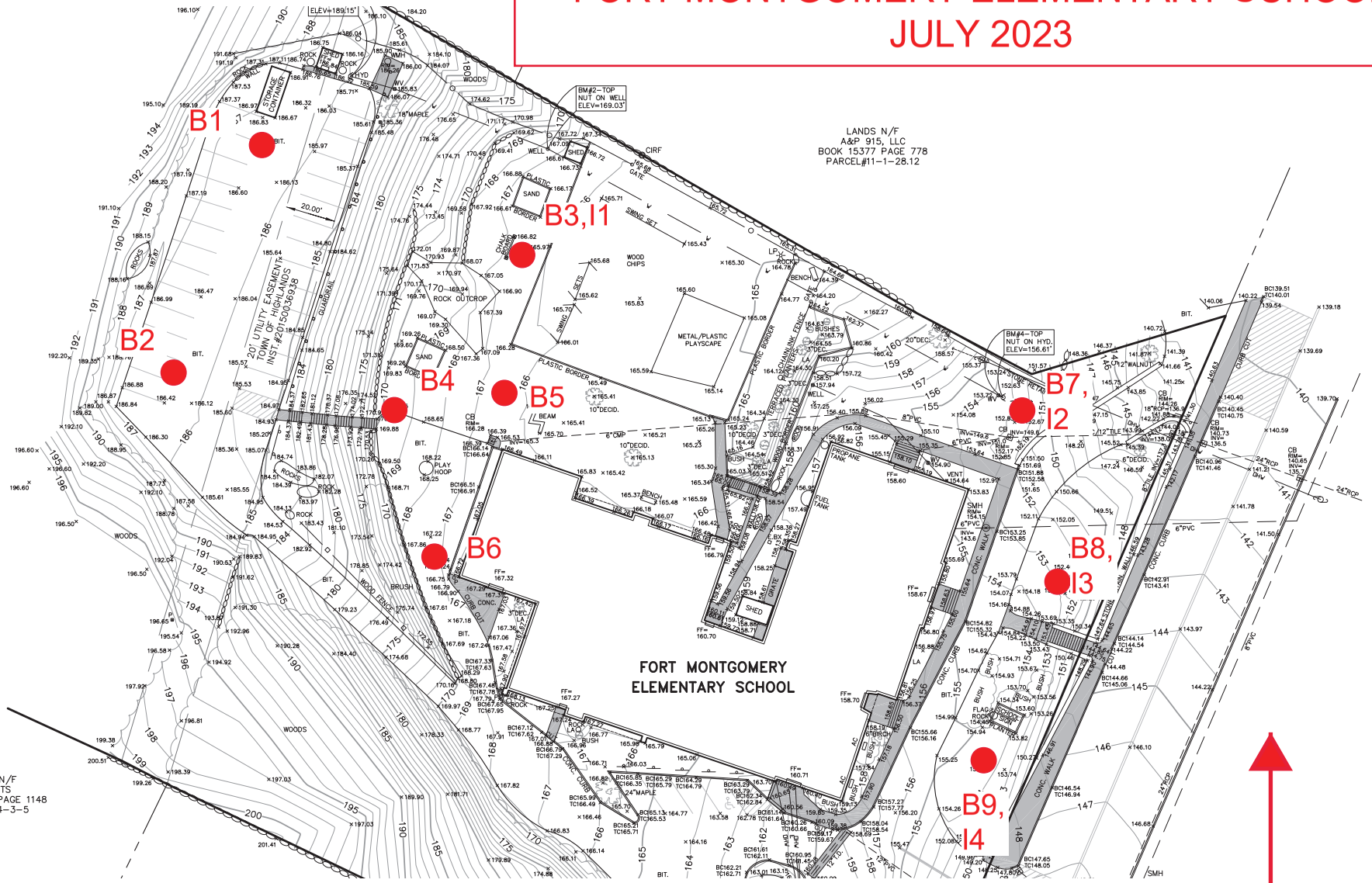
Michael C. Palmer, PhD, PE
Partner

Attachments

APPENDIX

BORING LOCATION PLAN

ELWYN & PALMER ENGINEERS
BORING AND INFILTRATION TEST LOCATION PLAN
FORT MONTGOMERY ELEMENTARY SCHOOL
JULY 2023



NOT TO SCALE

BORING LOGS

General Information and Key to Subsurface Logs

The subsurface logs attached to this report present the observations and mechanical data collected by the driller at the site, supplemented by classification of the material removed from the boring as determined through visual identification by technicians in the laboratory. It is cautioned that the materials removed form the borings represent only a fraction of the total volume of the deposits at the site and may not necessarily be representative of the subsurface conditions between adjacent borings or between sampled intervals. The data presented on the subsurface logs together with the recovered samples will provide basis for evaluating the character of the subsurface conditions relative to the project. The evaluation must consider all the recorded details and their significance relative to each other. Often analyses of standard boring data indicate the need for additional testing or sampling procedures to more accurately evaluate the subsurface conditions. Any evaluation of the contents of this report and the recovered samples must be performed by Professionals. The information presented in the following list defines some of the procedures and terms used on the subsurface logs to describe the conditions encountered.

1. The figures in the depth column define the scale of the subsurface log.
2. The sample column shows the depth range from which the sample was recovered. The sample type column will show an “S” for split spoon sample, a “T” for a tube sample and a “C” for a rock core sample.
3. The sample number is used for identification o n sample containers and in laboratory reports.
4. The Blows on Sampler column shows results of the Standard Penetration Tests and indicates the number of blows required to drive a split spoon sampler into the soil. The number of blows required for each six inches of penetration is recorded. The first six inches of penetration is considered the seating drive. The number of blows required for the second and third six inches of penetration is termed the penetration resistance, N. The sampler diameter, hammer weight, and length of drop are noted on the log.
5. All recovered soil samples are reviewed in the laboratory by an engineering technician, geologist, or geotechnical engineer unless noted otherwise. The visual descriptions are made on the basis of a combination of the driller’s field descriptions and observations and the sample as viewed in the laboratory. The method of visual classification is based primarily on the Unified Soil Classification System (ASTM D2487) with regard to particle size and plasticity. The relative portion by weight by weight of tow or more soil types is described for granular soils in accordance with “Suggested Methods of Test for Identification of Soils” by D.M. Burmister (ASTM Special Technical Publication No. 479, June 1970). The description of relative soil density or consistency is based on Penetration Test results. The description of soil moisture is based upon relative wetness of the soil as recovered and is described as dry, damp, moist, wet, and saturated. The presence of boulders and large gravel is sometimes, but not necessarily, detected by an evaluation of sampler blows or the behavior of the drill rig.
6. The description of rock is based on the recovered rock core and the driller’s observations.
7. The stratification lines present the approximate boundary between soil types. Actual boundaries may vary between sampling intervals and the transition may be gradual. Solid stratification lines are based on the driller’s field observations.
8. Miscellaneous observations and procedures noted by the driller are shown on the logs, including water level observations. It is important to realize the reliability of the water level observations depends upon the soil type (water does not readily stabilize in a hole through fine grained soils) and that drill water used to advance the boring may influence the observations. The groundwater level typically will fluctuate seasonally. One or more perched or trapped water levels may exist in the ground seasonally. All the available readings should be evaluated. If definite conclusion cannot be made, it may be necessary to examine the conditions more thoroughly through test pit excavations or observation wells.
9. The length of rock core run is defined as the length of penetration of the core barrel. Core recovery is the length of core recovered divided by the core run. The RQD (Rock Quality Designation) is the total pieces of NX core exceeding 4 inches in length divided by the core run. Fresh, irregular or drilling induced breaks are ignored and the pieces counted as intact lengths. RQD values are valid only for NX size cores (2.125” diameter). The barrel size is noted in the logs.

Definition of Descriptors used in Boring Logs

Soil Type and Particle Size

Type		Size
Boulder		>12”
Cobble		12”-3”
Gravel		
	Coarse	3”- ¾”
	Fine	¾”-#4
Sand		
	Coarse	#4-#10
	Medium	#10-#40
	Fine	#40-#200
Silt		<#200
Clay		<#200

Soil Type Proportions

Term	Percent of Sample
“and”	35-50
“some”	20-35
“little”	10-20
“trace”	1-10

Relative Compactness or Consistency

Granular Soils		Fine Grained Soils	
Descriptor	Blows/ft (N)	Descriptor	Blows/ft (N)
Loose	<11	Very Soft	0-2
Med-Dense	11-30	Soft	2-4
Dense	31-50	Medium	4-8
Very Dense	>51	Stiff	8-15
		Very Stiff	15-30
		Hard	>30

Stratification Description

Varved – Horizontal uniform layers or seams
Layer – Soil deposit more than 6” thick
Seam – Soil deposit less than 6” thick
Parting – Soil deposit less than 1/8” thick

Rock Classification Terms

Quality	Terms	Definition
Hardness	Soft	Scratched by fingernail
	Medium hard	Scratched easily by penknife
	Hard	Scratched with difficulty by penknife
	Very hard	Cannot be scratched with penknife
Weathering	Very weathered	Judged by the relative amounts of disintegration, iron staining, core recovery, clay seams, etc.
	Weathered	
	Sound	
Bedding	Laminated/Fissile	Less than 0.08”
	Thinly bedded	½” to 2”
	Medium bedded	2” to 2ft
	Thickly bedded	2 ft to 4 ft
	Massive	More than 6 ft

Client	ELWYN PALMER CONSULTING ENGINEERS	**LYON DRILLING CO.**	Boring No. B1
Project	FORT MONTGOMERY ELEMENTARY SCHOOL	**BORING LOG**	Project No.
Location	895 ROUTE 9W FORT MONTGOMERY, NY		Sheet 1 of 1
			Date Started 07/07/23
			Date Completed 07/07/23
			Driller HARRY LYON

Drill Rig	CME 45B	Boring Location	AS STAKED BY CLIENT
Casing	3 1/4" I.D. HOLLOW STEM AUGERS	Surface Elevation	187.0 +/-
Casing Hammer: Wt.	lb. Fall in.		
Soil Sampler	2" SPLIT SPOON		
Sample Hammer: Wt.	140 lb. Fall 30 in.		
Rock Sampler:			
Other:			
Weather Conditions:	85 SUNNY		

Ground Water Observations

Date	Time	Casing at	Hole at	Water at
07/07/23	7:15 PM	1.5	2.1	DRY
07/07/23	7:20 PM	OUT	1.9	DRY

Depth	Sample Number	Sample Depth From (Ft)	Sample Depth To (Ft)	Sample Type	SOIL Blows on Sampler 0'/0.5'	0.5'/1.0'	1.0'/1.5'	1.5'/2.0'	N	Rock Recovery Ft.	Rock Recovery %	RQD	Sample Recovery	MATERIAL DESCRIPTION	Depth of Change	REMARKS
	1	0.0	2.0	S	9	14	18	50	32				1.3	BLACKTOP	0.1	
														MOIST BLACK FIRM FINE GRAVEL AND COARSE		
	2	2.0	2.1	S	50/.1								0.1	TO FINE SAND (SUB BASE)	0.35	
5														MOIST BROWN FIRM FINE TO COARSE SAND SOME FINE GRAVEL	1.9	
														MOIST GREY POSSIBLE BEDROCK OR BOULDER		
														BORING TERMINATED AT 2.1		AUGER REFUSAL AT 2.1
10																
15																
20																
25																
30																
35																
40																
45																
50																

Client ELWYN PALMER
CONSULTING ENGINEERS
Project FORT MONTGOMERY
ELEMENTARY SCHOOL
Location 895 ROUTE 9W
FORT MONTGOMERY, NY

LYON DRILLING CO.

BORING LOG

Boring No. B2
Project No.
Sheet 1 of 1
Date Started 07/07/23
Date Completed 07/07/23
Driller HARRY LYON

Drill Rig CME 45B
Casing 3 1/4" I.D. HOLLOW STEM AUGERS
Casing Hammer: Wt. ____ lb. Fall ____ in.
Soil Sampler 2" SPLIT SPOON
Sample Hammer: Wt. 140 lb. Fall 30 in.
Rock Sampler:
Other:

Weather Conditions: 85 SUNNY

Boring Location AS STAKED BY CLIENT

Surface Elevation 186.5 +/-

Ground Water Observations

Date	Time	Casing at	Hole at	Water at
07/07/23	6:20 PM	3.5	3.7	DRY
07/07/23	6:35 PM	OUT	3.3	DRY

Depth	Sample Number	Sample Depth From (Ft)	Sample Depth To (Ft)	Sample Type	SOIL Blows on Sampler 0'/0.5'	0.5'/1.0'	1.0'/1.5'	1.5'/2.0'	N	Rock Recovery Ft.	Rock Recovery %	RQD	Sample Recovery	MATERIAL DESCRIPTION	Depth of Change	REMARKS
	1	0.5	2.0	S	9	16	8		24				0.8	BLACKTOP	0.2	
														MOIST GREY FIRM FINE GRAVEL. LITTLE FINE TO		
	2	2.0	3.6	S	4	4	4	50/.1	8				1.3	COARSE SAND (SUB BASE)	0.6	
5														MOIST BROWN LOOSE FINE SAND. SOME MEDIUM TO COARSE SAND. LITTLE FINE GRAVEL	2.0	
														MOIST BROWN LOOSE FINE SAND. LITTLE SILT TRACE ORGANICS	2.4	
10														MOIST BROWN MEDIUM SILT. SOME FINE SAND TRACE MEDIUM TO COARSE SAND	3.5	
														MOIST GREY POSSIBLE BEDROCK OR BOULDER		
15														BORING TERMINATED AT 3.7		AUGER REFUSAL AT 3.7
20																
25																
30																
35																
40																
45																
50																

Client ELWYN PALMER CONSULTING ENGINEERS	**LYON DRILLING CO.**	Boring No. B3	
Project FORT MONTGOMERY ELEMENTARY SCHOOL	**BORING LOG**	Project No.	
Location 895 ROUTE 9W FORT MONTGOMERY, NY		Sheet 1 of 1	
		Date Started 07/06/23	
		Date Completed 07/06/23	
		Driller HARRY LYON	

Drill Rig CME 45B
Casing 3 1/4" I.D. HOLLOW STEM AUGERS
Casing Hammer: Wt. ____ lb. Fall ____ in.
Soil Sampler 2" SPLIT SPOON
Sample Hammer: Wt. 140 lb. Fall 30 in.
Rock Sampler:
Other:

Weather Conditions: 85 SUNNY

Boring Location AS STAKED BY CLIENT

Surface Elevation 167.0 +/-

Ground Water Observations

Date	Time	Casing at	Hole at	Water at
07/06/23	6:05 PM	4.0	4.5	DRY
07/06/23	6:08 PM	OUT	3.1	DRY

Depth	Sample Number	Sample Depth From (Ft)	Sample Depth To (Ft)	Sample Type	SOIL Blows on Sampler 0'/0.5'	0.5'/1.0'	1.0'/1.5'	1.5'/2.0'	N	Rock Recovery Ft.	Rock Recovery %	RQD	Sample Recovery	MATERIAL DESCRIPTION	Depth of Change	REMARKS
	1	0.0	2.0	S	2	4	14	14	18				1.2	MOIST BROWN LOOSE FINE SAND. TRACE SILT WITH ROOTS (TOPSOIL)	0.4	
	2	2.0	4.0	S	14	16	16	45	32				1.1	MOIST BROWN LOOSE FINE SAND. LITTLE MEDIUM TO COARSE SAND. TRACE BLACKTOP		
5	3	4.0	4.5	S	45	50/0							0.5	(FILL)	4.0	AUGER REFUSAL AT 4.6
														MOIST BROWN FIRM FINE TO COARSE SAND SOME FINE GRAVEL WITH OCCASIONAL COBBLES	4.2	BORING OFFSET 2.5' SW
														MOIST BROWN GRAY POSSIBLE WEATHERED BEDROCK OR BOULDER		
10														BORING TERMINATED AT 4.6		AUGER REFUSAL AT 3.6
15																
														I1 INFILTRATION TEST RESULTS BEGINNING WATER LEVEL 1.6 NO DROP IN WATER LEVEL IN 1 HOUR		INFILTRATION TEST PIPE SET AT 3.6'
20																
25																
30																
35																
40																
45																
50																

Client ELWYN PALMER CONSULTING ENGINEERS	**LYON DRILLING CO.**	Boring No. B4	
Project FORT MONTGOMERY ELEMENTARY SCHOOL	**BORING LOG**	Project No.	
Location 895 ROUTE 9W FORT MONTGOMERY, NY		Sheet 1 of 1	
		Date Started 07/07/23	
		Date Completed 07/07/23	
		Driller HARRY LYON	

Drill Rig CME 45B
Casing 3 1/4" I.D. HOLLOW STEM AUGERS
Casing Hammer: Wt. ____ lb. Fall ____ in.
Soil Sampler 2" SPLIT SPOON
Sample Hammer: Wt. 140 lb. Fall 30 in.
Rock Sampler:
Other:

Weather Conditions: 85 SUNNY

Boring Location AS STAKED BY CLIENT

Surface Elevation 169.0 +/-

Ground Water Observations

Date	Time	Casing at	Hole at	Water at
07/06/23	5:40 PM	9.0	9.3	DRY
07/06/23	5:50 PM	OUT	7.2	DRY

Depth	Sample Number	Sample Depth From (Ft)	Sample Depth To (Ft)	Sample Type	SOIL Blows on Sampler 0'/0.5'	0.5'/1.0'	1.0'/1.5'	1.5'/2.0'	N	Rock Recovery Ft.	Rock Recovery %	RQD	Sample Recovery	MATERIAL DESCRIPTION	Depth of Change	REMARKS
	1	0.5	2.0	S	3	1	2		3				0.6	BLACKTOP (WEATHERED)	0.5	
														MOIST BROWN LOOSE FINE TO COARSE SAND		
	2	2.0	3.4	S	3	36	50/.4						1.0	TRACE FINE GRAVEL (SUB BASE)		
														MOIST BROWN LOOSE FINE TO MEDIUM SAND		
5	3	4.0	6.0	S	42	37	17	18	54				1.1	LITTLE SILT	2.5	2.5-3.0 COBBLE
														MOIST BROWN COMPACT FINE TO COARSE SAND		
	4	6.0	8.0	S	9	9	24	50	33				1.3	SOME FINE GRAVEL. TRACE SILT WITH		
														OCCASIONAL COBBLES	6.0	
	5	8.0	9.1	S	40	46	50/.1						0.9	GRADES TO WET BROWN FINE TO MEDIUM SAND		
10														LITTLE COARSE SAND TO FINE GRAVEL	7.5	
														GRADES TO MOIST BROWN COMPACT FINE TO		
														COARSE SAND AND FINE GRAVEL WITH		
														OCCASIONAL COBBLES		
15														BORING TERMINATED AT 9.3		AUGER REFUSAL AT 9.3
20																
25																
30																
35																
40																
45																
50																

Client ELWYN PALMER CONSULTING ENGINEERS	**LYON DRILLING CO.**	Boring No. B5	
Project FORT MONTGOMERY ELEMENTARY SCHOOL	**BORING LOG**	Project No.	
Location 895 ROUTE 9W FORT MONTGOMERY, NY		Sheet 1 of 1	
		Date Started 07/06/23	
		Date Completed 07/07/23	
		Driller HARRY LYON	

Drill Rig CME 45B
Casing 3 1/4" I.D. HOLLOW STEM AUGERS
Casing Hammer: Wt. ____ lb. Fall ____ in.
Soil Sampler 2" SPLIT SPOON
Sample Hammer: Wt. 140 lb. Fall 30 in.
Rock Sampler: NWD4
Other:

Weather Conditions: 85 SUNNY

Boring Location AS STAKED BY CLIENT

Surface Elevation 166.0 +/-

Ground Water Observations

Date	Time	Casing at	Hole at	Water at
07/07/23	12:30 PM	4.6	9.6	*3.0
07/07/23	1:00 PM	OUT	5.1	3.0

Depth	Sample Number	Sample Depth From (Ft)	Sample Depth To (Ft)	Sample Type	SOIL Blows on Sampler 0'/0.5'	0.5'/1.0'	1.0'/1.5'	1.5'/2.0'	N	Rock Recovery Ft.	Rock Recovery %	RQD	Sample Recovery	MATERIAL DESCRIPTION	Depth of Change	REMARKS
	1	0.0	2.0	S	7	4	17	14	21				1.1	MOIST BROWN LOOSE FINE SAND. LITTLE FINE GRAVEL (TRACE ROOTS)	1.0	*WATER ADDED TO BORING
	2	2.0	3.7	S	27	28	48	50/.2	76				1.2	MOIST BROWN FIRM FINE SAND. SOME MEDIUM TO COARSE SAND. LITTLE FINE GRAVEL WITH		
5	3	4.0	4.6	S	24	50/.1							0.3	OCCASIONAL COBBLES	2.0	
	R1	4.6	9.6	C		4.0	80		73					SIMILAR BECOMES COMPACT	4.5	
														WET GREY LIGHTLY WEATHERED BEDDED GREY GRANITE		8.6 POSSIBLE VERTICAL FRACTURE
10														BORING TERMINATED AT 9.6		
15																
20																
25																
30																
35																
40																
45																
50																

Client ELWYN PALMER CONSULTING ENGINEERS
Project FORT MONTGOMERY ELEMENTARY SCHOOL
Location 895 ROUTE 9W FORT MONTGOMERY, NY

LYON DRILLING CO.

BORING LOG

Boring No. B6
Project No.
Sheet 1 of 1
Date Started 07/07/23
Date Completed 07/07/23
Driller HARRY LYON

Drill Rig CME 45B
Casing 3 1/4" I.D. HOLLOW STEM AUGERS
Casing Hammer: Wt. ____ lb. Fall ____ in.
Soil Sampler 2" SPLIT SPOON
Sample Hammer: Wt. 140 lb. Fall 30 in.
Rock Sampler:
Other:
Weather Conditions: 85 SUNNY

Boring Location AS STAKED BY CLIENT
Surface Elevation 167.0 +/-

Ground Water Observations

Date	Time	Casing at	Hole at	Water at
07/07/23	3:40 PM	4.5	4.8	DRY
07/07/23	3:50 PM	OUT	3.0	DRY

Depth	Sample Number	Sample Depth From (Ft)	Sample Depth To (Ft)	Sample Type	SOIL Blows on Sampler 0'/0.5'	0.5'/1.0'	1.0'/1.5'	1.5'/2.0'	N	Rock Recovery Ft.	Rock Recovery %	RQD	Sample Recovery	MATERIAL DESCRIPTION	Depth of Change	REMARKS
	1	0.5	1.2	S	4	4	50/.2						0.8	BLACKTOP	0.1	
														MOIST BLACK FINE TO COARSE SAND		COBBLE AT 1.0
	2	2.0	4.0	S	18	8	9	8	17				1.1	(OLD WEATHERED BLACKTOP)	0.3	
														MOIST BROWN LOOSE FINE SAND. SOME		
5	3	4.0	4.7	S	27	50/.3							0.5	MEDIUM TO COARSE SAND. TRACE COAL. TRACE		
														BRICK (FILL)	0.8	
														MOIST BROWN FINE SAND. SOME MEDIUM TO		
														COARSE SAND. LITTLE FINE GRAVEL. TRACE SILT		
														TRACE COAL ASH (FILL)	2.0	
10														MOIST BROWN FIRM FINE TO COARSE SAND		
														AND FINE GRAVEL WITH COBBLES	4.5	
														POSSIBLE BEDROCK OR BOULDER		
														BORING TERMINATED AT 4.8		AUGER REFUSAL AT 4.8
15																
20																
25																
30																
35																
40																
45																
50																

Client	ELWYN PALMER CONSULTING ENGINEERS	**LYON DRILLING CO.**	Boring No. B7
Project	FORT MONTGOMERY ELEMENTARY SCHOOL	**BORING LOG**	Project No.
Location	895 ROUTE 9W FORT MONTGOMERY, NY		Sheet 1 of 1
			Date Started 07/06/23
			Date Completed 07/06/23
			Driller HARRY LYON

Drill Rig	CME 45B	Boring Location	AS STAKED BY CLIENT
Casing	3 1/4" I.D. HOLLOW STEM AUGERS	Surface Elevation	153.0 +/-
Casing Hammer: Wt.	lb. Fall in.		
Soil Sampler	2" SPLIT SPOON		
Sample Hammer: Wt.	140 lb. Fall 30 in.		
Rock Sampler:			
Other:	4" I.D. PVC		
Weather Conditions:	85 SUNNY		

Ground Water Observations

Date	Time	Casing at	Hole at	Water at
07/06/23	3:40 PM	4.5	5.0	DRY
07/06/23	3:45 PM	OUT	4.0	DRY

Depth	Sample Number	Sample Depth From (Ft)	Sample Depth To (Ft)	Sample Type	SOIL Blows on Sampler 0'/0.5'	0.5'/1.0'	1.0'/1.5'	1.5'/2.0'	N	Rock Recovery Ft.	Rock Recovery %	RQD	Sample Recovery	MATERIAL DESCRIPTION	Depth of Change	REMARKS
	1	0.0	2.0	S	2	4	9	9	13				1.2	TOPSOIL	0.2	
														MOIST BROWN LOOSE FINE SAND. SOME MEDIUM		BORING OFFSET
	2	2.0	4.0	S	4	6	9	25	15				0.5	TO COARSE SAND. LITTLE FINE GRAVEL WITH		INFILTRATION TEST
														OCCASIONAL COBBLES	4.0	PIPE SET AT 4.0'
5	3	4.0	4.9	S	18	50/.4							0.8	MOIST BROWN COMPACT FINE SAND. SOME MEDIUM TO COARSE SAND	4.9	
														MOIST BROWN POSSIBLE BEDROCK OR BOULDER		
10														BORING TERMINATED AT 5.0		AUGER REFUSAL AT 5.0
15																
20														I2 INFILTRATION TEST RESULTS BEGINNING WATER LEVEL 2.0		
25														TIME MINUTES 1 2.0 2 2.0 3 2.0 5 2.01 10 2.01 15 2.02 30 2.04 45 2.07 60 2.09		
30																
35																
40																
45																
50																

Client ELWYN PALMER CONSULTING ENGINEERS	**LYON DRILLING CO.**	Boring No. B8	
Project FORT MONTGOMERY ELEMENTARY SCHOOL	**BORING LOG**	Project No.	
Location 895 ROUTE 9W FORT MONTGOMERY, NY		Sheet 1 of 1	
		Date Started 07/06/23	
		Date Completed 07/06/23	
		Driller HARRY LYON	

Drill Rig CME 45B
Casing 3 1/4" I.D. HOLLOW STEM AUGERS
Casing Hammer: Wt. ____ lb. Fall ____ in.
Soil Sampler 2" SPLIT SPOON
Sample Hammer: Wt. 140 lb. Fall 30 in.
Rock Sampler:
Other: 4" I.D. PVC

Weather Conditions: 85 SUNNY

Boring Location AS STAKED BY CLIENT

Surface Elevation 153.0 +/-

Ground Water Observations

Date	Time	Casing at	Hole at	Water at
07/06/23	1:00 PM	9.0	9.6	DRY
07/06/23	1:05 PM	OUT	6.5	DRY

Depth	Sample Number	Sample Depth From (Ft)	Sample Depth To (Ft)	Sample Type	SOIL Blows on Sampler 0'/0.5'	0.5'/1.0'	1.0'/1.5'	1.5'/2.0'	N	Rock Recovery Ft.	Rock Recovery %	RQD	Sample Recovery	MATERIAL DESCRIPTION	Depth of Change	REMARKS
	1	0.0	2.0	S	1	3	3	15	6				0.8	TOPSOIL	0.1	
														MOIST BROWN LOOSE FINE SAND. SOME		BORING OFFSET
	2	2.0	4.0	S	4	5	6	6	11				0.7	MEDIUM TO COARSE SAND. LITTLE FINE GRAVEL		INFILTRATION TEST
														TRACE SILT WITH OCCASIONAL COBBLES	4.5	PIPE SET AT 4.0'
5	3	4.0	6.0	S	4	1	2	2	3				0.3	MOIST BROWN LOOSE FINE SAND. SOME FINE		
														GRAVEL. TRACE ROOTS. TRACE BRICK (FILL)		
	4	6.0	8.0	S	27	6	10	14	16				0.4		7.0	AUGERS HARDER AT 7.0'
														MOIST BROWN FIRM FINE TO COARSE SAND		
	5	8.0	8.6	S	17	50/.1							0.2	AND FINE GRAVEL	8.5	
10														POSSIBLE BOULDER OR BEDROCK		
														BORING TERMINATED AT 9.6		AUGER REFUSAL AT 9.6
15																
														I3 INFILTRATION TEST RESULTS		
														BEGINNING WATER LEVEL 2.0'		
20																
														TIME MINUTES		
														1 ____ 2.33		
														2 ____ 2.65		
														3 ____ 2.97		
														5 ____ 3.34		
25														10 ____ 3.89		
														15 ____ DRY		
30																
35																
40																
45																
50																

Client ELWYN PALMER
CONSULTING ENGINEERS
Project FORT MONTGOMERY
ELEMENTARY SCHOOL
Location 895 ROUTE 9W
FORT MONTGOMERY, NY

LYON DRILLING CO.

BORING LOG

Boring No. B9
Project No.
Sheet 1 of 1
Date Started 07/06/23
Date Completed 07/06/23
Driller HARRY LYON

Drill Rig CME 45B
Casing 3 1/4" I.D. HOLLOW STEM AUGERS
Casing Hammer: Wt. ____ lb. Fall ____ in.
Soil Sampler 2" SPLIT SPOON
Sample Hammer: Wt. 140 lb. Fall 30 in.
Rock Sampler:
Other: 4" I.D. PVC

Weather Conditions: 85 SUNNY

Boring Location AS STAKED BY CLIENT

Surface Elevation 154.0 +/-

Ground Water Observations

Date	Time	Casing at	Hole at	Water at
07/06/23	11:00 AM	3.5	4.7	DRY
07/06/23	11:10 AM	OUT	3.5	DRY

Depth	Sample Number	Sample Depth From (Ft)	Sample Depth To (Ft)	Sample Type	SOIL Blows on Sampler 0'/0.5'	0.5'/1.0'	1.0'/1.5'	1.5'/2.0'	N	Rock Recovery Ft.	Rock Recovery %	RQD	Sample Recovery	MATERIAL DESCRIPTION	Depth of Change	REMARKS
	1	0.0	2.0	S	2	4	3	3	7				1.4	TOPSOIL	0.2	
														MOIST BROWN LOOSE FINE SAND. SOME MEDIUM		BORING OFFSET
	2	2.0	4.0	S	3	5	5	10	10				0.9	TO COARSE SAND. TRACE SILT WITH ROOTS	0.9	INFILTRATION TEST
														MOIST BROWN LOOSE FINE SAND. LITTLE SILT		PIPE SET AT 4.0'
5	3	4.0	4.7	S	14	50/.2							0.4	TRACE ROOTS	1.8	
														MOIST BROWN SOFT SILT AND FINE SAND	4.0	
														MOIST BROWN FIRM FINE SAND. SOME FINE GRAVEL. TRACE SILT	4.5	
														POSSIBLE COBBLE OR BEDROCK		
10														BORING TERMINATED AT 4.7		AUGER REFUSAL AT 4.7
15																
20														I4 INFILTRATION TEST RESULTS BEGINNING WATER LEVEL 2.0' NO DROP IN WATER LEVEL IN 1 HOUR		
25																
30																
35																
40																
45																
50																

ROCK CORE PHOTO

ROCK CORE PHOTO
Core taken in Boring B5 from 4.6-9.6 ft
Recovery = 4 ft. RQD= 73
(Note: top of core is on left in photo)

SEISMIC DESIGN REPORT

Fort Montgomery Elementary School

895 Rte 9W, Fort Montgomery, NY 10922, USA

Latitude, Longitude: 41.3343068, -73.985963

Date	7/14/2023, 1:11:38 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	B - Rock

Type	Value	Description
S_S	0.271	MCE_R ground motion. (for 0.2 second period)
S_1	0.06	MCE_R ground motion. (for 1.0s period)
S_{MS}	0.244	Site-modified spectral acceleration value
S_{M1}	0.048	Site-modified spectral acceleration value
S_{DS}	0.163	Numeric seismic design value at 0.2 second SA
S_{D1}	0.032	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	A	Seismic design category
F_a	0.9	Site amplification factor at 0.2 second
F_v	0.8	Site amplification factor at 1.0 second
PGA	0.164	MCE_G peak ground acceleration
F_{PGA}	0.9	Site amplification factor at PGA
PGA_M	0.148	Site modified peak ground acceleration
T_L	6	Long-period transition period in seconds
SsRT	0.271	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	0.287	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.06	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.064	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
PGA_{UH}	0.164	Uniform-hazard (2% probability of exceedance in 50 years) Peak Ground Acceleration
C_{RS}	0.944	Mapped value of the risk coefficient at short periods
C_{R1}	0.938	Mapped value of the risk coefficient at a period of 1 s
C_V	0.771	Vertical coefficient

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