PROJECT MANUAL

HIGHLAND FALLS – FORT MONTGOMERY CSD

21 Morgan Road
Highland Falls, NY 10928

HS/IS Renovations

SED Control Nos.
44-09-01-04-0-004-016 Highland Falls Intermediate School
44-09-01-04-0-008-019 James O'Neill High School

BCA Project No. 2022-138 Ph3

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 00-01, 02-03, 05-12, 22-23, 26-28, & 31-32

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
HS/IS Renovations
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SPECIFICATION FOR

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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
HS/IS Renovations
Project No. 2022-138 Ph3

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 **3:30 p.m.** prevailing time, on **Tuesday January 28, 2025,** at the

Highland Falls-Fort Montgomery Central School District
District Office
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Any bid may be withdrawn without prejudice prior to the official bid submission time or any publicized postponement thereof.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: 1-845-651-3845, 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. 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, 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 **Thursday January 9, 2025,** commencing at **3:30 p.m.** at the High School. 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
HS/IS Renovations

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; HS kitchen upgrades, HS and IS HVAC upgrades, Electrical upgrades associated with HVAC work, 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 General 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 General Contractor shall further sub-divide his bid proposal as described in the following bid items, alternates, and/or unit prices. The General 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*

Unit Prices: As described in Specification Section 01 2200 Unit Prices

- *Unit Price No. 1 – Bulk Rock Removal*

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FORM OF PROPOSAL
Highland Falls-Fort Montgomery Central School District
HS/IS Renovations

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

Fifteen Thousand DOLLARS ($ 15,000.00)

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

UNIT PRICES

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

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
HS/IS Renovations

BID DESCRIPTION

CONTRACT NO. 2 – MECHANICAL

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

> Procurement and general requirements; HS kitchen upgrades, HS and IS HVAC upgrades, Electrical upgrades associated with HVAC work, 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*

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FORM OF PROPOSAL
Highland Falls-Fort Montgomery Central School District
HS/IS Renovations

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** 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

Twenty-Five Thousand DOLLARS ($ 25,000.00)

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
HS/IS Renovations

BID DESCRIPTION

CONTRACT NO. 3 – PLUMBING

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

> Procurement and general requirements; HS kitchen upgrades, HS and IS HVAC upgrades, Electrical upgrades associated with HVAC work, 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*

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FORM OF PROPOSAL
Highland Falls-Fort Montgomery Central School District
HS/IS Renovations

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** 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

Five Thousand DOLLARS ($ 5,000.00)

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
HS/IS Renovations

BID DESCRIPTION

CONTRACT NO. 4 – ELECTRICAL

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

> Procurement and general requirements; HS kitchen upgrades, HS and IS HVAC upgrades, Electrical upgrades associated with HVAC work, 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*

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FORM OF PROPOSAL
Highland Falls-Fort Montgomery Central School District
HS/IS Renovations

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** 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

Ten Thousand DOLLARS ($ 10,000.00)

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

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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)

«Highland Falls-Fort Montgomery Central School Distict HS/IS Renovations»
«Highland Falls Fort-Montgomery Central School District
21 Morgan Road
Highland Falls, New York 10928»

«Contract No. [INSERT CONTRACT NAME]

SED Control Nos.:
44-09-01-04-0-008-019 James O'Neill High School
44-09-01-04-0-004-016 Highs Falls Intermediate School

Architects Project No.: 2022-138 Ph3»

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

«Trition Construction»«»
«1279 Route 300, 1st Floor
Newburgh, New York 12550»
«Telephone Number: (212) 388-5700»
«»

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

«Bernier, Carr & Associates Engineers, Architects, and Land Surveyors, P.C.»«»
«31 Lewis Street

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.

Suite 402
Binghamton, New York 13901»
«Telephone Number: (607) 940-0199»
«»

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: « »

§ 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)

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

« Per the General Conditions of the Contract for Construction »

§ 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.)

«N/A »

§ 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.)

«Per the General Conditions of the Contract for Construction »

§ 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:

« »

§ 5.3 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.)

«0 » % «Annualy »

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 with exclusive jurisdiction in the New York Supreme Court with jurisdiction of the Project location.

[« »] 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.

§ 7.3 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 Article 11 of AIA Document A232™–2019, General Conditions of the Contract for Construction, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in Article 11 AIA Document A232™–2019, General Conditions of the Contract for , 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.)

«Exhibit B: Contractor's Form of Proposal
Exhibit C: Bonds and Insurances »

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 Distict HS/IS Renovations
Highland Falls Fort-Montgomery Central School District
21 Morgan Road
Highland Falls, New York 10928

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

Trition Construction
1279 Route 300, 1st Floor
Newburgh, New York 12550

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.
31 Lewis Street
Suite 402
Binghamton, New York 13901

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.

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TABLE OF ARTICLES

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents. The Contract Documents include the Notice to Bidders, Information to Bidders, Form of Proposals, General Conditions, Specifications, Drawings, Addenda issued prior to execution of the Contract, Agreement between Owner and Contractor("Agreement"), other Documents listed in the Agreement, and Modifications issued or negotiated after receipt of bids or execution of the Agreement, and when required by Governmental Agencies or Departments, appropriately inserted Certifications, Regulations, and Wage Rate Schedules.

§ 1.1.2 The Contract. The Contract Documents form the Contract for Construction. The Contract or Agreement 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 as a representative of the Owner, or (7) between any persons or entities other than the Owner and Contractor. The Construction Manager and Architect, as a representative of the Owner, shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of their duties.

Subcontractors shall assume the same obligations to the Contractors as the Contractor has to the Owner and the Architect under General Conditions AIA A232-2019 relationships and responsibilities of the Contractor to the Owner or Architect as defined in General Conditions AIA A232-2019 shall become those of the Subcontractor to the Contractor.

§ 1.1.2.1 Where the term "Agreement", "Contract" or "Prime Contract" is used in the General Conditions, and other Contract Documents, it shall mean the separate Owner-Contractor Agreement between the Owner and each individual Prime Contractor identified in Conditions of the Contract (General and other conditions)."

§ 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.

§ 1.1.11 Miscellaneous Definitions:

.1 The term "Addendum/Addenda" shall mean Changes to the Contract Documents prior to the receipt of bids which are made part of the Agreement.

.2 The term "Herein" shall mean the contents of the Contract Documents and/or the contents of the particular section where this term appears.

.3 The term "Indicated" as used herein shall mean shown on the Drawings or described in the Contract Documents. Terms such as "Shown", "Noted", "Scheduled" and "Specified" have the same meaning as "As Indicated".

.4 The term "Concealed" as used herein shall mean items hidden from sight in such locations as trenches, chases, shafts, furred spaces, walls, slabs, above ceilings and in crawl spaces or service tunnels.

.5 The term "Exposed" as used herein shall mean not "concealed" as defined herein and the spaces behind normally closed doors such as interiors of cabinets.

.6 The term "Product" as used herein shall include materials, systems and/or equipment.

.7 The term "Furnish" as used herein shall mean furnish and deliver to the job site all products necessary that are connected with the Work including unloading, handling, transporting, unwrapping, and inspecting those products to be installed.

.8 The term "Install" as used herein shall mean furnish all labor and perform all operations connected with assembly, erection, anchoring, installation of products or Work, curing, finishing, cleaning and similar operations including supplying all necessary tools, rigging and equipment to do the Work, and connect up, test, place in operation and service such products.

.9 The term "Provide" as used herein shall mean furnish and install, without limitation, all labor, products, materials, equipment, transportation, services, etc., required to install, complete the Work, and/or to test and place in operation/service.

.10 The term "Modifications" shall mean changes to the Contract Documents subsequent to the commencement of the work.

.11 The term "Piping" as used herein shall mean pipe, rigid conduit, fittings, valves, hangers, and other accessories, which comprise a system.

.12 The terms "proper", "satisfactory", "workmanlike" and words of similarly implied interpretation, judgment, or opinion, shall be understood to mean "in the opinion of the Architect".

.13 As used herein, the terms "General Contractor", "GC" and "General Construction Contractor" have the same meaning.

.14 As used herein, the terms "Mechanical Contractor" and "MC" shall mean the same thing.

.15 As used herein, the terms "Plumbing Contractor" and "PC" shall mean the same thing.

.16 As used herein, the terms "Electrical Contractor" and "EC" shall mean the same thing.

.17 As used herein, the terms "Site Contractor" and "SC" shall mean the same thing.

.18 As used herein, the terms "Roof Contractor" and "RC" shall mean the same thing.

.19 As used herein, the terms "Asbestos Abatement Contractor" and "AAC" shall mean the same thing.

.20 The term "project site" shall mean the space available to contractors at location of the project either exclusively or to be shared with other contractors for performance of Work.

.21 The term "minimum requirements" shall mean indicated requirements are for a specific minimum acceptable level of quality/quantity, as recognized in the industry. Actual Work shall comply (within specified tolerances) or may exceed minimums within reasonable limits. Refer uncertainties to Architect before proceeding.

.22 The term "basis of design" shall mean the material, product or manufacturer shown in the Contract Documents was selected to establish the minimum quality, performance and/or operation of the material or product.

.23 The term "labeled" refers to classification by an approved Standards Agency.

.24 As used herein, the term "Architect" shall also mean "Engineer" so duly licensed to "provide consulting services under a New York State License" and under Contract to provide professional services to the Owner."

.25 The term "Warranty" shall mean a formal promise (guarantee)in writing that the contractor shall repair or replace a faulty product, material, or installation within the prescribed warranty period after Substantial Completion.

.26 The term "General Conditions" shall mean the General Conditions of the Construction Contract, Construction Manager as Advisor Edition (AIA Document AIA A232-2019 Edition).

§ 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 intended 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.

§ 1.2.4 In the event of conflict or discrepancies among the Contract Documents, interpretations will be based on the following priorities:

.1 Contract (Agreement).
.2 Modifications.
.3 Addenda, with those of later date having precedence over those of earlier date.
.4 Instructions to Bidders.
.5 General Conditions of the Contract for Construction, Construction Manager as Advisor Edition.
.6 Division 01 of the specifications.
.7 Divisions 02 thru 49 of the specifications and drawings.
.8 Other documents specifically enumerated in the Contract as part of the Contract Documents.

In the case of conflict or discrepancies between drawings and Divisions 02 thru 49 of the specifications or within or among the Contract Documents and not clarified by addendum, the Architect will determine which takes precedence.

§ 1.2.5 Scaling Drawings for dimensions, if done, is done at the Contractor's own risk. All dimensions shown on the Drawings are subject to verification of actual dimensions by the Contractor. It is the responsibility of the Contractor to verify all dimensions in the field to insure proper and accurate fit of materials and items to be installed. Before ordering any materials or doing any Work, the Contractor and each Subcontractor shall verify all existing conditions and measurements. No extra charge or compensation will be allowed on account of differences between actual dimensions and the dimensions indicated on the Drawings. Any differences which may be found shall be submitted to the Construction Manager and Architect for resolution before proceeding with the Work."

§ 1.2.6 Where items are specified by the use of a reference standard not bound in the specifications, the date of the reference standard shall be the latest edition as outlined in the Building Codes of New York State and/or except as specifically indicated otherwise.

§ 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.

§1.4.1 In the event of conflicts or discrepancies among the Contract Documents, interpretations will be as outlined under § 1.2.4.

§ 1.4.2 In the event of inconsistencies within or between parts of the Contract Documents, or between the Contract Documents and applicable standards, codes and ordinances, the Contractor shall: (1) provide the better quality or greater quantity of Work, (2) comply with the more stringent requirement, or (3) either or both in accordance with the Architect's interpretation. The terms and conditions of this § 1.4.2, however, shall not relieve the Contractor of any of the obligations set forth in § 3.2 and § 3.7.

§1.4.2.1 On the Drawings, given dimensions shall take precedence over scaled measurements and large-scale drawings over small-scale drawings. Scaling Drawings for dimensions, if done, is done at the Contractor's own risk.

§1.4.2.2 Before ordering any materials or doing any Work, the Contractor and each Subcontractor shall verify measurements at the project site and shall be responsible for the correctness of such measurements. No extra charge or compensation will be allowed on account of differences between actual dimensions and the dimensions indicated on the Drawings. Any difference, which may be found, shall be submitted to the Architect for resolution before proceeding with the Work.

§1.4.2.3 If a minor change in the Work is found necessary due to actual field conditions, the Contractor shall submit detailed drawings of such departure for review by the Architect before initiating the change.

§ 1.4.3 The terms "knowledge", "recognize" and "discover", their respective derivatives and similar terms in the Contract Documents, as used in reference to the Contractor, shall be interpreted to mean that which the Contractor knows (or should know), recognizes (or should recognize) and discovers (or should discover) in exercising the care, skill and diligence required by the Contract Documents. The expression "reasonably inferable" and similar terms in the Contract Documents shall be interpreted to mean reasonably inferable by a Contractor familiar with the Project and exercising the care, skill and diligence required of the Contractor by the Contract Documents.

§ 1.4.4 The phrase "persistently fails" and other similar expressions, as used in reference to the Contractor, shall be interpreted to mean any combination of acts or omissions, which causes the Owner or the Architect to reasonably conclude that the Contractor will not complete the Work within the Contract Time, for the Contract Sum or in substantial compliance with the requirements of the Contract Documents.

§ 1.4.5 In the event of inconsistencies within or between parts of the Contract Documents, or between the Contract Documents and applicable standards, codes and ordinances, the Architect shall be the sole and final interpreter and will issue a written decision to the Owner and the Contractor within a reasonable time of written notification. The Architect's decision shall be conclusive and final.

§ 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.

§ 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.

(Paragraph deleted)

§ 2.2.3 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.

(Paragraph deleted)

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 The Owner shall make available for inspection, upon request, that field survey or testing information of existing conditions, which is known to be available, and which is held by the Owner at their offices. Such records are not Contract Documents and the Owner makes no representation as to their accuracy or completeness.

§ 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 reasonable 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 may furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner may 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 each Prime Contractor the following:

.1 Copies for Construction: The Prime Contractors will each be furnished without charge up to two (2) sets of Contract Drawings, Project Manuals and Bid Addendums for use during construction for their own use and the use of their Subcontractors.

.2 Owner shall furnish additional sets upon a Contractor's written request. Such additional sets will be provided at the cost of printing, postage and handling. Partial sets will NOT be provided.

.3 Subcontractors and other entities desiring copies of Drawings and other contract Documents shall obtain them from the respective Prime Contractor.

§ 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.

§ 2.3.9 The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, the Contractors' means, methods, techniques, sequences, or procedures of construction or the safety precautions and programs incident thereto, or for any failure of the Contractor to comply with laws or regulations applicable to the furnishing or performance of the Work. Owner will not be responsible for Contractor's failure to perform or furnish the Work in accordance with the Contract Documents.

§ 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.

§ 2.5.1 In the event Contractor fails, refuses or neglects to perform closeout obligations, including without limitation performance of incomplete items as attached to the Certificate of Substantial Completion, within forty-five (45) days following the date of Substantial Completion or time frame mutually agreed upon between Owner and Prime Contractor, the Owner may, without further notice (except to inform the Contractor its attempt to cure is inadequate) and without prejudice to other remedies the Owner may have, correct such deficiencies. In such case, an appropriate Change Order shall be issued deducting from Payments then or thereafter due to Contractor the cost of correcting such deficiencies. Contractor shall be liable to the Owner for any additional costs, including without limitation, those charged by Architect, Attorneys, or others attributable to such failure, refusal, or neglect.

§ 2.6 Owner's Rights for Use of Premises

§ 2.6.1 Whether Work of various Contractors is or is not partially or fully completed, the premises (site and buildings) are the property of the Owner who shall have certain rights and privileges in connection with use of same.

§ 2.6.2 In such event, Contractor whose unfinished Work is performed subsequently shall be responsible for the prevention of any damage to such Owner's installation. Such use or occupancy by the Owner shall in no instance constitute acceptance of any of the Work.

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.

§ 3.1.1.1 Where the words "Contractor", "Prime Contractor", or any reference to "each Contractor" occurs in the Contract Documents, they shall mean the person, firms or organization having a Contract for the Work as set forth in the Agreement.

§ 3.1.1.2 The Contractor represents to the Owner that it possesses the skill, experience, and resources to perform the Work competently and diligently in an orderly and safe fashion and in accordance with the anticipated milestone and/or completion date(s) as applicable.

§ 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.

§ 3.2.2.1 The Contractor shall promptly notify the Construction Manager and Architect, in writing, of any inconsistencies or errors to provide the Architect ample time for observation, investigation, detail drawings, etc.

§ 3.2.2.2 All Contactors submitting bid proposals shall be presumed to have examined the site to consider fully all conditions, which may have a bearing on the Work, and to have accounted for these conditions in their bid proposals.

§ 3.2.2.3 When required, off-site storage is the responsibility of the Contractor.

§ 3.2.2.4 The exactness of grades, elevations, dimensions, or locations indicated on the Drawings of Work installed by others is not guaranteed by the Construction Manager, Architect, or the Owner.

§ 3.2.2.5 Except as to any reported errors, inconsistencies and to concealed or unknown conditions referred to in § 3.7.4, by executing the Agreement, the Contractor represents the following:

.1 The Contract Documents are sufficiently complete and detailed for the Contractor to (1) perform the Work required to produce the results intended by the Contract Documents and (2) comply with all the requirements of the Contract Documents.

.2 The Work required by the Contract Documents, including, without limitations, all construction details, construction means, methods, procedure and techniques necessary to perform the Work, use of materials, selection of equipment and requirements of product manufacturers are consistent with: (1) good and sound practices within the construction industry; (2) generally prevailing and accepted industry standards applicable to Work; (3) requirements of any warranties applicable to the Work; and (4) all laws, ordinances, regulations, rules and orders which bear upon the Contractor's performance of the Work.

§ 3.2.2.6 The Contractor shall satisfy itself as to the accuracy of all grades, elevations, dimensions, and locations indicated on the Drawings. Where the Work of this Contract connects or interfaces with existing or other Work, Contractor shall verify at the site all conditions of such existing or other Work. Any errors due to the Contractor's failure to verify such information shall be promptly remedied by the Contractor at no additional cost to the Owner.

§ 3.2.2.7 Before ordering any materials or doing any Work, the Contractor and each Subcontractor shall verify all existing conditions and measurements. Any differences, which may be found, between actual measurements and dimensions indicated on the Drawings shall be submitted to the Architect for resolution before proceeding with the Work. No extra compensation will be allowed for such discrepancies.

§ 3.2.3 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.

(Paragraph deleted)

§ 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.

§ 3.3.1.1 Laying out the work:

.1 Each Contractor shall carefully lay out its Work in accordance with the Contract Documents and shall coordinate its Work with existing and new Work and it shall verify all lines and levels indicated in the Contract Documents that affect its Work.

.2 Adjustments required to suit field conditions shall be made only after the Construction Manager's and Architect's review. Each Contractor shall be responsible for the accuracy of layout and shall correct at its own expense any Work that his forces have laid out incorrectly.

.3 Where equipment lines or piping and/or conduit are shown diagrammatically, the Contractor shall be responsible for the coordination and orderly arrangement of the various lines of piping and conduit included in the Work of its Contract. Contractor shall coordinate its work and prevent all interferences between equipment, lines of piping, architectural features, and avoid any unsightly arrangements in the exposed areas.

§ 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.

§ 3.3.4 Shutdowns: Such Work as connections to existing sewers, plumbing, heating, and electric systems, shall be done at a time agreeable to the Owner and Construction Manager and shall be determined and agreed to well in advance of the actual doing of such Work so as to interfere as little as possible with the operation and use of existing facilities. Shutdowns must be coordinated through the Construction Manager 48 hours prior to shut down. The continued uninterrupted operation of all facilities is essential. If any existing facilities must be interrupted, the Contractor for the Work shall provide all necessary temporary facilities and connections necessary for maintaining existing facilities. No mechanical, heating, plumbing, sprinkler, or electric services shall be interrupted at any time, except as approved in advance by the Owner. All communication systems must be maintained without interruption. As much related work as possible shall be performed prior to shut-downs, so as to minimize the period of shut-down. All material and manpower to do the work involved shall be at the job prior to interruption of services.

§ 3.3.5 If the Work involves a School facility, the Contractor represents that it is familiar with and shall adhere to the "Uniform Standards for School Construction and Maintenance Projects" set forth at 8 New York Code of Rules and Regulations §155.5 (8 NYCRR 155).

§ 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.

§ 3.4.4 Equivalent Products: Except as otherwise specified, whenever a material, article or piece of equipment is identified on the Drawings or in the Specifications by reference to manufacturer's or vendors' names, catalog numbers, or the like, it is so identified for the purpose of establishing a standard, and any material, article, or piece of equipment of other manufacturers or vendors which will perform adequately the duties imposed by the general design may be considered equally acceptable provided the material, article, or piece of equipment so proposed is, in the opinion of the Architect, of equal substance, appearance, size, function and performance. Such proposed product shall not be purchased or installed until approved by the Architect.

.1 The Owner and the Architect will consider a formal request for the substitution of a product in place of the one specified only under the conditions set forth in the General Requirements (Contract, & General Conditions) on "EQUIVALENCY", of the Specifications) for each proposed substitution.

.2 The Architect will be allowed ten (10) business days to evaluate each proposed substitution. The Architect will be the sole judge of equivalence, and no substitution shall be ordered, installed or utilized without the Architect's review process having been completed and the product accepted by written notification.

.3 Owner may require Contractor to furnish at the Contractor's expense a special performance warranty or other surety with respect to any substitution.

.4 The Architect will record time required by the Architect and the Architect's consultants in evaluating substitutions proposed by the Contractor and in making changes in the Contract Documents occasioned thereby. Whether or not the Architect accepts a proposed substitution, Contractor shall reimburse the Owner for the charges of the Architect and the Architect's Consultants for evaluating each proposed substitution. In the event Owner is not obligated to pay Architect for such costs incurred by the Architect in evaluating proposed Substitutions as Additional Services. Contractor shall pay Architect's additional cost for such evaluation directly to Architect as a third-party beneficiary under this Contract.

.5 Full explanation of the proposed substitution and submittal of all supporting data including technical information, catalog cuts, warranties, test results, installation instructions, operating procedures, and other like information necessary for a complete evaluation of the substitution.

.6 Reasons the substitution is advantageous and/or necessary, including the benefits to the Owner and Work in the event substitution is acceptable.

.7 The adjustment, if any, in the Contract Sum in the event the substitution is acceptable.

.8 The adjustment, if any, in the time of completion of the contract and the construction schedule in the event the submission is acceptable.

.9 Contractor shall demonstrate that the proposed substitution conforms and meets all the requirements of the pertinent Specifications and the Drawings; and the Contractor accepts the warranty and correction obligations in connection with the proposed substitution as if originally specified by the Architect. Proposals for substitutions shall be submitted to the Architect. Architect will review and make an informed decisions on proposed substitution within ten (10) business days.

.10 Substitutions and alternates may be rejected with or without written explanation.

.11 No substitute material shall be purchased or installed by the Contractor without the Architect's written approval. Material that, in the Architect's opinion, is inferior to that specified or is unsuited for the intended use will be rejected. The Architect's decision regarding acceptance of equals shall be final. The risk of whether a proposed substitution will be accepted is borne by the Contractor. No requests for substitution will be considered unless the Architect determines that such substitution is in the best interest of the Owner under the conditions set forth in the Contract Documents.

.12 By making requests for substitutions the Contractor:

- **a.** Represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;
- **b.** Represents that the Contractor will provide the same warranty for the substitution that the Contractor would provide for the specified product;
- **c.** Certifies that the cost data presented is complete and includes all related costs under this Contract except the Architect's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent;
- **d.** Will coordinate the installation of the accepted substitution, making such changes as may be required for the Work to be complete in all respects; and,
- **e.** Will reimburse Owner for additional costs from claims by other Prime Contractors resulting from incorporation of the requested substitution.

.13 If the Project involves Public Work subject to N.Y. General Municipal Law §103, whenever a material, article, device, piece of equipment or type of construction is identified on the Drawings or in the Specifications by reference to manufacturers' or vendors' names, trade names, catalog numbers, or similar specific information, it is so identified for the purpose of establishing a standard of quality, and such identification shall not be construed as limiting competition. In such event, any material, article, device, piece of equipment or type of construction of other manufacturers or vendors that will perform the duties imposed by the general design will be considered equally acceptable provided the material, article, device, piece of equipment or type of construction so proposed is completely described in submittals as set forth herein and is, in the opinion of the Architect, of equal substance, appearance, and function.

.14 The burden of proof to show equivalency or equal quality shall be that of the Contractor. Submissions for this purpose shall follow the format for Submittals. Submissions shall be complete, informative & address all data required in the base bid specification in such a manner that the Architect can, without unusual effort or exhaustive research, review and make a judgment as to its equivalency. Excessive or unusual effort required of the Architect by the Contractor to review, research and qualify items proposed as equivalents shall be charged to the Contractor at the current billing rate of the Architect.

.15 Proposed equivalents or substitutions will not be considered unless requested as set forth herein. Mere express or implied indication of equivalents or substitutions will not be considered without full compliance these requirements.

.16 The Contractor shall indicate the kind, type, brand or manufacturer that is to be substituted for the specified item. The Contractor will submit information describing in specific detail the differences in quality, performance, cost and time between the substitution and the item that was specified. This information shall include notification of possible changes to the Work or to work of other contracts."

§ 3.4.5 A shortage of labor in the industry shall not be accepted as an excuse for not properly manning the project at each site.

§ 3.4.6 Contractor shall be responsible for the care and protection of all equipment and materials for his work of this project, including equipment and material furnished by the Owner.

§ 3.4.7 Contractor warrants that it has good title to all materials used in the Work of this Contract. No materials or supplies shall be furnished by Contractor or any of its Subcontractors that are subject to any chattel mortgage, conditional sale or other agreement by which an interest is retained by the seller.

§ 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.

§ 3.5.1.1 Neither final payment, nor provision in Contract Documents, nor partial or entire occupancy of premises by Owner shall constitute an acceptance of Work not done in accordance with Contract Documents or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship.

§ 3.5.1.2 In emergencies occurring during the warantee period, the Owner may correct any defect immediately and charge the cost to the Contractor. The Owner shall at once notify the Contactor, who may take over the Work and make any corrections remaining after his forces arrive at the Work. Any repair work not started within seven (7) days following notice to the Contractor of any defect shall be considered an emergency.

§ 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

Except as otherwise specified, 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.

§ 3.6.1 The OWNER is exempt from the payment of Sales and Compensating Use Taxes of the State of New York and of cities and counties, on all materials, equipment and supplies to be sold to the OWNER pursuant to this Contract. The exemption does not, however, apply to tools, machinery, equipment, or other property leased by or to the contractor or to a Sub-Contractor and the Contractor and its Sub-Contractor. Also exempt from such taxes are purchases by the CONTRACTOR and its subcontractors of materials, equipment and supplies to be sold to the OWNER pursuant to its Contract, including tangible personal property to be incorporated in any structure, building or other real property forming part of the Project." The exemption does not, however, apply to tools, machinery, equipment, or other property leased by or to the CONTRACTOR or a Sub-Contractor and the CONTRACTOR and its Sub-Contractor shall be responsible for any pay, any and all applicable taxes, including Sales and Compensating Use Taxes, on such leased tools, machinery, equipment or other property, and for materials not incorporated into the project.

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

§ 3.7.1 Each Contractor shall secure and pay for all required permits, governmental fees, licenses, certificates of inspection, of occupancy, of Underwriters, and of all other required certificates for the Work, necessary for the proper execution and completion of the Work, which are customarily secured after execution of the Contract and which are legally required at the time the bids are received. Each Contractor shall be responsible for complying with any and all requirements specified with each Permit.

§ 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 or affected work is performed and in no event later than 7 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 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.

.4 Value of allowances shall also include:

- All costs for plant, equipment and labor for unloading, handling and storage at the site;
- Any costs for protection;
- All costs for associated demolition work;
- Costs for removal and off-site disposal of demolished materials;
- Cost for labor, materials and equipment for installation and finishing, except where labor is specified not to be a part of the allowance.
- Other expenses required to complete the installation.

§ 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.

§ 3.9.4 The Contractor shall not reduce or terminate supervision of the Work.

§ 3.9.5 If, for any reason, the Contractor takes an action resulting in any of the changes noted in **§ 3.9**, which negatively affects the projects progress or quality, or resulting in additional work by the Owner or their agents, the Owner has the right to charge the Contractor all costs associated with these efforts including the costs of legal, Construction Management Services, and Architectural services. The Owner shall notify the Contractor in writing of their intent to back charge as a result of lack of supervision.

§ 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.

§ 3.12.5.1 No extension of time will be granted to the Contractor because of failure to have shop drawings, product data, and samples submitted in ample time to allow for review by the Construction Manager, Architect or their Consultants.

§ 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.

§ 3.12.10.2.1 If it is the position of the Contractor, or his licensed design professional, that the Owner and Architect have not provided all performance and design criteria, the Contractor shall request additional criteria in writing before proceeding with the professional services described in § 3.12.10. Proceeding with the professional services shall be evidence that the Owner and Architect have provided all necessary performance and design criteria.

§ 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.

§ 3.13.1.1 Use of site and building:

.1 Each Prime Contractor shall cooperate with the Owner in making available for the Owner's use, areas of the completed or partially completed building(s) or site as provided for in Article 9, Paragraph 9.9. The Owner shall have the right to take possession of and to use any completed or partially completed portions of the building or site even though the time of completing the entire Work or such portion of the Work may not have expired. Such use shall not constitute acceptance thereof. Such occupancy shall in no way abrogate any specified warranties or guaranties for materials, workmanship or operation of equipment pertaining to the occupied portions.

.2 Each Prime Contractor shall cooperate with the Owner in making available for the Owner's use such building services as heating, ventilating, cooling, water, lighting and telephone for the space or spaces to be occupied, and if the equipment required to furnish such services is not entirely completed at the time the Owner desires to occupy the aforesaid space or spaces, the Contractor shall make every reasonable effort to complete such part of his Work as soon as possible to the extent that the necessary equipment can be put into operation and use.

.3 Mutually acceptable arrangements shall be made as to the warranties or guaranties affecting all Work associated therewith.

.4 Such occupancy or use shall not commence prior to a time mutually agreed to by the Owner and Contractor and to which the insurance company or companies providing the property insurance have consented by endorsement to the policy or policies. (See 11.3.1.5) Such occupancy shall be documented with an appropriately executed Certificate of Substantial Completion.

.5 See Article 2, Paragraph 2.5 for special situations.

§ 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.

§ 3.13.3 Protection of Building Occupants

§ 3.13.3.1 Owner or Tenant occupied areas of the building shall always comply with the minimum requirements necessary to maintain a Certificate of Occupancy.

§ 3.13.3.2 General safety and security standards for this project include:

.1 All construction materials shall be stored in a safe and secure manner;

.2 Fences shall be maintained around construction supplies or debris.

.3 Gates in temporary fences shall always be locked unless a worker is in attendance to prevent unauthorized entry to the Contract areas.

.4 During exterior renovation work, overhead protection shall be provided for any sidewalks or areas immediately beneath the work site or such areas shall be fenced off and provided with warning signs to prevent entry.

.5 Workers shall wear photo-identification badges at all times for identification and security purposes.

.6 Separation of Construction Areas: Construction areas that are under the control of a Contractor and therefore not occupied by Owner or Tenants shall be separated from occupied areas. Provisions shall be made to prevent the passage of dust and contaminants into occupied parts of the building. Periodic inspection and repairs of the contaminant barriers must be made to prevent exposure to dust or contaminants. Each Contractor working inside the buildings shall temporarily seal doorways enclosing their work area, using heavy duty plastic, duct tape, etc. Repairs of the plastic and tape must be made in the event the tape becomes loose or the plastic is cut or torn.

.7 Type "X" Gypsum Board shall be used in exit ways or other areas that require fire rated separation.

.8 Plastic sheeting may be used only as a vapor, fine dust, or air infiltration barrier, and shall not be used to separate occupied spaces from construction areas.

.9 A specific stairwell and/or elevator should be assigned for construction worker use during work hours. In general, workers may not use corridors, stairs, or elevators designated for Owner or Tenants.

.10 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.

.11 All parts of the building affected by renovation activity shall be cleaned at the close of each workday, including but not limited to cleaning and disinfection in connection with infectious disease exposure precautions, whether permanent or temporary, required or suggested by federal, state or local governmental authorities.

.12 Fire and hazard prevention: Areas of buildings under construction that are to remain occupied shall maintain a Certificate of Occupancy.

§ 3.13.3.3 Noise Abatement During Construction:

.1 Construction and maintenance operations shall not produce noise in excess of 60 dba in occupied spaces or shall be scheduled for times when the building is not occupied, or acoustical abatement measures shall be taken.

§ 3.13.3.4 Control of airborne contaminates during construction:

.1 The Contractor shall be responsible for the control of the chemical fumes, gases, and other contaminates produced by their welding, gasoline or diesel engines, roofing, paving, painting, etc. to ensure they do not enter occupied portions of the building or air intakes.

.2 The Contractor shall be responsible to ensure that its activities and materials which result in off-gassing of volatile organic compounds such as glues, paints, furniture, carpeting, wall covering, drapery, etc. are scheduled, cured, or ventilated in accordance with manufacturer's recommendations before a space can be occupied.

.3 Large and small asbestos abatement projects as defined by 12NYCRR56 shall not be performed in occupied areas of the building. Any area of the building where abatement of hazardous materials is being performed must be sealed off in an air-tight fashion from the remainder of the building in accordance with NY Code Rule 56 and other applicable laws and regulations.

.4 The requirements of Section 155 of the Regulations of the New York State Commissioner of Education apply to this Project. Reference Section 01 3529.1 Life Safety Requirements During School Construction and the Official Compilation of Codes, Rules and Regulations of the State of New York, Title 8 Education Department, Chapter II Regulations of the Commissioner, Subchapter J. Buildings and Transportation Part 155 Education Facilities.

§ 3.13.4 Each Contractor shall be responsible for complying with Occupational Safety and Health Administration (OSHA) and U.S. Department of Health and Human Services' Center for Disease Control and Prevention (CDC) on COVID-19 Guidance for safe work practices, use of personal protective equipment (PPE), social distancing, cleaning, and sanitizing of the worksite. These protocols shall be incorporated into each Contractor's safety work plan.

§ 3.13.5 All construction workers and suppliers are to execute a Health Declaration Form/Questionnaire each day prior to gaining access to one of the construction sites during the COVID-19 crisis.

§ 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 In order to eliminate cutting and patching as much as possible, each Prime Contractor shall coordinate the installation of sleeves and inserts with the other Prime Contractors affected and shall give proper and detailed instructions to others where Work may be affected by their Work, with adequate notice prior to the erection of new Work. Cutting and patching Work as required to install new Work or remove existing Work shall be done carefully and neatly with as little damage as possible.

§ 3.14.3 Unless otherwise stated in Specification Section 01 7329 Cutting and Patching, each Prime Contractor shall perform all cutting and patching as required to complete their Work. Cutting is to be done neatly with minimal damage to surrounding materials and holes to be patched and/or fire safe as required to the satisfaction of the Construction Manager, Architect and Owner.

§ 3.14.4 Any costs caused by defective or ill-timed Work shall be borne by the Contractor responsible, therefore. Any Contractor who is required to cut and patch its new Work to provide conditions for other contractors to complete their new Work and who was not given adequate prior notice of the conditions required for completion of such Work before doing its Work, shall charge the Contractor in default the documented cost of the cutting and patching Work plus 15% for overhead and profit unless otherwise specified.

§ 3.14.5 Cutting and patching of any Work shall be made in such a manner as to not breach any provisions of any guarantee or warranty on existing Work left in place or guarantee or warranty required for his new Work. Patching of Work shall match existing adjacent surfaces and patch work shall be disguised completely to hide any trace of patching.

§ 3.14.6 Refer to Contract (General and other conditions) Section 01 7329 Cutting and Patching for more information.

§ 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.

§ 3.15.3 Each Prime Contractor is solely responsible for clean-up to the Construction Manager's and Owner's satisfaction. Further, each Contractor shall fully cooperate with all other Contractors in the coordinated effort to meet the Owner's time and quality requirements for clean-up.

§ 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 defend, indemnify and hold harmless the Owner, Architect, and the Construction Manager, and each of their consultant's, officers, board members, agents, and employees, from and against any suits, claims, damages, losses, or expenses, including but not limited to attorneys' fees and litigation costs, arising out of or resulting from performance of the Work, including suits, claims, damages, losses or expenses attributable to any bodily injury, sickness, disease, or death, or injury to or destruction of any tangible property, including loss of use resulting therefrom, or any statutory violations, but only to the extent caused in whole or in part by the act, omission, fault, or statutory violation of the Contractor, a subcontractor, or any person or entity directly or indirectly employed by them, or any person or entity for whose acts they may be liable or arises out of operation of law as a consequence of any act or omission of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of the above may be liable, regardless of whether any of them has been negligent. This provision shall not be construed to require the Contractor to indemnify the Owner, Architect or Construction Manager for the negligence of the Owner, Architect or Construction Manager, respectively, to the extent such negligence, in whole or in part, proximately caused the damages resulting in the suit, claim, damage, loss or expense.

§ 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.

§ 3.18.3 In any and all Claims against the Owner, Construction Manager, or the Architect or their agents or employees by third parties, the indemnification obligation under § 3.18 shall apply and shall not be limited by limitation or amount of or type of damages, compensation, or benefits payable by or for the Contractor or Subcontractors.

§ 3.18.4 Contractor shall comply with, and cooperate with, Construction Manager, Architect and Owner in complying with legal requirements. Among other things, Contractor shall be responsible for performing corrective Work within any abatement periods prescribed by governmental entities including but not limited to OSHA, appealing from decisions or orders, requesting extensions on abatement periods, and furnishing such information or evidentiary material as may be necessary or as may be requested by Construction Manager, Architect or Owner to fully protect the rights and interests of Owner, Construction Manager, and Architect with respect to possible, threatened or pending proceedings or orders.

§ 3.19 Contractor's Responsibilities

§ 3.19 Contractor agrees, in addition to all other responsibilities and duties under the Contract:

§ 3.19.1 To use all necessary means to discover and to notify the Construction Manager, Architect and Owner in writing of any defect in other Work upon which the satisfactory performance of the Work may depend, and to allow a reasonable amount of time for remedying such defects. If Contractor should proceed with the Work, Contractor shall be considered to have accepted and be responsible for such other Work unless over Contractor's written objection, Contractor shall have proceeded pursuant to written instructions from the Architect.

§ 3.19.2 To submit to Owner, Construction Manager, and Architect promptly upon request, information with respect to the names, responsibilities and titles of the principal members of Contractor's staff.

§ 3.19.3 To take all steps necessary to avoid labor disputes; and to be responsible for any delays and damages to Owner caused by such disputes.

§ 3.19.4 To pay for costs of repair to other Work attributable, in whole or in part, to the fault or negligence of Contractor and Owner's charges for removal of rubbish attributed to Contractor, and any clean-up related to Contractor or the Work, as determined by Owner or Construction Manager.

§ 3.19.5 To comply with all legal requirements; to appear at hearings, proceedings or in court in respect of such compliance or in respect of violations or claimed violations of legal requirements; to pay any fines or penalties imposed for said violations; and to pay all legal fees, fines and penalties incurred by or imposed upon Owner relating to Contractor's compliance, violations or claimed violations. Without limiting the foregoing, Contractor shall appear at hearings, proceedings and/or in court and consent to its substitution as a party defendant in respect of all summonses and claimed violations arising out of or relating to the Work.

§ 3.19.6 Not to display on or about the Project site any sign, trademark or other advertisement without written consent of the Owner.

§ 3.19.7 Each Contractor's Subcontractor and supplier shall be bound by all Contract Documents to the same extent and with the same effect as if the Subcontractor or supplier were the Contractor. Contractor shall cause Subcontractors and suppliers to comply with all the Contract Documents. Contractor shall be responsible for all the acts, work, material and equipment of its Subcontractors and supplier and all persons either directly or indirectly employed by any of them.

§ 3.19.8 To:

.1 Furnish a competent and adequate staff and use its best skill and attention for the proper administration, coordination, supervision, and superintendence of the Work;

.2 Organize the procurement of all materials and equipment so that they will be available at the time needed for the Work;

.3 Keep an adequate force of skilled workers on the job to complete the Work in strict accordance with all requirements of the Contract Documents;

.4 Maintain throughout the duration of the Work a competent superintendent and any necessary assistants, all of whom shall be acceptable to Owner and shall not be changed without the consent of the Owner;

.5 Enforce discipline and order and not to employ at the Project any unfit person or anyone not skilled in the task assigned; and

.6 Provide supervision by experts in all aspects of the application of the materials, equipment or system being fabricated and installed.

§ 3.19.9 That if any Work is performed which is contrary to legal requirements, to promptly make all changes as required and take all other corrective action to comply therewith and pay all costs arising there from.

§ 3.19.10 That any review or consideration by Owner, Construction Manager, or Architect of any method of construction, invention, appliance, process, article, device or material of any kind shall be for its general adequacy for the Work and shall not be an approval for the use thereof by Contractor in violation of any patent or other rights of any third person. Owner and Architect shall in no event be deemed to have reviewed or to have been required to review or consider the means and methods of construction, all of which are chosen exclusively by the Contractor.

§ 3.19.11 That if any provision of the Contract Documents conflicts with any agreement among members of trade associations, or with a union or labor council which regulates the work to be performed by a particular trade, to reconcile such conflict without delay or damage to Owner. In the event the progress of the Work is delayed by such conflict, Architect may require that other material or equipment of equal or better kind and quality be provided at no additional cost to Owner. This right of substitution shall not limit other rights that the Owner may have concerning such delay.

§3.19.12 In accordance with local or NY State Laws and Regulations, the Contractor, including any of its employees, subcontractors, suppliers or materialmen or other representatives, shall not use tobacco in any form on the premises during the course of the Work. Contractors failing to abide by this requirement shall be prohibited from working at the site and shall be responsible for any consequent delays or added costs to the Owner as a result of such noncompliance.

§ 3.19.13 The Contractor shall provide reasonable and visible identification for each employee, Subcontractor, or other person at the Project site, and shall, upon request of the Owner, make available a list of names of those employees, Subcontractors or others working under the direction of the Contractor at the Project site. Any such identification shall be reasonably visible to the Construction Manager, Architect and to Owner's or Tenants' personnel at all times to allow the Owner to maintain the safety and security of buildings, property, and persons at the Project site. Contractors failing to abide by this requirement are different from those as indicated.

§ 3.19.14 The Contractor, its employees and Subcontractors and their employees shall be subject to and abide by rules and regulations established by the Owner. No weapons of any kind shall be permitted on-site; there shall be no harassment of a sexual, ethnic, or religious nature; there shall be no use of profanity.

§ 3.20 Local Conditions, Existing Features and Underground Data

§ 3.20.1 The Contractor acknowledges it has satisfied itself as to the nature and location of the Work, the general and local conditions, particularly those bearing on transportation, disposal, handling and storage of materials, availability of labor, materials, equipment, utilities, roads, weather, ground water table, character of surface and subsurface materials and conditions, the facilities needed to prosecute the Work, and all other factors which in any way affect the Work or the cost thereof under this Contract. Any failure by the Contractor to acquaint itself with the available information concerning these conditions will not relieve it from the responsibility of successfully performing work. See Section § 1.2.2.1.

§ 3.20.2 The location of existing features shown on plans is intended for general information only. The Contractor is solely responsible for accurate determination of the location of all structures and shall not be entitled to any extra payment due to any unforeseen difficulties or distances encountered in the Work.

§3.20.3 The locations, depths, and data as to underground conditions have been obtained from records, surface indications and data furnished by others. The information furnished is solely for the convenience of the Contractor without any warranty, expressed or implied as to its accuracy or completeness. To the extent permitted by law, the Contractor shall make no claim against the Owner or Architect or the Construction Manager with respect to the accuracy or completeness of such information if erroneous, or if the conditions found at the time of construction.

§ 3.21 Construction Stresses

§ 3.21.1 The Contractor shall be solely responsible for the load conditions created during construction. The Contractor shall be responsible for repairing any structure which is dislocated, over strained, or damaged during construction.

§ 3.21.2 The Contractor is responsible for restoration and/or repair of utilities, property, buildings, pavement, walkways, roads, etc. damaged by its activities.

§ 3.22 Training and Instructions

§ 3.22.1 Upon Substantial Completion of the Work, the Contractor shall orient and instruct the Owner's designated personnel in the operation and maintenance of all equipment furnished by the Contractor and shall turn over all pertinent literature and operational manuals relating to the equipment. The format for organizing, binding, and delivering such manuals shall be as described in the Specifications.

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, and Architect. Consent shall not be unreasonably withheld.

§ 4.1.4 If the employment of the Architect or Construction Manager is terminated, the Owner shall employ a successor Architect or Construction Manager.

§ 4.1.5 The Architect shall be deemed a third-party beneficiary of the Contract and the General Conditions of the Construction Contract. As such, where Architect incurs additional costs as a result of actions of the Contractor or any of its Subcontractors and Architect is not entitled to compensations for such costs by Owner as Additional Services, such additional cost shall be paid by the Contractor directly to the Architect as Architect's current rates.

§ 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 on the Project. 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 on the Project. 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.

§ 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.

§ 7.1.1.1 Construction Change Directive: Architect may issue a document, on AIA Form G714, signed by Owner, instructing Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. The Document shall describe the changes in the Work and designates method of determining any change in Contract Sum or Contract Time.

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.

§ 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.

§ 7.1.2.1 Proposal Request: Architect may issue a document which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications. Contractor shall prepare and submit a fixed price quotation within 7 calendar days of receipt of such documents.

§ 7.1.2.2 Submit to the Construction Manager, the Name of the Individual Authorized to receive change documents and who will be responsible for informing others in contractor's employ or subcontractors of changes to the Contract Documents.

§ 7.1.2.3 Contractor may propose a change by submitting a request for change to the Construction Manager, 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. The Construction Manager Shall Submit to the Architect for review.

§ 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.

§ 7.1.4 Changes in the Work involving additional Work or deletion of Work whether or not resulting in an addition to or subtraction from the Contract Sum shall not be made until the Contractor submits to the Construction Manager the cost of the added or deleted Work with a complete and detailed listing of all Subcontractors involved, all materials, labor and equipment.

§ 7.1.4.1 Overhead and profit as described in § 7.1.7 and § 7.1.7.1 may be added to the cost of a Claim for additional Work *only* when the source of monies for such additional Work is not an Allowance included in the Contract Sum or any other monies for Work included in the Contract Sum.

§ 7.1.4.2 Changes in the Work whether or not involving additions or deductions from the Contract Sum shall not be made until an appropriate Change Order or Change Directive have been issued.

§ 7.1.4.3 ALL CHANGE ORDERS MUST HAVE THE APPROVAL OF THE OWNER AND ARCHITECT IN WRITING.

§ 7.1.5 Actual cost of labor and material shall be defined as the amount paid for the following items, to the extent determined reasonable and necessary:

.1 Cost of materials delivered to the job site for incorporation into the contract work.

.2 Wage paid to workers and foreman and wage supplements paid to labor organizations in accordance with current labor agreements.

.3 Premiums or taxes paid by the Contractor for worker's compensation insurance, unemployment insurance, FICA tax and other payroll taxes as required by law, net of actual and anticipated refunds and rebates. (Not to be included in calculation of overhead and profit.)

.4 Sales taxes as required by law.

.5 Allowance for use of construction equipment (exclusive of hand tools and minor equipment), as approved for use by the Architect. The rate on self-owned equipment used for periods of under 1 week will be the Associated Equipment Distributor's published monthly rate divided by 22 days to establish a daily rate and divided again by 8 hours to establish an hourly rate. Equipment used for periods of 5 days or more will be billed at a rate equal to 45 percent of the published monthly rate. In the alternative, the Architect may approve the reimbursement of a rate representing the allocable costs of ownership. Self-owned equipment is defined to include equipment rented from controlled or affiliated companies. Rented equipment will be paid for at the actual rental cost. Gasoline, oil and grease required for operation and maintenance will be paid for at the actual cost. When, in the opinion of the Contractor and as approved by the Architect, suitable equipment is not available on the site, the moving of said equipment to and from the site will be paid for at actual cost.

§ 7.1.6 Overhead shall include insurance other than those incidental to labor mentioned above, premiums on bonds required by the Contractor, Contractor's Supervisory employees, office management, home and field office expenses, transportation costs and both manual and power small tools and manual and power small equipment.

§ 7.1.6.1 For Work done by the Prime Contractor's own forces, mark-up for combined overhead and profit on materials and on cost of labor shall not exceed 15%.

.1 Work authorized under Article §3.8 Allowances are not subject to overhead and profit.

§ 7.1.6.2 For Work done by the Subcontractors, mark-up of costs as defined herein by Subcontractor's for combined overhead and profit on materials and on cost of labor shall not exceed 10%.

.1 To this amount, 5% may be added for the Prime Contractor's combined overhead and profit.

.2 Work authorized under Article §3.8 Allowances are not subject to overhead and profit.

§ 7.1.7 To facilitate reviewing quotations for either extra charges or deductions, all proposals shall be accompanied by a complete itemization of costs including labor, materials, subcontracts, and if allowed, mark-ups for overhead and profit. Subcontracts shall be similarly itemized. In no case will a change involving over $1,000.00 be approved without itemization.

§ 7.1.7.1 If requested, the Contractor shall submit detailed quotations from material suppliers.

§ 7.1.8 Regardless of the method used to determine the value of any change, the Contractor will be required to submit evidence satisfactory to the Architect to substantiate each and every item that constitutes his proposal of the value of the change. The amounts allowed for overhead and profit shall not exceed the applicable percentages as established in the two (2) following Sections:

§ 7.1.8.1 If the Work is done directly by the Contractor, overhead and profit in the amount of 15% may be added to the cost proposal. The percentages for overhead and profit may vary according to the nature, extent and complexity of the work involved, but in no case shall exceed the percentages set forth in the paragraph. Overhead and profit percentages are not to be applied to the premium portion of overtime pay.

§ 7.1.8.2 If the Work is done by a subcontractor, subcontractor's overhead and profit in the amount of 10% may be added to the cost of labor and materials. To this amount, there may be added 5 percent for the Contractor's combined overhead and profit. Overhead and profit percentages are not to be applied to the premium portion of overtime pay.

§ 7.1.9 Whenever the cost of any Work is to be determined pursuant to § 7.1.1 thru § 7.1.8, Contractor will submit in form acceptable to the Construction Manager and Architect an itemized cost breakdown together with supporting data.

§ 7.1.9.1 In computing the value of a change order which involves additions and deductions of work and the added work exceed the omitted work, overhead and profit shall be computed on the amount by which the cost of additional labor and materials exceeds the cost of the omitted labor and material, except no additional overhead and profit shall be allowed on value of work determined in accordance with § 7.1.5.

§ 7.1.9.2 In computing the value of a change order which involves deductions and additions and the Work omitted exceeds the added Work, the Contractor will be allowed to retain the overhead and profit on the amount by which the omitted Work exceeds the added Work, except that no overhead and profit shall be retained on value of work.

§ 7.1.9.3 The Contractor may retain overhead and profit on a change order which involves deductions only, except that no overhead and profit shall be considered on value of 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 Architect and signed by the Owner, Contractor, 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. Lump sum adjustment shall be substantiated by submitting evidence of actual costs to the Construction Manager and Architect for 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
.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 allowance for overhead and profit in accordance with § 7.1.8, § 7.1.8.1, § 7.1.8.2, § 7.1.9, § 7.1.9.1, § 7.1.9.2, § 7.1.9.3, and when permitted by § 7.1.6 and § 7.1.6.1. 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 manual and small power tools and manual and small power equipment, whether rented from the Contractor or others;

.4 Costs of permit fees, and sales, use, or similar taxes, directly related to the change; and

.5 Costs of consumable supplies.

§ 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 incorporated into a Change Order.

§ 7.3.8 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.

§ 7.3.9 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.

(Paragraph deleted)

§ 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.

§ 7.5 Unit Prices

§ 7.5.1 Where the Work involved is covered by unit prices contained in the Contract Documents, by application of unit prices to the quantities of the items involved (subject to the provisions of § 7.1.1.1 through § 7.5.1.4 inclusive).

§ 7.5.1.1 Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the established unit prices for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Architect in accordance with § 7.5.4.

§ 7.5.1.2 Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

§ 7.5.1.3 Where the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement and there is no corresponding adjustment with respect to any other item of work and if Contractor believes that Contractor has incurred additional expense as a result thereof, Contractor may make a claim for an increase in the Contract Price in accordance with Article 11 if the parties are unable to agree as to the amount of any such increase.

§ 7.5.1.4 Construction Manager will determine the actual quantities and classifications of unit price work performed by Contractor. Construction Manager and Architect will review with the Contractor, Architect's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Architect's written decisions thereon will be final and binding upon Construction Manager, Owner and Contractor unless, within 10 days after the date of any such decision, either Owner or Contractor delivers to the other party to the Agreement and to Architect written notice of intention to appeal from such a decision.

§ 7.6 Alternates

§ 7.6.1 Where the Work involved is covered by Alternate contained in the Contract Documents, the Owner shall have the right of selection in respect to any or all of the Alternates as Bid. The Contractor shall provide the Owner thirty (30) days' written notice when the doing said work of an Alternate impacts the new Work or the removal of materials/products already installed or the acceptance of the Alternate will increase the Contractor's Contract amount.

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 IS OF THE ESSENCE IN THE COMMENCEMENT, EXECUTION AND CONSTRUCTION OF THE WORK. Contractor shall be responsible for all direct and consequential damages to Owner, Construction Manager, and Architect arising from any delay of Contractor, its Subcontractors and suppliers, in performing or completing the Work in accordance with the time requirements. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.1.1 Contractor shall cooperate with the Owner, Construction Manager, Architect and other Contractors on the Project, making every reasonable effort to reduce the contract time.

§ 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.

§ 8.2.2.1 Contractor shall not commence Work on the site until two copies of all insurance policies as indicated in Article 11, attesting that the required coverage is in force, have been accepted by the Owner.

§ 8.2.3 Contractor shall do all things necessary to ensure the prosecution of the Work in accordance with any one or more of the following as determined by the Construction Manager and the Owner, in their discretion:

- **.1** Project schedules and revisions thereof,;
- **.2** The time requirements for various portions of Work;
- **.3** The requirements of the Project including, but not limited to, coordination requirements as may from time to time be known to Contractor;
- **.4** Schedules of the Work provided by Contractor to Construction Manager upon the Owner's request.

§ 8.2.4 If the Contractor does not achieve Substantial Completion within the Contract Time established in the Agreement between the Owner and the Contractor, or in a subsequent Change Order, the Contractor shall be liable to the Owner, in addition to any actual or consequential damages, for the costs of reimbursements to the Owner's Agents including, but not limited to, the Construction Manager and Architect for their services attributable to this delay.

§ 8.2.5 Should the progress of the Work and/or other Work be delayed by any fault, neglect, act or failure to act of Contractor or any of its Subcontractors or suppliers so as to cause any additional cost, expense, liability or damage to Owner, Construction Manager, or Architect or for which Owner , Construction Manager, or Architect may become liable, Contractor shall hold Owner, Construction Manager, and Architect harmless from and indemnify Owner, Construction Manager, and Architect against all such additional cost, expense liability or damage in accordance with the provisions of Article 11.

§ 8.2.6 The Work shall be performed during designated working hours, except that in the event of emergency or when necessary to perform the Work in accordance with the requirements of § 8.2, Work shall be performed at Contractor's cost and expense on other shifts, overtime, Saturdays, Sundays, Holidays and at other times, if permission to do so has been obtained in writing from Owner. Without limiting the requirements of the preceding sentence, if the progress of the Work or of the Project has been delayed by any fault, neglect, act or failure to act of Contractor or any of its Subcontractors or suppliers, Contractor shall work such overtime, at Contractor's cost and expense as aforesaid, as Construction Manager shall deem necessary or desirable to make up for all time lost and to avoid delay in the completion of the Work and of the Project. The failure by Construction Manager to direct Contractor to engage in such overtime shall not relieve Contractor of the consequences of its delay.

§ 8.2.7 Unless otherwise noted, the date of commencement of the Work is the date established in the Agreement. Contractor shall organize construction schedules as specified in § 3.10, Contractor's Construction Schedules. The commencement date shall not be postponed by the failure to act of the Contractor or of persons or entities for which the Contractor is responsible.

§ 8.2.8 The Construction Manager may direct acceleration of the Work so that it may be performed in advance of the schedules, time requirements and Project requirements. If so directed, Contractor shall increase its staff and/or work overtime. Contractor will not be entitled to additional compensation for Work performed outside of designated working hours, except as approved by Owner. Provided that Contractor is not in default under the Contract, and Owner has issued the aforesaid authorization, there shall be added to the Contract Sum as actual out-of-pocket amount equal to:

.1 Additional premiums on wages actually paid, at rates that have been accepted by Construction Manager and Architect

.2 Taxes imposed by law on such additional wages;

.3 Premiums for worker's compensation and liability insurance if required to be paid on such additional wages.

Written authorization for overtime work that exceeds $500.00 for which Contractor intends to charge the Owner in any one week shall be invalid unless confirmed in writing by the Owner, it being understood that Owner's Designated Representative shall not have authority to authorize such overtime which exceeds $500.00 in any one week.

§ 8.2.9 In no case shall the contractor delay the progress of the Work or any part thereof on account of changes in the Work or disputes caused by proposed or ordered changes in the Work or any disputes or dis-agreements as to the equitable value of such changes.

§ 8.2.10 Contractor and Contractor's Surety shall be strictly accountable for completion as a condition to satisfactorily contractual performance.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 Should Contractor be obstructed or delayed in the commencement, prosecution or completion of the Work, without fault on its part, by reason of failure to act, direction, order, neglect, delay or default of the Owner, Construction Manager, or the Architect; by changes in the Work; fire, lightning, earthquake, enemy action, act of God

or similar catastrophe; by Governmental restrictions with respect to materials or labor, or by an industry-wide strike beyond Contractor's reasonable control, then Contractor shall be entitled to an extension of time lost by reason of any and all causes aforesaid, but no Claim for extension of time on account of delay shall be allowed unless a Claim in writing therefore is presented to Construction Manager with reasonable diligence but in any event not later than fifteen (15) days after the commencement of such claimed delay. Except for the causes specifically listed above in this sub-section, no other cause or causes of delays shall give rise to an extension of time to perform the Work. The granting of an extension of time is conditioned upon Contractor's timely submission of the aforesaid written notice. Except to the extent, if any, expressly prohibited by law, Contractor expressly agrees not to make, and hereby waives, any Claim for damages, including those resulting from increased labor or material cost, on account of any delay, obstruction or hindrance for any cause whatsoever, whether or not foreseeable and whether or not anticipated including but not limited to the aforedescribed causes, and agrees that the sole right and remedy therefore shall be extension of time, provided the requisite condition as to written Claim has been met.

§ 8.3.2 If Contractor claims an increase in the Contract Sum or an extension in the completion time required by reason of a change in the Work, Contractor shall give Construction Manager and Architect written notice within fifteen (15) days after Contractor's knowledge of the occurrence of the matter giving rise to such Claim. This notice shall be given by Contractor before proceeding to execute the changed Work, except in an emergency endangering life or property in which case Contractor shall proceed in accordance with § 10.3. No such Claim will be valid unless notice is given as required in this section. Contractor shall proceed to execute the Work, even though the increase or time extension has not been agreed upon.

§ 8.3.2.1 Extension of time, if requested by the Contractor, shall only be considered after the Contractor has made reasonable effort to recover the lost time. These efforts shall be documented by the Contractor and submitted to the Architect.

§ 8.3.2.2 An extension, or extensions, of time may be granted subject to the provisions of this article, but only after written application therefore by the contractor in accordance with Article 15.

§ 8.3.2.3 An extension of time shall be only for the number of days of delay that the Construction Manager may determine to be due solely to the causes set forth in the application for extension of time. The Contractor shall not be entitled to receive a separate extension of time for each one of several causes of delay operating concurrently; but if at all, only the actual period of delay as determined by the Construction Manager.

§ 8.3.3 Contractor shall not be allowed an extension of time unless Contractor has established to the satisfaction of the Owner, Construction Manager, and Architect that the delay claimed by Contractor is to a portion of the Work on the critical patch of the work schedule.

§ 8.3.4 Under no circumstances will Contractor look to or make a Claim against Owner, Construction Manager, or Architect for the consequences of any delay resulting from directions given or not given by Construction Manager including scheduling and coordination of the Work or resulting from Architect's preparation of Drawings and Specifications or review of Shop Drawings.

§ 8.3.5 When the Contract Time has been extended, such extension of time shall not be considered as justification for extra compensation to the Contractor for administrative costs or other similar reasons.

§ 8.4 Damages for Delay

§ 8.4.1 Architectural Changes for Delay in Completion. If the entire work is not fully completed within the maximum allowable time for completion specified in the agreement, including any extensions granted thereto, architectural charges incurred by the Owner, from the completion date thus established to the actual final Date of Substantial Completion of the work, shall be charges to the Contractor for failing to complete its work by the stipulated date and be deducted from the final monies due the Contractor. Such charges shall be determined at the rate of $750.00 per day per man for each and every man and day that the Architect and Construction Manager needs to furnish project management or an on-site Construction Manager Representative.

§ 8.4.2 Liquidated Damages for Delay in Completion. Failure to complete the work within the maximum allowable time for completion specified in the Agreement and/or the Milestone Schedule, including any extensions granted thereto, or failure to meet an intermediate milestone date as established by the Milestone Schedule, shall entitle the

Owner to deduct from monies due to the Contractor, or to otherwise charge the Contractor, as liquidated damages the amount per calendar day of One Thousand Dollars ($1,000.00) for each calendar day beyond such maximum allowable time in the completion of the work. Such amount of liquidated damages shall be in addition to the $750 per day charges for delay described in Paragraph 8.4.1.

The absence of a liquidated damage amount and/or other criteria concerning same shall not preclude the Owner from exercising its rights. All time limits stated in the Contract Documents are of the essence of the Agreement. The provisions of this Article 8 shall not exclude recovery by Owner for damages (including but not limited to fees and charges of Engineers, Architects, Construction Manager, Attorneys and other professionals and court and litigation costs) for delay by the Contractor.

§ 8.4.3 No Damage for Delay. Each Prime Contractor agrees to make no claims for delay in the performance of this Contract occasioned by an act or omission, or act of the Owner of any of its representatives and agrees that such a claim shall be fully compensated for by an extension of time to complete the performance of the work as provided herein.

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.

§ 9.2.1 Submit a printed schedule on AIA form G703 – Application and Certificate for Payment Continuation Sheet. Submit in duplicate to the Architect within 15 days after date of Owner-Contractor Agreement.

§ 9.2.2 Format: Utilize the Table of Contents of the Project Manual. Identify each line item with number and title of the Specification Section for each Project site. Provide breakdown of both labor and materials.

§ 9.2.3 Include within each line item a direct proportional amount of contractor's overhead and profit.

§ 9.2.4 Line item for Record Drawings which are to be turned over to the Owner at the end of the Project shall not be less than o.15 percent of the Contract price.

§ 9.2.5 Schedule of Contract Values

.1 The list of items shall include all items included in all Divisions and Sections of the specifications and shall be shown as separate line items.

.2 The following items shall also be listed separately as line items (with their respective values):

- Bond and Project Insurance.
- Mobilization and Demobilization.
- Superintendence.
- Training, Operations and Maintenance Manual, Construction Record Documents.
- Each Allowance associated with the Contract.

- Each Alternate accepted.
- Each Change Directive as it is issued; to be listed below the associated allowance.
- Each Change Order as it is issued.
- Warranties.
- Records Drawings.
- Temporary Facilities.
- Cleaning.
- Submittals.
- Items to be Completed List.

.3 Contractor shall maintain and keep current all changes to the Schedule of Values caused by Change Orders, Construction Change Directives or other authorized changes. Such revised Schedule of Values shall be presented monthly with the Application for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 Applications for payment shall be made monthly on the current AIA Form G732-2019 Application and Certificate for Payment and G703 Continuation Sheet for operations completed in accordance with the Approved Schedule of Values. Applications shall be based on the contract prices of labor and materials incorporated into the Work and of materials suitably stored and secured up to the last day of the previous month, less retainage and less the aggregate of previous payments. Change orders when approved shall be listed at the bottom of the last sheet of the payment application.

§ 9.3.1.1 At least twenty (20) days prior to date established for each progress payment, each Contractor shall submit to the Construction Manager for its review, a preliminary pencil copy of an itemized Application for Payment completed in accordance with the approved Schedule(s) of Values.

§ 9.3.1.2 Such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives but not included in Change Orders. Such items, if anticipated to be paid from an Allowance, shall be listed under that associated Allowance.

§ 9.3.1.3 Such applications may not include requests for payment of amounts the Contractor does not intend to pay to a Subcontractor or material supplier because of a dispute or other reason.

§ 9.3.1.4 All supporting data requested by the Construction Manager and Architect from Subcontractors and material suppliers necessary to substantiate the Contractor's right to payment shall be furnished by the Contractor.

§ 9.3.1.5 Until the Contract-scheduled date of Substantial Completion (including authorized adjustment), the Owner shall pay 95% of the amount due the Contractor on account of progress payments, less an amount equal to 250% of the amount of any Claims, liens, or judgments against the Contractor which have not been satisfactorily discharged.

.1 Retainage resulting from § 9.3.1.5 shall be 5% plus an amount equal to 200% of the amount of any Claims, liens, or judgments against the Contractor which have not been satisfactorily discharged.

.2 At Substantial Completion, when satisfied with the progress of the Work, the Owner, with Consent of Surety, may adjust the amount retained from previous progress payments in accordance with § 9.8.3.

.3 The full retainage may be reinstated if the manner of completion of the Work and its progress do not remain satisfactory to the Owner and the Architect, if the Surety withholds his consent or for other good and sufficient reasons.

§ 9.3.1.6 Each Contractor shall submit three (3) final copies of their Application for Payment, incorporating those revisions noted on the pencil copies, to the Construction Manager within two (2) days after being notified that the draft copy, with revisions, is acceptable.

§ 9.3.1.7 The final copies of each Application for Payment (AIA Form G732-2019) shall be signed by an officer of the Contractor whose signature shall be notarized in the space provided.

§ 9.3.1.8 Applications shall be based on the completed Work as described above less retainage, and less the aggregate of previous payments. Change Orders when approved shall be listed at the bottom of the last sheet of the payment application.

§ 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.

§ 9.3.2.1 Procedures required by Owner shall include, but are not necessarily limited to, submission by the Contractor to the Construction Manager and Architect of bills of sale and bills of lading for such materials and equipment, provision of opportunity for the Construction Manager's and Architect's visual verification that such materials and equipment are in face in storage; and, if stored off-site, submission by the contractor of verification that such materials and equipment are stored in a bonded warehouse.

§ 9.3.2.2 All such materials and equipment, including materials and equipment stored on-site but not yet incorporated into the Work, and upon which partial payments have been made, shall become the property of the Owner. The care and protection of such materials and equipment shall remain the responsibility of the Contractor until incorporation into the Work, including property storage and maintenance of insurance coverage against theft, damage and fire on a replacement cost basis without voluntary deductible.

§ 9.3.2.3 Stored Materials

.1 If the Contractor intends to request payment for materials stored on the site in accordance with the provisions of the Contract Documents, he must identify same on the current Contractor's Application for Payment form. The value of **previous** months' "stored materials" shall be included in the "Work Completed" column of the current application.

.2 The relationship of labor and materials as indicated on the Payment Application shall be the basis for establishing the rate of payment for the transfer of material stored to materials installed.

.3 All such materials and equipment, including materials and equipment stored on-site but not yet incorporated into the Work, upon which partial payments have been made, shall become the property of the Owner.

.4 Payment for stored materials shall be in the amount of 95% of the value of stored materials less 5% retainage.

§ 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.

§ 9.3.3.1 The Contractor shall keep the Owner and the Owner's property (including funds for payment under the Project) free from all liens, legal or equitable, arising out of Contractor's Work hereunder. If any such lien is filed with the Owner by anyone claiming by, through or under the Contractor, the Contractor shall discharge the lien within 10 days of the filing thereof. The Contractor further expressly agrees to defend the Owner, at the Contractor's sole expense, against any actions, lawsuits or proceedings brought against the Owner as a result of liens filed against payments due the Contractor or the Work, the site of any of the Work, the Project site and any improvements thereon or any portion of the property of the Owner. The Contractor hereby agrees to indemnify and hold the Owner harmless against any such liens or Claims of lien and agrees to pay any judgment or lien resulting from any such actions, lawsuits or proceedings. The Owner agrees to release any payments with as a result of a duly filed lien, upon compliance by the Contractor with the applicable discharge or vacatur provisions of the Lien Law.

§ 9.3.4 The Contractor and all of its subcontractors shall submit to the Owner, within thirty (30) days after issuance of their first certified payroll and every thirty (30) days thereafter, a transcript of the original certified payroll record, as provided by the Labor Law, subscribed, and affirmed as true under the penalties of perjury for the Contractor and all its Subcontractors. Failure to do so shall be cause for the Owner to withhold payment until such records are received.

§ 9.3.5 When the Construction Manager or Architects requires substantiating information, submit data justifying dollar amount 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."

§ 9.3.6 The Contractor further expressly undertakes to defend the Owner, at the Contractor's sole expense, against any actions, lawsuits or proceedings brought against Owner as a result of liens filed against the Work, the site of any of the Work, the project site, and any improvements thereon, payments due the Contractor or any portion of the property of any of the Owners (referred to collectively as liens in §9.3.3). The Contractor hereby agrees to indemnify and hold Owner harmless against any such liens or claims of lien and agrees to pay any judgment or lien resulting from any such actions, lawsuits, or proceedings.

§ 9.3.7 The Owner shall release any payments withheld due to a lien or a claim of lien if the Contractor obtains security acceptable to the Owner or a lien bond which is: (1) issued by a surety acceptable to the Owner, (2) in form and substance satisfactory to the Owner, and (3) in the maximum amount prescribed by law. By posting a lien bond or other acceptable security, however, the Contractor shall not be relieved of any responsibilities or obligations under this § 9.3, including, without limitation, the duty to defend and indemnify the Indemnities. The cost of any premiums incurred in connection with such bonds and security shall be the responsibility of the Contractor and shall not be part of, or cause any adjustment to, the Contract Sum.

§ 9.3.8 The Contractor agrees to waive any right which it may have to assert a mechanic's or other lien against the Project site and any improvements thereon, including, without limit, the Work itself. Furthermore, the Contractor will cause a similar provision, waiving any right to a mechanic's or other lien against the property, to be included in all of its subcontracts, any subcontracts, and all contracts with material suppliers. Upon execution of the Agreement, the Contractor shall also execute the waiver of lien attached to the Agreement and made a part thereof as an Exhibit.

§ 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 and as permitted by State Law, 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;
- **.7** repeated failure to carry out the Work in accordance with the Contract Documents; or
- **.8** any other breach of this Agreement.

§ 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 30 days after receipt, 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.

§ 9.6.9 Upon Substantial Completion of the entire Work, the Contractor shall submit a requisition for the "contract balance". The Owner shall pay the remaining amount less the greater value of a lump sum of $10,000 OR the sum of two- and one-half times the value of any items to be completed plus an amount necessary to satisfy any outstanding Claims, liens, or judgments against the Contractor. Until all remaining items of Work are satisfactory completed or corrected, the Owner may hold all retainage, including monies for all "uncompleted" items, until all items are completed, and closeout submittals are complete.

§ 9.6.9.1 Contractors' requests for discontinuance of retainages shall be accompanied by a properly executed copy of the "Consent of Surety to Reduction in or Partial Release of Retainage", AIA Document G707A.

§ 9.6.10 Retainage

§ 9.6.10.1 Applications for Payment shall include a retainage amount of not less than five percent (5%) of the value of the completed work. Reduction of retainage shall only be approved upon completion of the Work and when authorized by the Owner in writing.

§ 9.7 Failure of Payment

If the Construction Manager and Architect fail persistently to 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 fails persistently to pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Construction Manager and Architect, then the Contractor may, upon thirty 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.

§ 9.8.3.1 No partial payments will be made after the time fixed for the completion of the Work or the time to which completion may be extended under the terms of the Contract, until the full and final completion and acceptance of all Work herein agreed upon.

§ 9.8.3.2 Where project includes heating and/or air conditioning or other systems that are not put into operation at the time of occupancy, a sum shall be withheld until these systems have operated to the general satisfaction of the Architect. The retained amount shall approximate 5% of the cost of the systems as determined by the cost breakdown submitted.

§ 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 or this Agreement.

§ 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.

§ 9.8.6 If the Architect and/or the Construction Manager are required to inspect the Work more than two (2) times prior to certifying the Work as being substantially complete on account of the discovery of one or more items that are not sufficiently complete, the Contractor shall be liable to the Owner for the amount of any costs, additional fees or compensation due from or paid by the Owner to the Architect and/or the Construction Manager for the additional inspections.

§ 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. The Contractor will provide the Owner and Construction Manager with photographs documenting the condition of the space to be occupied. The photographs must be dated and supplied within three (3) business days of the inspection. Any subsequent damage to the space which cannot be confirmed by the Contractor's photographs (as occurring as a result of the Owner's occupancy) will be repaired by the Contractor at no additional cost to the Owner.

§ 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.

§ 9.10.1.1 If the Work is not accepted by the Owner after final inspection and additional time is required to complete items identified during the final inspection, the date starting the one-year correction period described in Article 12 shall be set by the Architect at its discretion.

§ 9.10.1.2 If the Architect and Construction Manager are required to perform additional inspections subsequent to the "final inspection" because the Work fails to comply with the requirements of the Contract, the amount of compensation paid to the Architect and Construction Manager by the Owner for additional services shall be deducted from the final payment to the Contractor.

§ 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.

(a) 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.

§ 9.10.2.1 In addition to the submittals requested in § 9.10.2 above, the Contractor shall submit releases or waivers of liens from each Subcontractor, material supplier, and others with lien rights against the property of the Owner and shall submit a list of such parties.

§ 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;

.4 audits performed by the Owner, if permitted by the Contract Documents, after final payment; or

.5 Costs, loss or damages sustained, either prior to or subsequent to such payment, as a result of any breach of the Contract, or any wrongful act or omission of the Contractor or any Subcontractor.

§ 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.

§ 10.1.1 Contractor is fully responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work and the Work site consistent with applicable laws and regulations, and generally accepted standards in the construction industry. Contractor acknowledges and agrees that it is fully responsible for the supervision and control of the Work and of Contractor's employees, subcontractors and/or suppliers, (and any party employed directly or indirectly by any of them, or for whom any of them are legally responsible) and the means, methods and manner in which the Work is performed.

§ 10.1.2 Contractor specifically agrees to provide all necessary equipment, give all required notices, perform all required tests, and to employ all necessary safety measures and procedures to protect its employees, agents, subcontractors, and all other persons at t5he Project site from any hazards created directly or indirectly by Contractor's operation or performance of the Work, and any hazards which are not created by Contractor's operations or performance of the Work to which such parties are exposed at the Project site as a result of Contractor's operations or performance of the Work. In the event that equipment or safety devices are required, Contractor agrees that it wil obtain such equipment or safety devices and employ same at its sole expense, and will strictly adhere to all provisions of the Occupational Safety and Health Act, as well as any State statues, codes, rules and regulations pertaining to the safety or property as may be deemed applicable to the Contractor's work or the work of any person or party directly or indirectly employed by Contractor or for whom contractor is responsible. Contractor agrees that it shall be Contractor's sole responsibility to ensure that each of its employees, subcontractors and suppliers are also fully aware and in compliance with all such statutes, codes, rules and regulations at all times.

§ 10.1.3 From the commencement until the acceptance of the Work, Contractor shall be solely responsible for the care of the Work covered by the Contact and for the materials, supplies and equipment delivered at the Site intended to be used in the Work, and all injury or damage to the same from whatever cause shall be made good at this expense before the final payment is made. Contractor shall provide suitable means of protection for and shall protect all materials intended to be used in the Work, all work in progress, and all completed work. Contractor shall take all necessary precautions to prevent injury or damage to the Work by flood, fire freezing or from inclemencies of the weather.

§ 10.1.4 Not by way of limitation of the foregoing, at the end of each workday, Contractor shall secure all power tools and other potentially dangerous tools and equipment and shall remove means of access to areas of the Work site, so as to further protect the safety of occupants of the premises during such off-work hours.

§ 10.1.5 Contractor's obligations under this section are not dependent upon any question of negligence on it part or on the part of its officers, agents, servants or employees, and neither the approval by the Architect or the Owner to Architect to call attention to improper or inadequate methods or to require a change in methods nor the neglect of the Architect or the Owner to direct Contractor to take any particular precautions or to refrain from doing any particular thing shall excuse the Contractor from his obligations hereunder in case of any such injury to person or damage to property. The provisions of this section are intended for the sole benefit and protection of the Owner and shall not create any cause of action in favor of any person, corporation entity, other than the Owner.

§ 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.

§ 10.2.2.1 The Contractor acknowledges that certain applicable laws, including, but not limited to, Sections 240 and 241 of New York State Labor Law, may impose liability on the Owner for injuries to persons employed by the

Contractor or by its Subcontractors or Sub-subcontractors. As between the Owner and the Contractor (or any of the Contractor's Subcontractors or Sub-subcontractors or any persons for which any of them shall be responsible), the Contractor shall be solely responsible for compliance with all such laws to the extent they pertain to the safety or protection of persons on the Project site or performing the Work. Any claim, charge, penalty or cause of action arising out of or on account of any such law shall be subject to Section 3.18.

§ 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

Injury or Damage to Person or Property. If the Contractor suffers injury or damage to persons or property because of an act or omission of the Owner or of any of the Owner's employees or agents or any others for whose acts the Owner is legally responsible, the Contractor shall give written notice thereof to the Owner and the Architect within a reasonable time not exceeding 2 days after first observance. The notice shall provide sufficient detail to enable to Owner to investigate the matter. If a Claim for additional cost or additional time is related to this Claim, it shall be made in accordance with the provisions of Article 15.

§ 10.2.9 Restoration. If during the construction, public or private property is damaged or destroyed as a result of its Work, the Contractor responsible shall, at its own expense, restore such property to a condition equal to that existing before such damage or injury was done, by cleaning up, repairing, rebuilding or replacing it, or otherwise making good such damage or destruction in an acceptable manner.

§ 10.2.10 OSHA. In addition to all requirements set forth herein, all Contractors and Subcontractors who perform any Work under this Contract will fully comply with the provisions of the Federal Occupational Safety and Health Act (OSHA) of 1970 and with any rules and regulations pursuant to the Act. This requirement shall apply continuously and not be limited to normal Working hours. The duty of the Construction Manager, Architect to conduct construction review of the Contractor's or its Subcontractor's performance is not intended to include review of the adequacy of the Contractor's or its Subcontractor's safety measures in, on or near the construction site or buildings.

§ 10.2.11 Welding:

.1 All welding shall be done in accordance with the American Welding Society Code for Arch Welding Society, certified for current year.

.2 When cutting or welding is to be done, the Owner **MUST** be notified prior to start. In addition, the Contractor for the Work shall provide a **fire guard** with proper fire extinguisher for duration of cutting and welding work.

.3 A welding curtain is to be installed around area where welding or cutting is to be done. No welding machines will be ties into electric panels without express permission from the Owner. Portable gasoline driven generators may **not** be used without the expressed permission of the Owner.

.4 Obtain Owner's permission for each location in existing building where welding is required. Owner's stipulated requirements shall be adhered to.

§ 10.2.12 Open Burning. Open burning on the site is prohibited. All possible precautions shall be taken to prevent fires.

§ 10.2.13 When all or a portion of the Work is suspended for any reason, the Contractor shall securely fasten down all coverings and protect the Work from damage by any cause.

§ 10.2.14 The Contractor shall promptly report, in writing, to the Construction Manager, Architect and the Owner all accidents arising out of or in connection with the Work that causes property damage, personal injury or death, giving full details and statements of any witnesses. In addition, if death, serious personal injury or serious property damage is caused, the accident shall be reported immediately by telephone or messenger to the above parties."

§ 10.2.15 The Contractor shall be solely responsible for the conditions which develop during construction and in the event any structure is dislocated, over strained, or damaged so as to affect is usefulness, the Contractor shall be solely responsible. The Contractor shall take whatever steps necessary to strengthen, relocate or rebuild the structure to meet requirements.

§ 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 written 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

§ 10.4.1 1 In an emergency affecting life, the Work, or the Owner or Owner's property, Contractor, without special instructions or authorization from Construction Manager or Architect, shall take the action necessary to deal adequately with such emergency. Notice of any such action shall be given by Contractor to Construction Manager, Architect and Owner as soon as is practicable, but not later than 2 days following the occurrence.

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 occurrence-based insurance from an insurance company or insurance companies rated A- or better by A.M. Best Company or better insurer and to which the Owner has no reasonable objection and is licensed and admitted to conduct business and to issue insurance in New York State. Notwithstanding any terms, conditions, or provisions, in any other written agreement between parties, the Contractor hereby agrees to effectuation the Owner, the Architect and Architect's consultants, and the Construction Manager and Construction Manager's consultants, and along with their respective officers, products and employees shall be named as additional insureds on the Contractor's insurance policies for ongoing operations, products and completed operations, with the exception of NYS Workers' Compensation and NYS Disability Insurance. .

§ 11.1.1.1 The policy naming the Owner, the Architect, and the Construction Manager as Additional Insured shall:

1. State the organization's coverage shall be primary and non-contributory coverage for the Owner, Construction Manager and Architect, its Board, officers, employees, subconsultants, and volunteers including a waiver of subrogation in favor of the Owner, Architect and Construction Manager for all coverages including NYS Workers' Compensation.
2. Additional insured status for General Liability coverage shall be provided by standard or other endorsements that extend coverage to the Owner for on-going operation (CG 20 38 or equivalent) and products and completed operations (CG 20 37 or equivalent). The decision to accept an endorsement rest solely with the Owner. A completed copy of the endorsements must be attached to the Certificate of Insurance to include General Liability, Auto Liability and Umbrella/Excess Coverages.
3. The Certificate of Insurance must describe all services being provided by the Contractor that are covered by the liability insurance policies. (For example – site work, carpentry, roofing, plumbing, electrical, etc.).
    1. At the Owner's request, the Contractor is to provide a copy of the declaration page of the liability and umbrella/excess liability policies with a list of endorsements and forms.
    2. There will be no coverage restrictions and/or exclusions involving the New York State Labor Law statutes or gravity related injuries.
    3. Policies containing escape clauses or exclusions contrary to the Owner's interests **will not** be accepted.
    4. A fully completed New York Construction Certificate of Liability Insurance Addendum (ACORD 855 2014/15) must be included with the certificate of insurance. For any "yes" answers to Items G through L on this Form, additional details must be provided in writing. Policy exclusions may or may not be accepted by the Owner.
    5. The Contractor agrees to indemnify the Owner for applicable deductibles and self-insured retentions.

§ 11.1.1.2 Within the time period set by the Owner after award of the Contract, and before the effective date of the Agreement, the Contractor shall cause the authorized representative of the insurance company to completely fill out and execute the Certificate of Insurance form which is bound with the Agreement section of the Contract Documents, such instrument certifying the kinds and amounts of insurance being issued, including statement that coverage provided under the policies will not be canceled or materially changed until at least 30 days prior written notice has been given to the Owner. The Contractor shall also furnish the Owner one (1) duplicate of the original policy covering each kind of insurance issued. Each subcontractor shall follow the identical procedure, and it shall not commence work until the Certificate of Insurance, including any requested duplicate policies, has been submitted to and approved by the Owner. The Contractor shall furnish to the Owner insurance certificates for all subcontractors with the amount of insurance as required herein. Contractor shall include New York Construction Certificate of Liability Insurance Addendum – Accord Form 855 with the Certificate of Insurance as described above.

§ 11.1.1.3 All claims against the Contractor or its subcontractors, arising from the performance of the work or conditions incidental thereto, must be investigated immediately by the insurance company furnishing the applicable coverage. The Contractor shall require the insurance company to furnish, to the Owner, Architect and Construction Manager, written reports following the investigation and the disposition of each claim or demand by the Owner; a status report shall be provided to the Owner, Architect and Construction Manager on all claims more than two months outstanding.

§ 11.1.1.4 All insurance coverage furnished by subcontractors shall remain in force until their work has been completed and the subcontractor does not intend to gain further access to the site, and the Contractor has released said subcontractor from further liability associated therewith. All liability insurance furnished by the Contractor shall remain in force during the time intervals defined Article 8 – Time in General Conditions of the Contract for Construction. All property insurance furnished by Contractor shall remain in force until Owner approves Architect's Certificate of Substantial Completion and has made final payment to Contractor.

§ 11.1.1.5 The Minimum Required Insurance required by the Contractor and their subcontractors:

.1 **Worker's Compensation and Employer's Liability**: Statutory Workers' Compensation (C105.2 or U26.3) for all employees. Proof of coverage must be on the specific form as described and required by the New York State Workers' Compensation Board. ACORD certificates are **not** acceptable. A person seeking an exemption must file CE-200 Form (Certificate of Attestation of Exemption) with the New York State Workers' Compensation Board.

.2 **Non-Occupational Disability Benefits**: Statutory New York State Disability (DB-120.1) for all employees Proof of Coverage must be on the specific form as described and as required by the New York State Workers' Compensation Board. ACORD certificates are **not** acceptable.

.3 **Comprehensive General Liability** having limits of not less than:

General (except Products Complete & Operations)	$1,000,000 per Occurrence/$2,000,000 aggregate
Products Completed & Operations Aggregate	$2,000,000
Personal and Advertising Aggregate	$1,000,000
Fire Damage	$250,000
Medical Expenses	$10,000

The general aggregate shall apply on a per-project basis.

.4 **BODILY INJURY LIABILITY + PROPERTY DAMAGE LIABILITY** having limits of not less than the following:

Combined single limit (including Products	$1,000,000.00 Each Occurrence
and Completed Operations)	$2,000,000.00 Aggregate

for all damages arising during the life of the Contract, and shall include at least the following designated hazards:

a. Premises and Operations
b. Independent Contractors
c. Completed Operations, including products
d. Broad Form Property Damage, including "XCU" (explosion, collapse, and underground)

e. Contractual Liability, covering indemnification assumed per requirements of Article 11 (AIA Document A232 -2019 General Conditions of the Contract for Construction, Construction Manager as advisor edition.
f. Labor Law coverage is mandatory for all General Liability Policies.

Completed projects shall carry General Liability coverage for 2 years after Substantial Completion.

.5 Pollution/Special Hazards Liability: Provide coverage for legal liability and expense for damage to property or bodily injury and death with respect to the removal, disturbance, handling, and disposal of contaminated or hazardous materials under this contract by the Contractor and any entity employed directly or indirectly by the Contractor in accordance with Article 11.1.1.7. (NOTE: This coverage is required only for those contracts which contain work involving Asbestos Abatement Lead Hazard Control work, PCB Containing Material Removal, or Petroleum Remediation.) If included in Contractor's Umbrella Policy, this shall be detailed in the Umbrella Policy Documents.

Combined single limit (including Products	$2,000,000.00 Each Occurrence
and Completed Operations)	$2,000,000.00 Aggregate

Such coverage shall include coverage for the Contractor's Operations including, but not limited to removal, replacement, enclosure, encapsulation and/or disposal of asbestos, lead, PCBs, petroleum or any other hazardous material, along with any related pollution events, including coverage for third-party liability claims for bodily injury, property damage and related clean-up cost.

If the Contractor is utilizing motor vehicles for the transportation of hazardous materials, the Contractor shall maintain pollution liability broaden coverage (ISO Endorsement CA 9948 or CA 01 12), as well as prof of MCS 90. Coverage shall fulfill all requirements of these specifications and shall extend for a period of three (3) years following the acceptance of Owner of the Certificate of Completion of hazardous materials work.

.6 Comprehensive Automobile Liability (including owned, hired, borrowed and non-owned motor vehicles), having limits of liability not less than $1,000,000.00 combined single limit.

.7 Umbrella/Excess Liability (mandatory):

$5,000,000 for Contracts under $1,000,000.00 each occurrence and aggregate for construction and no work at an elevation less than 1 story or 10 feet.

$10,000,000 for Contracts exceeding $1,000,000.00 each occurrence and aggregate for high-risk construction and work at an elevation greater than 1 story or 10 feet.

$15,000,000 for Contracts exceeding $10,000,000.00 each occurrence and aggregate for high-risk construction and work at an elevation greater than 1 story or 10 feet.

Umbrella/Excess Liability shall be on a follow-form basis or provide broader coverage over the General Liability and Auto Liability coverages.

Labor Law Coverage is mandatory for all Umbrella Liability Policies

.8 Property Insurance (Builders Risk/Installation Floater): To be provided (purchased and maintained) by the Owner.

The Owner will purchase and maintain Builders Risk Insurance to include the interest of the Owner, Contractor, Subcontractors and Sub-subcontractors jointly. The limit will reflect the total completed value (all material and labor costs) and will provide coverage for fire, lightning, explosion, extended coverage, vandalism, malicious mischief, windstorm, hail and flood. Coverage will remain in effect until the Owner is the only entity that has an insurable interest in the property.

Each Contractor, subcontractor and sub-subcontractor is responsible for all tools, equipment, materials, Work, etc., until the Owner is the only entity that has an insurable interest. Each Contractor shall provide insurance for theft as he may require for himself, his Subcontractors, and his employees' protection. The insurance coverage referred to in this subparagraph shall be in accordance with a standard Builder's Risk Policy used within New York State.

The Owner does not waive any rights of recovery or provide any waivers of subrogation for losses caused by negligent acts of the Contractor, subcontractor or sub-subcontractor. Any right of recovery or subrogation shall not affect payment of claims made by the Property Insurer to all the aforementioned parties including any negligent party.

.9 **Owner's Protective Liability (OCP)**:

a. **For projects less than or equal to $1,000,000 and/or work on 1 story (10 feet) only: $1,000,000 per occurrence, $2,000,000 aggregate.**

b. **For projects greater than $1,000,000 and/or work over 1 story (10 feet): $2,000,000 per occurrence, $4,000,000 aggregate.**

The Owner's/Contractor's Protective Liability (OCP) must be provided by a New York State licensed and admitted carrier.

The Owner will be the Named Insured on OCP policies. Additional Insured on OCP policies will not be permitted.

.10 Testing Agency/Company Errors and Omission Insurance

For Testing or other Professional act of the Testing Agency/Company performed under the Contract with the Owner.	$1,000,000 Each Occurrence $2,000,000 Aggregate

.11 **Per Project Aggregate**: Provide full aggregate general liability limits of each project.

.12 **Waiver of Subrogation**: To the fullest extent permitted by state law, a waiver of subrogation clause shall be added to the general liability, auto, and workers' compensation policies in favor of the Owner, its officers, agents, or employees with respect to this project. The Owner does not waive any rights of recovery or provide any waivers of subrogation for losses caused by negligent acts of the aforementioned parties. Any right of recovery or subrogation shall not affect payment of claims made by the Property Insurer to all the aforementioned parties including any negligent party.

§ 11.1.1.6 The Contractor acknowledges that the failure of the Contractor to obtain the insurance required of this Article on behalf of the Owner constitutes a material breach of Contract and subjects the Contractor to liability for damages, indemnification, and all other legal remedies available to the Owner.

The Contractor is to provide the Owner with the certificate of insurance, evidencing Article 11's insurance requirements have been met prior to the commencement of the work. The failure of the Owner to object to the contents of the certificate of the absence of the certificate shall not be deemed a waiver of any rights held by the Owner.

§ 11.1.1.7 The Contractor is advised that the Contractor's subcontractors are subject to the same terms and conditions for the insurance requirements as outlined herein. Each Contractor shall submit to the Owner copies of their subcontractor's insurance certificate(s) showing compliance with the insurance requirements prior to the start of any work by their subcontractor.

In the event, the Contractor fails to obtain the required certificates of insurance from their subcontractor and a claim is made or suffered, the Contractor will indemnify, defend and hold harmless the Owner, its Board, officers, employees and volunteers from any and all claims for which the required insurance would have provided coverage. This indemnity obligation of the Contractor for its subcontractor is in addition to any other indemnity obligation provided in the Contract.

§ 11.1.1.8 The Contractor shall not commence Work at the project site under this Contract until Contractor has obtained all the insurance required herein and until such insurance has been accepted by the Owner, nor shall Work be commenced on their subcontracts until the same insurance for the Subcontractors has been obtained. The Owner and Architect may request copies of subcontractors' insurance certificate(s) and are to be provided to Owner and Architect by the Contractor upon request.

§ 11.1.2 Each Contractor shall furnish Bonds covering the faithful performance of the Contract and the payment of all obligations arising thereunder in the amount of 100% of the accepted bid on the form indicated in the Information to Bidders, with such Sureties as may be agreeable to the Owner. The Premiums shall be paid by the Contractor.

§ 11.1.2.1 The Contractor shall deliver the required Bond dated as of the date of the Contract or applicable letter of intent, whichever is earlier, to the Owner no later than the date of execution of the Contract, or if the Work is commenced prior thereto in response to a Notice to Proceed, the Contractor shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such Bond will be issued."

§ 11.1.2.2 The Bonds shall be written on AIA Document A312-2010Performance Bond and Payment Bond forms and the Warranty Bond shall be written on AIA Document A313-2020 or such other forms as the Owner may require or approve.

§ 11.1.2.3 The Contractor shall require the attorney-in-fact who executes the required Bonds on behalf of the Surety to affix thereto a certified and current copy of the power of attorney.

§ 11.1.2.4 The Contractor shall provide the name and address of Surety for process of service as well as supply the contact information for the Surety representative responsible for the Bond, including the individual's name, address, telephone number, fax number and email address."

§ 11.1.2.5 The Performance and Payment Bonds shall remain in full force and effect through the warranty period.

§ 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.

§ 11.3.1.1 As relates to § 11.3, the Owner does not waive any rights of recovery or provide any waivers of subrogation for losses caused by negligent acts of the aforementioned parties. Any right of recovery or subrogation shall not affect payment of claims made by the Property Insurer to all the aforementioned parties including any negligent party.

§ 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.

§ 11.6 Appearance of Counsel

§ 11.6.1 If an action for bodily injury and/or property damage is commenced against Owner or Architect, which in the opinion of the Owner's Architect's legal counsel or insurance coordinator is covered by the indemnity provisions of Article 3, Contractor shall, upon Owner's written request, promptly cause Contractor's insurance carrier to have its attorneys appear timely in the action on behalf of Owner and/or Architect and provide the defense of Owner and/or Architect.

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. *Exception*: Any correction made under this 12.2.2 or under any other guarantee or warranty required by or included in the Contract Documents shall likewise be subject to correction at Contractor's own expense if it is found not to be in accordance with the Contract Documents within one year after the date that such correction is accepted by the Owner.

§ 12.2.2.4 The guarantee-warrantees required by § 12.2.2 shall be written in a form acceptable to the Owner, properly sworn to and signed by a responsible officer of the Contractor's firm.

§ 12.2.2.5 The Performance and Payment Bonds shall remain in effect and full force through this period.

§ 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.

§ 12.3.1 The Owner, with the advice of the Construction Manager and assistance of the Architect, shall determine the adjustment to the Contract Sum. The Contractor shall bear all direct, indirect and consequential costs attributable to the evaluation of and decision to accept such defective Work. Such costs for the efforts of the Construction Manager and Architect (at their current billing rates) and any other costs to the Owner will be charged to the Contractor through Change Order procedures.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located.

§ 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.

(Paragraph deleted)

§ 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 a rate of 1% per annum.

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 thirty days' notice to the Owner, Construction Manager and Architect, and upon the failure of the Owner to cure the alleged grounds for termination within 14 days following receipt of said notice, 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** 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** disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- **.4** otherwise is guilty of breach of a provision of the Contract Documents.
- **.5** files for bankruptcy or other debtor insolvency relief;
- **.6** an act of omission by the Contractor that stops, delays, interferes with or damages the Work;
- **.7** any other failure by the Contractor to perform any other terms and conditions of their Contract;
- **.8** disregards the authority of the Owner.

§ 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 Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. 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.

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. The Owner may, but is not required to, comply with the provisions of Article 15 when filing a Claim.

§ 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.

§ 15.1.2.1 An additional Claim made after any initial Claim has been filed with the Owner, Construction Manager and Architect will not be considered unless submitted in a timely manner and in accordance with Article 15."

§ 15.1.2.2 Any Claim shall be sufficiently detailed and descriptive to allow for a complete evaluation. The Contractor shall furnish any information requested by the Owner or Architect in connection with this investigation within ten (10) business days of that request. Failure to provide the requested information shall constitute a waiver of the Claim.

§ 15.1.2.3 All written Claims for additional cost, additional time, or damages shall include the time of occurrence, location and other identifying factors and shall be supported, at a minimum, by letters, photographs, journals and diaries, instructions, or other pertinent and applicable records, as the Architect and Owner may require.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by other parties or the 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 Owner 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 the Contractor under this Section 15.1.3.1 shall be initiated within 15 days after occurrence of the event giving rise to such Claim or within 15 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by other parties or the 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.

§ 15.1.3.3 An additional Claim made after any initial Claim has been filed with the Owner and Architect will not be considered unless submitted in a timely manner and in accordance with Article 15.

§ 15.1.3.4 Claims by the Contractor must be made by written notice in accordance with the following procedures:

.1 The Contractor may submit a claim concerning a matter properly noticed in accordance with the time requirements of this Contract.

.2 Failure by the Contractor to furnish the required claim documentation within the time set forth above shall constitute waiver of the Contractor's right to compensation for such claim.

.3 Contractor shall furnish three (3) certified copies of the required claim documentation, with a copy submitted to the Owner and Architect. The claim documentation shall be complete when furnished. The evaluation of the Contractor's claim will be based, among other things, upon the Owner project records and the Contractor's furnished claim documentation.

.4 Claim documentation shall conform to Generally Accepted Accounting Principles and shall be in the following format:

A. General Introduction
B. General Background Discussion
C. Issues
    1) Index of Issues (listed numerically)
    2) For **each** issue:
        (a) Background
        (b) Chronology
        (c) Contractor's position (reason for Owner's potential liability)
        (d) Supporting documentation of merit or entitlement
        (e) Begin each issue on a new page
D. All critical path method schedules, (as planned, monthly updates, schedule revisions, and as-built) along with the computer disks of all schedules related to the claim.
E. Productivity exhibits (if appropriate)
F. Summary of Issues and Damages

.5 Supporting documentation of merit for each issue shall be cited by reference, photocopies, or explanation. Supporting documentation may include, but shall not be limited to, general conditions; general requirements; technical specifications; drawings; correspondence; conference notes; shop drawings and submittals; shop drawing logs; survey books; inspection reports; delivery schedules; test reports; daily reports; subcontracts; fragmentary CPM schedules or time impact analyses; photographs; technical reports; requests for information; field instructions; and all other related records necessary to support the Contractor's claim.

.6 Supporting documentation of damages for each issue shall be cited, photocopies, or explained. Supporting documentation may include, but shall not be limited to, any or all documents related to the preparation and submission of the bid; certified, detailed labor records including labor distribution reports; material and equipment procurement records; construction equipment ownership cost records or rental records; subcontractor or vendor files and cost records; service cost records; purchase orders; invoices; project as-planned and as-built cost records; general ledger records; variance reports; accounting adjustment records; and any other accounting materials necessary to support the Contractor's claim.

.7 Each copy of the claim documentation shall be certified by a responsible officer of the Contractor in accordance with the requirements of these Contract Documents.

§ 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 waives all Claims against the Owner for consequential damages arising out of or relating to this Contract. This
(Paragraphs deleted)
waiver includes, but is not limited to, damages incurred by the Contractor for principal office expenses, including the compensation of personnel stationed there, for losses of financing, business losses and reputation damage, and for loss of profit. This waiver also is applicable, without limitation, to all consequential damages due to Owner's termination of the Contract in accordance with Article 14, and the Contractor's sole rights to payment in the event of any termination of the Contract by the Owner are limited to the payments expressly set forth in Article 14.

§ 15.1.8 Limitation and Waiver of Money Damages

§ 15.1.8.1 Notwithstanding anything else set forth in the Contract Documents or otherwise, the Owner shall not be liable to the Contractor and/or any Subcontractor for Claims or damages of any nature caused by or arising out of delays, impacts on schedule, schedule acceleration, schedule compression or by any breach of contract, delay in performance or other act of neglect by other Contractors or Subcontractors having Contracts for performance of any portion of Work. Except to the extent, if any, expressly prohibited by law the Contractor agrees not to make any Claim for such damages. The sole remedy against the Owner for delays shall be the allowance of additional time for completion of the Work, the amount of which shall be subject to the Claims procedure set forth herein. The Contactor understands that it hereby agrees not to make, and hereby waives, any Claim for damages for delay from any cause whatsoever, including but not limited to, those resulting from increased labor or material costs; schedule acceleration, schedule compression, directions given or not given by the Construction Manager, Owner or Architect, including but not limited to scheduling and coordination of the Work; the Architect's preparation of Drawings and Specifications; the Architect's review of shop drawings and requests for instruction(s); or on account of any delay, obstruction or hindrance for any other cause whatsoever by the Owner, Construction Manager, Architect or any other Contractor on the project whether or not foreseeable or anticipated. The Contractor agrees that no monetary recovery may be obtained by the Contractor for any of the foregoing against the Owner, Construction Manager or the Architect based upon any reason, and it is emphasized that the Contractor's sole remedy for any of the foregoing shall be an extension of time, if appropriate.

§ 15.2 Initial Decision

§ 15.2.1 Claims by the Contractor, 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, (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, or (6) submit a schedule to the parties indicating when the Architect expects to take action.

§ 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 litigation.

§ 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. 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.

§ 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 Litigation

§ 15.4.1 Claims that have not been satisfactorily resolved by other means shall be subject to litigation in accordance with law. The Contractor shall comply with any applicable statutory requirements regarding Notice of Claim and with any applicable Statute of Limitations provisions. In the event the Contractor serves a Notice of Claim to the Owner, the Owner may, as a condition precedent to litigation, require the Contractor to submit to an examination under oath by an attorney or other representative of the Owner, and to provide documentary evidence reasonably requested in connection with the examination. The venue of any litigation shall be New York State Supreme Court in the county in which the Project is located. The prevailing party of the litigation shall be entitled to reasonable attorneys' fees and necessary disbursements.

Statement of Special Inspections

Project: *Alterations & Additions to Fort Montgomery Intermediate School PH3*

Location: *52 Mountain Ave., Highland Falls, New York 10928*

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 III, PE
(type or print name)

Joseph E. Caza III

5/09/24
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*	*950 Danby Road, Suite 201-N* *Ithaca, NY 14850* *(607) 272-5060* *jec@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 = 121*
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 Intermediate School PH3**

BCA Project #:2022-138 PH3 **Client Project No:**

Project Address: ***52 Mountain Ave., Highland Falls, New York 10928***

Building Information: __

Name of Person Completing this Statement	**Phone**	**Date**
Joseph E. Caza III	***(607) 272-5060***	**5/20/24**

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		

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)
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		

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)
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		

Statement of Special Inspections

Project: *Alterations & Additions to Fort Montgomery High School PH3*

Location: *21 Morgan Road, Highland Falls, New York 10928*

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 III, PE
(type or print name)

Joseph E. Caza III

5/09/24
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*	*950 Danby Road, Suite 201-N* *Ithaca, NY 14850* *(607) 272-5060* *jec@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 = 121*
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 High School PH3**

BCA Project #:2022-138 PH3 **Client Project No:**

Project Address: ***21 Morgan Road, Highland Falls, New York 10928***

Building Information: __

Name of Person Completing this Statement	**Phone**	**Date**
Joseph E. Caza III	***(607) 272-5060***	**5/20/24**

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		

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)
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		

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)
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		

Highland Falls-Fort Montgomery

John Sokol
31 Lewis Street
Suite 402
Binghamton NY 13901

Schedule Year	2023 through 2024
Date Requested	05/15/2024
PRC#	2024005717

Location	HHFM HFIS & JOHS
Project ID#	2022-138PH3
Project Type	SED Control Nos: 44-09-01-04-0-004-016 Highland Falls Intermediate School 44-09-01-04-0-008-019 James O'Neill High School

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
31 Lewis Street
Suite 402
Binghamton NY 13901

Schedule Year	2023 through 2024
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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 001001
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 002113
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 of the use of a Post Office Box address for the delivery of addenda, as UPS cannot be delivered 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 the State of New York of sales, compensation and use taxes on materials and equipment to be incorporated into the Work. Said taxes shall not be included in the Bid.
   1. Owner's exemption does not apply to construction tools, machinery, equipment, or other property puchased by or leased by the Contractor, or to supplies or material not incorporated into the Work.

B. New York State Tax Law Section 5-a requires the Owner to award Contracts only to Bidders who comply with its provisions prior to the award of the Contract. The successful Bidder will be required to certify to the Owner that the Bidder, its affiliates, its subcontractors, and subcontractors' affiliates are in compliance with New York State Tax Law Section 5-a prior to the Award of the Contract.

C. Pursant to New York State Tax Law Section 5-a, Bidders are to provide within five (5) business days of being notified that the Bidder is the apparent low, responsible bidder by the Architect or Owner a completed and executed New York State Department of Taxation and Finance Contractor Certification Form ST-220.
   1. Bidders are advised that if the Contract period is in excess of one (1) year, an annual refiling of the Contractor Certification may be required.
   2. Bidders may contact the New York State Tax Department at 1-800-972-1233 for all questions relating to New York State Tax Law Section 5-a and to a business' registration status with the Tax Department.
      a. For additional information please reference the NYS Department of Tax and Finance website: https://www.tax.ny.gov/pubs_and_bulls/tg_bulletins/st/section_5a.htm

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

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Highland Falls-Fort Montgomery CSD

HS/IS Renovations

Project No. 2022-138Ph3

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): John Huckabone/ Maxwell Bendert Email: jhuckabone@thebcgroup.com 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 010000
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 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 SWPPP (STORMWATER POLLUTION PREVENTION PLAN) REQUIREMENTS

A. Each prime contractor and subcontractor must identify at least one trained individual from their company that will be responsible for implementation of the SWPPP. This trained individual must be on site on a daily basis when soil disturbance activities are being performed.

B. The prime contractor and subcontractor will be required to sign a Certification Statement and list trained individual(s) responsible for SWPPP implementation.
   1. A trained individual is defined as an employee from a construction contracting firm that has received a minimum of four (4) hours of training, which has be endorsed by the New York State Department of Environmental Conservation. These course(s) can be from a Soil and Water Conservation District or Certified Professional in Erosion & Sediment Control such as EnviroCert International, Inc or other NYS DEC endorsed entity who trains in proper erosion control and sediment control prinicples.
   2. After the initial training, the trained individual is required to receive four (4) hours of training every three (3) years. The trained individual will provide copies of initial training and subsequent training to the .
   3. This trained individual will be responsible for the implementation and continuation of the SWPPP throughout construction of the Work Architect and Owner.

1.19 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.

1.20 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.

1.21 CONTRACTORS STAGING

A. Areas for the Contractor's vehicle parking, storage trailers, staging, and offices shall be coordinated by the Owner.

1.22 KEY PERSONNEL

A. The Architect 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

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SECTION 012000
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 012100 - Allowances: Payment procedures relating to allowances.

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 in duplicate 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 013000.
2. Construction progress schedule, revised and current as specified in Section 013000.
3. Partial release of liens from major subcontractors and vendors.
4. Project record documents as specified in Section 017800, 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. Document any requested substitutions in accordance with Section 016000.

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 017000.
   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.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 012100
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 $15,000.00 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 $25,000.00 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 $5,000.00 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 $10,000.00 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 012200
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 002113 - Instructions to Bidders: Instructions for preparation of pricing for Unit Prices.

B. Section 012000 - 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.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 013000
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 016000 - Product Requirements: General product requirements.

B. Section 017000 - Execution and Closeout Requirements: Additional coordination requirements.

C. Section 017800 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

1.03 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with requirements of Section 017000 - 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 - 016000 - 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 - 013216 - 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.

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. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.
   1. 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.
   2. 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.

D. Final Property Survey.

3.11 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 017800.

3.12 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.

3.13 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. Authorizing purchasing, fabrication, delivery, and installation:
    a. "Approved", or language with same legal meaning.
        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.
    b. "Approved as Noted, Resubmission not required", or language with same legal meaning.
        1) 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.
        2) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
    c. "Approved as Noted, Resubmit for Record", or language with same legal meaning.
        1) 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.
        2) Resubmit corrected item, with review notations acknowledged and incorporated. Resubmit separately, or as part of project record documents.
        3) Non-responsive resubmittals may be rejected.
2. Not Authorizing fabrication, delivery, and installation:
    a. "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:
1. Items for which no action was taken:
    a. "Received" - to notify the Contractor that the submittal has been received for record only.
2. Items for which action was taken:
    a. "Reviewed" - no further action is required from Contractor.

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

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

SUBMITTAL FORM

Project Name: Highland Falls-Fort Montgomery CSD
HS/IS Renovations
BCA Project Number: 2022-138 Ph3
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:

SECTION 013529.10
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 and the Manual of Planning Standards.

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 REFERENCE STANDARDS

A. New York State Uniform Fire Prevention and Building Code

B. The State University of New York, the State Education DepartmentManual of Planning Standards, 2022.

1.03 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.

1.04 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.

1.05 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.

1.06 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.

1.07 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.

1.08 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.

1.09 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 6200 Asbestos, Lead and Pcb Assessment and 02 8213 Asbestos Abatement 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.

1.10 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 014000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittals.
B. Quality assurance.
C. References and standards.
D. Testing and inspection agencies and services.
E. Contractor's construction-related professional design services.
F. Contractor's design-related professional design services.
G. Control of installation.
H. Mock-ups.
I. Tolerances.
J. Defect Assessment.

1.02 RELATED REQUIREMENTS

A. Section 013000 - Administrative Requirements: Submittal procedures.
B. Section 01 4533 - Special Inspections and Procedures.
C. Section 016000 - Product Requirements: Requirements for material and product quality.

1.03 REFERENCE STANDARDS

A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008 (Reapproved 2023).
B. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation; 2024.
C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2023.
D. 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.
E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2023.
F. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2021.
G. ASTM E699 - Standard Specification for Agencies Involved in Testing, Quality Assurance, and Evaluating of Manufactured Building Components; 2016.
H. New York State Uniform Fire Prevention and Building Code - 2020 New York State Codes Collection; 2020.

1.04 DEFINITIONS

A. Contractor's Quality Control Plan: Contractor's management plan for executing the Contract for Construction.
B. Contractor's Professional Design Services: Design of some aspect or portion of the project by party other than the design professional of record. Provide these services as part of the Contract for Construction.
    1. Design Services Types Required:
        a. Construction-Related: Services Contractor needs to provide in order to carry out the Contractor’s sole responsibilities for construction means, methods, techniques, sequences, and procedures.

b. Design-Related: Design services explicitly required to be performed by another design professional due to highly-technical and/or specialized nature of a portion of the project. Services primarily involve engineering analysis, calculations, and design, and are not intended to alter the aesthetic aspects of the design.

C. Design Data: Design-related, signed and sealed drawings, calculations, specifications, certifications, shop drawings and other submittals provided by Contractor, and prepared directly by, or under direct supervision of, appropriately licensed design professional.

1.05 CONTRACTOR'S CONSTRUCTION-RELATED PROFESSIONAL DESIGN SERVICES

A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.

1.06 CONTRACTOR'S DESIGN-RELATED PROFESSIONAL DESIGN SERVICES

A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.

B. Base design on performance and/or design criteria indicated in individual specification sections.
   1. Submit a Request for Interpretation to Architect if the criteria indicated are not sufficient to perform required design services.

C. Scope of Contractor's Professional Design Services: Provide for the following items of work:
   1. Structural Design of Formwork: As described in Section 031000 - Concrete Forming and Accessories.
   2. Concrete Mix Design: As described in Section 033000 - Cast-in-Place Concrete. No specific designer qualifications are required.
   3. Structural Design of Railings: As described in Section 055213 - Pipe and Tube Railings.

1.07 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Designer's Qualification Statement: Submit for Architect's knowledge as contract administrator, or for Owner's information.
   1. Include information for each individual professional responsible for producing, or supervising production of, design-related professional services provided by Contractor.
      a. Full name.
      b. Professional licensure information.
      c. Statement addressing extent and depth of experience specifically relevant to design of items assigned to Contractor.

C. Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
   1. Include calculations that have been used to demonstrate compliance to performance and regulatory criteria provided, and to determine design solutions.
   2. Include required product data and shop drawings.
   3. Include a statement or certification attesting that design data complies with criteria indicated, such as building codes, loads, functional, and similar engineering requirements.
   4. Include signature and seal of design professional responsible for allocated design services on calculations and drawings.

D. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and Construction Manager
   1. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of inspector.
      d. Date and time of sampling or inspection.

e. Identification of product and specifications section.
f. Location in the Project.
g. Type of test/inspection.
h. Date of test/inspection.
i. Results of test/inspection.
j. Compliance with Contract Documents.
k. When requested by Architect, provide interpretation of results.

2. Test report submittals are for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.

E. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect and Construction Manager, in quantities specified for Product Data.
1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.

F. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

G. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
1. Submit report within 30 days of observation to Architect for information.
2. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.

H. Erection Drawings: Submit drawings for Architect 's benefit as contract administrator or for Owner.
1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.
2. Data indicating inappropriate or unacceptable Work may be subject to action by Architect or Owner.

1.08 QUALITY ASSURANCE

A. Testing Agency Qualifications:
1. Prior to start of work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
2. 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.

B. Designer Qualifications: Where professional engineering design services and design data submittals are specifically required of Contractor by Contract Documents, provide services of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

C. Contractor's Quality Control (CQC) Plan:
1. Prior to start of work, submit a comprehensive plan describing how contract deliverables will be produced. Tailor CQC plan to specific requirements of the project. Include the following information:
a. Management Structure: Identify personnel responsible for quality. Include a chart showing lines of authority.

1) Include qualifications (in resume form), duties, responsibilities of each person assigned to CQC function.

b. Owner will not make a separate payment for providing and maintaining a Quality Control Plan. Include associated costs in Bid price.

D. Quality-Control Personnel Qualifications. Engage a person with requisite training and experience to implement and manage quality assurance (QA) and quality control (QC) for the project.

1.09 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from Contract Documents by mention or inference otherwise in any reference document.

1.10 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Owner will employ and pay for services of an independent testing agency to perform specified testing as described in Section 01 4553 Special Inspections and Procedures.

B. Contractor shall employ and pay for services of an independent testing agency to perform other specified testing required as part of their Work.

C. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

D. Contractor Employed Agency:
1. Testing agency: Comply with requirements of ASTM E329, ASTM E543, ASTM E699, ASTM C1021, ASTM C1077, ASTM C1093, and ASTM D3740.
2. Inspection agency: Comply with requirements of ASTM D3740 and ASTM E329.
3. Laboratory: Authorized to operate in the State in which the Project is located.
4. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 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.

3.02 MOCK-UPS

A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.

B. Accepted mock-ups establish the standard of quality the Architect will use to judge the Work.

C. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.

D. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

E. Obtain Architect's approval of mock-ups before starting work, fabrication, or construction.

F. Architect will use accepted mock-ups as a comparison standard for the remaining Work.

G. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect.

3.03 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.04 TESTING AND INSPECTION

A. See 01 4533 Special Inspections and Procedures and individual specification sections for testing and inspection required.

B. Testing Agency Duties:
   1. Provide qualified personnel at site. Cooperate with Architect, Construction Manager, 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, Construction Manager, and Contractor of observed irregularities or non-compliance of Work or products.
   5. Perform additional tests and inspections required by Architect.
   6. Attend preconstruction meetings and progress meetings as requested by theConstruction Manager.
   7. Submit reports of all tests/inspections specified.

C. Limits on Testing/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.

D. Contractor Responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
   3. Provide incidental labor and facilities:
      a. To provide access to Work to be tested/inspected.
      b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
      c. To facilitate tests/inspections.
      d. To provide storage and curing of test samples.
   4. Notify Architect, Construction Manager, and laboratory 48 hours prior to expected time for operations requiring testing/inspection services.
   5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
   6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

E. Concrete Reinforcement Inspection and Testing:
   1. Prior to use, the General Contractor and Site Contractor shall be responsible for testing all reinforcement steel bars for compliance with the specified standards.
      a. Material identified by mill test reports and certified by the testing laboratory does not require additional testing. Require the supplier to furnish mill test reports to the testing laboratory for certification.
      b. Tag identified steel at the supplier's shop. When steel arrives at the job site without such tags, test it as unidentified steel.
   2. Unidentified Steel:
      a. Have the testing laboratory select samples consisting of two (2) pieces, each 18 inches long, of each size.
      b. Have the testing laboratory make one (1) tensile test and one (1) bend test for each 2-1/2 tons, or fraction thereof, of each size of unidentified steel.
   3. Provide continuous inspection for all welding of reinforcement steel.

F. Concrete Inspection and Testing:
   1. Portland Cement:
      a. The General Contractor and Site Contractor shall secure from the cement manufacturer Certificates of Compliance delivered directly to the concrete producer for further delivery directly to the testing laboratory.
      b. If so required by the Architect and Engineer, promptly provide such other specific physical and chemical data as requested.
   2. Aggregate:
      a. The General Contractor and Site Contractor shall provide one (1) test unless character of material changes, material is substituted, or additional test is requested by the Engineer.
      b. Sample from conveyor belts or batching gates at the ready-mix plant:
         1) Sieve analysis to determine compliance with specified standards and grading.
         2) Specific gravity test for compliance with specified standards.

G. Fire stopping:
   1. Contractor shall coordinate visual inspections and destructive testing with Independent Testing Agency as Work is being performed according to ASTM E2174 and ASTM E2393.

2. Contractor shall repair or replace through-penetration, membrane penetration and joint firestopping at locations where visual inspection results indicate penetration and joint firestopping do not meet specified requirements for the project and the manufacturer's tested and listed firestop system.
3. Contracor shall repair or replace through-penetration, membrane penetration and joint penetration firestopping at locations where code required destructive inspections are performed. Owner shall pay for firestopping re-installation found in compliance. Contractor shall pay for firestopping re-installation found in non-compliance.
4. Contractor shall be responsible to correct Work found to be not in compliance with Contract Documents.
5. See Section 07 8400 Firestopping for additional information related to destructive testing and reinstallation.

H. Re-testing required because of non-compliance or deficient work with specified requirements shall be performed by the same agency on instructions by Architect.

I. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.05 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not complying with specified requirements.

B. If, in the opinion of Architect, it is not practical to remove and replace the work, Architect will direct an appropriate remedy or adjust payment.

END OF SECTION

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SECTION 014510
ASBESTOS AIR & PROJECT MONITORING AND CONTROL

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

A. All Work under this Contract shall be done in strict accordance with all applicable Federal, State, and Local regulations.

B. The Owner shall assume the cost of providing the asbestos monitoring and control.

1.02 RELATED SECTIONS

A. Section 02 2600 - Asbestos, Lead and PCB Assessment.

B. Section 02 8213 - Asbestos Abatement.

1.03 DESCRIPTION OF WORK

A. Work required by this Section includes an Project Monitor (Environmental Consultant) who provides a technician with EPA Certified Supervisor Certificate, Air Monitor Certificate and Project Monitor Certificate with direct contact with on staff Certified Industrial Hygienist.

B. The Project Monitor will conduct:
   1. Pre-abatement background air sampling.
   2. Daily air monitoring during the abatement project.
   3. Final air clearance sampling.
   4. Oversight of asbestos scope and timing
   5. Verify quantities of removed ACMs.
   6. Verify containment.
   7. Report/document events and all noncompliance to Owner, Asbestos Designer of Record, and Resident Project Representative.
   8. Shutdown abatement process for observed noncompliance.
   9. Insure the abatement activities of the Abatement Contractor meets all requirements of the Contract Documents, as well as NYS and Federal regulations for asbestos abatement.
   10. Maintain a daily project log.
   11. The services of an EPA and NYS Department of Health approved Testing Laboratory to analyze all air samples collected according to specified analysis methods.

C. Work Includes:
   1. Review Asbestos Abatement Contractor's submittals and closeout package (see Section 02 8213) for completeness and conformance with all applicable Code Rules and Regulations.
   2. Provide the services of a testing laboratory and a technician under the direct supervision of a certified industrial hygienist to perform the specified functions during asbestos removal operations.
   3. Perform background air sampling and required analysis of samples for each regulated Work Area as indicated prior to commencement of asbestos removal operations.
   4. Conduct area sampling and required analysis of samples during each day of the Asbestos Abatement Project.
   5. Conduct aggressive clearance air sampling and required analysis of clearance samples for regulated Work Sreas. The Asbestos Removal Contractor is responsible for all costs incurred for additional air sampling and analysis should a Work Area not pass the initial clearance sampling.
   6. Oversee the scope, timing, phasing, remedial methods to be utilized on the Asbestos Abatement Project and shall verify the completeness of the asbestos abatement.

7. The Project Monitor shall attend project meetings and act as the Owner's Liaison in all matters involving the Asbestos Abatement Work. The Project Monitor shall schedule meetings as required to expedite the Work and to correct issues concerning abatement in liaison with the Owner, Architect, Asbestos Designer of Record, and Resident Project Representative and Contractor(s).
8. Utilizing Drawings provided by the Asbestos Designer of Record, quantify the type and quantities of daily removals. Submit Drawings upon completion of Project certifying that designated Abatement Work is complete.
9. Submit two (2) copies of the daily and three (3) copies of the final report to the Asbestos Designer of Record.
10. The Project Monitor must be on the job site at all times during the abatement work.
11. No Phase II asbestos regulated work area preparation, abatement or cleaning work will occur without the presence of the Project Monitor.
12. When required provide variance application services.

1.04 QUALITY ASSURANCE

A. Contractor's Qualifications: A firm specializing in asbestos abatement project air sampling and project monitoring as well as providing laboratory analysis of air samples for projects similar to this project for not less than five years.
   1. The On-site Project Monitoring Representative must be a certified Asbestos Project Monitor and Project Supervisor with an EPA accredited supervisor's course and restricted Asbestos Handler II certified and his/her initial and current certificates must be available for review.
   2. The testing laboratory used for analysis of air samples must be accredited by the National Institute of Standards and Testing (NIST) to conduct such analysis using Phase Contrast Microscopy (PCM) and enrolled in the American Industrial Hygiene Association Proficiency Analytical Testing Program for Phase Contrast Microscopy (PCM). In addition, the laboratory also must be approved to perform asbestos air sample analysis by the NYS Department of Health.

1.05 SUBMITTALS

A. The air monitoring and control firm must carry Asbestos Liability Insurance, in addition to the minimum insurance limits as described in the Supplementary General Conditions. Submit certificates of insurance to the Owner.

B. Testing laboratory accreditation certificates as required by this Section, Quality Assurance.

C. EPA and Department of Labor Certificates for air monitoring and project monitoring personnel.

1.06 MILESTONE INSPECTIONS:

A. Pre-abatement inspection shall be conducted as follows:
   1. Notification in writing to the Asbestos Monitoring Firm shall be made by the Abatement Contractor to request a pre-abatement inspection at least 48 hours in advance of the desired date of inspection. This inspection shall be requested each time another regulated work area is started.
   2. The Project Monitor shall ensure that:
      a. The job site is properly prepared and that all containment measures are in place.
      b. All workers shall present to the Project Monitor a valid asbestos handling certificate issued by the New York State Department of Labor.
      c. Measures for the disposal of removed asbestos material are in place and conform to the regulatory standards.

d. The Contractor has a list of emergency telephone numbers at the job site which will include the project monitor, monitoring firm employed by the Owner, Owner, Asbestos Designer of Record, and Resident Project Representative and telephone numbers for fire, police, emergency squad, local hospital and health officer, and the New York State Department of Labor.

3. If all is in order, the Project Monitor shall issue a written notice to proceed in the field. If the job site is not in order, then any needed corrective action must be taken before any abatement work activity is to commence. Conditional approvals will not be granted.

B. Progress inspections shall be conducted as follows:
1. Primary responsibility for ensuring that the asbestos abatement work progresses in accordance with these technical specifications rests with the Abatement Contractor. The Project Monitor shall continuously be present to observe the progress of work, perform a minimum of two inspections within each regulated work area daily, or work shift and perform required tests.
2. If the Project Monitor observes irregularities at any time, he shall direct the AbatementContractor Supervisor to provide such corrective action as may be necessary. If the Contractor fails to take the corrective action required, or if the Contractor or any of their employees habitually and/or excessively violate the requirements of any regulation, or the specification, then the Project Monitor shall inform the Owner or other authorized representative having jurisdiction who shall issue a Stop Work Order to the Contractor and have the work site secured until all violations are corrected.

C. Final cleaning visual inspections shall be conducted as follows:
1. Notice for a final cleaning visual inspection shall be requested by the Abatement Contractor at least 48 hours in advance of the desired date of inspection.
2. The final cleaning visual inspection shall be conducted after completion of the final waiting/settling/drying period and prior to the collection of final clearance samples.
3. The Project Monitor visual inspection for completeness of abatement and completeness of cleanup shall be performed as per the provisions of the current ASTM Standard E1368 “Standard Practice for Visual Inspection of Asbestos Abatement Projects. It shall ensure that:
a. The work site has been properly cleaned and is free of visible asbestos, asbestos-containing material, waste, debris, dust and residue.
b. All removed asbestos has been properly placed in a locked secure container outside of the work area.
c. There are no visible pools of liquid or condensation.
4. The Project Monitor and the Asbestos Abatement Contractor Supervisor will record detailed findings of the visual inspection in the asbestos abatement contractor supervisor’s daily log book.
5. If all is in order, the Project Monitor shall conduct final clearance sampling in accordance with all applicable regulations and the provisions of this Section.
6. Upon receipt of written sample analysis reports that indicate airborne fiber levels meet or exceed clearance requirements, the Project Monitor will provide written notice of authorization to remove barriers from the job site.

D. Work Area Removal inspection shall be conducted as follows:
1. Upon notice by the Owner or by the Contractor and within 24 hours after the removal of the critical barriers and any temporary hardwall barriers that were used to establish the regulated abatement work area, an inspection shall be made to ensure that the abatement work in that area is complete and no visible signs of asbestos, asbestos-containing materials, materials or equipment associated with the abatement and no waste/debris remain. After satisfactory completion of the Work Area Removal Inspection, removal of the Decontamination Enclosures may begin.

E. Decontamination Enclosure Removal inspection shall be conducted as follows:
   1. Upon notice by the Owner or by the Contractor and within 24 hours after the removal of the decontamination enclosure systems, a final inspection shall be made to ensure that no visible signs of asbestos, asbestos-containing materials, materials or equipment associated with the abatement and no waste/debris remain.

F. Violations:
   1. The Project Monitor shall ensure that the work conforms to the specification. If it is found that the asbestos abatement work is being conducted in violation of the specifications the Project Monitor shall issue in writing a Stop Work Order to the Contractor and have the work site secured until all violations are abated. If the Contractor fails to correct the violation, the course of action listed under provisions of the Section will be followed.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. Commercially available sampling cassettes must be used for all air sampling. Cassettes shall be of the 25 mm filter size. Pre-screen the loaded cassette collection filters to assure that they do not contain concentrations of asbestos which may interfere with the analysis of the sample.
   1. Mixed cellulose-ester filter pore size - 0.45 microns for TEM and 0.8 microns for PCM.
   2. Place filters in series with a 5.0 micron back-up filter to serve as a diffuser and support pad.
   3. Electrical operated pump capable of delivering a flow rate approximately 10 liters per minute. Calibrate sampling pumps and their flow indicators over the range of their intended use with a recognized standard.
      a. Select an appropriate flow rate based on the filter size being used.

PART 3 EXECUTION

3.01 AIR MONITORING

A. The Asbestos Monitoring Firm will perform the air monitoring for this project.

B. General: All sampling and monitoring shall be performed in accordance with Code Rule 56 New York State Department of Labor, 40 CFR Part 763 Final Rule and Notice, "AHERA" and the New York State School Asbestos Safety Act (SASA).

C. Monitoring outside the work area shall be provided throughout removal operations to ensure that no outside contamination is occurring.
   1. The sampling zone for indoor air samples shall be representative of the building occupant's breathing zone.
   2. Outdoor ambient and baseline samplers shall be placed four feet to six feet above the ground surface in reasonable proximity to the building and away from obstructions and drafts that may unduly affect airflow.
   3. Samples shall have a chain-of-custody record.
   4. Area air sampling shall be conducted as specified in the following documents except as restricted or modified herein:
      a. Measuring airborne asbestos following an abatement action, USEPA document 600/4-85-049 (Nov. 1985).
      b. Guidance for controlling asbestos-containing materials in building; USEPA Publication 560/5-85-024 (June 1984).
      c. Asbestos Hazard Emergency Response Act of 1986 (AHERA), USEPA 40 CFR 763, Subpart E.
      d. NIOSH Method 7400, Revised.
      e. NYS DOL ICR 56.

D. Filter cassettes and sampling train shall be assembled as specified in NIOSH Method 7400. The total volume shall be a volume sufficient to achieve a detection limit of 0.004 f/cc. A minimum sample volume of 1200 liters shall be collected; flow rate shall be calibrated between 2 and 15 liters per minute before and after sampling, and a record kept of this calibration.

E. Prior to the asbestos abatement contractor's mobilization, background air samples shall be taken in accordance with NYS Industrial Code Rule 56-6. The samples shall be taken during normal occupancy activities and conditions at the site. Samplers shall be located inside the intended regulated abatement work area and outside of the intended regulated work area within ten feet of the anticipated locations of isolation or critical barriers. The number and location of background samples shall be sufficient to represent the entire work area and agreed upon by the Asbestos Project Monitoring Firm.
   1. For minor regulated asbestos abatement work areas that are part of a small or large asbestos project, post-abatement clearance air samples will be collected. A minimum of 1 sample will be collected from inside the regulated work area and 1 sample will be collected outside the work area within 10 feet of the work area.
   2. Background air monitoring samples for a small regulated asbestos abatement work area shall include 3 inside and 3 outside samples, at a minimum, to be taken. Post-abatement clearance air monitoring samples for a small regulated asbestos abatement work area shall include 5 inside and 5 outside samples, at a minimum, to be taken, in accordance with AHERA requirements.
   3. Background and post-abatement clearance air monitoring samples for each large regulated asbestos abatement work area shall include 5 inside and 5 outside samples, at a minimum, to be taken. In addition to the five sample minimum, one representative sample shall be collected for every 5,000 square feet above 25,000 square feet of floor space.

F. The following minimum number of samples shall be provided during abatement for large regulated work areas. The frequency and duration shall be representative of the actual conditions. Air sampling shall be performed during work area preparation when the regulated work area includes the abatement of OSHA Class 1 and/or OSHA Class II friable materials. Air sampling is not required during work area preparation of large regulated work areas if only OSHA Class II non-friable materials are present in the work area.
   1. Two area samples outside the regulated abatement work area in uncontaminated areas of the building, within ten feet of the isolation or critical barriers.
      a. Primary location selection shall be within ten feet of isolation barriers.
      b. When positive pressurized HVAC ducts are located withing the regulated work area, one of these samples will be collected within ten feet of an HVAC diffuser, at the downstream side of the regulated work area.
      c. Where the entire buidling is the regulated work area, one additional exterior ambient air sample shall be collected.
   2. One ambient air sample will be collected outside of the building.
   3. One sample within ten feet of and within proximity to each entrance or exit from the regulated work area, i.e., at the uncontaminated entrance to each worker decontamination and waste decontamination enclosure system.
   4. Once negative air systems have been established, one sample shall be collected in front of and within ten feet of each unobstructed negative pressure exhaust or bank of up to five exhausts.
   5. Once negative pressure air systems have been established, where exhaust ducts run through non-work areas of the building to access the exterior, one sample shall be collected within ten feet of the exhaust duct system.

G. If the Contractor's barriers or other control methods are observed to malfunction and if the Contractor does not correct the problems immediately upon notification, the Project Monitor is to stop the work and notify the Owner, Architect, and Resident Project Representative. In such a situation additional area sampling of up to three samples per day shall be performed by the project/air monitoring firm.

H. Criteria during preparation and abatement activities - If air samples collected outside of the work area during preparation or abatement activities indicate airborne fiber concentrations at or above 0.01 f/cc or the established background level, whichever is greater, as determined by Phase Contrast Microscopy (PCM), work shall stop immediately for inspection and repair of barriers and negative air ventilation systems as necessary.
   1. The Contractor is to be directed to clean-up of surfaces outside of the regulated work area using HEPA vacuums and wet cleaning techniques shall be performed prior to resuming preparation or abatement activities.

I. The turn-around time for analysis of the samples shall be a maximum of 48 hours from the time samples are collected.
   1. This requirement may be superseded by a site specific variance that requires a faster turn-around time for analysis.
   2. The evaluation criteria shall be 0.01 fibers per cubic centimeter

J. A series of smoke tests are to be performed at the decontamination unit entrance/exit, by the Project Monitor to ensure continuous negative air pressure during abatement activities.

K. The Project Monitor shall calculate the required number of negative air filtration units for each work area. This calculation shall be made whenever the volume of the work area changes. The Project Monitor will alert the Contractor of any discrepancies between the number of units required and those in operation within the work area. If problems are identified and not corrected, the monitor shall inform the Owner or other authorized representative.

L. The Project Monitor shall keep a record in a daily log of all on-site observations, and required activities of the Contractor.

M. Report weekly to Owner and Resident Project Representative the as to progress of the abatement operations.

3.02 POST-ABATEMENT FINAL AIR CLEARANCE TESTING

A. Post-abatement testing shall be conducted as follows:
   1. After completion of the final cleaning, appropriate drying time and visual inspection, an aggressive final clearance air test shall be performed. This test is required to establish safe conditions for removal of critical barriers and to permit renovation activity to proceed. Sufficient time following clean-up activities shall be allowed so that all surfaces are dry during monitoring.
   2. Samplers shall be placed at random around the work area. If the number of rooms within the work area is equivalent to the number of required samples based on floor area, a sampler shall be placed in each room. When the number of rooms is greater than the required number of samples a representative sample of rooms shall be selected.
   3. The representative samplers placed outside the work area but within the building shall be located in uncontaminated areas within ten feet of the isolation barriers.
   4. The following aggressive sampling procedures shall be used within the work area during all clearance air monitoring:
      a. Before starting the sampling pumps use forced air equipment (such as a one horsepower leaf blower) to direct exhaust air against all walls, ceilings, floors, ledges and other surfaces in the work area.
         1) This pre-sampling procedure shall take at least five minutes per 1,000 square feet of floor area.

2) At a minimum, place a 20-inch fan 3 feet above the floor in the center of each room. (Use one fan per 10,000 cubic feet of room space). Place the fan on slow speed and point it toward the ceiling.
3) Start the sampling pumps and sample for the required time or volume.
4) Turn off the pumps and then the fan(s) when sampling is completed.

5. For post-abatement monitoring, area samples shall conform to the following schedule:

AREA SAMPLES FOR ANALYSIS BY	MINIMUM VOLUME	FLOW RATE
PCM	1200 liters	5 to 15 l/min.
TEM	1800 liters	5 to 9.9 l/min.

6. Each homogeneous work area that does not meet the clearance criteria shall be thoroughly recleaned using wet methods, with the negative pressure ventilation system in operation. A full set of samples shall be collected in the work area as described above. The process shall be repeated until the work site passes the test.
7. For an asbestos project with more than one homogeneous work area, the release criteria shall be applied to each work area.
8. Preparation and analysis of area samples by PCM shall be by NIOSH Method 7400.
9. Preparation and analysis of area samples by TEM shall be accordance with AHERA procedures.
10. Clearance and/or Re-occupancy Criteria:
    a. The clearance criteria shall be applied to each homogeneous work area independently.
    b. For PCM analysis, the clearance level of any work area shall be less than 0.01 f/cc, or the work area.
    c. For TEM analysis, the clearance level of any work area shall be less than the average of 70 structures per square millimeter for the samples collected inside the work area.

B. Final inspections shall be conducted by the Project Monitor as follows:
1. Upon notice by the Contractor and within 48 hours after the removal of the remaining barriers and decontamination enclosures, a final inspection shall be made to ensure the absence of any visible signs of asbestos or asbestos-containing material.
2. The visual inspection shall be completed by the Project Monitor who has been on-site for the duration of the asbestos abatement and by a Project Monitor (fresh set of eyes familiar with the scope but has not been involved with the day to day activities).
3. The Project Monitor is to confirm that all asbestos waste and asbestos-contaminated waste has been removed from the work site in a registered vehicle by a registered waste hauler.

C. Notify the Owner, Asbestos Designer of Record, and Resident Project Representative and Contractor of any and all violations so that immediate action can be taken to correct the infraction.

D. Keep daily records of all work performed. Records shall indicate areas where work is performed, type and quantity of material removed, all conversations with Contractor and any and all necessary information required to document removal operations are performed in strict accordance with the Contract Documents and all applicable regulations. Daily photographs showing date and time taken shall be provided as back-up documentation. Report weekly to the Resident Project Representative as to progress of the abatement operations.

3.03 PERSONAL AIR MONITORING

A. The Contractor is responsible for conducting personal sampling in accordance with applicable rules and regulations. The Contractor is responsible for all cost associated with personal air monitoring.

B. In addition to the requirements of OSHA 1926.1101, the contractor shall be required to perform personal air monitoring during every work shift in each work area during which abatement activities occur in order to verify that appropriate respirator protection is being utilized.

C. Results of the monitoring shall be returned to the site, at least verbally, and posted no later than 24 hours following the time the sample was collected. Written results shall be returned to the site and posted no more than five days after the monitoring was performed.

D. Personal air samples shall be analyzed by a laboratory which holds certification by the New York State Department of Health's Environmental Laboratory Approval Program. The Owner, Asbestos Designer of Record, and Environmental Consultant (Project Monitor) must approve the laboratory the contractor intends to use.

3.04 LABORATORY ANALYSIS METHODS

A. Phase Contrast Microscopy (PCM) shall be performed using the National Institute for Occupational Safety and Health (NIOSH) Method 7400 entitled "Fibers" published in the NIOSH Manual of Analytical Methods, 3rd Edition, Second Supplement, August 1987.

B. Transmission Electron Microscopy (TEM) shall be performed in accordance with 40 CFR Part 763 Asbestos Containing Materials in Schools, Final Rule and Notice, Appendix A to Subpart E, Interim Transmission Electron Microscopy Analytical Methods.

3.05 PROJECT MONITORING, AIR MONITORING AND CONTROL REPORT

A. The Project/Air Monitoring and Control Report will be a record of all air sampling, location, quantities, date, photographs, daily logs (organized consecutively by date), dates of non-compliances by Contractor and how they were corrected, and laboratory analysis results.

1. Provide one (1) digital (PDF) of the Air Monitoring and Control Report to Report to Owner, Asbestos Designer of Record, and Resident Project Representative and is to be submitted within 2 weeks of the completion of the project or designated work area.
2. Provide one (1) bound hard copy to Owner delivered simultaneously with the digital copy.

END OF SECTION

SECTION 014533
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.

D. Manufacturers' field services.

E. Fabricators' field services.

1.02 RELATED REQUIREMENTS

A. Statement of Special Inspections

B. Section 013000 - Administrative Requirements: Submittal procedures.

C. Section 014000 - Quality Requirements.

D. Section 016000 - Product Requirements: Requirements for material and product quality.

1.03 DEFINITIONS

A. 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.

B. 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 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, with Errata (2023).

C. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field; 2024.

D. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2021.

E. ASTM C172/C172M - Standard Practice for Sampling Freshly Mixed Concrete; 2017.

F. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2023.

G. 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.

H. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2023.

I. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2021.

J. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestop Systems; 2020a.

K. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers; 2020a.

L. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).

M. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2018, with Errata (2022).

N. AWS D1.4/D1.4M - Structural Welding Code - Steel Reinforcing Bars; 2018, with Amendment (2020).

O. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

P. New York State Uniform Fire Prevention and Building Code - 2020 New York State Codes Collection; 2020.

Q. SDI (QA/QC) - Standard for Quality Control and Quality Assurance for Installation of Steel Deck; 2017.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Special Inspection Agency Qualifications: Prior to the start of work, the Special Inspection Agency is required to:
   1. Submit agency name, address, and telephone number, names of full time registered Engineer and responsible officer.
   2. 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.
   3. Submit certification that Special Inspection Agency is acceptable to AHJ.

C. Manufacturer's Qualification Statement: Manufacturer is required to submit documentation of manufacturing capability and quality control procedures.

D. Fabricator's Qualification Statement: Fabricator is required to submit documentation of fabrication facilities and methods as well as quality control procedures.

E. 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.
   1. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of Special Inspector.
      d. Date and time of special inspection.
      e. Identification of product and specifications section.
      f. Location in the Project.
      g. Type of special inspection.
      h. Date of special inspection.
      i. Results of special inspection.
      j. Compliance with Contract Documents.
   2. Final Special Inspection Report: Document special inspections and correction of discrepancies prior to the start of the work.

F. Fabricator Special Inspection Reports: After each special inspection of fabricated items at the Fabricator's facility, Special Inspector is required to promptly submit copies of report; one to Architect and Construction Manager.
   1. Include:
      a. Date issued.
      b. Project title and number.

c. Name of Special Inspector.
d. Date and time of special inspection.
e. Identification of fabricated item and specification section.
f. Location in the Project.
g. Results of special inspection.
h. Verification of fabrication and quality control procedures.
i. Compliance with Contract Documents.
j. Compliance with referenced standard(s).

G. Test Reports: After each test or inspection, promptly submit copies of report; one to Architect and Construction Manager
1. Include:
a. Date issued.
b. Project title and number.
c. Name of inspector.
d. Date and time of sampling or inspection.
e. Identification of product and specifications section.
f. Location in the Project.
g. Type of test or inspection.
h. Date of test or inspection.
i. Results of test or inspection.
j. Compliance with Contract Documents.

H. Certificates: When specified in individual special inspection requirements, Special Inspector shall submit certification by the manufacturer, fabricator, and installation subcontractor to Construction Manager and Architect, in quantities specified for Product Data.
1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

I. Manufacturer's Field Reports: Submit reports to Architect and Construction Manager.
1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in Contract Documents.

J. Fabricator's Field Reports: Submit reports to Architect and Construction Manager
1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in Contract Documents.

1.06 SPECIAL INSPECTION AGENCY

A. Owner 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 will also provide services of an independent testing agency and perform testing and sampling associated with special inspections and required by the building code.

C. Employment of the Special Inspection Agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.07 TESTING AND INSPECTION AGENCIES

A. Owner will employ services of an independent testing agency to perform additional testing and sampling associated with special inspections but not required by the building code.

B. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.08 QUALITY ASSURANCE

A. Special Inspection Agency Qualifications:
   1. Independent firm specializing in performing testing and inspections of the type specified in this section.
   2. The Special Inspection Agency shall employ experienced personnedl educated in conducting, supervising and evaluation tests as well as Special Inspections.
   3. The Special Inspection Agency shall have adequate equipment to perform required tests. The equipment shall be periodically calibrated.

B. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document.

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. 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.

B. Reinforcing Steel Welding: Verify compliance with AWS D1.4/D1.4M and ACI 318, Section 3.5.2; periodic.

C. Anchors Cast in Concrete: Verify compliance with ACI 318; periodic.

D. 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.

E. 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.

F. Anchors Installed in Hardened Concrete: Verify compliance with ACI 318, Sections 3.8.6, 8.1.3, and 21.2.8; periodic.

G. 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.

H. Design Mix: Verify plastic concrete complies with the design mix in approved Contract Documents and with ACI 318, Chapter 4 and 5.2; periodic.

I. Portland Cement:
1. Abtain from the General Contractor and Site Contractor the cement manufacturer's Certificates of Compliance.

J. 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.
4. Throughout progress of concrete placement, complete slump testing to verify conformance with specified slump at the beginning of each pour and as directed by the Architect and Construction Manager .

K. Molded Concrete Cylinders:
1. Provide three (3) test cylinders for each 25 cubic yards, or fraction thereof of each class of concrete of each day's placement.
2. Test one (1) cylinder at 7 days, (1) at 28 days, and one (1) when so directed by Architect.

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 Construction Manager, Architect, and Owner will require testing of materials in accordance with the appropriate standards and criteria in ACI 318, Chapters 19 and 20.

Q. Materials: If the Contractor cannot provide sufficient data or documentary evidence that concrete materials comply with the quality standards of ACI 318, the Construction Manager, Architect, and Owner will require that the Special Inspector verify compliance with the appropriate standards and criteria in ACI 318, Chapter 3.

R. Core Testing: Provide core testing of in-place concrete when directed by Architect and Engineer as a result of low cylinder test results. Cost of core testing will be borne by the Contractor.
1. Core testing shall be cut from locations directed by Architect and Engineer. Core testing shall be completed in accordance with ASTM C42 and prepare and test in accordance with ASTM C39/C39M.

3.04 SPECIAL INSPECTIONS FOR SOILS

A. Visually inspect imported fill and backfill. Complete tests and retesting as necessary to determine compliance with the Contract Documents and suitability for use in the Work.
1. Completed field density testing on in-place material and sample materials.
2. Inspect and test the scarifying and recompaction of cleaned subgrade.
3. Inspect the progress of excavations, filling and grading. Complete density testing at fills and backfills and verify compliance with the requirements of the Contract Documents including individual Specification Sections.

B. 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.

C. Testing: Classify and test excavated material; periodic.

D. Prepare and distrubute soil testing reports.

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 Construction Manager, Architect, and Contractorof observed irregularities or non-compliance of work or products.
   6. Perform additional tests and inspections required by Construction Manager and 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 CONTRACTOR DUTIES AND RESPONSIBILITIES

A. The construction or Work for which special inspection or testing is required shall remain accessible and exposed for special inspection or testing purposes until completion of the required special inspections or tests.

B. 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 Construction Manager, Architect, and Contractor 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.

3.08 MANUFACTURERS' AND FABRICATORS' FIELD SERVICES

A. When specified in individual specification sections, require material suppliers, assembly fabricators, or product manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to Construction Manager and Architect, 30 days in advance of required observations.
1. Observer subject to approval of Architect.
2. Observer subject to approval of Owner.

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

END OF SECTION

SECTION 015000
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Dewatering

B. Temporary telecommunications services.

C. Temporary sanitary facilities.

D. Temporary Controls: Barriers, enclosures, and fencing.

E. Vehicular access and parking.

F. Waste removal facilities and services.

G. Project identification sign.

1.02 RELATED REQUIREMENTS

A. Section 01 3529.10 - Life Safety Requirements During School Construction.

B. Section 013553 - Security Procedures

C. Section 015100 - Temporary Utilities.

D. Section 015213 - Field Offices and Sheds.

1.03 REFERENCE STANDARDS

A. The State University of New York, the State Education Department, Manual of Planning Standards - 2022.

B. New York State Uniform Fire Prevention and Building Code

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

D. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2023.

E. Manual of Planning Standards - Manual of Planning Standards 2022 - The State Education Department; 2022.

F. New York State Uniform Fire Prevention and Building Code - 2020 New York State Codes Collection; 2020.

1.04 DEWATERING

A. Provide temporary means and methods for dewatering all temporary facilities and controls.

B. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
   1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
   2. Remove snow and ice as required to minimize accumulations.

C. Maintain temporary facilities in operable condition.

D. Maintain temporary facilities as directed by Construction Manager.

1.05 TEMPORARY UTILITIES - SEE SECTION 015100

1.06 OTHER MATERIALS & EQUIPMENT

A. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches.

B. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

1. Provide adequate Fire Extinguishers in each work area. Use of Owner's Fire Extinguishers is prohibited.

C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

D. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
   1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities. Safe use of hoisting equipment is the sole responsibility of the Contractor.

1.07 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

B. The General Contractor is to provide temporary toilet and wash facilities for use by all construction personnel, Construction Manager, Architect and other related construction related personnel.
   1. Provide a minimum of two (2) temporary toilet and wash facilites at the Contractor staging area and the area of the Work.
      a. The use of the Owner's existing or new toilet room facilities ***is not permitted***.
   2. The General Contractor is to provide a minimum (2) safety showers and eye wash stations. Provide one in Constractor staging area and one at the area of the Work.
   3. Installation, removal and use charges of temporary sanitary faciliities, safety showers and eye wash is to be included in the General Contractor's base bid.

C. Maintain daily in clean and sanitary condition.

1.08 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
   1. Comply with Section 01 3529.10 Life Safety Requirements During School Construction.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.

C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.09 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
   1. Protect porous materials from water damage.
   2. Protect stored and installed material from flowing or standing water.
   3. Keep porous and organic materials from coming into prolonged contact with concrete.
   4. Remove standing water from decks.
   5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
   1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
   2. Keep interior spaces reasonably clean and protected from water damage.
   3. Periodically collect and remove waste containing cellulose or other organic matter.
   4. Discard or replace water-damaged material.

5. Do not install material that is wet.
6. Discard, replace, or clean stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use permanent HVAC system to control humidity.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
   a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
   b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
   c. Remove materials that can not be completely restored to their manufactured moisture level within 48 hours.

1.10 FENCING

A. Temporary Portable Chain Link Fence Panels & Barricades - Provide pre-fabricated temporary fence panels.
1. Temp Fence Frame constructed of galvanized 1-3/8" diameter, .065 wall tubing.
2. 11-1/2" gauge galvanized fence fabric with 2-1/4" mesh.
3. All fence panel and gate corner joints are welded and sprayed with a galvanized paint to cover any exposed metal.
4. Temp Fence Panels with pedestrian Gates: 3' wide opening pedestrian gate pre-hung in panel with hinges and pad-lockable latch.
5. Temp Fence Panels with Vehicle Gates:Size width of vehicle gate as needed to accommdate the work. Vehicle gateate pre-hung in panel with hinges and pad-lockable latch.
6. Provide galvanized saddle clamps, nuts, bolts used to attach panels together.
7. Provide panel stands. 6 ft in height, minimum.
   a. Ground Base of heavy-duty flat steel plate with welded 7" x 7/8" solid steel uprights for mounting panels. Groud base to include two holes for securing base with spike anchors. Ground base to be painted safety yellow.
   b. Panel Stands: Chain link fence panel stands to be fabricated from galvanized 1-3/8" diameter tubing and welded at corners and vertical uprights.
8. Warning signs: Sheet metal, plastic or other rigid, waterproof material, 1.5 feet by 2.0 feet with 4 inch black letters on a white background.
   a. Text: Danger - Construction Zone, Authorized Personnel Only, Hard Hat, Safety Glasses and Safety Shoes must be worn on this Site.

B. Temporary Plastic Barrier Fencing:
1. Materials for Temporary Plastic Barrier Fences shall meet the following requirements:
2. Fence: High-density polyethylene mesh, ultraviolet-stabilized min. 2 years; minimum height 4.0 feet.
   a. .Color: high-visibility orange.
3. Posts: Rigid metal, minimum length 6.0 feet.
4. Ties: Steel wire, #14 gauge.
5. Warning signs: Sheet metal, plastic or other rigid, waterproof material, 1.5 feet by 2.0 feet with 4 inch black letters on a white background.

a. Text: Danger - Construction Zone, Authorized Personnel Only, Hard Hat, Safety Glasses and Safety Shoes must be worn on this Site.
b. Text for tree and planting protection: Tree Protection Zone, Do not Remove this Fencing.

1.11 EXTERIOR ENCLOSURES

A. Provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.12 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.
   1. Comply with Section 01 3529.10 Life Safety Requirements During School Construction.

B. Construction: Framing and gypsum board sheet materials with closed joints and sealed edges at intersections with existing surfaces:
   1. STC rating of 35 in accordance with ASTM E90.
   2. Maximum flame spread rating of 75 in accordance with ASTM E84.
   3. Insulation: Unfaced mineral-fiber, slag wool or rock wool.
      a. Flame Spread: 25 maximum.
      b. Smoke Developed: 50 maximum.

C. Paint surfaces exposed to view from Owner-occupied areas.

D. Polyethylene Sheeting: Reinforced, fire-resistive sheet, 10 mill minimum thickness with a flame-spread rating of 15 or less in accordane with ASTM E-84 and passing NFPA 701, Test method 2.

E. Dust Control Walk-off Mats: Provide dust control adhesive surface walk-off matts with a minimum dimension of 36" wide by 60" long.

1.13 SECURITY - SEE SECTION 013553

A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

1.14 VEHICULAR ACCESS AND PARKING

A. Coordinate access and haul routes with governing authorities and Owner.

B. Provide and maintain access to fire hydrants, free of obstructions.

C. Provide means of removing mud from vehicle wheels before entering streets.

D. Provide dust-control treatment that is nonpolluting and non-tracking on permanent roads used to access the construction site. Reapply treatment as required to minimize dust.

E. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

F. Traffic Controls: Comply with requirements local authorities having jurisdiction.

G. Protect existing site improvements to remain, including curbs, pavement, and utilities.

H. Maintain access for emergency equipment and fire fighting equipment. Maintain access to fire hydrants

1.15 WASTE REMOVAL

A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

B. Provide containers with lids. Remove trash from site periodically.

C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.16 PROJECT IDENTIFICATION

A. Provide project identification sign of design and construction indicated on drawings.

B. Erect on site at location indicated.

C. No other signs are allowed without Owner permission except those required by law.

1.17 FIELD OFFICES - SEE SECTION 015213

A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture, drawing rack, and drawing display table.

B. Provide space for Project meetings, with table and chairs to accommodate 6 persons.

C. Locate offices a minimum distance of 30 feet from existing and new structures.

1.18 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. Mechanical Equipment: Provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

C. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.

D. Heating, Cooling, and Dehumidifying Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

E. Permanent Mechanical System: If Owner and Construction Manager authorize use of permanent mechanical systems for temporary use during construction, provide filter with MERV 13 at each return-air grille in system. Remove at end of construction and clean entire mechanical system.

F. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 TEMPORARY FACILITIES - GENERAL

A. Coordinate construction and use of temporary facilities for the conservation of energy, water, power and materials. Minimize waste.

B. Coordinate the location of all temporary facilities with Owner and Construction Manager. Location of the temporary facilities shall not interfere with Owner's use of site and building. Relocate temporary facilities as required by the Owner and the progress of the Work.

C. Temporary use of existing elevators ***is not permitted***.

D. Existing Stair Usage: Use of Owner's existing stairs will be permitted. The existing tairs are cleaned and maintained in a condition acceptable to Owner and Construction Manager. Prior to Substantial Completion, restore stairs to condition existing before the use by the Contractors as part of their Work.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas, so no evidence remains of correction work.

E. Isolation of the Work:
   1. The General Contractor shall construct interior enclosures to prevent the migration of dust, fumes and odors in Owner occupied areas.
   2. Prior to commencement of the Work, the Mechanical Contractor is to isolate the mechanical systems in the work area from Owner occuped areas. Confirm isolation/disconnection of mechanical systems will not impact mechanical systems in Owner occupied areas.
      a. Disconnect supply and return ducts in work area from mechanical systems serving the Owner occupied areas.
   3. Maintain negative air pressure within the Work Area. Utilize HEPA-equpped air filtration units starting with the commencement of interior enclosures (temporary partitions) construction and continuing through Substantial Completion or the permanent removal of interior enclosures (temporary partitions) is complete.
   4. Maintain dust protection system during all phases of the Work.
      a. Utilize vacuum collection systems and attachments on equipment which produce dust.
      b. Use portable containment systems when work to be completed in Owner occupied areas.
   5. Perform daily construction cleaning and cleanup utilizing HEPA-equipped vacuum equipment and damp mopping. Dry sweeping is not be be utilized.

F. Waste Disposal Facilities: Provide waste collection containers in sizes adequate to handle waste from construction operations. Legally removal and dispose of construction waste in accordance local, state and federal regulations.

3.02 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.

B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.

C. Clean and repair damage caused by installation or use of temporary work.

D. Restore existing facilities used during construction to original condition.

E. Restore new permanent facilities used during construction to specified condition.

END OF SECTION

SECTION 015713
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 321123 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 015721
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 014000 - 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 ot 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.

E. Air Contaminant Test Plan: Identify the following:
   1. Testing agency qualifications.
   2. Locations and scheduling of air sampling.
   3. Test procedures, in detail.
   4. Test Instruments and apparatus.
   5. Sampling Methods.

F. Air Contaminant Test Reports: Show the following:
   1. Location where each sample was taken, and time.
   2. Test values for each air sample; average the values of each set of three (3).
   3. HVAC operating conditions.
   4. Certification of test equipment calibration.
   5. Other conditions or discrepancies that might have influenced results.

1.07 QUALITY ASSURANCE

A. Testing and Inspection Agency Qualifications: Independent testing agency having a minimum of five (5) years experience in performing the types of testing Specified.

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 016000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General product requirements.

B. Re-use of existing products.

C. Transportation, handling, storage and protection.

D. Product option requirements.

E. Substitution limitations.

F. Procedures for Owner-supplied products.

G. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

A. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions: Requirements for VOC-restricted product categories.

B. Section 017419 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

1.03 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 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.

B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.

C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

2.02 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:
   1. Made using or containing CFC's or HCFC's.
   2. Containing lead, cadmium, asbestos, or pcbs.

C. Where other criteria are met, Contractor shall give preference to products that:
   1. If used on interior, have lower emissions.
   2. If wet-applied, have lower VOC content.

2.03 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 with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.04 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

A. Architect will consider requests for substitutions as outlined herein and as described in the General Conditions of the Contract for Construction.

B. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.

C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

D. A request for substitution constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
   2. Will provide the same warranty for the substitution as for the specified product.
   3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.
   5. Will reimburse Owner and Architect for review or redesign services associated with re-approval by authority having jurisdiction.

E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

F. Substitution Submittal Procedure:
   1. Submit one copy of request for substitution for consideration. Limit each request to one proposed substitution. Provide all information as required under Section 01 3000 - Administrative Requirements, and Section 3.4.4. of the General Conditions of the Contract for Construction.
   2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence as outlined is Section 01 3000 - Administrative Requirements. Burden of proof is on proposer. When colors are preselected and noted on the drawings or in the specifications, the substitution form will include proposed substitute color palette.
   3. The Architect will notify Contractor in writing of decision to accept or reject request.

3.02 OWNER-SUPPLIED PRODUCTS

3.03 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.
   1. Arrange for delivery of materials and equipment during the hours of the day established by the Construction Manager and Owner.
   2. Have workers available to receive and unload materials and equipment delivered to the site. Do not deliver, or have delivered, any materials and equipment to the site unless such forces are available.
   3. Owner's personnel are not authorized to sign for receipt of Contractor’s material or equipment, nor will they accept the Contractor's materials or equipment.

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.

3.04 STORAGE AND PROTECTION

A. Provide protection of stored materials and products against theft, casualty, or deterioration.

B. 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.
   1. Structural Loading Limitations: Handle and store products and materials so as not to exceed static and dynamic load-bearing capacities of project floor and roof areas.

C. Store and protect products in accordance with manufacturers' instructions.

D. Neatly pile, store, protect, and secure materials and equipment in locations where directed by the Construction Manager and Owner.

E. Store with seals and labels intact and legible.

F. Arrange storage of materials and products to allow for visual inspection for the purpose of determination of quantities, amounts, and unit counts.

G. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

H. For exterior storage of fabricated products, place on sloped supports above ground.

I. Provide off-site storage and protection when site does not permit on-site storage or protection.

J. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

K. Comply with manufacturer's warranty conditions, if any.

L. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

M. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

N. Prevent contact with material that may cause corrosion, discoloration, or staining.

O. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

P. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

Q. Do not store volatile liquids inside Owner's building or within Work are

END OF SECTION

SECTION 017000
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.

C. Pre-installation meetings.

D. Surveying for laying out the work.

E. Cleaning and protection.

F. Starting of systems and equipment.

G. Demonstration and instruction of Owner personnel.

H. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

I. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

A. Division 1 - General Requirements for all Contracts.

B. Section 01 3529.10 - Life Safety Requirements during School Construction.

C. Section 015000 - Temporary Facilities and Controls: Temporary exterior enclosures.

D. Section 015000 - Temporary Facilities and Controls: Temporary interior partitions.

1.03 REFERENCE STANDARDS

A. Manual of Planning Standards - Manual of Planning Standards 2022 - The State Education Department; 2022.

1.04 SUBMITTALS

A. See Section 013000 - 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.

1.05 QUALIFICATIONS

A. For surveying work, employ a land surveyor registered in the State of New York and acceptable to Architect and Construction Manager. 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,

B. For field engineering, employ a professional engineer of the discipline required for specific service on Project, licensed in the State of New York. Employ only individual(s) trained and experienced in establishing and maintaining horizontal and vertical control points necessary for laying out construction work on project of similar size, scope and/or complexity.

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.
   5. Comply with Storm Water Pollution Protection Plan as attached in the Project Manual.

H. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
   1. Reference Section 01 3529.10 Life Safety Requirements during School Construction for additional noise control requirements.

I. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.
   1. Coordinate with Owner's pest control program for any pest control required as part of the Work.

J. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.
   1. Coordinate with Owner's rodent control program for any rodent control required as part of the Work.

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.

1.07 COORDINATION

A. 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.

B. Notify affected utility companies and comply with their requirements.

C. 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.

D. 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.

E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

F. Coordinate completion and clean-up of work of separate sections.

G. 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

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. Existing condition photographs will be required to be submittal to the Architect for record prior to the start of any work.

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 Architect, Construction Manager, and Owner 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. Reference Section 01 0000 - General Requirements for Owner provided project lines and grades.

B. The Contractors shall be responsible for the layout of his Work as follows:
   1. Verify locations of survey control and reference points prior to starting Work. Preserve and protection of survey control and reference points during construction.
   2. Promptly notify Owner's Project Representative and Architect and of any discrepancies discovered.

C. Promptly report to Architect, Construction Manager, and Owner the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
   1. Have dislocated survey control points re-established based on original survey control. Make no changes without prior written notice to Architect, Construction Manager, and Owner.
   2. Utilize recognized engineering survey practices.
   3. 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.

D. Establish elevations, lines, and levels. Locate and lay out the Work utilizing the services of a Licensed Land Surveyor:
   1. Site improvements including pavements, athletic facilities, stormwater management improvements, utilities, and any and all other site improvements requiring location and layout. Provide stakes for grading, fill and topsoil placement; utility locations and elevations, slopes, and invert elevations.
   2. Grid or axis for structures.
   3. Building foundation, column locations, ground floor elevations.
   4. Any and all other survey control required to establish location, lines and grades for site improvements as outlined in the Contract Documents.
   5. Periodically verify layouts by same means.
   6. Maintain a complete and accurate log of Control and Survey Work as it progresses.
   7. On completion of foundation walls and major site improvements, prepare a certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.

E. Verify locations of survey control points prior to starting work.

F. Promptly notify Architect and Construction Manager of any discrepancies discovered.

G. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

H. Utilize recognized engineering survey practices.

I. 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.

J. Periodically verify layouts by same means.

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 and Construction Manager 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 015000 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.

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

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. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.10 SYSTEM STARTUP

A. Coordinate with requirements of Section 019113 - General Commissioning Requirements.

B. Coordinate schedule for start-up of various equipment and systems.

C. 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.

D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify that wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.

G. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.11 DEMONSTRATION AND INSTRUCTION

A. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of Substantial Completion.

B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.

C. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.

D. 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.

E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

F. 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 230593 - 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, light fixture lenses, cabinetry (interior and exterior surefaces), ductwork (interior and exterior - exposed to view), exposed structural elements, 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. Replace all filters utilized during the Contruction Phase.

G. Clean debris from 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 Section 01 7800 - Closeout Submittals.

B. Accompany Architect, Construction Manager, and Owner 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 Architect and Construction Manager when work is considered ready for Substantial Completion inspection.

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 Architect's Substantial Completion inspection.

E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect, Construction Manager, and Owner's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect and Construction Manager.

F. Correct items of work listed in list in the executed Certificate of Substantial Completion and comply with requirements for access to Owner-occupied areas.
   1. Items of Work listed in executed Certificates of Substantial Completion shall be scheduled and completed within 15 working days of the date of issuance.
   2. Exterior and Site-Related Corrective Work, which may be weather dependent, will be completed within 20 business days of acceptable weather conditions.
   3. Schedule and complete items of Work determined by Architect/Engineer's final inspection immediately.

G. Notify Architect and Construction Manager when work is considered finally complete and ready for Architect's Substantial Completion final inspection.

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 017329
CUTTING AND PATCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements of this section apply to Each Prime Contractor and their Subcontractors to perform all work required. Cutting, patching, matching, trenching, excavating, and backfilling as indicated on the Contract Drawings or as required for the installation of work of their Contract where this work is not specifically described in other sections.

B. Work included, but not necessarily limited to:
   1. Make the parts fit properly.
   2. Uncover work to provide for installation, inspection, or of ill-timed work.
   3. Remove and replace work not conforming to requirements of the Contract Documents.
   4. Remove and replace defective work.
   5. Provide all required cutting, patching, matching, trenching, excavating, and backfilling as required to perform the work of their contract, except specifically noted otherwise on the Contract Drawings.
   6. All cutting and patching required to incorporate existing work or equipment with installation of new work.
   7. In addition to other requirements specified, upon the Architect/Engineer's request, uncover work to provide for inspection by the Architect/Engineer of covered work and remove samples of installed materials for testing.
   8. Do not cut or alter work performed under separate contract without the Architect/Engineer's written permission.

1.02 RELATED REQUIREMENTS

A. The Contract Documents, including but not limited to, the Drawings and Individual Specification Sections, apply to this Section.

B. Section 01 0000 - General Requirements.

C. Section 01 3000 - Administrative Requirements.

D. Section 01 3529.10 - Life Safety Requirements during School Construction.

E. Section 01 6000 - Product Requirements

1.03 DEFINITIONS

A. Cutting: The removal of portions of the construction, its equipment or site elements with extreme care to preserve the finish or the function of that portion which remains, because the cutting is done with the knowledge and intention that this remaining portion will be patched or restored to approximately its previous condition.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of Work of the contract.

C. Demolition: The complete wrecking or removal of existing elements of the building and subsequent alteration or change in that which remains.

1.04 REFERENCE STANDARDS

A. Existing Building Code of New York State - Chapter 15 - Construction Safeguard; 2020.

B. Fire Code of New York State - Chapter 33 - Fire Safety During Demoltion and Construction.; 2020.

1.05 PROJECT CONDITIONS

A. Existing Conditions: Do not disturb existing structures, construction, materials or equipment unless required by hte Contract.

1.06 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal process.

B. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:

1. Extent: At each occurrence, describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
3. Products: List products to be used and firms or entities that will perform the Work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
7. Design Professional's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.07 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements that is to remain, unless approved by the Architect and Engineer. Do not cut or drill or patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that result in increased maintenance or decreased operational life or safety.

C. Fire Rated Elements: Do not cut and patch fire rated elements (i.e. floors, walls, roofs, shafts, etc.) in a manner that results in reducing their capacity to perform as intended or that results in decreased fire-resistance.

D. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their opg capacity, which results in reducing their capacity to perform as intended, or that result in increased maintenance or decreased operational life or safety.

E. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the Design Professional's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

F. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including other trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

G. Comply with the requirements of the Existing Building Code of New York State and Fire Code of New York State as well as the provisions of Manual of Planning Standards and Section 01 3529.10 Life Safety Requirements during School Construction.

1.08 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

B. See Section 017800 - Closeout Submittals for additional warranty requirements.

1.09 CUTTING, PATCHING AND DEMOLITION

A. Coordination:
   1. Prime Contractors and their Subcontractors are responsible for the timely and accurate layout of their work that involves cutting of raised floors or roof systems of either the existing or new building by the General Contractor as described in paragraph 1.07 A.2. and shall provide the General Contractor with this information.
   2. The General Contractor shall be responsible for cutting and patching operations of surfaces including raised floors and roof systems as noted on the drawings or as required to complete the work to be provided by the other Prime Contractors and their Subcontractors for openings requiring drilling of holes 10" or greater in diameter or cutting openings of 100 square inches or greater for piping, conduit, ductwork, and other openings required for the installation of new work by other Prime Contractors and their Subcontractors.
   3. Prime Contractors and their Subcontractors shall be responsible for cutting and patching of holes or openings of lesser dimensions as noted in paragraph 1.07.A.2 above unless otherwise noted on the contract drawings.
   4. Any openings required to be cut through the roof system shall be performed by a certified roofing installer and maintain existing warranty. These openings shall include the installation of headers and blocking to support remaining deck and other material above.
   5. All openings in walls shall include installation of headers or lintels as required to support wall material and masonry above opening.
   6. All openings in floors shall include the installation of headers and bracing to support the remaining floor and other materials above.
   7. All Prime Contractors and their Subcontractors shall be responsible for all patching of areas of cutting, except as noted in paragraph 1.07.A.2 above or otherwise specifically noted on the Contract Drawings.
   8. Patching shall be done in a manner that disturbed surfaces are restored to their original condition.
      a. Brick, CMU, and Glazed Tile unit walls shall be repaired by replacing whole masonry units in area of cutting to match surrounding walls.
      b. Lay-in acoustic ceiling tiles and tee grid removed to execute the work of this contract shall be replaced upon the completion of the work. All acoustic tiles and tee grid members damaged by the work of this contract shall be replaced by the General Contractor. Tile units replaced shall match existing tile units in color and texture.
      c. Plaster and gypsum wallboard walls and ceilings shall be patched or replaced to the closest stud and painted to restore to original condition.
      d. Wall finishes such as ceramic tile and wall paper shall be patched or replaced to the nearest tile and the wallpaper shall be patched to the nearest seam.
      e. Finished flooring surfaces including sheet vinyl, VCT, terrazzo, ceramic or quarry tile, and underlying concrete shall be patched or replaced by replacing whole units to the nearest joint or divider strip.
      f. Vapor barriers, air barriers and water barriers shall be patched in walls, foundations, concrete slab-on-grade and roofing where existing barriers exist.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. General: For replacement of work removed, use materials to match new or existing adjacent surfaces which comply with the pertinent sections of these specifications.

B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
   1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials, unless specified otherwise in other Sections.

C. Fire Rated Elements: Provide firestopping products/systems specified in system design listings by approved testing agencies that conform to the construction type, penetrating item, annular space requirements and fire rating involved in each separate assembly. Refer to applicable Individual Specification Sections.

D. For replacement of excavated materials see Division 31 for Excavating, Filling, and Grading.

2.02 SOURCE QUALITY CONTROL

A. See Section 014000 - Quality Requirements for additional requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine surfaces to be cut, drilled or removed and patched and conditions under which cutting and patching are to be performed. Investigate both sides of the surface when feasible.

B. After uncovering the work, inspect conditions affecting installation of new work.

C. Discrepancies:
   1. If uncovered conditions are not as anticipated, immediately notify the Architect, Engineer, and Construction Manager to secure needed directions.
   2. Do not proceed in areas of discrepancy until all such discrepancies have been fully resolved.

D. Compatibility:
   1. Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.

3.02 PREPARATION PRIOR TO CUTTING

A. Temporary Support: Provide temporary shoring and other support of Work to be cut to prevent damage to existing construction which is to remain.

B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Utility Services and Mechanical/Electrical/Plumbing Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting or patching to minimize interruption to occupied areas.

3.03 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
   1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

2. Comply with the requirements of Existing Building Code of New York State, Fire Code of New York State and Section 01 3529.10 Life Safety Requirements during School Construction.

B. Perform all required trenching, excavating and backfilling as required for all work unless otherwise indicated in pertinent sections of these specifications. Perform cutting and demolition by methods which will prevent damage to other portions of the work and will provide proper surfaces to receive installation of repair and new work.

C. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval to avoid marring or damaging existing finishes. Cut or drill from the exposed or finished side into concealed surfaces.

D. Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill. Dampen as required to minimize dust.

E. Comply with requirements of applicable sections of Division 31 where cutting and patching requires excavating and backfilling.

F. Bypass utility services such as pipe or conduit before cutting where services are shown or required to be removed, relocated or abandoned. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture of other foreign matter after bypassing and cutting.

G. Restore work with new Products in accordance with requirements of Contract Documents.

H. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction.
   1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
   2. In fire rated assemblies cut opening only to the size required to provide the annular spacing for the required fire stopping system.
   3. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
   4. Concrete or Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
   5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
   6. Proceed with patching after construction operations requiring cutting are complete.

I. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
   1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
   2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
      a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
      b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.
6. Fire Rated Elements: Install firestopping systems to comply with applicable Individual Specification Sections and firestopping manufacturer's written installation instructions and published drawings for products and applications.

J. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest corner, intersection or natural break. For an assembly, refinish entire unit.

K. Perform fitting and adjustment of products to provide finished installation complying with the specified tolerances and finishes.

L. Where no detail is provided, the prime contractor shall patch areas disturbed, as required by the execution of their Contract, with systems and materials of similar composition to match existing adjacent systems and materials, subject to approval by Architect/Engineer.

3.04 INTERFACE WITH OTHER WORK

A. Coordinate as required with other Trades to assure proper and adequate provision in the Work for those Trades that interface with the Work of this Section.

3.05 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements for additional requirements.

3.06 CLEANING

A. See Section 017000 - Execution and Closeout Requirements for additional requirements.

B. Each Contractor shall be responsible for thoroughly cleaning area upon the completion of cutting and patching operations. Thoroughly clean adjacent surrounding surfaces of all dust debris, oil residue, moisture, and patching materials prior to new finishes being installed and upon completion of final finishing.

3.07 CLOSEOUT ACTIVITIES

A. See Section 017800 - Closeout Submittals for additional submittals.

3.08 PROTECTION

A. Protect installed work from subsequent construction operations.

3.09 REINSTALLATION

A. Where reinstallation of removed items is indicated, reinstall items to a condition equal to or better than their condition before removal.

END OF SECTION

SECTION 017800
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project record documents.

B. Operation and maintenance data.

C. Warranties and bonds.

D. Insurance

1.02 RELATED REQUIREMENTS

A. General Conditions of the Contract for Construction - Performance bond and labor and material payment bonds, warranty, insurance and correction of work.

B. Section 013000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

C. Section 017000 - 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 and Construction Manager with claim for final Application for Payment. See the General Conditions for the Contract for Construction and Section 01 2000 Price and Payment Procedures for addtional information.

B. Operation and Maintenance Data:
   1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect and Construction Manager will review draft and return one copy 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 Construction Manager 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.

C. 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.

D. Insurances:
   1. Maintain Insurance Coverages as required in the General Conditions of the Contract for Construction.

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 Owner.

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. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   3. Field changes of dimension and detail.
   4. Details not on original Contract drawings.
   5. Record documents shall be turned over to the Owner at the conclusion of the project along with the final payment.

3.02 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. Additional information as specified in individual product specification sections.

D. 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.

3.03 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.

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.

3.04 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, Consultants, Contractor 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 and bonds.
   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.

3.05 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 photocopies of each in operation and maintenance manuals, indexed separately on Table of Contents.

END OF SECTION

PROJECT CLOSEOUT
CHECK LIST

Project: Highland Falls-Fort Montgomery Central School District **Project No.** 2022-138Ph3

HS/IS Renovations

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 Central School District HS/IS Renovations** (Architect/Engineer Project No. 2022-138Ph3) 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):

Highland Falls-Fort Montgomery
Central School District

21 Morgan Road

Highland Falls, New York 10928

Date:

Contract: No. –

Project No.: 2022-138Ph3

Project: HS/IS Renovations
(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 019113
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. 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. The Commissioning Authority directs and coordinates all commissioning activities; this section describes some but not all of the Commissioning Authority's responsibilities.

D. The Commissioning Authority is employed by Owner.

1.02 SCOPE OF COMMISSIONING

A. The following are to be commissioned:

B. HVAC System, including:
   1. Major and minor equipment items.
   2. Piping systems and equipment.
   3. Ductwork and accessories.
   4. Terminal units.
   5. Control system.
   6. Variable frequency drives.

C. Special Ventilation:
   1. Packaged Air to Air Energy Recovery Units
   2. Packaged Outdoor Central Station Air-Handling Systems.
   3. Variable Refrigeratn Flow HVAC Systems.
   4. Convection Heating and Cooling Units.

D. Boiler Systems
   1. Condensing Boilers.

E. Integrated Automation.

F. Other equipment and systems explicitly identified elsewhere in Contract Documents as requiring commissioning.

1.03 RELATED REQUIREMENTS

A. Section 017800 - Closeout Submittals: Scope and procedures for operation and maintenance manuals and project record documents.

B. Section 017900 - Demonstration and Training: Scope and procedures for Owner personnel training.

C. Section 230800 - Commissioning of HVAC: HVAC control system testing; other requirements.

1.04 REFERENCE STANDARDS

A. ASHRAE Guideline 0 - The Commissioning Process; 2013.

B. ASHRAE Guideline 0.2 - Commissioning Process for Existing Systems and Assemblies; 2015.

C. ASHRAE Guideline 1.1 - HVAC&R Technical Requirements for the Commissioning Process; 2007, with Errata (2012).

D. ASHRAE Guideline 4 - Preparation of Operations and Maintenance Documentation for HVAC&R Systems; 2019.

E. ASTM E779 - Standard Test Method for Determining Air Leakage Rate by Fan Pressurization; 2019.

F. CSI/CSC MF - Masterformat; 2016.

1.05 SUBMITTALS

A. See Section 013000 - 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.

1.06 QUALITY ASSURANCE

A. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

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 017800 - 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

SECTION 019114
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 020150.99
SITE RESTORATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Restoration of site.

1.02 RELATED SECTIONS

A. Section 31 1000 - Site Clearing.

B. Section 31 2200 - Grading.

C. Section 31 2316 - Excavation.

D. Section 31 2316.13 - Trenching.

E. Section 31 2323 - Fill.

1.03 GENERAL REQUIREMENTS

A. The Contractor shall restore the Project Site to the same conditions he found before commencing his operations or he shall notify and develop the site to the finished conditions shown on the Drawings. The requirements for removal of debris, embankments, fill material, rough grading and similar preliminary Work are specified in the Sections entitled "Excavation" and "Backfill".

B. All cultivated lands to be restored as existed prior to start of Work and described below. Uncultivated lands to be restored in accordance with Article 3.09.

C. All Landscape Work, including transplanting, planting and maintenance of trees, bushes, shrubs, ground covers and lawns, shall be done by or under the supervision of an experienced practicing landscape gardener.

D. All lawns dug up and/or damaged shall be restored as described in the General Requirements of this section, including fine grading, topsoil, fertilizing, seeding, planting, mulching, protection and maintenance.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 AREAS AND FEATURES TO BE RESTORED

A. All areas including natural and artificial features occurring thereon, which are damaged or disturbed by the Contractor's operations, shall be restored, repaired or replaced to the same or superior condition which existed prior to construction unless otherwise stated or shown on the Drawings.

B. Grassed or lawn areas shall be dressed with topsoil, raked, fertilized, seeded, mulched and maintained as specified in later clauses. Gardens and similarly cultivated areas shall be dressed with topsoil, raked and new plants and crops of the same species planted during the appropriate time of year to replace the damaged or destroyed vegetation; maintenance and protection of such plantings are specified in later clause. Existing trees, shrubs, hedges, saplings, vines, ground cover vegetation, etc., shall be re-established or replaced with new material as ordered by the Engineer, unless stated otherwise. Restoration of uncultivated lands is specified in Article 3.09.

C. Walls, terraces, fences, ditches, drains, culverts, drives, posts, patios, outdoor recreational equipment, garden decorations and appurtenances, small structures, and all other artificial features shall be repaired, restored or replaced to the same or superior condition which existed prior to construction.

3.02 AREAS TO BE DEVELOPED

A. When the Project Site is to be modified and developed to meet new conditions, the Contractor shall perform all required grading, topsoiling, fertilizing, seeding, planting, mulching and maintenance of areas, all in accordance with the Drawings and as specified herein. Unless shown otherwise on the Drawings, the entire unpaved area within the grading limits and within the overall areas excavated and backfilled shall be so developed. New Landscaping Work and artificial features if any are shown on the Drawings and specified elsewhere.

3.03 FINE GRADING

A. Areas requiring topsoil shall be fine graded to within 4 inches of finished grade to provide a minimum compacted thickness of 4 inches of topsoil at all locations. All such areas, whether in cut or fill, shall be raked to a depth of 1 inch be parallel to finished grade as shown or required, and shall be free of all stones roots rubbish and other deleterious material.

3.04 TOPSOILING

A. Topsoil shall be furnished and spread in the required areas to a depth of approximately 5 inches unless otherwise specified. Stockpiled topsoil may be used if it is acceptable to the Engineer. In the event this topsoil is not satisfactory or is inadequate to cover the required areas, the Contractor shall furnish the required amount of satisfactory topsoil from approved sources off the site. Topsoil furnished from off the site shall be natural, fertile, friable soil, capable of sustaining vigorous plant growth, free from stones roots, sticks and other foreign substances and shall pass a 1/4 inch screen. Topsoil shall not be delivered or laced in a frozen or muddy condition. The soil shall be uniformly compacted with a light hand roller to a final depth of not less than 4 inches. When finished, the surface shall conform to the finished grades shown or required and shall have a smooth pulverized surface at the time of seeding. Any irregularities shall be corrected before the fertilizer and seed are placed. Any subsequent settlement or displacement of the topsoil shall be restored to an acceptable condition at the Contractor's expense.

3.05 FERTILIZING

A. Fertilizer shall be a complete, partially organic, commercial 10-6-4 fertilizer, containing at least 10 percent nitrogen, 6 percent available phosphorous and 4 percent potash. When required by the Engineer, the Contractor shall furnish an analysis of the fertilizer. The fertilizer shall be uniformly spread by a mechanical spreader at the rate of 25 pounds per 1,000 square feet. The fertilizer shall be incorporated into the upper 2 inches of topsoil immediately after spreading. Other commercial fertilizers, such as 20-10-10 or 12- 6-6 may be used at rates adjusted to provide the same quantity of nitrogen per 1,000 square feet.

3.06 SEEDING

A. The seed used on this Project shall be fresh, re-cleaned, and of the latest crop year. It shall conform to Federal and State standards. Each type of grass in the mixture shall meet or exceed the minimum percentage of purity and germination listed for that type of grass with a maximum weed content of 0.1 percent. Seed shall be applied at a rate of not less than 5 pounds per 1,000 square feet, using a mechanical spreader. The Contractor is advised to do all seeding during the periods of May 1st to June 15th or August 15th to October 1st. Seeding may be conducted under unseasonable conditions without additional compensation, and at the option and full responsibility of the Contractor.
   1. Kentucky Blue Grass (50 percent by weight): 85 percent purity; 80 percent germination.
   2. Red or Chewing Fescue (20 percent by weight): 97percent purity; 80 percent germination.
   3. Red Top (30 percent by weight): 92 percent purity; 90 percent germination.

B. All seed furnished under this item shall be delivered in standard size, unopened bags of the vendor, showing the weight, mixture, vendor's name and guaranteed analysis. Seed shall be properly stored by the Contractor at the site of the Contract and any seed damaged during storage shall be replaced by him. Seeding is to be done in dry or moderately dry soil and at times when the wind velocity does not exceed 5 miles per hour. After the finished grading is completed and just before seeding, the areas to be seeded shall be loosened to a depth of 2 inches and raked to true lines, free from all variation, bumps, ridges and depressions which will hold water. All sticks, stones roots, or other objectionable materials, which might interfere with the formation of the fine seed bed, shall be removed from the soil. Upon completion of the seeding, the area shall be raked lightly and rolled with a light hand roller.

3.07 PLANTING

A. The Contractor shall reestablish all existing trees, shrubs, vines and ground covers as practicable. He shall provide additional or modify existing vegetation, as outlined in the Special Requirements or shown on the drawings, the size of the new plant material shall, if practical, match that of the item being replaced, consistent with normally available sizes from nursery stock. Depending on the size and type of material, and when ordered by the Engineer, guy wires stakes, anchors and wrapping shall be furnished and installed in a proper manner to brace and protect the plant. The Contractor shall, as soon as practicable, water and maintain all reestablished, replaced or disturbed plant materials until final acceptance of total Contract.

B. Any new, reestablished, replaced or disturbed plant material that fails to respond properly within the 1 year guarantee period shall be replaced as specified above at the Contractor's expense. Classifications of plants, dimensions, planting procedures etc,. shall conform to ANSI Standard Z-60.1, "Nursery Stock".

3.08 MULCHING, PROTECTION AND MAINTENANCE

A. The Contractor shall protect and maintain seeded areas to assure a full even stand of grass. Immediately after seeding and rolling, the Contractor shall apply stalks of oats, wheat rye or other approved crops free from noxious weeds as a mulch, to a loose depth of about 1 inch. The Contractor shall perform all watering, mowing and reseeding as necessary for a minimum of 30 days, and until final acceptance of the Contract, to ensure the establishment of a uniform stand of specified grasses. Upon completion of the Contract, the Contractor is required to show all seeded areas uniformly germinated to a height of 1-1/4 inches to 2 inches and to remove all excess mulch.

B. Any portion of seeded areas failing to produce a full uniform stand of grass from any cause, shall be re-seeded at full rate and re-fertilized at one-half rate and protected and maintained until such full stand has been obtained.

3.09 RESTORATION OF UNCULTIVATED LANDS

A. Unless otherwise stated or shown on the Drawings, areas of uncultivated land shall be restored as follows. The disturbed surfaces shall be rough-graded to the original elevations and general appearance which existed prior to construction (or to the new elevations and grades which are required), all debris, large stones, boulders, etc., being removed in the process. The surface shall then be seeded with perennial rye grass, being spread at the rate of 1 pound per 800 square feet. Seed shall meet the general requirements of Articles 3.05 and 3.06 as to type, packaging, sowing conditions storage, etc., except that the area need not be raked or rolled after completion of seeding.

B. In all cases where brand names and/or manufacturers are specified, it shall be the intent of these Specifications that the words "or equal" shall apply.

C. Low lying area or bellies identified in lawn areas within 6 months of seeding shall be topped, graded, reseeded, mulched, protected and maintained as indicated above.

END OF SECTION

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SECTION 028213
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, High School* 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
HS HM100	NOTE A2 REMOVE INTERIOR ASBESTOS-CONTAINING EXPANSION CAULK TO CLEAN SUBSTRATE AT/ASSOCIATED WITH WINDOW FRAME SCHEDULED FOR REMOVAL UNDER ABATEMENT CONDITIONS.	7 SF
HS HM101	NOTE A1 REMOVE NON-ASBESTOS-CONTAINING FLOOR TILE LAYERS, COVE BASE, COVE BASE MASTIC, AND ASBESTOS-CONTAINING FLOOR TILE MASTIC. REMOVAL INCLUDES ALL LAYERS OF TILES, FILLERS, MASTICS, UNDERLAYMENTS, FELTS, ETC. TO CLEAN SUBSTRATE UNDER ABATEMENT CONDITIONS	1,600 SF
	NOTE A2 REMOVE INTERIOR ASBESTOS-CONTAINING EXPANSION CAULK TO CLEAN SUBSTRATE AT/ASSOCIATED WITH WINDOW FRAME SCHEDULED FOR REMOVAL UNDER ABATEMENT CONDITIONS.	5 SF
	NOTE A3 REMOVE PRESUMED ASBESTOS-CONTAINING PIPE/FITTING INSULATION. SELECTIVE DEMOLITION OF OPENINGS TO ACCESS ASBESTOS-CONTAINING PIPE/FITTING INSULATION TO BE PERFORMED UNDER ABATEMENT CONDITIONS.	60 LF

Abatement Work Area Location	Asbestos Abatement of Work Description	Approximate Quantity
HS HM101	NOTE A4 REMOVE ASBESTOS-CONTAINING HVAC VIBRATION DAMPENER INSULATION. ABATEMENT OF INSULATION TO BE PERFORMED UNDER ABATEMENT CONDITIONS.	2 SF
	NOTE A5 REMOVE PRESUMED ASBESTOS-CONTAINING ELECTRICAL COMPONENTS IN THEIR ENTIRETY. COORDINATE DISCONNECTS WITH ELECTRICAL CONTRACTOR.	12 SF
HS HM102	NOTE A2 REMOVE INTERIOR ASBESTOS-CONTAINING EXPANSION CAULK TO CLEAN SUBSTRATE AT/ASSOCIATED WITH WINDOW FRAME SCHEDULED FOR REMOVAL UNDER ABATEMENT CONDITIONS.	9 SF
HS HM104	NOTE A2 REMOVE INTERIOR ASBESTOS-CONTAINING EXPANSION CAULK TO CLEAN SUBSTRATE AT/ASSOCIATED WITH WINDOW FRAME SCHEDULED FOR REMOVAL UNDER ABATEMENT CONDITIONS.	13 SF

Table Notes: LF=Lineal Feet, SF=Square Feet

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 Section 01 33 00:

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 <u>original</u> 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

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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 High and Intermediate School* 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 028314

PCB CAULK ABATEMENT

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Specification Sections, shall apply to this Section.

B. Refer to C&S Companies *Limited Hazardous Material Pre-Renovation Survey Report, Highland Falls-Fort Montgomery Central School District, High School* for information regarding materials that have been identified as PCB containing materials, or that have been sampled and determined to be non-PCB containing.

1.02 GENERAL

A. Current state and federal regulations require the implementation of appropriate protocols while handling, transporting, and disposing of polychlorinated biphenyls (PCBs). This specification was developed to ensure the completeness of abatement procedures while ensuring the health & safety of workers, the general public, and the environment. Any changes in laws and regulations that may be issued in the future could alter the applicability of this document. The District and District Representatives (i.e. Project Architect, Construction Manager, Project Designer, Environmental Consultant, etc.) shall not be responsible for any future regulatory changes that affect this specification.

B. Building materials found to contain PCBs at a concentration at or above 50 parts per million (ppm) or presumed to contain PCBs are considered PCB bulk wastes (hazardous) by the United States Environmental Protection Agency (USEPA) and the New York State Department of Environmental Conservation (NYSDEC). Concentrations of PCBs in solids greater than 50 ppm must be handled and disposed of in accordance with all applicable state and federal regulations.

C. The Contractor shall follow the procedures of this specification to ensure that any activities that disturb PCB-containing materials are conducted in a manner that will minimize any potential exposure to the environment, employees, and the general public.

D. If conflicts occur between any federal, state, and/or or local regulations and this specification, the most stringent course of action shall apply.

1.03 SCOPE OF WORK

A. This project includes the abatement and disposal of approximately 30 square feet of PCB containing interior expansion caulk. Reference figure HS HM100,HS HM101, HS HM102, and HS HM 104 in the plan set for the locations of the PCB containing caulk to be abated. For the purposes of this specification, caulking applications shall include all sealants. As such, the Contractor shall be responsible for abating the caulking applications required to complete scheduled renovation activities.

B. Where an existing substrate is scheduled to remain, the Contractor shall remove all visible caulk to a smooth, flat condition without causing damage to the existing substrate. After the removal and cleaning activities have been completed, an Architect-approved encapsulating agent or sealant shall be utilized to coat / cover the abated areas.

C. The Contractor shall be responsible for providing all waste containers and labels. Post containerization, the Contractor shall be responsible for completing waste manifest, and coordinating the transport and disposal of all PCB abatement related wastes on this project. As such, these services, materials, and fees shall be included in the Contractor's scope of work.

D. Upon completion of work shift, the Contractor shall coordinate the storage of any waste containers with the District and District Representatives.

E. In the event that the Contractor selects a removal method that generates any additional waste materials (brick, block, window units/door units in their entirety) other than PCB-containing caulk applications, the Contractor assumes the responsibility for proper transportation and disposal of those components and all associated costs.

F. Upon completion of all PCB abatement activities, the Contractor shall provide all abatement-related documentation to the Project Architect and Project Designer within ten (10) business days.

1.04 SUBMITTALS

A. Pre-Abatement Submittals. The Contractor shall submit the following information to the Project Architect and Project Designer at least ten (10) business days prior to starting the work:

1. Copies of the following workers certifications:
    a. HAZMAT or HAZWOPER certificates for all personnel that shall handle PCB-containing materials.
    b. Medical evaluations to show suitably to wear respiratory protection.
    c. Fit test records to show respirator suitability.
2. The Contractor's proposed plan for conducting the work including decontamination facility locations, procedures, etc.
3. Certification of mechanical lift training for employees that will be removing PCB caulk at elevated levels.
4. Safety Data Sheets (SDS) shall be submitted for all materials and products to be used on-site.
5. A detailed plan for the collection, handling, and disposal of any wastewater to be generated on the project.
6. Manufacturers' certifications for all equipment to be used on the project.
7. Copy of the company's Hazard Communication Program, Respiratory Protection Plan, and Site Emergency Response Plan.
8. Copy of notifications to the local fire and rescue that work will be conducted at the site.

9. Copies of the emergency phone numbers that will be posted on the personal decontamination unit.

10. Proposed Supervisor on the project, including a list of other projects that the Supervisor has worked on of similar nature.

B. Abatement-Related Submittals. During the course of abatement activities, the Contractor shall submit the following information to the Project Architect and Project Designer for review:

1. Personal Air Sample Results for PCB Exposure – The Contractor shall be responsible for the collection of personal air samples during the course of PCB abatement activities. The collection, analysis, and interpretation of the air samples are the sole responsibility of the Contractor. The Project Architect and Project Designer shall not be responsible for the interpretation of the laboratory results, only to verify that the Contractor has collected the samples.
2. A daily list of the abatement personnel on-site.
3. Copies of workers certifications, medical evaluations, and fit test forms. These documents shall only be valid one (1) year from the date that they were taken. Expired certifications, evaluations, and fit tests shall not be permitted. Workers with expired documentation will not be permitted to work on this project.

C. Project Closeout Submittals. At the conclusion of PCB caulk abatement activities, the Contractor shall submit the following information to the Project Architect and Project Designer for review:

1. Copies of the Supervisor's daily log book entries for the project, which must include a daily count of containerized waste, drums, or dumpsters generated during the course of abatement activities.
2. Original waste manifests and other waste documentation related to the PCB abatement work.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Plastic Sheeting - To prevent dust migration, dust barriers, containments, and/or enclosures shall be constructed utilizing 6-mil fire-retardant polyethylene sheeting when necessary. These barriers shall be constructed to minimize dust migration into adjacent non-work areas when utilized.

B. 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 and fire codes.

C. Tapes / Adhesives - Commercially available tape and spray adhesives designed for such purposes are allowed 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 during all abatement related activities, as per all applicable OSHA regulations.

B. Respiratory Protection - The Contractor shall provide workers with adequate respiratory protection based on the identified hazards. The level of respiratory protection shall be determined through personal exposure assessment air monitoring.

C. Respirator Filters - The Contractor shall provide their 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 PRE-ABATEMENT WORK

A. The Contractor shall utilize decontamination procedures to comply with OSHA regulations. A separate decontamination area shall be utilized for equipment. The Contractor shall create this decontamination unit/area to capture all wastewater (including proper berms). The Contractor shall be responsible for the proper transportation and disposal of all wastewater generated during PCB abatement activities. At no time, shall this wastewater be permitted to be disposed of in the ground or sanitary sewer.

B. After the decontamination unit is deemed satisfactory by the Environmental Consultant, the Contractor shall establish the regulated work area. This area shall comply with state and federal regulations, and shall include the following:

1. Barrier tape, or preferably orange construction fencing, shall be utilized to prevent unauthorized personnel from accessing the regulated work area. This area shall be extended 25 feet (if possible) in a horizontal direction from the furthest point of abatement activities.
2. Signage that complies with OSHA regulations shall be placed on the decontamination unit/area, any waste dumpsters, and at frequent intervals around the perimeter of the work area boundary.

C. The Contractor shall provide their personnel with PPE to minimize employee exposure to PCBs. This PPE shall be provided to the Environmental Consultant, the District, District Representatives, regulatory inspectors, and/or any authorized visitors, upon demand.

D. Critical barriers shall be installed, prior to the commencement of abatement activities. These barriers shall be constructed of two (2) layers of 6-mil polyethylene sheeting and shall be secured in place utilizing duct tape and spray glue (or an approved equivalent). These barriers shall remain in place until the work areas have met visual clearance criteria and the Environmental Consultant grants permission for these barriers to be removed. Any air intakes, doors, or other means of air intrusion into the building within 25 feet of removal activities shall also be covered with critical barriers.

E. A drop cloth made of 6-mil polyethylene sheeting shall be utilized. This drop cloth shall be placed directly below the entire area being abated. The drop cloth should extend ten (10) feet laterally from the furthest point where abatement shall take place, should extend ten (10) feet horizontally from the edge of the building, and should extend two (2) feet up the wall where abatement is taking place. The drop cloth should be firmly secured to the ground utilizing

appropriate measures. The drop cloth shall also be constructed / situated to allow wastewater to pool for proper recovery.

3.02 ABATEMENT WORK

A. A six (6) mil polyethylene drop cloth shall be positioned directly under any abatement areas to capture any abated caulk or water being utilized. Accumulations of caulk and/or water on the drop cloth shall not be tolerated. Any caulking, debris, and/or waste shall be handled and disposed appropriately.

B. During gross removal activities, the caulk shall be immediately placed into approved containers, labeled accordingly, and disposed of in accordance with applicable regulatory requirements.

C. The Contractor shall sufficiently abate all visible caulking utilizing wet and manual methods. Dry removal shall not be permitted. Mechanical methods shall not be permitted. Upon completion of abatement activities, the Contractor shall clean the substrate in proximity to the areas where the caulk has been abated. This measure is required to clean any PCB oils or dusts that may be present on the substrate post abatement.

D. Excessive amounts of water shall not be utilized, but the caulking should be adequately wet to prevent any dust release during removal operations.

E. The Contractor shall be allowed to remove additional building components (i.e. the entire window system, as opposed to just the caulking around the window) related to the work; however, the Contractor assumes responsibility for the proper transport and disposal of any additional wastes and the associated fees.

F. The Contractor accepts that visual inspections will be utilized to determine completeness of abatement. The Contractor understands that the Environmental Consultant is responsible for conducting the final visual inspections and they must complete abatement to the satisfaction of the Environmental Consultant.

G. For interior removal activities, two (2) layers of polyethylene sheeting shall be placed on the entire floor where the abatement work is being performed. The sheeting shall extend a minimum of one (1) foot up the walls and be taped to the wall surface. The interior work area shall be contained and negative air pressure (utilizing negative air machines) shall be utilized, similar to an asbestos abatement regulated work area.

a. WASTE TRANSPORTATION & DISPOSAL ACTIVITIES

A. All PCB waste generated during abatement activities shall be transported and disposed of by the Contractor in accordance with all federal, state, and local regulations.

b. ENVIRONMENTAL CONSULTANT RESPONSIBILITIES

A. The District shall retain the services of a third party Environmental Consultant to observe the Contractor's work for compliance with applicable regulations and the project specifications.

B. The Environmental Consultant will conduct final visual inspections to ensure that the PCB caulk has been satisfactorily removed.

C. The Contractor understands that the Environmental Consultant has been retained by the District to oversee the PCB abatement work and that the District has authorized the Environmental Consultant 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 District and District Representatives 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 District or District Representatives. The Contractor shall not be compensated for any lost time, labor, materials, etc., due to inappropriate actions or behaviors related to the PCB abatement work on this project.

END OF SECTION

SECTION 028315
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 High School & Intermediate School,* 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 033001
CONCRETE SIDEWALKS, CURBS AND EXTERIOR CONCRETE FLATWORK

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes exterior Portland cement concrete paving for the following:
   1. Curbs.
   2. Walkways.
   3. Equipment pads.

1.02 SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.
   1. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, joint systems, curing compounds, dry-shake finish materials, and others if requested by Architect.
   2. Design mixes for each class of concrete. Include revised mix proportions when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
   3. Laboratory test reports for evaluation of concrete materials and mix design tests.

1.03 QUALITY ASSURANCE

A. Concrete Standards: Comply with provisions of the following standards, except where more stringent requirements are indicated.
   1. American Concrete Institute (ACI) 301, “Specification for Structural Concrete for Buildings.”
   2. ACI 318-14, “Building Code Requirements for Structural Concrete”.
   3. Concrete Reinforcing Steel Institute (CRSI) “Manual of Standard Practice”.

B. Concrete Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C94 requirements for production facilities and equipment.

C. Preinstallation Conference: Conduct conference at Project Site to comply with requirements of Division 1 Section “Project Meetings” and the following:
   1. Before installing Portland cement concrete paving, meet with representatives of Owner, Architect, consultants, independent testing agency, and other concerned entities to review requirements. Notify participants at least 3 working days before conference.

1.04 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 PRODUCTS

2.01 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other acceptable panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
   1. Use flexible or curved forms for curves of 100 feet or less radius.

B. Form Release Agent: Provide commercial formulation form-release agent with a maximum of 350 g/L volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.02 REINFORCING MATERIALS

A. Reinforcing Bars and Tie Bars: ASTM A 615, Grade 60, deformed.

B. Deformed-Steel Welded Wire Fabric: ASTM A 497.
   1. Furnish in flat sheets, not rolls, unless otherwise acceptable to Architect.

C. Supports for Reinforcement: Chairs, spacers, dowel bar supports and other devices for spacing, supporting, and fastening reinforcing bars, welded wire fabric, and dowels in place. Use wire bar-type supports complying with CRSI Specifications.
   1. Use supports with sand plates or horizontal runners where base material will not support chair legs.
   2. Use of concrete brick, pieces of broken concrete, stone, soil, and other items deemed unacceptable to Architect, are prohibited for support of reinforcement.

2.03 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I.
   1. Use one brand of cement throughout Project unless otherwise acceptable to Architect.

B. Fly Ash: ASTM C 618, Type F.

C. Normal-Weight Aggregates: ASTM C 33, Class 4, and as follows. Provide aggregates from a single source.
   1. Maximum Aggregate Size: 1-1/2 inch.
   2. Do not use fine or coarse aggregates that contain substances that cause spalling.
   3. Local aggregates not complying with ASTM C 33 that have been shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to Architect.

D. Water: Portable, having maximum acceptable 0.5 mg/l total chlorine residual.

E. Fiber Reinforcement: Provide mandatory inclusion of synthetic fibers engineered and designed for secondary reinforcement of concrete slabs, complying with ASTM C 1116, Type III.
   1. Fiber reinforcement products and manufacturers:
      a. SikaFiber Force 650; Sika Corp.
      b. Fibermesh 650; Fibermesh.
      c. Forta-Ferro; Forta Corporation.

2.04 ADMIXTURES

A. Provide concrete admixtures that contain not more than 0.1 percent chloride ions.

B. Air-Entraining Admixtures: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

C. Water-Reducing Admixture: ASTM C 494, Type A.

D. High-Range Water-Reducing Admixture: ASTM C 494, Type F or Type G.

E. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.

F. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

G. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
   1. Air-Entraining Admixture:
      a. Air-Mix; Euclid Chemical Co.
      b. Darex AEA or Daravair; GCP Applied Technologies.
      c. MasterAir AE 200; BASF.
      d. Sika AIR; Sika Corp.
   2. Water-Reducing Admixture:
      a. Eucon A+; Euclid Chemical Co.
      b. ADVA 198; GCP Applied Technologies.
      c. MasterPozzolith 200; BASF.

d. Plastocrete 161; Sika Corp.

3. High-Range Water-Reducing Admixture:
   a. Eucon 37; Euclid Chemical Co.
   b. ADVA 190 or Daracem 100; GCP Applied Technologies.
   c. MasterRheobuild 1000; BASF.
   d. Sikament 686; Sika Corp.
4. Water-Reducing and Accelerating Admixture:
   a. Accelguard 80; Euclid Chemical Co.
   b. Duraset 400; GCP Applied Technologies.
   c. MasterSet FP20; BASF.
   d. Sika Set NC; Sika Corp.
5. Water-Reducing and Retarding Admixture:
   a. Eucon Retarder 75; Euclid Chemical Co.
   b. Daratard-17;GCP Applied Technologies.
   c. MasterSet R122; BASF.
   d. Plastiment; Sika Corporation.

2.05 CURING MATERIAL

A. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 ounces per square yard, complying with AASHTO M 182, Class 2.

B. Moisture-Retaining Cover: One (1) of the following, complying with ASTM C 171.
   1. Waterproof paper.
   2. Polyethylene film.
   3. White burlap-polyethylene sheet.

C. Clear Solvent-Borne Liquid Membrane-Forming Curing Compound: ASTM C 309, Type I, Class A or B, wax free.
   1. Provide material that has a maximum volatile organic compound (VOC) rating of 350 g/L.

D. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.

E. Products: Subject to compliance with requirements, provide on of the following:
   1. Clear Solvent-Borne Liquid Membrane-Forming Curing Compound:
      a. Diamond Clear VOX; Euclid Chemical Co.
      b. Masterkure; BASF.
      c. 3100 Series; W.R. Meadows, Inc.
      d. Kure-N-Seal; Sonneborn-Chemrex.
   2. Evaporation Control:
      a. Eucobar; Euclid Chemical Co.
      b. Confilm; BASF.

2.06 RELATED MATERIAL

A. Bonding Agent: Acrylic or styrene butadiene.

B. Epoxy Adhesive: ASTM C 881, 2-component material suitable for dry or damp surfaces. Provide material type, grade, and class to suit requirements.

C. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
   1. Bonding Agent:
      a. Day-Chem Ad Bond (J-40); Dayton Superior Corp.
      b. SBR Latex; Euclid Chemical Co.
      c. Daraweld C; GCP Applied Technologies.

d. MasterProtect; BASF.
e. Sonocrete; Sonneborn-Chemrex.

2. Epoxy Adhesive:
a. Resi-Bond (J-58); Dayton Superior.
b. Euco Epoxy System #452; Euclid Chemical Co.
c. MasterEmaco; BASF.
d. Sikadur 32 Hi-Mod; Sika Corp.

D. Anti-spalling Compound: Combination of boiled linseed oil, curer seal and mineral spirits; complying with AASHTO M-233 Standard, or approved equivalent.

E. Preformed Joint Filler: ASTM D-1056, SCAE1, 2CI, RE41E1 closed cell expanded neoprene manufactured by Williams Products, Inc., or approved equivalent.

2.07 CONCRETE MIX

A. Prepare design mixes for each type and strength of normal-weight concrete by either laboratory trial batch or field experience methods as specified in ACI 301. For the trial batch method, use a qualified independent testing agency for preparing and reporting proposed mix designs.
1. Do not use the Owner's field quality-control testing agency as the independent testing agency.
2. Limit use of fly ash to 25 percent of total cementitious material content by mass.

B. Proportion mixes according to ACI 211.1, ACI 301, and ACI 318 to provide normal-weight concrete with the following properties:
1. Compressive Strength (28-Day): 5000 psi, minimum.
2. Maximum Water-Cementitious Material Ratio at Point of Placement: 0.40.
3. Slump Limit at Point of Placement: 3 inches.
a. Slump limit for concrete containing high-range water-reducing admixture (superplasticizers): Not more than 8 inches after adding admixture to site verified 2 inch to 3 inch slump concrete.
4. Minimum 650 pounds cementitious material per cubic yard of concrete.

C. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows with a tolerance of plus or minus 1.5 percent (per ACI 318, R26.4.2.1(a)(5)):
1. Air Content:
5.5 percent for 1-1/2 inch nominal maximum aggregate size.
6.0 percent for 1 inch nominal maximum aggregate size.
6.0 percent for 3/4 inch nominal maximum aggregate size.
7.0 percent for 1/2 inch nominal maximum aggregate size.
2. Mixes with a design compressive strength greater than 5,000 psi at 28 days will be allowed a 1 percent reduction in target air content.

D. Fiber Reinforcement: Polypropylene fibers engineered and designed for secondary reinforcement of concrete slabs, complying with ASTM C 1116, Type III. Add to mix at rate of 1.5 pounds per cubic yard, unless manufacturer recommends otherwise.

E. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, project conditions, weather, test results, or other circumstances warrant.

2.08 CONCRETE MIXING

A. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94.
1. When air temperature is between 85 degrees F and 90 degrees F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes.

PART 3 EXECUTION

3.01 SURFACE PREPARATION

A. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction. Do not begin Paving Work until such conditions have been corrected and are ready to receive paving.

B. Remove loose material from compacted subbase surface immediately before placing concrete.

3.02 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for paving to required lines, grades, and elevations. Install forms to allow continuous progress of Work and so that forms can remain in place at least 24 hours after concrete placement.

B. Check completed formwork and screeds for grade and alignment to following tolerances:
   1. Top of Forms: Not more than 1/8 inch in 10 feet.
   2. Vertical Face on Longitudinal Axis: Not more than 1/4 inch in 10 feet.

C. Clean forms after each use and coat with form release agent as required to ensure separation from concrete without damage.

3.03 PLACING REINFORCEMENT

A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "placing reinforcing bars" for placing and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement in accordance with ACI 318.

D. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least the greater of one (1) full mesh and/or 12 inch minimum lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities or replace units as required before placement. Set mats for a minimum 12 inch overlap to adjacent mats.

3.04 JOINTS

A. General: Construct contraction (control), construction, and isolation (expansion) joints true to line with faces perpendicular to surface plane of concrete. Construction transverse joints at right angles to the centerline, unless indicated otherwise.
   1. When joining existing paving, place transverse joints to align with previously placed joints, unless indicated otherwise.

B. Contraction Joints: Provide weakened-plane contraction joints, sectioning concrete into areas as shown on Drawings. Construct contraction joints for a depth equal to at least one-quarter of the concrete slab thickness, as follows:
   1. Tooled Joints: Form contraction joints in fresh concrete by grooving and finishing each edge of joint with a radiused jointer tool.
   2. Inserts: Form contraction joints by inserting premolded sponge rubber strips into fresh concrete until top surface of strip is at least 1/2 inch below paving surface. Radius each joint edge with a jointer tool. Clean groove of loose debris after concrete has hardened and apply approved caulking material to upper exposed portion of joint.

C. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than 1/2 hour, unless paving terminates at isolation joints.

1. Continue reinforcement across construction joints unless indicated otherwise. Do not continue reinforcement through sides of strip paving unless indicated.
2. Provide tie bars at sides of paving strips where indicated.
3. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.

D. Isolation Joints: Form isolation joints of preformed sponge rubber joint filler strips abutting concrete curbs, curb corners, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
1. Located expansion joints at intervals of 60 feet, unless indicated otherwise.
2. Extend joint fillers full width and depth of joint, not less 1/2 inch or more than 1 inch below finished surface where joint sealant is indicated. Place top of joint filler flush with finished concrete surface when no joint sealant is required.
3. Furnish Joint fillers in 1-piece lengths for full width being placed wherever possible. Where more than one (1) length is required, lace or clip joint filler sections together.
4. Protect top edge of joint filler during concrete placement with a metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

E. Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one (1) side of joint.

3.05 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and compete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Remove snow, ice, or frost from sub-base surface and reinforcing before placing concrete. Do not place concrete on surfaces that are frozen or have standing water.

C. Moisten sub-base to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.

D. Comply with requirements and with ACI 304R for measuring, mixing, transporting, and placing concrete.

E. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
1. When concrete placing is interrupted for more than 1/2 hour, place a construction joint.

F. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surface.

G. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete complying with ACI 309 R.
1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocation of reinforcing, dowels, and joint devices.

H. Screed paved surfaces with a straightedge and strike off. Use bull floats or darbies to form a smooth surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces prior to beginning finishing operations.

I. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not acceptable, remove and replace with formed concrete.

J. Cold-Weather Placement: Comply with provisions of ACI 306R and as follows. Protect concrete work form physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
   1. When air temperature has fallen to or is expected to fall below 40 degrees F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F and not more than 80 degrees F at point of placement.
   2. Do not use frozen materials or materials containing ice or snow.
   3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.

K. Hot-Weather Placement: Place concrete complying with ACI 305 R and as specified when hot weather conditions exist.
   1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 degrees F. Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
   2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
   3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.06 CONCRETE FINISHING

A. Float Finish: Begin floating when bleed water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Finish surfaces to true planes within a tolerance of 1/4 inch in 10 feet as determined by a 10-foot-long straightedge placed anywhere on the surface in any direction. Cut down high spots and fill low spots. Refloat surface immediately to a uniform granular texture.
   1. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating surface 1/16 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

B. Final Tooling: Tool edges of paving, gutters, curbs, and joints formed in fresh concrete with a jointing tool to the following radius. Repeat tooling of edges and joints after applying surface finishes. Eliminate tool marks on concrete surfaces.
   1. Radius: 3/8 inch.

3.07 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with the recommendation of ACI 306 R for cold weather protection and ACI 305 R for hot weather protection during curing.

B. Evaporation Control: In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before floating.

C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
   1. Moisture Curing: Keep surfaces continuously moist for not less than 14 days with the following materials:
      a. Water.
      b. Continuous water-fog spray.

c. Absorptive surfaces and edges with a minimum 12 inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inch minimum, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material an waterproof tape.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

E. Anti-spalling Treatment: A pply treatment to concrete surfaces no sooner than 28 days after placement, to clean, dry concrete free of oil, dirt, and other foreign material. Apply curing and sealing compound at a maximum coverage rate of 300 square feet per gallon. Apply anti-spalling compound in two (2) sprayed applications, taking care to ensure that spray application is in a fine mist (the formation of large droplets in spray application is prohibited). First application shall be applied at a rate of at least 40 square yards per gallon; second application shall be applied at a rate of at least 60 square yards per gallon. Allow complete drying between applications of anti-spalling treatment compound.

3.08 REPAIRS AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective, or does not meet the requirements of the Section.

B. Drill test cores where directed by Architect when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with Portland cement concrete bonded to paving with epoxy adhesive.

C. Protect concrete from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep concrete paving not more than 2 days prior to date scheduled for Substantial Completion inspections.

3.09 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 014000 - Quality Requirements.

B. Provide free access to concrete operations at Project Site and cooperate with appointed firm.

C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.

D. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.

E. Compressive Strength Tests: ASTM C 39/C 39M. For each test, mold and cure three (3) concrete test cylinders. Obtain test samples for every of each class 50 cubic yards.

F. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

G. Perform one (1) slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

H. Perform one air content test for each set of test cylinders taken following procedures of ASTM C231 or ASTM C173.

END OF SECTION

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.
      a. Acceptable products include Tnemec Series AK01 Shop Primer, Sherwin Williams Steel Spec 1000 Series, or equivalent substitutions.

C. Galvanizing: ASTM A123/A123M; hot dip galvanized after fabrication. Galvanizing is required for all exposed exterior structural steel.

D. Galvanizing for Bolts, Connectors, and Anchors:
   1. Hot-Dipped Galvanizing, all G90:
      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.

D. Touch-Up Galvanizing: Tnemec Series 90-98 Zinc Rich paint or equal.

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 055000
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated steel and aluminum items.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.

1.03 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.

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 A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2018.

E. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.

F. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2023.

G. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; 2021, with Editorial Revision.

H. ASTM A992/A992M - Standard Specification for Structural Steel Shapes; 2011 (Reapproved 2015).

I. ASTM B210/B210M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes; 2019a.

J. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

K. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.

L. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).

M. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2014, with Errata (2020).

N. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172; 2019.

O. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.

P. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.

Q. SSPC-SP 2 - Hand Tool Cleaning; 2018.

1.04 SUBMITTALS

A. See Section 013000 - 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.

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.

1.05 QUALITY ASSURANCE

A. 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.

B. Fabricator Qualifications: A qualified steel fabricator that is accredited by IAS AC172.

1.06 WARRANTY - STAIR NOSINGS

A. Provide manufacturer's warranty that materials furnished will perform as specified for period of not less than five (5) years when installed in accordance with manufacturer's written instructions.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Steel Bars and Bar-Size Shapes: ASTM A36/A36M.

B. Steel Sections:
   1. W shapes: ASTM A992/A992M.
   2. S, M, HP and C-channels: ASTM A572/A572M, grade 50.
   3. Angles: ASTM A36/A36M.
   4. General Plates: ASTM A36/A36M.

C. Steel Tubing: ASTM A500/A500M Grade B cold-formed structural tubing, including round, square and rectangular shapes.

D. Plates:
   1. ASTM A283/A283M, Grade C.
   2. Plates to be bent or cold form.

E. Pipe: ASTM A53/A53M, Grade B Schedule 40, black and hot-dip galvanized finish, as indicated.

F. Mechanical Fasteners: Same material as or compatible with materials being fastened; type consistent with design and specified quality level.
   1. Provide zinc-coated fasteners at exterior use location and where installed as part of an exterior wall construction.

G. Bolts, Nuts, and Washers: ASTM A307, Grade A, plain.

H. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

I. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
   1. Primer selected shall be compatible with finish coats of paint. Coordinate selection of metal primer with actual finish paint provided by Contractor.

J. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 MATERIALS - ALUMINUM

A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

B. Aluminum-Alloy Drawn Seamless Tubes: ASTM B210/B210M, 6063 alloy, T6 temper.

2.03 FABRICATION

A. Work to dimensions shown or accepted on the Shop Drawings using proven details of fabrication and support.

B. Fit and shop assemble items in largest practical sections, for delivery to site.

C. Fabricate items with joints tightly fitted and secured.

D. Continuously seal joined members by intermittent welds and plastic filler.

E. 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.

F. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

G. Provide components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.04 FABRICATED ITEMS

A. Ledge Angles and Plates Not Attached to Structural Framing: For support of metal decking and wall opening infills; prime paint finish.

B. Lintels: As detailed; prime paint finish.

C. Door Frames for Overhead Door Openings and Wall Openings: Channel sections; prime paint finish.

2.05 FINISHES - STEEL

A. Prime paint steel items.

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: Two coats.

2.06 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.

2.07 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.

2.08 FABRICATION STAIR NOSING

A. Fabricate stair nosing assemblies as detailed. Provide anchors and accessories indicated in the installation instructions and necessary for complete installation.
   1. Provide specified anchors and where required, tread plate securing screws.
   2. Surfaces to be embedded in concrete shall be coated with a clear acrylic lacquer

B. Aluminum sub-channels and tread plates shall be:
   1. Class II, clear anodized finish.
   2. Clear acrylic lacquer coated for components to be embedding in concrete

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.

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

SECTION 061000
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Rough opening framing for doors, windows, and roof openings.

B. Roof-mounted curbs.

C. Roofing nailers.

D. Concealed wood blocking, nailers, and supports.

1.02 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

B. PS 20 - American Softwood Lumber Standard; 2021.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Blocking details and anchorage for for items listed in this section or noted on the drawings.

1.04 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

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.

C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
   1. Lumber: S4S, No. 2 or Standard Grade.
   2. Boards: Standard or No. 3.

2.03 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.
   3. Anchors: Toggle bolt type for anchorage to hollow masonry.

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. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.

D. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.

E. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

F. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

G. 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. Shower seat. Resist a single concentrated load of 250 pounds in any direction at any point on the seat so as to produce the maximum load effects.
   7. Wall-mounted door stops.
   8. Chalkboards, Tackboards, and marker boards.
   9. Wall paneling and trim.
   10. Joints of rigid wall coverings that occur between studs.

3.03 ROOF-RELATED CARPENTRY

A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

B. Provide wood curb at all roof openings except where specifically indicated otherwise. Form corners by alternating lapping side members.

C. Place horizontal members with crown side up.

D. Construct curb members of single pieces.

3.04 TOLERANCES

A. Framing Members: 1/4 inch from true position, maximum.

B. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.05 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

3.06 CLEANING

A. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

B. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

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SECTION 070553
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. 2020 NYS Building Code

B. 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 013000 - 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 072100
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Board insulation at cavity wall construction and exterior wall behind exterior louver and interior gypsum wallboard wall finish.

1.02 RELATED REQUIREMENTS

A. Section 054000 - Cold-Formed Metal Framing: Board insulation as wall sheathing.

B. Section 061000 - Rough Carpentry: Supporting construction for batt insulation.

C. Section 078400 - Firestopping: Insulation as part of fire-rated through-penetration assemblies.

D. Section 092116 - Gypsum Board Assemblies: Acoustic insulation inside walls and partitions.

1.03 REFERENCE STANDARDS

A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2023.

B. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2023a.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

D. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal process.

B. Provide product data on product characteristics and performance criteria.

C. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

PART 2 PRODUCTS

2.01 FOAM BOARD INSULATION MATERIALS

A. Polyisocyanurate (ISO) Board Insulation: Rigid cellular foam, complying with ASTM C1289.
   1. Classifications:
      a. Type I: Faced with aluminum foil on both major surfaces of the core foam.
         1) Class 1 - Non-reinforced core foam.
         2) Compressive Strength: 16 psi, minimum.
         3) Thermal Resistance, R-value: At 1-1/2 inch thick; 9.0 at 75 degrees F.
   2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
   3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
   4. Board Size: 48 inch by 96 inch.
   5. Board Thickness: 3.0 inch.
   6. Board Edges: Square.

2.02 ACOUSTICAL FIRE BATT INSULATION MATERIALS

A. Batt Insulation: ASTM C 665; preformed batt; conforming to the following:
   1. Material: Mineral wool fiber made from basalt rock and slag fiber.
   2. Flame Spread Index: 0 when tested in accordance with ASTM E 84.
   3. Smoke Developed Index: 0 when tested in accordance with ASTM E 84.
   4. Formaldehyde Content: Zero.
   5. Thickness: 3-1/2 inch for metal framing.
   6. Facing: Unfaced.

7. Provide wire or metal straps to hold insulation in place in applications where the stud depth is larger than the insulation thickness.
8. Manufacturer: Roxul AFB Acoustical Fire Batts by Roxul or approved equal.

2.03 ACCESSORIES

A. Sheet Vapor Retarder: Clear polyethylene film for above grade application, 6 mil thick.

B. Air Infiltration Barrier: Tyvek CommercialWrap as manufactured by DuPont or approved equal.

C. Tape joints of rigid insulation in accordance with insulation manufacturers' instructions.

D. Adhesive: Type recommended by insulation manufacturer for application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulationand adhesive.

B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

C. Sequence Work to ensure fireproofing and firestop materials are in place before beginning Work of this Section.

3.02 BOARD INSTALLATION AT EXTERIOR WALLS

A. Install boards horizontally on walls.
1. Place boards to maximize adhesive contact.
2. Install in running bond pattern.

B. Extend boards over expansion joints, unbonded to wall on one (1) side of joint.

C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

D. Place 6 inch wide polyethylene sheet at perimeter of wall openings, from adhesive vapor retarder bed to louver frames, and tape seal in place to ensure continuity of vapor retarder and air seal.

E. Tape insulation board joints.

3.03 BATT INSTALLATION

A. Install insulation in accordance with manufacturer's instructions.

B. Install in wall spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

E. Retain insulation batts in place with wire mesh secured to framing members.

F. Tape seal tears or cuts in vapor retarder.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

3.05 PROTECTION

A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 072726
FLUID-APPLIED MEMBRANE AIR BARRIERS, VAPOR IMPERMEABLE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. All Contract Documents, including General and Supplementary Conditions and Division 01 - General Requirements, apply to the Work of this Section.

1.02 SUMMARY

A. The Work of this Section includes, but is not limited to, the following:
   1. Materials and installation methods for fluid applied air and vapor barrier membrane system located in the non-accessible part of the wall.
   2. Materials and installation methods to bridge and seal air leakage pathways in roof and foundation junctions, window and door openings, control and expansion joints, masonry ties, piping, and other penetrations through the wall assembly.

1.03 RELATED SECTIONS

A. Section 03 3000 - Cast-In-Place Concrete.

B. Section 04 2000 - Unit Masonry.

C. Section 07 9000 - Joint Sealers.

1.04 PERFORMANCE REQUIREMENTS

A. Provide an air and vapor barrier system to perform as a continuous barrier to air infiltration/ exfiltration and water vapor transmission and to act as a liquid water drainage plane flashed to discharge any incidental condensation or water penetration.

B. Air Barriers:
   1. The building envelope shall be designed and constructed with a continuous air barrier to control air leakage into or out of the conditioned space. An air barrier shall also be provided for interior partitions between conditioned space and space designed to maintain temperature or humidity levels which differ from those in the conditioned space by more than 50 percent of the difference between the conditioned space and design ambient conditions. The air barrier shall have the following characteristics:
      a. It must be continuous, with all joints made airtight.
      b. It shall have an air permeability not to exceed 0.004 cfm per square foot under a pressure differential of 0.3 inch water. (1.57 psf.) (equal to 0.02L/s/m2 @ 75 Pa.).
      c. It shall be capable of withstanding positive and negative combined design wind, fan, and stack pressures on the envelope without damage or displacement, and shall transfer the load to the structure. It shall not displace adjacent materials under full load.
      d. It shall be durable or maintainable.
   2. The air barrier shall be joined in an airtight and flexible manner to the air barrier material of adjacent systems, allowing for the relative movement of systems due to thermal and moisture variations and creep. Connection shall be made between:
      a. Foundation and walls.
      b. Walls and windows or doors.
      c. Different wall systems.
      d. Wall and roof.
      e. Wall and roof over unconditioned space.
      f. Walls, floor and roof across construction, control and expansion joints.
      g. Walls, floors and roof to utility, pipe and duct penetrations.

C. Air barrier Penetrations:

1. All penetrations of the air barrier and paths of air infiltration/exfiltration shall be made airtight.

1.05 REFERENCES

A. The following standards and publications are applicable to the extent referenced in the text. The most recent version of these standards is implied unless otherwise stated.
   1. American Society for Testing and Materials (ASTM):
      a. Standard Specification for High Solids, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course.
      b. Standard Test Methods for Rubber Properties in Tension.
      c. Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.
      d. D 1644 Test Methods for Non-volatile Content of Varnishes.
      e. D 1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
      f. D 4541 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
      g. D 3767 Standard Practice for Rubber - Measurements of Dimensions.
      h. Test Methods for Water Vapor Transmission of Materials.
      i. Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
      j. E 2178 Standard Test Method for Air Permeance of Building Materials.
      k. Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.

1.06 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal process.

B. Product Data: Submit manufacturer's product data, installation instructions, use limitations, and substrate preparation recommendations.

C. Shop drawings showing locations and extent of air and vapor barrier system including details for terminations flashings, penetrations, window and door openings, and treatment of substrate joints and cracks.

D. Written documentation demonstrating installers qualifications under the "Quality Assurance" article including reference Projects of a similar scope.

E. Samples: Submit representative samples of the following for approval:
   1. Fluid applied air barrier membrane.
   2. Transition membrane.

F. Warranty: Submit a sample warranty identifying the terms and conditions stated in Article 1.09.

1.07 QUALITY ASSURANCE

A. Manufacturer: Air and vapor barrier systems shall be manufactured and marketed by a firm with a minimum of 20 years experience in the production and sales of waterproofing and air barrier products. Manufacturers proposed for use, but not named in these Specifications, shall submit evidence of ability to meet all requirements specified and include a list of Projects of similar design and complexity completed within the past 5 years.

B. Installer: The installer shall demonstrate qualifications to perform the Work of this Section by submitting the following:
   1. List of at least three (3) Projects contracted within the past 5 years of similar scope and complexity to this Project carried out by the firm and Site Supervisor.
   2. Installer must show evidence of adequate equipment and trained field personnel to successfully complete the Project in a timely manner.

C. Materials: Fluid applied air and vapor barrier material shall be 2-part synthetic rubber based systems free of solvents, isocyanurates, and bitumen. For each type of material required for the Work of this Section, provide primary materials that are the products of one (1) manufacturer.

D. A Pre-installation Conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this Work with related and adjacent Work. Agenda for meeting shall include, but not be limited to, the following:
   1. Review of submittals.
   2. Review of surface preparation, minimum curing period and installation procedures.
   3. Review of special details and flashings.
   4. Sequence of construction, responsibilities and schedule for subsequent operations.
   5. Review of mock-up requirements.
   6. Review of inspection, testing, protection and repair procedures.

E. Mock-up:
   1. Prior to installation of the air and vapor barrier system a field-constructed mock-up shall be provided under the provisions of Section 01 3000 - Administrative Requirements, to verify details and tie-ins and to demonstrate the required quality of materials and installation.
   2. Construct a typical exterior wall section, 8 feet long x 8 feet wide, incorporating back-up wall, cladding, window and door frame and sill, insulation, flashing and any other critical junction (roof, foundation, etc.).
   3. Allow 24 hours for inspection and testing of mock-up before proceeding with Air and Vapor Barrier Work.
   4. Mock-up may remain as part of the Work.
   5. Inspection and Testing: Cooperate and coordinate with the Owner’s inspection and testing agency. Do not cover any installed air and vapor barrier membrane until it has been inspected, tested and approved.

1.08 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products in labeled packages. Store and handle in strict compliance with manufacturer’s instructions, recommendations, and material safety data sheets. Protect from damage from sunlight, weather, excessive temperatures, and construction operations. Remove damaged material from the site and dispose of in accordance with applicable regulations.

B. Do not double-stack pallets of fluid applied membrane components on the Job Site. Provide cover on top and all sides, allowing for adequate ventilation.

C. Protect fluid-applied membrane components from freezing and extreme heat.

D. Sequence deliveries to avoid delays but minimize on-site storage.

1.09 PROJECT CONDITIONS

A. Perform Work only when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials used. Proceed with installation only when the Substrate Construction and Preparation Work is complete and in condition to receive the air and vapor barrier membrane.

1.10 WARRANTY

A. Submit manufacturer's warranty that air and vapor barrier and accessories are free of defects at time of delivery and are manufactured to meet manufacturer's published physical properties and material specifications.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Grace Construction Products; Product Perm-A-Barrier® Liquid.

B. Or approved equal.

C. Substitutions: See Section 01 6000 - Product Requirements.

2.02 GENERAL

A. For each type of material required for the Work of this Section, provide primary materials that are the products of one manufacturer.

2.03 FLUID APPLIED MEMBRANES

A. Description: A 2-part, self-curing, synthetic rubber based material free of solvents, isocyanurates and bitumen

B. Performance Requirements:

Property	Test Methods	Typical Value
Color		Green
Cured Film Thickness	ASTM D 3767 Method A	1.5 mm (0.060 in.) nominal
Solids Content	ASTM D 1644	100 percent
Air Permeance at 75Pa (0.3 in. water) Differential Pressure	ASTM E 2178	<0.001 L/(s.m2) (<0.0002 cfm/ft2)
Assembly Air Permeance at 75Pa (0.3 in. water) Differential Pressure	ASTM E 2357	<0.004 L/s*m2 (<0.0008 cfm/ft2)
Water Vapor Permeance	ASTM E 96, Method BW	Less than 4.6 ng/Pa.s.m2 (0.08 Perms)
Pull Adhesion to Concrete Block (CMU)	ASTM D 4541-02	0.24 N/mm² (35 psi)
Pull Adhesion to Glass Faced Wall Board	ASTM D 4541-02	0.12 N/mm² (18 psi)
Peel Adhesion to Concrete	ASTM D 903 Modified	880 N/m (5 lb./in.)
Elongation	ASTM D 412	500 percent minimum
Pliability, 180 Degree Bend over 1 inch Mandrel at-23 degrees F	ASTM D 1970	Unaffected
Low Temperature Flexibility and Crack Bridging 1/8 inch crack cycling at -15 degrees F	ASTM C836	Pass
Extensibility over 1/4 inch crack after heat aging	ASTM C836	Pass

1. NOTE: The membrane is applied to concrete and allowed to cure. Peel adhesion of the membrane is measured at a rate of 2 inches per minute with a peel angle of 90 degrees at room temperature.

2.04 TRANSITION MEMBRANE

A. Description: 36 mils of self-adhesive rubberized asphalt integrally bonded to 4 mil of cross-laminated, high-density polyethylene film to provide a minimum 40 mil thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed.

B. Performance Requirements:
   1. Water Vapor Transmission: ASTM E 96, Method B: 2.9 ng/m2sPa (0.05 perms) max.
   2. Air Permeance at 75Pa (0.3 inch water) pressure difference: 0.0006 L/(s.m2) (0.00012 cfm/ft2) max.
   3. Puncture Resistance: ASTM E 154: 178 N (40 lbs.) minimum.
   4. Lap Adhesion at 25 degrees F, ASTM D 1876: 880 N/m (5.0 lbs./in.) of width minimum.
   5. Low Temperature Flexibility, ASTM D 1970: Unaffected to -45 degrees F.
   6. Tensile Strength, ASTM D 412, Die C Modified: Minimum. 400 psi.
   7. Elongation, Ultimate Failure of Rubberized Asphalt, ASTM D 412 Die C: Minimum 200 percent.

C. Acceptable Materials:
   1. Perm-A-Barrier Detail Membrane manufactured by Grace Construction Products or approved equal.

2.05 FLEXIBLE MEMBRANE WALL FLASHING

A. Description: 32 mils of self-adhesive rubberized asphalt integrally bonded to 0.8 mil of cross-laminated, high-density polyethylene film to provide a minimum 40 mil thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed.

B. Performance Requirements:
   1. Water Vapor Transmission, ASTM E 96, Method B: 2.9 ng/m2sPa (0.05 perms) maximum.
   2. Water Absorption, ASTM D 570: maximum 0.1 percent by weight.
   3. Puncture Resistance, ASTM E 154: 356 N (80 pounds) min.
   4. Tear Resistance:
      a. Initiation ASTM D 1004: Min. 58 N (13.0 pounds) M.D.
      b. Propagation ASTM D 1938: Min. 40 N (9.0 pounds) M.D.
   5. Lap Adhesion at -4ºC (25ºF), ASTM D 1876: 880 N/m (5.0 pounds/inch) of width.
   6. Low Temperature Flexibility, ASTM D 1970: Unaffected to -45 degrees F.
   7. Tensile Strength, ASTM D 412, Die C Modified: Min. 5.5 MPa (800 psi).
   8. Elongation, Ultimate Failure of Rubberized Asphalt, ASTM D412, Die C: Minimum 200 percent.

C. Acceptable Materials:
   1. Perm-A-Barrier Wall Flashing manufactured by Grace Construction Products or approved equal.

2.06 AIR & VAPOR BARRIER ACCESSORIES

A. Description: Water-based primer which imparts an aggressive, high tack finish on the treated substrate
   1. Flash Point: No flash to boiling point.
   2. Solvent Type: Water.
   3. VOC Content: Not to exceed 10 g/l.
   4. Application Temperature: 25 degrees F and above.
   5. Freezing point (as packaged): 21 degrees F.
   6. Product: Perm-A-Barrier WB Primer manufactured by Grace Construction Products or approved equal.

B. Description: 2-part, elastomeric, trowel grade material designed for use with self-adhered membranes and tapes. 10 g/l maximum VOC Content.
   1. Product: Bituthene® Liquid Membrane manufactured by Grace Construction Products or approved equal.

C. Optional Primers:

1. Description: High tack water based primer. 10 g/l maximum VOC content.
2. Product: Perm-A-Barrier Liquid Part B manufactured by Grace Construction Products.
3. Description: High tack low VOC solvent based primer. <200 g/l maximum VOC content.

D. Product: Bituthene Primer B2 LVC manufactured by Grace Construction Products.

E. Description: High tack solvent based primer. 440 g/l maximum VOC content.

F. Product: Bituthene Primer B2 manufactured by Grace Construction Products.

PART 3 EXECUTION

3.01 EXAMINATION

A. The installer shall examine conditions of substrates and other conditions under which this Work is to be performed and notify the Contractor, in writing, of circumstances detrimental to the proper completion of the Work. Do not proceed with Work until unsatisfactory conditions are corrected.

3.02 PREPARATION

A. Refer to manufacturer's literature for requirements for preparation of substrates. Surfaces shall be sound and free of voids, spalled areas, loose aggregate and sharp protrusions. Remove contaminants such as grease, oil and wax from exposed surfaces. Remove dust, dirt, loose stone, and debris. Use repair materials and methods that are acceptable to manufacturer of the fluid-applied waterproofing.

B. Exterior Sheathing Panels: Ensure that the boards are sufficiently stabilized with corners and edges fastened with appropriate screws. Pre-treat all board joints with 2 inch to 3 inch wide reinforced self-adhesive tape or fiberglass mesh style wallboard tape. Gaps greater than 1/4 inch should be filled with mastic or caulk, allowing sufficient time to fully cure before application of the tape and fluid applied membrane.

C. Masonry Substrates: Apply air and vapor barrier over concrete block and brick with smooth flush mortar joints. Fill all voids and holes, particularly in the mortar joints, with a lean mortar mix, non-shrinking grout or parge coat.

D. Related Materials: Treat construction joints and install flashing as recommended by manufacturer.

3.03 INSTALLATION

A. Refer to manufacturer's literature for recommendations on installation.

B. Application of Fluid Applied Membrane:
1. Spray or trowel apply a continuous uniform film at minimum 0.060 inch dry film thickness using multiple, overlapping passes.
2. When spraying use a cross-hatching technique (alternating horizontal and vertical passes) to ensure even thickness and coverage.
3. When spraying use high pressure, multi-component, airless spray equipment approved by material manufacturer.
4. Carry membrane into any openings a minimum of 2 inches.
5. Seal all brick-ties and other penetrations as Work progresses.

C. Application of Transition Membrane
1. After allowing the fluid applied membrane to cure to tack-free, apply transition membrane with a minimum overlap of 3 inches onto each surface at all beams, columns, and joints as indicated in Detail Drawings.
2. Tie in to window and door frames, spandrel panels, roof and floor intersections, and changes in substrate.
3. Use pre-cut, easily handled lengths for each location.

4. Remove silicone-coated release paper and position membrane flashing carefully before placing it against the surface.
5. When properly positioned, place against surface by pressing firmly into place by hand roller.
6. Overlap adjacent pieces 2 inches and roll all seams with a hand roller.
7. Seal top edge of flashing with termination mastic.
8. When transition flashing is pre-installed prior to application of fluid applied membrane, apply transition flashing as above. Spray or trowel a continuous uniform film of fluid membrane at minimum 0.060 inch dry film thickness using multiple, overlapping passes with a minimum overlap of 3 inches onto transition flashing. For sill condition, spray or trowel fluid membrane onto pre-installed sill flashing and onto horizontal section of sill.

3.04 PROTECTION AND CLEANING

A. Remove any masking materials after installation. Clean any stains on materials that would be exposed in the completed Work using procedures as recommended by manufacturer.

B. Liquid is not suitable for permanent exposure and should be protected from the effects of sunlight.

C. Schedule Work to ensure that the liquid system is covered as soon as possible after installation. Protect liquid system from damage during subsequent operations. If the liquid system cannot be covered within 60 days after installation, apply temporary UV protection such as dark plastic sheet or tarpaulins.

END OF SECTION

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SECTION 078400
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 016116 - Volatile Organic Compound (VOC) Content Restrictions.

F. Section 017000 - Execution and Closeout Requirements: Cutting and patching.

G. Section 070553 - Fire and Smoke Assembly Identification.

H. Section 092116 - Gypsum Board Assemblies: Gypsum wallboard fireproofing.

I. Division 03 0000 - Concrete; concrete work.

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) - 2020 NYS Building Code Series; 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; 2023b.

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; 2023a.

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 013000 - 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.

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 incorporate 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. Contractor shall coordinate visual inspections and destructive testing with Independent Testing Agency as Work is being performed according to ASTM E2174 and ASTM E2393.

C. Contractor shall repair or replace through-penetration, membrane penetration and joint firestopping at locations where visual inspection results indicate penetration and joint firestopping do not meet specified requirements for the project and the manufacturer's tested and listed firestop system.

D. Contracor shall repair or replace through-penetration, membrane penetration and joint penetration firestopping at locations where code required destructive inspections are performed. Owner shall pay for firestopping re-installation found in compliance. Contractor shall pay for firestopping re-installation found in non-compliance.

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 XHEZ.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 079005
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 088000 - Glazing: Glazing sealants and accessories.

C. Section 092116 - 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.

G. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2015 (Reapproved 2021).

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.

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. Concrete Floor Joint Filler: Self-leveling, pourable, semi-rigid sealant intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
1. Composition: Polyurea, Single or multi-part,100 percent solids by weight.
2. Hardness: 85 after 7 days, when tested in accordance with ASTM D2240 Shore A.
3. Color: To be selected by Architect from manufacturer's standard colors.
4. Joint Width: 1/8 inch.
5. Joint Width, Maximum: 1/4 inch.
6. Joint Depth: Provide product suitable for joints from 1/8 inch to 2 inches in depth including space for backer rod.

F. 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.

E. Exposed Concrete Floor Joints: Test joint filler in inconspicuous area of floor slab. Verify specified product does not stain or discolor slab.

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.

I. Concrete Floor Joint Filler: Install concrete floor joint filler per manufacturer's written instructions. After floor joint filler is fully cured, shave joint filler flush with top of concrete slab.

3.04 CLEANING

A. Clean adjacent soiled surfaces.

3.05 PROTECTION

A. Protect sealants until cured.

END OF SECTION

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SECTION 081113
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.

1.02 RELATED REQUIREMENTS

A. Section 087100 - Door Hardware.

B. Section 088000 - 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; 2023, with Editorial Revision.

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 013000 - 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. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

E. Manufacturer's Qualification Statement.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.

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 016000 - 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 Core Material: Manufacturers standard core material/construction and in compliance with requirements.
   3. 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 Core Material: Manufacturers standard core material/construction in compliance with requirements.
6. 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. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.

G. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.

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 088000, 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. 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 087100.

F. Comply with glazing installation requirements of Section 088000.

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 081416
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 081113 - Hollow Metal Doors and Frames.

B. Section 087100 - Door Hardware.

C. Section 088000 - 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 017800 - 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 016000 - 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 081113.

B. Glazing: As specified in Section 088000.

C. Door Hardware: As specified in Section 087100.

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

SECTION 08 17 43
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.

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

2.02 DESCRIPTION

A. Model.
   1. SL-17 Pebble Grain FRP/ Aluminum Hybrid Door.
B. Door Opening Size.
   1. As indicated on door schedule.
C. Construction.
   1. Door Thickness.
      a. 1-3/4”.
   2. Stiles & Rails.
      a. Aluminum extrusions made from 6063 aluminum alloys with a minimum temper of T5.
      b. 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.
      c. Screw or snap in place applied caps are not acceptable.
      d. Top rails must have integral legs for interlocking continuous extruded aluminum flush cap.
      e. 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.
      f. Meeting stiles to include integral pocket to accept pile brush weather seal.
   3. Corners.
      a. Mitered.
      b. Secured with 3/8” diameter full-width steel tie rod through extruded splines top and bottom which are integral to standard tubular shaped rails.
      c. 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.
      d. Weld, glue, or other methods of corner joinery are not acceptable.
   4. Core.
      a. Poured-in-place polyurethane foam.
      b. Laid in foam cores are not acceptable.
      c. Foam Plastic Insulated Doors: IBC 2603.4.
         1. Foam plastic shall be separated from the interior of a building by an approved thermal barrier.
         2. Approved thermal barrier must meet the acceptance criteria of the Temperature Transmission Fire Test and Integrity Fire Test as stated in NFPA 275.

3. 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.
4. 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.

5. Face Sheet.
   a. Exterior
      1. 0.120” thick, pebble texture, through color with SpecLite 3® integral surfaseal film FRP sheet.
      2. Optional painted finish consult manufacturer.
      3. Class C standard.
   b. Interior
      1. 0.120” thick, pebble texture, through color with SpecLite 3® integral surfaseal film FRP sheet.
      2. Optional painted finish consult manufacturer.
      3. Class C standard optional Class A available consult manufacturer.
   c. Attachment of face sheet.
      1. 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.
      2. Use of glue to bond face sheet to core or extrusions is not acceptable.
6. Cutouts.
   a. Manufacture doors with cutouts for required vision lites, louvers, and panels.
7. Hardware.
   a. Pre-machine doors in accordance with templates from specified hardware manufacturers.
   b. Surface mounted closures will be reinforced for but not prepped or installed at factory.
   c. Factory install door hardware.
8. Reinforcements.
   a. Aluminum extrusions made from 6061 or 6063 aluminum alloys.
   b. Sheet and plate to conform to ASTM-B209.
   c. Alloy and temper to be selected by manufacturer for strength, corrosion resistance, and application of required finish, and control of color.
   d. Bars and tubes to meet ASTM-B221.

D. Sustainability Characteristics.
1. LEED Declaration.
   a. Entrance Products contribute to point calculations for the following credits:
      1. MR Credit 4.1 Recycled Content 10% (post-consumer = ½ pre-consumer) 1 point.
      2. MR Credit 4.2 Recycled Content 20% (post-consumer = ½ pre-consumer) 1 point.
   b. All aluminum extrusions are produced using prime-equivalent billet produced from 100% reprocessed 6063-T6 alloy recovered from industrial processes. The USGBC classifies these extrusions as pre-consumer recycled material.
   c. Manufacturing facility located within 500 miles of major components and materials, including aluminum extrusions.
   d. The point of recovery and smelting of pre-consumer recycled material within 500 miles of the manufacturing facility.

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 10^3 psi.
        b. Flexural Modulus, ASTM-D790: 0.7 x 10^6 psi.
        c. Tensile Strength, ASTM-D638: 13 x 10^3 psi.
        d. Tensile Modulus, ASTM-D638: 1.2 x 10^6 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 10^3 psi.
b. Flexural Modulus, ASTM-D790: 0.57 x 10^6 psi.
c. Tensile Strength, ASTM-D638: 6.8 x 10^3 psi.
d. Tensile Modulus, ASTM-D638: 0.90 x 10^6 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 m^2K/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. 0.12 cfm/sqft @ 1.57 psf.
2. 0.06 cfm/sqft @ 6.24 psf.
b. Commercially Glazed Swinging Entrance Door (> than 50% glass)
1. 0.04 cfm/sqft @ 1.57 psf.
2. 0.14 cfm/sqft @ 6.24 psf.

E. AF-150 Framing.
1. Tensile Strength, ASTM-D638: 15,900 psi.
2. Tensile Modulus of Elasticity, ASTM-D638: 1.58 x 10^6 psi.
3. Maximum Compressive Strength, ASTM-D695: 15,500 psi.
4. Compressive Modulus of Elasticity, ASTM-D695: 6.7 x 10^5 psi.
5. Flexural Strength, ASTM-D790: 39.3 x 10^3 psi.
6. Flexural Modulus, ASTM-D790: 1.23 x 10^6 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 $kg.m^3$ @ 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%.

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.
                  a. 70% polyvinylidene difluoride (PVDF) resin, meets or exceeds all AAMA 2605 specifications
               2. Color.
                  a. 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.
a. 70% polyvinylidene difluoride (PVDF) resin, meets or exceeds all AAMA 2605 specifications
2. Color.
a. 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

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SECTION 083100
ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SUBMITTALS

A. See Section 013000 - 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 083323
OVERHEAD COILING DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire-rated coiling doors.

B. Electric operators and control stations.

C. Wiring from electric circuit disconnect to operators and control stations.

1.02 RELATED REQUIREMENTS

A. Section 079200 - Joint Sealants: Sealing joints between frames and adjacent construction.

B. Section 260583 - Wiring Connections: Power to disconnect.

1.03 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

C. ITS (DIR) - Directory of Listed Products; Current Edition.

D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.

E. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2008 (Reaffirmed 2020).

F. NEMA MG 1 - Motors and Generators; 2021.

G. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.

H. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2022.

I. UL (DIR) - Online Certifications Directory; Current Edition.

J. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

K. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide general construction, electrical equipment, and component connections and details.

C. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.

D. Manufacturer's qualification statement.

E. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.

F. Specimen warranty.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

B. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction as suitable for purpose specified and indicated.

1.06 WARRANTY

A. See Section 017800 - 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 COILING DOORS

A. Fire-Rated Coiling Doors: Steel slat curtain; comply with NFPA 80.
   1. Provide products listed and labeled by ITS (DIR) or UL (DIR) as suitable for purpose specified and indicated on drawings.
   2. Oversized Openings: Provide certificate of compliance from authorities having jurisdiction indicating approval of fire rated units and operating hardware assembly.
   3. Finish: Primed.
   4. Finish: Factory painted, color as selected.
   5. Guides, Angles: Stainless steel.
   6. Hood Enclosure: Manufacturer's standard; primed steel.
   7. Fire Alarm Release Mechanism: Electric-motor operated from fire alarm system and local heat or smoke detectors.
      a. Provide fail-secure, fail-closed, locking device upon power loss.
      b. Provide 10 second time delay for activation upon loss of power.
      c. Provide resettable device without replacement of parts, except when release triggered by exposure to local heat.
   8. Electric operation.
   9. Mounting: Within framed opening.

2.02 MATERIALS

A. Metal Curtain Construction: Interlocking slats.
   1. Curtain Bottom for Slat Curtains: Fitted with angles to provide reinforcement and positive contact in closed position.
   2. Weatherstripping for Exterior Doors: Moisture and rot proof, resilient type, located at jamb edges, bottom of curtain, and where curtain enters hood enclosure of exterior doors.
   3. Smoke Seals: Provide brush or gasket type weatherstripping seals to prevent passage of smoke and hot gases in compliance with UL 1784 testing requirements.

B. Guide Construction: Continuous, of profile to retain door in place with snap-on trim, mounting brackets of same metal.

C. Guides - Angle: ASTM A36/A36M metal angles, size as indicated.
   1. Stainless Steel: ASTM A 666, Type 304, rollable temper.

D. Hood Enclosure and Trim: Internally reinforced to maintain rigidity and shape.

E. Lock Hardware:
   1. For motor operated units, additional lock or latching mechanisms are not required.
   2. Slide Bolt: Provide on single-jamb side, extending into slot in guides, with padlock on one side.

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 ELECTRIC OPERATION

A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.
   1. Provide interlock switches on motor operated units.

B. Electric Operators:
   1. Mounting: Side mounted.
   2. Motor Enclosure:
      a. Interior Coiling Doors: NEMA MG 1, Type 1; open drip proof.
   3. Motor Rating: 1/3 HP; continuous duty.
   4. Motor Voltage: 120 volts, single phase, 60 Hz.
   5. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
   6. Controller Enclosure: NEMA 250, Type 4.
   7. Opening Speed: 12 inches per second.
   8. Brake: Manufacturer's standard type, activated by motor controller.
   9. Manual override in case of power failure.
   10. See Section 260583 for electrical connections.

C. Control Station: Provide standard three button, 'Open-Close-Stop' momentary-contact control device for each operator complying with UL 325.
   1. 24 volt circuit.
   2. Surface mounted, at interior door jamb.
   3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
      a. Primary Device: Provide electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors as required with momentary-contact control device.

D. Safety Edge: Located at bottom of coiling door, full width, electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object, hollow neoprene covered.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that adjacent construction is suitable for door installation.

B. Verify that electrical services have been installed and are accessible.

C. Verify that door opening is plumb, header is level, and dimensions are correct.

D. Notify Architect of any unacceptable conditions or varying dimensions.

E. Commencement of installation indicates acceptance of substrate and door opening conditions.

3.02 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Install fire-rated doors in accordance with NFPA 80.

C. Install smoke door assemblies in accordance with NFPA 105.

D. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

E. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

F. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

G. Coordinate installation of electrical service with Section 260583.

H. Complete wiring from disconnect to unit components.

I. Complete wiring from fire alarm system.

J. Install enclosure and perimeter trim.

3.03 ADJUSTING

A. Adjust operating assemblies for smooth and noiseless operation.

3.04 CLEANING

A. Clean installed components.

B. Remove labels and visible markings.

END OF SECTION

SECTION 085113
ALUMINUM WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Extruded aluminum windows with fixed sash, operating sash, and infill panels.

B. Operating hardware.

C. Insect screens.

1.02 RELATED REQUIREMENTS

A. Section 055000 - Metal Fabrications: Steel lintels.

B. Section 061000 - Rough Carpentry: Wood perimeter shims.

C. Section 079005 - Joint Sealers: Perimeter sealant and back-up materials.

D. Section 088000 - Glazing.

E. Section 12 2113 - Horizontal Louver Blinds and Roller 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 - 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.

3. Outswing Casement Windows - 3-1/4 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.
   b. Condensation Resistance Factor: CRF of 61 (frame) and 65 (glass) when measured in accordance with AAMA 1503.1.
   c. Thermal Transmittance: maximum .42 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.
4. Single Hung Windows - 3-1/4 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 56 (frame) and 62 (glass) when measured in accordance with AAMA 1503.1.
   c. Thermal Transmittance: maximum .51 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.
   f. Balance: Class 5 calibrated to each sash weight.
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 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. Samples: Submit two (2) samples, 12 inches x 12 inches in size, illustrating typical corner construction, accessories, and finishes.

E. Grade Substantiation: Prior to submitting Shop Drawings or starting fabrication, submit one(1) of the following showing compliance with specified grade:
   1. Evidence of AAMA Certification.
   2. Evidence of WDMA Certification.
   3. Evidence of CSA Certification.
   4. Test report(s) by independent testing agency itemizing compliance and acceptable to authorities having jurisdiction.

F. Manufacturer's Installation Instructions: Include complete preparation, installation, and cleaning requirements.

G. 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 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.

1.07 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.

1.08 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.

1.09 WARRANTY

A. See Section 017800 - 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.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Traco; Product TR-9500 Heavy Commercial F-AW100 Fixed, Thermal Aluminum Window - 4" Depth. (Stand Alone Unit)

B. Traco; Product TR-3100 Heavy Commercial C-AW-65 Outswing Casement, Thermal Aluminum Window - 3-1/4" Depth.

C. Traco; Product TR-9700 Heavy Commercial H-AW40 Single Hung, Side Load, Thermal Aluminum Window - 3-1/4" Depth .

D. Or approved equal.

E. Substitutions: See Section 016000 - 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.

D. Outswinging Casement Type:
   1. Construction: Thermally broken.
   2. Provide screens.
   3. Glazing: Double; clear; Solarban 60 on # 3 surface Low E.

E. Single-Hung Type:
   1. Construction: Thermally broken.
   2. Provide screens.
   3. Glazing: Double; clear; Solarban 60 on # 3 surface Low E.

2.03 COMPONENTS

A. Glazing: As specified in Section 088000.

B. Insect Screens (Outswing Casement): Full; field-mounted on interior with steel spring clips; handle-access wickets; 3/4 inch x 1-1/8 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; PVC spline.
   1. Insect screens shall not be installed on emergency egress windows.

C. Insect Screens (Single Hung): Half; held in exterior applied rigid PVC tracks with two (2) stainless steel leaf springs; 7/16 inch x 1-1/4 inches x .045 inch extruded tubular aluminum frame with window finish; corners mitered, gusset reinforced, and crimped; 18 x 16 dark aluminum mesh secured to frame with PVC spline.
   1. Insect screens shall not be installed on emergency egress windows.

D. Weatherstrip (Outswing Casement): Secured in extruded ports; double rows of EPDM gasket on vent perimeters.

E. Weatherstrip (Single Hung): Secured in extruded ports; on sash perimeters: rigid PVC weatherseal in one side of the vertical stiles, and pile conforming to AAMA 701-92 with polypropylene center fin in remaining locations.

F. Glazing Materials: As specified in Section 088000.

2.04 MATERIALS

A. Extruded Aluminum: ASTM B 221, 6063 alloy, T5 temper.

2.05 HARDWARE

A. Hardware (Outswing Casement): Concealed stainless steel hinges conforming to AAMA 904-01 to rotate vent outward on vertical axis; white bronze cam handles and strikes; stainless steel limit arm with release key; crank handles.

B. Hardware (Single Hung): Aluminum automatic sill locks, two (2) per window.

2.06 FABRICATION

A. Outswing Casement:
   1. Frame and Vent: All members double tubular; corners mitered, double gusset reinforced, factory-sealed with sealant conforming to AAMA 800-92, and crimped.
   2. Water Control: Pressure equalization gasket on vent interior; vent and frame weeps, foam baffles, and exterior hoods to allow water to drain by gravity and resist wind-driven water.
   3. Drip cap: Field-mounted on frame exterior above vent head.

B. Single Hung:

1. Frame: Members fastened with two (2) stainless steel screws per joint; factory-sealed with sealant conforming to AAMA 800-92.
2. Sash: Tubular horizontal sash rails coped and fastened to vertical sash stiles with a telescope-design joint secured with two stainless steel screws per sash corner; corners factory-sealed with sealant conforming to AAMA 800-92.
3. Sash Design: Continuous extruded lift rail on the bottom sash interior; mechanical interlock; weep holes for drainage.

C. 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 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.

B. Class I Color Anodized Finish: AAMA 611 AA-M12C22A44 Electrolytically deposited colored anodic coating not less than 0.7 mils thick; Light bronze medium bronze dark bronze black.

C. 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.

2.08 INSULATED METAL PANELS

A. Furnish and install all MAPEPANEL porcelain insulating, panels as manufactured by MAPES Industries, Inc.:
1. Porcelain on Aluminum (Embossed):
a. Exterior Face: 2 4 gauge porcelain enamel on aluminum of a suitable alloy for application of exterior grade porcelain enamel. Porcelain enamel shall be acid resistant CLASS A or better in accordance with current conditions of the Porcelain Enamel Institutes S-100(65) "Test for Weather Resistance of Architectural Porcelain Enamels". The base metal shall be pre-cleaned and treated to insure maximum adherence of the porcelain enamel. The surface of the aluminum shall receive a ground coat of porcelain enamel which is fused to the metal by a separate firing operation. A porcelain enamel cover coat of color selected shall be applied to one (1) surface of the ground coat and fused by a second firing operation. All porcelain enamel slips shall be machine applied with automatic spray to insure finish uniformity. Porcelain enamel shall be MAPE'S full color range as selected by the Architect.
b. Exterior Substrate: 1/8 inch thick fiber reinforced cement board.
c. Core Material for Insulating Panel: 1.7 pound density Isocyanurate
d. Lamination: Lamination shall be permanently elastic type neoprene or rubber base adhesive, using heat and pressure. Neither the adhesive selected nor the method of lamination shall be incompatible with the core material used. Adhesive strength shall be equal or better than the strength of any of the core materials.
e. Interior Substrate: 1/2 inch Type ‘X’, fire rated gypsum board.
f. Interior Finish: Smooth Primed Aluminum. Color to be selected by Architect.

g. Dimensional Tolerance: The tolerance shall be width and length plus or minus 1/16 inch. Thickness shall be plus or minus 1/16 inch.
h. Panel Thickness: Insulating panels shall have an actual thickness of 1 inch width.
i. R-Value: 3.6100.
j. U-Value: 0.2270.
k. Job Site Storage: All panels shall be stored in a protected area free from moisture. If the panels are allowed to get wet, they will be rejected by the Architect and replaced by the Contractor at no additional cost to the Owner.
l. Erection: Panels shall be properly blocked with elastic blocking devices in accordance with recommendations by the window manufacturers.
m. Cleaning: Panels shall be delivered with the surfaces clean from foreign matter.
n. Guarantee: All porcelain enamel finishes shall carry the guarantee as set forth in the Porcelain Enamel Institutes' specifications.
o. Warranty: 25 year on lamination.
p. A representative panel sample shall be submitted by the manufacturer for the Architect's inspection and approval.

2. Kynar on Aluminum (Smooth):
a. Exterior Face: Standard Kynar finish chosen from MAPE'S full color range as selected by the Architect.
b. Exterior Substrate: 1/8 inch thick fiber reinforced cement board.
c. Core Material for Insulating Panel: 1.7 pound density Isocyanurate
d. Lamination: Lamination shall be permanently elastic type neoprene or rubber base adhesive, using heat and pressure. Neither the adhesive selected nor the method of lamination shall be incompatible with the core material used. Adhesive strength shall be equal or better than the strength of any of the core materials.
e. Interior Substrate: 1/2 inch Type 'X', fire rated gypsum board.
f. Interior Finish: Smooth Primed Aluminum. Color to be selected by Architect.
g. Dimensional Tolerance: The tolerance shall be width and length plus or minus 1/16 inch. Thickness shall be plus or minus 1/16 inch.
h. Panel Thickness: Insulating panels shall have an actual thickness of 1 inch width.
i. R-Value: 3.6100.
j. U-Value: 0.2270.
k. Job Site Storage: All panels shall be stored in a protected area free from moisture. If the panels are allowed to get wet, they will be rejected by the Architect and replaced by the Contractor at no additional cost to the Owner.
l. Erection: Panels shall be properly blocked with elastic blocking devices in accordance with recommendations by the window manufacturers.
m. Cleaning: Panels shall be delivered with the surfaces clean from foreign matter.
n. Guarantee: All porcelain enamel finishes shall carry the guarantee as set forth in the Porcelain Enamel Institutes specifications.
o. Warranty: 20 year on Lamination.
p. A representative panel sample shall be submitted by the manufacturer for the Architect's inspection and approval.

3. Porcelain on Steel (Smooth) - RUST:

a. Exterior Face: 24 gauge porcelain enamel on steel of a suitable alloy for application of exterior grade porcelain enamel. Porcelain enamel shall be acid resistant CLASS A or better in accordance with current conditions of the Porcelain Enamel Institutes S-100(65) "Test for Weather Resistance of Architectural Porcelain Enamels". The base metal shall be pre-cleaned and treated to insure maximum adherence of the porcelain enamel. The surface of the steel shall receive a ground coat of porcelain enamel which is fused to the metal by a separate firing operation. A porcelain enamel cover coat of color selected shall be applied to one surface of the ground coat and fused by a second firing operation. All porcelain enamel slips shall be machine applied with automatic spray to insure finish uniformity. Porcelain enamel shall be MAPE'S non-standard color as selected by the Architect.
b. Exterior Substrate: 1/8 inch thick fiber reinforced cement board.
c. Core Material for Insulating Panel: 1.7 pound density Isocyanurate.
d. Lamination: Lamination shall be permanently elastic type neoprene or rubber base adhesive, using heat and pressure. Neither the adhesive selected nor the method of lamination shall be incompatible with the core material used. Adhesive strength shall be equal or better than the strength of any of the core materials.
e. Interior Substrate: 1/2 inch Type 'X', fire rated gypsum board.
f. **Interior Finish: ??_____??**
g. Dimensional Tolerance: The tolerance shall be width and length plus or minus 1/16 inch. Thickness shall be plus or minus 1/16 inch.
h. Panel Thickness: Insulating panels shall have an actual thickness of 1 inch width.
i. R-Value: 3.6100.
j. U-Value: 0.2770.
k. Job Site Storage: All panels shall be stored in a protected area free from moisture. If the panels are allowed to get wet, they will be rejected by the Architect and replaced by the Contractor at no additional cost to the Owner.
l. Erection: Panels shall be properly blocked with elastic blocking devices in accordance with recommendations by the window manufacturers.
m. Cleaning: Panels shall be delivered with the surfaces clean from foreign matter.
n. Guarantee: All porcelain enamel finishes shall carry the guarantee as set forth in the Porcelain Enamel Institutes specifications.
o. Warranty: 20 year on lamination.
p. A representative panel sample shall be submitted by the manufacturer for the Architect's inspection and approval.

2.09 ACCESSORIES

A. Roller Shades for all new windows as described in Section 12 2113 - Horizontal Louver Blinds and Roller 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 and infill panels in accordance with requirements specified in Section 088000.

J. Install perimeter sealant in accordance with requirements specified in Section 079005 - 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.

3.03 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.

3.04 ADJUSTING

A. Adjust hardware for smooth operation and secure weathertight closure.

3.05 CLEANING

A. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant and window manufacturer.

END OF SECTION

SECTION 087100
DOOR HARDWARE

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 (25) 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 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).

2.7 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.

B. Mortise Locks:

1. Locks shall meet or exceed ANSI/BHMA A156.13 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 (TSL). MSS Series (Basis of Design)
   b. Schlage (SC) L Series.
   c. Sargent Manufacturing (SA) 8200 Line.

2.8 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.

2.9 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).

2.10 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).

2.11 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).

2.12 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).

2.13 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).

2.14 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.

2.15 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
A&J	A&J Washroom
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

Legend:
↯Electrified Opening

Hardware Group No. 01

For use on Door #(s):
171-1A 171-6A

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 LOCKSET	REUSE EXISTING RELOCATED	↯	626	
1	EA	WALL STOP	WS406/407CCV		630	IVE
3	EA	SILENCER	SR64		GRY	IVE

Hardware Group No. 02

For use on Door #(s):
171-2A

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 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	WALL STOP	WS406/407CCV		630	IVE
3	EA	SILENCER	SR64		GRY	IVE
1	EA	HOOK & BUMPER	UB14		CH	A&J

Hardware Group No. 03

For use on Door #(s):
171-3A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONTINUOUS HINGE	SL11 HD (BY DOOR MFR.)		628	SEL
1	EA	ACCESS CONTROL LOCKSET	REUSE EXISTING RELOCATED	✓	626	
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

Hardware Group No. 04

For use on Door #(s):
171-5A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONTINUOUS HINGE	SL11 HD (BY DOOR MFR.)		628	SEL
1	EA	ACCESS CONTROL LOCKSET	REUSE EXISTING RELOCATED	✓	626	
1	EA	SURFACE CLOSER	TDC40 H SCUSH		689	TOW
1	EA	ARMOR PLATE	8400 36" X 1 1/2" LDW B-CS		613	IVE
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

Hardware Group No. 05

For use on Door #(s):
171-OHD

Provide each RU door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	RIM OR MORTISE CYLINDER	AS REQUIRED		626	BES
1			BALANCE OF HARDWARE BY DOOR MANUFACTURER			

VERIFY CYLINDER REQUIREMENTS WITH DOOR MFR.

Hardware Group No. 06

For use on Door #(s):
171A 171B

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	BB81 4.5" NRP		US26D	PBB
1	EA	ACCESS CONTROL LOCKSET	REUSE EXISTING RELOCATED	✓	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	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
1	EA	MAGNET	SEM7830 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.

END OF SECTION

SECTION 088000
GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Glass.

B. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

A. Section 079005 - Joint Sealers: Sealant and back-up material.

B. Section 081113 - Hollow Metal Doors and Frames: Glazed doors.

C. Section 081416 - Flush Wood Doors: Glazed lites in doors.

D. Section 085113 - Aluminum Windows: Glazing furnished by window manufacturer.

E. Section 086300 - Metal-Framed Skylights: Glazing furnished by skylight manufacturer.

1.03 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.

B. ASTM C1036 - Standard Specification for Flat Glass; 2021.

C. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.

D. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2019.

E. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).

F. ASTM E 119 - Standard Test Method for Tests of Building Construction and Materials.

G. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.

H. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2019.

I. GANA (GM) - GANA Glazing Manual; 2022.

J. GANA (SM) - GANA Sealant Manual; 2008.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal process.

B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.

C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.

D. Certificates: Certify that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with GANA Glazing Manual and FGMA Sealant Manual for glazing installation methods. Maintain one copy on site.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum _____ years experience.

1.06 PERFORMANCE REQUIREMENTS

A. Glazing shall comply with the CPSC 16 CFR, Part 1201 criteria for Category 1 or Category 2:
   1. Category 1: 9 square feet or less of exposed surface area.
   2. Category 2: more than 9 square feet of exposed surface area.

1.07 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 50 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.08 WARRANTY

A. See Section 017800 - Closeout Submittals for additional warranty requirements.

B. Sealed Insulating Glass Units: Provide a 5 year warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.

C. Laminated Glass: Provide a 5 year warranty to include coverage for delamination, including replacement of failed units.

PART 2 PRODUCTS

2.01 GLAZING TYPES

2.02 EXTERIOR GLAZING ASSEMBLIES

A. Performance Criteria: Select type and thickness of glass to withstand dead and 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.

2.03 GLASS MATERIALS

A. Glass Manufacturers:
   1. Pilkington Building Products North America.
   2. PPG Industries, Inc.
   3. Or approved equal.
   4. Substitutions: Refer to Section 016000 - Product Requirements.

B. Float Glass: All glazing is to be float glass unless otherwise indicated.
   1. Annealed Type: ASTM C1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select).
   2. Heat-Strengthened and Fully Tempered Types: ASTM C1048.
   3. Tinted Types: Color and performance characteristics as indicated.
   4. Thicknesses: As indicated; for exterior glazing comply with specified requirements for wind load design regardless of specified thickness.

C. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
   1. Laminated Safety Glass: Comply with 16 CFR 1201 test requirements for Category II.
   2. Plastic Interlayer:
      a. Polyvinyl Butyral (PVB) Interlayer: 0.030 inch thick, minimum.

D. Clear Float Glass: Clear, unless otherwise indicated, annealed.
   1. Comply with ASTM C 1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select).
   2. Refer to requirements for sealed insulating glass units for performance characteristics of assembled units composed of tinted glass, coated or uncoated.

E. Safety Glass (Type A): Clear; laminated.
   1. Laminated with 0.030 inch thick plastic interlayer; comply with ASTM C 1172
   2. 1/4 inch minimum thick.

F. Safety Glass (Type B): Clear; fully tempered.

1. Comply with 16 CFR 1201 test requirements for Category I (for glass areas under 9 square feet) and Category II (for glass areas over 9 square feet).
2. 1/4 inch (6 mm) minimum thick.

G. Safety Glass (Type C): Clear; Fire Rated.
1. 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.
2. 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.
3. 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.
4. All glass to be clear. No visual distortion and/or imperfections will be accepted.

2.04 SEALED INSULATING GLASS UNITS

A. Sealed Insulating Glass Units: Types as indicated.
1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
2. Edge Spacers: warm edge spacer.
3. Edge Seal: Glass to elastomer.
4. Purge interpane space with dry hermetic air.

B. Insulated glass for the aluminum entrances and the windows are to be provided by the manufacturer and is as specified in the appropriate sections.

C. Insulated Glass Units (Type D): Double pane with glass to elastomer edge seal.
1. Outer pane of 1/4 inch fully tempered safety (Type B) glass, inner pane of 1/4 inch fully tempered safety (Type B) glass with argon gas.
2. Total unit thickness of 1 inch minimum.

2.05 GLAZING COMPOUNDS

A. Silicone Sealant: Single component; moisture curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920, Type S, Grade NS, use NT, G, A, O, Class A cured Shore A hardness of 26 to 30; color as selected.

2.06 GLAZING ACCESSORIES

A. Glazing Tape: Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, designed for compression of 25 percent to effect an air barrier and vapor retarder seal; 1/4 inch x 1/4 inch size.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that openings for glazing are correctly sized and within tolerance.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

C. No glazing work shall be completed when the temperature is below 40 degrees F in accordance with Fed. Spec. TT-C-00598b and TT-S-00230.

3.02 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant.

D. Install sealants in accordance with ASTM C1193 and GANA Sealant Manual.

E. Install sealant in accordance with manufacturer's instructions.

3.03 INSTALLATION GENERAL

A. The bite or overlap requirements established by the glass manufacturer shall be complied with. All bed clearance shall be maintained by setting blocks and as required by the glass manufacturer.

B. The minimum bite shall be maintained as follows:
   1. 1/4 inch bite on glass under 50 inches.
   2. 3/8 inch bite on glass between 50 and 100 inches.
   3. 1/2 inch bite on glass over 100 inches.
   4. Larger as required by special types and/or sizes of glass.
   5. Glass shall be centered exactly in openings.

C. All tong marks or other irregularities in the glass shall be concealed in the "bite" against window members. If any marks cannot be concealed the glass unit shall be rejected and shall be replaced at no additional cost to the Owner.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Glass product manufacturers to provide field surveillance of the installation of their products.

C. Monitor and report installation procedures and unacceptable conditions.

3.05 CLEANING

A. Remove glazing materials from finish surfaces.

B. Remove labels after Work is complete.

C. Clean glass and adjacent surfaces.

3.06 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.

END OF SECTION

SECTION 090561
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 014000 - Quality Requirements: Additional requirements relating to testing agencies and testing.

B. Section 033000 - 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 50 mm [2 in.] Cube Specimens); 2023.

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 013000 - 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 016000 - 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 016000 - 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 092116
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. Gypsum sheathing.

E. Cementitious backing board.

F. Gypsum wallboard.

G. Joint treatment and accessories.

H. Glass mat faced board.

1.02 RELATED REQUIREMENTS

A. Section 061000 - Rough Carpentry: Wood blocking product and execution requirements.

B. Section 072100 - Thermal Insulation: Acoustic insulation.

C. Section 072500 - Weather Barriers: Water-resistive barrier over sheathing.

D. Section 078400 - Firestopping: Top-of-wall assemblies at fire-resistance-rated walls.

E. Section 079200 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.

1.03 REFERENCE STANDARDS

A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; 2012.

B. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2018.

C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

E. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members; 2015.

F. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2017 (Reapproved 2022).

G. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2018.

H. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2020.

I. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2023.

J. 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.

K. 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.

L. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2019.

M. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2017.

N. ASTM C1280 - Standard Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing; 2018 (Reapproved 2023).

O. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.

P. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.

Q. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2023.

R. ASTM E413 - Classification for Rating Sound Insulation; 2022.

S. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).

T. GA-216 - Application and Finishing of Gypsum Panel Products; 2021.

U. UL (FRD) - Fire Resistance Directory; Current Edition.

1.04 SUBMITTALS

A. See Section 013000 - 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.

E. Test Reports: For stud framing products that do not comply with ASTM C645 or ASTM C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum 5 years of experience.

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 45-49 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

C. Fire-Resistance-Rated Assemblies: Provide completed assemblies with the following characteristics:
   1. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).
   2. As indicated on the Drawings.

2.02 METAL FRAMING MATERIALS

A. 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.

B. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws, and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI S100-12.
2. Material: ASTM A653/A653M steel sheet, SS Grade 50/340, with G60/Z180 hot-dipped galvanized coating.
3. Provide components UL-listed for use in UL-listed fire-resistance-rated head of partition joint systems indicated on drawings.
4. Provide mechanical anchorage devices as described above that accommodate deflection while maintaining the fire-resistance rating of the wall assembly.
5. Provide top track preassembled with connection devices spaced to fit stud spacing indicated on drawings; minimum track length of 12 feet.

C. Deflection and Firestop Track: Intumescent strip factory-applied to track flanges expands when exposed to heat or flames to provide a perimeter joint seal.

D. 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.
a. Materials: ASTM A36/A36M formed sheet steel support member with factory-welded ASTM A1003/A1003M steel plate base.
3. Framing Connectors: ASTM A653/A653M G90 galvanized steel clips; secures cold rolled channel to wall studs for lateral bracing.

E. Grid Suspension Systems: Steel grid system of main tees and support bars connected to structure using hanging wire.

2.03 BOARD MATERIALS

A. 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. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
a. Mold resistant board is required where indicated on the drawings.
3. 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.
4. Thickness:
a. Vertical Surfaces: 5/8 inch.
b. Ceilings: 1/2 inch.
5. Mold Resistant Paper Faced Products:
a. Basis of Design: Georgia-Pacific Gypsum; ToughRock Mold-Guard.
b. Substitutions: See Section 016000 - Product Requirements.
6. Glass Mat Faced Products:
a. Basis of Design: Georgia-Pacific Gypsum; DensArmor Plus.
b. Substitutions: See Section 016000 - Product Requirements.

B. Abuse Resistant Wallboard:
1. Application: High-traffic areas indicated.
2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
3. Type: Fire-resistance-rated Type X, UL or WH listed.
4. Thickness: 5/8 inch.

5. Edges: Tapered.
6. Paper-Faced Products:
    a. Basis of Design: Georgia-Pacific Gypsum; ToughRock Fireguard X Mold Guard Abuse-Resistant.
    b. Substitutions: See Section 016000 - Product Requirements.

C. Backing Board For Non-Wet Areas: Water-resistant gypsum backing board as defined in ASTM C1396/C1396M; sizes to minimum joints in place; ends square cut.
1. Application: Vertical surfaces behind thinset tile, except in wet areas.
2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
3. Regular Board Thickness: 5/8 inch.
4. Edges: Tapered.
5. Products:
    a. Basis of Design: Georgia-Pacific Gypsum; ToughRock Mold-Guard Gypsum Board.
    b. Substitutions: See Section 016000 - Product Requirements.

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.
4. Products:
    a. Basis of Design: Georgia-Pacific Gypsum; ToughRock Span 24 Ceiling Board.
    b. Substitutions: See Section 016000 - Product Requirements.

E. Exterior Sheathing Board: Sizes to minimize joints in place; ends square cut.
1. Application: Exterior sheathing, unless otherwise indicated.
2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
3. Fungal Resistance: No fungal growth when tested in accordance with ASTM G21.
4. Glass Mat Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.
5. Regular Board Thickness: 5/8 inch.
6. Edges: Square.
7. Glass Mat Faced Products:
    a. Basis of Design: Georgia-Pacific Gypsum; DensGlass Sheathing.
    b. Substitutions: See Section 016000 - Product Requirements.

2.04 GYPSUM WALLBOARD ACCESSORIES

A. Acoustic Insulation: As specified in Section 072100.

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 072500.

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.

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. Finishing Compound: Surface coat and primer, takes the place of skim coating.

G. 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.

H. 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.

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 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.

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 top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.

D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

E. Blocking: Install wood blocking for support of:
   1. Framed openings.
   2. Wall-mounted cabinets.
   3. Plumbing fixtures.
   4. Toilet accessories.
   5. Wall-mounted door hardware.

3.03 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.
   1. Place one bead continuously on substrate before installation of perimeter framing members.
   2. Place continuous bead at perimeter of each layer of gypsum board.
   3. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

3.04 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. Single-Layer Nonrated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.

C. Fire-Resistance-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.

D. Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.
   1. Paper-Faced Sheathing: Immediately after installation, protect from weather by application of water-resistive barrier.

E. Cementitious Backing Board: Install over steel framing members and plywood substrate where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.

F. 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.

3.05 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
   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.

D. Moisture Guard Trim: Install on bottom edge of gypsum board according to manufacturer's instructions and in locations indicated on drawings.

3.06 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. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
   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 1: Fire-resistance-rated wall areas above finished ceilings, whether or not accessible in the completed construction.

C. 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.
   2. Taping, filling, and sanding are not required at surfaces behind adhesive applied ceramic tile and fixed cabinetry.

D. 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.

E. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

END OF SECTION

SECTION 093000
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 079200 - Joint Sealants: Sealing joints between tile work and adjacent construction and fixtures.

B. Section 090561 - Common Work Results for Flooring Preparation: Concrete slab moisture and alkalinity testing and remediation procedures.

C. Section 092116 - Gypsum Board Assemblies: Tile backer board.

D. Section 092400 - 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; 2023.

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; 2023.

R. ANSI A118.7 - American National Standard Specifications for High Performance Cement Grouts for Tile Installation; 2019.

S. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 2019.

T. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2014 (Reaffirmed 2019).

U. ANSI A136.1 - American National Standard Specifications for Organic Adhesives for Installation of Ceramic Tile; 2020.

V. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2022.

W. 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).

X. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2024.

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 013000 - 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 016000 - 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. Substitutions: See Section 016000 - Product Requirements.

B. Glazed Wall Tile (PWT-3): ANSI A137.1 standard grade.
   1. Moisture Absorption: 7.0 to 20.0 percent as tested in accordance with ASTM C373.
   2. Size: 4-1/4 by 4-1/4 inch, nominal.
   3. Edges: Cushioned.
   4. Surface Finish: High gloss.
   5. Color(s): To be selected by Architect from manufacturer's standard range.
   6. Trim Units: Matching bead, bullnose, cove, and base shapes in sizes coordinated with field tile.
   7. Products:
      a. Dal-Tile Corporation: www.daltile.com/#sle.
      b. Substitutions: See Section 016000 - Product Requirements.

C. Porcelain Floor Tile, Type PFT-1: 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 24 inch, nominal.
   3. Thickness: 3/8 inch, nominal.
   4. Edges: Cushioned.
   5. Surface Finish: Unglazed.
   6. Color(s): As indicated on drawings.
   7. Pattern: As indicated on drawings..
   8. Products:
      a. Dal-Tile Corporation: www.daltile.com/#sle.
      b. Substitutions: See Section 016000 - Product Requirements.

D. Porcelain Wall Tile, Type (PWT-1): 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. Color(s): As indicated on drawings.
6. Pattern: As indicated on drawings..
7. Products:
    a. Dal-Tile Corporation; Portfolio: www.daltile.com/#sle.
    b. Substitutions: See Section 016000 - Product Requirements.

E. Porcelain Wall Tile, Type PWT-2: ANSI A137.1 standard grade.
1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
2. Size: [6 by 24] inch, nominal.
3. Thickness: 3/8 inch.
4. Color(s): As indicated on drawings.
5. Pattern: [As indicated on drawings.].
6. Products:
    a. Marazzi Corporation; Edgewood: www.marazzi.com/#sle
    b. Substitutions: See Section 016000 - Product Requirements

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. Applications:
    a. Transition between floor finishes of different heights.
    b. Thresholds at door openings.
    c. Floor to wall joints.
    d. Borders and other trim as indicated on drawings.
2. Manufacturers:
    a. Basis of DesigSchluter-Systems: www.schluter.com/#sle.
    b. Substitutions: See Section 016000 - 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 016000 - 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. LATICRETE International, Inc; TRI-LITE: www.laticrete.com/#sle.
d. Substitutions: See Section 016000 - 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 016000 - 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 016000 - 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 indicated on drawings.
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 016000 - 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 016000 - 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 016000 - 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 016000 - Product Requirements.

B. Backer Board: Cementitious type complying with ANSI A118.9; high density, glass fiber reinforced, 7/16 inch thick; 2 inch wide coated glass fiber tape for joints and corners.

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 090561.
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.

D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.

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

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SECTION 095100
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical units.

1.02 RELATED REQUIREMENTS

A. Section 016116 - 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 013000 - 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 016000 - 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 016000 - 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 016000 - 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 016116.

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 016000 - 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, Type ____: 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 016000 - 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. Perimeter Moldings: Same metal and finish as grid.

D. 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 017000 - Execution and Closeout Requirements for additional requirements.

B. Clean surfaces.

C. Replace damaged or abraded components.

END OF SECTION

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SECTION 096500
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 016116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 090561 - Common Work Results for Flooring Preparation: Removal of existing floor coverings, cleaning, and preparation.

C. Section 090561 - 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; 2023.

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 013000 - 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 016000 - 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 016000 - 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 016116.
   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.

C. 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 016000 - 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: Solid vinyl with color and pattern throughout thickness.
   1. Manufacturers:
      a. Johnsonite, a Tarkett Company: www.johnsonite.com/#sle.
      b. Mannington Commercial: www.manningtoncommercial.com#sle.
      c. Metroflor Corporation; Aspecta Five LVT: www.aspectaflooring.com/#sle.
      d. Substitutions: See Section 016000 - 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. Total Thickness: 0.125 inch.
   6. Color: As indicated on drawings.

C. Rubber Tile - Type RFT: Homogeneous, color and pattern throughout thickness.
   1. Manufacturers:
      a. Basis of Design: Johnsonite, a Tarkett Company; "Minerality": www.johnsonite.com/#sle.
      b. Substitutions: See Section 016000 - Product Requirements.
   2. Minimum Requirements: Comply with ASTM F1344, 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: 18 by 18 inch nominal.
   5. Total Thickness: 0.125 inch.
   6. Texture: Smooth.
   7. Color: As indicated on drawings.

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 016000 - 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 016000 - 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, a Tarkett Company; _____: www.johnsonite.com/#sle.
b. Substitutions: See Section 016000 - 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 material as flooring.
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 099000
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 055000 - 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 013000 - 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 016000 - 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 102600
WALL AND DOOR PROTECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Corner guards.

B. Protective wall covering.

1.02 RELATED REQUIREMENTS

A. Section 092116 - Gypsum Board Assemblies: Placement of supports in stud wall construction.

1.03 REFERENCE STANDARDS

A. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics; 2023, with Editorial Revision.

B. ASTM D543 - Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents; 2021.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

D. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.

E. ASTM F476 - Standard Test Methods for Security of Swinging Door Assemblies; 2023.

F. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Indicate physical dimensions, features, anchorage details, rough-in measurements, and corner guards.

C. Shop Drawings: Include plans, elevation, sections, and attachment details.

D. Samples: Submit samples illustrating component design, configurations, joinery, color and finish.
   1. Submit one samples of protective wall covering and door surface protection, 6 by 6 inches square.

E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project:
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Extra Stock Materials: One package(s) of minimum 96 inches long unit of each kind of covers for corner guards, bumper rails, and protective corridor handrails.

G. Maintenance Data: Manufacturer's instructions for care and cleaning of each type of product. Include information about both recommended and potentially detrimental cleaning materials and methods.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver wall and door protection items in original, undamaged protective packaging. Label items to designate installation locations.

B. Protect work from moisture damage.

C. Protect work from UV light damage.

D. Do not deliver products to project site until areas for storage and installation are fully enclosed, and interior temperature and humidity are in compliance with manufacturer's recommendations for each type of item.

E. Store products in either horizontal or vertical position, in compliance with manufacturer's instructions.

1.06 WARRANTY

A. See Section 017800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide 5-year manufacturer warranty for metal corner guards. Complete forms in Owner's name and register with manufacturer.
   1. Failures include, but are not limited to, the following:
      a. Structural failures or internal connection failures.
      b. Deterioration of materials beyond that expected of normal use, as intended by manufacturer.

C. Installer Warranty: Provide 5-year warranty for metal corner guards commencing on Date of Substantial Completion. Complete forms in Owner's name and register with installer.
   1. Failures include, but are not limited to, the following:
      a. Detachment of rail system from substrate.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Corner Guards:
   1. Construction Specialties, Inc; Stainless Steel Corner Guard: www.c-sgroup.com/#sle.
   2. Inpro; Stainless Steel Flush Mount Corner Guards: www.inprocorp.com/#sle.
   3. Substitutions: See Section 016000 - Product Requirements.

B. Protective Wall Covering:
   1. Construction Specialties, Inc; Acrovyn Wall Panels: www.c-sgroup.com/#sle.
   2. Inpro; Stainless Steel Sheet Wall Cladding: www.inprocorp.com/#sle.
   3. Pawling Corp; Rigid Vinyl Wall Covering: www.pawling.com/#sle.
   4. Substitutions: See Section 016000 - Product Requirements.

2.02 PERFORMANCE CRITERIA

A. Impact Strength: Unless otherwise noted, provide protection products and assemblies that have been successfully tested for compliance with applicable provisions of ASTM D256 and/or ASTM F476.

B. Chemical and Stain Resistance: Unless otherwise noted, provide protection products and assemblies with chemical and stain resistance complying with applicable provisions of ASTM D543.

C. Fungal Resistance: Unless otherwise noted, provide protection products and assemblies which pass ASTM G21 testing.

2.03 PRODUCT TYPES

A. Corner Guards - Flush Mounted: (CG-1)
   1. Material: Type 304 stainless steel, brushed No. 4 finish, 18 gauge, thick.
   2. Performance: Resist lateral impact force of 100 lbs at any point without damage or permanent set.
   3. Fire Resistance: Where fire rating is specified for the wall in which the guard is mounted, provide assemblies that have been tested in accordance with ASTM E119 for the same rating as the wall.

4. Surface Burning Characteristics: Provide assemblies with flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
5. Width of Wings: 2 inches.
6. Corner: Square.
7. Color: Brushed Stainless Steel.
8. Length: One piece.

B. Corner Guards - Surface Mounted, Transparent Plastic:
1. Material: Clear polycarbonate, extruded.
2. Thickness: 0.075 inch.
3. Performance: Resist lateral impact force of 100 lbs at any point without damage or permanent set.
4. Surface Burning Characteristics: Provide assemblies with flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
5. Width of Wings: 3/4 inches, with radiused corner and rounded wing tips.
6. Corner Angle: 90 degrees.
7. Length: One piece, 48 inches.

C. Protective Wall Covering (WP-1):
1. Material: Polyethylene terephthalate (PET or PETG); PVC and PBTs-free.
2. Thickness: 0.040 inch.
3. Surface Burning Characteristics: Provide assemblies with flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
4. Resistant to certain bacterial & fungal growth (per ASTM G 22-76 and G21-13)
5. Chemical Resistant (per ASTM D 543)
6. Impact Resistant (per ASTM F 476-84)
7. Color: As indicated on drawings.
8. Size: 4'x8' sheets
9. Accessories: Provide manufacturer's standard color-matched trim and moldings.
   a. Inside Corner Trim: Standard angle
   b. Outside Corner Trim: Standard angle.
10. Mounting: Adhesive.

2.04 FABRICATION

A. Fabricate components with tight joints, corners and seams.

2.05 SOURCE QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.

B. Verify that field measurements are as indicated on drawings.

C. Verify that substrate surfaces for adhered items are clean and smooth.

D. Refer to drawings for locations of corner guards.

E. Start of installation constitutes acceptance of project conditions.

3.02 INSTALLATION

A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to supporting construction.

B. Position corner guard 4 inches above finished floor to cut to full height of ceiling.

C. Position protective wall covering no less than 4 inch above finished floor to allow for floor level variation.
   1. Full-Height Installation: Establish a plumb line located at edge of starting point of first sheet to ensure following sheets will be installed plumb.
   2. Apply adhesive with 1/8 inch V-notch trowel to an area of wall surface that can be completed within cure time of the adhesive.
   3. Install trim pieces as required for a complete installation. Allow tolerance for thermal movement.
   4. At inside and outside corners cut covering sheets to facilitate installation of trim pieces or corner guards.

3.03 TOLERANCES

A. Maximum Variation From Required Height: 1/4 inch.

B. Maximum Variation From Level or Plane For Visible Length: 1/4 inch.

3.04 CLEANING

A. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.

B. Clean wall and door protection items of excess adhesive, dust, dirt, and other contaminants.

END OF SECTION

SECTION 102800
TOILET ROOM ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Commercial toilet accessories.

B. Under-lavatory pipe supply covers.

C. Accessories for toilet rooms and utility rooms.

D. Grab bars.

1.02 RELATED REQUIREMENTS

A. Section 088300 - Mirrors: Other mirrors.

B. Section 093000 - Tiling: Ceramic washroom accessories.

C. Section 224000 - Plumbing Fixtures: Under-lavatory pipe and supply covers.

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; 2024.

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 016000 - Product Requirements.

B. Under-Lavatory Pipe Supply Covers:
   1. Plumberex Specialty Products, Inc: www.plumberex.com/#sle.
   2. IPS Corp., Truebro.
   3. Substitutions: Section 016000 - 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) 18 inches.
         2) 36 inches.
         3) 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.

2.05 UNDER-LAVATORY PIPE AND SUPPLY COVERS

A. Specified in 224000 - Plumbing Fixtures.

2.06 UTILITY ROOM ACCESSORIES

A. Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, hat-shaped channel.
   1. Holders: Three spring-loaded rubber cam holders.
   2. Length: 36 inches.

B. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, with 1-1/2 inch returned edges, steel wall brackets.
   1. Drying rod: Stainless steel, 1/4 inch diameter.
   2. Hooks: 3, stainless steel rag hooks at shelf front.
   3. Mop/broom holders: 4 spring-loaded rubber cam holders at shelf front.
   4. Length: 36 inches.
   5. Product: B-224 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 104400
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 061000 - Rough Carpentry: Wood blocking product and execution requirements.

1.03 REFERENCE STANDARDS

A. FM (AG) - FM Approval Guide; Current Edition.

B. NFPA 10 - Standard for Portable Fire Extinguishers; 2022.

C. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide extinguisher operational features.

C. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.05 FIELD CONDITIONS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fire Extinguishers:
   1. Ansul, a Tyco Business: www.ansul.com/#sle.
   2. Kidde, a unit of United Technologies Corp: www.kidde.com/#sle.
   3. Pyro-Chem, a Tyco Business: www.pyrochem.com/#sle.
   4. Substitutions: See Section 016000 - Product Requirements.

B. Fire Extinguisher Cabinets and Accessories:
   1. Activar Construction Products Group, Inc. - JL Industries: www.activarcpg.com/#sle.
   2. Kidde, a unit of United Technologies Corp: www.kidde.com/#sle.
   3. Larsen's Manufacturing Co: www.larsensmfg.com/#sle.
   4. Substitutions: See Section 016000 - Product Requirements.

2.02 FIRE EXTINGUISHERS

A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
   1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.

B. Dry Chemical Type Fire Extinguishers: Stainless steel tank, with pressure gauge.
   1. Class: K type.
   2. Size: 1.6 gallons.
   3. Finish: Polished stainless steel.

4. Temperature range: Minus 20 degrees F to 120 degrees F.

2.03 FIRE EXTINGUISHER CABINETS

A. Cabinet Construction: Non-fire rated.

B. Cabinet Configuration: Semi-recessed type.
   1. Size to accommodate accessories.
   2. Trim: Flat square edge, with 1 1/2 inch wide face.

C. Door: 0.036 inch metal thickness, reinforced for flatness and rigidity with nylon catch. Hinge doors for 180 degree opening with two butt hinges.

D. Door Glazing: Float glass, clear, 1/8 inch thick, and set in resilient channel glazing gasket.

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.

2.04 ACCESSORIES

A. Extinguisher Brackets: Formed steel, chrome-plated.

B. Lettering: “FIRE EXTINGUISHER” decal, or vinyl self-adhering, prespaced 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.

B. Install cabinets plumb and level in wall openings, 24 inches from finished floor to inside bottom of cabinet.

C. Secure rigidly in place.

D. Place extinguishers in cabinets.

3.03 MAINTENANCE

A. See Section 017000 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.

B. Provide a separate maintenance contract for specified maintenance service.

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 a 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

HIGH SCHOOL

4.1 Item 1 - Ice Maker (By Owner) - One (1)

4.2 Item 2 - Mop Sink (By Plumbing Contractor) - One (1)

4.3 Item 3- High Density Shelving Units – One Lot (1 Lot) Required

A. Metro
   1. 1 kt Model MXTTE24 MetroMax Top-Track™ End Unit Kit, includes components for (2) 24"W stationary end units: (8) 86"H corrosion-proof polymer posts, track supports & hardware, compatible with MetroMax® 4™ & MetroMax® Q™ shelves (sold separately), NSF
   2. 1 set Model TTS14NA Super Erecta®, MetroMax® Q™ Top-Track Track Set, 14 ft., includes: necessary sections of track for assembling track runs (only (1) track set is required between stationary units), NSF
   3. 5 kt Model MXTTM24C MetroMax Top-Track™ Mobile Unit Kit, 24"W, includes: (4) MX74UP 74"H corrosion proof posts, (4) bumpers, (4) roller assemblies, (2) caster channels & (4) plate casters, compatible with MetroMax® 4™ & MetroMax® Q™ shelves (sold separately), NSF
   4. 28 ea. Model MQ2448G Quick Ship - MetroMax® Q Shelf, 48"W x 24"D, removable open grid polymer shelf mats on an epoxy coated steel frame with quick adjust corner releases, (4) wedge
   5. FEC to field measure and adjust shelving sizes if required to ensure a proper fit.

4.4 Item 4 - Dry Storage Dunnage - One Lot (1 Lot) Required

A. New Age
   1. 2 ea. Model 2015 Dunnage Rack, 48"W x 24"D x 8"H, all welded aluminum construction, 1-1/2" x 1-3/4" x 0.070 tubing, welded aluminum caps on feet, weight capacity 2500 lbs., NSF, Made in USA
   2. 2 ea. Model 2014 Dunnage Rack, 36"W x 24"D x 8"H, all welded aluminum construction, 1-1/2" x 1-3/4" x 0.070 tubing, welded aluminum caps on feet, weight capacity 2500 lbs., NSF, Made in USA
   3. Lifetime warranty
   4. FEC to field measure and just dunnage sized if required to ensure a proper fit.

4.5 Item 5- Hand Sink – One Lot (1 Lot) 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, heavy duty splash mounted gooseneck faucet, knee valve, basket drain, keyhole wall mount bracket, NSF, cCSAus. Provide each with the following:
   1. 1 ea. Model 7-PS-10 P-trap, heavy duty, 1-1/2", 17 gauge

4.6 Item 6 - 3 Compartment Sink - One (1) Required

A. Custom Model by EMI/MARLO size and shape as shown on drawing#24HF01 Approximately 35” X 138" X 34” high. 1 5/8” OD S/S legs with adjustable S/S flanged feet on front legs, S/S adjustable bullet feet on back 1 5/8” OD S/S cross bracing at 10” AFF, welded to legs. 14-gauge 304 S/S top with raised rolled edges. (finished edges if meets wall) S/S channel edge construction “C”, channel bracing cylindrical gussets and mastic sound deadening. 10” back splash at 45 degree & ¾ turn down enclosed back and ends.

B. Three (3) 20” wide X 28” long X 14” deep S/S sinks coved corner with S/S apron coved corner. 36” left and right drain boards sloped to sink Lever waste valve with overflow and support bracket Accommodate for Two (2) 8” OC faucets. Finished edge if meets wall. To be NSF & UL approved

1. 1 ea. T&S Brass Model B-0133-A12-B08 EasyInstall Pre-Rinse Unit, 8" wall mount, adjustable centers, EasyInstall 12" add-on faucet with stream regulator, spring action gooseneck, quarter-turn Eterna cartridges with spring checks, lever handles with color coded indexes, 18"rigid riser, 44" flexible stainless steel hose, 1.07 GPM JeTSpray spray valve, 6" adjustable wall bracket, 1/2" NPT, low lead, NSF, cCSAus
2. 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
3. 1 ea. T&S Brass 3 year limited warranty,
4. 1 ea. T&S Brass Model B-0231-CC Sink Mixing Faucet, wall mount, 12" swing nozzle, 8" centers, 1/2" NPT male inlets, lever handles, quarter-turn Eterna cartridges, low lead, ADA Compliant

4.7 Item 7 - Panni Maker (Existing Item #E32 – Relocate) - One (1)

4.8 Item 8 - Griddle (Existing Item #E36 – Relocate) – One (1)

4.9 Item 9 - Utility Carts (Existing Item #E31 – Relocate) – One Lot (1 Lot)

4.10 Item 10 -30 Gallon Tilting Braising Pan – One (1) Required

A. Cleveland Range Model SEL30TR Dimensions: 37(h) x 36(w) x 42(d) DuraPan™ Tilting Skillet, electric, 30-gallon capacity, modular open base, standard with hydraulic hand tilt with quick lowering feature, stainless steel construction, includes spring-assisted cover and gallon markings, stainless steel level adjustable feet, UL, CE, NSF, IPX6. Provide with the following:

1. 1 ea. 1-year parts & labor warranty
2. 1 ea. Extended Warranty, not to exceed 36 months from date of installation (K-12 Schools only)
3. 1 ea. Performance start-up included FEC to coordinate this is required.
4. 1 ea. 208v/60/3-ph, 40.0 amps
5. 1 ea. Model HTS Standard Manual Hand Tilt, with quick lowering feature (hydraulic)
6. 1 ea. Model TD2SK 2" tangent draw-off valve, front mounted left side
7. 1 ea. Model TDDC Drain Cup Assembly, includes: 8' length of 2" ID hose, stainless steel cup assembly & hose clamp

8. 1 ea. Model SLD Sliding Drain Drawer
9. 1 ea. Model SGSLD-TR Retractable Splash Guard/Pan Shelf, for sliding drain drawer
10. 1 ea. Model FSSK Food Strainer, 30 & 40 gallon, for braising pans
11. 1 ea. T&S Brass Model B-0176-ER Spray Assembly, single hole base, deck mount, 18" add-on swing faucet, spray valve, swivel adapter arm, vacuum breaker, quarter-turn Eterna cartridges, low lead. FEC to coordinate spray assembly with Cleveland mounting bracket

4.11 Item 11 – 12 Pan Steamer – One (1) Required

A. Cleveland Range Model (2) 22CET66.1 Dimensions: 67.2(h) x 25.5(w) x 36.95(d) SteamChef™ 6 Convection Steamer, electric, boilerless, double stacked, on ES26304066E equipment stand, (6) full size pan capacity per compartment, SureCook controls, 60-minute electro-mechanical timer & manual (continuous steaming) bypass switch, left-hand hinged door, controls on right, automatic drain & water level controls, KleanShield™ interior, standard treated & tap water connection, stainless steel exterior, 4" adjustable legs with flanged feet, UL, cUL, NSF, ENERGY STAR®. Provide each compartment with the following:
   1. 1 ea. 1-year parts & labor warranty,
   2. 1 ea. Extended warranty, not to exceed 24 months from date of installation (for K-12 schools only)
   3. 1 ea. 3 year Convection Steamer Door Warranty
   4. 1 ea. Performance start-up included FEC to coordinate this is required.
   5. 1 ea. (VOS1) (2) 208-240v/60/3-ph, 10.7-14.3 kW, 29.8-34.4 amps, 3-wire
   6. 1 ea. Model WBT-QTI1-CR Optipure Water Treatment System, dual-cartridge, reduces sediments over 0.5 microns, reduces chlorine, includes (1) CTOS-Q10 Catalytic Carbon Filter & (1) CTOS-QCR activated carbon filter
   7. 1 ea. Second year limited warranty on water related parts only when purchasing a steamer and filter from Cleveland. Must include a completed Performance Start-Up
   8. 1 ea. Model WBT-CTO-Q10 Optipure CTO-Q10 Water Treatment Cartridge, activated carbon filter, for QTI1-CR
   9. 1 ea. Model WBT-CTOS-QCR Optipure CTOS-QCR Water Treatment Cartridge, catalytic carbon filter, for CTI1-CR
   10. 1 ea. CDF Model DTV120-SV 3/4" Inlet Drain Tempering Valve Kit with brass fittings and double check valve 120 degree F set Point. Standard volume to be used to temper water below 140 degree at less than 25 GPH.

4.12 Item 12 - Combination Oven – One (1) Require

A. RATIONAL Model ICP 10-FULL E 208/240V 3 PH (LM100EE) Dimensions: 39.9(h) x 42.25(w) x 38.4(d) (CE1ERRA.0000221) iCombi Pro® 10-Full Size Combi Oven, electric, (10) 18" x 26" sheet pan or (20) 12" x 20" steam pan or (10) 2/1 GN pan capacity, (5) stainless steel grids included, intelligent cooking system with (4) assistants; iDensityControl, iCookingSuite, iProductionManager, & iCareSystem, (6) operating modes, (5) cooking methods, (3) manual operating modes, 85° to 572°F temperature range, quick clean, care control, eco mode, 6-point core temperature probe, retractable hand shower, Ethernet interface, Wi-Fi enabled, 208/240v/60/3-ph, 37.4 kW, CE, IPX5, UL, cULus, NSF, ENERGY

STAR-®. Provide with the following:

1. 1 ea. 2 years parts and labor, 5 years steam generator warranty
2. 1 ea. Model CAP Chef Assistance Program, a RATIONAL certified Chef conducts 4 hours/location specialized application training with personnel, FEC to coordinate, This is required
3. 1 ea. Model 9999.2201 RCI RATIONAL Certified Installation, new certified installation for each individual electric table-top iCombi on a stand or counter, FEC to coordinate this is required
4. 1 ea. Model 9999.2100 Commissioning iCombi Electric – for one (1) electric iCombi when not installed and commissioned by trained technicians. FEC to coordinate, This is required
5. 1 ea. Model 8720.1554US (Installation Kit, for electric iCombi/SCC/CMP 102 (208/60/3 & 240/60/3); electric iCombi/SCC/CMP 202 (440/60/3)
6. 1 ea. Model 1900.1154US Water Filtration Single Cartridge System, for any iVario, single Combi model, or XS or half-size Combi-Duos, includes: (1) single head with pressure gauge, R95-CL filter & filter installation kit
7. 1 ea. NOTE: The RATIONAL Water Filtration Systems helps provide consistent high quality water to your RATIONAL cooking systems. The patented carbon block technology reduces the effects of sediment, chloramines and chlorine while providing the required flow rates
8. 1 ea. Model 1900.1155US Water Filtration Cartridge, replacement or add on with additional Modular Head to Double Cartridge System, includes: (1) R95-CL filter
9. 1 ea. Model 56.00.562 Care Tabs, bucket of 150 packets for all iCombi Pro/Classic models and SelfCooking Center® units from 10/2008, with CareControl - Serial SG, SH or SI series
10. 1 ea. Model 60.31.106 Stand III Mobile Oven Stand, 27-1/2"H, (14) supporting rails, side panels, rear panel and cover, stainless steel construction, height adjustable casters, for iCombi 6- and 10-full size Classic/Pro
11. 1 ea. Model 87.00.732US Safety-Set, Equipment placement system for all casters-mounted equipment, allows precise, consistent equipment placement for drain lines to floor sinks and under the fire suppression in ventilation systems, satisfies NFPA codes 17A (5.6.4) and 96 (12.1.2.3), includes tow (2) pieces and installation pack.
12. 1 ea. CDF Model DTV120-SV 3/4" Inlet Drain Tempering Valve Kit with brass fittings and double check valve 120 degree F set Point. Standard volume to be used to temper water below 140 degree at less than 25 GPH.
13. 1 ea. Model CUSTOM RATIONAL FREE K-12 ACCESSORIES (5) COMBI FRY BASKETS (5) STAINLESS STEEL GRATES

4.13 Item 13 - Fire Suppression System - One Lot (1 Lot) Required

A. Ansul R-102 Ansul

1. This item shall provide coverage for items 8, 10, 11,12, 14 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. FEC to provide tag and testing documents at close out

4.14 Item 14 - Exhaust Hood w/Supply Air - One (1) Required

A. Dimensions: As shown on Halton's Drawings# U24-173 with a typical hanging height of 6'-8" above finished floor. Hood shall have fire cabinet mounted on right or left side, as shown on drawings. Hood controls to be remote and are to ship loose for installation in the field. FEC to coordinate 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-PSP 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 brushed finish, double shell end walls and face construction. Single wall construction will not be permitted. Hood shall be UL Listed and labeled for "zero clearance" at the end(s) of the hood as shown on drawings when mounted against a wall. Unexposed surfaces are 18-gauge stainless steel. The installation shall be in accordance with the manufacturer's recommendations and conform to NFPA-96 guidelines and all applicable local codes. The hood height shall not exceed 24" H. The overall lengths of the hoods shall be as indicated on drawings and/or equipment schedule. Use of Capture Walls to create a seal between cooking equipment and wall shall not be used as they require cooking equipment to be located further from wall reducing isle space. Bottom edge of hood front panels to be square, chamfered front shall not be allowed as they reduce front overhang and jeopardize capture and containment over tall cooking equipment. The use of S/S end panels or the installation of a s/s rear seal installed behind the cooking equipment shall not be permitted.

3. The hood shall be provided with a 24” wide PSP-Perforated Supply Plenum the entire length of the hood front as shown on drawings with a white powder coat finish to match the drop ceiling tiles in the kitchen. It shall provide a laminar flow down discharge through a 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 through 28% perforated panel, nor affect the hood capture and containment.
4. The KVE hood combines Capture Jet technology, T.A.B. ports and KSA grease filters.
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. Include 12” W S/S Fire cabinet full depth of hood on the end of the hood as shown on drawings.
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. Each hood shall be equipped with Halton Culinary LED Lights (HCL). Constructed from stainless steel frame and Aluminum hosing, the light fitting comprises flush mounted broad beam spots with a diffusion angle of at least 80°. Each light is comprised of a patented mixing chamber and a specific reflector. Both shall provide a good balance between direct and diffuse light components without dazzling the staff to mitigate eye fatigue. The shielding angle shall exceed DIN 12464-1 requirement and be at least 30°. The illuminance on the working surfaces shall be 50-foot candles with a CRI Color Rendering Index greater than 80. The wattage per fixture will be 14W, and provide code required 50-foot candles
10. at the cooking surface. The LED’s lifetime shall be 50,000 hours. The internal power supplies shall have at least the same lifetime. They shall enable switching on/off or dimming the light (0-100%) with one or several switches. The lights shall be supplied with vapor proof, grease proof, and heat proof UL-listed designed specifically for commercial kitchen hood application. All light fixtures shall be wired in a concealed manner to a junction box on top of the hood for connection to the remote wall mounted light switch. All wiring is in accordance with the National Electric Code (NFPA 70).
11. The Exhaust fan(s) will be controlled by the remote wall mounted fan switch panel that includes the light switch.

12. The exhaust airflow will be based on the convective heat generated by the appliances underneath each canopy. Submittal shall include convective heat calculations based 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. The use of end panels or rear seals to achieve required airflows are not acceptable.
13. 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.
14. Supply and install S/S closure panels around perimeter of hood to finished ceiling.
15. KSA Filter Removal Tool. FEC to mount in convenient location using wall bracket included
16. Pre-pipe fire suppression system.
17. Please Note: Field verify all collar locations with structure above prior to releasing the hood for fabrication.
18. Remote control panel (verify location with Architect)

4.15 Item 15 - Microwave Oven - One (1) Required

A. ACP Model RCS10TS Dimensions: 13.75(h) x 22(w) x 19(d) Amana® Commercial Microwave Oven, 1000 watts, 1.2 cu. ft. capacity, medium volume, 4-stage cooking, (5) power levels, (100) memory settings, braille touch pads, non-removable air filter, side hinged door with tempered glass, accommodates 14" plate, stainless steel interior & exterior, 120v/60/1-ph, 13.0 amps, 15 MCA, 1550 watts (total), NEMA 5-15P, cETLus, ETL-Sanitation
   1. 1 ea. 3-year limited warranty (1 year full)

4.16 Item 16 - Worktable - One (1) Required

A. Custom Model by EMI/MARLO size and shape as shown on drawing#24HF01 Approximately 30” X 78" 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 splash at 90 degree and ¾ turn down enclosed back and ends. 1 5/8” OD stainless legs adjustable s/s flanged front 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 ONE (1) 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. Single over shelf for the entire length of the table 12” wide X length of the table. 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. Extend over shelf to accommodate microwave item #15

D. Provide One (1) GFI convivence outlet mount within the back splash. One (1) outlet for item #15 mounted in the chase. 18-gauge S/S chase to run from tabletop 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 tabletop connections. FEC to seal chase to floor To be NSF & UL listed and approved

4.17 Item 17 - Worktable W/Sink – One (1) Required

A. Custom Model by EMI/MARLO size and shape as shown on drawing# 24HF01 Approximately 30” X 78" 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 splash at 90 degree and ¾ turn down enclosed back and ends. 1 5/8” OD stainless legs adjustable s/s flanged front 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 ONE (1) 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. One (1) 20” x 20” X 10” deep coved construction prep sink with twist handle waste with bracket and overflow. S/S flanged feet at front legs. No under shelf at sink area.

D. 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 (6) six corrosion resistant s/s type pot hooks. For the remaining length of the table provide over shelf Single over shelf for the entire length of the table 12” wide X length of the table. 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.

E. Provide two (2) GFI convivence outlets mount within the splash. 18-gauge S/S chase to run from tabletop 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 tabletop connections. FEC to seal chase to floor. To be NSF & UL listed and 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

4.18 Item 18 – Griddle Stand – One (1) Required

A. Advance Tabco Model ES-304 Dimensions: 25(h) x 48(w) x 30(d) Equipment Stand, 48"W x 30"D x 25"H (overall), 24" working height, 14 gauge 304 stainless steel top with 1"H up-turn on sides & rear, 18 gauge adjustable stainless steel undershelf, stainless steel legs with adjustable stainless steel bullet feet, NSF.

1. FEC to coordinate this stand with existing Griddle item #8

4.19 Item 19 – Island Worktable - One (1) Required

A. Custom Model by EMI/MARLO size and shape as shown on drawing#.24HF01 Approximately 60” X 72” 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. 1 5/8” OD stainless legs adjustable s/s flanged front 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 FOUR (4) 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. Single over shelf for the entire length of the table 12” wide X length of the table. 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.

D. Provide TWO (2) doghouse GFI outlets (120/1/15AMPS) as indicted on drawings for 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 tabletop 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 tabletop connections.

4.20 Item 20 - Reach in Refrigerator – Two (2) Required

A. Continental refrigerator model 2RNSA dimensions: 82.25(h) x 52(w) x 35.38(d) refrigerator, reach-in, two-section, self-contained refrigeration, stainless steel exterior, aluminum interior, standard depth, full-height solid doors, cylinder locks, electronic control with digital display, hi-low alarm, electric condensate evaporator, r290 hydrocarbon refrigerant, 1/3 hp, cetlus, nsf, energy star® Provide each with the following:
   1. warranty: 6-year parts and labor; additional 1 year compressor part
   2. 1 ea. 115v/60/1-ph, 6.9 amps, cord, NEMA 5-15P
   3. 1 ea. Expansion valve, in lieu of capillary system
   4. 1 ea. Left Door hinged on left & right door hinged on right
   5. 1 ea. 5" Casters
   6. 1 ea Model 50-P008A Pan Slide Assembly, full section for 18 x 26 or (2) 18 x 14 pans on 3" centers, bottom support, stainless steel angle (holds 16 per full section)
   7. 1 ea. NOTE: Please specify location of pan slides
   8. PAN SLIDES ON ONE SIDE ONLY

4.21 Item 21 - Mobile Sheet pan Racks (Existing Item #E40 – Relocate) – One (1)

4.22 Item 22 - Spare Number

4.23 Item 23 - Island Worktable W/2 Sinks – One (1) Required

A. Custom Model by EMI/MARLO size and shape as shown on drawing# 24HF01 Approximately 60” X 138” 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. 1 5/8” OD stainless legs adjustable s/s flanged front 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 FOUR (4) 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. TWO (2) 20” x 20” X 10” deep coved construction prep sink with twist handle waste with bracket and overflow. Provide pre-rinse bracket S/S flanged feet at front legs. No under shelf at sink area.

D. Over prep sink area provide approximately 48” 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 (6) SIX corrosion resistant s/s type pot hooks. Provide support bracket for pre-rinse bracket.

E. Provide THREE (3) doghouse GFI outlets (120/1/15AMPS) as indicted on drawings for items #24, 25, 26 internally factory wired to junction box (UL certified) to a single point connection at a chase. 18-gauge S/S chase to run from tabletop 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 tabletop connections. FEC to seal chase to floor. To be NSF & UL listed and approved. Supply with the following:

1. 1 ea. T&S Brass Model MPZ-8DLN-06 Mini Pre-Rinse Unit, 8" deck mount base faucet, compact spring & flex hose, spray valve, 6" wall bracket, lever handles, 6" add on faucet
2. 1 kt T&S Brass Model B-0425-KIT Inlet Kit with 24" supply hoses, Nipples, Washer and Locknuts that provide 1/2" NPT male outlet and 3/8" female compression inlet. Certified to ASME A112.18.1/CSA B125.1, NSF 61-Section 9 and NSF 372.

4.24 Item 24 - Slicer – One (1) Required

A. Hobart Model HS9-1 Dimensions: 27.25(h) x 24.63(w) x 30.31(d) Heavy Duty Meat Slicer, automatic, 13" CleanCut™ removable knife with removal tool, anodized finish with (6) interlocks, (3) stroke lengths & (4) stroke speeds, removable meat grip assembly, removable ring guard cover, product fence, single action top mounted sharpener with Borazon™ stones, manual lift lever, 1/2 hp motor, 120v/60hz/1-ph NSF cETLus

1. 1 ea. warranty - 1-Year parts, labor & travel time during normal working hours within the USA

4.25 Item 25 - Can Opener (Existing Item #E47 – Relocate) - One (1)

4.26 Item 26 - Food Processor – One (1) Required

A. Robot Coupe Model R401 Dimensions: 22.5(h) x 9(w) x 12(d) Combination Food Processor, 4.5 liter stainless steel bowl with handle, continuous feed kit with kidney shaped & cylindrical shaped hoppers, includes:)1) "S" blade (27344), (1) 2mm grating disc (27577), (1) 4mm slicing disc (27566), on/off & pulse switch, single speed, 1725 RPM, 120v/60/1-ph, 12 amps, 1-1/2 HP, NEMA 5-15P, cETLus, ETL-Sanitation

1. 1 ea. 1 year parts & labor warranty
2. 1 set Model SP5DISC SP5Disc, (5) disc package includes: (1) 1/4" grating disc, (1) 1/4" x 1/4" julienne disc, (1) 5/64" julienne disc, (1) 1/32" slicing disc, (1) 1/4" slicing disc

4.27 Item 27 – Pot/Pan Drying Rack – One (1) Required

A. Metro

1. 4 ea. Model MQ2160G Quick Ship - MetroMax® Q Shelf, 60"W x 21"D, removable open grid polymer shelf mats on an epoxy coated steel frame with quick adjust corner releases, (4) wedge connectors, Microban® antimicrobial product protection, 600 lb. capacity per shelf, NSF
2. 4 ea. Model MX74UP Quick Ship - Polymer trilobal post (compatible with MetroMax® i, MetroMax® 4, MetroMax® Q), 73-3/16"H, for use with stem casters, adjusts at 1" increments, corrosion proof all polymer construction with built in Microban® antimicrobial product protection

3. 2 ea. Model 5PCX Quick Ship - Polymer Stem Caster, swivel, 5" dia., 1-1/4"W face, -20° F to 120°F temperature range, polyurethane wheel tread, 300 lb. capacity, NSF (donut bumpers included) (for use with all MetroMax posts & shelves)
4. 2 ea. Model 5PCBX Quick Ship - Polymer Stem Caster, brake, 5" dia., 1-1/4"W face, -20° F to 120°F temperature range, polyurethane wheel tread, 300 lb. capacity, NSF (donut bumpers included) (for use with all MetroMax posts & shelves)
5. FEC to field measure and adjust shelving sizes if required.

4.28 Item 28 – Mobile Warming Cabinet – One (1) Required

A. Metro Model C589-SDS-U Dimensions: 74.75(h) x 29.13(w) x 32.63(d) C5™ 8 Series Controlled Temperature Holding Cabinet with 6.8" touch-screen controls, mobile, full height, insulated, solid dutch doors, universal wire slides, (17) 18" x 26" or (34) 12" x 20" x 2-1/2" pan capacity, 3" O.C. (adjustable on 1-1/2" increments), 5" casters, 304 stainless steel, 120v/60/1-ph, 2000 watts, 16.7 amps, NEMA 5-20P, cULus, NSF, Made in USA, ENERGY STAR®
   1. 1 ea. 1 year warranty against manufacturing defects

4.29 Item 29 – Worktable – One (1) Required

A. Custom Model by MARLO/EMI size and shape as shown on drawing#24HF01. Approximately 30” X 102" 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 splash at 90 degree and ¾ turn down enclosed back and ends. 1 5/8” OD stainless legs adjustable s/s bullet 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. To be NSF & UL approved.

4.30 Item 30 - Walk In Cooler/Freezer – One (1) Required

A. Custom Model BALLY Sectional “L” shaped Walk-in Cooler/ Freezer complete with doors shall be manufactured by Bally Refrigerated Boxes, Inc. drawing #28960 Overall size of walk-in shall be approximately 24’-0 1/2” long x 15’-10 -3/4” & 11’-1 ¼” wide x 8’-6” high, size and configuration per Bally’s current drawing #28960 drawing (field verify Size).
   1. Foam core panels shall be Underwriters Laboratories-listed as having flame spread of 25 or lower and smoke generation of 450 or lower when tested in accordance with ASTME-84-76. Panels shall be approved by Factory Mutual as a Class I building type. They shall be foamed using HCFC expanding agents and shall meet all current international standards.
   2. All work and materials shall be in full accordance with local and/or state ordinances, and with other prevailing rules or regulations.

3. Panels shall consist of interior and exterior metals skins precisely foamed with steel and dies and roll-form equipment and thoroughly checked with gauges for accuracy. The metal skins shall be placed into heated molds and liquid urethane injected between them. Urethane shall be foamed-in place (poured, not frothed) and, when completely heat cured, shall bind tenaciously to the metal skins to form an insulated panel. Panels shall contain 100 percent urethane insulation and have no internal wood or structural members between the skins. To ensure tight joints, panel edges must have foamed-in-place tongues and grooves with a flexible vinyl gasket on the interior and exterior of all tongue edges. Gaskets shall be resistant to damage from oil, fats, water and detergents and must be NSF-approved. Panel thickness shall be 4" thick.
4. Exterior Finish:
    a. Walls, floor and ceiling shall be Stucco-embossed aluminum.
5. Interior Finish:
    a. Floor panels shall have ¾" Plywood foamed in panel and 1/8" aluminum Diamond Treadplate
    b. Walls and ceiling shall be Stucco-embossed aluminum.
6. All panels except corner panels shall be made in 23" and 46" widths, fully interchangeable for fast, easy assembly. Panels 11-1/2", 17-1/4" or 34-1/2" wide are to be furnished only if required to fit the allocated space. To assure perfect alignment and maximum strength, corner panels shall employ a right-angle configuration with exterior horizontal dimensions of 12" on each side. Vertical panels (except corner panels) shall be supplied in a single length up to 28' high (16" high for installations with aluminum or stainless-steel finish). For outdoor applications, single-height panels greater than 19" (16" for aluminum) or multi-tiered vertical panels must be secured to horizontal girts mounted between building columns. 8. Panels shall be equipped with Bally Speed-lok diaphragmatic joining devices. The distance between locks shall not exceed 46". Each device shall consist of a cam action, hooked locking arm placed in one panel, and a steel rod positioned in the adjoining panel, so that when the arm is rotated, the hook engages the rod and draws the panels tightly together with cam action. Arms and rods shall be housed in individual steel pockets. Pockets on one side of the panel shall be connected to pockets on the other side in width, by the use of 2" -wide metal straps set into and completely surrounded by the insulation. When panels are joined together, these straps shall form lock-to-lock connections for extra strength.
7. Supply two (2) Super Doors 36" wide x 78" height with 1/8" DT kick plate interior and exterior. Doors are in-fitting and flush mounted. Magnetic core, thermoplastic gaskets installed on the top edge and both sides of the door shall keep the door in a closed position, forming a tight seal; a flexible, dual blade wiper gasket shall be installed at the bottom of the door. NSF-approved gaskets shall be replaceable and resistant to damage from oil, fats, water and detergent. A heavy U-channel structural steel frame around the perimeter of the door opening shall prevent racking or twisting; steel frame is to be reinforced for hardware attachment. Anti-condensate heater wire shall be concealed behind the metal edge of the doorjambs. The door panel shall also include a vapor-proof interior lamp with LED light fixture; junction box for 120v., 60 cycle, 1 phase, a.c. service (15-amp maximum); 2"-dia. flush-face dial thermometer (field mounted on 60" wide doors).

8. Hardware
    a. Supply with each door: three spring-loaded, self-closing hinges and door closer. Provide satin aluminum finish.
9. Door Options
    a. Provide one Observation Window in each Entrance Door - (a 14" X 14") heated observation window shall be provided in the entrance door. It consists of three panes of glass with sealed air spaces between them. The window shall be supplied with heated glass and frame and units shall be removable for replacement.)
    b. Provide one NSF-approved Strip Curtain for each door – clear-vinyl strip curtains shall permit easy passage while minimizing air infiltration.
    c. Bally's standard door latch hardware.
    d. 1/8" D.T. Kickplate Int. & Ext.
10. Options:
    a. Provide Pressure Relief Port in freezer compartment.
    b. Alarm Systems -one door Provide two (2) 75LC Multi-Monitor w/ push button, two (2) MC1F Mag. Contacts, one (1) IP1 Panic Button, one motion detector.
    c. Vinyl rub rail along entire exposed front and sides (verify color with Architect).
    d. Five (5) LED Kason 1809 Lights LED 17" long, including bulbs.
    e. Provide trim strips alongside walls & closure panels along the top to finish ceiling (same finish as wall panel).
11. Construction shall be of a design approved by the National Sanitation Foundation and shall carry the NSF Label of Approval mounted on each door section.
12. Warranties
    a. Bally shall warrant that any part of the structure it supplies (except the refrigeration system and its related accessories) is free from defects in materials or workmanship under normal use and service. The insulated panel portion of the structure is warranted free from defects under normal use and service for a period of 10 years from date of installation (but in no event shall the warranty be in force for more than 10 years and 6 months from the date the product was first shipped by Bally). Panel surface condition is warranted free from defects under normal use and service for one year from installation, provided the panel is stored and installed according to Bally's instructions. Mechanical (including hardware, gasketing, Speed-lok assemblies, aluminum weather roofs) and electrical components, except refrigeration systems (which are covered by a separate warranty) are warranted to be free from defects under normal use and service for one year from date of installation. (In no case shall this portion of the warranty be in force for more than one year and six months from the date the product was first shipped by Bally.) The warranty shall not include any labor charges for replacement or repair of defective parts or refrigeration. Full warranty information is to be provided with the walk-in.
13. CONTRACTOR'S RESPONSIBILITIES:
    a. It shall be the responsibility of this Contractor to Deliver, set-in-place and completely assemble the walk-in components and refrigeration systems. Install trim strips and closure panels (as specified - securely attached and sealed with silicone) between the box and all adjoining wall and ceiling areas. Material shall be of the same type and finish as the walk-in box surface. This contractor shall verify existing building conditions and field verify size and location of space where the walk-in is scheduled

to be installed. Coordinate finished floor elevation with the Architect.

b. Installation requirements of the walk-in box shall not be limited to but also include the following items:
   1) Verify that all panel to panel am locks are fully engaged and stainless cover caps are in place.
   2) Entrance door should close and seal on its own. Verify seal at gasket by checking for light from inside of door with interior light turned off. Adjust door hinges as required to obtain a tight seal.
   3) Remove all protective coating, shipping materials and packaging labels from panel surfaces, both inside and outside of the box
   4) Neatly seal all penetrations/gaps to prevent condensation or ice from occurring. Seal or verify seal at all electrical conduits both internally & externally at entrance point.
   5) Fasten door threshold plates to the floor panel using 12-24 x ½ self-tapping screws provided by Bally.
   6) Check door lock for proper operation, key should rotate freely for 90 degrees from the open to lock position. The key should sassily be removed from the cylinder in either the open or locked position.
   7) Verify door frame heater operation. Heater strikes should feel warm to the touch.
   8) Heat Trace required under freezer portion of walk in. FEC to provide drawing of layout of heat trace in submittal process. Heat trace and installation of heat traces shall be supplied and installed by the electrical contractor. FEC to coordinate.

c. Refrigerant used shall be of the latest type available and shall meet all codes and governmental requirements. All condensing units shall be factory assembled using UL listed or recognized components. Evaporators shall be forced air type, designed for ceiling installation. Freezer evaporators shall come with automatic electric defrost system with time clock, fan delay thermostat, heaters and heated drain pan. Evaporators shall be UL listed or recognized.

d. Verify location of condensing units with Architect.

e. It shall be the responsibility of this Contractor to completely install all refrigeration piping and controls (including interconnection of all electric) and pipe drain lines from coils in rigid copper to the floor drain, leaving the unit ready for final connections only by other trades. Drain line heater for freezer shall be supplied and installed by this Contractor. Electrical Contractor to interwire lights to switch.

f. Condensate lines that will be installed either by the FEC or PC should be run from the drain connection, sloping at least 1” per foot and have the size at least as large as the drain connection. A trap in warm area outside the room must be provided to allow proper draining through tubing. Connection should be made to proper drainage facilities that comply with local regulations. To prevent free up when the temperature of the refrigerated space is 35F or lower the drain line should be heated along its run inside the cold room. The heated drain line should be insulated. It is recommended that the heater be energized at all times. A heat input of 20 watts per foot in a 25F room and 30 watts per foot for -20F rooms, is satisfactory. Drain line heaters are not required for constant room temperatures above 35F. Always trap evaporator drain line individually to prevent vapor migration. Endure that the drain line has sufficient slop for proper drainage (prevention of ice buildup/blockage in pan).

4.31 Item 30A - Walk In Cooler Refrigeration System -One Lot (1 Lot) Required

A. Custom Model BALLY
   1. Cooler: One (1) Scroll Condensing Unit – BEZA 010 M8 HT3BD (208-230/3/60) Outdoor
   2. Cooler: One (1) Evaporator Coil Smart Vap+ with EEV installed – BLP 211 MA-S1D-SV+ 115/1/60 Evaporator coil.
   3. Heated & Insulated Receiver
   4. Five (5) year total refrigeration parts and compressor warranty(s).
   5. Refrigeration piping and control wiring by Foodservice Contractor.
   6. Installation requirements of the refrigeration system shall not be limited to but include the following:
      a. Purge refrigerant lines with nitrogen while brazing to avoid carbon formation in the line sets. Installation of a field mounted liquid line filter drier is recommending just outside the evaporator cabinet to catch any contaminants that may have entered the system during installation.
      b. Perform leak check of all factory & field installed joints and mechanical connections. Double evacuate entire system to 250microns. Weigh in and document refrigerant type and total charge for cold weather operation.
      c. Verify that site voltage is within specifications of equipment. Supply must be 5/+10% of name plate voltage. Verify that all mechanical and connections are tight and sealed correctly.
      d. Evaporator drain lines must be properly trapped to avoid moisture and contaminates from being pulled back into the walk in. When sharing common drain line, make certain to install a trap between any freezer and cooler evaporator to avoid moisture from being drained back into the freezer compartment.
      e. Freezer drain lines must be installed using copper pipe. Freezer drains must be heated and insulated to avoid freezing of pipe. Maintain adequate slope to allow for a fast removal of moisture from the line.
      f. Check and set pressure controls with refrigeration gauges. Make certain that differential settings allow the compressor to remain offline during any off-cycle periods
      g. Check and adjust superheat at the evaporator coil. Coolers 8-12-degree F. Maintain a minimum of 20 degrees of super heat at the compressor to avoid liquid flood back
      h. Suction lines must be insulated properly and neatly with no gaps through the entire length of the run. This insulation should be run through the insulated Bally panel and not just up to the penetration to avoid vapor leaks at the panel juncture.
      i. Run systems through a complete operation cycle allowing them to pull down to set point temperature including a defrost cycle to verify all functions, setting and pressures are operation as specified.
      j. On Smart Vap Controllers-(smart electric & air defrost systems) adjust the air sensor on the rear of the evaporator coil to a distance of 6” from the face of the coil surface
      k. Smart Vap Electric defrost controller Should be set at a factory default for defrost is on a Demand basis. Adjustment under advance menu may be required
   7. 1 ea. Bally Compressor stand Model DR200

4.32 Item 30B - Walk In Freezer Refrigeration System -One Lot (1 Lot) Required

A. Custom Model BALLY

1. Cooler: One (1) Scroll Condensing Unit – BEZA 035 L8 HT3DN (208-230/3/60) Outdoor
2. Cooler: One (1) Evaporator Coil Smart Vap+ with EEV installed – BLP 211 LE-S2D-SV+ 208-230/1/60 Evaporator coil.
3. Heated & Insulated Receiver
4. Five (5) year total refrigeration parts and compressor warranty(s).
5. Refrigeration piping and control wiring by Foodservice Contractor.
6. Installation requirements of the refrigeration system shall not be limited to but include the following:
    a. Purge refrigerant lines with nitrogen while brazing to avoid carbon formation in the line sets. Installation of a field mounted liquid line filter drier is recommending just outside the evaporator cabinet to catch any contaminants that may have entered the system during installation
    b. Perform leak check of all factory & field installed joints and mechanical connections. Double evacuate entire system to 250microns. Weigh in and document refrigerant type and total charge for cold weather operation.
    c. Verify that site voltage is within specifications of equipment. Supply must be 5/+10% of name plate voltage. Verify that all mechanical and connections are tight and sealed correctly.
    d. Evaporator drain lines must be properly trapped to avoid moisture and contaminates from being pulled back into the walk in. When sharing common drain line, make certain to install a trap between any freezer and cooler evaporator to avoid moisture from being drained back into the freezer compartment.
    e. Freezer drain lines must be installed using copper pipe. Freezer drains must be heated and insulated to avoid freezing of pipe. Maintain adequate slope to allow for a fast removal of moisture from the line
    f. Check and set pressure controls with refrigeration gauges. Make certain that differential settings allow the compressor to remain offline during any off-cycle periods
    g. Check and adjust superheat at the evaporator coil. Coolers 8-12-degree F. Maintain a minimum of 20 degrees of super heat at the compressor to avoid liquid flood back
    h. Suction lines must be insulated properly and neatly with no gaps through the entire length of the run. This insulation should be run through the insulated Bally panel and not just up to the penetration to avoid vapor leaks at the panel juncture.
    i. Run systems through a complete operation cycle allowing them to pull down to set point temperature including a defrost cycle to verify all functions, setting and pressures are operation as specified.
    j. On Smart Vap Controllers-(smart electric & air defrost systems) adjust the air sensor on the rear of the evaporator coil to a distance of 6” from the face of the coil surface
    k. Smart Vap Electric defrost controller Should be set at a factory default for defrost is on a Demand basis. Adjustment under advance menu may be required
7. 1 ea. Bally compressor stand Model DR200

4.33 Item 31 - Walk In Cooler Shelving – 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.

4.34 Item 32 - Walk in Cooler Dunnage – One Lot (1 Lot) Required

A. New Age
   1. 1 ea. Model 2027 Dunnage Rack, 48"W x 30"D x 12"H, all welded aluminum construction, 1-1/2" x 1-3/4" x 0.070 tubing, welded aluminum caps on feet, weight capacity 3000 lbs., NSF, Made in USA
   2. 1 ea. Lifetime warranty against rust & corrosion, 5 year workmanship and material defects warranty, standard
   3. It shall be the responsibility of this contractor to verify and adjust shelving sizes to insure proper fit.

4.35 Item 33 - Walk In Freezer Shelving – 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.

4.36 Item 32 - Walk In Freezer Dunnage – One Lot (1 Lot) Required

A. New Age
   1. 1 ea Model 2016 Dunnage Rack, 60"W x 24"D x 8"H, all welded aluminum construction, 1-1/2" x 1-3/4" x 0.070 tubing, welded aluminum caps on feet, weight capacity 2000 lbs., NSF, Made in USA

2. 1 ea. Model 2015 Dunnage Rack, 48"W x 24"D x 8"H, all welded aluminum construction, 1-1/2" x 1-3/4" x 0.070 tubing, welded aluminum caps on feet, weight capacity 2500 lbs., NSF, Made in USA
3. Lifetime warranty against rust & corrosion, 5 year workmanship and material defects warranty,
4. It shall be the responsibility of this contractor to verify and adjust shelving sizes to insure proper fit.

4.37 Item 35 - Milk Coolers – Two (2) Required

A. Continental refrigerator model MC3NSSD dimensions: 47(h) x 34(w) x 33(d) milk cooler, 34" long, dual access, forced air cooling, (8) 13" x 13" x 11" or (4) 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, 1/4 hp, cetlus, nsf. Provide each with the following:
1. warranty: 6 year parts and labor; additional 1 year compressor part
2. 1 ea. 115v/60/1-ph, 5.7 amps, cord, NEMA 5-15p
3. 1 ea. custom laminate finish. Color selected is Bubble Art 8958-58 FEC to verify color selections with Architect prior to ordering
4. 1 ea. model /00lp modified evaporator for rear loading

4.38 Item 36 - Spare Number

4.39 Refrigerated merchandisers – Two (2) Required

A. Structural Concepts Model HECO37R Dimensions: 82.13(h) x 36.5(w) x 33.25(d) Oasis® High Environment Self-Service Refrigerated Case, 40°F product In environments up to 85°F/60% RH, 36-1/4"W, 82-1/8"H, Breeze-E (Type II) with EnergyWise self-contained refrigeration system, Blue Fin coated coil, (4) non-lit adjustable metal shelves, top light, one piece formed ABS plastic tub, black interior, (2) full end panels, 4"D removable wall spacer brackets, environmental door system with roll-down locking security cover, casters, cETLus, ETL-Sanitation. Provide each with the following
1. NOTE: If GFCI is required, a GFCI breaker MUST be used in lieu of a GFCI receptacle
2. 1 yr. parts & labor warranty, 5 yr. compressor warranty,
3. 1 ea. Refrigeration: Breeze self-contained refrigeration with evaporator pan (front air intake/rear discharge)
4. 1 ea. Model CLEAN SWEEP Clean Sweep®, automatic condenser coil cleaner (self-cont.)
5. 1 ea. Electrical: 110-120v/60/1ph, 16.0 amps, 1,616 watts
6. 1 ea. Electrical Connection: 6' Straight blade power cord NEMA-5-20P (base exit)
7. 1 ea. Base Support: Casters with levelers (self-cont.)
8. 1 ea. Interior Color: Stainless steel
9. 1 ea. Exterior Color: Laminate Color selected is Bubble Art 8958-58 FEC to verify color selections with Architect prior to ordering
10. 1 ea. Model GRAIN DIRECTION Standard laminate grain directions (when applicable):

11. - Front Panels (Upper Header and Lower Panels): Horizontal grain direction End Panels: Vertical grain direction Blend & Reveal Cases Only: Horizontal grain direction on front and end panels. FEC to coordinate color selections with Architect
12. 1 ea. Rear Exterior Color: Black
13. 1 ea. Rear Doors: Rear loading hinged doors, locking
14. 1 ea. Lower Front Panel Color: Powder coated SCC Standard Silversan Black (FDA compliant),
15. 1 ea. End Panel Left: Full with stainless steel mirror interior,
16. 1 ea. End Panel Right: Full with stainless steel mirror interior
17. 1 ea. Thermometer: Digital Fahrenheit thermometer
18. 1 ea. Add Lights (LED) to standard shelves (4)

4.40 Item 38 - Breath Protectors – Two (2) Required

A. Premier Metal & Glass Model TM2S-A - Per drawing #52377 " 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. 58" cl length; approx. 164 lbs. ea. (2 end supports) fully adjustable single tier to protect hot food unit item 39 & 67
   1. FEC to ship to Piper for factory installation

4.41 Item 39 - 4 Well Hot Food Unit – One (1) Required

A. Piper Products/Servolift Eastern Model 4-HF Per drawing #7607 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. Provide 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,
   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 HD-60 Hinged doors for (4) openings Elite system
   7. 1 ea. Model LD Locks, for doors for Elite system
   8. 1 ea. Model FRMAD-60 Formica laminate with doors, for Elite systems. Color selected is Bubble Art 8958-58 FEC to verify color selections with Architect prior to ordering.
   9. 1 ea. Model SCB-8-60 Cutting Board for Elite system, 8", for (4) openings - 60"W, stainless
   10. 1 ea. Model SRTS-60 Tray slide for Elite system, 12" solid ribbed, heavy gauge stainless steel, for (4) openings - 60"W
   11. 1 ea. Model PG MOUNT Mounting of other manufacturer's sneeze guard. ELECTRICAL TO EXIT OPERATOR RIGHT BACK LEG. ***
   12. Item 38 Premier PMG Guard to be provided by FEC and installed by Piper.

4.42 Item 40 - Solid Top Unit – One (1) Required

A. Piper Products/Servolift Eastern Model 2-ST Per drawing #7607 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. Model JC Unit to include 14 gauge stainless steel "J" channel cord chase to
   3. 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. Color selected is Bubble Art 8958-58 FEC to verify color selections with Architect prior to ordering
   8. 1 ea. Model SCB-8-32 Cutting Board for Elite system, 8", for (2) openings - 32"W, stainless
   9. 1 ea. Model SRTS-32 Tray slide for Elite system, 12" solid ribbed, heavy gauge stainless steel, for (2) openings - 32"W

4.43 Item 41 - Sandwich Prep Unit – One (1) Required

A. Continental Refrigerator Model SW36N15M-FB Dimensions: 40.88(h) x 36(w) x 35(d) Mighty Top Sandwich Unit, front Breather, 36" W, two-section, (15) 1/6 size x 4" deep pans with 8" cutting board, (2) field rehingeable doors, stainless steel top, front & end panels, aluminum back & interior, 3-3/4" casters, rear mounted self-contained refrigeration, automatic hot gas condensate evaporator, R290 hydrocarbon refrigerant, 1/5 hp, cETLus, NSF
   1. 1 ea. warranty: 6 year parts and labor; additional 1 year compressor part
   2. 1 ea. 115v/60/1-ph, 2.46 amps, cord, NEMA 5-15P,
   3. 1 ea. Left Door hinged on left & right door hinged on right
   4. 1 ea. (00FVL) Flat lid with vision panel - with hinges
   5. 1 ea. Crumb catcher
   6. 1 ea. Cylinder lock (per door/drawer)

4.44 Item 42 - False Front Unit – One (1) Required

A. Piper Products/Servolift Eastern Model C-4-FF-MOD Per Drawing #7607 Dimensions: 30(h) x 48(w) x 4(d) Elite False front, 48" long, 4" wide, 30" high, stainless steel construction, MODIFIED TO 40"L. Provide with the following:
   1. 1 ea. 1 year warranty parts and labor
   2. 1 ea. Model FLP Filler Strips, for Elite systems
   3. 1 ea. Model FRMA-40 Formica laminate without doors, for Elite systems Color selected is Bubble Art 8958-58 FEC to verify color selections with Architect prior to ordering
   4. 1 ea. Model SRTS-44 Tray slide for Elite system, 12" solid ribbed, heavy gauge stainless steel, for (3) openings - 46"W
   5. ***Confirm the overall length item 42 needs to be for item 41. ***
   6. FEC to coordinate opening with Piper allow enough room for unit to roll in and out easily

4.45 Item 43 - Heated Sandwich Slides – Two (2) Required

A. Hatco Model HXMS-30D Dimensions: 32.71(h) x 33.9(w) x 28.13(d) Slant Heated Merchandiser with LED Lighting Warmer, 30" W, countertop, dual shelf, (12) divider rods, (2) bulbs per shelf, thermostat, infrared heat, hardcoat aluminum base, tempered side glass hinged to post. Provide each with the following:
   1. 1 ea. NOTE: Includes 24/7 parts & service assistance, call 414-671-6350
   2. 1 ea. One year on-site parts & labor warranty, plus one additional year parts only warranty on all Glo-Ray metal sheathed elements
   3. 1 ea. 120/208v/60/1-ph, 1800 watts, 7.5 amps, NEMA L14-20P (domestic voltage),
   4. 1 ea. Model BLACK Black, designer color (available at time of purchase only)
   5. 1 ea. NOTE: Flip door not available for both front & rear configurations
   6. 1 ea. NOTE: Flip door not available for both front & rear configurations
   7. 3 ea. Model HZM-DIV Additional stainless steel divider rods

4.46 Item 44 - Solid Top Unit – One (1) Required

A. Piper Products/Servolift Eastern Model 3-ST Per Drawing #7607 Dimensions: 36(h) x 46(w) x 28(d) Elite Utility Serving Counter, 46"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. 120/208v/60/1-ph, 7.5 amps, NEMA 14-20P
   3. 1 ea. Model SOUT Single Outlet, NEMA L14-20R FOR ITEM 43 HATCO HXMS-30D
   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 CWB Cut out with bushing for cords & wires
   6. 1 ea. Model FLP Filler Strips, for Elite systems
   7. 1 ea. Model HD-46 Hinged doors for (3) openings Elite system
   8. 1 ea. Model LD Locks, for doors for Elite system
   9. 1 ea. Model FRMAD-46 Formica laminate with doors, for Elite systems. Color selected is Bubble Art 8958-58 FEC to verify color selections with Architect prior to ordering
   10. 1 ea. Model SCB-8-46 Cutting Board for Elite system, 8", for (3) openings - 46"W, stainless
   11. 1 ea. Model SRTS-46 Tray slide for Elite system, 12" solid ribbed, heavy gauge stainless steel, for (3) openings - 46"W

4.47 Item 45 - Spare Number

4.48 Item 46 - Solid Top Unit – One (1) Required

A. Piper Products/Servolift Eastern Model 4-ST-MOD Per Drawing #7607 Dimensions: 36(h) x 60(w) x 28(d) Elite Utility Serving Counter, 60"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. 120v/60/1-ph, 15.5 amps, NEMA 5-20P
3. 1 ea. Model SOUT Single Outlet, NEMA 5-20R FOR ITEM 47 Duke HF48-2HFL-HFL
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 HD-60 Hinged doors for (4) openings Elite system
7. 1 ea. Model LD Locks, for doors for Elite system
8. 1 ea. Model FRMAD-60 Formica laminate with doors, for Elite systems. Color selected is Bubble Art 8958-58 FEC to verify color selections with Architect prior to ordering
9. 1 ea. Model SCB-8-60 Cutting Board for Elite system, 8", for (4) openings - 60"W, stainless
10. 1 ea. Model SRTS-60 Tray slide for Elite system, 12" solid ribbed, heavy gauge stainless steel, for (4) openings - 60"W
11. 1 ea. Model ME Mitered end for tray slide for Elite system
12. 1 ea. Model INSTALL PACKAGE INSTALL PACKAGE - to include cut-out in the countertop, 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.***
13. Item 47 Low Temp 2QSGT-42 to be provided by others and installed by Piper.

4.49 Item 47 - Two Tier Hot/Cold Frost Top Units – Two (2) Required

A. Duke Manufacturing Model HF48-2-HFL-HFL Dimensions: 45.25(h) x 48.25(w) x 32(d) HotFrost™ Hot Frost Shelf Merchandiser, 2-tier hot/cold switchable food display, drop-in unit, 48"W x 32"D, fits (2) 18 x 13" pan per tier, individually controlled tiers, programmable color touch screen control, stainless steel body and shelves, self-contained refrigeration, 120-208v/60/1 phase, 1997 watts, 8.2 amps, NEMA L14-20P
   1. FEC to ship to Piper for factory installation

4.50 Item 48 - Solid Top Unit – One (1) Required

A. Piper Products/Servolift Eastern Model 2-CR-MODP Per Drawing #7607 Dimensions: 36(h) x 28(w) x 28(d) Elite Corner Serving Counter, 28"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"L AND 30"D. Provide with the following:
   1. 1 ea. 1 year warranty parts and labor
   2. 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
   3. 1 ea. Model FLP Filler Strips, for Elite systems
   4. 1 ea. Model HD-28 Hinged doors for (2) openings Elite system
   5. 1 ea. Model LD Locks, for doors for Elite system
   6. 1 ea. Model FRMAD-28 Formica laminate with doors, for Elite systems. Color selected is Bubble Art 8958-58 FEC to verify color selections with Architect prior to ordering

4.51 Item 49 - Solid Top Unit – One (1) Required

A. Piper Products/Servolift Eastern Model 4-ST-MOD Per Drawing #7607 Dimensions: 36(h) x 60(w) x 28(d) Elite Utility Serving Counter, 60"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 120/208v/60/1-ph, 9.6 amps, NEMA 14-20P
3. 1 ea Model SOUT Single Outlet, NEMA 14-20R FOR ITEM 50 LOW TEMP DI-QSCHP-2
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 HD-60 Hinged doors for (4) openings Elite system
7. 1 ea Model LD Locks, for doors for Elite system
8. 1 ea Model FRMAD-60 Formica laminate with doors, for Elite systems Color selected is Bubble Art 8958-58 FEC to verify color selections with Architect prior to ordering
9. 1 ea Model SCB-8-60 Cutting Board for Elite system, 8", for (4) openings - 60"W, stainless
10. 1 ea Model SRTS-60 Trayslide for Elite system, 12" solid ribbed, heavy gauge stainless steel, for (4) openings - 60"W
11. 1 ea Model ME Mitered end for trayslide for Elite system
12. 1 ea Model INSTALL PACKAGE INSTALL PACKAGE - to include cut-out in the countertop, install for the drop-in provided by FEC electrical hook-up, reinforced top, and louvered panels if required. ***Drop-in to be provided by FEC.***
13. Item 50 Low Temp DI-QSCHP-2 to be provided by others and installed by Piper.
14. 1 ea Model PG MOUNT Mounting of other manufacturer's sneeze guard. ELECTRICAL TO EXIT OPERATOR RIGHT BACK LEG. ***
15. Item 51 Premier PMG Guard to be provided by others and installed by Piper.

4.52 Item 50 - 2 Well Hot/Cold Food Units – Two (2) Required

A. Low Temp Industries Model DI-QSCHP-2 Dimensions: 21.64(h) x 34.25(w) x 26.8(d) QuickSwitch™ Hot/Cold/Freeze Food Well, drop-in, 34-1/4"W x 26-3/4"D x 21-16/25"H, 14ga stainless steel top, accommodates (2) 12" x 20" pan size, wired remote, individual wired remote digital controls for hot or cold operation, manifold drain, stainless steel top & wells, galvanized exterior, cUL, UL, UL EPH Classified (ANSI/NSF 4, ANSI/NSF 7). Provide each with the following

1. 120/208v/60/1-ph, 9.6 amps, NEMA 14-20P
2. FEC to ship to Piper for factory installation

4.53 Item 51 - Breath Protectors – Two (2) – Required

A. Premier Metal & Glass Model TMT2S-A -Per drawing #52377 1" OD gearless adjustable two tier food shield with top shelf, rear supports and slanted front support; 3/8" clear tempered brushed stainless finish; approx. 40" cl length; approx. 136 lbs. ea. (2 end supports) fully adjustable breath guard double tiered to protect item 50. FEC to Ship to Piper for installation.

4.54 Item 52 - False Front Unit W/Slanted Snack Shelf – One (1) Required

A. Piper Products/Servolift Eastern Model 3-ST-MOD Per drawing #7607 Dimensions: 36(h) x 46(w) x 28(d) Elite Utility Serving Counter, 46"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 43" L AND TO BE U-SHAPED TO ACCEPT ITEM 53 MASTER-BILT MSC-31AA. Provide with the following:
   1. 1 ea. 1 year warranty parts and labor
   2. 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
   3. 1 ea. Model FLP Filler Strips, for Elite systems
   4. 1 ea. Model FRMA-46 Formica laminate without doors, for Elite systems. Color selected is Bubble Art 8958-58 FEC to verify color selections with Architect prior to ordering
   5. 1 ea. Model SRTS-46 Tray slide for Elite system, 12" solid ribbed, heavy gauge stainless steel, for (3) openings - 46"W
   6. 1 ea. Model SDOHS-46 Sloped Double Overhead Shelf Less Plexiglas (Cafeteria Style) for Elite system, for (3) openings - 46"W
   7. FEC to coordinate opening for ice cream merchandiser with Piper allow room for unit to roll in and out easily.

4.55 Item 53 - Ice Cream Merchandisers – Two (2) Required

A. Master-Bilt Products Model MSC-31AA Dimensions: 33.5(h) x 31.5(w) x 27.38(d) COLDIN-3™ Display Freezer, 7.2 gross cu. ft., curved tempered glass sliding lids, (3) standard baskets, (3) basket dividers, external analog thermometer and lock, white zinc-coated enamel steel exterior, painted white steel interior with LED lighting, defrost water drain, temperature range -18° to 10°F (-27° to -12° C), self-contained refrigeration, heavy duty 3" casters, R290 Hydrocarbon refrigerant, 1/3 hp, 115v/60/1-ph, 1.3 amps, 6-1/2' cord, NEMA 5-15P, cETLus, ETL-Sanitation, Provide each with the following:
   1. 1 year parts and labor warranty

4.56 Item 54 - Spare Number

4.57 Item 55 - Cash Registers (By Owner) – Two (2)

4.58 Item 56 - Cashier Station – One (1) Required

A. Piper Products/Servolift Eastern Model 2-CD Per drawing #7607 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 footrest-cashier unit, Elite systems
   7. 1 ea. Model FRMA-30 Formica laminate without doors, for Elite systems. Color selected is Bubble Art 8958-58 FEC to verify color selections with Architect prior to ordering
   8. 1 ea. Model SRTS-30 Tray slide for Elite system, 12" solid ribbed, heavy gauge stainless steel, for (2) openings - 30"W

4.59 Item 57 - Cashier Station – One (1) Required

A. Piper products/servolift eastern model 2-cd per drawing #7607 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 footrest-cashier unit, Elite systems
   7. 1 ea Model FRMA-30 Formica laminate without doors, for Elite systems. Color selected is Bubble Art 8958-58 FEC to verify color selections with Architect prior to ordering
   8. 1 ea Model SRTS-30 Trayslide for Elite system, 12" solid ribbed, heavy gauge stainless steel, for (2) openings - 30"W

4.60 Item 58 - False Front Unit W/Slanted Snack Shelf – One (1) Required

A. Piper Products/Servolift Eastern Model 3-ST-MOD Per drawing #7607 Dimensions: 36(h) x 46(w) x 28(d) Elite Utility Serving Counter, 46"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 43" L AND TO BE U-SHAPED TO ACCEPT ITEM 53 MASTER-BILT MSC-31AA. Provide with the following
   1. 1 ea. 1 year warranty parts and labor
   2. 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
   3. 1 ea. Model FLP Filler Strips, for Elite systems

4. 1 ea. Model FRMA-46 Formica laminate without doors, for Elite systems. Color selected is Bubble Art 8958-58 FEC to verify color selections with Architect prior to ordering
5. 1 ea. Model SRTS-46 Tray slide for Elite system, 12" solid ribbed, heavy gauge stainless steel, for (3) openings - 46"W
6. 1 ea. Model SDOHS-46 Sloped Double Overhead Shelf Less Plexiglas (Cafeteria Style) for Elite system, for (3) openings - 46"W
7. FEC to coordinate opening for ice cream merchandiser with Piper allow room for merchandiser to roll in and out easily.

4.61 Item 59 - Solid Top Unit – One (1) Required

A. Piper Products/Servolift Eastern Model 4-ST-MOD Per drawing #7607 Dimensions: 36(h) x 60(w) x 28(d) Elite Utility Serving Counter, 60"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. 120/208v/60/1-ph, 9.6 amps, NEMA 14-20P
   3. 1 ea. Model SOUT Single Outlet, NEMA 14-20R FOR ITEM 50 LOW TEMP DI-QSCHP-2
   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 HD-60 Hinged doors for (4) openings Elite system
   7. 1 ea. Model LD Locks, for doors for Elite system
   8. 1 ea. Model FRMAD-60 Formica laminate with doors, for Elite systems. Color selected is Bubble Art 8958-58 FEC to verify color selections with Architect prior to ordering
   9. 1 ea. Model SCB-8-60 Cutting Board for Elite system, 8", for (4) openings - 60"W, stainless
   10. 1 ea. Model SRTS-60 Tray slide for Elite system, 12" solid ribbed, heavy gauge stainless steel, for (4) openings - 60"W
   11. 1 ea. Model ME Mitered end for tray slide for Elite system
   12. 1 ea. Model INSTALL PACKAGE INSTALL PACKAGE - to include cut-out in the countertop, install for the drop-in provided by FEC, electrical hook-up, reinforced top, and louvered panels if required. ***Drop-in to be provided by FEC.***
   13. Item 50 Low Temp DI-QSCHP-2 to be provided by others and installed by Piper.
   14. 1 ea. Model PG MOUNT Mounting of other manufacturer's sneeze guard. ELECTRICAL TO EXIT OPERATOR RIGHT BACK LEG. ***
   15. Item 51 Premier PMG Guard to be provided by FEC and installed by Piper.

4.62 Item 60 - Solid Top Unit – One (1) Required

A. Piper Products/Servolift Eastern Model 2-CR-MOD per drawing #7607 Dimensions: 36(h) x 28(w) x 28(d) Elite Corner Serving Counter, 28"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"L AND 30"D.

Provide with the following:

1. 1 ea. 1 year warranty parts and labor
2. 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
3. 1 ea. Model FLP Filler Strips, for Elite systems
4. 1 ea. Model HD-28 Hinged doors for (2) openings Elite system
5. 1 ea. Model LD Locks, for doors for Elite system
6. 1 ea. Model FRMAD-28 Formica laminate with doors, for Elite systems Color selected is Bubble Art 8958-58 FEC to verify color selections with Architect prior to ordering .

4.63 Item 61 – Solid Top Unit – One (1) Required

A. Piper Products/Servolift Eastern Model 4-ST-MOD Per Drawing #7607 Dimensions: 36(h) x 60(w) x 28(d) Elite Utility Serving Counter, 60"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. 120v/60/1-ph, 15.5 amps, NEMA 5-20P
3. 1 ea. Model SOUT Single Outlet, NEMA 5-20R FOR ITEM 47 LOW TEMP 2QSGT-42
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 HD-60 Hinged doors for (4) openings Elite system
7. 1 ea. Model LD Locks, for doors for Elite system
8. 1 ea. Model FRMAD-60 Formica laminate with doors, for Elite systems. Color selected is Bubble Art 8958-58 FEC to verify color selections with Architect prior to ordering
9. 1 ea. Model SCB-8-60 Cutting Board for Elite system, 8", for (4) openings - 60"W, stainless
10. 1 ea. Model SRTS-60 Tray slide for Elite system, 12" solid ribbed, heavy gauge stainless steel, for (4) openings - 60"W
11. 1 ea. Model ME Mitered end for tray slide for Elite system
12. 1 ea. Model INSTALL PACKAGE INSTALL PACKAGE - to include cut-out in the countertop, install for the drop-in provided by FEC, electrical hook-up, reinforced top, and louvered panels if required. ***Drop-in to be provided by FEC.***
13. Item 47 Low Temp 2QSGT-42 to be provided by FEC and installed by Piper.

4.64 Item 62 - Solid Top Unit – One (1) Required

A. Piper Products/Servolift Eastern Model 3-ST Per drawing #7607 Dimensions: 36(h) x 46(w) x 28(d) Elite Utility Serving Counter, 46"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. 120/208v/60/1-ph, 7.5 amps, NEMA 14-20P
3. 1 ea. Model SOUT Single Outlet, NEMA L14-20R FOR ITEM 43 HATCO HXMS-30D

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 CWB Cut out with bushing for cords & wires
6. 1 ea. Model FLP Filler Strips, for Elite systems
7. 1 ea. Model HD-46 Hinged doors for (3) openings Elite system
8. 1 ea. Model LD Locks, for doors for Elite system
9. 1 ea. Model FRMAD-46 Formica laminate with doors, for Elite systems Color selected is Bubble Art 8958-58 FEC to verify color selections with Architect prior to ordering
10. 1 ea. Model SCB-8-46 Cutting Board for Elite system, 8", for (3) openings - 46"W, stainless
11. 1 ea. Model SRTS-46 Tray slide for Elite system, 12" solid ribbed, heavy gauge stainless steel, for (3) openings - 46"W

4.65 Item 63 - Spare Number

4.66 Item 64 - Solid Top Unit – One (1) Required

A. Piper Products/Servolift Eastern Model 4-ST-MOD Per drawing #7607 Dimensions: 36(h) x 60(w) x 28(d) Elite Utility Serving Counter, 60"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. 120v/60/1-ph, 6.9 amps, NEMA 5-15P
   3. 1 ea. Model SOUT Single Outlet, NEMA 5-15R FOR ITEM 65 HATCO HCSBF-36-S
   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 HD-60 Hinged doors for (4) openings Elite system
   7. 1 ea. Model LD Locks, for doors for Elite system
   8. 1 ea. Model FRMAD-60 Formica laminate with doors, for Elite systems. Color selected is Bubble Art 8958-58 FEC to verify color selections with Architect prior to ordering
   9. 1 ea. Model SCB-8-60 Cutting Board for Elite system, 8", for (4) openings - 60"W, stainless
   10. 1 ea. Model SRTS-60 Tray slide for Elite system, 12" solid ribbed, heavy gauge stainless steel, for (4) openings - 60"W
   11. 1 ea. Model INSTALL PACKAGE INSTALL PACKAGE - to include cut-out in the countertop, install for the drop-in provided by FEC, electrical hook-up, reinforced top, and louvered panels if required. ***Drop-in to be provided by FEC.***
   12. Item 65 Hatco HCSBF-36-S to be provided by others and installed by Piper.
   13. 1 ea. Model PG MOUNT Mounting of other manufacturer's sneeze guard. ELECTRICAL TO EXIT OPERATOR RIGHT BACK LEG. ***
   14. Item 66 Premier PMG Guard to be provided by FEC and installed by Piper.

4.67 Item 65 - Warming Shelf – One (1) Required

A. Hatco Model HCSBF-36-S Dimensions: 10.13(h) x 37.5(w) x 25.5(d) Hot/Cold Shelf, built-in flush top, 36"W x 24"D, electronic temperature control, condensing unit, aluminum hardcoat, top mount, cULus, Made in USA. Provide with the following:
   1. 1 ea. NOTE: Includes 24/7 parts & service assistance, call 414-671-6350
   2. 1 ea. NOTE: CE mark not available
   3. 1 ea. 1 year on-site parts & labor warranty
   4. 1 ea. 1-Yr Warranty on Blanket Heating Elements against burnout,
   5. 1 ea. 120v/60/1-ph, 825 watts, 6.9 amps, 1/3 HP, NEMA 5-15P (domestic voltage),

4.68 Item 66 - Breath Protector – One (1) Required

A. Premier Metal & Glass Model TM2S-A -per drawing #52377 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. 40" cl length; approx. 136 lbs. ea. (2 end supports) fully adjustable single tier to protect hot food unit item 65
   1. FEC to ship unit to Piper for factory installation

4.69 Item 67 - 4 Well Hot Food Unit – One (1) Required

A. Piper Products/Servolift Eastern Model 4-HF Per drawing #7607 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 Provide 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,
   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 HD-60 Hinged doors for (4) openings Elite system
   7. 1 ea. Model LD Locks, for doors for Elite system
   8. 1 ea. Model FRMAD-60 Formica laminate with doors, for Elite systems. Color selected is Bubble Art 8958-58 FEC to verify color selections with Architect prior to ordering
   9. 1 ea. Model SCB-8-60 Cutting Board for Elite system, 8", for (4) openings - 60"W, stainless
   10. 1 ea. Model SRTS-60 Tray slide for Elite system, 12" solid ribbed, heavy gauge stainless steel, for (4) openings - 60"W
   11. 1 ea. Model PG MOUNT Mounting of other manufacturer's sneeze guard. ELECTRICAL TO EXIT OPERATOR RIGHT BACK LEG. ***
   12. Item 38 Premier PMG Guard to be provided by FEC and installed by Piper.

4.70 Item 68 - Mobile Warming Cabinet (Existing Item #E46 – Relocate) – One (1)

4.71 Item 69 - Can Rack – One (1) Required

A. Piper Products/Servolift Eastern Model CSR-FF-156 Dimensions: 81.06(h) x 27.25(w) x 42(d) Can Rack, (156) #10 cans, all welded aluminum. Provide with the following
   1. 1 ea. 1 year warranty parts and labor
   2. 1 set Model -Y5 Polyurethane 5" casters, set of 4, with ball bearing seals
   3. 1 set Model -WB Wheel brakes (set of 2)

4.72 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.

4.73 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.

4.74 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.…

4.75 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: Drawings FS100, FS101, FS102, FS103, FS104, FS105, FS106 & FS107

END OF SECTION

SECTION 122400
WINDOW SHADES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior manual roller shades.

1.02 RELATED REQUIREMENTS

A. Section 061000 - 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 013000 - 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 016000 - 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 016000 - 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 017800 - 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 220510
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 CONCRETE BASES

A. Provide concrete bases for all floor-mounted equipment (unless otherwise noted). Provide 3,000 lb. concrete, chamfer edges, trowel finish, and securely bond to floor by roughening slab and coating with cement grout. Bases 4" high (unless otherwise indicated); shape and size to accommodate equipment. Set anchor bolts in sleeves before pouring and after anchoring and leveling, fill equipment bases with grout.

1.21 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.

1.22 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."

1.23 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.

1.24 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.

1.25 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.

1.26 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.

1.27 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.

1.28 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.

1.29 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.

1.30 ALL TRADES TEMPORARY HEAT

A. Refer to the Standard General Conditions of the contract for Construction and Supplemental General Conditions.

1.31 PLUMBING TEMPORARY FACILITIES

A. Refer to the Standard General Conditions of the Contract for Construction and Supplemental General Conditions.

1.32 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 220515
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 220553
PLUMBING IDENTIFICATION

25PART 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 220719
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; 2023d.

J. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 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.

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 221005
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. Flanges, unions, and couplings.
   4. Pipe hangers and supports.

1.02 RELATED REQUIREMENTS

A. Section 220553 - Plumbing Identification.

B. Section 220719 - 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; 2023.

W. AWWA C651 - Disinfecting Water Mains; 2023.

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 016000 - 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, BURIED WITHIN 5 FEET OF BUILDING

A. Cross-Linked Polyethylene (PEX) Pipe: ASTM F876 or ASTM F877.
1. PPI TR-4 Pressure Design Basis:
a. 100 psig at maximum 180 degrees F.
2. Fittings: Use Solid Pipe, no fittings under slab.
3. Run piping within 2" conduit in floor.

2.04 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.

2.05 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.

2.06 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.

2.07 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 016000 - 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.

2.08 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 016000 - 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.

2.09 RELIEF VALVES

A. Temperature and Pressure Relief:
1. Manufacturers:
a. Cla-Val Co: www.cla-val.com.
b. Henry Technologies: www.henrytech.com.
c. Watts Regulator Company: www.wattsregulator.com.
d. Substitutions: See Section 016000 - Product Requirements.
2. AGA Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME (BPV IV) certified and labelled.

2.10 STRAINERS

A. Manufacturers:
1. Watts.: www.watts.com.
2. Substitutions: See Section 016000 - 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 220516.

G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 220719.

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 312316.

L. Backfill in accordance with Section 312323.

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. Refer to Section 099000. 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 220548.
   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.

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 221006
PLUMBING PIPING SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Floor drains.

B. Cleanouts.

C. Hydrants.

D. Water hammer arrestors.

E. Sanitary waste interceptors.

1.02 RELATED REQUIREMENTS

A. Section 221005 - Plumbing Piping.

B. Section 224000 - Plumbing Fixtures.

1.03 REFERENCE STANDARDS

A. ASME A112.6.3 - Floor Drains; 2022.

B. NSF 61 - Drinking Water System Components - Health Effects; 2023, 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. Floor Drain (FD-1):
   1. ASME A112.6.3; epoxy coated cast iron two piece body with double drainage flange, weep holes, reversible clamping collar, and square, adjustable heal proof stainless steel 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-1100-M: www.watts.com.
      c. Zurn Industries, Inc: 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.

B. Floor Sink (FS-1):
1. 12" square by 6" deep 14 ga. type 304 stainless steel sanitary floor sink with loose set cast stainless steel grate, stainless steel dome bottom strainer, and no hub (standard) outlet.
2. Manufacturers:
a. Josam Company: www.josam.com.
b. Watts Water Technologies; Model FS-710: www.watts.com.
c. Zurn Industries, Inc.: www.zurn.com.
d. Substitutions: See Section 01 6000 - Product Requirements.
3. Accessories: Floor drain trap seal.
a. Manufacturers:
1) ProVent Systems, Inc.: www.trapguard.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 016000 - 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 HOSE BIBBS

A. Manufacturers:
1. Jay R. Smith Manufacturing Company: www.jayrsmith.com
2. Watts Water Technologies: www.watts.com
3. Zurn Industries, Inc: www.zurn.com
4. Substitutions: See Section 016000 - Product Requirements.

B. Interior Hose Bibbs (HB-1):
1. Exposed, lead-free, anti-siphon, moderate climate wall hydrant for residential and light commercial applications. Hydrant features external vacuum breaker with 3/4” male hose connection, bronze and stainless steel interior components, vandal resistant operating stem, and secured wheel-type handle.
2. Zurn Industries, Inc, Z1341XL; or approved equal.

2.04 HYDRANTS

A. Manufacturers:
1. Jay R. Smith Manufacturing Company: www.jayrsmith.com

2. Zurn Industries, Inc: www.zurn.com
3. Watts Water Technologies: www watts.com
4. Substitutions: See Section 016000 - Product Requirements.

B. Exterior Wall Hydrants (HYD-1):
1. Encased, lead-free, non-freeze automatic draining wall hydrant for flush installation. Hydrant features integral backflow preventer with anti-siphon technology, copper casing, all-bronze interior components with 1/2 turn long-life ceramic disc cartridge, combination 3/4" female solder and 3/4" male pipe thread inlet connection, and 3/4" male hose connection. Includes operating key.
2. Zurn Industries, Inc, Model Z1321XL; or approved equal.

C. Exterior Wall Hydrants (HYD-2):
1. Encased, lead-free, non-freeze automatic draining wall hydrant for flush installation. Hydrant features integral backflow preventer with anti-siphon technology, copper casing, all-bronze interior components with 1/2 turn long-life ceramic disc cartridge, combination 3/4" female solder and 3/4" male pipe thread inlet connection, and 3/4" male hose connection. Includes operating Wheel Handle opperator.
2. Zurn Industries, Inc, Model Z1321XL-WH; or approved equal.

2.05 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 016000 - 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.

2.06 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-25 FM: www.highlandtank.com.
4. Substitutions: See Section 016000 - 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. 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.

B. Install floor cleanouts at elevation to accommodate finished floor.

C. 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 223000
PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water Heaters:
   1. Commercial electric.

1.02 SUBMITTALS

A. See Section 013000 - 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. 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: 50 gal.
      b. Heating Element Size: 4.1 kW.
      c. Number of Heating Elements: 3.
      d. Maximum Working Pressure: 150 psig.
   3. Electrical Characteristics:
      a. 208 volts, single 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.

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.

END OF SECTION

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SECTION 224000
PLUMBING FIXTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flush valve water closets.

B. Lavatories.

C. Mop sinks.

1.02 REFERENCE STANDARDS

A. ASME A112.6.1M - Floor-Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use; 1997 (Reaffirmed 2017).

B. ASME A112.18.1 - Plumbing Supply Fittings; 2018, with Errata.

C. ASME A112.19.2 - Ceramic Plumbing Fixtures; 2018, with Errata.

D. ASME A112.19.5 - Flush Valves and Spuds for Water Closets, Urinals, and Tanks; 2022.

E. ASSE 1070 - Performance Requirements for Water Temperature Limiting Devices; 2020.

F. NSF 61 - Drinking Water System Components - Health Effects; 2023, with Errata.

G. NSF 372 - Drinking Water System Components - Lead Content; 2022.

H. UL (DIR) - Online Certifications Directory; Current Edition.

1.03 SUBMITTALS

A. See Section 013000 - 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 017800 - 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-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 016000 - 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 016000 - 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 016000 - 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 016000 - 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-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 016000 - 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. ASSE 1070 listed with combination stop, strainer, and check valves, and flexible stainless steel connectors.

F. Accessories:
1. Chrome-plated 17 gauge, 0.0538 inch brass P-trap with clean-out plug and arm with escutcheon.

2.05 MOP SINKS (JS-1)

A. Manufacturers:
1. Acorn Engineering Company: www.acorneng.com
2. FIAT; Model TSBCR1100: www.fiatproducts.com.
3. Substitutions: See Section 016000 - Product Requirements.

B. Material: Precast terrazzo composed of marble chips cast in Portland cement.

C. Type: 12" Mop Service Basin with 6" Curved 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.
   4. Wall Guards - Stainless Steel.

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.

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: 3/4 Inch.
    b. Cold Water: 3/4 Inch.
    c. Waste: 3 Inch.
    d. Vent: 2 Inch.

END OF SECTION

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SECTION 230510
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. NFPANational 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 230516
EXPANSION FITTINGS AND LOOPS FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flexible pipe connectors.

B. Expansion joints and compensators.

C. Pipe loops, offsets, and swing joints.

1.02 RELATED REQUIREMENTS

A. Section 232113 - Hydronic Piping.

1.03 REFERENCE STANDARDS

A. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard; 2020.

B. ASTM A536 - Standard Specification for Ductile Iron Castings; 1984, with Editorial Revision (2019).

C. EJMA (STDS) - EJMA Standards; Tenth Edition.

D. FM (AG) - FM Approval Guide; Current Edition.

E. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data:

1. Flexible Pipe Connectors: Indicate maximum temperature and pressure rating, face-to-face length, live length, hose wall thickness, hose convolutions per foot and per assembly, fundamental frequency of assembly, braid structure, and total number of wires in braid.

C. Manufacturer's Instructions: Indicate manufacturer's installation instructions, special procedures, and external controls.

PART 2 PRODUCTS

2.01 FLEXIBLE PIPE CONNECTORS - STEEL PIPING

A. Manufacturers:

1. The Metraflex Company: www.metraflex.com.

B. Inner Hose: Stainless Steel.

C. Exterior Sleeve: Single braided, stainless steel.

D. Pressure Rating: 125 psi and 450 degrees F.

E. Joint: As Specified for Pipe Joints.

F. Size: Use pipe sized units.

G. Maximum offset: 3/4 inch on each side of installed center line.

2.02 FLEXIBLE PIPE CONNECTORS - COPPER PIPING

A. Manufacturer:

1. The Metraflex Company: www.metraflex.com.

B. Inner Hose: Bronze.

C. Exterior Sleeve: Braided bronze.

D. Pressure Rating: 125 psi and 450 degrees F.

E. Joint: As specified for pipe joints.

F. Size: Use pipe sized units.

G. Maximum offset: 3/4 inch on each side of installed center line.

2.03 EXPANSION JOINTS - HOSE AND BRAID

A. Manufacturers:
   1. Flex-Weld, Inc; Keflex Ke-Loop: www.flex-weld.com.
   2. The Metraflex Company; Metraloop: www.metraflex.com.

B. Provide flexible loops with two flexible sections of hose and braid, two 90 degree elbows, and 180 degree return with support bracket and air release or drain plug.

C. Provide flexible loops capable of movement in the x, y, and z planes. Flexible loops to impart no thrust loads to the building structure.

D. Flexible Connectors: Flanged, braided type with wetted components of stainless steel, sized to match piping.
   1. Maximum Allowable Working Pressure: 150 psig at 180 degrees F.
   2. Accommodate the Following:
      a. Axial Deflection in Compression and Expansion:
      b. Lateral Movement: 2 inch.
      c. Angular Rotation: 15 degrees.
      d. Force developed by 1.5 times specified maximum allowable operating pressure.
   3. End Connections: Same as specified for pipe jointing.
   4. Provide necessary accessories including, but not limited to, swivel joints.

2.04 ACCESSORIES

A. Pipe Alignment Guides:
   1. Manufacturers:
      a. Flex-Weld, Inc: www.flex-weld.com.
      b. The Metraflex Company; PGQ Glide Riser Guide: www.metraflex.com.
   2. Two piece welded steel with enamel paint, bolted, with spider to fit standard pipe, frame with four mounting holes, clearance for minimum 1 inch thick insulation, minimum 3 inches travel.

B. Engineered Riser Anchor Clamps:
   1. Manufacturers:
      a. The Metraflex Company; Engineered Riser Anchor Clamp: www.metraflex.com.
   2. Applications:
      a. Provide one clamp to serve as a riser clip.
         1) Verify the total load of filled pipe to be supported will be a safety factor of one less than the maximum loading of the clamp per the manufacturer's instructions.
      b. Provide one clamp above and one clamp below the slab to anchor pipe.
   3. Provide two piece, ductile iron in compliance with ASTM A536. Use with metal pipes with an outer diameter of 2.5 inches to 8 inches.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with EJMA (Expansion Joint Manufacturers Association) Standards.

C. Install flexible pipe connectors on pipes connected to vibration isolated equipment. Provide line size flexible connectors.

D. Anchor pipe to building structure where indicated. Provide pipe guides so movement is directed along axis of pipe only. Erect piping such that strain and weight is not on cast connections or apparatus.

E. Provide support and equipment required to control expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where required.

END OF SECTION

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SECTION 230517
SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe sleeves.

B. Manufactured sleeve-seal systems.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.

B. Section 230553 - Identification for HVAC Piping and Equipment: Piping identification.

C. Section 230719 - HVAC Piping Insulation.

1.03 REFERENCE STANDARDS

A. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type); 2022a.

B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2023a.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store sleeve and sleeve seals in shipping containers, with labeling in place.

B. Provide temporary protective coating on cast iron and steel sleeves if shipped loose.

PART 2 PRODUCTS

2.01 PIPE SLEEVES

A. Vertical Piping:
   1. Sleeve Length: 1 inch above finished floor.
   2. Provide sealant for watertight joint.

B. Pipe Passing Through Exterior Walls:
   1. Zinc coated or cast iron pipe with asphalt coating.
   2. Provide watertight space with link rubber or modular seal between sleeve and pipe on both pipe ends.

C. Pipe Passing Through Mechanical Floors and walls:
   1. Galvanized steel pipe or black iron pipe with asphalt coating.
   2. Connect sleeve with floor plate except in mechanical rooms.

D. Clearances:
   1. Provide allowance for insulated piping.
   2. Wall, Floor, Floor, Partitions, and Beam Flanges: 1-1/2 inch greater than external; pipe diameter.
   3. All Rated Openings: Caulked tight with fire stopping material in compliance with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.

2.02 MANUFACTURED SLEEVE-SEAL SYSTEMS

A. Manufacturers:
   1. Advance Products & Systems, LLC; Innerlynx: www.apsonline.com.

2. Flexicraft Industries; PipeSeal: www.flexicraft.com.

B. Modular/Mechanical Seal:
   1. Synthetic rubber interlocking links continuously fill annular space between pipe and wall/casing opening.
   2. Provide watertight seal between pipe and wall/casing opening.
   3. Elastomer element size and material in accordance with manufacturer's recommendations.
   4. Glass reinforced plastic pressure end plates.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and foreign material, from inside and outside, before assembly.

3.02 INSTALLATION

A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

B. Install piping to conserve building space, to not interfere with use of space and other work.

C. Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

D. Structural Considerations:
   1. Do not penetrate building structural members unless indicated.

E. Provide sleeves when penetrating footings, floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
   1. Aboveground Piping:
      a. Pack solid using mineral fiber in compliance with ASTM C592.
      b. Fill space with an elastomer caulk to a depth of 0.50 inch where penetrations occur between conditioned and unconditioned spaces.
   2. All Rated Openings: Caulk tight with fire stopping material in compliance with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.
   3. Caulk exterior wall sleeves watertight with lead and oakum or mechanically expandable chloroprene inserts with mastic-sealed components.

F. Manufactured Sleeve-Seal Systems:
   1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
   2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
   3. Locate piping in center of sleeve or penetration.
   4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
   5. Tighten bolting for a water-tight seal.
   6. Install in accordance with manufacturer's recommendations.

G. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.03 CLEANING

A. Upon completion of work, clean all parts of the installation.

B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

END OF SECTION

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SECTION 230519
METERS AND GAUGES FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pressure gauges and pressure gauge taps.

B. Thermometers and thermometer wells.

1.02 RELATED REQUIREMENTS

A. Section 232113 - Hydronic Piping.

1.03 REFERENCE STANDARDS

A. ASME B40.100 - Pressure Gauges and Gauge Attachments; 2022.

B. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers; 2014 (Reapproved 2020).

C. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers; 2014 (Reapproved 2021).

D. AWWA M6 - Water Meters -- Selection, Installation, Testing, and Maintenance; 2012, with Addendum (2018).

E. UL 393 - Indicating Pressure Gauges for Fire-Protection Service; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.

PART 2 PRODUCTS

2.01 PRESSURE GAUGES

A. Manufacturers:
   1. Dwyer Instruments, Inc: www.dwyer-inst.com.
   2. Moeller Instrument Company, Inc: www.moellerinstrument.com.
   3. Omega Engineering, Inc: www.omega.com.

B. Pressure Gauges: ASME B40.100, UL 393 drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.
   1. Case: Steel with brass bourdon tube.
   2. Size: 4-1/2 inch diameter.
   3. Mid-Scale Accuracy: One percent.
   4. Scale: Psi and KPa.

2.02 PRESSURE GAUGE TAPPINGS

A. Gauge Cock: Tee or lever handle, brass for maximum 150 psi.

2.03 STEM TYPE THERMOMETERS

A. Manufacturers:
   1. Dwyer Instruments, Inc: www.dwyer-inst.com.
   2. Omega Engineering, Inc: www.omega.com.
   3. Weksler Glass Thermometer Corp: www.wekslerglass.com.

B. Thermometers - Adjustable Angle: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device; adjustable 360 degrees in horizontal plane, 180 degrees in vertical plane.
   1. Size: 9 inch scale.
   2. Window: Clear Lexan.
   3. Stem: 3/4 inch NPT brass.
   4. Accuracy: 2 percent, per ASTM E77.
   5. Calibration: Degrees F.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inch for installation of thermometer sockets. Ensure sockets allow clearance from insulation.

C. Provide instruments with scale ranges selected according to service with largest appropriate scale.

D. Install gauges and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.

E. Adjust gauges and thermometers to final angle, clean windows and lenses, and calibrate to zero.

END OF SECTION

SECTION 230523
GENERAL-DUTY VALVES FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Applications.

B. General requirements.

C. Ball valves.

D. Butterfly valves.

E. Check valves.

F. Drain valves.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping.

B. Section 083100 - Access Doors and Panels.

C. Section 230719 - HVAC Piping Insulation.

D. Section 232113 - Hydronic Piping.

1.03 REFERENCE STANDARDS

A. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2020.

B. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.

C. ASME B31.9 - Building Services Piping; 2020.

D. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings; 2004 (Reapproved 2023).

E. ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures; 1999 (Reapproved 2022).

F. ASTM A536 - Standard Specification for Ductile Iron Castings; 1984, with Editorial Revision (2019).

G. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings; 2017.

H. AWWA C606 - Grooved and Shouldered Joints; 2022.

I. MSS SP-45 - Drain and Bypass Connections; 2020.

J. MSS SP-67 - Butterfly Valves; 2022.

K. MSS SP-71 - Gray Iron Swing Check Valves, Flanged and Threaded Ends; 2018.

L. MSS SP-72 - Ball Valves with Flanged or Butt-Welding Ends for General Service; 2010a.

M. MSS SP-80 - Bronze Gate, Globe, Angle, and Check Valves; 2019.

N. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010, with Errata .

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

C. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.

1.05 QUALITY ASSURANCE

A. Manufacturer:
   1. Obtain valves for each valve type from single manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:
   1. Minimize exposure of operable surfaces by setting plug and ball valves to open position.
   2. Protect valve parts exposed to piped medium against rust and corrosion.
   3. Protect valve piping connections such as grooves, weld ends, threads, and flange faces.
   4. Secure check valves in either the closed position or open position.
   5. Adjust butterfly valves to closed or partially closed position.

B. Use the following precautions during storage:
   1. Maintain valve end protection and protect flanges and specialties from dirt.
      a. Provide temporary inlet and outlet caps.
      b. Maintain caps in place until installation.
   2. Store valves in shipping containers and maintain in place until installation.
      a. Store valves indoors in dry environment.
      b. Store valves off the ground in watertight enclosures when indoor storage is not an option.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. Provide the following valves for the applications indicated:
   1. Isolation (Shutoff): Butterfly and Ball.
      a. 2-1/2 NPS and smaller: Bronze Ball Valve.
   2. Check Valves:
      a. 2-1/2 NPS and Smaller: Bronze Swing Check Valve.
   3. Low Point Drains:
      a. All Sizes: 3/4 NPS Bronze Drain Valve with Cap.

2.02 GENERAL REQUIREMENTS

A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.

B. Valve Sizes: Match upstream piping unless otherwise indicated.

C. Valve Actuator Types:
   1. Gear Actuator: Quarter-turn valves 8 NPS and larger.
   2. Handwheel: Valves other than quarter-turn types.
   3. Hand Lever: Quarter-turn valves 6 NPS and smaller.
   4. Chainwheel: Device for attachment to valve handwheel, stem, or other actuator, of size and with chain for mounting height, as indicated in the "Valve Installation" Article.

D. Valves in Insulated Piping: Provide 2 NPS stem extensions and the following features:
   1. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
   2. Butterfly Valves: Extended neck.
   3. Memory Stops: Fully adjustable after insulation is installed.

E. Memory Stops: Fully adjustable after insulation is installed.

F. Valve-End Connections:
   1. Flanges on Iron Valves: ASME B16.1 for flanges on iron valves.

2. Solder Joint Connections: ASME B16.18.
3. Mechanical Press: ASME B16.51
4. Grooved End Connections: AWWA C606.

G. General ASME Compliance:
1. Building Services Piping Valves: ASME B31.9.

H. Bronze Valves:
1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

I. Valve Bypass and Drain Connections: MSS SP-45.

J. Source Limitations: Obtain each valve type from a single manufacturer.

2.03 BRONZE BALL VALVES

A. Two Piece, Full Port with Bronze or Brass Trim:
1. Comply with MSS SP-110.
2. CWP Rating: 600 psig.
3. Body: Bronze.
4. Ends: Threaded or Mechanical Press
5. Seats: PTFE or RPTFE.
6. Stem: Extended Brass.
7. Ball: Chrome plated brass.
8. Manufacturers:
a. Apollo Valves: www.apollovalves.com.

2.04 IRON, SINGLE FLANGE BUTTERFLY VALVES

A. Lug type: Bi-directional dead end service without downstream flange.
1. Comply with MSS SP-67, Type I.
2. CWP Rating: 200 psig.
3. Body Material: ASTM A536 ductile iron.
4. Stem: One or two-piece stainless steel.
5. Seat: EPDM.
6. Disc: Aluminum-bronze.
7. Manufacturers:
a. Apollo Valves: www.apollovalves.com.

2.05 IRON, GROOVED-END BUTTERFLY VALVES

A. CWP Rating: 300 psig (2070 kPa): 8 NPS (50 DN) or smaller.
1. Comply with MSS SP-67, Type I.
2. Body: ASTM A536 Ductile Iron.
3. Stem: Stainless steel.
4. Disc: Aluminum Bronze.
5. Disc Seal: EPDM.
6. Manufacturers:
a. Victaulic Series 761: www.victaulic.com

2.06 BRONZE LIFT CHECK VALVES

A. Class 125:
1. CWP Rating: 400 psig.
2. Design: Horizontal or Vertical flow.
3. Body: Bronze.
4. Ends: Threaded.
5. Disc: RPTFE Ball Cone Check.

6. Manufacturers:
    a. Apollo Valves: www.apollovalves.com.

2.07 BRONZE SWING CHECK VALVES

A. Class 125: CWP Rating: 200 psig (1380 kPa).
1. Comply with MSS SP-80, Type 3.
2. Body Design: Horizontal flow.
3. Body Material: Bronze, ASTM B62.
4. Ends: Threaded.
5. Disc: Bronze.
6. Manufacturers:
    a. Apollo Valves: www.apollovalves.com.

2.08 IRON, FLANGED END SWING CHECK VALVES

A. Class 125: CWP Rating: 200 psig (1380 kPa) with Metal Seats.
1. Comply with MSS SP-71, Type I.
2. Design: Clear or full waterway with flanged ends.
3. Body: Gray iron with bolted bonnet in accordance with ASTM A126.
4. Trim: Bronze.
5. Disc Holder: Bronze.
6. Disc: ASTM A126 Cast Iron.

B. Manufacturers:
1. Apollo Valves: www.apollovalves.com.

2.09 IRON, GROOVED-END SWING CHECK VALVES

A. 300 CWP:
1. 2 NPS to 8 NPS.
2. 10 NPS to 12 NPS.
3. CWP Rating: 300 psig.
4. Body Material: ASTM A536, Grade 65-45-12 ductile iron.
5. Disc: Stainless steel.
6. Coating: Black, non-lead paint.
7. Seat: EPDM.
8. Serviceable closure housing with removable cap.
9. Manufacturers:
    a. Victaulic Series 712: www.victaulic.com.

2.10 DRAIN VALVE

A. Two Piece, Full Port with Bronze or Brass Trim:
1. Comply with MSS SP-110.
2. CWP Rating: 300 psig.
3. Body: Bronze.
4. Ends: Threaded or Mechanical Press
5. 3/4" Hose Connection with heavy brass cap with heavy duty stainless steel chain.
6. Seats: Multi-fill PTFE.
7. Stem: Brass ASTMB16.
8. Ball: Chrome plated brass.
9. Manufacturers:
    a. Apollo Valves: www.apollovalves.com.

PART 3 EXECUTION

3.01 EXAMINATION

A. Discard all packing materials and verify that valve interior, including threads and flanges, are completely clean without signs of damage or degradation that could result in leakage.

B. Verify valve parts to be fully operational in all positions from closed to fully open.

C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.

D. Should valve is determined to be defective, replace with new valve.

3.02 INSTALLATION

A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.

B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.

C. Provide chainwheels on operators for valves 4 NPS and larger where located 8 feet or more above finished floor, terminating 6 feet above finished floor.

END OF SECTION

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SECTION 230529
HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment components for equipment, piping, and other HVAC/hydronic work.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Concrete equipment pads.

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 A181/A181M - Standard Specification for Carbon Steel Forgings, for General-Purpose Piping; 2023.

D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999, with Editorial Revision (2022).

F. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.

G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

H. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.

I. MFMA-4 - Metal Framing Standards Publication; 2004.

J. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).

K. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

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 033000.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.

C. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.

1.06 QUALITY ASSURANCE

A. Comply with applicable building code.

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 plumbing 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 3. Include consideration for vibration, equipment operation, and shock loads where applicable.
   4. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
   5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
      a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
      b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. 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. Manufacturers:
      a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com/#sle.
      b. Thomas & Betts Corporation: www.tnb.com/#sle.
      c. Unistrut, a brand of Atkore International Inc: www.unistrut.com/#sle.
      d. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.
   2. Comply with MFMA-4.
   3. Channel Material:
      a. Indoor Dry Locations: Use galvanized steel.
      b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
   4. Minimum Channel Thickness: Steel sheet, 12 gage, 0.1046 inch.
   5. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height.

C. 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. Piping up to 1 inch (27 mm) nominal: 1/4 inch diameter.
c. Piping larger than 1 inch (27 mm) nominal: 3/8 inch diameter.
d. Trapeze Support for Multiple Pipes: 3/8 inch diameter.

D. Thermal Insulated Pipe Supports:
1. General Construction and Requirements:
a. Insulated pipe supports to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
b. Surface Burning Characteristics: Flame spread index/smoke developed index of 5/30, maximum, when tested in accordance with ASTM E84 or UL 723.
c. Pipe supports to be provided for nominally sized, 1/2 inch to 30 inch iron pipes.
d. Insulation inserts to consist of rigid polyisocyanurate (urethane) insulation surrounded by a 360 degree, PVC jacketing.
2. PVC Jacket:
a. Pipe insulation protection shields to be provided with a ball bearing hinge and locking seam.
b. Moisture Vapor Transmission: 0.0071 perm inch, when tested in accordance with ASTM E96/E96M.
c. Thickness: 60 mil.
3. Pipe insulation protection shields to be provided at the hanger points and guide locations on pipes requiring insulation as indicated on drawings.

E. Pipe Supports:
1. Liquid Temperatures Up To 122 degrees F:
a. Overhead Support: MSS SP-58 Types 1, 3 through 12.
b. Support From Below: MSS SP-58 Types 35 through 38.

F. Pipe Stanchions: For pipe runs, use stanchions of same type and material where vertical adjustment is required for stationary pipe.
1. Material: Malleable iron, ASTM A47/A47M; or carbon steel, ASTM A36/A36M.
2. Provide coated or plated saddles to isolate steel hangers from dissimilar metal tube or pipe.

G. Beam Clamps: MSS SP-58 Types 19 through 23, 25 or 27 through 30 based on required load.
1. Material: ASTM A36/A36M carbon steel or ASTM A181/A181M forged steel.
2. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.

H. Riser Clamps:
1. Provide copper plated clamps for copper tubing support.
2. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.

I. Offset Pipe Clamps: Double-leg design two-piece pipe clamp.

J. Strut Clamps: Two-piece pipe clamp.

K. Insulation Clamps: Two bolt-type clamps designed for installation under insulation.

L. Pipe Hangers: For a given pipe run, use hangers of the same type and material.
1. Material: Malleable iron, ASTM A47/A47M; or carbon steel, ASTM A36/A36M.
2. Provide coated or plated hangers to isolate steel hangers from dissimilar metal tube or pipe.

M. Dielectric Barriers: Provide between metallic supports and metallic piping and associated items of dissimilar type; acceptable dielectric barriers include rubber or plastic sheets or coatings attached securely to pipe or item.

N. Nonpenetrating Rooftop Supports for Low-Slope Roofs:

1. Provide steel pedestals with thermoplastic or rubber base that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.
2. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
3. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
4. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.

O. Pipe Shields for Insulated Piping:
1. General Construction and Requirements:
a. Surface Burning Characteristics: Comply with ASTM E84 or UL 723.
b. Shields Material: UV-resistant polypropylene with glass fill.
c. Maximum Insulated Pipe Outer Diameter: 12-5/8 inch.
d. Minimum Service Temperature: Minus 40 degrees F.
e. Maximum Service Temperature: 178 degrees F.
f. Pipe shields to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.

P. 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. 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.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.

C. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

D. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

F. Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.

G. 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.

H. Preset Concrete Inserts: Use manufacturer-provided closure strips to inhibit concrete seepage during concrete pour.

I. Secure fasteners according to manufacturer's recommended torque settings.

J. Remove temporary supports.

END OF SECTION

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SECTION 230553
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 099123 - Interior Painting: Identification painting.

1.03 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2023.

B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2017.

1.04 SUBMITTALS

A. See Section 013000 - 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 099123, 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 099123 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 099123.

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 230593
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 019113 - General Commissioning Requirements: Commissioning requirements that apply to all types of work.

B. Section 230800 - 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, with Errata (2022).

D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing; 2023.

1.04 SUBMITTALS

A. See Section 013000 - 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 019113 - General Commissioning Requirements and 230800 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 230713
DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Duct insulation.

B. Insulation jackets.

1.02 RELATED REQUIREMENTS

A. Section 230553 - Identification for HVAC Piping and Equipment.

B. Section 233100 - 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; 2023d.

F. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 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 013000 - 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.

2.04 JACKETS

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

SECTION 230716
HVAC EQUIPMENT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Equipment insulation.

B. Flexible removable and reusable blanket insulation.

C. Covering.

1.02 REFERENCE STANDARDS

A. 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).

B. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.

C. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation; 2017 (Reapproved 2023).

D. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2023.

E. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013 (Reapproved 2019).

F. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type); 2022a.

G. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014 (Reapproved 2019).

H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

I. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.

J. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for equipment scheduled.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labeled 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.

1.05 FIELD CONDITIONS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

B. Maintain temperature during and after installation for minimum period of 24 hours.

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. 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 C553; flexible, noncombustible.
   1. K Value: 0.36 at 75 degrees F, when tested in accordance with ASTM C177 or ASTM C518.
   2. Maximum Service Temperature: 450 degrees F.
   3. Maximum Water Vapor Absorption: 5.0 percent by weight.

C. Vapor Barrier Jacket: Kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
   1. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
   2. Secure with self-sealing longitudinal laps and butt strips.
   3. Secure with outward clinch expanding staples and vapor barrier mastic.

D. Vapor Barrier Lap Adhesive: Compatible with insulation.

2.03 GLASS FIBER, RIGID

A. Manufacturer:
   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 C612 or ASTM C592; rigid, noncombustible.
   1. K Value: 0.25 at 75 degrees F, when tested in accordance with ASTM C177 or ASTM C518.
   2. Maximum Service Temperature: 850 degrees F.
   3. Maximum Water Vapor Absorption: 5.0 percent by weight.
   4. Maximum Density: 8.0 lb/cu ft.

C. Vapor Barrier Jacket:
   1. Kraft paper reinforced 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 self-sealing longitudinal laps and butt strips.
   4. Secure with outward clinch expanding staples and vapor barrier mastic.

2.04 HYDROUS CALCIUM SILICATE

A. Manufacturer:
   1. Johns Manville Corporation: www.jm.com/#sle.

B. Insulation: ASTM C533; rigid molded, asbestos free, gold color.
   1. K Value: 0.40 at 300 degrees F, when tested in accordance with ASTM C177 or ASTM C518.
   2. Maximum Service Temperature: 1200 degrees F.
   3. Density: 15 lb/cu ft.

2.05 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

A. Manufacturer:
   1. Aeroflex USA, Inc: www.aeroflexusa.com/#sle.
   2. Armacell LLC: www.armacell.us/#sle.
   3. K-Flex USA LLC: www.kflexusa.com/#sle.

B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1, in sheet form.
   1. Minimum Service Temperature: Minus 40 degrees F.
   2. Maximum Service Temperature: 220 degrees F.
   3. Connection: Waterproof vapor barrier adhesive.

C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

2.06 JACKETS

A. PVC Plastic:
   1. Jacket: Sheet material, off-white color.
      a. Minimum Service Temperature: Minus 40 degrees F.
      b. Maximum Service Temperature: 150 degrees F.
      c. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
      d. Thickness: 10 mil.
      e. Connections: Brush on welding adhesive.

B. Canvas Jacket: UL listed 6 oz/sq yd plain weave cotton fabric treated with dilute fire retardant lagging adhesive.
   1. Lagging Adhesive: Compatible with insulation.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Factory Insulated Equipment: Do not insulate.

C. Exposed Equipment: Locate insulation and cover seams in least visible locations.

D. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Fasten insulation to equipment with studs, pins, clips, adhesive, wires, or bands.

E. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor barrier cement.

F. Insulated equipment containing fluids below ambient temperature; insulate entire system.

G. Fiber glass insulated equipment containing fluids below ambient temperature; provide vapor barrier jackets, factory-applied or field-applied. Finish with glass cloth and vapor barrier adhesive.

H. For hot equipment containing fluids 140 degrees F or less, do not insulate flanges and unions, but bevel and seal ends of insulation.

I. For hot equipment containing fluids over 140 degrees F, insulate flanges and unions with removable sections and jackets.

J. Fiber glass insulated equipment containing fluids above ambient temperature; provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Finish with glass cloth and adhesive.

K. Inserts and Shields:
   1. Application: Equipment 1-1/2 inches diameter or larger.
   2. Shields: Galvanized steel between hangers and inserts.
   3. Insert Location: Between support shield and equipment and under the finish jacket.
   4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
   5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

L. Finish insulation at supports, protrusions, and interruptions.

M. Equipment in Mechanical Equipment Rooms or Finished Spaces: Finish with canvas jacket sized for finish painting.

3.03 SCHEDULE

A. Heating Systems:
   1. Air Separators:
   2. Expansion Tanks:

END OF SECTION

SECTION 230719
HVAC PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping insulation.

B. Flexible removable and reusable blanket insulation.

C. Jackets and accessories.

D. Engineered wall outlet seals and refrigerant piping insulation protection.

1.02 RELATED REQUIREMENTS

A. Section 232113 - Hydronic Piping: Placement of hangers and hanger inserts.

B. Section 232300 - Refrigerant Piping: Placement of inserts.

1.03 REFERENCE STANDARDS

A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.

C. 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).

D. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.

E. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation; 2017 (Reapproved 2023).

F. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2023.

G. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2022a.

H. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation; 2022.

I. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2023).

J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

K. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.

L. 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).

M. 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).

N. ASTM G153 - Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials; 2013 (Reapproved 2021).

O. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 013000 - 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 CELLULAR GLASS

A. Pipe and Tubing Insulation: ASTM C552, Type II, Grade 6.
   1. K Value: 0.35 at 100 degrees F.
   2. Service Temperature Range: From 250 degrees F to 800 degrees F.
   3. Water Vapor Permeability: 0.005 perm inch maximum per inch.
   4. Water Absorption: 0.5 percent by volume, maximum.
   5. Density: A minimum of 6.12 lb/cu ft.

B. Block Insulation: ASTM C552, Type I, Grade 6.
   1. K Value: 0.35 at 100 degrees F.
   2. Service Temperature: 800 degrees F, maximum.
   3. Water Vapor Permeability: 0.005 perm inch maximum per inch.
   4. Water Absorption: 0.5 percent by volume, maximum.

2.04 HYDROUS CALCIUM SILICATE

A. Manufacturers:
   1. Johns Manville Corporation: www.jm.com/#sle.

B. Insulation: ASTM C533 and ASTM C795; rigid molded, asbestos free, gold color.

1. K Value: 0.40 at 300 degrees F, when tested in accordance with ASTM C177 or ASTM C518.
2. Maximum Service Temperature: 1200 degrees F.
3. Density: 15 lb/cu ft.

C. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

2.05 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.

2.06 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.

2.07 ENGINEERED WALL OUTLET SEALS AND REFRIGERANT PIPING INSULATION PROTECTION

A. Pipe Penetration Wall Seal: Seals HVAC piping wall penetrations with compression gasket wall mounted rigid plastic outlet cover.
1. Wall Outlet Size, Stucco and Masonry Applications: 7-1/2 inch wide by 10 inch high.
a. Elastomeric Sleeve Diameter: 1-11/16 inch.
2. Outlet Cover Color: White.
3. Water Penetration: Comply with ASTM E331.
4. Air Leakage: Comply with ASTM E283.

B. Insulation Protection System: Refrigerant piping insulation PVC protective cover.
1. PVC Insulation Cover Color: White with full-length velcro fastener.
2. Weatherization and Ultraviolet Exposure Protection: Comply with ASTM G153.
3. Water/Vapor Permeability: Comply with ASTM E96/E96M.

4. Flame Spread and Smoke Development Rating of 24/450: Comply with ASTM E84 or UL 723.

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, pump bodies, 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. Inserts and Shields:
   1. Application: Piping 1-1/2 inches diameter or larger.
   2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
   3. Insert location: Between support shield and piping and under the finish jacket.
   4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
   5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

I. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 078400.

J. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with PVC jacket and fitting covers.

K. 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. Heating Systems:

1. Heating Water Supply and Return: Glass Fiber, 1-1/2 in on pipes 1-1/4 in and less. 2 in on pipes 2" and more.
2. Glycol Heating Supply and Return:Glass Fiber, 1-1/2 in on pipes 1-1/4 in and less. 2 in on pipes 2" and more

B. Cooling Systems:
1. Condensate Drains from Cooling Coils: Glass Fiber, 1-1/2 in on pipes 1-1/4 in and less.
2. Refrigerant Suction: Closed Cell, 1" on pipes 1/1/4 in and less.
3. Refrigerant Hot Gas: Closed Cell, 1" on pipes 1/1/4 in and less.

END OF SECTION

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SECTION 230800
COMMISSIONING OF HVAC

PART 1 GENERAL

1.01 SUMMARY

A. See Section 019113 - General Commissioning Requirements for overall objectives; comply with the requirements of Section 019113.

B. This section covers the Contractor's responsibilities for commissioning; each subcontractor or installer responsible for the installation of a particular system or equipment item to be commissioned is responsible for the commissioning activities relating to that system or equipment item.

C. The Commissioning Authority (CA) directs and coordinates all commissioning activities and provides Prefunctional Checklists and Functional Test Procedures for Contractor's use.

D. The HVAC systems install in this contract is to be commissioned, including commissioning activities for the following specific items:
   1. Control system.
   2. Major and minor equipment items.
   3. Terminal units.
   4. Other equipment and systems explicitly identified elsewhere in Contract Documents as requiring commissioning.

E. The Prefunctional Checklist and Functional Test requirements specified in this section are in addition to, not a substitute for, inspection or testing specified in other sections.

1.02 SUBMITTALS

A. Updated Submittals: Keep the Commissioning Authority informed of all changes to control system documentation made during programming and setup; revise and resubmit when substantial changes are made.

B. Startup Reports, Prefunctional Checklists, and Trend Logs: Submit for approval of Commissioning Authority.

C. HVAC Control System O&M Manual Requirements. In addition to documentation specified elsewhere, compile and organize at minimum the following data on the control system:
   1. Specific step-by-step instructions on how to perform and apply all functions, features, modes, etc. mentioned in the controls training sections of this specification and other features of this system. Provide an index and clear table of contents. Include the detailed technical manual for programming and customizing control loops and algorithms.
   2. Full as-built set of control drawings.
   3. Full as-built sequence of operations for each piece of equipment.
   4. Full points list; in addition to the information on the original points list submittal, include a listing of all rooms with the following information for each room:
      a. Floor.
      b. Room number.
      c. Room name.
      d. Air handler unit ID.
      e. Reference drawing number.
      f. Air terminal unit tag ID.
      g. Heating and/or cooling valve tag ID.
      h. Minimum air flow rate.
      i. Maximum air flow rate.
   5. Full print out of all schedules and set points after testing and acceptance of the system.
   6. Full as-built print out of software program.

7. Marking of all system sensors and thermostats on the as-built floor plan and HVAC drawings with their control system designations.
8. Maintenance instructions, including sensor calibration requirements and methods by sensor type, etc.
9. Control equipment component submittals, parts lists, etc.
10. Warranty requirements.
11. Copies of all checkout tests and calibrations performed by the Contractor (not commissioning tests).
12. Organize and subdivide the manual with permanently labeled tabs for each of the following data in the given order:
    a. Sequences of operation.
    b. Control drawings.
    c. Points lists.
    d. Controller and/or module data.
    e. Thermostats and timers.
    f. Sensors and DP switches.
    g. Valves and valve actuators.
    h. Dampers and damper actuators.
    i. Program setups (software program printouts).

D. Project Record Documents: See Section 017800 for additional requirements.
1. Submit updated version of control system documentation, for inclusion with operation and maintenance data.
2. Show actual locations of all static and differential pressure sensors (air, water and building pressure) and air-flow stations on project record drawings.

E. Training Manuals: See Section 017900 for additional requirements.

PART 2 PRODUCTS

2.01 TEST EQUIPMENT

A. Provide all standard testing equipment required to perform startup and initial checkout and required functional performance testing; unless otherwise noted such testing equipment will NOT become the property of Owner.

B. 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.

PART 3 EXECUTION

3.01 PREPARATION

A. Cooperate with the Commissioning Authority in development of the Prefunctional Checklists and Functional Test Procedures.

B. Furnish additional information requested by the Commissioning Authority.

C. Prepare a preliminary schedule for HVAC pipe and duct system testing, flushing and cleaning, equipment start-up and testing, adjusting, and balancing start and completion for use by the Commissioning Authority; update the schedule as appropriate.

D. Notify the Commissioning Authority when pipe and duct system testing, flushing, cleaning, startup of each piece of equipment and testing, adjusting, and balancing will occur; when commissioning activities not yet performed or not yet scheduled will delay construction notify ahead of time and be proactive in seeing that the Commissioning Authority has the scheduling information needed to efficiently execute the commissioning process.

E. Put all HVAC equipment and systems into operation and continue operation during each working day of testing, adjusting, and balancing and commissioning, as required.

F. Provide test holes in ducts and plenums where directed to allow air measurements and air balancing; close with an approved plug.

G. Provide temperature and pressure taps in accordance with Contract Documents.

3.02 INSPECTING AND TESTING - GENERAL

A. Submit startup plans, startup reports, and Prefunctional Checklists for each item of equipment or other assembly to be commissioned.

B. Perform the Functional Tests directed by the Commissioning Authority for each item of equipment or other assembly to be commissioned.

C. 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 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).

D. Isolation Valve or System Valve Leak Check: For valves not by coils.
   1. With full pressure in the system, command valve closed.
   2. Use an ultra-sonic flow meter to detect flow or leakage.

E. Deficiencies: Correct deficiencies and re-inspect or re-test, as applicable, at no extra cost to Owner.

3.03 TAB COORDINATION

A. TAB: Testing, adjusting, and balancing of HVAC.

B. Coordinate commissioning schedule with TAB schedule.

C. Review the TAB plan to determine the capabilities of the control system toward completing TAB.

D. Provide all necessary unique instruments and instruct the TAB technicians in their use; such as handheld control system interface for setting terminal unit boxes, etc.

E. Have all required Prefunctional Checklists, calibrations, startup and component Functional Tests of the system completed and approved by the Commissioning Authority prior to starting TAB.

F. Provide a qualified control system technician to operate the controls to assist the TAB technicians or provide sufficient training for the TAB technicians to operate the system without assistance.

3.04 CONTROL SYSTEM FUNCTIONAL TESTING

A. Prefunctional Checklists for control system components will require a signed and dated certification that all system programming is complete as required to accomplish the requirements of Contract Documents and the detailed Sequences of Operation documentation submittal.

B. Do not start Functional Testing until all controlled components have themselves been successfully Functionally Tested in accordance with Contract Documents.

C. Using a skilled technician who is familiar with this building, execute the Functional Testing of the control system as required by the Commissioning Authority.

D. Functional Testing of the control system constitutes demonstration and trend logging of control points monitored by the control system.
   1. The scope of trend logging is partially specified; trend log up to 50 percent more points than specified at no extra cost to Owner.
   2. Perform all trend logging specified in Prefunctional Checklists and Functional Test procedures.

E. Functionally Test integral or stand-alone controls in conjunction with the Functional Tests of the equipment they are attached to, including any interlocks with other equipment or systems; further testing during control system Functional Test is not required unless specifically indicated below.

F. Demonstrate the following to the Commissioning Authority during testing of controlled equipment; coordinate with commissioning of equipment.
   1. Setpoint changing features and functions.
   2. Sensor calibrations.

G. Demonstrate to the Commissioning Authority:
   1. That all specified functions and features are set up, debugged and fully operable.
   2. That scheduling features are fully functional and setup, including holidays.
   3. That all graphic screens and value readouts are completed.
   4. Correct date and time setting in central computer.
   5. That field panels read the same time as the central computer; sample 10 percent of field panels; if any of those fail, sample another 10 percent; if any of those fail test all remaining units at no extra cost to Owner.
   6. Functionality of field panels using local operator keypads and local ports (plug-ins) using portable computer/keypad; demonstrate 100 percent of panels and 10 percent of ports; if any ports fail, sample another 10 percent; if any of those fail, test all remaining units at no extra cost to Owner.
   7. Power failure and battery backup and power-up restart functions.
   8. Global commands features.
   9. Security and access codes.
   10. Occupant over-rides (manual, telephone, key, keypad, etc.).
   11. O&M schedules and alarms.
   12. Occupancy sensors and controls.
   13. All control strategies and sequences not tested during controlled equipment testing.

H. If the control system, integral control components, or related equipment do not respond to changing conditions and parameters appropriately as expected, as specified and according to acceptable operating practice, under any of the conditions, sequences, or modes tested, correct all systems, equipment, components, and software required at no additional cost to Owner.

3.05 OPERATION AND MAINTENANCE MANUALS

A. See Section 017800 for additional requirements.

B. Submit manuals related to items that were commissioned to Commissioning Authority for review; make changes recommended by Commissioning Authority.

C. Commissioning Authority will add commissioning records to manuals after submission to Owner.

3.06 DEMONSTRATION AND TRAINING

A. See Section 017900 for additional requirements.

B. Demonstrate operation and maintenance of HVAC system to Owner' personnel; if during any demonstration, the system fails to perform in accordance with the information included in the O&M manual, stop demonstration, repair or adjust, and repeat demonstration. Demonstrations may be combined with training sessions if appropriate.

C. These demonstrations are in addition to, and not a substitute for, Prefunctional Checklists and demonstrations to the Commissioning Authority during Functional Testing.

D. Provide the services of manufacturer representatives to assist instructors where necessary.

E. Provide the services of the HVAC controls instructor at other training sessions, when requested, to discuss the interaction of the controls system as it relates to the equipment being discussed.

END OF SECTION

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SECTION 230923
DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. 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 232113
HYDRONIC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hydronic system requirements.

B. Heating water piping, above grade.

C. Heating water and glycol piping, above grade.

D. Equipment drains and overflows.

E. Unions, flanges, mechanical couplings, and dielectric connections.

F. Valves:
   1. Ball valves.
   2. Butterfly valves.
   3. Check valves.

G. Flow controls.

1.02 RELATED REQUIREMENTS

A. Section 230553 - Identification for HVAC Piping and Equipment.

B. Section 230719 - HVAC Piping Insulation.

C. Section 232114 - Hydronic Specialties.

D. Section 232500 - HVAC Water Treatment: Pipe cleaning.

1.03 REFERENCE STANDARDS

A. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators; 2023.

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 B31.9 - Building Services Piping; 2020.

E. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.

F. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2023a.

G. ASTM A536 - Standard Specification for Ductile Iron Castings; 1984, with Editorial Revision (2019).

H. ASTM B32 - Standard Specification for Solder Metal; 2020.

I. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2022.

J. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2020.

K. ASTM D2000 - Standard Classification System for Rubber Products in Automotive Applications; 2018.

L. ASTM F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications; 2007 (Reapproved 2019).

M. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2019.

N. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).

O. AWWA C606 - Grooved and Shouldered Joints; 2022.

P. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Welders Certificate: Include welders certification of compliance with ASME BPVC-IX.

C. Product Data:
   1. Include data on pipe materials, pipe fittings, valves, and accessories.
   2. Provide manufacturers catalog information.
   3. Indicate valve data and ratings.
   4. Show grooved joint couplings, fittings, valves, and specialties on drawings and product submittals, specifically identified with the manufacturer's style or series designation.

D. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.

1.05 QUALITY ASSURANCE

A. Provide all grooved joint couplings, fittings, valves, specialties, and grooving tools from a single manufacturer.

B. Coupling Manufacturer:
   1. Perform on-site training by factory-trained representative to the Contractor's field personnel in the proper use of grooving tools and installation of grooved joint products.
   2. Periodic job site visits by factory-trained representative to ensure best practices in grooved joint installation.
   3. A distributor's representative is not considered qualified to perform the training.

C. Welder Qualifications: Certify in accordance with ASME BPVC-IX.
   1. Provide certificate of compliance from authority having jurisdiction, indicating approval of welders.

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.

PART 2 PRODUCTS

2.01 HYDRONIC SYSTEM REQUIREMENTS

A. Comply with ASME B31.9 and applicable federal, state, and local regulations.

B. Piping: Provide piping, fittings, hangers, and supports as required, as indicated, and as follows:
   1. Where more than one piping system material is specified, provide joining fittings that are compatible with piping materials and ensure that the integrity of the system is not jeopardized.
   2. Use non-conducting dielectric connections whenever jointing dissimilar metals.
   3. Grooved mechanical joints may be used in accessible locations only.
      a. Accessible locations include those exposed on interior of building, in pipe chases, and in mechanical rooms, aboveground outdoors, and as approved by Architect.
      b. Use rigid joints unless otherwise indicated.

c. Use gaskets of molded synthetic rubber with central cavity, pressure-responsive configuration, and complying with ASTM D2000, Grade 2CA615A15B44F17Z for circulating medium up to maximum 230 degrees F or Grade M3BA610A15B44Z for circulating medium up to maximum 200 degrees F.

4. Provide pipe hangers and supports in accordance with ASME B31.9 or MSS SP-58 unless indicated otherwise.

C. Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges, unions, or grooved couplings to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.

D. Valves: Provide valves where indicated:
1. Provide drain valves where indicated, and if not indicated, provide at least at main shut-off, low points of piping, bases of vertical risers, and at equipment. Use 3/4 inch ball valves with cap; pipe to nearest floor drain.
2. Isolate equipment using butterfly valves with lug end flanges or grooved mechanical couplings.
3. For shut-off and to isolate parts of systems or vertical risers, use ball or butterfly valves.

E. Welding Materials and Procedures: Comply with ASME BPVC-IX.

2.02 HEATING WATER AND GLYCOL PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M, Schedule 40, black, using one of the following joint types:
1. Welded Joints: ASTM A234/A234M, wrought steel welding type fittings; AWS D1.1/D1.1M welded.
2. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.

B. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), drawn, using one of the following joint types:
1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings.
a. Solder: ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
b. Braze: AWS A5.8M/A5.8 BCuP copper/silver alloy.
2. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.
3. Mechanical Press Sealed Fittings: Double pressed type complying with ASME B16.22, utilizing EPDM, nontoxic synthetic rubber sealing elements.
a. Manufacturers:
1) Apollo Valves: www.apollovalves.com/#sle.
2) Grinnell Products: www.grinnell.com/#sle.
3) Viega LLC: www.viega.us/#sle.

2.03 EQUIPMENT DRAINS AND OVERFLOWS

A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), drawn; using one of the following joint types:
1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings; ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.

2.04 UNIONS, FLANGES, MECHANICAL COUPLINGS, AND DIELECTRIC CONNECTIONS

A. Unions for Pipe 2 Inches and Less:
1. Copper Pipe: Bronze, soldered joints.

B. Flanges for Pipe 2 Inches and Greater:
1. Ferrous Piping: 150 psig forged steel, slip-on.
2. Copper Piping: Bronze.
3. Gaskets: 1/16 inch thick, preformed neoprene.

C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.
   1. Dimensions and Testing: In accordance with AWWA C606.
   2. Mechanical Couplings: Comply with ASTM F1476.
   3. Housing Material: Ductile iron, galvanized complying with ASTM A536.
   4. Gasket Material: EPDM suitable for operating temperature range from minus 30 degrees F to 230 degrees F.
   5. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
   6. When pipe is field grooved, provide coupling manufacturer's grooving tools.
   7. Manufacturers:
      a. Anvil International: www.anvilintl.com/#sle.
      b. Grinnell Products: www.grinnell.com/#sle.
      c. Victaulic Company: www.victaulic.com/#sle.

D. Dielectric Connections:
   1. Waterways:
      a. Water impervious insulation barrier capable of limiting galvanic current to 1 percent of short circuit current in a corresponding bimetallic joint.
      b. Dry insulation barrier able to withstand 600-volt breakdown test.
      c. Construct of galvanized steel with threaded end connections to match connecting piping.
      d. Suitable for the required operating pressures and temperatures.
   2. Flanges:
      a. Dielectric flanges with same pressure ratings as standard flanges.
      b. Water impervious insulation barrier capable of limiting galvanic current to 1 percent of short circuit current in a corresponding bimetallic joint.
      c. Dry insulation barrier able to withstand 600-volt breakdown test.
      d. Construct of galvanized steel with threaded end connections to match connecting piping.
      e. Suitable for the required operating pressures and temperatures.

2.05 BALL VALVES

A. Manufacturers:
   1. Anvil International: www.anvilintl.com/#sle.
   2. Apollo Valves: www.apollovalves.com/#sle.
   3. Victaulic Company: www.victaulic.com/#sle.

B. Up To and Including 2 Inches:
   1. Bronze one piece body, stainless steel ball, teflon seats and stuffing box ring, lever handle with balancing stops, solder ends with union.

C. Over 2 Inches:
   1. Ductile iron body, chrome plated stainless steel ball, teflon or Virgin TFE seat and stuffing box seals, lever handle or gear operated, flanged ends, rated to 800 psi.

2.06 BUTTERFLY VALVES

A. Manufacturers:
   1. Anvil International: www.anvilintl.com/#sle.
   2. Apollo Valves: www.apollovalves.com/#sle.
   3. Victaulic Company: www.victaulic.com/#sle.

B. Body: Cast or ductile iron with resilient replaceable EPDM seat, wafer, lug, or grooved ends, extended neck.

C. Disc: Construct of chrome plated ductile iron, stainless steel, ductile iron with EPDM encapsulation, or Buna-N encapsulation.

D. Stem: Stainless steel with stem offset from the centerline to provide full 360-degree circumferential setting.

E. Operator: 10 position lever handle.

2.07 SWING CHECK VALVES

A. Manufacturers:
   1. Anvil International: www.anvilintl.com/#sle.
   2. Apollo Valves: www.apollovalves.com/#sle.
   3. Victaulic Company: www.victaulic.com/#sle.

B. Up To and Including 2 Inches:
   1. Bronze body, bronze trim, bronze rotating swing disc, with composition disc, solder ends.

C. Over 2 Inches:
   1. Iron body, bronze trim, stainless steel or bronze swing disc, renewable disc and seat, flanged or grooved ends.

2.08 SPRING LOADED CHECK VALVES

A. Manufacturers:
   1. Anvil International: www.anvilintl.com/#sle.
   2. Shurjoint Piping Products, Inc: www.shurjoint.com/#sle.
   3. Victaulic Company: www.victaulic.com/#sle.

B. Iron body, bronze trim, split plate, hinged with stainless steel spring, resilient seal bonded to body, wafer, or threaded lug ends.

2.09 FLOW CONTROLS

A. Manufacturers:
   1. Griswold Controls: www.griswoldcontrols.com/#sle.
   2. Hays Fluid Controls: www.haysfluidcontrols.com/#sle.
   3. ITT Bell & Gossett: www.bellgossett.com/#sle.
   4. Victaulic Company: www.victaulic.com/#sle.

B. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.

C. Calibration: Control flow within 10 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, minimum pressure 2 psi.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Prepare pipe for grooved mechanical joints as required by coupling manufacturer.

C. Remove scale and dirt on inside and outside before assembly.

D. Prepare piping connections to equipment using jointing system specified.

E. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install heating water, glycol, chilled water piping to ASME B31.9 requirements.

C. Route piping in orderly manner, parallel to building structure, and maintain gradient.

D. Install piping to conserve building space and to avoid interference with use of space.

E. Group piping whenever practical at common elevations.

F. Sleeve pipe passing through partitions, walls, and floors.

G. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified.

H. Slope piping and arrange to drain at low points.

I. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 220516.

J. Grooved Joints:
   1. Install in accordance with the manufacturer's latest published installation instructions.
   2. Gaskets to be suitable for the intended service, molded, and produced by the coupling manufacturer.

K. 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.

L. Pipe Hangers and Supports:
   1. Install hangers to provide minimum 1/2-inch space between finished covering and adjacent work.
   2. Place hangers within 12 inches of each horizontal elbow.
   3. Use hangers with 1-1/2 inches minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
   4. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
   5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
   6. Provide copper plated hangers and supports for copper piping.

M. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 220719.

N. Install valves with stems upright or horizontal, not inverted.

3.03 SCHEDULES

A. Hanger Spacing for Copper Tubing.
   1. 1/2 Inch and 3/4 inch: Maximum span, 5 feet; minimum rod size, 1/4 inch.
   2. 1 Inch: Maximum span, 6 feet; minimum rod size, 1/4 inch.
   3. 1-1/2 Inches and 2 Inches: Maximum span, 8 feet; minimum rod size, 3/8 inch.
   4. 2-1/2 Inches: Maximum span, 9 feet; minimum rod size, 3/8 inch.

B. Hanger Spacing for Steel Piping.
   1. 2-1/2 Inches: Maximum span, 11 feet; minimum rod size, 3/8 inch.
   2. 3 Inches: Maximum span, 12 feet; minimum rod size, 3/8 inch.
   3. 4 Inches: Maximum span, 14 feet; minimum rod size, 1/2 inch.
   4. 6 Inches: Maximum span, 17 feet; minimum rod size, 1/2 inch.
   5. 8 Inches: Maximum span, 19 feet; minimum rod size, 5/8 inch.
   6. 10 Inches: Maximum span, 20 feet; minimum rod size, 3/4 inch.

END OF SECTION

SECTION 232114
HYDRONIC SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Expansion tanks.

B. Air vents.

C. Air separators.

D. Strainers.

E. Pump connectors.

F. Combination pump discharge valves.

G. Pressure-temperature test plugs.

H. Balancing valves.

I. Combination flow controls.

J. Relief valves.

K. Pressure reducing valves.

L. Glycol system.

1.02 RELATED REQUIREMENTS

A. Section 232113 - Hydronic Piping.

B. Section 232500 - HVAC Water Treatment: Pipe cleaning.

1.03 REFERENCE STANDARDS

A. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels; 2023.

PART 2 PRODUCTS

2.01 EXPANSION TANKS

A. Manufacturers:
   1. Amtrol Inc: www.amtrol.com/#sle.
   2. ITT Bell & Gossett: www.bellgossett.com/#sle.
   3. Taco, Inc: www.taco-hvac.com/#sle.

B. Construction: Welded steel, tested and stamped in accordance with ASME BPVC-VIII-1; supplied with National Board Form U-1, rated for working pressure of 125 psi, with flexible EPDM diaphragm or bladder sealed into tank, and steel support stand.

C. Accessories: Pressure gauge and air-charging fitting, tank drain; precharge to 12 psi.

D. Automatic Cold Water Fill Assembly: Pressure reducing valve, reduced pressure double check backflow preventer, test cocks, strainer, vacuum breaker, and valved by-pass.

2.02 AIR VENTS

A. Manufacturers:
   1. Armstrong International, Inc: www.armstronginternational.com/#sle.
   2. ITT Bell & Gossett: www.bellgossett.com/#sle.
   3. Taco, Inc: www.taco-hvac.com/#sle.

B. Manual Type: Short vertical sections of 2-inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.

C. Float Type:

1. Brass or semi-steel body, copper, polypropylene, or solid non-metallic float, stainless steel valve and valve seat; suitable for system operating temperature and pressure; with isolating valve.
2. Cast iron body and cover, float, bronze pilot valve mechanism suitable for system operating temperature and pressure; with isolating valve.

2.03 AIR SEPARATORS

A. Coalescing Air/Dirt Separators:
   1. Manufacturers:
      a. Armstrong International, Inc: www.armstronginternational.com/#sle.
      b. ITT Bell & Gossett: www.bellgossett.com/#sle.
      c. Spirotherm, Inc: www.spirotherm.com/#sle.
   2. Tank: Fabricated steel tank; tested and stamped in accordance with ASME BPVC-VIII-1; for 150 psi operating pressure and 270 degrees F maximum operating temperature; subject to the requirements of the application and the manufacturer's standard maximum operating conditions.
   3. Coalescing Medium: Provide structured copper or stainless steel medium filling the entire vessel to suppress turbulence and provide air elimination efficiency of 100 percent free air, 100 percent entrained air, and 99.6 percent dissolved air at the installed location.
   4. Air Vent: Integral float actuated air vent at top fitting of tank rated at 150 psi, threaded to the top of the separator.
   5. Inlet and Outlet Connections: Threaded for 2 NPS and smaller; Class 150 flanged connections for 2-1/2 NPS and larger.
   6. Blowdown Connection: Threaded.
   7. Size: Match system flow capacity.

2.04 STRAINERS

A. Manufacturers:
   1. Armstrong International, Inc: www.armstronginternational.com/#sle.
   2. Grinnell Products: www.grinnell.com/#sle.
   3. The Metraflex Company: www.metraflex.com/#sle.

B. Size 2 inch and Under:
   1. Screwed brass or iron body for 175 psi working pressure, Y pattern with 1/32 inch stainless steel perforated screen.

C. Size 2-1/2 inch to 4 inch:
   1. Provide flanged or grooved iron body for 175 psi working pressure, Y pattern with 1/16 inch or 3/64 inch stainless steel perforated screen.

D. Size 5 inch and Larger:
   1. Provide flanged or grooved iron body for 175 psi working pressure, basket pattern with 1/8 inch stainless steel perforated screen.

2.05 PUMP CONNECTORS

A. Manufacturers:
   1. The Metraflex Company: www.metraflex.com/#sle.

B. Flexible Connectors: Flanged, braided type with wetted components of stainless steel, sized to match piping.
   1. Maximum Allowable Working Pressure: 150 psig at 200 degrees F.
   2. Accommodate the Following:
      a. Axial Deflection in Compression and Expansion: 1 inch.
      b. Lateral Movement: 1 inch.
      c. Angular Rotation: 15 degrees.
      d. Force developed by 1.5 times specified maximum allowable operating pressure.

3. End Connections: Same as specified for pipe jointing.

2.06 COMBINATION PUMP DISCHARGE VALVES

A. Manufacturers:
   1. Anvil International: www.anvilintl.com/#sle.
   2. Taco, Inc: www.taco-hvac.com/#sle.
   3. Victaulic Company of America: www.victaulic.com/#sle.

B. Valves: Straight or angle pattern, flanged cast-iron valve body with bolt-on bonnet for 175 psi operating pressure, non-slam check valve with spring-loaded bronze disc and seat, stainless steel stem, and calibrated adjustment permitting flow regulation.

2.07 PRESSURE-TEMPERATURE TEST PLUGS

A. Construction: Brass body designed to receive temperature or pressure probe with removable protective cap, and Neoprene rated for minimum 200 degrees F.

B. Application: Use extended length plugs to clear insulated piping.

2.08 BALANCING VALVES

A. Manufacturers:
   1. Armstrong International, Inc: www.armstronginternational.com/#sle.
   2. Hays Fluid Controls: www.haysfluidcontrols.com/#sle.
   3. ITT Bell & Gossett: www.bellgossett.com/#sle.

B. Size 2 inch and Smaller:
   1. Provide ball or globe style with flow balancing, flow measurement, and shut-off capabilities, memory stops, minimum of two metering ports and NPT threaded, soldered, or grooved connections.
   2. Metal construction materials consist of bronze or brass.
   3. Non-metal construction materials consist of Teflon, EPDM, or engineered resin.

C. Size 2.5 inch and Larger:
   1. Provide globe style with flow balancing, flow measurement, and shut-off capabilities, memory stops, minimum of two metering ports and flanged, grooved, or weld end connections.
   2. Valve body construction materials consist of cast iron, carbon steel, or ductile iron.
   3. Internal components construction materials consist of brass, aluminum bronze, bronze, Teflon, EPDM, NORYL, or engineered resin.

2.09 COMBINATION FLOW CONTROLS

A. Manufacturers:
   1. Armstrong International: www.armstronginternational.com/#sle.
   2. Hays Fluid Controls: www.haysfluidcontrols.com/#sle.
   3. ITT Bell & Gossett: www.bellgossett.com/#sle.

B. Construction: Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet with blowdown/backflush drain.

C. Calibration: Control flow within 10 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, minimum pressure 2 psi.

D. Provide with inlet and outlet unions as required.

E. Control Mechanism: Provide stainless steel or nickel-plated, brass piston or regulator cup, operating against stainless steel helical or wave formed spring or elastomeric diaphragm and polyphenylsulfone orifice plate.

2.10 RELIEF VALVES

A. Manufacturers:
   1. Apollo Valves: www.apollovalves.com/#sle.

2. Armstrong International, Inc: www.armstronginternational.com/#sle.
3. ITT Bell & Gossett: www.bellgossett.com/#sle.

B. Bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labelled.

2.11 PRESSURE REDUCING VALVES

A. Manufacturers:
1. Apollo Valves: www.apollovalves.com/#sle.
2. Armstrong International, Inc: www.armstronginternational.com/#sle.
3. ITT Bell & Gossett: www.bellgossett.com/#sle.

B. Operation: Automatically feeds make-up water to the hydronic system whenever pressure in the system drops below the pressure setting of the valve. Refer to Section 232113.

C. Materials of Construction:
1. Valve Body: Constructed of bronze or brass.
2. Internal Components: Construct of stainless steel or brass and engineered plastics or composition material.

D. Connections:
1. Soldered: 0.50 inch.

E. Provide integral check valve and strainer.

F. Maximum Fluid Temperature: 180 degrees F.

2.12 GLYCOL SYSTEM

A. Mixing Tank: 55 gallon steel drum with fittings suitable for filling and hand pump for charging, rubber hose for connection of hand pump to system.

B. Storage Tank: Closed type, welded-steel construction, tested and stamped in accordance with ASME BPVC-VIII-1; 100 psi rating; cleaned, prime coated, and supplied with steel support saddles. Construct with tappings for installation of accessories.

C. Glycol Solution:
1. Inhibited propylene glycol and water solution mixed 40 percent glycol - 60 percent water, suitable for operating temperatures from minus 40 degrees F to 250 degrees F.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install specialties in accordance with manufacturer's instructions.

B. Where large air quantities can accumulate, provide enlarged air collection standpipes.

C. Provide manual air vents at system high points and as indicated.

D. For automatic air vents in ceiling spaces or other concealed locations, provide vent tubing to nearest drain.

E. Provide air separator on suction side of system circulation pump and connect to expansion tank.

F. Provide valved drain and hose connection on strainer blowdown connection.

G. Provide pump suction fitting on suction side of base-mounted centrifugal pumps where indicated. Remove temporary strainers after cleaning systems.

H. Provide combination pump discharge valve on discharge side of base mounted centrifugal pumps where indicated.

I. Support pump fittings with floor-mounted pipe and flange supports.

J. Provide relief valves on pressure tanks, low-pressure side of reducing valves, heat exchangers, and expansion tanks.

K. Select system relief valve capacity so that it is greater than make-up pressure reducing valve capacity. Select equipment relief valve capacity to exceed rating of connected equipment.

L. Clean and flush glycol system before adding glycol solution. Refer to Section 232500.

M. Feed glycol solution to system through make-up line with pressure regulator, venting system high points.

N. Perform tests determining strength of glycol and water solution and submit written test results.

END OF SECTION

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SECTION 232123
HYDRONIC PUMPS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. In-line circulators.

B. Base-mounted pumps.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete.

B. Section 232113 - Hydronic Piping.

C. Section 232114 - Hydronic Specialties.

1.03 REFERENCE STANDARDS

A. UL 778 - Standard for Motor-Operated Water Pumps; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide certified pump curves showing performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable. Include electrical characteristics and connection requirements.

C. Millwright's Certificate: Certify that base mounted pumps have been aligned.

D. Operation and Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Armstrong Fluid Technology, Inc: www.armstrongfluidtechnology.com/#sle.

B. Bell & Gossett, a Xylem Inc. brand: www.bellgossett.com.

C. Taco; www.taco.com

2.02 HVAC PUMPS - GENERAL

A. Provide pumps that 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.

B. Base Mounted Pumps: Aligned by qualified millwright.

C. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.

2.03 IN-LINE CIRCULATORS

A. Type: Horizontal shaft, single stage, direct connected, with resiliently mounted motor for in-line mounting, oil lubricated, for 125 psi maximum working pressure.

B. Casing: Cast iron, with flanged pump connections.

C. Impeller: Cadmium plated steel, keyed to shaft.

D. Bearings: Permanently-lubricated ball bearings.

E. Shaft: Stainless steel with bronze sleeve, integral thrust collar.

F. Seal: Mechanical seal, 225 degrees F maximum continuous operating temperature.

G. Drive: Flexible coupling.

2.04 BASE-MOUNTED PUMPS

A. Type: Horizontal shaft, single stage, direct connected, radially or horizontally split casing, for 125 psi maximum working pressure.

B. Casing: Cast iron, or ductile iron with suction and discharge gauge ports, renewable bronze casing wearing rings, seal flush connection, drain plug, flanged suction and discharge.

C. Impeller: Bronze, fully enclosed, keyed to shaft.

D. Bearings: Oil lubricated roller or ball bearings.

E. Shaft: Alloy steel with copper, bronze, or stainless steel shaft sleeve.

F. Seal: Mechanical seal, 225 degrees F maximum continuous operating temperature.

G. Seal: Packing gland with minimum four rings graphite impregnated packing and bronze lantern rings, 250 degrees F maximum continuous operating temperature.

H. Drive: Flexible coupling with coupling guard.

I. Baseplate: Cast iron or fabricated steel with integral drain rim.

PART 3 EXECUTION

3.01 PREPARATION

A. Verify that electric power is available and of the correct characteristics.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide access space around pumps for service. Provide no less than minimum space recommended by manufacturer.

C. Decrease from line size with long radius reducing elbows or reducers. Support piping adjacent to pump such that no weight is carried on pump casings.

D. Provide line sized shut-off valve and pump suction fitting on pump suction, and line sized combination pump discharge valve on pump discharge along with a line sized shut-off valve.

E. Provide drains for bases and seals, piped to and discharging into floor drains.

F. Check, align, and certify alignment of base-mounted pumps prior to start-up.

G. Install base-mounted pumps on concrete housekeeping base, with anchor bolts, set and level, and grout in place. Refer to Section 033000.

H. Lubricate pumps before start-up.

END OF SECTION

SECTION 232300
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 083100 - Access Doors and Panels.

B. Section 220719 - Plumbing Piping Insulation.

C. Section 230719 - 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 Addendum (2024).

C. ASHRAE Std 34 - Designation and Safety Classification of Refrigerants; 2022, with Errata (2024).

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; 2023.

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 013000 - 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. Coordinate size and location of access doors with Section 083100.

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 220716.

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 232500
HVAC WATER TREATMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Materials.
   1. System cleaner.
   2. Closed system treatment (water).

1.02 RELATED REQUIREMENTS

A. Section 232113 - Hydronic Piping.

B. Section 232114 - Hydronic Specialties.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide chemical treatment materials, chemicals, and equipment including electrical characteristics and connection requirements.

C. Manufacturer's Installation Instructions: Indicate placement of equipment in systems, piping configuration, and connection requirements.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience. Company shall have local representatives with water analysis laboratories and full time service personnel.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Nalco, an Ecolab Company: www.nalco.com/#sle.

2.02 REGULATORY REQUIREMENTS

A. Perform work in accordance with local health department regulations.

2.03 MATERIALS

A. System Cleaner:
   1. Liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products; sodiumtripoly phosphate and sodium molybdate.

B. Closed System Treatment (Water):
   1. Sequestering agent to reduce deposits and adjust pH; polyphosphate.
   2. Corrosion inhibitors; boron-nitrite, sodium nitrite and borax, sodium totyltriazole, low molecular weight polymers, phosphonates, sodium molybdate, or sulphites.

PART 3 EXECUTION

3.01 PREPARATION

A. Systems shall be operational, filled, started, and vented prior to cleaning. Use water meter to record capacity in each system.

B. Place terminal control valves in open position during cleaning.

C. Verify that electric power is available and of the correct characteristics.

3.02 CLEANING SEQUENCE

A. Hot Water / Glycol Heating Systems:
   1. Apply heat while circulating, slowly raising temperature to 160 degrees F and maintain for 12 hours minimum.

2. Remove heat and circulate to 100 degrees F or less; drain systems as quickly as possible and refill with clean water.
3. Circulate for 6 hours at design temperatures, then drain.
4. Refill with clean water and repeat until system cleaner is removed.

B. Flush open systems and glycol filled closed systems with clean water for one hour minimum. Drain completely and refill.

C. Remove, clean, and replace strainer screens.

D. Inspect, remove sludge, and flush low points with clean water after cleaning process is completed. Include disassembly of components as required.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.04 CLOSED SYSTEM TREATMENT

A. Introduce closed system treatment through glycol feeder when required or indicated by test.

B. Provide 3/4 inch water coupon rack around circulating pumps with space for 4 test specimens.

END OF SECTION

SECTION 233100
HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal ductwork.

B. Kitchen hood ductwork.

1.02 RELATED REQUIREMENTS

A. Section 230593 - Testing, Adjusting, and Balancing for HVAC.

B. Section 230713 - Duct Insulation: External insulation and duct liner.

C. Section 233300 - Air Duct Accessories.

D. Section 233700 - 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; 2023d.

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 013000 - 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

SECTION 233300
AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air turning devices/extractors.

B. Backdraft dampers - metal.

C. Duct access doors.

D. Fire dampers.

E. Flexible duct connectors.

F. Volume control dampers.

1.02 RELATED REQUIREMENTS

A. Section 233100 - 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.

1.04 SUBMITTALS

A. See Section 013000 - 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 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.

2.05 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.

2.06 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.

2.07 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 233100 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 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. Demonstrate re-setting of fire dampers to Owner's representative.

F. 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.

G. Use splitter dampers only where indicated.

H. 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 233423
HVAC POWER VENTILATORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Roof exhausters.

B. Inline centrifugal fans.

C. Kitchen hood side wall exhausters.

1.02 RELATED REQUIREMENTS

A. Section 233300 - Air Duct Accessories: Backdraft dampers.

1.03 REFERENCE STANDARDS

A. AMCA 99 - Standards Handbook; 2016.

B. UL 705 - Power Ventilators; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.

C. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.05 FIELD CONDITIONS

A. Permanent ventilators may not be used for ventilation during construction.

PART 2 PRODUCTS

2.01 POWER VENTILATORS - GENERAL

A. Manufacturers:
   1. Greenheck Fan Corporation: www.greenheck.com/#sle.
   2. PennBarry, Division of Air System Components: www.pennbarry.com/#sle.

B. Static and Dynamically Balanced: AMCA 204 - Balance Quality and Vibration Levels for Fans.

C. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.

D. Sound Ratings: AMCA 301, tested to AMCA 300 and bearing AMCA Certified Sound Rating Seal.

E. Fabrication: Comply with AMCA 99.

F. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.

G. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

H. Enclosed Safety Switches: Comply with NEMA 250.

2.02 ROOF EXHAUSTERS

A. Manufacturers:
   1. Greenheck Fan Corporation: www.greenheck.com/#sle.
   2. PennBarry, Division of Air System Components: www.pennbarry.com/#sle.

B. Fan Unit: V-belt or direct driven as indicated, with spun aluminum housing; resilient mounted motor; 1/2 inch mesh, 0.62 inch thick aluminum wire birdscreen; square base to suit roof curb with continuous curb gaskets.

C. Roof Curb: 18 inch high self-flashing of galvanized steel with continuously welded seams, built-in cant strips.

D. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor and wall mounted multiple speed switch.

E. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

2.03 INLINE CENTRIFUGAL FANS

A. Manufacturers:
   1. Greenheck Fan Corporation: www.greenheck.com/#sle.
   2. Loren Cook Company: www.lorencook.com/#sle.
   3. PennBarry, Division of Air System Components: www.pennbarry.com/#sle.

B. Centrifugal Fan Unit: V-belt or direct driven with galvanized steel housing lined with acoustic insulation, resilient mounted motor, gravity backdraft damper in discharge.

C. Disconnect Switch: Cord and plug in housing for thermal overload protected motor and wall mounted switch.

D. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

2.04 KITCHEN HOOD SIDE WALL EXHAUSTERS

A. Manufacturers:
   1. Greenheck Fan Corporation: www.greenheck.com/#sle.
   2. PennBarry, Division of Air System Components: www.pennbarry.com/#sle.

B. Belt Drive Fan:
   1. Fan Wheel:
      a. Type: Non-overloading, backward inclined centrifugal.
      b. Material: Aluminum.
   2. Statically and dynamically balanced.
   3. Motors:
      a. Open drip-proof (ODP).
      b. Heavy duty ball bearing type.
      c. Mount on vibration isolators or resilient cradle mounts, out of air stream.
      d. Fully accessible for maintenance.
   4. Housing:
      a. Construct of heavy gage aluminum including curb cap, windband, and motor compartment.
      b. Rigid internal support structure.
      c. One-piece fabricated or fully welded curb-cap base to windband for leak proof construction.
      d. Construct drive frame assembly of heavy gage steel, mounted on vibration isolators.
      e. Provide breather tube for fresh air motor cooling and wiring.

C. Shafts and Bearings:
   1. Fan Shaft:
      a. Ground and polished steel with anti-corrosive coating.
      b. First critical speed at least 25 percent over maximum cataloged operating speed.

2. Bearings:
    a. Permanently sealed or pillow block type.
    b. Minimum L10 life in excess of 100,000 hours (equivalent to L50 average life of 500,000 hours), at maximum cataloged operating speed.
    c. 100 percent factory tested.

D. Drive Assembly:
1. Belts, pulleys, and keys oversized for a minimum of 150 percent of driven horsepower.
2. Belts: Static free and oil resistant.
3. Fully machined cast iron type, keyed and securely attached to the wheel and motor shafts.
4. Motor pulley adjustable for final system balancing.
5. Readily accessible for maintenance.

E. Disconnect Switches:
1. Factory mounted and wired.
2. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
3. Finish: Aluminum
4. Positive electrical shutoff.
5. Wired from fan motor to junction box installed within motor compartment.

F. Side wall extension: self-flashing of galvanized steel with continuously welded seams, ventilated double wall and factory installed nailer strip.

G. Drain Trough: Allows for single-point drainage of water, grease, and other residues.

H. Options/Accessories:
1. Birdscreen:
    a. Provide aluminum construction.
2. Clean Out Port: Removable grease repellent compression rubber plug allows access for cleaning wheel through windband.
3. Grease Trap:
    a. Aluminum.
    b. Includes drain connection.
    c. Collects grease residue.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Secure roof exhausters with stainless steel lag screws to roof curb.

C. Extend ducts to roof exhausters into roof curb. Counterflash duct to roof opening.

D. Hung Inline Fans:
1. Install fans with resilient mountings and flexible electrical leads.
2. Install flexible connections specified in Section 233300 between fan and ductwork. Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.

E. Provide sheaves required for final air balance.

END OF SECTION

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SECTION 233700
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. 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 013000 - 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 '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.

2.04 EXHAUST AIR INLETS:

A. Type 'E2':
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.

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 099123.

END OF SECTION

SECTION 235100
BREECHINGS, CHIMNEYS, AND STACKS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Double wall metal stacks.

1.02 RELATED REQUIREMENTS

A. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. NFPA 54 - National Fuel Gas Code; 2024.

B. NFPA 82 - Standard on Incinerators and Waste and Linen Handling Systems and Equipment; 2024.

C. NFPA 211 - Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances; 2024.

D. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

E. UL 103 - Factory-Built Chimneys for Residential Type and Building Heating Appliances; Current Edition, Including All Revisions.

F. UL 441 - Standard for Gas Vents; Current Edition, Including All Revisions.

G. UL 959 - Medium Heat Appliance Factory Built Chimneys; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating factory built chimneys, including dimensional details of components and flue caps, dimensions and weights, electrical characteristics and connection requirements.

C. Shop Drawings: Indicate general construction, dimensions, weights, support and layout of breechings. Submit layout drawings indicating plan view and elevations where factory built units are used.

1.05 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 MANUFACTURERS

A. Lifetime Chimney Supply: www.lifetimechimneysupply.com

B. DuraVent; DuraStack Pro (DIS2): www.duravent.com/#sle.

C. Metal-Fab, Inc: www.mtlfab.com/#sle.

D. Selkirk Corporation: www.selkirkcommercial.com/#sle.

2.02 BREECHINGS, CHIMNEYS, AND STACKS - GENERAL REQUIREMENTS

A. Regulatory Requirements:
   1. Comply with applicable codes for installation of natural gas burning appliances and equipment.

2.03 DOUBLE WALL METAL STACKS (INTERMEDIATE SCHOOL WITH CONDENSING BOILERS)

A. Boiler venting shall be provided by boiler supplier to ensure venting system is coordinated with the boilers for proper functioning on boiler operation. Venting system shall include all draft control dampers and controls for a complete and operating system.

B. Provide double wall metal stacks, tested to UL 103 and UL listed with positive pressure rating, for use with building heating equipment, in compliance with NFPA 211.

C. Fabricate with 1 inch minimum air space between walls and construct inner liner of AL29-4C stainless steel and outer jacket of 304 stainless steel.
   1. Protect aluminized steel surfaces exposed to the elements with a minimum of one base coat of primer and one finish coat of corrosion resistant paint suitable for outer jacket skin temperatures of the application.

D. Accessories, UL labeled:
   1. Wall Thimble: Designed for horizontal wall penetrations. Mounting plates with sleeve and pipe spacer.
   2. Sidewall Exit Elbow: 45 Degree elbow down with Stainless Steel bird mesh across opening.
   3. Drain Tee: Tee fitting for the bottom of risers with sloped bottom towards condensate drain plug.

2.04 DOUBLE WALL METAL STACKS (HIGH SCHOOL SCHOOL WITH CONVENTIONAL BOILERS)

A. Boiler venting shall be provided by boiler supplier to ensure venting system is coordinated with the boilers for proper functioning on boiler operation. Venting system shall include all draft control dampers and controls for a complete and operating system.

B. Provide double wall metal stacks, tested to UL 103 and UL listed with positive pressure rating, for use with building heating equipment, in compliance with NFPA 211.

C. Fabricate with 1 inch minimum air space between walls and construct inner liner of 304 stainless steel and outer jacket of 304 stainless steel.
   1. Protect aluminized steel surfaces exposed to the elements with a minimum of one base coat of primer and one finish coat of corrosion resistant paint suitable for outer jacket skin temperatures of the application.

D. Accessories, UL labeled:
   1. Wall Thimble: Designed for horizontal wall penetrations. Mounting plates with sleeve and pipe spacer.
   2. Sidewall Exit Elbow: 45 Degree elbow down with Stainless Steel bird mesh across opening.
   3. Drain Tee: Tee fitting for the bottom of risers with sloped bottom towards condensate drain plug.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NFPA 54

C. Install breechings with minimum of joints. Align accurately at connections, with internal surfaces smooth.

D. Support breechings from building structure, rigidly with suitable ties, braces, hangers and anchors to hold to shape and prevent buckling. Support vertical breechings, chimneys, and stacks at 12 foot spacing, to adjacent structural surfaces, or at floor penetrations. Refer to SMACNA (DCS) for equivalent duct support configuration and size.

E. Pitch breechings with positive slope up from fuel-fired equipment to chimney or stack.

F. Coordinate installation of dampers, and induced draft fans. Refer to Section 260583.

G. Assemble and install stack sections in accordance with NFPA 82, industry practices, and in compliance with UL listing. Join sections with acid-resistant joint cement. Connect base section to foundation using anchor lugs.

H. Level and plumb chimney and stacks.

I. Clean breechings, chimneys, and stacks during installation, removing dust and debris.

J. At appliances, provide slip joints permitting removal of appliances without removal or dismantling of breechings, breeching insulation, chimneys, or stacks.

END OF SECTION

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SECTION 235216
CONDENSING BOILERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. High Efficiency Hot Water Boiler.

1.02 RELATED SECTIONS

A. Section 23 2113 - Hydronic Piping.

B. Section 23 2114 - Hydronic Specialties.

C. Section 23 5100 - Breechings, Chimneys, and Stacks.

1.03 REFERENCES

A. ANSI Z21.13 - American National Standard for Gas-Fired Low-Pressure Steam and Hot Water Boilers; 2004 (addendum 2005).

B. ASME (BPV IV) - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers; The American Society of Mechanical Engineers; 2004.

C. ASME (BPV VIII, 1) - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels; The American Society of Mechanical Engineers; 2004.

D. HI BTS - Testing and Rating Standard for Commercial Boilers; The Hydronics Institute; 2000.

E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2003.

F. NFPA 54 - National Fuel Gas Code; National Fire Protection Association; 2002.

G. NFPA 58 - Liquefied Petroleum Gas Code; National Fire Protection Association; 2004.

H. NFPA 70 - National Electrical Code; National Fire Protection Association; 2005.

I. Part 4 of Title 12 Rules and Regulations of the State of New York Industrial Code Rule No. 4 (12NYCRR4).

1.04 PERFORMANCE REQUIREMENTS

A. Performance rating shall be in accordance with Hydronics Institute Testing and Rating Standard for Commercial Boilers.

1.05 SUBMITTALS

A. Product Data: Manufacturer's catalog sheets, specifications and installation instructions.

B. Contract Closeout Submittals:
   1. Department of Labor Certification of Inspection: Deliver 2 copies to the Owner's Representative.
   2. Operation and Maintenance Data: Deliver 2 copies, covering the installed products to the Owner's Representative.
   3. Service Organization Data: Written notification from boiler manufacturer specifying the name, address, telephone number, and available service programs of fully equipped and authorized service organization.

C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Boiler shall be constructed, tested and stamped in accordance with the ASME Code for Low Pressure Heating Boilers, bearing the 'H' stamp for 160 psig working pressure.

2. Boiler shall comply with the requirements of Part 4 of Title 12 Rules and Regulations of the State of New York Industrial Code Rule No. 4 (12NYCRR4).
3. Boiler shall comply with New York State Department of Environmental Conservation Law 6NYCRR, Parts 200, 201, 227 and 231.
4. Boiler shall be certified and listed by C.S.A. International under the latest edition of ANSI Z 21.13.

B. Certification: Affidavit by the Company Field Advisor, certifying that the boiler meets the contract requirements and is operating properly.

C. Company Field Advisor: Secure the services of a Company Field Advisor for a minimum of working hours for the following:
1. Render advice regarding installation and final adjustment of the boiler.
2. Visit the Site upon completion of boiler to inspect the Work, and to notify the Owner's Representative of any Work which must be done or modified prior to NYS Department of Labor inspection.
3. Witness final system test and then certify with an affidavit that the boiler is installed in accordance with the Contract Documents and is operating properly.
4. Train facility personnel on the operation and maintenance of the system (minimum of two 4 hour sessions).
5. Explain available service programs to facility supervisory personnel for their consideration.

D. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.

1.07 WARRANTY

A. The boiler manufacturer shall warrant each boiler, including boiler, trim, boiler control system, and all related components, accessories, and appurtenances against defects in workmanship and material for a period of twelve (12) months from date of startup, provided that startup is completed within six (6) months of shipment and the start-up report is furnished to the manufacturer within thirty (30) days of startup.

B. The boiler manufacturer shall warrant the boiler’s fuel burner for a period of five (5) years from date of startup, provided that startup is completed within six (6) months of shipment and the start-up report is furnished to the manufacturer within thirty (30) days of startup.

C. The boiler manufacturer shall warrant the boiler’s heat exchanger for a period of ten (10) years from date of startup, provided that startup is completed within six (6) months of shipment and the start-up report is furnished to the manufacturer within thirty (30) days of startup.

D. The boiler manufacturer shall also warrant the boiler’s heat exchanger against failure due to thermal shock for a period of ten (10) years from date of startup, provided that startup is completed within six (6) months of shipment and the start-up report is furnished to the manufacturer within thirty (30) days of startup.

PART 2 PRODUCTS

2.01 HIGH EFFICIENCY HOT WATER BOILER

A. Manufacturers:
1. Patterson-Kelley: www.pattersonkelley.com
2. Aerco International, Inc.: www.aerco.com
3. LAARS heating Sytem Company: www.laars.com
4. Fulton Boiler Works, Inc.: www.fulton.com

B. Construction:
1. Boiler modules shall be natural gas/propane fired, condensing fire tube design with a modulating forced draft power burner and positive pressure vent discharge.

C. Heat Exchanger:

1. Each completed heat exchanger shall consist of consist of welded 316L SS helical water tubes and provide no less than the total fireside heating surface area of 487.12 ft.². Each completed heat exchanger shall include an integral stainless-steel condensate pan/collector, condensate drain, removable burner assembly, inlet temperature sensor, outlet temperature sensor, flue gas temperature sensor, heat exchanger temperature sensor, automatic air vent, thermowell for high temperature limit capillary, low water cutoff probe or flow switch, and all necessary assembly hardware.
2. Each hot water boiler shall contain an ASME Section IV heat exchanger with an “H” stamp designed for a maximum allowable working temperature of 220°F and a maximum allowable working pressure of 125 PSig.
3. Each heat exchanger must be hydrostatically tested by the manufacturer to a minimum of 1-1/2 times the maximum allowable working pressure for a minimum of 5 minutes. During this hydrostatic pressure test, the operator will inspect the pressure gauge and visually verify there are no water leaks.

D. Main Gas Train:
1. Boilers configured for single fuel operation shall be equipped with an integral main gas valve train capable of burning either Natural Gas or Propane Gas. Each single fuel gas valve train shall include at least the following.
   a. One (1) upstream manual shutoff valve for field-connection.
   b. One (1) combination Air-Gas ratio control and safety shutoff valve with dual solenoids (in-series) that can be independently energized for leak testing and integrated into a single body design. The combination gas valve shall operate as a “Zero Governor” and control to a neutral gas pressure inside the gas valve.
   c. One (1) low gas pressure switch (manual reset).
   d. One (1) high gas pressure switch (manual reset).
   e. Two (2) gas pressure test ports.
   f. One (1) downstream manual shutoff valve.
2. The main gas valve train(s) shall be factory assembled, piped, and wired and allow for operation at full rated boiler capacity from 3.5 - 4.0” W.C. up to the maximum inlet gas pressure of 14.0” W.C.

E. Power Burner:
1. The boiler manufacturer must furnish an integral power type fuel burner with each boiler. The complete power fuel burner assembly must consist of a gas burner, combustion air blower, main gas valve train, and ignition system. The burner manufacturer must fully coordinate the burner design with the boiler’s heat exchanger and the boiler control system in order to provide the required capacities, efficiencies, and performance specified. Boilers shipped without a power burner and field-equipped with a 3rd party power burner are not acceptable.
2. Each burner must be installed horizontally inside the combustion chamber with combustion gases flowing downward through the heat exchanger. The burner must consist of a stainless steel flange and woven fiber mesh cylindrical design.
3. Each boiler must be equipped with direct spark ignition. Main flame must be monitored and controlled by a flame rod / ionization probe (rectification) system. The boiler shall utilize a piloted ignition system. Pilot flame must utilize natural gas as the ignition source. The gas pilot system components must include: ignition transformer, pilot safety shut off valve, and manual gas shutoff cock.

F. Boiler Saftey and Trim Devices
1. The boiler manufacturer shall furnish and test the following safety and trim devices with each boiler:
   a. Safety relief valve shall be provided in compliance with the ASME code. Contractor is required to pipe the relief valve discharge piping to an acceptable drain.
   b. Water pressure/temperature gauge.

c. Low Water / Flow cutoff.
d. Manual reset high limit water temperature controller.
e. Operating temperature control to control the sequential operation of the burner.
f. High and Low Gas Pressure switches.
g. g. Flame rod / ionization probe (rectification) system.

2. The boiler manufacturer shall provide a CSD-1 form identifying each safety and trim device.
3. The boiler shall be capable of interfacing with the following external safety devices:
   a. Auxiliary Low Water Cutoff device.
   b. Combustion Air Damper End Limit Switch.
   c. Emergency Stop (E-Stop) switch.
   d. External Safety Device w/ contact closure.
4. Provide acid neutralization kit for condensing boilers in conformance with 2020 PCNYS 803.1.

G. Boiler Control System:
1. Each boiler shall be provided with all necessary controls, all necessary programming sequences, and all safety interlocks. Each boiler control system shall be properly interlocked with all safeties.
2. Each boiler shall be provided with a “Full Modulating” firing control system whereby the firing rate is infinitely proportional at any firing rate between low fire and high fire as determined by the pulse width modulation input control signal. Both fuel input and air input must be sequenced in unison to the appropriate firing rate without the use of mechanical linkage.
3. The boiler’s control system shall provide the minimum capabilities:
   a. 7” color touchscreen display with one or more USB ports.
   b. b. Standard on-board Ethernet port for wired internet connectivity and embedded wireless driver for optional wireless internet connectivity to remote monitoring and software update services.
   c. Parameter uploads and downloads via external USB flash drive.
   d. Software updates via external USB flash drive.
   e. Capture screen shots from the control’s display by saving digital image files to external USB flash drive.
   f. Local Representative Screen can be programmed to provide contact information for the local boiler manufacturer’s representative.
   g. Programmable Relay Outputs for direct control of pumps, control valves, dampers and other auxiliary devices.
   h. Multiple boiler “cascade” network up to 24 boilers without any external control panel. The installation of external sequencing control panels is not acceptable.
   i. Automatic hybrid system control for multiple boiler “cascade” systems with both condensing and non-condensing boilers. This control logic prioritizes condensing boilers at low water temperatures and prioritizes non-condensing boilers at high water temperatures.
   j. Auxiliary Boiler Relay for multiple boiler “cascade” systems which can be used to enable a 3rd party boiler platform in the event the “cascade” system is unable to satisfy the heating load.
   k. Programmable Boiler and System pump control for multiple boiler “cascade” systems installed in a Primary-Secondary piping arrangement.
   l. Programmable Control Valve logic for multiple boiler “cascade” systems installed in a Primary-Only piping arrangement.
   m. Integration with external Building Management Systems (BMS) via MODBUS® RTU protocol. NOTE: Optional Protocol Converter for communication via LONWORKS® and BACnet® must be available for purchase from the boiler manufacturer.

n. Hardwire integration with Building Management Systems (BMS) via 4-20mA analog control signal for temperature or firing rate control.
o. Intuitive “Setup Wizards” ask the user a series of questions and allow for step-by-step configuration of the boiler control.
p. On-Screen error notifications with a comprehensive description of all alarm conditions and several troubleshooting steps.
q. Automatic flue gas temperature and outlet (supply) temperature compensation to prevent over-firing of the boiler equipment.
r. Automatic differential temperature compensation to prevent over-firing of the boiler equipment in a low flow condition.
s. Automatically adjust the temperature set point and shutdown the boiler based on the outdoor air temperature conditions.
t. Night Setback functionality via external point of closure (or BMS integration) for unique “Occupied” and “Unoccupied” temperature setpoint values.
u. Maintain single temperature set point with a minimum outlet (supply) water temperature of 42°F up to a maximum outlet (supply) water temperature of 194°F.
v. On-Board DHW Priority capable of seamless transition between Comfort Heat (CH) and Domestic Hot Water (DHW) operation.
w. On-Board CH&DHW operation for simultaneous Comfort Heat (CH) and Domestic Hot Water (DHW) operation.
x. Alarm Relay Output to announce alarm conditions which require manual reset.
y. Programmable Low Fire Delay to prevent excessive short-cycling of the boiler equipment.
z. Local Manual Operation.

4. The boiler control system shall be capable of interfacing with the following external control devices:
   a. Building Management System (MODBUS®). NOTE: Optional Protocol Converter for communication via LONWORKS® and BACnet® must be available for purchase from the boiler manufacturer.
   b. Domestic Hot Water Break-on-Rise Aquastat (Normally Closed).
   c. Domestic Hot Water Tank Temperature Sensor (12kΩ).
   d. External Header Temperature Sensor (12kΩ).
   e. Outdoor Air Temperature Sensor (12kΩ).

H. Exhaust Venting:
1. The boilers must be dual certified as Category II or IV appliances and are capable of operating with slightly negative to slightly positive exhaust vent pressure, and the vent gas temperature is likely to cause condensate production in the vent.
2. Install the exhaust/flue venting system in accordance with NFPA 54/ANSI Z223.1 (United States) and per the manufacturer’s recommendations in the installation manual.
3. Boiler Manufacturer supplier shall provide the boiler venting, including all draft control dampers and controls with the boilers to ensure boilers function properly for a complete operating system.

I. Air Inlet:
1. The boilers must be certified for Direct Vent / Sealed Combustion installations where the combustion air is supplied directly to the boiler through ductwork.
2. Install the air inlet system in accordance with NFPA 54/ANSI Z223.1 (United States) and per the manufacturer’s recommendations in the installation manual.

J. Electrical:
1. Install an external disconnect and overload protection for each boiler in accordance with the requirements of NFPA 70.
2. The voltage requirements for each boiler must be configured for 208-240VAC or 480VAC, Three-Phase (w/ Neutral), 60Hz

PART 3 EXECUTION

3.01 INSTALLATION

A. Installation must be performed by the contractor in accordance with the requirements of the applicable codes. Contractor must review the boiler and installation for compliance with requirements and/or issues that may affect boiler performance. Installation should not proceed until unsatisfactory conditions have been corrected.

B. Install boiler on concrete housekeeping base, sized minimum 4 inches larger than boiler base. Arrange to allow sufficient room for cleaning and servicing all components.

C. Provide framed glass holder for NYS Department of Labor certificate of inspection, and post near the boiler prior to operation of the boiler.

D. Attach to boiler, identification number assigned by NYS Department of Labor Commissioner.

E. Each boiler shall be provided with an individual supply gas regulator for proper gas regulation for each gas supply as close to the boiler inlet connection as possible.

F. Provide connection of natural gas service in accordance with requirements of NFPA 54 and applicable codes.

G. Provide hydronic piping connections and accessories as indicated.

H. Provide breeching and chimney connections as indicated.

I. The vent system must conform with all manufacturer’s recommendations and shall utilize UL listed stainless steel AL-29-4C Positive Pressure.

J. Pipe relief valves and condensate drain to nearest floor drain.

K. Coordinate for electrical connections by Division 26.

3.02 FIELD QUALITY CONTROL

A. Preliminary Requirements:
   1. Employ the services of Company Field Advisor to complete duties specified in Quality Assurance Article.

B. Boiler Start Up:
   1. Arrange with NYS Department of Labor for inspection of boiler upon completion of installation.
      a. Do not operate boiler until NYS Department of Labor inspection is made and a Certificate of Inspection is posted.
      b. Pay application and inspection fees required by NYS Department of Labor.
      c. Prepare boiler for internal inspection or hydrostatic pressure test on the date specified by the Department of Labor inspector.
         1) Remove handhole plates, and washout plugs in the water column connection.
         2) Remove as directed by the NYS Department of Labor inspector, brick work and insulation.
         3) Remove gages for testing if required by NYS Department of Labor inspector.
         4) Stop leaks of steam or hot water into the boiler being inspected from the other components.
         5) Make available to the NYS Department of Labor inspector a competent person to be placed under the inspector's supervision to disassemble, reassemble, test, adjust, operate or forcible handling any part of the boiler.
   2. Preliminary System Tests:
      a. Preparation: After the State Department of Labor Certificate of Inspection has been posted, fire the boiler for the purpose of checking general operation, proving mechanical and electrical controls, and making necessary adjustments. Operate the system long enough to assure that it is performing properly.
      b. Run preliminary test for the purpose of:

1) Determining whether the boiler and appurtenances are in suitable condition to conduct the acceptance test.
2) Checking the adjusting equipment.
3) Training Facility personnel.

3. System Acceptance Test:
   a. Preparation: Notify the Owner's Representative at least 3 working days prior to the test so arrangements can be made to have a Facility Representative witness the test.
   b. Make the following tests:
      1) Operate boiler, appurtenances, and fine tune adjustable devices.
      2) Test alarm indicating devices.
      3) Operate for a sufficient period of time to demonstrate satisfactory overall performance of the heating system.
   c. Supply equipment necessary for system adjustment and testing.
   d. Submit a typewritten report of the test results, signed by the Company Field Advisor and the Owner's Representative. Enclose a copy of the report in a metal frame covered with plastic sheet glazing and mount it adjacent to the control panel.

END OF SECTION

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SECTION 235223
CAST-IRON BOILERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Boilers.

B. Controls and boiler trim.

C. Hot water connections.

D. Fuel connection.

E. Collector, draft hood, and chimney connection.

1.02 RELATED REQUIREMENTS

A. Section 230913 - Instrumentation and Control Devices for HVAC.

B. Section 232114 - Hydronic Specialties.

C. Section 235100 - Breechings, Chimneys, and Stacks.

D. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. ASME BPVC-IV - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers; 2023.

B. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels; 2023.

C. UL 726 - Oil-Fired Boiler Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data indicating general layout, dimensions, and size and location of water, gas, and vent connections, and electrical characteristics and connection requirements.

C. Manufacturer's Instructions: Submit manufacturer's complete installation instructions.

D. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, cleaning procedures, replacement parts list, and maintenance and repair data.

1.05 QUALITY ASSURANCE

A. Regulatory Requirements:

1. The boiler shall be designed, constructed, and tested in accordance with the ASME Boiler Code Section IV, Heating Boilers.
2. Installation of Boilers shall comply with the requirements of Industrial Code Rule No. 4 (12NYCRR4) of the State of New York, Board of Standards and Appeal and National Fire Code.
3. All Electrical components shall be UL listed.
4. Manufacturer’s Representatives Qualifications: Must have represented the product for more than five years. A manufacturer’s representative must have on staff their own factory certified technicians and provide service 24 hours per day / 7 days per week.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect units before, during, and after installation from damage to casing by leaving factory shipping packaging in place until immediately prior to final acceptance.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. DeDietrich Boilers; Model GT530A-24: www.dedietrichboilers.com.

B. Substitutions: See Section 016000 - Product Requirements.

2.02 MANUFACTURED UNITS

A. Hot Water Boilers:
   1. Building heating boilers shall be near condensing DeDietrich series GTA-530A-24 a firing rate 5984 MBH for operation using 41.5 GPH for #2 fuel oil. Boilers approved to ANSI Z21.13 CSA 4.9-2000 standards meeting category II with minimum efficiency of 85.2% and sustainable efficiencies up to 88%. Boilers shall have no limit on inlet water temperatures, tempering of return water with supply water is NOT ACCEPTABLE.
   2. The boiler shall have a maximum output of 5099 MBH when fired with No 2 oil, and/or 1,000 Btu/cu.ft. When fired with natural gas. Available electrical power will be 208 Volt, 3 phase 60Hz and 120v, 1 phase 60 Hz for the control circuit.

2.03 FABRICATION

A. Boilers shall be constructed of eutectic cast iron sections manufactured in accordance with ASME requirements for low pressure boilers and each section shall be permanently marked with the ASME symbol and the maximum allowable working pressures. The eutectic cast iron shall have a modulus of elasticity of 30 % greater than other cast iron. The warranty on boilers should not be affected if flue gas condensation is allowed with in the boiler. Boilers and burners shall be listed as a package, site approval not acceptable. Boiler and burner package must have proven field verified track record.

B. Boilers shall be of a four pass wet base, wetbacks design with optimized fins and cast iron turbulators to permit greater heat transfer. The forced draft burner shall be capable of firing the boilers pressurized combustion chamber assuring proper draft and positive ventilation. The burner shall be mounted to swing open either left or right on hinged mounting plate.

C. Boiler sections shall be surface ground to ensure smooth positive mating surfaces. Boiler sections shall be assembled with precision-machined bi-spherical push nipples pressed into mating machinery nipple port in the section. A gas tight seal with the use of a siliconed thermocord sandwiched between sections prevents leakage of flue gases. The boiler shall be complete with a drain tapping and drain valve. Boilers shall be complete with full-swing doors that five access to all flue ways and combustion areas for easy maintenance and cleaning without burner removal.

D. The complete boiler including the bottom shall be insulated with a minimum thickness of four inches of reinforced fiberglass wool insulation, and shall be encased in a heavy gauge steel boiler jacket. This jacket shall be installed after system piping has been connected to the boiler section assembly. Jacket will have removable panels to allow access to the boiler as required.

E. The boiler shall be equipped with a simplified control panel that includes and LED temperature indicator, built in on/off limit, high limit manual reset, service switch and be large enough in size to permit easy integration with third party energy management systems.

2.04 HOT WATER BOILER TRIM

A. The following items will need to be installed on the boiler that is provided by the boiler manufacturer:
   1. 60 PSI ASME relief valve
   2. 3-1/4” temperature and pressure gauge
   3. Two probe type Low water cut off’s, one automatic and one manual reset, modulation control
   4. Supplied control panel
   5. Drain valve

2.05 INSTALLATION

A. The boilers shall be field assembled by contractor at jobsite with tools provided by boiler manufacturer to ensure all parts are torqued properly. Install boilers level and plumb on concrete pad. Arrange piping as to provide adequate clearance for service and operation. Pipe safety relief valves and drain valves to floor drain. Install thermometers and pressure gauges on supply and return piping no higher than 6'-0" above floor. Install relief valve sized to suit boiler input and located upstream of any shut-off valve. Conform to manufacturer's installation instructions and piping schematic on drawings.

B. Upon notification of completion of the installation, boiler manufacturer shall furnish the services of a field technician, to start the boiler and provide combustion tests over the operating range and issue report to the consultant indicating system acceptance as installed.

2.06 WARRANTY

A. The boiler shall be warranted free from defects in material and workmanship for two years from the date of installation at the original installation site, ten years on the casting against corrosion and ten years on the casting against damage from thermal shock stress conditions caused by the boiler. The burner and controls shall have a one year parts and labor warranty which starts when the burner has been commissioned at the site. Provided the boiler is operated and maintained in accordance with the conditions specified in the Owner's Operating and Maintenance Manual.

2.07 EFFICIENCY

A. The boiler shall have a thermal efficiency up to 88%.

2.08 REQUIREMENTS

A. The boiler shall be provided with a UL and CSD-1 approved fuel burning system in full accordance with the requirements of state, provincial and local codes, the local gas utility, and other applicable regulatory bodies.

B. The complete fuel burning system shall be in full accordance with Industrial Risk Insurers (IRI) requirements.

2.09 BURNER DESCRIPTION

A. The burners shall be Power Flame Inc forced draft flame retention Head model C4-G0-30. Each burner shall be capable of burning 56.0 GPH of commercial grade No. 2 fuel oil.

B. Each burner shall be of welded steel construction and have a baked on powder coat finish. The combustion head shall incorporate a multi blade, stainless steel, flame retention diffuser. The gas firing head shall be of the multiport type and constructed such as to place annular gas distribution opening between two parallel air flow streams to achieve maximum fuel/air mixing. Burners with cast alloy blower housings will not be accepted. The burner combustion head will carry full five (5) year replacement warranty.

C. All air required for combustion shall be supplied by a blower mounted integral to the burner. The blower wheel shall be of the forward curved centrifugal design and shall be directly driven by a 5 HP 3450 RPM 208 volt, 60 Hertz 3 phase motor. A dual blade damper assembly located on the inlet side of the blower wheel shall meter the combustion air flow. A VFD shall be mounted in the burner control panel to control fan speed based on firing rate. The VFD shall be controlled by the Autoflame Mini Mk8.

D. The combustion air will be ducted to the burner, provide all accessories and damper assemble suitable for a ducted connection to the burner.

2.10 IGNITION SYSTEM (MOUNTED,AND WIRED)

A. To insure total fuel independence, the main oil flame shall be ignited by a 10,000-volt direct spark oil ignition system (available on C4 burners and smaller).

2.11 OIL BURNER

A. The oil burner shall be of the mechanical pressure atomizing type.

B. A two-stage oil pump shall be provided as an integral part of the burner.

C. Two approved automatically operated safety shutoff valve(s) shall be provided in the oil supply line to the burner valves to be piped in series but wired parallel.

D. Supply an oil pressure gauge to indicate the discharge oil pump pressure.

E. Install a manual valve, fuel oil filter, or strainer and vacuum gauge on the suction side of the oil pump.

F. Install a fusible-link-actuated oil safety shutoff valve in the oil supply line between the oil tank and the manual gate valve at the oil pump.

G. Oil pressure monitoring shall be provided by an approved pressure switch interlocked to accomplish a non-recycling safety shutdown in the event of low oil pressure.

2.12 BURNER CONTROLS

A. Provide a microcompressor based system for boiler/burner modulation and lead/lag control. The control system shall be provided as a packaged system, pre-engineered and programmed form the factory. The controller shall incorporate the following functions:
   1. 0-to 50% adjustable ignition start point adjustment, to determine the firing rate position at the time the burner is energized.
   2. 50 to 100% adjustable modulation start point.
   3. Adjustable purge timer.
   4. Pressure setback function.
   5. Standby timer.

B. The system shall be provided with a NEMA 1 enclosure and shall be UL listed.

C. The precision combustion control management system shall be fully capable of preprogrammed fuel/air ration control throughout the full firing range of the burner without the use of mechanical linkages to operate the air input dampers of fuel valves. The position of the fuel valves and air metering points of the precision combustion control system shall be operated by individual electrical positioning motors capable of a repeatable accuracy to within 0.1 angular degree. The precision combustion control system shall be readily programmable so that combustion quality can be optimized throughout the full range of the equipment while maintaining system temperature. The controller shall have an operational interface to communicate with the new building control system via Modbus with an RS232 or RS485 connection. In addition a separate controller will be provided to retrieve data from both MM controllers and provide a gateway to communicate with BMS. Provide Autoflame or approved equal.

D. The precision combustion management system shall include a central control module containing a microcomputer and power supply which shall include a Touchscreen interface on high definition XVGA 1024x768 screen, all of which will be protected beneath a tamper-proof cover. The control module display shall indicate the angular position of the air damper motor and the fuel valve(s) at any time. The control module display will indicate the preprogrammed set points or current conditions on demand.

E. An additional high limit safety pressure control of the manual reset type shall be provided to control the burner.

F. Pre-and post-operation of the burner fan shall be provided per current UL requirements.

G. The full modulation of the burner shall be controlled by water temperature by means of a temperature control.

H. Lead boiler as selected by building controls shall be operational boiler. In the event that lead boiler cannot maintain load, then lag boiler shall operate.

I. Operational boiler shall start and run on fall in water temperature form setpoint, sensed at operating aquastat.

J. If boiler water temperature exceeds setpoint, boiler shall stop. If temperature continues to rise, high limit aquastat shall open and prevent boiler operation until reset manually.

K. The burner shall utilize a Autoflame mini MK8 flame safeguard programmer

L. All control wiring inside burner control panel shall be set by factory representative. All remote control wiring to building system shall be by Contractor.

M. A manual restart of the burner shall be necessary in the event of shutdown due to flame failure.

N. All three phase motors shall be controlled and protected by an automatic starter with thermal overload protection. The starter shall be interlocked to prevent burner operation when overload relays are tripped out.

O. Supply a burner mounted diagram air flow switch to prevent energizing the main fuel valves in the event of insufficient combustion air, or to provide safety shutdown in the event of combustion air interruption.

P. A factory wired control cabinet shall be supplied and mounted on the boiler frame. The control cabinet shall house the flame safeguard control, programming timer, burner motor starter, fuses, control circuit transformer, control switches, alarm bell with automatic reset silencing switch to ring on low water or flame failure, indicating lamps and relays as required.

Q. Provide (4) individual lights with nameplates on the control cabinet to indicate “call for heat”, “main fuel valve on”, “low water” and “main flame failure”.

R. The changing from one fuel to another shall be manual by means of a fuel selector switch. No burner adjustments shall be required to switch from one fuel to the other.

S. The burner shall be equipped with suitable fuel and air controls to assure smooth main flame ignition. The burner shall utilize a proportional air flow damper design, including independent low-fire and high-fire air flow shutter assemblies for ease of adjustment and consistent excess air performance throughout the firing range.

T. Fuel-air control shall be synchronized. The fuel air drive unit shall be provided with a position indicating switch interlocked with the flame safeguard system to assure starting at the low fire position. The flame safeguard system shall further program this drive to provide a full open louver of sufficient time to provide a four air change pre-ignition of the combustion chamber, heat exchanger and flue passages.

U. Pre-ignition pure air flow rate shall not be less than 60% maximum firing rate air flow. Interlocks shall be provided to monitor and prove 60% air flow purge when air inlet louvers are automatically opened to obtain this rate.

V. Electronic safety combustion controls shall be supplied, complete with ultra-violet frame scanner to monitor the main flame. It shall be so utilized as to provide intermittent type gas/electric ignition and pre-ignition timer. Flame rod will not be permitted for proving pilot or main flame.

W. The boilers shall be controlled by a data transfer interface (DTI) manufactured by Autoflame. The control must have the capabilities to control up to 10 M.M. Controllers. The data collected shall be available for transmission to an external source via RS422 and Ethernet data links. The data gathered can be collected and viewed with the DTI manager software, which allows data collection over a local area network or over the internet. The Mk8 DTI displays information from the mini Mk8. The 12.1” touch-screen shall display the operational status of the DTI communications, with corresponding error conditions in the event of a communication failure. Remote on/off control of the burner can also be achieved as well as the adjustment of the temperature or pressure set point and the sequence order. Through the DTI touch screen, DTI manager software and via Modbus, the following information is shall be available:

1. Mini MK8 M.M.
    a. Actual boiler temperature (deg. C/F) or pressure (Bar/PSI)
    b. required set point i.e. required boiler temperature (deg. C/F) or pressure (Bar/PSI)
    c. Burner on/off status
    d. Burner firing rate (%)
    e. Fuel selected
    f. Burner rating
    g. Fuel flow metering values
    h. Load detector type (temperature/pressure)
    i. Lockout and Error history
    j. Auto/hand/low flame hold operation
    k. Number of channels used
    l. Channel 1, 2, 3 servomotor angle
    m. Channel 4 output and input signals to VFD with feedback history
    n. Burner firing status
    o. Lead/lag boiler status
    p. Sequence order
    q. Sequence status (on, standby, warming, off)
    r. Enabled/disabled status
    s. Total hours
    t. Number of start-ups per fuel

PART 3 EXECUTION

3.01 INSTALLATION

A. Install boiler package in accordance with manufacturer's installation instructions. Install plumb and level and firmly supported and anchored. Boilers to be installed in accordance with all applicable codes.

B. Furnish electrical wiring diagrams to electrical installer for power wiring to units.

C. Start Up: Provide services of factory trained service personnel of equipment representative to perform initial testing, calibration and start up of boilers and place them into automatic operation. Perform combustion test and adjust for specified efficiency. Provide warranty service, parts and labor for one year from date of start-up.

D. Install boilers and burners in accordance with manufacturer's recommendations and in compliance with state and local codes.

E. Vent each gas regulator to the exterior in accordance with state and local codes.

F. Warranty: Manufacturer shall provide a standard warranty for equipment for a period of one year from start-up. In addition, the boiler manufacturer shall provide a ten year warranty on the cast iron heat exchanger and the sections of the boiler free from defects in material and workmanship.

3.02 FUEL FOR START-UP AND TESTING

A. Oil: Connect to new oil piping for firing boilers, all as required by the drawings and the specifications.

3.03 FIELD QUALITY CONTROL

A. Preliminary Requirements: Provide the services of a competent field service representative of the boiler-burner unit manufacturer for the following:
    1. Inspect boiler installations prior to start up.
    2. Supervise initial firing of boilers.
    3. Instruction of School Personnel.
    4. Service

B. Factory trained field service representative must provide certification that they are properly trained on the supplied equipment from the factory. The service representative providing the boilers shall be in business for no less than 10-years and have their own service technicians, third party service support is not acceptable. All documentation must be submitted to the engineer for review during the submittal process.

C. Boiler Pre-Start-Up and Start-Up:
   1. Upon completion of boiler installations, the manufacturer's representative shall visit the site; inspect the installations and notify the Engineer of any work which must be done or modified prior to firing boilers.
   2. Upon completion of required work or modifications to install work and all testing, the manufacturer's representative shall supervise the boiler start-up.
   3. Fire the boilers and conduct preliminary test, for the purpose of checking general operation of the boilers, proving mechanical and electrical controls and making necessary adjustments.
   4. Provide pre-start check list, start-up list and operating instructions for each type of boiler, framed under rigid plastic and placed where directed in the Boiler Room.

D. Instruction of Personnel: The manufacturer's representative shall instruct duly authorized School Personnel in the operation and maintenance of the boilers and all accessories. Provide a minimum of 8 hours for on-site instruction purposes, exclusive of all pre-start-up, start-up and Service call time.

3.04 CLOSEOUT ACTIVITIES

A. Train operating personnel in operation and maintenance of units.

B. Provide the services of the manufacturer's field representative to conduct training.

END OF SECTION

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SECTION 237413
PACKAGED ROOF-TOP UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Packaged roof top unit. (Including DOAS, RTU's, and AHU-1 at the HS)

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 260583 - 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 016000 - 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 (RTU'S, DOAS, AND AHU-1)

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: (Except for RTU-1 at Intermediate Building)
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 Glycol Heating coil: (40% Propylene)
1. Glycol heating coil shall be factory installed in the heat section. The glycol heat section shall be installed downstream of the supply air fan. A factory-tested diffuser shall be used in order to provide air distribution across the coil. The rooftop unit shall include a piping vestibule to allow piping to penetrate roof within the unit roof curb. The coil connection shall terminate in the vestibule. All coil connections shall be copper, steel connections shall not be allowed in order to prevent dielectrics and corrosion.
2. Coils shall be fabricated of seamless 3/8" diameter copper tubing that is mechanically expanded into high efficiency rippled and corrugated aluminum plate fins. All coil vents and drains shall be factory installed. Glycol coil shall be fully cased to allow for easy replacement.

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. Convenience Receptacle shall be mounted on exterior of unit enclosure. Include signage noting convenience receptacle.
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.

2. Where called out on plans the unit shall be provided with a fully insulated plenum curb to allow existing duct penetrations to work with the configuration of the new units. The supply air and return/exhaust air streams shall not mix within the 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 017800 - Closeout Submittals, for closeout submittals.

B. See Section 017900 - 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. Provide written report to Owner.

END OF SECTION

SECTION 238126.13
SMALL-CAPACITY SPLIT-SYSTEM AIR CONDITIONERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air cooled condensing units.

B. Indoor air handling (fan and coil) units for ductless systems.

C. Controls.

1.02 REFERENCE STANDARDS

A. AHRI 210/240 - Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2023.

B. AHRI 520 - Performance Rating of Positive Displacement Condensing Units; 2004.

C. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2022, with Addendum (2024).

D. ASHRAE Std 23.1 - Methods for Performance Testing Positive Displacement Refrigerant Compressors and Condensing Units that Operate at Subcritical Pressures of the Refrigerant; 2019.

E. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

F. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2024.

G. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.

C. Shop Drawings: Indicate assembly, required clearances, and location and size of field connections.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Mitsubishi Electric: www.mitsubishi.com.

B. Daikin Applied: www.daikin.com.

C. Samsung: www.samsung.com.

2.02 INDOOR UNITS FOR DUCTLESS SYSTEMS

A. Indoor Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, evaporator coil, and controls; wired for single power connection with control transformer.
   1. Location: High-wall.
   2. Fan: Line-flow fan direct driven by a single motor.
   3. Filter return air with washable, antioxidant pre-filter and a pleated anti-allergy enzyme filter.

B. Evaporator Coils: Copper tube aluminum fin assembly, galvanized or polymer drain pan sloped in all directions to drain, drain connection, refrigerant piping connections, restricted distributor or thermostatic expansion valve.
   1. Construction and Ratings: In accordance with AHRI 210/240 and UL 207.

2. Manufacturer: System manufacturer.

2.03 OUTDOOR UNITS

A. Outdoor Units: Self-contained, packaged, pre-wired unit consisting of cabinet, with compressor and condenser.
   1. Comply with AHRI 210/240.
   2. Refrigerant: Use only refrigerants that have ozone depletion potential (ODP) of zero and global warming potential (GWP) of less than 50.
   3. Refrigerant: R-410A.
   4. Cabinet: Galvanized steel with baked enamel finish, easily removed and secured access doors with safety interlock switches, glass fiber insulation with reflective liner.
   5. Construction and Ratings: In accordance with AHRI 210/240 with testing in accordance with ASHRAE Std 23.1 and UL 207.

B. Compressor: Hermetic, 3600 rpm, AHRI 520 resiliently mounted integral with condenser, with positive lubrication, crankcase heater, high pressure control, motor overload protection, service valves and drier. Provide time delay control to prevent short cycling and rapid speed changes.

C. Air Cooled Condenser: Aluminum fin and copper tube coil, AHRI 520 with direct drive axial propeller fan resiliently mounted, galvanized fan guard.
   1. Condenser Fans: Direct-drive propeller type.

D. Accessories: Filter drier, high pressure switch (manual reset), low pressure switch (automatic reset), service valves and gauge ports, thermometer well (in liquid line).
   1. Provide thermostatic expansion valves.

E. Operating Controls:
   1. Control by room thermostat to maintain room temperature setting.
   2. Low Ambient Kit: Provide refrigerant pressure switch to cycle condenser fan on when condenser refrigerant pressure is above 285 psig and off when pressure drops below 140 psig for operation to -40 Degrees F.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions and requirements of local authorities having jurisdiction.

B. Install in accordance with NFPA 90A and NFPA 90B.

C. Install refrigeration systems in accordance with ASHRAE Std 15.

END OF SECTION

SECTION 238129
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 230800 - 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 Addendum (2024).

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 013000 - 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 019113 - General Commissioning Requirements for additional requirements.

B. Execute mechanical system commissioning as indicated on Section 230800.

C. Replace components not functioning properly.

3.04 CLOSEOUT ACTIVITIES

A. See Section 017800 - 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

SECTION 238200
CONVECTION HEATING AND COOLING UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Finned tube radiation.

B. Unit heaters.

C. Cabinet unit heaters.

D. Unit ventilators.

E. Vertical Unit Ventilators.

1.02 RELATED REQUIREMENTS

A. Section 230716 - HVAC Equipment Insulation.

B. Section 230719 - HVAC Piping Insulation.

C. Section 232113 - Hydronic Piping.

D. Section 232114 - Hydronic Specialties.

1.03 REFERENCE STANDARDS

A. AHRI Directory of Certified Product Performance - Air-Conditioning, Heating, and Refrigeration Institute (AHRI); Current Edition.

B. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications; Most Recent Edition Cited by Referring Code or Reference Standard.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide typical catalog of information including arrangements.

C. Shop Drawings:
   1. Submit schedules of equipment and enclosures typically indicating length and number of pieces of element and enclosure, corner pieces, end caps, cap strips, access doors, pilaster covers, and comparison of specified heat required to actual heat output provided.

1.05 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 HYDRONIC FINNED TUBE RADIATION

A. Manufacturers:
   1. Sterling Hydronics Corporation: www.sterlinghydronics.com.
   2. Slant/Fin Corporation: www.slantfin.com/#sle.
   3. Zehnder Rittling: www.rittling.com/#sle.

B. Required Directory Listing: AHRI Directory of Certified Product Performance - Air-Conditioning, Heating, and Refrigeration Institute (AHRI); current edition at www.ahrinet.org.

C. Heating Elements: 3/4 inch ID seamless copper tubing, mechanically expanded into evenly spaced aluminum fins sized 4 by 4 inches, suitable for soldered fittings.

D. Element Hangers: Quiet operating, ball bearing cradle type providing unrestricted longitudinal movement, on enclosure brackets.

E. Enclosures: 18 gage, 0.0478 inch sheet steel up to 18 inches in height, 16 gage, 0.0598 inch sheet steel over 18 inches in height or aluminum as detailed, with easily jointed components for wall to wall installation.

F. Finish: Factory applied baked primer coat.

G. Damper: Where not thermostatically controlled, provide knob-operated internal damper at enclosure air outlet.

H. Access Doors: For otherwise inaccessible valves, provide factory-made permanently hinged access doors, 6 by 7 inch minimum size, integral with cabinet.

2.02 HYDRONIC UNIT HEATERS

A. Manufacturers:
   1. Sigma Corporation: www.sigmaproducts.com/#sle.
   2. Sterling Hydronics, a Mestek Company: www.sterlingheat.com/#sle.

B. Coils: Seamless copper tubing, silver brazed to steel headers, and with evenly spaced aluminum fins mechanically bonded to tubing.

C. Perform factory run test under normal operating conditions, water, and steam flow rates.

D. Casing: Minimum 18 gage, 0.0478 inch thick sheet steel casing with threaded pipe connections for hanger rods for horizontal models and minimum 18 gage, 0.0478 inch thick sheet steel top and bottom plates for vertical projection models.

E. Finish: Factory applied baked primer coat.

F. Fan: Direct drive propeller type, statically and dynamically balanced, with fan guard; horizontal models with permanently lubricated sleeve bearings; vertical models with grease lubricated ball bearings.

G. Air Outlet: Adjustable pattern diffuser on vertical projection models and two way louvers on horizontal projection models.

H. Totally Enclosed Motors: Permanently lubricated sleeve bearings on horizontal models, grease lubricated ball bearings on vertical models.

I. Electrical Characteristics:
   1. 120 volts, single phase, 60 Hz.

2.03 HYDRONIC CABINET UNIT HEATERS

A. Manufacturers:
   1. Sigma Corporation: www.sigmaproducts.com/#sle.
   2. Sterling Hydronics a Mestek Company: www.sterlingheat.com/#sle.

B. Provide products listed, classified, and labeled by Underwriters Laboratories Inc. (UL), Intertek (ETL), or testing firm acceptable to Authority Having Jurisdiction as suitable for the purpose indicated.

C. Coils:
   1. Evenly spaced aluminum fins mechanically bonded to copper tubes.
   2. Heating Hot Water: Suitable for working temperatures up to a maximum not less than 200 degrees F.

D. Cabinet: Minimum 16 gage, 0.0598 inch thick sheet steel front panel with exposed corners and edges rounded, easily removed panels, glass fiber insulation, integral air outlet, and inlet grilles.

E. Finish: Factory applied baked primer coat on visible surfaces of enclosure or cabinet.

F. Fans: Centrifugal forward-curved double-width wheels, statically and dynamically balanced, direct driven.

G. Motor: Tap wound multiple speed permanent split capacitor with sleeve bearings, resiliently mounted.

H. Control: Factory wired, solid state, infinite speed control, located in cabinet.

I. Filter: Easily removed, 1 inch thick glass fiber throw-away type, located to filter air before coil.

J. Electrical Characteristics:
   1. 120 volts, single phase, 60 Hz.

2.04 UNIT VENTILATORS

A. Manufacturers:
   1. Daikin Applied: www.daikinapplied.com/#sle.
   2. Trane, a brand of Ingersoll Rand: www.trane.com/#sle.

B. Performance Data and Safety Requirements:
   1. Unit capacities certified and tested in accordance with AHRI 840 and AHRI 350.
   2. Provide products listed, classified, and labeled by Underwriters Laboratories Inc. (UL), Intertek (ETL), or testing firm acceptable to Authority Having Jurisdiction as suitable for the purpose indicated.

C. Required Directory Listings: AHRI Directory of Certified Product Performance - Air-Conditioning, Heating, and Refrigeration Institute (AHRI).

D. Hydronic Coils:
   1. Copper tubes mechanically expanded or bonded into evenly spaced aluminum fins.
   2. Provide insulated drain pan under heating coils, to prevent sweating, with field convertible left or right hand drain connections.

E. Cabinet: 14 gage, 0.0747 inch sheet steel on solid base pan with exposed edges rounded. Provide removable front panels with quick-acting, key-operated cam locks. Provide removable die-cast or fabricated steel discharge grilles. Coordinate unit dimentions with GC for coordination with the adjacent casework.

F. Finish: Factory applied baked primer coat on visible surfaces of enclosure or cabinet.

G. Fans: Centrifugal forward-curved double-width wheels, statically and dynamically balanced, direct driven, arranged to draw air through coil.

H. Wall Louvers: Anodized aluminum wall intake box and louvers removable from frame with 1/2 inch square mesh galvanized screen in back of louver.

I. Motor: Tap wound multiple speed permanent split capacitor with sleeve bearings, resiliently mounted.

J. Controls:
   1. Coordinate control with Building Temperature Control manufacturer.
   2. Unit Ventilator Manufacturer's Controls:
      a. Fan speed switch for unit mounting.
      b. Disconnect switch.
   3. Provide ASHRAE Cycle I as defined in ASHRAE (HVACA) Handbook - HVAC Applications.

K. Filter: Easily removed 1 inch thick glass fiber throw-away type, located to filter air before coil.

L. Mixing Dampers: Multi-blade with compressible seal, capable of varying proportion of mixed air from 100 percent room air to 100 percent outside air.

2.05 VERTICAL UNIT VENTILATOR - (AIREDALE)

A. General: Provide combination heating-ventilating units complete with an outlet air intake box. Furnish units complete with return and outlet air grilles and dampers, with capacities, airflow, and configuration as listed on drawing schedules.

B. Cabinet:
   1. Insulation: 1-inch thick, acoustic Hushcloth Polyester/Polyurethane foam with density of 2-pounds per cubic foot containing no fibrous materials.
      a. Fire-Hazard Classification: Insulation shall have a fire rating of UL94HF-1.
      b. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
   2. Cabinet Construction: Constructed from aluminized steel with 20 gauge panels, degreased and coated with electrostatically applied baked-on polyester powder paint.
   3. Cabinet Finish: The unit color shall be CUSTOMER TO SPECIFY COLOR FROM AIR75-403.
      a. Paint finish shall be easily cleanable and hard wearing to give maximum protection.
   4. Service and Maintenance Access: All service and maintenance access shall be possible through the front of the unit only.
   5. Standard Access Door: Access Doors factory installed on the front of the unit are insulated and have integral low-level return air grilles on the front of them. Door has heavy-duty hinges with a spring-loaded pin to allow for easy removal if required. Door is secured with two (2) key locks. Door swing designed to turn into itself allowing each side of the unit to be installed directly against a wall in the corner of room.
   6. Condensate Connection: Factory installed condensate connection stub provided for connection to the field installed building condensate drain.

C. Coils:
   1. Hot Water Coil:
      a. Separate coil assemblies shall be utilized for all units within the range. Standard or high capacity coils shall be used dependent on unit configuration. Each coil shall be manufactured from refrigeration quality 3/8” diameter cooper tubing mechanically bonded onto aluminum fins with coil circuitry designed to ensure minimum waterside pressure drops. Each coil shall be fitted with an air bleed at the high point of the coil and a drain plug at the low point. All coils subject to chilled water flow shall be mounted in an ABS vacuum formed condensate tray. Coil configuration shall be one of the following:
      b. 3/8” wall closed cell type insulation shall cover all factory installed piping.

D. Cooling Section:
   1. Packaged heat pump utilizing HFC-R410A and is fitted with dual thermal expansion devices and a reversing valve to enable the unit to operate in either cooling or heat pump mode.
   2. Factory mounted outdoor coil stat allows defrosting of the outside coil when in heat pump mode.
   3. Fitted with automatic reset highpressure and low-pressure cut-out switches and a sight glass for system observation.

E. Fans and Motors:

1. The indoor fan assembly consists of one blower inside teardrop housing assembly engineered specifically for optimal airflow with low noise and minimal power consumption. Blower is powered by electronically commutated motor (ECM). The DC motor features brushless, permanently lubricated ball bearing construction for maintenance free operation. A wide range of programmable speeds and torque characteristics is possible for ultra-high efficiency and low audible noise. The ECM provides constant airflow by automatically adjusting the speed if the external static pressure changes. Electrical and control wiring to fan assembly includes quick disconnect plug local to assembly.
2. Outdoor (Condenser) Fan Assembly: The outdoor fan assembly consists of one backward curved plug fan with centrifugal blower wheel powered by an electronically commutated motor (ECM). The DC motor features brushless, permanently lubricated ball bearing construction for maintenance free operation. A wide range of programmable speeds and torque characteristics are possible for ultra-high efficiency and low audible noise. Fan design capable of overcoming external static pressures brought on by rear extensions backs and duct work connected to the fan discharge opening. Fan is sized such that powered exhaust shall be integral to the unit to prevent over pressurization of the space when the unit is introducing outside air. Capable of exhausting 100% equivalent of the fresh air intake of the unit. Electrical and control wiring to fan assembly includes quick disconnect plug local to assembly.

F. Filter:
1. 2” thick radial pleated disposable cotton and synthetic blend filters. Minimum Efficiency Reporting Value of MERV 13 per ASHRAE standard 52.2.

G.
1. Control Panel: Located at top of the unit behind the front door for direct, centrally located access to controller, controller transformer (24V), and all necessary contactors, relays, and circuit breakers.
2. Wiring: Individually numbered terminal blocks and wires are to match job-specific wiring diagrams. All electrical wires in the control panel will run in an enclosed trough. Wiring outside the control panel to be contained in a protective sleeve. All controls and wiring is factory installed in a clean, organized arrangement.
3. Plug and Socket Wiring: Supply and Exhaust Fan decks, compressor and damper assembly wiring includes plugs local to the assembly allowing for quick wiring disconnect when the component requires removal for service.

H. Economizer:
1. Single-blade damper that pivots using a central single shaft attached to a single actuator allowing for complete balance of the return, outside, and exhaust air streams. Capable of full modulation allowing any mixture of outside air and return air to be possible. Will allow for 100% of the units airflow to be taken from the outside during conditions allowing for full economizer savings. Damper blade edges lined with rubber gasket to prevent air infiltration in full recirculation or full economizer operation. Complete damper assembly slides out of unit on rails allowing for the damper assembly to be removed through the front of the unit if it requires service. Electrical and control wiring to damper assembly includes quick disconnect plug local to assembly.
2. Outside Air Damper: Outside air damper and actuator provided for protection from outdoor elements when unit is not in use.
3. Damper Actuator: Low voltage modulating damper actuator with spring-return, fail safe. When power is cut to actuator, damper actuator will force damper blade closed to outside air.

I. Accessories:

1. Disconnect Switch: Located on the control panel, a amp power disconnect switch sized for the full load amperage of the unit. Allows the unit to be disconnected from the power supply prior to any maintenance. In the off position the switch can be locked out.

J. Field Installed Accessories:
   1. Wall Sleeve: Designed to provide a sealed plenum for the fresh air intake and exhaust air outlet on the back of the classroom unit to the outside of the building. Intake and exhaust airstreams are separated with an insulated horizontal splitter plate. A two-piece frame allows for the sleeve to adjust to wall depths between 8” and 14”. Includes double-sided gasket to create an air tight seal between the wall sleeves and the back of the unit.Louver: An outdoor louver suitable for masonry, glass, or panel wall construction. The louvers are flanged style with the following finish:Aluminum with bird screen and a clear anodized finish - Greenheck ESD435 Model - AMCA ratedOutside Air Rear Extension: Where site conditions do not permit the use of the standard locations for outside air intake and exhaust air discharge, an insulated outside air rear extension is supplied for site installation between the back of the unit and the outside wall by the mechanical contractor. The outside air rear extension is 11" deep and with adjustable panels to allow for the exhaust air discharge to be at a height from floor of 30"- 38".
   2. Rear Filler Panels: When an outside air rear extension is used in conjunction with a plenum, rear filler panels are used to fill the gap between the rear of the plenum and the wall. Rear filler panels are painted to match the unit and shall be shipped separately for field mounting.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are suitable for installation.

B. Verify that field measurements are as indicated on drawings.

3.02 INSTALLATION

A. Install in accordance with manufacturer's recommendations.

B. Install equipment exposed to finished areas after walls and ceilings are finished and painted.

C. Finned Tube Radiation:
   1. Locate on outside walls and run cover continuously wall-to-wall unless otherwise indicated.
   2. Center elements under window with elements of equal length centered under each window for multiple windows.
   3. Install wall angles and end caps where units butt against walls.

D. Unit Ventilators:
   1. Locate as indicated, level and shim units, and anchor to structure.
   2. Coordinate exact location of wall louvers.
   3. Provide wall trim pieces for continuous wall-to-wall installation.

E. Units with Hydronic Coils:
   1. Provide with shut-off valve on supply and return piping and tamper-proof, balancing valve with memory stop on return piping. Refer to coil piping schematic for more information.

3.03 FIELD QUALITY CONTROL

A. Provide manufacturer's field representative to test, inspect, instruct, and observe.

3.04 CLEANING

A. After construction and painting is completed, clean exposed surfaces of units.

B. Touch-up marred or scratched surfaces of factory-finished cabinets using finish materials furnished by the manufacturer.

C. Install new filters.

3.05 CLOSEOUT ACTIVITIES

A. See Section 017800 - Closeout Submittals, for closeout submittals.

END OF SECTION

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SECTION 238216
AIR COILS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hot Water heating coils.

1.02 RELATED REQUIREMENTS

A. Section 230719 - HVAC Piping Insulation.

B. Section 232114 - Hydronic Specialties.

C. Section 233100 - HVAC Ducts and Casings: Installation of duct coils.

1.03 REFERENCE STANDARDS

A. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide coil and frame configurations, dimensions, materials, rows, connections, and rough-in dimensions.

C. Shop Drawings: Indicate coil and frame configurations, dimensions, materials, rows, connections, and rough-in dimensions.

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 MANUFACTURERS

A. Sigma Corporation: www.sigma.com/#sle.

B. Greenheck: www.greenhecj.com.

C. Trane, a brand of Ingersoll Rand: www.trane.com/#sle.

2.02 HOT WATER HEATING COILS

A. Tubes: 5/8 inch OD seamless copper arranged in parallel or staggered pattern, expanded into fins, silver brazed joints.

B. Fins: Aluminum or copper continuous plate type with full fin collars.

C. Casing: Die formed channel frame of 16 gage, 0.0598 inch galvanized steel with mounting holes on 3 inch centers. Provide tube supports for coils longer than 36 inches.

D. Headers: Cast iron with tubes expanded into header.

E. Testing: Air test under water to 200 psi for working pressure of 200 psi and 220 degrees F.

F. Configuration: Drainable, with threaded plugs for drain and vent.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturers written instructions.

B. Install in ducts and casings in accordance with SMACNA (DCS).
   1. Support coil sections independent of piping on steel channel or double angle frames and secure to casings.

C. Protect coils to prevent damage to fins and flanges. Comb out bent fins.

D. Make connections to coils with unions and flanges.

END OF SECTION

SECTION 260505
SELECTIVE DEMOLITION FOR ELECTRICAL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical demolition.

1.02 RELATED REQUIREMENTS

A. Section 017000 - 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 013000 - 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 260510
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 260519
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 078400 - Firestopping.

B. Section 260505 - Selective Demolition for Electrical: Disconnection, removal, and/or extension of existing electrical conductors and cables.

C. Section 260526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.

D. Section 260553 - 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; 2023.

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 013000 - 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 260526.

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 260553.

Q. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.

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 014000 - 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 260526
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 260519 - 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 260553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

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 013000 - 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 260526:
   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 260519.

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 260553.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - 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 260529
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 033000 - Cast-in-Place Concrete: Concrete equipment pads.

B. Section 260533.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.

C. Section 260533.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.

D. Section 265100 - Interior Lighting: Additional support and attachment requirements for interior luminaires.

E. Section 265600 - 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; 2023.

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 033000.

1.05 SUBMITTALS

A. See Section 013000 - 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 014000 - 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 260533.13
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 078400 - Firestopping.
B. Section 260526 - Grounding and Bonding for Electrical Systems.
C. Section 260529 - Hangers and Supports for Electrical Systems.
D. Section 260553 - 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; 2023.
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 013000 - 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 260529 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 078400.

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 260553 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 260526.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - 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

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SECTION 260533.16
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 083100 - Access Doors and Panels: Panels for maintaining access to concealed boxes.

B. Section 260529 - Hangers and Supports for Electrical Systems.

C. Section 260533.13 - 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 260553 - Identification for Electrical Systems: Identification products and requirements.

E. Section 262726 - Wiring Devices:
   1. Wall plates.
   2. Floor box service fittings.
   3. Additional requirements for locating boxes for wiring devices.

F. Section 271000 - Structured Cabling: Additional requirements for communications systems outlet boxes.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

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 013000 - 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 016000 - 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 271000.
    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 262726.
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 262726; 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 083100 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 262726.
      b. Communications Systems Outlets: Comply with Section 271000.
   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 260533.13.
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 260529 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 078400.

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 260526.

S. Identify boxes in accordance with Section 260553.

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

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SECTION 260553
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 099113 - Exterior Painting.

B. Section 099123 - Interior Painting.

C. Section 260519 - 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 262726 - Wiring Devices - Lutron: Device and wallplate finishes; factory pre-marked wallplates.

E. Section 271000 - 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 013000 - 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 099123 and 099113.
   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 260519.
2. Identification for Communications Conductors and Cables: Comply with Section 271000.
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 099123 and 099113.
3) Vinyl Color Coding Electrical Tape: Comply with Section 260519.
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 099123 and 099113 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 271000.
2. Wiring Device and Wallplate Finishes: Comply with Section 262726.
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 014000 - 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

SECTION 260923
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 260529 - Hangers and Supports for Electrical Systems

B. Section 260533.16 - Boxes for Electrical Systems.

C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

D. Section 262726 - 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; 2023.

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 013000 - 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 017800 - 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 262726, 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 016000 - 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 262726, 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 260533.16 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 262726.

G. Provide required supports in accordance with Section 260529.

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 260553.

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 014000 - 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 019113 - 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 262416
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 260526 - Grounding and Bonding for Electrical Systems.

B. Section 260529 - Hangers and Supports for Electrical Systems.

C. Section 260553 - 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; 2023.

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 013000 - 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 016000 - 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 014000 - 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 260529.

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 260526.
   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 260553.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - 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 262726
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 260533.16 - Boxes for Electrical Systems.

B. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

C. Section 271000 - Structured Cabling: Voice and data jacks.

1.03 REFERENCE STANDARDS

A. FS W-C-596 - Connector, Electrical, Power, General Specification for; 2014h (Validated 2022).

B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification); 2017g (Validated 2023).

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

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 013000 - 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 016000 - 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 016000 - 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 260533.16 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 271000.
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 271000.
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 260533.16 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 260553.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - 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 262816.16
ENCLOSED SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Enclosed safety switches.

1.02 RELATED REQUIREMENTS

A. Section 260526 - Grounding and Bonding for Electrical Systems.

B. Section 260529 - Hangers and Supports for Electrical Systems.

C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

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 013000 - 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 016000 - 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 260529.

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 260526.

H. Identify enclosed switches in accordance with Section 260553.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - 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

SECTION 263213
ENGINE GENERATORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Packaged engine generator system and associated components and accessories:
   1. Engine and engine accessory equipment.
   2. Alternator (generator).
   3. Generator set control system.
   4. Generator set enclosure.
   5. The owner will furnish generator to contractor for installation.
   6. Contractor to provide equipment pad and install generator on pad.

1.02 RELATED REQUIREMENTS

A. Section 260526 - Grounding and Bonding for Electrical Systems.

B. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. ASTM D975 - Standard Specification for Diesel Fuel; 2023a.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

C. NECA/EGSA 404 - Standard for Installing Generator Sets; 2014.

D. NEMA MG 1 - Motors and Generators; 2021.

E. NFPA 30 - Flammable and Combustible Liquids Code; 2024.

F. NFPA 37 - Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines; 2021.

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. NFPA 99 - Health Care Facilities Code; 2024, with Errata.

I. NFPA 110 - Standard for Emergency and Standby Power Systems; 2025.

J. UL 142 - Steel Aboveground Tanks for Flammable and Combustible Liquids; Current Edition, Including All Revisions.

K. UL 1236 - Battery Chargers for Charging Engine-Starter Batteries; Current Edition, Including All Revisions.

L. UL 2200 - Stationary Engine Generator Assemblies; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate compatibility of generator sets to be installed with work provided under other sections or by others.
   2. Coordinate arrangement of equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   3. Coordinate the work to provide electrical circuits suitable for the power requirements of the actual auxiliary equipment and accessories to be installed.
   4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Preinstallation Meeting: Convene one week before starting work of this section; require attendance of all affected installers.

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 each product, including ratings, configurations, dimensions, finishes, weights, service condition requirements, and installed features. Include alternator starting capabilities, engine fuel consumption rates, and cooling, combustion air, and exhaust requirements.
   1. Include generator set sound level test data.
   2. Include characteristic trip curves for overcurrent protective devices upon request.
   3. Include alternator thermal damage curve upon request.

C. Shop Drawings: Include dimensioned plan views and sections indicating locations of system components, required clearances, and field connection locations. Include system interconnection schematic diagrams showing all factory and field connections.

D. Evidence of qualifications for installer.

E. Evidence of qualifications for maintenance contractor (if different entity from installer).

F. Manufacturer's factory emissions certification.

G. Source quality control test reports.

H. Provide NFPA 110 required documentation from manufacturer where requested by authorities having jurisdiction, including but not limited to:
   1. Certified prototype tests.
   2. Torsional vibration compatibility certification.
   3. NFPA 110 compliance certification.
   4. Certified rated load test at rated power factor.

I. Manufacturer’s detailed field testing procedures.

J. Field quality control test reports.

K. Maintenance contracts.

L. Project Record Documents: Record actual locations of system components, installed circuiting arrangements and routing, and final equipment settings.

1.06 QUALITY ASSURANCE

A. Comply with the following:
   1. NFPA 70 (National Electrical Code).
   2. NFPA 110 (Standard for Emergency and Standby Power Systems); meet requirements for Level 2 system.
   3. NFPA 37 (Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines).
   4. NFPA 30 (Flammable and Combustible Liquids Code).

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. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience with engine generator systems of similar size, type, and complexity; manufacturer's authorized installer.

E. Maintenance Contractor Qualifications: Same entity as installer or different entity with specified qualifications.

F. 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 generator sets in accordance with manufacturer's instructions and NECA/EGSA 404.

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 instructions to avoid damage to generator set components, enclosure, and finish.

1.08 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Provide minimum five year manufacturer warranty covering repair or replacement due to defective materials or workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Packaged Engine Generator Set:
   1. Caterpillar Inc: www.cat.com/#sle.
   2. Cummins Power Generation Inc: www.cumminspower.com/#sle.
   3. Generac Power Systems: www.generac.com/industrial/#sle.
   4. Kohler Co: www.kohlerpower.com/#sle.

2.02 PACKAGED ENGINE GENERATOR SYSTEM

A. Provide new engine generator system consisting of all required equipment, sensors, conduit, boxes, wiring, piping, supports, accessories, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. System Description:
   1. Application: Emergency/standby.
   2. Configuration: Single packaged engine generator set operated independently (not in parallel).

D. Packaged Engine Generator Set:
   1. Type: Gaseous (spark ignition).
   2. Power Rating: As indicated on drawings, standby.
   3. Voltage: As indicated on drawings.
   4. Main Line Circuit Breaker:
      a. Type: Thermal magnetic.
      b. Trip Rating: Select according to generator set rating.

E. Generator Set General Requirements:
   1. Prototype tested in accordance with NFPA 110 for Level 1 systems.
   2. Factory-assembled, with components mounted on suitable base.
   3. List and label engine generator assembly as complying with UL 2200.
   4. Power Factor: Unless otherwise indicated, specified power ratings are at 0.8 power factor for three phase voltages and 1.0 power factor for single phase voltages.

5. Provide suitable guards to protect personnel from accidental contact with rotating parts, hot piping, and other potential sources of injury.
6. Main Line Circuit Breakers: Provide factory-installed line side connections with suitable lugs for load side connections.

F. Service Conditions: Provide engine generator system and associated components suitable for operation under the service conditions at the installed location.

G. Starting and Load Acceptance Requirements:
1. Cranking Method: Cycle cranking complying with NFPA 110 (15 second crank period, followed by 15 second rest period, with cranking limiter time-out after 3 cycles), unless otherwise required.
2. Cranking Limiter Time-Out: If generator set fails to start after specified cranking period, indicate overcrank alarm condition and lock-out generator set from further cranking until manually reset.
3. Start Time: Capable of starting and achieving conditions necessary for load acceptance within 10 seconds (NFPA 110, Type 10).
4. Maximum Load Step: Supports 100 percent of rated load in one step.

H. Exhaust Emissions Requirements:
1. Comply with federal (EPA), state, and local regulations applicable at the time of commissioning; include factory emissions certification with submittals.
2. Do not make modifications affecting generator set factory emissions certification without approval of manufacturer and Engineer. Where such modifications are made, provide field emissions testing as necessary for certification.

2.03 ENGINE AND ENGINE ACCESSORY EQUIPMENT

A. Provide engine with adequate horsepower to achieve specified power output at rated speed, accounting for alternator efficiency and parasitic loads.

B. Engine Fuel System - Diesel
1. Fuel Source: Diesel, ASTM D975 No. 2-D or approved cold weather diesel blends.
2. Fuel Storage: Sub-base fuel tank.
3. Engine Fuel Supply: Provide engine-driven, positive displacement fuel pump with replaceable fuel filter(s), water separator, check valve to secure prime, manual fuel priming pump, and relief-bypass valve. Provide fuel cooler where recommended by manufacturer.
4. Engine Fuel Connections: Provide suitable, approved flexible fuel lines for coupling engine to fuel source.
5. Sub-Base Fuel Tank:
   a. Provide sub-base mounted, double-wall fuel tank with secondary containment; listed and labeled as complying with UL 142.
   b. Tank Capacity: Size for minimum of 24 hours of continuous engine generator operation at 100 percent rated load, but not larger than permissible by applicable codes.
   c. Features:
      1) Direct reading fuel level gauge.
      2) Normal atmospheric vent.
      3) Emergency pressure relief vent.
      4) Fuel fill opening with lockable cap.
      5) Dedicated electrical conduit stub-up area.
      6) Low fuel level switch.
      7) Leak detection switch; located within secondary containment interstitial space for detection of primary tank fuel leak.

C. Engine Starting System:

1. System Type: Electric, with DC solenoid-activated starting motor(s).
2. Battery(s):
    a. Battery Type: Lead-acid.
    b. Battery Capacity: Size according to manufacturer's recommendations for achieving starting and load acceptance requirements under worst case ambient temperature; capable of providing cranking through two complete periods of cranking limiter time-outs without recharging.
    c. Provide battery rack, cables, and connectors suitable for the supplied battery(s); size battery cables according to manufacturer's recommendations for cable length to be installed.
3. Battery-Charging Alternator: Engine-driven, with integral solid-state voltage regulation.
4. Battery Charger:
    a. Provide dual rate battery charger with automatic float and equalize charging modes and minimum rating of 10 amps; suitable for maintaining the supplied battery(s) at full charge without manual intervention.
    b. Capable of returning supplied battery(s) from fully discharged to fully charged condition within time required by NFPA 110 for Level indicated while carrying normal loads.
    c. Recognized as complying with UL 1236.
    d. Furnished with integral overcurrent protection; current limited to protect charger during engine cranking; reverse polarity protection.
    e. Provide integral DC output ammeter and voltmeter with five percent accuracy.
    f. Provide alarm output contacts as necessary for alarm indications.
5. Battery Heater: Provide thermostatically controlled battery heater to improve starting under cold ambient conditions.

D. Engine Speed Control System (Governor):
1. Single Engine Generator Sets (Not Operated in Parallel): Provide electronic isochronous governor for controlling engine speed/alternator frequency.
2. Frequency Regulation, Electronic Isochronous Governors: No change in frequency from no load to full load; plus/minus 0.25 percent at steady state.

E. Engine Lubrication System:
1. System Type: Full pressure, with engine-driven, positive displacement lubrication oil pump, replaceable full-flow oil filter(s), and dip-stick for oil level indication. Provide oil cooler where recommended by manufacturer.

F. Engine Cooling System:
1. System Type: Closed-loop, liquid-cooled, with unit-mounted radiator/fan and engine-driven coolant pump; suitable for providing adequate cooling while operating at full load under worst case ambient temperature.
2. Fan Guard: Provide suitable guard to protect personnel from accidental contact with fan.

G. Engine Air Intake and Exhaust System:
1. Air Intake Filtration: Provide engine-mounted, replaceable, dry element filter.
2. Engine Exhaust Connection: Provide suitable, approved flexible connector for coupling engine to exhaust system.

2.04 ALTERNATOR (GENERATOR)

A. Alternator: 4-pole, 1800 rpm (60 Hz output) revolving field, synchronous generator complying with NEMA MG 1; connected to engine with flexible coupling; voltage output configuration as indicated, with reconnectable leads for 3 phase alternators.

B. Exciter:
1. Exciter Type: Brushless; provide permanent magnet generator (PMG) excitation system; self-excited (shunt) systems are not permitted.

2. PMG Excitation Short-Circuit Current Support: Capable of sustaining 300 percent of rated output current for 10 seconds.
3. Voltage Regulation (with PMG excitation): Plus/minus 0.5 percent for any constant load from no load to full load.

C. Temperature Rise: Comply with UL 2200.

D. Insulation System: NEMA MG 1, Class H; suitable for alternator temperature rise.

E. Enclosure: NEMA MG 1, drip-proof.

F. Total Harmonic Distortion: Not greater than five percent.

G. Alternator Heater: Provide strip heater to prevent moisture condensation on alternator windings.

2.05 GENERATOR SET CONTROL SYSTEM

A. Provide microprocessor-based control system for automatic control, monitoring, and protection of generator set. Include sensors, wiring, and connections necessary for functions/indications specified.

B. Control Panel:
1. Control Panel Mounting: Unit-mounted unless otherwise indicated; vibration isolated.
2. Generator Set Control Functions:
   a. Automatic Mode: Initiates generator set start/shutdown upon receiving corresponding signal from remote device (e.g. automatic transfer switch).
   b. Manual Mode: Initiates generator set start/shutdown upon direction from operator.
   c. Reset Mode: Clears all faults, allowing generator set restart after a shutdown.
   d. Emergency Stop: Immediately shuts down generator set (without time delay) and prevents automatic restarting until manually reset.
   e. Cycle Cranking: Programmable crank time, rest time, and number of cycles.
   f. Time Delay: Programmable for shutdown (engine cooldown) and start (engine warmup).
   g. Voltage Adjustment: Adjustable through range of plus/minus 5 percent.
3. Generator Set Status Indications:
   a. Voltage (Volts AC): Line-to-line, line-to-neutral for each phase.
   b. Current (Amps): For each phase.
   c. Frequency (Hz).
   d. Real power (W/kW).
   e. Reactive power (VAR/kVAR).
   f. Apparent power (VA/kVA).
   g. Power factor.
   h. Duty Level: Actual load as percentage of rated power.
   i. Engine speed (RPM).
   j. Battery voltage (Volts DC).
   k. Engine oil pressure.
   l. Engine coolant temperature.
   m. Engine run time.
   n. Generator powering load (position signal from transfer switch).
4. Generator Set Protection and Warning/Shutdown Indications:
   a. Comply with NFPA 110; configurable for NFPA 110 Level 1 or Level 2, or NFPA 99 systems including but not limited to the following protections/indications:
      1) Overcrank (shutdown).
      2) Low coolant temperature (warning).
      3) High coolant temperature (warning).
      4) High coolant temperature (shutdown).

5) Low oil pressure (shutdown).
6) Overspeed (shutdown).
7) Low fuel level (warning).
8) Low coolant level (warning/shutdown).
9) Generator control not in automatic mode (warning).
10) High battery voltage (warning).
11) Low cranking voltage (warning).
12) Low battery voltage (warning).
13) Battery charger failure (warning).

b. In addition to NFPA 110 requirements, provide the following protections/indications:
1) High AC voltage (shutdown).
2) Low AC voltage (shutdown).
3) High frequency (shutdown).
4) Low frequency (shutdown).
5) Overcurrent (shutdown).
6) Fuel tank leak (warning), where applicable.

c. Provide contacts for local and remote common alarm.
d. Provide lamp test function that illuminates all indicator lamps.

5. Other Control Panel Features:
a. Event log.
b. Communications Capability: Compatible with system indicated. Provide all accessories necessary for proper interface.
c. Remote monitoring capability via PC.

C. Remote Annunciator:
1. Remote Annunciator Mounting: Wall-mounted; Provide flush-mounted annunciator for finished areas and surface-mounted annunciator for non-finished areas unless otherwise indicated.
2. Generator Set Status Indications:
a. Generator powering load (via position signal from transfer switch).
b. Communication functional.
3. Generator Set Warning/Shutdown Indications:
a. Comply with NFPA 110; configurable for NFPA 110 Level 1 or Level 2, or NFPA 99 systems including but not limited to the following indications:
1) Overcrank (shutdown).
2) Low coolant temperature (warning).
3) High coolant temperature (warning).
4) High coolant temperature (shutdown).
5) Low oil pressure (shutdown).
6) Overspeed (shutdown).
7) Low fuel level (warning).
8) Low coolant level (warning/shutdown).
9) Generator control not in automatic mode (warning).
10) High battery voltage (warning).
11) Low cranking voltage (warning).
12) Low battery voltage (warning).
13) Battery charger failure (warning).
b. Provide audible alarm with silence function.
c. Provide lamp test function that illuminates all indicator lamps.

D. Remote Emergency Stop: Provide approved red, mushroom style remote emergency stop button where indicated or required by authorities having jurisdiction.

2.06 GENERATOR SET ENCLOSURE

A. Enclosure Type: Sound attenuating, weather protective.

B. Enclosure Material: Steel or aluminum.

C. Hardware Material: Stainless steel.

D. Color: Manufacturer's standard.

E. Access Doors: Lockable, with all locks keyed alike.

F. Openings: Designed to prevent bird/rodent entry.

G. External Drains: Extend oil and coolant drain lines to exterior of enclosure for maintenance service.

H. Sound Attenuating Enclosures: Line enclosure with non-hydroscopic, self-extinguishing sound-attenuating material.

I. Enclosure Space Heater: Provide thermostatically controlled enclosure space heater to prevent condensation and improve starting under cold ambient conditions; size according to manufacturer's recommendations for achieving starting and load acceptance requirements under worst case ambient temperature.

2.07 SOURCE QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Perform production tests on generator sets at factory to verify operation and performance characteristics prior to shipment. Include certified test report with submittals.

C. Generator Set production testing to include, at a minimum:
   1. Operation at rated load and rated power factor.
   2. Single step load pick-up.
   3. Transient and steady state voltage and frequency performance.
   4. Operation of safety shutdowns.

D. Diesel Fuel Storage Tanks: Perform pressurized leak test prior to shipment.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that the ratings and configurations of generator sets and auxiliary equipment are consistent with the indicated requirements.

C. Verify that rough-ins for field connections are in the proper locations.

D. Verify that mounting surfaces are ready to receive equipment.

E. 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 generator sets and associated accessories in accordance with NECA/EGSA 404.

D. Arrange equipment to provide minimum clearances and required maintenance access.

E. Unless otherwise indicated, mount generator set on properly sized, minimum 6 inch high concrete pad constructed in accordance with Section 033000.

F. Provide required support and attachment in accordance with Section 260529.

G. Use manufacturer's recommended oil and coolant, suitable for the worst case ambient temperatures.

H. Provide natural gas piping in accordance with Section 231123.

I. Provide engine exhaust piping factory installed.
   1. Include piping expansion joints, piping insulation, thimble, condensation trap/drain, rain cap, hangers/supports, etc. as indicated or as required.
   2. Do not exceed manufacturer's maximum back pressure requirements.

J. Provide grounding and bonding in accordance with Section 260526.

K. Identify system wiring and components in accordance with Section 260553.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Provide services of a manufacturer's authorized representative to prepare and start systems and perform inspection and testing. Include manufacturer's detailed testing procedures and field reports with submittals.

C. Notify Owner and Architect at least two weeks prior to scheduled inspections and tests.

D. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.

E. Provide all equipment, tools, and supplies required to accomplish inspection and testing, including load bank and fuel.

F. Preliminary inspection and testing to include, at a minimum:
   1. Inspect each system component for damage and defects.
   2. Verify tightness of mechanical and electrical connections are according to manufacturer's recommended torque settings.
   3. Check for proper oil and coolant levels.

G. Prepare and start system in accordance with manufacturer's instructions.

H. Perform acceptance test in accordance with NFPA 110.

I. Inspection and testing to include, at a minimum:
   1. Verify compliance with starting and load acceptance requirements.
   2. Verify voltage and frequency; make required adjustments as necessary.
   3. Verify phase sequence.
   4. Verify control system operation, including safety shutdowns.
   5. Verify operation of auxiliary equipment and accessories (e.g. battery charger, heaters, etc.).
   6. Perform load tests in accordance with NFPA 110 (1.5 hour building load test followed by 2 hour full load test).

J. Provide field emissions testing where necessary for certification.

K. Sound Level Tests: Measure sound levels for compliance with specified requirements. Identify and report ambient noise conditions.

L. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.

M. Submit detailed reports indicating inspection and testing results and corrective actions taken.

3.04 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.05 CLOSEOUT ACTIVITIES

A. See Section 017800 - Closeout Submittals, for closeout submittals.

B. See Section 017900 - Demonstration and Training, for additional requirements.

C. Demonstration: Demonstrate proper operation of system to Owner, and correct deficiencies or make adjustments as directed.

D. Training: Train Owner's personnel on operation, adjustment, and maintenance of system.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
   2. Provide minimum of four hours of training.
   3. Instructor: Manufacturer's authorized representative.

E. After successful acceptance test and just prior to Substantial Completion, replace air, oil, and fuel filters.

3.06 PROTECTION

A. Protect installed engine generator system from subsequent construction operations.

3.07 MAINTENANCE

A. Provide to Owner at no extra cost, a separate maintenance contract for the service and maintenance of engine generator system for two years from date of Substantial Completion; Include a complete description of preventive maintenance, systematic examination, adjustment, inspection, and testing, with a detailed schedule.

B. Conduct site visit at least once every three months to perform inspection, testing, and preventive maintenance. Submit report to Owner indicating maintenance performed along with evaluations and recommendations.

C. Provide trouble call-back service upon notification by Owner:
   1. Provide on-site response within 4 hours of notification.
   2. Include allowance for call-back service during normal working hours at no extra cost to Owner.
   3. Owner will pay for call-back service outside of normal working hours on an hourly basis, based on actual time spent at site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.

D. Maintain an on-site log listing the date and time of each inspection and call-back visit, the condition of the system, nature of the trouble, correction performed, and parts replaced.

END OF SECTION

SECTION 263600
TRANSFER SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Transfer switches for low-voltage (600 V and less) applications and associated accessories:
   1. Automatic transfer switches.
   2. Includes service entrance rated transfer switches.
   3. Remote annunciators.
   4. Owner to furnish ATS. Contractor to install on equipment pad.

1.02 RELATED REQUIREMENTS

A. Section 260526 - Grounding and Bonding for Electrical Systems.

B. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

C. Section 262100 - Low-Voltage Electrical Service Entrance.

D. Section 263213 - Engine Generators: For interface with transfer switches.
   1. Includes related demonstration and training requirements.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.

C. NEMA ICS 10 Part 1 - Industrial Control and Systems Part 1: Electromechanical AC Transfer Switch Equipment; 2020.

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. NFPA 110 - Standard for Emergency and Standby Power Systems; 2025.

G. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

H. UL 1008 - Transfer Switch Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate compatibility of transfer switches to be installed with work provided under other sections or by others.
      a. Engine Generators: See Section 263213.
   2. Coordinate arrangement of equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   3. Coordinate the work with placement of supports, anchors, etc. required for mounting.
   4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Preinstallation Meeting: Convene one week before starting work of this section; require attendance of all affected installers.

C. Where work of this section involves interruption of existing electrical service, arrange service interruption with Owner.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal process.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product, including ratings, configurations, dimensions, finishes, weights, service condition requirements, and installed features.

C. Specimen Warranty: Submit sample of manufacturer's warranty.

D. Evidence of qualifications for installer.

E. Evidence of qualifications for maintenance contractor (if different entity from installer).

F. Source quality control test reports.

G. Manufacturer’s detailed field testing procedures.

H. Field quality control test reports.

I. Operation and Maintenance Data: Include detailed information on system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.
   1. Include contact information for entity that will be providing contract maintenance and trouble call-back service.

J. Executed Warranty: Submit documentation of final executed warranty completed in Owner's name and registered with manufacturer.

K. Maintenance contracts.

L. Project Record Documents: Record actual locations of system components, installed circuiting arrangements and routing, and final equipment settings.

1.06 QUALITY ASSURANCE

A. Comply with the following:
   1. NFPA 70 (National Electrical Code).
   2. NFPA 110 (Standard for Emergency and Standby Power Systems); meet requirements for Level 2 system.

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. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience with power transfer systems of similar size, type, and complexity; manufacturer's authorized installer.

E. Maintenance Contractor Qualifications: Same entity as installer or different entity with specified qualifications.
   1. Contract maintenance office located within 100 miles of project site.

F. 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 transfer switches in accordance with manufacturer's instructions.

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 instructions to avoid damage to transfer switch components, enclosure, and finish.

1.08 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY

A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

B. Provide minimum five year manufacturer warranty covering repair or replacement due to defective materials or workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Transfer Switches:
   1. ABB/GE: www.geindustrial.com/#sle.
   2. ASCO Power Technologies: www.ascopower.com/#sle.
   3. Eaton Corporation: www.eaton.com/#sle.

B. Products other than basis of design are subject to compliance with specified requirements and prior approval of Engineer. By using products other than basis of design, Contractor accepts responsibility for costs associated with any necessary modifications to related work, including any design fees.

C. Source Limitations: Furnish transfer switches and accessories produced by a single manufacturer and obtained from a single supplier.

2.02 TRANSFER SWITCHES

A. Provide complete power transfer system consisting of all required equipment, conduit, boxes, wiring, supports, accessories, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Applications:
   1. Utilize open transition transfer unless otherwise indicated or required.
   2. For transfer of highly inductive loads (e.g. large motors and transformers), utilize open transition transfer with in-phase monitor or delayed transition transfer.

D. Construction Type: Either "contactor type" (open contact) or "breaker type" (enclosed contact) transfer switches complying with specified requirements are acceptable.

E. Automatic Transfer Switch:
   1. Transfer Switch Type: Service entrance rated automatic transfer switch. NEMA 3R.
   2. Transition Configuration: Open-transition (no neutral position).
   3. Voltage: As indicated on the drawings.
   4. Ampere Rating: As indicated on the drawings.
   5. Neutral Configuration: Solid neutral (unswitched), except as indicated.
   6. Load Served: As indicated on the drawings.
   7. Primary Source: Utility.
   8. Alternate Source: As indicated on the drawings.

F. Comply with NEMA ICS 10 Part 1, and list and label as complying with UL 1008 for the classification of the intended application (e.g. emergency, optional standby).

G. Do not use double throw safety switches or other equipment not specifically designed for power transfer applications and listed as transfer switch equipment.

H. Load Classification: Classified for total system load (any combination of motor, electric discharge lamp, resistive, and tungsten lamp loads with tungsten lamp loads not exceeding 30 percent of the continuous current rating) unless otherwise indicated or required.

I. Switching Methods:
   1. Open Transition:
      a. Provide break-before-make transfer without a neutral position that is not connected to either source, and with interlocks to prevent simultaneous connection of the load to both sources.
      b. Where in-phase transfer is indicated, utilize in-phase monitor to initiate transfer when phase angle difference between sources is near zero to limit in-rush currents.
   2. Delayed Transition:
      a. Provide break-before-make transfer with programmable time delay in a neutral position not connected to either source, and with interlocks to prevent simultaneous connection of the load to both sources.
   3. Obtain control power for transfer operation from line side of source to which the load is to be transferred.

J. Service Conditions: Provide transfer switches suitable for continuous operation at indicated ratings under the service conditions at the installed location.

K. Enclosures:
   1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
      a. Outdoor Locations: Type 3R or Type 4.
   2. Provide lockable door(s) for outdoor locations.
   3. Finish: Manufacturer's standard unless otherwise indicated.

L. Short Circuit Current Rating:
   1. Withstand and Closing Rating: As listed on drawings.

M. Automatic Transfer Switches:
   1. Description: Transfer switches with automatically initiated transfer between sources; electrically operated and mechanically held.
   2. Control Functions:
      a. Automatic mode.
      b. Test Mode: Simulates failure of primary/normal source.
      c. Voltage and Frequency Sensing:
         1) Undervoltage sensing for each phase of primary/normal source; adjustable dropout/pickup settings.
         2) Undervoltage sensing for alternate/emergency source; adjustable dropout/pickup settings.
         3) Underfrequency sensing for alternate/emergency source; adjustable dropout/pickup settings.
      d. Outputs:
         1) Contacts for engine start/shutdown (except where direct generator communication interface is provided).
         2) Auxiliary contacts; one set(s) for each switch position.
      e. Adjustable Time Delays:
         1) Engine generator start time delay; delays engine start signal to override momentary primary/normal source failures.
         2) Transfer to alternate/emergency source time delay.
         3) Retransfer to primary/normal source time delay.
         4) Engine generator cooldown time delay; delays engine shutdown following retransfer to primary/normal source to permit generator to run unloaded for cooldown period.
      f. In-Phase Monitor (Open Transition Transfer Switches): Monitors phase angle difference between sources for initiating in-phase transfer.

g. Engine Exerciser: Provides programmable scheduled exercising of engine generator selectable with or without transfer to load; provides memory retention during power outage.

3. Status Indications:
   a. Connected to alternate/emergency source.
   b. Connected to primary/normal source.
   c. Alternate/emergency source available.
4. Other Features:
   a. Event log.
   b. Communications Capability: Compatible with system indicated. Provide all accessories necessary for proper interface.
   c. Remote monitoring capability via PC.
5. Automatic Sequence of Operations:
   a. Upon failure of primary/normal source for a programmable time period (engine generator start time delay), initiate starting of engine generator where applicable.
   b. When alternate/emergency source is available, transfer load to alternate/emergency source after programmable time delay.
   c. When primary/normal source has been restored, retransfer to primary/normal source after a programmable time delay. Bypass time delay if alternate/emergency source fails and primary/normal source is available.
   d. Where applicable, initiate shutdown of engine generator after programmable engine cooldown time delay.

N. Service Entrance Rated Transfer Switches:
1. Furnished with integral disconnecting and overcurrent protective device on the primary/normal source and with ground-fault protection where indicated.
2. Listed and labeled as suitable for use as service equipment according to UL 869A.

O. Remote Annunciators:
1. Remote Annunciator Mounting: Wall-mounted; Provide flush-mounted annunciator for finished areas and surface-mounted annunciator for non-finished areas unless otherwise indicated.
2. Transfer Switch Status Indications:
   a. Connected to alternate/emergency source.
   b. Connected to primary/normal source.
   c. Alternate/emergency source available.

P. Interface with Other Work:
1. Interface with engine generators as specified in Section 263213.

2.03 SOURCE QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Perform production tests on transfer switches at factory to verify operation and performance characteristics prior to shipment. Include certified test report with submittals.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that the ratings and configurations of transfer switches are consistent with the indicated requirements.

C. Verify that rough-ins for field connections are in the proper locations.

D. Verify that mounting surfaces are ready to receive transfer switches.

E. 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. Arrange equipment to provide minimum clearances and required maintenance access.

D. Install transfer switches plumb and level.

E. Unless otherwise indicated, mount floor-mounted transfer switches on properly sized 3 inch high concrete pad constructed in accordance with Section 033000.

F. Provide grounding and bonding in accordance with Section 260526.

G. Identify transfer switches and associated system wiring in accordance with Section 260553.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.

B. Provide services of a manufacturer's authorized representative to observe installation and assist in inspection and testing. Include manufacturer's detailed testing procedures and field reports with submittals.

C. Prepare and start system in accordance with manufacturer's instructions.

D. Automatic Transfer Switches:
   1. Inspect and test in accordance with NETA ATS, except Section 4.
   2. Perform inspections and tests listed in NETA ATS, Section 7.22.3. The insulation-resistance tests listed as optional are not required.

E. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.

F. Submit detailed reports indicating inspection and testing results and corrective actions taken.

3.04 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.05 CLOSEOUT ACTIVITIES

A. See Section 017800 - Closeout Submittals, for closeout submittals.

B. See Section 017900 - Demonstration and Training, for additional requirements.

C. Demonstration: Demonstrate proper operation of transfer switches to Owner, and correct deficiencies or make adjustments as directed.

D. Training: Train Owner's personnel on operation, adjustment, and maintenance of transfer switches.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
   2. Provide minimum of four hours of training.
   3. Instructor: Manufacturer's authorized representative.
   4. Location: At project site.

E. Coordinate with related generator demonstration and training as specified in Section 263213.

3.06 PROTECTION

A. Protect installed transfer switches from subsequent construction operations.

3.07 MAINTENANCE

A. Provide to Owner at no extra cost, a separate maintenance contract for the service and maintenance of transfer switches for two years from date of Substantial Completion; Include a complete description of preventive maintenance, systematic examination, adjustment, inspection, and testing, with a detailed schedule.

B. Conduct site visit at least once every three months to perform inspection, testing, and preventive maintenance. Submit report to Owner indicating maintenance performed along with evaluations and recommendations.

C. Provide trouble call-back service upon notification by Owner:
   1. Provide on-site response within 4 hours of notification.
   2. Include allowance for call-back service during normal working hours at no extra cost to Owner.
   3. Owner will pay for call-back service outside of normal working hours on an hourly basis, based on actual time spent at site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.

D. Maintain an on-site log listing the date and time of each inspection and call-back visit, the condition of the system, nature of the trouble, correction performed, and parts replaced.

END OF SECTION

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SECTION 265100
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 260529 - Hangers and Supports for Electrical Systems.

B. Section 260533.16 - Boxes for Electrical Systems.

C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

D. Section 260923 - Lighting Control Devices.

E. Section 262726 - 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; 2023.

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 013000 - 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 016000 - 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 017800 - 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 262726.
b. Daylighting Controls: See Section 260923.

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 016000 - 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 260533.16 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 260529.

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 260553.

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 014000 - 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 017800 - Closeout Submittals, for closeout submittals.

B. See Section 017900 - 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 271500
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 275313
GPS (PRIMEX) WIRELESS CLOCK SYSTEM

PART 1 GENERAL

1.01 GENERAL

A. Middle/High School:
   1. Provide additions and modifications to the existing system as indicated on plans.

1.02 SECTION INCLUDES

A. Clocks
   1. Analog (Lithium battery powered)

1.03 RELATED SECTIONS

A. Division 26 – Electrical (120 volt grounded outlet required for transmitter.)

1.04 REFERENCES

A. This Technical Specification and Associated Drawings

1.05 SYSTEM DESCRIPTION

A. The system shall synchronize all clocks to each other. The system shall utilize GPS technology to provide atomic time. The system shall not require hard wiring. Clocks shall automatically adjust for Daylight Savings Time.

B. Analog Clocks shall be synchronized to within 10 milliseconds 6 times per day, and the system shall have an internal oscillator that maintains plus or minus one second per day between synchronizations, so that clock accuracy shall not exceed plus or minus 0.2 seconds.

C. The system shall include an internal clock reference so that failure of the GPS signal shall not cause the clocks to fail in indicating time.

D. The system shall incorporate a “fail-safe” design so that failure of any component shall not cause failure of the system. Upon restoration of power or repair of failed component, the system shall resume normal operation without the need to reset the system or any component thereof.

E. Clock locations shall be as indicated, and clocks shall be fully portable, capable of being relocated at any time.

1.06 SUBMITTALS

A. Product Data: Submit complete catalog data for each component, describing physical characteristics and method of installation. Submit brochure showing available colors and finishes of clocks.

B. Operating License: Submit evidence of application for FCC Radio Station Authorization prior to installing equipment. Furnish the license or a copy of the application for the license, to the Owner/End User prior to operating the equipment. The original license must be delivered to the Owner/End User.

C. Samples: Submit one clock for approval. Approved sample shall be tagged and shall be installed in the work at location directed.

D. Manufacturer's Instructions: Submit complete installation, set-up and maintenance instructions.

E. Floor plans indicating the location of system transmitter(s), approved by manufacturer, will be submitted to owner prior to installation.

1.07 QUALITY ASSURANCE

A. Permits: Obtain operating license for the transmitter from the FCC.

B. Qualifications:

1. Manufacturer: Company specializing in manufacturing commercial time system products including 4 years experience producing GPS wireless time systems.
2. Installer: Company with documented experience in the installation of commercial time systems.

C. Prior to installation, a site survey must be performed to determine proper transmitter placement.

1.08 DELIVERY STORAGE AND HANDLING

A. Deliver all components to the site in the manufacturer's original packaging. Packaging shall contain manufacturer's name and address, product identification number, and other related information.

B. Store equipment in finished building, unopened containers until ready for installation.

1.09 PROJECT SITE CONDITIONS

A. Clocks shall not be installed until painting and other finish work in each room is complete.

B. Coordinate installation of GPS receiver for access to the roof or exterior side wall so that the bracket and related fasteners are watertight.

1.10 SYSTEM STARTUP

A. At completion of installation and prior to final acceptance, turn on the equipment; ensure that all equipment is operating properly, and that all clocks are functioning.

1.11 WARRANTY

A. Manufacturer will provide a 5 year warranty on GPS receiver and transmitter. All other components will have a 1 year warranty.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. GPS wireless clocks: Pyramid Wall Clock: Radio Freq, Arabic, Round, 13 1/4 in Overall Dia., 13 in Face Dia., Battery, Analog

B. Proposed substitutions, to be considered, shall be manufactured of equivalent materials that meet or exceed specified requirements of this Section.

C. Other systems requiring wiring and/or conduit between master and clocks will not be accepted.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that construction is complete in spaces to receive equipment and that rooms are clean and dry.

B. Verify that 120 volt electrical outlet is located within 6 feet (1.83m) of location of transmitter and the outlet is operational and properly grounded.

3.02 INSTALLATION

A. Analog clocks (Lithium battery): Perform the following operations with each clock:
1. Install batteries.
2. Set clock to correct time in accordance with manufacturer's instructions.
3. Observe analog clock until valid signals are received and analog clock adjusts itself to correct time.
4. Install the analog clock on the wall in the indicated location, plumb, level and tight against the wall. use suitable fasteners as approved by clock manufacturer.

B. Wire guards: Secure to wall, using approved theft-resistant fasteners.

3.03 ADJUSTING

A. Prior to final acceptance, inspect each clock, adjust as required, and replace parts which are found defective.

3.04 CLEANING

A. Prior to final acceptance, clean exposed surfaces of clocks, using cleaning methods recommended by clock manufacturer. Remove temporary labels from clock faces. Do not remove labels from backs of clocks.

3.05 DEMONSTRATION

A. Provide training to Owner's representative on setting and adjusting clocks, replacing batteries and routine maintenance.

3.06 PROTECTION

A. Protect finished installation until final acceptance of the project.

3.07 TESTING

A. All devices must be tested at their operational location under normal operational conditions to assure reception of signal.

END OF SECTION

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SECTION 283100.10
FIRE DETECTION AND ALARM

PART 1 GENERAL

1.01 SUMMARY

A. Provide materials and equipment necessary to complete modifications and additions to existing Fire Alarm System:
   1. Add new control devices and wiring.
   2. Add new audible/visual devices.
   3. Reuse existing control panel and add new modules, batteries, and expansion power supplies. Program system and test new devices for proper operation.

B. Conform to any and all local codes.

C. System Installer to provide proof of licensing under N Y S General Business Law.

D. Before proceeding with any testing, the contractor shall notify all persons and facilities who will receive an alarm, supervisory, or trouble signal shall be notified to prevent unnecessary response All building occupants shall also be notified. At the conclusion of testing, those previously notified shall be further notified that testing has been concluded.

1.02 SUBMITTALS

A. Shop Drawings Include the following:
   1. Bill of materials.
   2. Composite wiring and/or schematic diagrams of the complete system as proposed to be installed (standard diagrams will not be acceptable).
   3. Total electrical load of the complete system in supervisory and alarm conditions.
   4. Interconnection details between new and existing systems

B. Product Data:
   1. Manufacturer's catalog sheets, specifications and installation instructions.
   2. Name, address and telephone number of nearest fully equipped service organization.
   3. Company Field Advisor Data Include name, work address and telephone number of Company Field Advisor, secured for the required services. If requested, include certified statement from the Company listing the qualifications of the Company Field Advisor.

C. Test Reports:
   1. Existing fire alarm system test report.
   2. Final system test report.

D. Certificate Affidavit, signed by the Company Field Advisor and notarized, certifying that the system meets the contract requirements and is operating properly.

1.03 QUALITY ASSURANCE

A. The contractor shall provide qualified service personnel to provide the services specified:
   1. Individuals shall be factory trained on existing fire alarm control panel.
   2. Individuals must be qualified and experienced in the inspection, testing, and maintenance of fire alarm systems.

B. National Institute for Certification in Engineering Technologies (NICET) certification is required for all service personnel providing services under this contract. Copies of NICET certificates shall be supplied with the bid documents:
   1. NICET level 2 (Associate Engineering Technician) certification is required for technicians providing maintenance and testing services.
   2. NICET level 3 (Engineering Technician) certification is required for technicians providing general supervision of NICET level 2 technicians.

PART 2 PRODUCTS

2.01 FIRE ALARM CONTROL PANEL

A. Reuse existing fire alarm control panel:

2.02 PHOTOELECTRIC SMOKE DETECTORS

A. Provide photoelectric smoke detectors which are UL Listed for use with the existing control panel:

B. Smoke detectors to utilize drift compensation to minimize possibility of false alarm due to dirt accumulation:
   1. Smoke detectors to be compatible with both two and four wire detector bases.

C. Smoke detector to utilize common base with heat detector:
   1. All field wiring to terminate on detector base.

D. Provide steel wire guards where indicated on plans.

2.03 PHOTOELECTRIC DUCT SMOKE DETECTORS

A. Duct detector housing shall be two-wire style equipped with smoke detector as specified in 2.02.

B. Duct detector housing shall have clear cover allowing visual inspection.

C. Test ports shall be provided to allow Functional testing of duct detector without removing cover:
   1. Sampling tubes shall be of proper size for duct, per manufacturers recommendations.
   2. Provide remote indicating light with test switch for all duct detectors Simplex 4098-9834.

2.04 WIRING

A. Initiating Circuits & Magnetic Door Holders:
   1. One twisted pair #14 unshielded, plenum rated.

B. Audible Circuits:
   1. One twisted pair #12 unshielded, plenum rated.

C. Verify wiring types with equipment supplier and their approved shop drawings.

PART 3 EXECUTION

3.01 TESTING

A. System Pre-test:
   1. To ensure the existing fire alarm system is operating properly, a complete system test will be performed prior to any system modifications.
   2. Testing will be scheduled with minimum 24 hour notice, and will be witnessed by a representative of the school district (unless witness of test is declined by owner).
   3. Correction of any existing system deficiencies is not included in this contract and repairs will be performed on a time-and-material basis.

B. Completion Test:
   1. The entire fire alarm will be tested and certified upon completion of this project.
   2. Testing will be scheduled with minimum 24 hour notice, and will be witnessed by a representative of the school district (unless witness of test is declined by owner).

C. Control Equipment:
   1. All fire alarm control panel modifications to be performed by a factory trained and certified technician, currently.
   2. Employed by a manufacturer's authorized sales and service organization.

D. Contractor shall test all functions of the system in various alarm and trouble modes, including but not limited to:
   1. Open circuit conditions.

2. Grounds.
3. Power outage.
4. All tests shall be in accordance with the system manufacturer's instructions.
5. Remove fuse(s) and verify rating and supervision.
6. The integrity of single or multiple circuits providing interface between two or more control panels shall be verified. Interfaced equipment connections shall be tested by operating or simulating operation of the equipment being supervised. Signals required to be transmitted shall be verified at the control panel.
7. Lamps and LEDs shall be illuminated.
8. The primary (main) power supply shall be tested by disconnecting all secondary (standby) power. The primary (main) power supply shall be tested under maximum load, including all alarm appliances requiring simultaneous operation. All secondary (standby) power shall be reconnected at the end of test. For redundant power supplies, each shall be tested separately.

E. Initiating Devices:
   1. Smoke Detectors
      a. Test each detector in place and verify smoke entry into the sensing chamber and alarm response. Testing with smoke or listed aerosol acceptable to the manufacturer, or other means acceptable to the detector manufacturer shall be permitted as an acceptable test method.
      b. Verify that each detector is within its listed and marked sensitivity range by testing using either.
      c. A calibrated test method or the manufacturer's calibrated sensitivity test instrument or listed control equipment arranged for the purpose.
      d. Note: The detector sensitivity shall not be tested or measured using any spray device that administers an unmeasured concentration of aerosol into the detector
   2. Duct Detector
      a. All air duct detectors shall be tested and inspected to ensure the device will sample the air stream. The test shall be in accordance with the manufacturers instructions.

F. Alarm Notification Devices:
   1. Audible.
   2. Measure sound pressure level with sound level meter meeting ANSI S-1 4a, Sound Level Meters, Type 2 requirements. Measure and record levels throughout protected area.
   3. Visible.
   4. Test in accordance with manufacturer's instructions. Verify device locations are per approved layout and confirm that no floor plan changes affect the approved layout.
   5. Secondary(Standby) Power Supply.
   6. Disconnect all primary (main) power supplies and verify that required trouble indication for loss of primary power occurs. Measure or verify system's standby and alarm current demand and, using manufacturers data, verify whether batteries are adequate to meet standby and alarm requirements. Operate general alarm systems for a minimum of five (5) minutes. Reconnect primary (main) power supply at end of test.

G. Batteries:
   1. General Tests:
      a. Inspect batteries for corrosion or leakage. Check and ensure tightness of connections. If necessary, clean and coat the battery terminals or connections. Visually inspect electrolyte level in lead acid batteries.
      b. Batteries shall be replaced in accordance with the manufacturer's recommendations.
      c. With the battery charger disconnected, load test the batteries per the manufacturer's recommendations. The voltage level shall not fall below the levels specified. An artificial load equal to the full alarm load connected to the battery shall be permitted to be utilized in conducting this test.

2. Specific Tests:
    a. Sealed Lead-Acid Types.
    b. With the batteries fully charged and connected to the charger, verify the batteries are within the tolerance specified by the manufacturer.
    c. Under load, the float voltage shall not fall below 2 05 volts per cell.

H. Interfaced Equipment:
1. Interfaced equipment connections shall be tested by operating or simulating the equipment being supervised. Signals required to be transmitted shall be verified at the control panel. Test frequency for the interfaced equipment shall be the same as the frequency required by the applicable NFPA standard(s) for the equipment being supervised.

I. Special Procedures:
1. Alarm Verification verify time delay and alarm response for smoke detector circuits identified as having alarm verification.
2. Documentation.
3. The contractor shall maintain and provide to the owner's representative with documentation of all inspections, testing, and maintenance performed on the system. The documentation shall be in accordance with NFPA 72 chapter 7 section 7-5 The NFPA "Inspection and Testing Form" shall be used to document all contractor system inspection, testing and maintenance activities. Documentation shall be a computer generated printout listing all fire alarm devices with locations and a pass/fail indication Hand written documentation will not be acceptable.
4. Copies of manufacturer's recommendations used. For testing and maintenance shall be provided to the owner and maintained on site.

3.02 INSPECTION

A. The contractor shall perform visual inspections of the system and connected devices in accordance with NFPA.

B. 72 chapter 7 Table 7-2 2. The contractor shall ensure visually that there are no adverse changes that may affect the system performance.

3.03 WIRING

A. All wiring to be concealed in building construction, above layer ceilings or in raceway system.

B. Wiring to all equipment and devices shall be per system supplier's recommendations.

3.04 EQUIPMENT AND DEVICES

A. Install as recommended by system supplier and in accord with published installation data.

3.05 FAN SHUTDOWN

A. Provide control wiring required for fan shutdown at mechanical units indicated on Equipment Connection Schedule and closing of Fire/Smoke dampers; coordinate with Contractor responsible for Mechanical Work.

B. Provide all contacts/relays required to accommodate both closing of Fire/Smoke dampers and shutdown of mechanical units indicated on Equipment Connection Schedule. Fully coordinate requirements with Contractor responsible for Mechanical Work.

C. Ventilation Unit Shutdown Control:
1. Provide shutdown control through main control unit.
2. Control package within main control unit shall include electrically operated, mechanically held relays, drill-fan shutdown bypass switch, time operated fan reset switch, fan bypass lamp and buzzer, and necessary contacts and wiring.
3. Upon activation of alarm, the “shutdown” relay will become energized.

4. Upon restoration of fire alarm system, the fan reset switch, when operated, will de-energize the “shutdown” relay.

END OF SECTION

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SECTION 310000
EARTHWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Underground utilities
B. Excavation
C. Dewatering
D. Placing engineering fabric
E. Placing fill and backfill
F. Placing fill to support structures
G. Compaction
H. Rough grading
I. Subgrade surface for walks and pavement
J. Finish grading
K. Maintenance and restoration
L. Disposal of excess and unstable materials
M. Field quality control
N. Protection

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 32 1216 - Asphalt Paving
B. Section 03 3001 - Concrete Sidewalks, Crubs and Exterior Concrete Flatwork
C. 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.
    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.
        c. Boulders of any size.
        d. 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 the General Conditions 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. Engineering 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 7000.

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. 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. 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).

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 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.

3.04 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. Pavement: Excavate to subgrade surface elevation as indicated on the drawings.

F. 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.

G. Notify the Owner's Representative upon completion of excavation operations. Do not proceed with the work until the excavation is inspected and approved.

H. 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.

3.05 DEWATERING

A. 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.

B. Prevent surface and subsurface water from flowing into excavations and trenches and from flooding the site and surrounding area.

C. 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.

D. 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.

E. Provide temporary controls to restrict the velocity of discharged water as necessary to prevent erosion and siltation of receiving areas.

3.06 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.

3.07 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.

3.08 PLACING FILL AND BACKFILL

A. 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.

B. 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.

C. 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.

D. 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.

3.09 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. Pavements and Walks: 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.

3.10 ROUGH GRADING

A. 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.

3.11 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.

3.12 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. 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.
   2. 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.

3.13 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.

3.14 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.

3.15 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. 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.
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.

3.16 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

SECTION 321216
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 - Earthwork

1.03 SUBMITTALS

A. Comply with the requirements of the General Conditions 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 7800.

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. Aggregate Base: Comply with the New York State Department of Transportation Standard Specification, Section 304, Paragraph 304-2, as modified in Section 31 0000 - Earthwork.

B. 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 7 Topcourse.

Sieve Size	Sieve Size (mm)	General Limits	Job Limit Tol. %
½"	12.5	100	-
¼"	6.3	90 - 100	-
No. 6 Sieve	3.2	45–70	+/-6
No. 20 Sieve	.850	15 –40	+/-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 - 8.0%.
   b. The mixing and placement temperature range shall be 120 - 165 degrees C.

C. 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.

D. 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, 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. Aggregate Base Course: Comply with the requirements of the New York State Department of Transportation Standard Specification, Section 304-3, for aggregate gradations specified, unless otherwise indicated.

B. 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.

C. 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.

D. 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.

E. 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