Kensico Waterfowl and Lab Building Re-Development
STORMWATER POLLUTION PREVENTION PLAN

Prepared For:

NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION
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LIST OF ACRONYMS

CAMP	Community Air Monitoring Plan
cfs	cubic feet per second
CIP	Cast Iron Pipe
CPESC	Certified Professional in Erosion and Sediment Control
cy	cubic yard
DIP	Ductile Iron Pipe
fps	feet per second
HASP	Health and Safety Plan
HSG	Hydrologic Soil Groups
NOI	Notice of Intent
NYCDEP	New York City Department of Environmental Protection
NYSDEC	New York State Department of Environmental Conservation
RCP	Reinforced Concrete Pipe
SCS	Soil Conservation Service
SPDES	State Pollutant Discharge Elimination System
SWPPP	Stormwater Pollution Prevention Plan
USGS	United States Geological Survey

SECTION 1

INTRODUCTION

1.1 BACKGROUND

The planned project involves two (2) major Phases, 1) Rehabilitation of an existing Laboratory Building and associated parking and 2) Re-development of an existing Water-Fowl Management Building, walkway and site pavement.

More than 90% of New York City's water supply is from upstate Catskill and Delaware Aqueducts. The Catskill and Delaware Aqueducts currently convey water by gravity from these upstate watersheds to Kensico Reservoir. The Kensico Reservoir and NYCDEP Campus is one of the last stops for water flowing from upstate reservoirs and it plays a critical role in delivering high quality drinking water to consumers in New York City.

Built in Valhalla in 1955, the Kensico Laboratory once served as a water quality laboratory for the Kensico Reservoir. Left vacant in the fall of 2015. For a newer facility 4 miles away.

The management of water-bird populations at key reservoirs throughout the New York City Water Supply is essential to meet stringent water quality regulations, as stated in the Environmental Protection Agency's (USEPA) Surface Water Treatment Rule (SWTR) (USEPA 1989). As a result, the New York City Department of Environmental Protection (DEP) developed and implemented a comprehensive Watershed Protection Program to protect its water supply and as a requirement of Filtration Avoidance Determinations (FAD) received from USEPA and New York State Department of Health (NYSDOH).

The objective of the bird management program is to minimize the fecal coliform loading to the reservoirs that result from roosting birds during the migratory season. The Waterfowl Management Program was originally developed in 1992 for the Kensico Reservoir in response to elevated coliform bacteria levels contained in the reservoir. The 2002 Filtration Avoidance Determination required that the City continue this program for the Kensico Reservoir on a routine basis.

The Waterfowl Management Program at the Kensico Reservoir is currently operated out of a double wide trailer. The trailer is set to be replaced by a permanent structure. In addition to the new waterfowl management program building, the vacant laboratory building will receive a renovation and the site's pavement will undergo a full depth replacement. This SWPPP is to serve as the plan for that development and site work.

1.2 SITE DATA

Operators:	New York City Department of Environmental Protection
Project Title:	Kensico Waterfowl and Lab Building Re-Development

Project Coordinates: N 41.086

E -73.775

1.3 OBJECTIVES

This SWPPP was developed pursuant to the New York State Department of Environmental Conservation (NYSDEC) State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activities, Permit No. GP-0-20-001 (NYSDEC, 2020) and the NYSDEC New York State Standards and Specifications for Erosion and Sediment Control (NYSDEC, 2016), and includes the following objectives:

- The reduction or elimination of erosion and/or sediment loading to Kensico Reservoir due to construction activities associated with the WFM and Laboratory buildings.
- The identification and control of potential sources of sediment from stormwater runoff that may affect water quantity and quality.
- The identification of stormwater/erosion control features and procedures for implementing these features.

This SWPPP will be amended if and when:

- The provisions of this SWPPP are proven inadequate in reducing sediments in stormwater discharges during the construction phase.
- There is a change in the design, construction or operation that could potentially affect stormwater discharge quality and quantity.
- Deficiencies are identified by a qualified inspector or regulatory agency.

If deficiencies are identified by NYSDEC, the SWPPP will be updated and written notification of such updates will be submitted to the Department within fourteen calendar days.

1.4 GENERAL PROJECT DESCRIPTION

Existing Conditions:

The Project Site (Section 117.11-Block 3-Lot 1) is located in Valhalla, NY. The Project Site consists of a laboratory building, a waterfowl management trailer as well as access roads and associated parking. The Project Site encompasses an approximately 30.2 acres.

The Project Site is bordered by West Lake Drive. The proposed approximately 3,000 sq. ft Waterfowl Management Program building and boat wash in the vicinity of Shaft 18 on the west shore of Kensico Reservoir in Valhalla, New York. The building will be at-grade with no basement, with a lowest floor at El. 364 (+/- 0.5 ft). A porch is planned along the east side of the building with stairs stepping down to about El. 361. An approximately 600 sq. ft boat wash area is planned within the bump-out off the west side of the proposed building. The occupied interior space will be primarily used as office-space for NYCDEP personnel and/or subcontractors to the NYCDEP. The new

Waterfowl management building will be located in a grassed area that slopes down to the Kensico Reservoir, over 100 ft away. The area is currently occupied by a double wide trailer with access platform. The ground surface at the proposed building ranges from about El. 361 to El. 364.5. There is a gravel road boat ramp between the existing trailer and the Kensico Reservoir. The normal reservoir level is between El. 355 and El. 357, with a typical minimum level of El. 352. Shaft 18 (a major effluent structure connecting two aqueducts) is located about 160 ft to the south of the proposed Waterfowl building. The laboratory renovation will occur in the same footprint as the existing lab building. Refer to Figure 1-1 for overall site location and Figure 1-2 for project location(s)

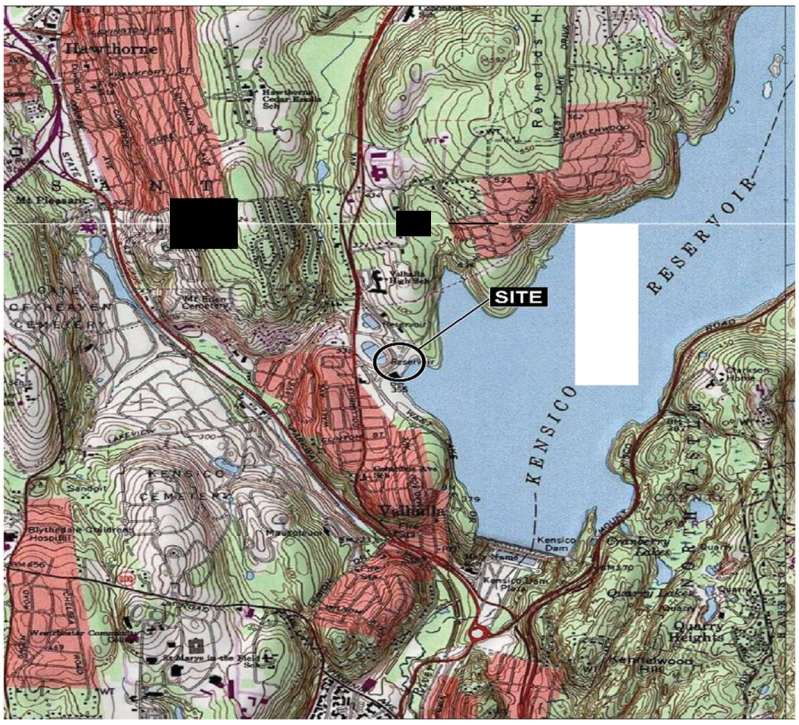


Figure 1-1 - Site Location Map

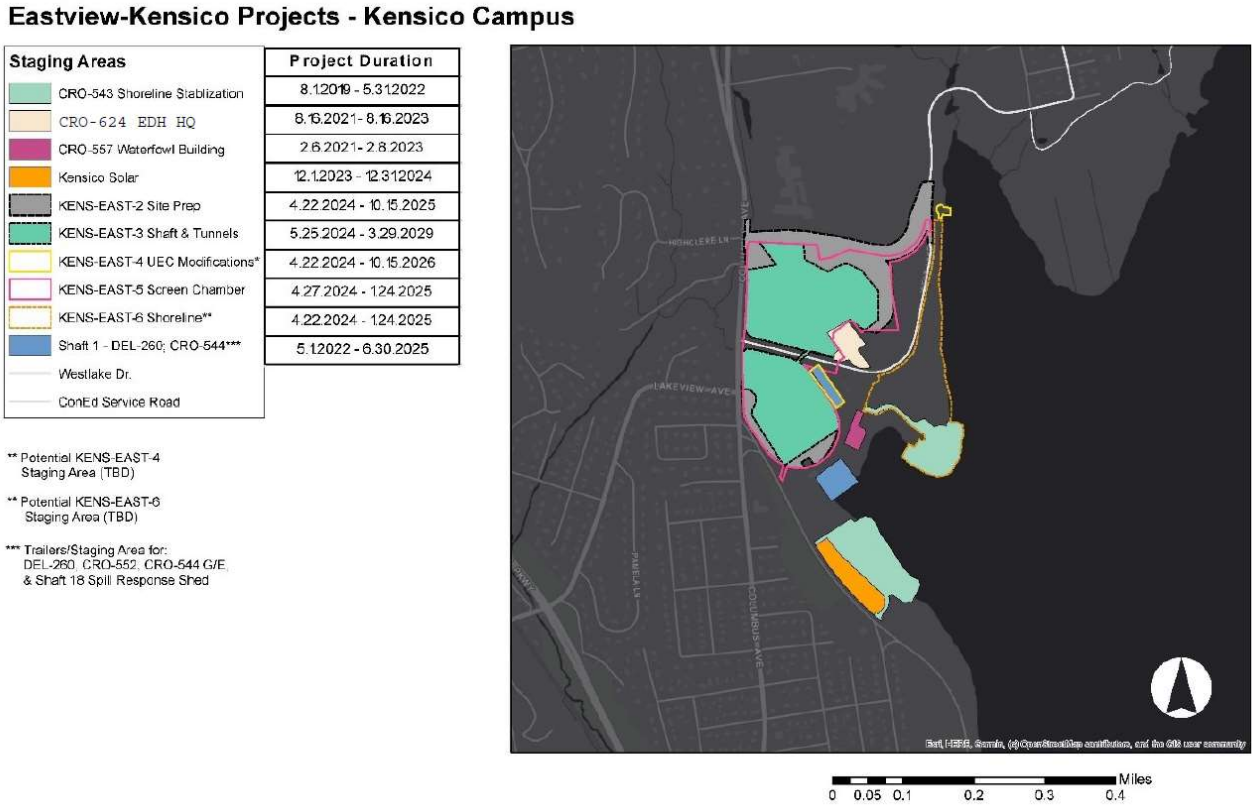


Figure 1-2 - Project Location Map

Developed Conditions:

The goal for this project is to maintain the current operations while expanding the Waterfowl Management capabilities, updating the lab and re-pave most of the site. This project includes, but is not limited to the following:

- Constructing an approximately 3,000 sq. ft Waterfowl Management Program building with boat wash area, oil-water separator and elevated rear porch to replace an already developed site operations trailer and appurtenances.

- Fully renovating the existing lab building. The basement will also receive waterproofing and perimeter drain to mitigate water intrusion; The exterior site of the building will also undergo some renovation. DEP intends to provide 35 parking spaces for employees and visitors, and site landscaping has to be investigated and designed by a Landscape Architect.

- Most of site will receive a full depth asphalt pavement replacement.

- The site is considered a two-phased redevelopment. The lab phase has a slight decrease in the proposed impervious cover while the water-fowl phase has a slight increase in proposed impervious cover but overall there is a decrease in impervious area.

1.5 COORDINATION WITH OTHER PROJECTS

This SWPPP addresses on-land activities in areas within the project limits that will be disturbed and will receive precipitation with the potential for generating stormwater runoff.

This project will also require design coordination and collaboration with the designers and contractors of the Kensico Eastview Connection (KEC) design project which will take place on site within the next few years. That project will total re-configure the onsite utilities as well as re-aligning the access roadway. Figure 1-3 depicts the location for the Kensico Eastview Connection (KEC) Project that would provide a second means of conveying water from the Kensico Reservoir to the Catskill/Delaware Ultraviolet Disinfection (CDUV) Facility in Eastview. The KEC Project is in the Town of Mount Pleasant and is comprised of the following components: Modifications to the Catskill Upper Effluent Chamber (UEC); Connecting Tunnels at the KEC Screen; Chamber and Dike Grade Tunnel Modifications; KEC Screen Chamber and Kensico Site Development; KEC Downtake Shaft; KEC Tunnel; Eastview Connection Chamber and Site Development.

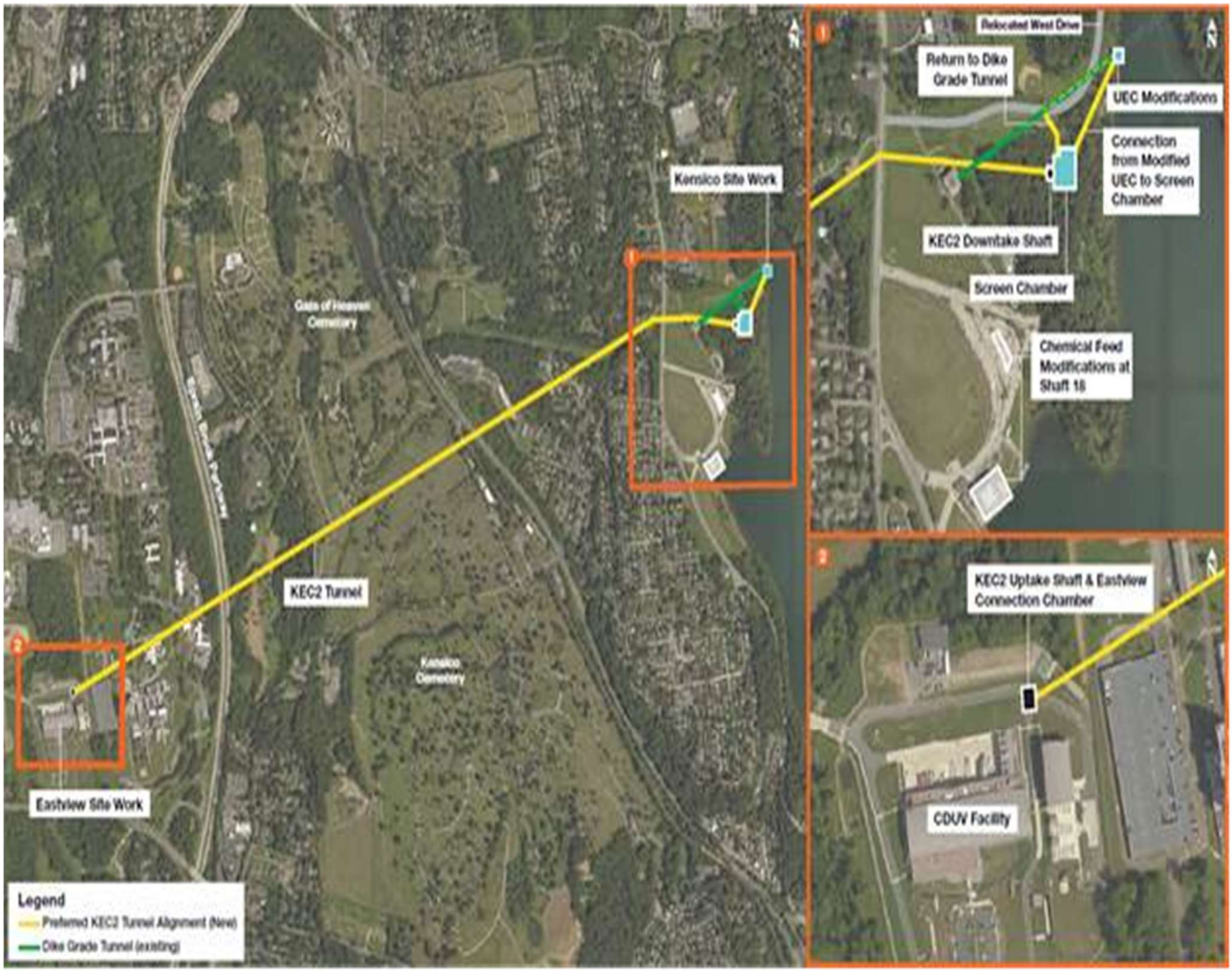


Figure 1-3 - KEC Concept Plan

SECTION 2

EXISTING SITE CONDITIONS

2.1 TOPOGRAPHY

The project site is generally flat and varies in elevation from about El. 361 to El. 364.5. A review of the USDA Natural Resources Conservation Service (NRCS) indicates that the Kensico site is classified as Udorthents, smoothed, 3 to 15 percent slopes (Map Unit: Ub)". The hydrologic soil group for the south parcel is generally classified as "Group B". Refer to Appendix B for Soil and Stormwater Maps.

2.2 SUBSURFACE INVESTIGATIONS CONDITIONS

General

The geotechnical subsurface investigation consisted of performing five (5) (B-1 to B-5) soil borings. Refer to Reference R-1 for a Geotechnical Report.

Subsurface explorations revealed the following materials at the site, described below in order of increasing depth below ground surface:

Stratum 1: TOPSOIL– Loose loamy silt and sand, with roots and root fibers.

Stratum 2: FILL – Loose to medium dense brown silty SAND, occasional gravel, root fibers and wood fragments. Stratum contains pavement base materials (typical 11 in. thick concrete pavement over roughly 6 in. thickness of brown well-graded sand and gravel) in existing paved areas.

Stratum 3: GLACIAL OUTWASH – Loose to medium dense gray-brown silty SAND with occasional gravel. Stratum becomes denser at about 30 ft depth.

Stratum 4: GLACIAL TILL – Medium dense to dense gray brown silty SAND with gravel. Stratum likely contains cobbles and boulders.

Groundwater

Groundwater level was El. 358.0 one day after installation of the observation well at B5-OW, which corresponds to 6.5 ft below ground surface in that area. Groundwater was encountered in the borings at the proposed waterfowl building at about El. 354 to 358, 6 to 10 ft below ground surface, during drilling. These levels may not have stabilized. We anticipate normal groundwater level will be within a couple feet of the reservoir surface, thus about El. 355 to 357. Groundwater levels will fluctuate with season, precipitation, nearby reservoir water levels, leakage into or out of utilities, and nearby construction activity.

2.3 DRAINAGE SYSTEM

The existing site drains through a connected network of inlets, manholes and pipes. The surface topography consists of shallow slopes, which direct water to sheet flow into nearby inlets and enter a major storm conveyance system running in the middle of the site to the abandoned aerator basin. There are a total of seven outfalls from the site, see the proposed drainage area map for proposed drainage areas and their outfalls.

2.4 ARCHEOLOGICAL SENSITIVE AREAS AND HISTORIC PLACES

In accordance with the parameters for a NYSDEC SPDES General Permit, construction activities were reviewed to ensure they do not occur within the an archeologically sensitive area. The closest Historic District is the site itself; The Kensico Reservoir Campus is located along Westlake Drive between Columbus Ave and the Kensico Reservoir in the Hamlet of Valhalla, Town of Mount Pleasant, Westchester County, with no other designated sites located within a 2000’ radius. This district of six contributing buildings is directly associated with the operations of the reservoir and is part of the Catskill Aqueduct and Delaware Aqueduct systems. The district is eligible under Criterion A in the area of Engineering and Community Planning and Development, as well as Criterion C in the area of Architecture. The buildings within this district encompass a 40-year period of construction and are predominantly in the Renaissance Revival style. The period of significance extends from 1915 to 1969 and the district has integrity of location, setting, materials, workmanship, feeling, and association.

1. The Catskill Aqueduct
2. Lower Effluent Chamber, the
3. Upper Effluent Chamber, and the
4. Screen Chamber building.
5. The Fluoride Building (1943)
6. Kensico Laboratory (1955)
7. Kensico Aerator # 1 (the Catskill Aerator, construction date unknown, 2.5 acres)
8. Kensico Aerator #2 (Delaware Aerator, 1940-42, 4.2 acres),

9. Delaware Shaft No. 18 Building

Appendix C shows the Site location in the context of nearby archeological sensitive districts and historic properties.

2.5 POTENTIAL SOURCES OF POLLUTION

Potentials sources of sediment to stormwater runoff:

- Installation of site structures (soil disturbance and stockpiling, dust, equipment tracking)
- Construction of the access roads and parking area (dust, equipment tracking)
- Installation of stormwater pond and swales (excavation, soil disturbance and stockpiling, dust, equipment tracking)
- Open trench installation of site utilities (soil disturbance and stockpiling, dust, equipment tracking)
- Soil compaction activities (equipment tracking and dust)
- Equipment staging (tracking of sediment)
- Soil stockpiles (dust, sediment)

Potential pollutants and sources, other than sediment, to stormwater runoff include:

- The introduction of fluids from equipment and construction vehicles to the site. Tools and equipment requiring washing shall be washed in a designated washout location that is appropriately constructed to prevent pollutants from exiting the site or entering the stormwater system. All debris resulting from washouts shall be removed and properly disposed. Potential wastes and products that may be stored on-site include grubbing wastes, packaging materials, building materials, paints and thinners, cleaning solvents, pesticides, petroleum products, and fertilizers. Fluids shall be stored within a lined, bermed location per prevailing Federal, State, and Local regulations.

- The introduction of concrete and asphalt, to the site. Therefore, proper precautions (installation of designated concrete wash-out areas) will be taken to prevent transfer of these pollutants offsite. The best management practices outlined in Section(s) 4 and 5 should be sufficient to prevent typical construction and development wastes from impacting stormwater quality.

- Fertilizers utilized in planting medium may introduce other pollutant sources. **Only non-phosphorus fertilizers shall be used at suggested manufacturer's application rates.**

SECTION 3

PROPOSED SITE WORK

3.1 POST DEVELOPMENT CONDITIONS

Site features including but not limited to pavement, parking upgrades, fences, and landscaping will be updated generally within the same locations.

The former Kensico Laboratory will undergo a complete renovation of the interior, including demolition of non-structural walls and construction of new office spaces on both floors. The garage located on the first floor will remain as a storage area but will have its HVAC system updated to provide climate control capabilities. Renovation work of the exterior façade and roof are also necessary in areas that have experienced deterioration caused by water intrusion and aging. Additional considerations will be made for the landscaping surrounding the building. And reconfigured parking that will reduce the number of parking spaces designated for the building.

In addition, a new Waterfowl Management Building and boat wash station will replace the existing operations trailer. The siting and configuration of the Waterfowl Management Program building, and boat wash station considered several variables, including Water Quality Concerns and the Protection of the water quality of Kensico Reservoir during the construction and operation of the Waterfowl Management Program building is of paramount consideration for its siting. The further west the facility is sited, the lower the risk of potential water quality issues associated with construction. Providing sufficient separation between the structures and the reservoir, to allow siting of erosion and sediment controls and such as diversion dike/swale and sediment trap as well as post-construction stormwater management facilities (grass lined swale, oil/water separator, hydrodynamic separator, and detention system), is necessary. The overall proposed impervious area is being reduced by the inclusion of 6292 SF of porous pavers.

3.2 SITE WORK

The following summarizes the major construction activities planned and the anticipated sequence of operation. Mobilization, construction, and restoration may be occurring concurrently. Maintenance and inspection of erosion and sediment control elements will be ongoing during these phases; refer to Appendix E for anticipated erosion and sediment control measures for on-land activities.

<u>Mobilization and Site Preparation</u>

- Installation of temporary stormwater runoff and erosion and sediment control measures
- Site security
- Survey
- Stabilized construction entrances
- Site clearing

- Relocation of existing site features and project trailers

Site Construction

- Construction of drainage and utilities
- Construction of all site features
- Full depth asphalt replacement

Restoration Phase

- Seeding and mulch
- Planting of various restoration zones, according to the restoration design.

Demobilization

- Removal of temporary facilities
- Removal of stormwater, erosion and sediment controls

3.3 MANAGEMENT OF MATERIALS

The associated stockpiles will be covered as required to reduce construction water generation during periods of precipitation. The cover will be weighed down with sand bags to help prevent wind from shifting it.

Temporary staging areas for imported borrow materials will be bermed around the perimeter. If the stabilization material is procured as loose material, temporary staging away from the reservoir will be incorporated, to minimize contact with stormwater.

3.4 CONSTRUCTION PHASING AND SEQUENCING

The anticipated phasing/sequencing is noted in Appendix F.

SECTION 4

EROSION AND SEDIMENT CONTROL MEASURES

4.1 GENERAL

The erosion and sediment control measures described in this plan conform to the latest version of the NYSDEC New York State Standards and Specifications for Erosion and Sediment Control (NYSDEC, 2016).

A qualified inspector will inspect the erosion and sediment control measures and disturbed areas of the site for compliance with this SWPPP. A typical Construction Site Inspection and Maintenance Log Book is included in Appendix G.

4.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

Temporary erosion and sedimentation controls will be installed prior to disturbance of areas to mitigate the potential for offsite erosion and sedimentation. These controls are a dynamic project element, requiring modification as the construction needs alter over time.

Locations for initial erosion and sedimentation control features are indicated on Drawings C101.00 and C102.00 in Appendix E. The initial locations will be adapted as necessary, depending on actual field conditions. Design details for each erosion and sediment control features are included in Appendix E.

4.2.1 Stabilization Practices

Temporary soil stabilization using topsoil, seed, mulch, and/or other approved methods will be implemented for bare soil areas left in rough grade condition if exposure over extended periods of time is anticipated. For portions of the site where soil disturbance activities have temporarily or permanently ceased, stabilization measures will be implemented within 7 days of the conclusion of activities. This requirement does not apply if the installation of stabilization measures is precluded by snow cover or frozen ground conditions; however, measures will be implemented as soon as practicable.

4.2.2 Control of Surface Runoff from Disturbed Areas

Silt fence will be installed to intercept sediment-laden runoff along the down-slope perimeter of disturbed site areas during construction. Conventional silt fencing will also be installed along the downstream side of roadways and staging areas as depicted in Appendix E.

The geotextile filter fabric fence requires periodic maintenance and will be checked for tears or clogging with silt or debris as part of weekly site inspections. Silt will be removed from the woven filter cloth with a stiff brush if clogging occurs. Strawbale sediment barriers will only be used when the lengths of the protected slope do not exceed the limits described in the specifications. Strawbales will be repaired and/or replaced.

Silt fence and/or strawbale sediment barriers will remain in place until permanent vegetation is established over disturbed areas. Following establishment of vegetation, silt fence and strawbales will be removed.

4.2.3 Diversion of Runoff to Disturbed Areas

Perimeter silt fences and straw bale dikes will be installed as required to prevent run-on into disturbed areas. Grades will promote positive drainage and runoff will discharge to a stabilized outlet. Weekly inspection and maintenance of the dike/swale will occur, and after each rain event at a minimum.

4.2.4 Catch Basin Inlet Protection

Catch basin inlet protection will be installed around the catch basins located within or immediately adjacent to the limit of work. This is a temporary installation and will be installed prior to any construction taking place upgradient or immediately adjacent to existing or proposed catch basins. Catch basin inlet protection is to prevent sediment laden water from entering a catch basin inlet.

4.2.5 Equipment and Laydown Areas

Designated staging areas shall be utilized for storage of all equipment on-site throughout the course of construction. These areas shall be located away from waterways and sensitive areas. Foam berms will be utilized around the equipment lay down areas. These berms will be adhered to impervious surfaces or pinned into pervious surfaces to create a containment area for spills.

Berms will be resistant to oils, coolants, and most chemicals. Upon discovery, all contained spills or leaks from the equipment lay down area must be cleaned up and reported to both the Owner and the NYSDEC, if required, in accordance with applicable State and Federal regulations. Refer to Appendix F.

4.2.6 Temporary Stockpile Areas

Temporary stockpile areas shall be surrounded by silt fence as necessary to prevent sedimentation of material onto adjacent property. Stockpiles shall not be located adjacent to a waterway, and shall not remain exposed for greater than 7 days unless they are to be utilized or moved within 21 days of last exposure or use. Side slopes of 1:4 shall be constructed.

4.2.7 Stabilized Construction Entrances

Stabilized construction entrances areas will be maintained to help prevent mud, dirt, and rocks from being tracked onto roadways. Mud or sediment deposited on paved roadways will be removed as necessary. Stabilized construction entrances will be present where site traffic enters public roads. Preliminary locations are indicated in Appendix E and will include stabilization geotextile below a minimum of 6 in. matrix of 1-in. to 4-in. stone. Periodic top dressing with additional aggregate may be required. Staging/laydown areas for vehicles and construction equipment will also be located on stabilized portions of the site.

The stabilized construction entrances shall be monitored as part of the periodic inspection.

4.2.8 Concrete Washout

Concrete washouts shall be used to wash any concrete, asphalt, or other pollutant off of vehicles and equipment. This area shall be designed per EPA standards and should not be placed within 50 feet of storm drains, open ditches, or waterbodies. The washout shall be constructed in a location that allows convenient access for concrete trucks. These areas should be far enough away from other construction traffic to reduce the likelihood of accidental damage and spills.

4.2.9 Dewatering

Any water pumped from subsurface construction and excavated areas must be free of sediment, chemicals, and other forms contamination prior to discharge. Discharges shall be conveyed to a contained, stabilized area or device where sediment and other contaminants (if present) may be captured. Discharges shall be conveyed to grassed areas and away from catch basins and other stormwater conveyances to the maximum extent practicable, in a non-erosive manner. Filter bags/sediment bags or other filter/storage systems shall be utilized during dewatering activities.

The Contractor is responsible for procuring any required permits prior to dewatering.

4.2.10 Protecting Vegetation during Construction

Protection of vegetation during construction will include protection of existing trees, shrubs, ground cover and other vegetation from damage by construction equipment. This will be by way of standard tree protection detail or installing orange warning fence to caution against encroachment. Both tree protection detail and warning fence is a temporary control device, and will require removal following site stabilization.

4.2.11 Seeding

All disturbed areas that will be left bare for more than one week (7 days) as determined by the schedule will be seeded and mulched in accordance with NYSDEC standards and specifications.

4.2.12 Mulching

Mulching will be used on soils subject to erosion and on areas of new seeding. Mulch is to be applied after site preparation, soil amendments and planting is accomplished.

4.2.13 Soil Restoration

Soil restoration shall be conducted on all areas of the site where soils have been disturbed, including equipment and stockpile areas. Soil restoration is applied in the cleanup, restoration, and landscaping phase of construction and is followed by permanent establishment of vegetation. After the disturbed soils are rough graded, the sub soils must be tilled, layered with topsoil, and vegetated in accordance with the New York State Stormwater Design Manual, January 2015 and the contract documents.

4.2.14 Additional Stormwater Controls

Additional controls and measures that will be implemented at the site include the following:

- Precautions will be taken to prevent spills onto public thoroughfares (e.g., leaking hydraulic lines, fuel leaks) so that they do not enter surface and subsurface drainage systems.
- Dust control measures will be provided to reduce the potential for dust migration. Measures may include water application or mulching, but will not include the use of chemical additives.

- Solid waste disposal dumpsters and containers will be covered and emptied regularly. Solid waste will be disposed of in accordance with local, state, and/or federal regulations.
- Portable toilets will be installed, secured in place and cleaned regularly, with proper disposal of waste. Such facilities will be leak and tip proof.
- Building materials will be properly stored and contained on-site with fuels in appropriate secondary containment.
- Good housekeeping is essential to reducing the risk of contaminating runoff waters during every stage of construction. The Owner or Owner's representative will ensure that employees are trained in good housekeeping practices as they pertain to the implementation of this SWPPP.

4.3 PERMANENT EROSION CONTROL

Temporary erosion and sediment controls will remain in place until vegetation is established over the restored areas. Permanent erosion controls will be installed throughout the projects using seeding and planting of finished surfaces.

4.4 FINAL STABILIZATION

Permanent seeding will be applied immediately after the final design grades are achieved on portions of the site but no later than 7 days after construction activities have permanently ceased. After the entire site is stabilized, any sediment that has accumulated will be removed and hauled off-site for disposal at an approved facility. Construction debris, trash and temporary BMPs (including silt fences, material storage areas, sanitary toilets, and inlet protection) will also be removed and any areas disturbed during removal will be seeded immediately.

4.4.1 Seedbed Preparation

a. In areas where disturbance results in subsoil being the final grade surface, topsoil will be spread over the finished area per specifications.
b. The seedbed will be free of large clods, rocks, woody debris and other objectionable materials.
c. Fertilizer and lime will be applied to the seedbed according to the manufacturer's recommendations or soil tests.
d. The top layer of soil will be loosened to a depth of 3–5 inches by raking, tilling, disking or other suitable means, or per specifications.

4.4.2 Grass Selection/Application

a. Surface areas at the site will be stabilized with grass as noted in specifications.
b. Seed will be applied uniformly based on specifications

4.5 INSPECTION AND MAINTENANCE REQUIREMENTS

4.5.1 Owner Requirements

Erosion and sediment control and stormwater management practices identified in the SWPPP will be inspected and maintained in effective operating condition. Inspections will be carried out by a qualified inspector. If soil disturbance activities are temporarily suspended and temporary stabilization measures have been applied to disturbed areas, the inspections may be stopped and begin once soil disturbance activities resume.

If soil disturbance activities have been shut down with partial project completion, maintenance inspections may be stopped if areas disturbed as of the project shutdown date have achieved final stabilization and post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational.

4.5.2 Implementation Plan

Table 4-1 on Page 4-6 provides a summary of erosion and sedimentation control implementation.

4.5.3 Maintenance Measures

Table 4-2 on Page 4-7 provides a summary of erosion and sedimentation control maintenance measures.

Table 4-1: Erosion and Sediment Control Implementation Plan			
Practice	**Duration**	**Time of Implementation**	**Time of Removal**
Stabilized Construction Entrance	Temporary	Prior to disturbance.	Upon completion of construction and after final site stabilization.
Catch Basin Inlet Protection	Temporary	Prior to construction.	Upon upgradient site stabilization.
Topsoil	Permanent	Prior to seeding.	NA
Protecting Vegetation During Construction	Temporary	Prior to disturbance.	Upon completion of construction and after final site stabilization.
Seeding	Temporary/ Permanent	Within one day of final disturbance.	If temporary, upon reconvening site work in location of temporary seeding .
Mulching	Temporary	After seeding.	NA
Soil Restoration	Permanent	Prior to seeding.	NA
Dust Control	Temporary	As needed.	Upon construction completion.
Equipment Laydown Areas	Temporary	Prior to commencement of construction.	Upon completion of construction and just before final stabilization.
Temporary Stockpiles	Temporary	Upon commencement of earthmoving activity.	Upon completion of final grading.
Check Dams	Permanent	Prior to construction upgradient of existing or proposed swales.	To be removed upon final stabilization of upgradient contributing areas.
Concrete Washout	Temporary	Prior to commencement of construction.	Upon completion of construction and just before final stabilization.
Dewatering Bag	Temporary	Prior to dewatering activities	Upon completion of dewatering activities.

Table 4-2: Erosion and Sediment Control Maintenance Plan-Maintenance Measures				
Practice	**Duration**	**Maintenance Required**	**Maintenance Frequency**	**Responsible Party**
Stabilized Construction Entrance	Temporary	Replacement of gravel when voids are full.	As sediment fills the voids of the aggregate or every two weeks (whichever occurs first).	Contractor
Silt Fence	Temporary	Replace upon identification of damaged materials and when sediment reaches half the height of the fiber roll.	Inspect daily and after each runoff event.	Contractor
Catch Basin Inlet Protection	Temporary	Replace upon identification of damaged materials and when sediment reaches half the height of the inlet barrier.	Inspect daily and after each runoff event.	Contractor
Topsoil	Permanent	Re-dress rutted or eroded areas.	Inspect daily and after each runoff event throughout duration of construction.	Contractor
Protecting Vegetation During Construction	Temporary	Reset/repair controls when ripped, downed, or otherwise compromised.	Inspect daily and after each runoff event.	Contractor
Seeding	Temporary/ Permanent	Reseed bare spots, water to establish growth, keep free of vehicular travel.	Weekly until stabilization occurs.	Contractor/ Owner
Mulching	Temporary	Reapply to bare spots and maintain appropriate density of cover until stabilized.	Inspect daily and after each runoff event.	Contractor
Soil Restoration	Permanent	Once restored, keep free of vehicular traffic and other activities that cause compaction or rutting.	Daily throughout construction.	Contractor
Dust Control	Temporary	N/A	Throughout dry weather periods until site is stabilized.	Contractor
Equipment Laydown Areas	Temporary	Repair or replacement of barrier.	Inspect daily and after each runoff event. If torn or leaking, replace immediately.	Contractor
Temporary Stockpiles	Temporary	Ensure appropriate side slopes and functioning perimeter barriers.	Weekly	Contractor
Check Dams	Permanent	Removal of sediment or replacement of check dam when 50% capacity is reached or voids are full.	Weekly during construction/yearly or when 50% capacity is reached (whichever occurs first)	Contractor

Table 4-2: Erosion and Sediment Control Maintenance Plan-Maintenance Measures

Practice	Duration	Maintenance Required	Maintenance Frequency	Responsible Party
Concrete Washout	Temporary	Remove hardened concrete and clean area when 75% capacity is reached.	Weekly	Contractor
Dewatering Bag	Temporary	Repair or replace ripped or other compromised bags. Reseal openings as needed.	Daily during dewatering activities.	Contractor

Notes:
1) All erosion and sediment control practices will be installed and operation prior to start of work upgradient of the practice.
2) Temporary practices will remain in place and operational until vegetative site stabilization, as directed by the Engineer.
3) Practices will be inspected weekly in accordance with GP-0-20-001.
4) The Contractor is responsible for installation and maintenance until submittal of Notice of Termination.

4.5.4 Final Inspection

After all construction activities that are identified in the SWPPP have been completed, the Owner or Owner's representative will have a qualified Environmental Inspector provide a final site inspection. The Environmental Inspector will ensure that all the necessary post-construction stormwater management maintenance procedures and practices are in place as required by the NYSDEC. The qualified Environmental Inspector shall sign the certification statements contained in the NYSDEC Notice of Termination (NOT). Within 14 days of becoming eligible, the Owner or Owner's Representative will provide the certifications and information to submit a completed Notice of Termination to the NYSDEC.

4.5.5 Qualified Inspector Requirements

A qualified inspector is a person who is knowledgeable in the principles and practices of erosion and sediment control, such as a licensed Professional Engineer, a Certified Professional in Erosion and Sediment Control (CPESC), a Registered Landscape Architect or other NYSDEC endorsed individual.

The qualified inspector will conduct site inspections at least once every seven calendar days. At a minimum, the qualified inspector will inspect:

- Erosion and sediment control practices to ascertain integrity and effectiveness
- Stormwater management practices to ensure that they are constructed in conformance with the design

- Areas of disturbance that have not achieved final stabilization
- Points of discharge to natural surface water bodies located within, or immediately adjacent to, the property boundaries of the construction site, and points of discharge from the construction site

The qualified inspector will also:

- Prepare an inspection report subsequent to each and every inspection. At a minimum, the inspection report shall include and/or address the following:
    a. Date and time of inspection
    b. Name and title of person(s) performing inspection
    c. A description of the weather and soil conditions (e.g., dry, wet, saturated) at the time of the inspection
    d. A description of the condition of the runoff at points of discharge from the construction site. This shall include identification of any discharges of sediment from the construction site. Include discharges from conveyance systems (i.e., pipes, culverts, ditches) and overland flow.
    e. A description of the condition of natural surface water bodies located within, or immediately adjacent to, the property boundaries of the construction site which receive runoff from disturbed areas. This shall include identification of any discharges of sediment to the surface water body.
    f. Identification of erosion and sediment control practices in need of repair or maintenance
    g. Identification of erosion and sediment control practices that were not installed properly or are not functioning as designed and need to be reinstalled or replaced
    h. Description and sketch of areas that are disturbed at the time of the inspection and areas that have been stabilized (temporary and/or final) since the last inspection
    i. Current phase of construction of post-construction stormwater management practices and identification of construction that is not in conformance with the SWPPP and technical standards
    j. Corrective action(s) that must be taken to install, repair, replace or maintain erosion and sediment control practices and to correct deficiencies identified with the construction of the post-construction stormwater management practice(s).
    k. Digital photographs, with date stamp, that clearly show the condition of practices that have been identified as needing corrective actions. The qualified inspector shall attach paper color copies of the digital photographs to the inspection report being maintained onsite within seven calendar days of the date of the inspection. The qualified inspector shall also take digital photographs, with date stamp, that clearly show the condition of the practice(s) after the corrective action has been completed. The qualified inspector shall attach paper color copies of the digital photographs to the inspection report that documents the completion of the corrective action work within seven calendar days of that inspection.

- Notify the Construction Management consultant or an appropriate subcontractor of any corrective actions that need to be taken within one business day. The corrective actions will be initiated within one business day of this notification and be completed in a reasonable time frame.
- Sign all inspection reports.

The inspection reports will be maintained on site with the SWPPP. The site log book will be maintained on site and will be made available to the permitting authority upon request. A summary of the site inspection activities will be posted at the site on a monthly basis. A typical Construction Site Inspection and Maintenance Log Book is included in Appendix G.

A site sketch map will be maintained on the project site indicating the extent of disturbed onsite areas and drainage ways throughout the duration of construction. The site sketch map will identify areas expected to undergo initial disturbance or significant site work within every 7-day period. The sketch will indicate areas of the site that have undergone temporary or permanent stabilization. Disturbed areas that have not undergone active site work during the previous 7-day inspection period will be noted.

Sediment control measures will be inspected and the degree of accumulation as a percentage of the sediment storage volume will be recorded. Maintenance required for installed erosion and sediment control structures will be noted, and documentation of areas where adjustments are needed to those measures will be provided. Deficiencies identified with the implementation of the SWPPP will be recorded.

SECTION 5

POST-CONSTRUCTION STORMWATER MANAGEMENT

5.1 ANALYSIS OF FLOWS

In accordance with the New York State Stormwater Management Design Manual, the hydraulic analyses were conducted to meet the following criteria by use of conventional and proprietary best management practices:

1. Water Quality Volume - The water quality treatment volume is designed to improve water quality by capturing and treating 90 percent of the average annual stormwater runoff volume. The plan proposes the use of alternative SMPs to treat 75 % of the water quality volume from the disturbed, impervious area as well as any additional runoff from tributary areas that are not within the disturbed, impervious area. The use of alternative SMPs is discussed in Sections 9.3 and 9.4 of the New York State Stormwater Management Design Manual, which is focused on the accepted verified manufactured technologies.
2. Extreme Storm Protection - This criterion must be met by controlling the peak discharge from the 100-year post-development storm event to the 100-year pre-development rates. Extreme Storm Protection is not required as the project is a redevelopment and the post construction 1 year 24 hour discharge rates are less than the pre-construction discharge rate as shown in Tables 5-1 and 5-2 below.
3. The plan proposes the use of alternative SMPs to treat 75 % of the water quality volume from the disturbed, impervious area as well as any additional runoff from tributary areas that are not within the disturbed, impervious area.
4. *Town of Mount Pleasant's local storm design requirements - Proposed system and piping is designed to handle a 25 year storm event.

- The pre-and post-development peak discharges for the site were calculated, including runoff volumes, peak rates of stormwater discharge and storage volumes as related to watershed area, rainfall frequency, runoff coefficients, land uses, time of concentration and watershed slopes. The pre- and post-construction area of the reconstruction site similar in layout. A 0.738 coefficient was used for the developed surface which resulted in an increase in post development runoff as opposed to pre-development, although the locations and type of run-on flows are generally unchanged. In order to mitigate the increase, the proposed project will provide detention via the perforated storm drainage and chambers system. The underground infiltration and detention storage (Stormtech) system is designed only for the detention of water and potential infiltration is not included in the design calculation due to the low infiltration rate. The project will, therefore, discharge stormwater at a rate less than that of the existing conditions. The pre-and post-development runoff calculations are provided for the 1, 10, 25, and 100-year, 24-hour storm event(s) in the table below. Refer to Appendix D for detailed computations.

Table 5-1: Pre Versus Post Construction Runoff Peak Rates Waterfowl Building			
Storm Frequency (24-Hour)	Pre-development Peak Runoff Rate (cfs)	Post-development Peak Runoff Rate (cfs)	Runoff Reduction (cfs)
1- year	7.302	7.146	-0.156
10-year	13.29	13.12	-0.17
25-year	16.00	15.82	-0.18
100-Year	20.05	19.82	-0.23

Table 5-2: Pre Versus Post Construction Runoff Peak Rates Lab Building			
Storm Frequency (24-Hour)	Pre-development Peak Runoff Rate (cfs)	Post-development Peak Runoff Rate (cfs)	Runoff Reduction (cfs)
1- year	16.16	16.16	0.00
10-year	39.37	39.37	0.00
25-year	50.35	50.35	0.00
100-Year	66.87	66.87	0.00

5.1.1 Runoff Reduction and Water Quality Volumes

Runoff reduction volume is based on the area of impervious cover at the site. Since this is a Redevelopment project where runoff reduction techniques will not be used to reduce the required WQv. (See Appendix D for calculations).

5.1.2 Runoff Reduction (RR) Techniques

The New York State Stormwater Management Design Manual (SMDM) allows for the project site to apply for certain credits to reduce the project's Water Quality volume (WQv) requirement. These credits are gained by calculating the effect of site features, such as existing trees to remain, tree planting, that reduce the project's stormwater impact. Tree planting was used onsite and calculated to be 0.429 Acres but was not used to reduce the required WQv since its so minimal and the project is considered a redevelopment with a reduction in impervious area.

5.1.3 Selected Permanent Stormwater Management Practices (SMPs)

The techniques listed in this section are permanent stormwater management practices that address all required stormwater sizing requirements. These are not only standard management or proprietary practices, but also green infrastructure planning and design methods. All practices identified herein as addressing sizing requirements for this project are illustrated on the construction plans in Appendix D.

Lab Building

- **SMPs (Hydrodynamic):** CDS Contech Engineering Solutions, with a total contributing impervious area of 0.937 acres. The CDS hydrodynamic separator uses swirl concentration and continuous deflective separation to screen, separate and trap trash, debris, sediment, and hydrocarbons from stormwater runoff. CDS captures and retains 100% of floatables and neutrally buoyant debris 4.7 mm or larger, effectively removes sediment, and incorporates a non-blocking screen.

Laboratory Pavement Area (SF,Acre)		
	SF	Acre
Total Disturbed Impervious Area	40,815.94	0.937005051
Outfall lab1	40,815.94	0.937005051
Total Impervious Treated	40,815.94	0.937005051
Percentage of Impervious area Treated	100.00%	100.00%

Water-fowl Management Building

- **SMPs (Hydrodynamic):** CDS Contech Engineering Solutions, with a total contributing impervious area of 16.61 acres. The CDS hydrodynamic separator uses swirl concentration and continuous deflective separation to screen, separate and trap trash, debris, sediment, and hydrocarbons from stormwater runoff. CDS captures and retains 100% of floatables and neutrally buoyant debris 4.7 mm or larger, effectively removes sediment, and incorporates a non-blocking screen.

- **Alternative SMPs (Extended Detention Chambers):** Stormtech storage chambers with a total contributing impervious area of 0.610 acres. The pipe system with the stone and fabric all around acts as filtration and partial detention in the stone..

Waterfowl Management Building Pavement Area		
	SF	Acres
Total Disturbed Impervious area	181,730.05	4.171947888
Outfall wfmb1	112,517.34	2.5830427
Outfall wfmb2	28,474.66	0.653688246
Total Impervious Treated	140,992.00	3.236730946
Percentage of Impervious area Treated	77.58%	77.58%

SECTION 6

POLLUTION PREVENTION

6.1 LITTER PREVENTION

The Contractor shall adhere to the following criteria for litter prevention:

- The contractor shall provide and assure easy access to dumpsters is available to those working the site. Check dumpsters daily to see that top and side doors are closed. This prevents scavengers from spreading trash on the ground.
- Cover all open loads on trucks leaving the site.
- Construction site will be a non-smoking site.
- Contractor shall enable a recycling program.
- Contractor shall educate workers about the importance of individual responsibility for a clean and safe working environment

6.2 SPILL PREVENTION PRACTICES

The Contractor shall adhere to the following criteria for spill prevention:

- Only enough of a single product as required for the job will be stored on site.
- All materials will be stored in neat, orderly areas in appropriate containers as recommended by the product manufacturers. Whenever possible a secure, roofed structure will be used for such storage.
- Unused materials will be kept in the original manufacturer's containers.
- Original material package safety and instruction labels shall be retained.
- Mixing materials will only be done as recommended by the manufacturer.
- Provide mixing areas and storage areas with containment to isolate spills from stormwater runoff.
- When possible, all of a product will be used prior to disposing of container.
- Manufacturer's instructions for proper use and disposal will be followed.
- A contractors' designee will be responsible for daily inspection of use and disposal of materials on site.
- Control loading, unloading and dispensing operations to designated areas and assign qualified personnel for oversight of these operations.

6.3 SPILL CONTROL AND CLEAN-UP

The Contractor shall adhere to the following criteria for spill control and clean-up:

- Manufacturer instructions for spill clean-up will be posted on site, and site personnel will be made aware of the procedures and the location of the information and cleanup supplies.
- Materials and equipment needed for spill cleanup will be kept near the material storage area(s) on site. The spill cleanup kit shall contain, at a minimum: Emergency Response Guidebook, various size socks, pillows, and pads, a bag of natural organic absorbent, Tyvek suits, pairs of chemical resistant gloves, pairs chemical resistant safety goggles, disposal bags/ties.
- All spills will be cleaned up immediately after discovery.
- The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury.
- Spill of toxic or hazardous materials will be reported to the appropriate federal, state, and/or local government agency, regardless of size.
- A description of the spill, what caused it, and the cleanup measures will be recorded in the inspection logs.
- The Contractor shall designate individuals to be responsible for various aspects of prevention and cleanup. These individuals will be trained to identify proper or improper storage and handling of the materials and to initiate appropriate cleanup procedures when required. These individuals' names will be posted at the material storage area.

6.4 WASTE CONTROL

During and post construction, all construction debris will be stored in dumpsters or neat piles until it can be removed from the site on a weekly basis by a licensed waste hauler to transfer station or other appropriate facility as required by state and local disposal regulations. If piles are used for debris, the piles shall be contained by a berm and covered. All stockpiles on site shall be covered.

APPENDIX A

NOTICE OF INTENT (NOI)

0644089821

NOTICE OF INTENT

New York State Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505

NYR _____ (for DEC use only)

Stormwater Discharges Associated with Construction Activity Under State Pollutant Discharge Elimination System (SPDES) General Permit # GP-0-20-001

All sections must be completed unless otherwise noted. Failure to complete all items may result in this form being returned to you, thereby delaying your coverage under this General Permit. Applicants must read and understand the conditions of the permit and prepare a Stormwater Pollution Prevention Plan prior to submitting this NOI. Applicants are responsible for identifying and obtaining other DEC permits that may be required.

-IMPORTANT-

RETURN THIS FORM TO THE ADDRESS ABOVE

OWNER/OPERATOR MUST SIGN FORM

Owner/Operator Information

Owner/Operator (Company Name/Private Owner Name/Municipality Name)
New York City DEP

Owner/Operator Contact Person Last Name (NOT CONSULTANT)
Mandarino

Owner/Operator Contact Person First Name
Maria

Owner/Operator Mailing Address
465 Columbus Avenue, Suite 270

City
Valhalla

State
NY

Zip
10595-1336

Phone (Owner/Operator)
914-749-5258

Fax (Owner/Operator)
___-___-____

Email (Owner/Operator)
mmandarino@dep.nyc.gov

FED TAX ID
__-_____ (not required for individuals)

Project Site Information

Project/Site Name
Kensico Waterfowl and Lab Buildings

Street Address (NOT P.O. BOX)
18 & 19 Westlake Drive

Side of Street
○ North ● South ○ East ○ West

City/Town/Village (THAT ISSUES BUILDING PERMIT)
Valhalla

State NY | Zip 10595-1336 | County Westchester | DEC Region 3

Name of Nearest Cross Street
Columbus Avenue

Distance to Nearest Cross Street (Feet)
0

Project In Relation to Cross Street
○ North ○ South ● East ○ West

Tax Map Numbers
Section-Block-Parcel
117.11-3-1

Tax Map Numbers

1. Provide the Geographic Coordinates for the project site. To do this, go to the NYSDEC Stormwater Interactive Map on the DEC website at:

https://gisservices.dec.ny.gov/gis/stormwater/

Zoom into your Project Location such that you can accurately click on the centroid of your site. Once you have located the centroid of your project site, go to the bottom right hand corner of the map for the X, Y coordinates. Enter the coordinates into the boxes below. For problems with the interactive map use the help function.

	X Coordinates (Easting)	Y Coordinates (Northing)
Waterfowl Building	-73.774	41.086
Lab Building	-73.774	41.088

2. What is the nature of this construction project?

○ **New Construction**

○ **Redevelopment with increase in impervious area**

● **Redevelopment with no increase in impervious area**

3. Select the predominant land use for both pre and post development conditions.
SELECT ONLY ONE CHOICE FOR EACH

Pre-Development Existing Land Use	Post-Development Future Land Use
○ FOREST	○ SINGLE FAMILY HOME
○ PASTURE/OPEN LAND	○ SINGLE FAMILY SUBDIVISION
○ CULTIVATED LAND	○ TOWN HOME RESIDENTIAL
○ SINGLE FAMILY HOME	○ MULTIFAMILY RESIDENTIAL
○ SINGLE FAMILY SUBDIVISION	○ INSTITUTIONAL/SCHOOL
○ TOWN HOME RESIDENTIAL	○ INDUSTRIAL
○ MULTIFAMILY RESIDENTIAL	○ COMMERCIAL
○ INSTITUTIONAL/SCHOOL	○ MUNICIPAL
○ INDUSTRIAL	○ ROAD/HIGHWAY
○ COMMERCIAL	○ RECREATIONAL/SPORTS FIELD
○ ROAD/HIGHWAY	○ BIKE PATH/TRAIL
○ RECREATIONAL/SPORTS FIELD	○ LINEAR UTILITY (water, sewer, gas, etc.)
○ BIKE PATH/TRAIL	○ PARKING LOT
○ LINEAR UTILITY	○ CLEARING/GRADING ONLY
○ PARKING LOT	○ DEMOLITION, NO REDEVELOPMENT
● OTHER	○ WELL DRILLING ACTIVITY *(Oil, Gas, etc.)
DEP Operations	● OTHER
	Same

Number of Lots: ___

***Note**: for gas well drilling, non-high volume hydraulic fractured wells only

4. In accordance with the larger common plan of development or sale, enter the total project site area; the total area to be disturbed; existing impervious area to be disturbed (for redevelopment activities); and the future impervious area constructed within the disturbed area. (Round to the nearest tenth of an acre.)

Total Site Area	Total Area To Be Disturbed	Existing Impervious Area To Be Disturbed	Future Impervious Area Within Disturbed Area
30.2	8.5	5.0	4.9

5. Do you plan to disturb more than 5 acres of soil at any one time? ○ **Yes** ● **No**

6. Indicate the percentage of each Hydrologic Soil Group(HSG) at the site.

A	B	C	D
85 %	15 %	___ %	___ %

7. Is this a phased project? ● **Yes** ○ **No**

8. Enter the planned start and end dates of the disturbance activities.

Start Date	End Date
09/01/2022	12/31/2024

8600089821

9. Identify the nearest surface waterbody(ies) to which construction site runoff will discharge.

Name

Clove Brook

9a. Type of waterbody identified in Question 9?

- ○ Wetland / State Jurisdiction On Site (Answer 9b)
- ○ Wetland / State Jurisdiction Off Site
- ○ Wetland / Federal Jurisdiction On Site (Answer 9b)
- ○ Wetland / Federal Jurisdiction Off Site
- ○ Stream / Creek On Site
- ● Stream / Creek Off Site
- ○ River On Site
- ○ River Off Site
- ○ Lake On Site
- ○ Lake Off Site
- ○ Other Type On Site
- ○ Other Type Off Site

9b. How was the wetland identified?

- ○ Regulatory Map
- ● Delineated by Consultant
- ○ Delineated by Army Corps of Engineers
- ○ Other (identify)

10. Has the surface waterbody(ies) in question 9 been identified as a 303(d) segment in Appendix E of GP-0-20-001? ○ **Yes** ● **No**

11. Is this project located in one of the Watersheds identified in Appendix C of GP-0-20-001? ○ **Yes** ● **No**

12. Is the project located in one of the watershed areas associated with AA and AA-S classified waters? ● **Yes** ○ **No**
If no, skip question 13.

13. Does this construction activity disturb land with no existing impervious cover and where the Soil Slope Phase is identified as an E or F on the USDA Soil Survey? ○ **Yes** ● **No**
If Yes, what is the acreage to be disturbed?

14. Will the project disturb soils within a State regulated wetland or the protected 100 foot adjacent area? ○ **Yes** ● **No**

15. Does the site runoff enter a separate storm sewer system (including roadside drains, swales, ditches, culverts, etc)? ○ Yes ○ No ● Unknown

16. What is the name of the municipality/entity that owns the separate storm sewer system?

Town of Mount Pleasant

17. Does any runoff from the site enter a sewer classified as a Combined Sewer? ○ Yes ● No ○ Unknown

18. Will future use of this site be an agricultural property as defined by the NYS Agriculture and Markets Law? ○ Yes ● No

19. Is this property owned by a state authority, state agency, federal government or local government? ● Yes ○ No

20. Is this a remediation project being done under a Department approved work plan? (i.e. CERCLA, RCRA, Voluntary Cleanup Agreement, etc.) ○ Yes ● No

21. Has the required Erosion and Sediment Control component of the SWPPP been developed in conformance with the current NYS Standards and Specifications for Erosion and Sediment Control (aka Blue Book)? ● Yes ○ No

22. Does this construction activity require the development of a SWPPP that includes the post-construction stormwater management practice component (i.e. Runoff Reduction, Water Quality and Quantity Control practices/techniques)? ● Yes ○ No
If No, skip questions 23 and 27-39.

23. Has the post-construction stormwater management practice component of the SWPPP been developed in conformance with the current NYS Stormwater Management Design Manual? ● Yes ○ No

24. The Stormwater Pollution Prevention Plan (SWPPP) was prepared by:

- ● **Professional Engineer (P.E.)**
- ○ **Soil and Water Conservation District (SWCD)**
- ○ **Registered Landscape Architect (R.L.A)**
- ○ **Certified Professional in Erosion and Sediment Control (CPESC)**
- ○ **Owner/Operator**
- ○ **Other**

SWPPP Preparer
Gedeon GRC Consulting

Contact Name (Last, Space, First)
Causarano James

Mailing Address
6901 Jericho Turnpike, Suite 216

City
Syosset

State Zip
NY 11791-

Phone
516-873-7010

Fax
516-873-7011

Email
jcausarano@gedeongrc.com

SWPPP Preparer Certification

I hereby certify that the Stormwater Pollution Prevention Plan (SWPPP) for this project has been prepared in accordance with the terms and conditions of the GP-0-20-001. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of this permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

First Name
James

MI

Last Name
Causarano

Signature

Date
08/12/2021

25. Has a construction sequence schedule for the planned management practices been prepared? ● Yes ○ No

26. Select **all** of the erosion and sediment control practices that will be employed on the project site:

Temporary Structural

- ○ Check Dams
- ● Construction Road Stabilization
- ● Dust Control
- ○ Earth Dike
- ● Level Spreader
- ○ Perimeter Dike/Swale
- ○ Pipe Slope Drain
- ○ Portable Sediment Tank
- ○ Rock Dam
- ● Sediment Basin
- ● Sediment Traps
- ● Silt Fence
- ● Stabilized Construction Entrance
- ● Storm Drain Inlet Protection
- ● Straw/Hay Bale Dike
- ○ Temporary Access Waterway Crossing
- ○ Temporary Stormdrain Diversion
- ● Temporary Swale
- ○ Turbidity Curtain
- ○ Water bars

Biotechnical

- ○ Brush Matting
- ○ Wattling

Vegetative Measures

- ○ Brush Matting
- ○ Dune Stabilization
- ● Grassed Waterway
- ● Mulching
- ● Protecting Vegetation
- ○ Recreation Area Improvement
- ● Seeding
- ● Sodding
- ● Straw/Hay Bale Dike
- ○ Streambank Protection
- ● Temporary Swale
- ● Topsoiling
- ○ Vegetating Waterways

Permanent Structural

- ● Debris Basin
- ○ Diversion
- ○ Grade Stabilization Structure
- ● Land Grading
- ○ Lined Waterway (Rock)
- ○ Paved Channel (Concrete)
- ○ Paved Flume
- ○ Retaining Wall
- ○ Riprap Slope Protection
- ○ Rock Outlet Protection
- ○ Streambank Protection

Other

Detention and Retention Storage on site

Concrete Washout Structure

Post-construction Stormwater Management Practice (SMP) Requirements

Important: Completion of Questions 27-39 is not required if response to Question 22 is No.

27. Identify all site planning practices that were used to prepare the final site plan/layout for the project.

- ○ **Preservation of Undisturbed Areas**
- ○ **Preservation of Buffers**
- ○ **Reduction of Clearing and Grading**
- ● **Locating Development in Less Sensitive Areas**
- ○ **Roadway Reduction**
- ● **Sidewalk Reduction**
- ○ **Driveway Reduction**
- ○ **Cul-de-sac Reduction**
- ○ **Building Footprint Reduction**
- ● **Parking Reduction**

27a. Indicate which of the following soil restoration criteria was used to address the requirements in Section 5.1.6("Soil Restoration") of the Design Manual (2010 version).

- ● All disturbed areas will be restored in accordance with the Soil Restoration requirements in Table 5.3 of the Design Manual (see page 5-22).
- ○ Compacted areas were considered as impervious cover when calculating the **WQv Required**, and the compacted areas were assigned a post-construction Hydrologic Soil Group (HSG) designation that is one level less permeable than existing conditions for the hydrology analysis.

28. Provide the total Water Quality Volume (WQv) required for this project (based on final site plan/layout).

Total WQv Required

		1	.	0	4	5	**acre-feet**

29. Identify the RR techniques (Area Reduction), RR techniques(Volume Reduction) and Standard SMPs with RRv Capacity in Table 1 (See Page 9) that were used to reduce the Total WQv Required(#28).

Also, provide in Table 1 the total impervious area that contributes runoff to each technique/practice selected. For the Area Reduction Techniques, provide the total contributing area (includes pervious area) and, if applicable, the total impervious area that contributes runoff to the technique/practice.

Note: Redevelopment projects shall use Tables 1 and 2 to identify the SMPs used to treat and/or reduce the WQv required. If runoff reduction techniques will not be used to reduce the required WQv, skip to question 33a after identifying the SMPs.

Table 1 - Runoff Reduction (RR) Techniques and Standard Stormwater Management Practices (SMPs)

	Total Contributing Area (acres)		Total Contributing Impervious Area (acres)
RR Techniques (Area Reduction)			
○ Conservation of Natural Areas (RR-1)		and/or	
○ Sheetflow to Riparian Buffers/Filters Strips (RR-2)		and/or	
● Tree Planting/Tree Pit (RR-3)	0.429	and/or	0.255
○ Disconnection of Rooftop Runoff (RR-4)		and/or	
RR Techniques (Volume Reduction)			
○ Vegetated Swale (RR-5)			
○ Rain Garden (RR-6)			
○ Stormwater Planter (RR-7)			
○ Rain Barrel/Cistern (RR-8)			
○ Porous Pavement (RR-9)			
○ Green Roof (RR-10)			
Standard SMPs with RRv Capacity			
○ Infiltration Trench (I-1)			
○ Infiltration Basin (I-2)			
○ Dry Well (I-3)			
○ Underground Infiltration System (I-4)			
○ Bioretention (F-5)			
○ Dry Swale (O-1)			
Standard SMPs			
○ Micropool Extended Detention (P-1)			
○ Wet Pond (P-2)			
○ Wet Extended Detention (P-3)			
○ Multiple Pond System (P-4)			
○ Pocket Pond (P-5)			
○ Surface Sand Filter (F-1)			
○ Underground Sand Filter (F-2)			
○ Perimeter Sand Filter (F-3)			
○ Organic Filter (F-4)			
○ Shallow Wetland (W-1)			
○ Extended Detention Wetland (W-2)			
○ Pond/Wetland System (W-3)			
○ Pocket Wetland (W-4)			
○ Wet Swale (O-2)			

Table 2 - Alternative SMPs (DO NOT INCLUDE PRACTICES BEING USED FOR PRETREATMENT ONLY)

Alternative SMP	Total Contributing Impervious Area (acres)
● Hydrodynamic	4.173
○ Wet Vault	
○ Media Filter	
● Other storm chamber	0.610

Provide the name and manufacturer of the Alternative SMPs (i.e. proprietary practice(s)) being used for WQv treatment.

Name: Cascade Separator

Manufacturer: Contech Engineered Solutions

Note: Redevelopment projects which do not use RR techniques, shall use questions 28, 29, 33 and 33a to provide SMPs used, total WQv required and total WQv provided for the project.

30. Indicate the Total RRv provided by the RR techniques (Area/Volume Reduction) and Standard SMPs with RRv capacity identified in question 29.

Total RRv provided

_____ . _____ **acre-feet**

31. Is the Total RRv provided (#30) greater than or equal to the total WQv required (#28).

○ **Yes** ○ **No**

If Yes, go to question 36.
If No, go to question 32.

32. Provide the Minimum RRv required based on HSG.
[Minimum RRv Required = (P)(0.95)(Ai)/12, Ai=(S)(Aic)]

Minimum RRv Required

_____ . _____ **acre-feet**

32a. Is the Total RRv provided (#30) greater than or equal to the Minimum RRv Required (#32)?

○ **Yes** ○ **No**

If Yes, go to question 33.
Note: Use the space provided in question #39 to summarize the specific site limitations and justification for not reducing 100% of WQv required (#28). A detailed evaluation of the specific site limitations and justification for not reducing 100% of the WQv required (#28) must also be included in the SWPPP.
If No, sizing criteria has not been met, so NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

33. Identify the Standard SMPs in Table 1 and, if applicable, the Alternative SMPs in Table 2 that were used to treat the remaining total WQv(=Total WQv Required in 28 - Total RRv Provided in 30).

Also, provide in Table 1 and 2 the total impervious area that contributes runoff to each practice selected.

Note: Use Tables 1 and 2 to identify the SMPs used on Redevelopment projects.

33a. Indicate the Total WQv provided (i.e. WQv treated) by the SMPs identified in question #33 and Standard SMPs with RRv Capacity identified in question 29.

WQv Provided

1.070 **acre-feet**

Note: For the standard SMPs with RRv capacity, the WQv provided by each practice = the WQv calculated using the contributing drainage area to the practice - RRv provided by the practice. (See Table 3.5 in Design Manual)

34. Provide the sum of the Total RRv provided (#30) and the WQv provided (#33a).

1.070

35. Is the sum of the RRv provided (#30) and the WQv provided (#33a) greater than or equal to the total WQv required (#28)? ● **Yes** ○ **No**

If Yes, go to question 36.
If No, sizing criteria has not been met, so NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

36. Provide the total Channel Protection Storage Volume (CPv) required and provided or select waiver (36a), if applicable.

CPv Required

0.022 **acre-feet**

CPv Provided

0.023 **acre-feet**

36a. The need to provide channel protection has been waived because:

○ Site discharges directly to tidal waters or a fifth order or larger stream.

● Reduction of the total CPv is achieved on site through runoff reduction techniques or infiltration systems.

37. Provide the Overbank Flood (Qp) and Extreme Flood (Qf) control criteria or select waiver (37a), if applicable.

Total Overbank Flood Control Criteria (Qp)

Pre-Development

52.660 **CFS**

Post-development

52.490 **CFS**

Total Extreme Flood Control Criteria (Qf)

Pre-Development

86.920 **CFS**

Post-development

86.690 **CFS**

37a. The need to meet the Qp and Qf criteria has been waived because:

- ○ Site discharges directly to tidal waters or a fifth order or larger stream.
- ○ Downstream analysis reveals that the Qp and Qf controls are not required

38. Has a long term Operation and Maintenance Plan for the post-construction stormwater management practice(s) been developed? ● **Yes** ○ **No**

If Yes, Identify the entity responsible for the long term Operation and Maintenance

N	Y	C	D	E	P																											

39. Use this space to summarize the specific site limitations and justification for not reducing 100% of WQv required(#28). (See question 32a) This space can also be used for other pertinent project information.

40. Identify other DEC permits, existing and new, that are required for this project/facility.

- ○ Air Pollution Control
- ○ Coastal Erosion
- ○ Hazardous Waste
- ○ Long Island Wells
- ○ Mined Land Reclamation
- ○ Solid Waste
- ○ Navigable Waters Protection / Article 15
- ○ Water Quality Certificate
- ○ Dam Safety
- ○ Water Supply
- ○ Freshwater Wetlands/Article 24
- ○ Tidal Wetlands
- ○ Wild, Scenic and Recreational Rivers
- ○ Stream Bed or Bank Protection / Article 15
- ○ Endangered or Threatened Species(Incidental Take Permit)
- ○ Individual SPDES
- ● SPDES Multi-Sector GP [N][Y][R][ ][ ][ ][ ][ ][ ]
- ○ Other [ ]
- ○ None

41. Does this project require a US Army Corps of Engineers Wetland Permit? ○ **Yes** ● **No**
If Yes, Indicate Size of Impact. [ ][ ][ ][ ][ ].[ ]

42. Is this project subject to the requirements of a regulated, traditional land use control MS4? ○ **Yes** ● **No**
(If No, skip question 43)

43. Has the "MS4 SWPPP Acceptance" form been signed by the principal executive officer or ranking elected official and submitted along with this NOI? ○ **Yes** ○ **No**

44. If this NOI is being submitted for the purpose of continuing or transferring coverage under a general permit for stormwater runoff from construction activities, please indicate the former SPDES number assigned. [N][Y][R][ ][ ][ ][ ][ ][ ]

3547089826

Owner/Operator Certification

I have read or been advised of the permit conditions and believe that I understand them. I also understand that, under the terms of the permit, there may be reporting requirements. I hereby certify that this document and the corresponding documents were prepared under my direction or supervision. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I further understand that coverage under the general permit will be identified in the acknowledgment that I will receive as a result of submitting this NOI and can be as long as sixty (60) business days as provided for in the general permit. I also understand that, by submitting this NOI, I am acknowledging that the SWPPP has been developed and will be implemented as the first element of construction, and agreeing to comply with all the terms and conditions of the general permit for which this NOI is being submitted.

Print First Name: Mandarino

MI:

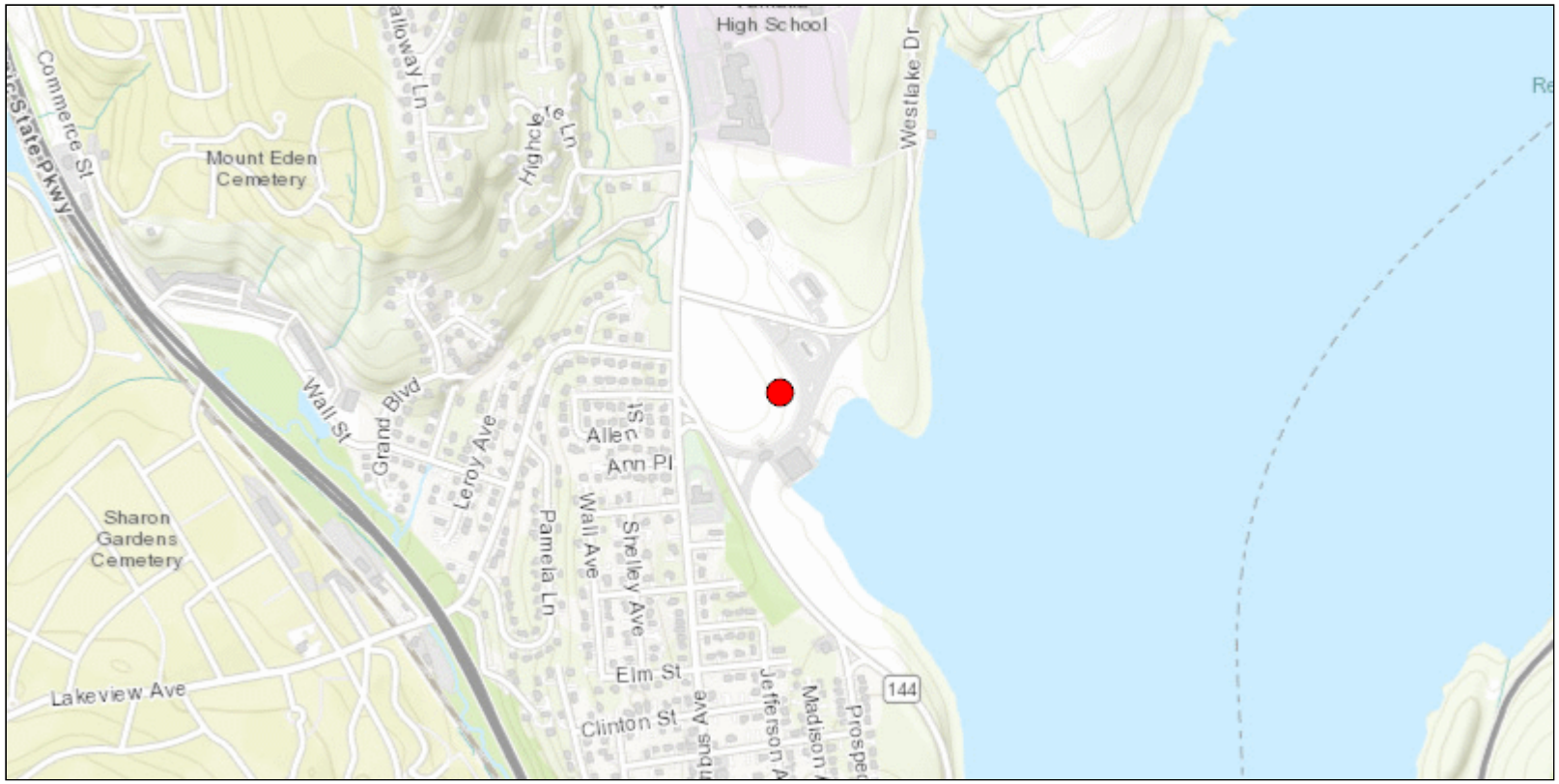
Print Last Name: Maria

Owner/Operator Signature: Maria L Mandarino

Date: 09 / 14 / 2021

APPENDIX B
Soil and Stormwater Maps

Stormwater Interactive Map



The coordinates of the point you clicked on are:

UTM 18	**Easting:**	602882.695	**Northing:**	4549059.131
Longitude/Latitude	**Longitude:**	-73.775	**Latitude:**	41.086

The approximate address of the point you clicked on is:
10595, Valhalla, New York

County: Westchester
Town: Mount Pleasant
USGS Quad: WHITE PLAINS

DEC Administrative Boundaries

Region 3:
(Lower Hudson Valley) Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster and Westchester counties. For more information visit **http://www.dec.ny.gov/about/607.html**.

Regulated MS4s

UA 2000: 63217
Standard: New York- Newark
Municipality: MOUNT PLEASANT
SWIS: 553400
Regulated: Automatic

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 18. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from digital orthophotography provided by the New York State Office of Cyber Security & Critical Infrastructure Coordination. This information was produced as 20-centimeter resolution natural color orthoimagery from photography dated April 2004.

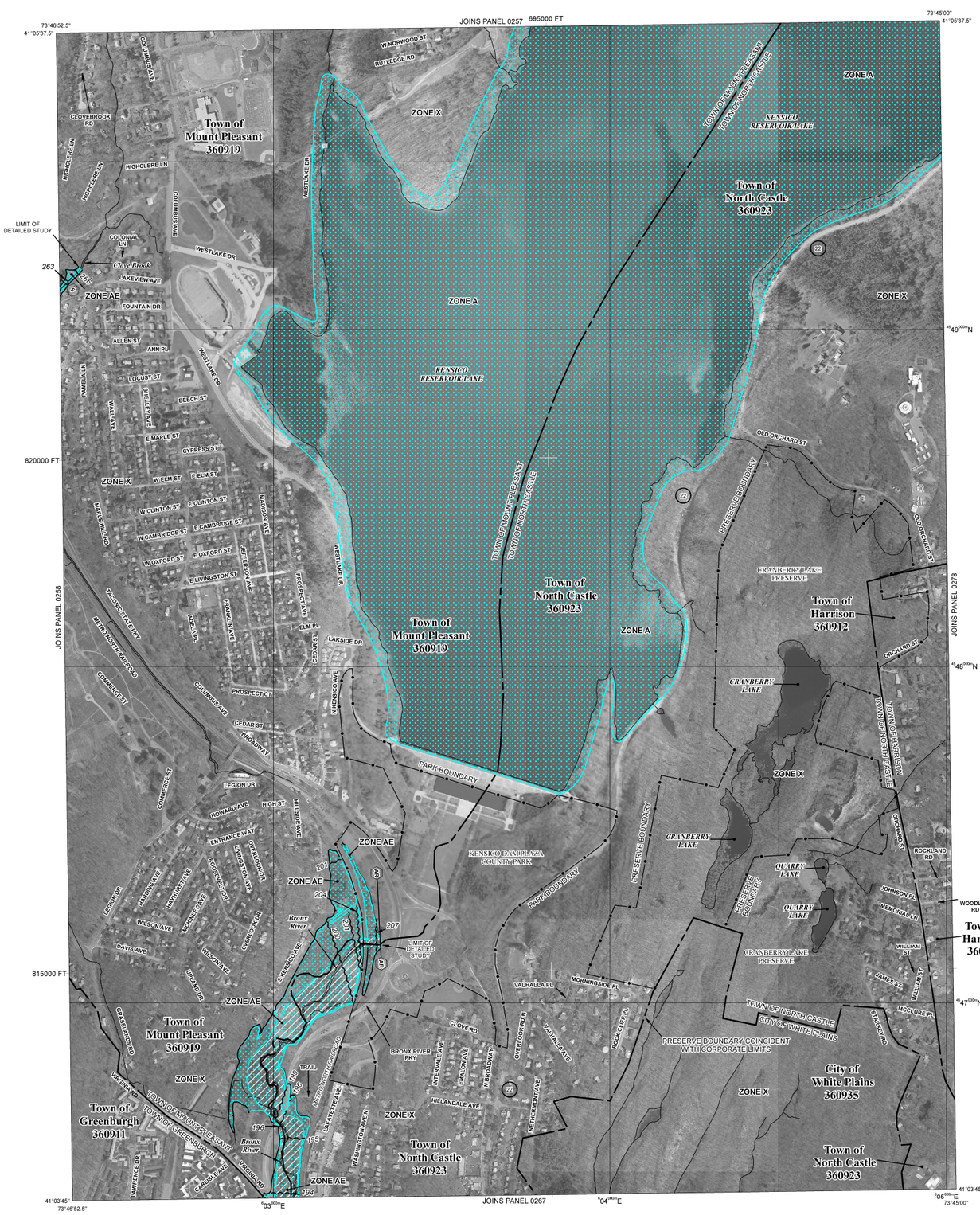
Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

- A — A — Cross section line
- 3 — 3 — Limited detail cross section line
- 23 — 23 — Transect line
- 87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 2676000mN — 1000-meter Universal Transverse Mercator grid values, zone 18N
- 600000 FT — 5000-foot grid ticks: New York State Plane coordinate system, East zone (FIPSZONE 3101), Transverse Mercator projection
- DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- ● M1.5 — River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
September 28, 2007

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0259F

FIRM

FLOOD INSURANCE RATE MAP

for WESTCHESTER COUNTY, NEW YORK (ALL JURISDICTIONS)

CONTAINS:

COMMUNITY	NUMBER
GREENBURGH, TOWN OF	360911
HARRISON, TOWN OF	360912
MOUNT PLEASANT, TOWN OF	360919
NORTH CASTLE, TOWN OF	360923
WHITE PLAINS, CITY OF	360935

PANEL 259 OF 426
MAP SUFFIX: F
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
36119C0259F

EFFECTIVE DATE
SEPTEMBER 28, 2007

Federal Emergency Management Agency


73° 46' 40" W
73° 46' 22" W
41° 5' 21" N
41° 5' 3" N
602670
602730
602790
602850
602910
602970
603030
4549380
4549320
4549260
4549200
4549140
4549080
4549020
4548960
4548900
4548840
64
Columbus Ave
Aerator Rd
Westlake Dr
Ramp
64ii
PnC
Uf
Ub
ChB
W
Soil Map may not be valid at this scale.
Map Scale: 1:2,640 if printed on A portrait (8.5" x 11") sheet.
N
Meters
0 35 70 140 210
Feet
0 100 200 400 600
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Westchester County, New York
Survey Area Data: Version 16, Jun 11, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 21, 2014—Aug 27, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
ChB	Charlton fine sandy loam, 3 to 8 percent slopes	0.0	0.1%
PnC	Paxton fine sandy loam, 8 to 15 percent slopes	0.1	0.4%
Ub	Udorthents, smoothed	20.8	85.2%
Uf	Urban land	3.5	14.2%
W	Water	0.0	0.0%
Totals for Area of Interest		**24.4**	**100.0%**

Archeological Description and Maps

In accordance with the parameters for a NYSDEC SPDES General Permit, construction activities were reviewed to ensure they do not occur within the an archeologically sensitive area. The closest Historic District is the site itself; The Kensico Reservoir Campus is located along Westlake Drive between Columbus Ave and the Kensico Reservoir in the Hamlet of Valhalla, Town of Mount Pleasant, Westchester County, with no other designated sites located within a 2000' radius. This district of six contributing buildings is directly associated with the operations of the reservoir and is part of the Catskill Aqueduct and Delaware Aqueduct systems. The district is eligible under Criterion A in the area of Engineering and Community Planning and Development, as well as Criterion C in the area of Architecture. The buildings within this district encompass a 40-year period of construction and are predominantly in the Renaissance Revival style. The period of significance extends from 1915 to 1969 and the district has integrity of location, setting, materials, workmanship, feeling, and association.

1. The Catskill Aqueduct
2. Lower Effluent Chamber, the
3. Upper Effluent Chamber, and the
4. Screen Chamber building.
5. The Fluoride Building (1943)
6. Kensico Laboratory (1955)
7. Kensico Aerator # 1 (the Catskill Aerator, construction date unknown, 2.5 acres)
8. Kensico Aerator #2 (Delaware Aerator, 1940-42, 4.2 acres),
9. Delaware Shaft No. 18 Building

Figure D-2C shows the Site location in the context of nearby archeological sensitive districts and historic properties.

CRIS Cultural Resource Information System

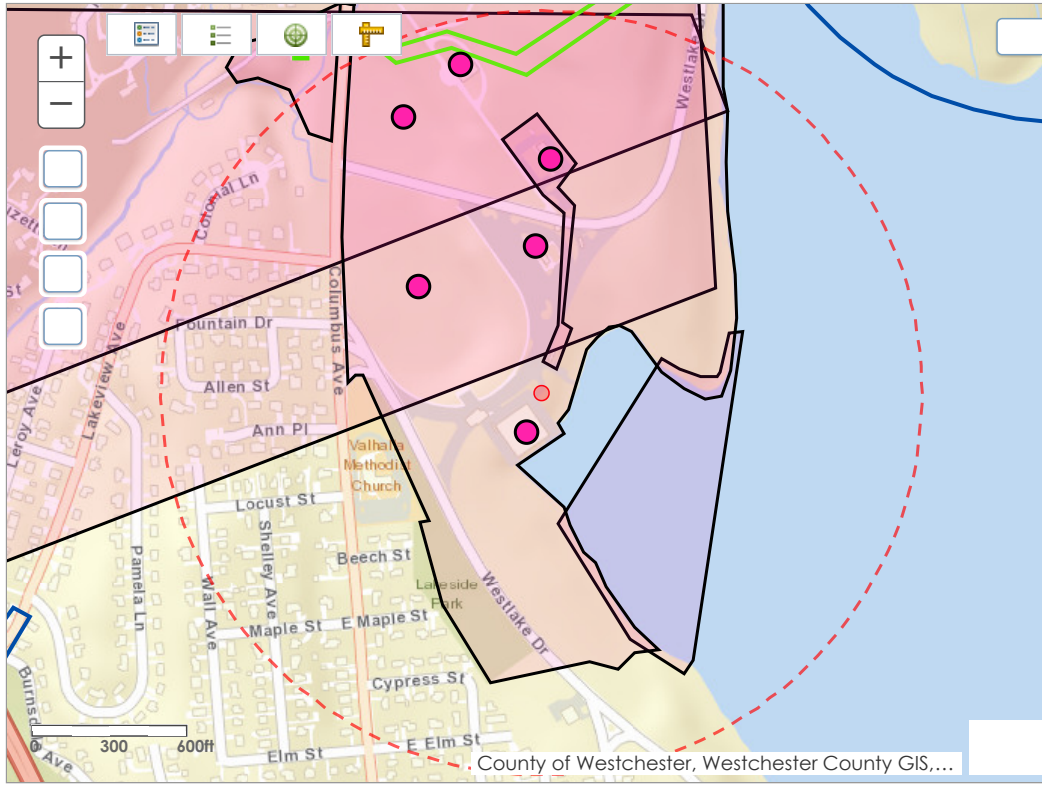
HOME SUBMIT SEARCH COMMUNICATE

Welcome Guest User | Contact Us | FAQ | Help | Si

Criteria | Spatial | Results

Building USNs (6) Download Results

Projects (4) Download Results



Version 1.2.3, Decembe

APPENDIX D
Calculations

Project	Consultant			revised	8/10/21
CAT-423 Waterfowl and Kensico Lab	Gedeon GRC Consulting	Designed By	James Causarano	Date	7/1/20
NYC DEP	6901 Jericho Turnpike	Checked By	Alan Fox	Sheet	1 of 2
Valhalla, New York	Syosset, New York 11791	Project Number	J201859_18283		

NOI Value Summary

Find Project Pre- and Post- Pervious and Impervious Area (WFM Program Building and Laboratory Buidling Development Areas)

Pre-Development (Existing)						
Total Drainage Area	Impervious	SF	acre	Pervious	SF	acre
588661 SF	Pavement/Building	41397.75	1.0	Natural Grass	273632	6.3
14 acre			0.0			0.0
	Total	41397.75	1.0	Landscape/Tree	273631	6.3
				Total	547263	12.6
	% Imp	7.03		291,150		

Post-Development (Proposed)						
Total Drainage Area	Impervious	SF	acre	Pervious	SF	acre
588661 SF	Roadway/Building	40815.94	0.9			0.0
14 acre						0.0
	Total	40815.94	0.9	Natural Grass	273632	6.3
				Landscape/Tree	315029	7.2
						0.0
	Increased Imp	-581.81		Total	588661	13.5
	I = % Imp	6				

Decrease in Impervious Area

Find project Water Quality Volume (WQv)

Follow section 4.1 of the SMDM

$$WQ_v = \frac{(P)(R_v)(A)}{12}$$

where:

WQ_v = water quality volume (in acre-feet)

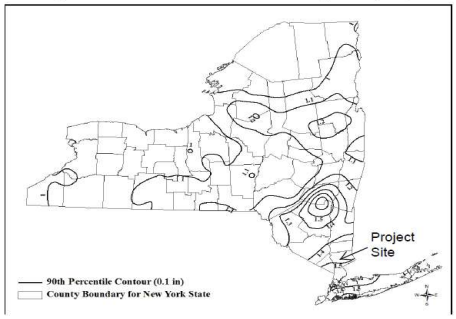
P = 90% Rainfall Event Number (see Figure 4.1)

R_v = 0.05 + 0.009(I), where I is percent impervious cover

A = site area in acres (Contributing area)

A minimum Rv of 0.2 will be applied to regulated sites.

Figure 4.1: 90th Percentile Rainfall in New York State (NYSDEC, 2013)



P = 1.5 inches of 90% Rainfall Event. Reference Figure 4.1.

R_v = 0.05 + 0.009 x I

= 0.05 + 0.009 x 6

R_v = 0.11

A = 6.5 acre

WQ_v = P x Rv x A

= 1.5 x 0.11 x 6.5

= 0.088 acre-ft

WQ_v = 3826 cubic feet

Project	Consultant			revised	8/10/21
CAT-423 Waterfowl Building	Gedeon GRC Consulting	Designed By	James Causarano	Date	7/1/20
NYC DEP	6901 Jericho Turnpike	Checked By	Alan Fox	Sheet	2 of 2
Valhalla, New York	Syosset, New York 11791	Project Number	J201859_18283		

NOI Value Summary

Find Project Pre- and Post- Pervious and Impervious Area (WFM Program Building and Laboratory Buidling Development Areas)

Pre-Development (Existing)						
Total Drainage Area	Impervious	SF	acre	Pervious	SF	acre
1015463 SF	Pavement/Building	313995.98	7.2	Natural Grass	196942	4.5
23 acre			0.0			0.0
	Total	313995.98	7.2	Landscape/Tree	504525	11.6
				Total	701467	16.1
	% Imp	31%				

Post-Development (Proposed)						
Total Drainage Area	Impervious	SF	acre	Pervious	SF	acre
1015463 SF	Roadway/Building	313966.06	7.2			0.0
23 acre				Porous Pavers	6292	0.1
	Total	313966.06	7.2	Natural Grass	196972	4.5
				Landscape/Tree	504525	11.6
						0.0
	Increased Imp. (SF)	-29.92		Total	701497	16.1
	I = % Imp	31				
	Decrease in Impervious Area					

Find project Water Quality Volume (WQv)

Follow section 4.1 of the SMDM

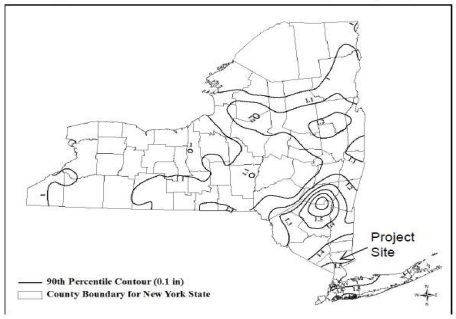
-29.92

$$WQ_v = \frac{(P)(R_v)(A)}{12}$$

where:
WQ_v = water quality volume (in acre-feet)
P = 90% Rainfall Event Number (see Figure 4.1)
R_v = 0.05 + 0.009(I), where I is percent impervious cover
A = site area in acres (Contributing area)

A minimum Rv of 0.2 will be applied to regulated sites.

Figure 4.1: 90th Percentile Rainfall in New York State (NYSDEC, 2013)



P = 1.5 inches of 90% Rainfall Event. Reference Figure 4.1.

R_v = 0.05 + 0.009 x I

= 0.05 + 0.009 x 30.92

R_v = 0.33

A = 23.3 acre

WQ_v = P x Rv x A

= 1.5 x 0.33 x 23.3

= 0.957 acre-ft

WQ_v = 41668 cubic feet

DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER & SEWER OPERATIONS

JOB Kenisico WFB SHEET 1 OF 1

LOCATION Vahalla COMPUTED BY C. DeBoma

DATE 8/1/2021 CHECKED BY J. Causarano

DATUM NAVD 1988 APPROVED BY

LOCATION	FROM	TO	ZONING	AREA UNIT	TOTAL 'A'	Design Flow: DOT RAINFALL INTENSITY (IN./HR.)	Design Flow: RUN-OFF COEFF.	Design Flow: TOTAL RUN-OFF (CFS)	SURFACE ELEVATION: UPPER END	SURFACE ELEVATION: LOWER END	COVER: UPPER END	COVER: LOWER END	INNER TOP ELEVATION: UPPER END	INNER TOP ELEVATION: LOWER END	FALL (F.T.)	LENGTH (F.T.)	SLOPE (%)	SHAPE OF SEWER	SIZE OF SEWER	Mannings Number "n"	CAPACITY OF SEWER (CFS)	VELOCITY (FPS)	TIME ELAPSED (MIN): UPPER END OF SECTION	TIME ELAPSED (MIN): IN SECTION	TIME ELAPSED (MIN): LOWER END OF SECTION	
Proposed Run to Existing Manhole in front of Shaft 18																										
Grade	Drainge Structure #5	Drainge Structure #4		0.185	0.185	6.00	0.46	0.51	362.09	364.33	3.67	6.62	358.42	357.71	0.71	71	1.00	Circular	8	0.013	1.21	3.46	5.00	0.34	5.34	
-	Roof Leader 1	Drainge Structure #3		0.057	0.057	6.00	0.95	0.32	364.83	364.25	7.00	6.79	357.83	357.46	0.37	37	1.00	Circular	6	0.013	0.56	2.86	5.00	0.22	5.22	
Grade	Drainge Structure #4	Drainge Structure #3		0.188	0.430	6.00	0.85	2.19	364.33	364.25	6.72	6.79	357.61	357.46	0.15	16	0.94	Circular	12	0.013	3.45	4.39	5.22	0.06	5.28	
Grade	Drainge Structure #3	Drainge Structure #2		0.052	0.539	6.00	0.85	2.75	364.25	364.35	6.89	7.99	357.36	356.36	1.00	100	1.00	Circular	12	0.013	3.56	4.54	5.22	0.37	5.58	
-	Roof Leader 2	Drainge Structure #2		0.057	0.057	6.00	0.95	0.32	364.83	364.35	8.29	7.99	356.54	356.36	0.18	18	1.00	Circular	6	0.013	0.56	2.86	5.00	0.10	5.10	
Grade	Drainge Structure #2	Storm Chambers		0.034	0.573	6.00	0.85	2.92	364.35	363.59	8.09	7.95	356.26	355.64	0.62	62	1.00	Circular	12	0.013	3.56	4.54	5.58	0.23	5.81	
Grade	Storm Chambers	CDS Stormwater Unit		0.000	0.573	6.00	0.85	2.92	363.00	363.00	7.36	7.76	355.64	355.24	0.40	40	1.00	Circular	12	0.013	3.56	4.54	5.81	0.15	5.96	
Grade	CDS Stormwater Unit	Drainge Structure #1		0.000	0.573	6.00	0.85	2.92	363.00	362.19	7.86	7.44	355.14	354.75	0.39	39	1.00	Circular	12	0.013	3.56	4.54	5.96	0.14	6.10	
Grade	Drainge Structure #1	Existing Structure		0.607	1.179	6.00	0.88	6.23	362.19	362.46	7.54	9.11	354.65	353.35	1.30	129	1.01	Circular	16	0.013	7.70	5.52	6.10	0.39	6.49	
		Sum		1.179												512										
Proposed Run to Riprap for Lab Building																										
Grade	Drainge Structure #1	Storm Manhole #1		1.880	1.880	6.00	0.85	9.59	364.23	364.35	5.00	5.34	359.23	359.01	0.44	22	2.00	Circular	16	0.013	10.85	7.77	5.00	0.05	5.05	
Grade	Foundation Drain	Storm Manhole #1		0.002	0.002	6.00	0.85	0.01	364.78	364.35	3.33	3.40	361.45	360.95	0.50	50	1.00	Circular	2	0.013	0.03	1.37	5.00	0.61	5.61	
Grade	Storm Manhole #1	Drainge Structure #2		0.000	1.882	6.00	0.85	9.60	364.35	364.10	5.45	5.69	358.90	358.41	0.49	49	1.00	Circular	18	0.013	10.50	5.94	5.05	0.14	5.18	
Grade	Drainge Structure #2	Storm Manhole #2		0.012	1.894	6.00	0.85	9.66	364.10	361.31	7.08	5.00	357.02	356.31	0.71	71	1.00	Circular	18	0.013	10.50	5.94	5.18	0.20	5.38	
Grade	Drainge Structure #3	Drainge Structure #4		5.860	5.860	6.00	0.37	13.01	359.98	361.02	5.00	7.33	354.98	353.69	2.58	129	2.00	Circular	18	0.013	14.86	8.41	5.00	0.26	5.26	
Grade	Drainge Structure #4	Drainge Structure #2		0.075	5.935	6.00	0.42	14.96	361.02	361.31	7.43	8.04	353.59	353.27	0.32	32	1.00	Circular	24	0.013	22.62	7.20	5.26	0.07	5.33	
Grade	Storm Manhole #2	Drainge Structure #5		0.000	7.829	6.00	0.85	39.93	361.61	361.80	8.44	8.83	353.17	352.97	0.35	20	1.75	Circular	27	0.013	40.97	10.30	5.33	0.03	5.36	
Grade	Drainge Structure #7	Storm Manhole #3		0.052	0.052	6.00	0.85	0.27	362.78	363.19	5.00	5.74	357.78	357.45	0.33	33	1.00	Circular	12	0.013	3.56	4.54	5.00	0.12	5.12	
Grade	Storm Manhole #3	Drainge Structure #6		0.000	0.052	6.00	0.85	0.27	363.19	363.13	5.84	6.18	357.35	356.95	0.40	40	1.00	Circular	12	0.013	3.56	4.54	5.12	0.15	5.27	
Grade	Drainge Structure #6	Drainge Structure #5		1.238	1.290	6.00	0.20	1.55	363.13	361.80	6.28	5.68	356.85	356.12	0.73	73	1.00	Circular	18	0.013	10.50	5.94	5.27	0.20	5.47	
Grade	Drainge Structure #5	CDS Stormwater Unit		0.182	9.301	6.00	0.63	35.16	361.80	361.24	8.93	8.60	352.87	352.64	0.35	23	1.50	Circular	27	0.013	37.93	9.54	5.36	0.04	5.40	
Grade	CDS Stormwater Unit	Rip Rap Unit		0.000	9.301	6.00	0.85	47.44	361.24	356.50	8.76	5.10	352.48	351.40	1.73	72	2.40	Circular	27	0.013	47.98	12.07	5.40	0.10	5.50	
		Sum		9.301												614										

Date: 7/16/2020
Project: Kensico Laboratory
Location: White Plains, NY
Prepared For: Gedeon GRC Consulting

Purpose: To calculate the water quality flow rate (Qwq) over a given site area. In this situation the WQv to be analyzed is the runoff produced by the first 1.5 inch(es) of rainfall, per Fig 4.1 of the New York State Stormwater Management Design Manual

Reference: United States Department of Agriculture Natural Resources Conservation Service TR-55 Manual, New York State Stormwater Management Design Manual - 2015

Formulas:

$$WQv = \frac{(P)(R_v)(A)}{12}$$

$$R_v = (0.05+0.009(I)$$

$$CN = 1000/[10+5P+10Qa-10(Qa^2+1.25QaP)^{1/2}]$$

$$Qwq = (q_u)*(A)*(Qa)$$

Structure: WQL1

P	1.50	in.
A	1.624	ac
I	99.77	%
t_c	6.0	min.
t_c	0.100	hr.
R_v	0.948	
90% WQv	0.192	ac-ft
90% WQv	8380.94	ft^3
Qa	1.422	in.
CN	99.33	
I_a	0.041	
I_a/P	0.027	
qu	650	(csm/in)
A	0.00254	$miles^2$
Qwq	2.34	cfs

Date: 8/2/2021
Project: Water-Fowl Management Program
Location: White Plains, NY
Prepared For: James Causarano

Purpose: To calculate the water quality flow rate (Qwq) over a given site area. In this situation the WQv to be analyzed is the runoff produced by the first 1.5 inch(es) of rainfall, per Fig 4.1 of the New York State Stormwater Management Design Manual

Reference: United States Department of Agriculture Natural Resources Conservation Service TR-55 Manual, New York State Stormwater Management Design Manual - 2015

Formulas:

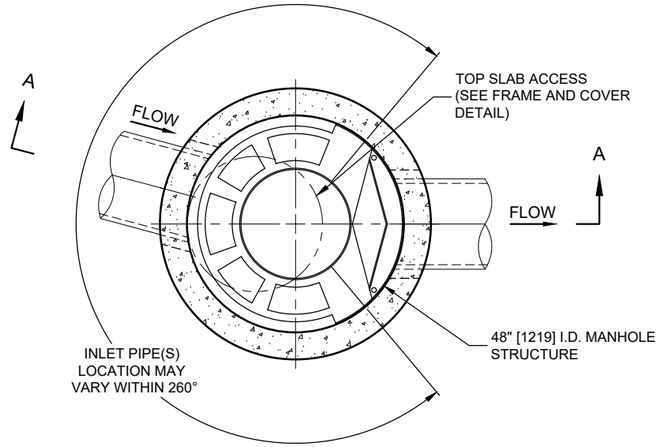
$$WQv = \frac{(P)(R_v)(A)}{12}$$

$$R_v = (0.05+0.009(I)$$

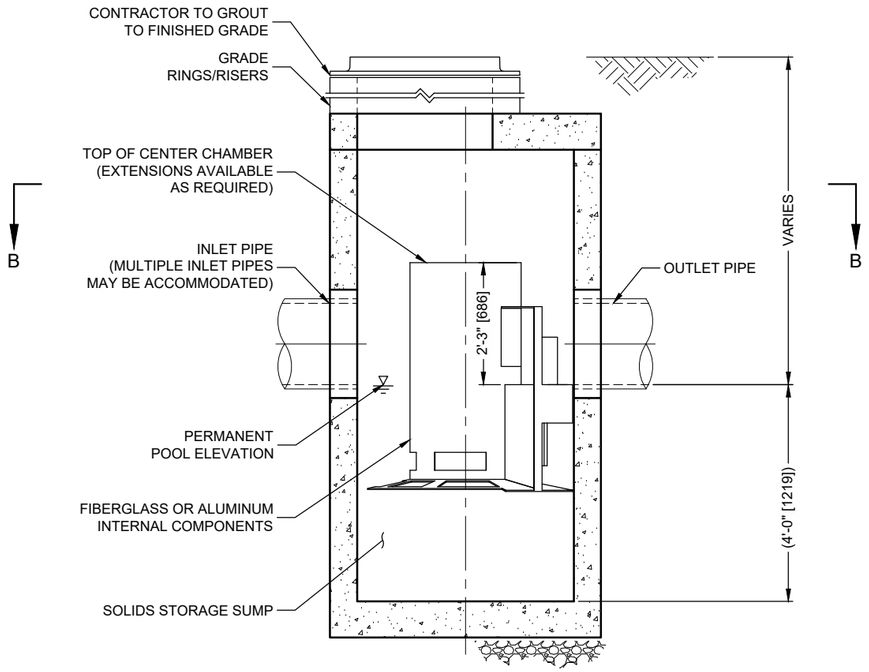
$$CN = 1000/[10+5P+10Qa-10(Qa^2+1.25QaP)^{1/2}]$$

$$Qwq = (q_u)*(A)*(Qa)$$

Structure:	WQWF1		**Structure:**	WQWF2	
P	1.50	in.	P	2.80	in.
A	2.580	ac	A	2.580	ac
I	100.00	%	I	100.00	%
t_c	6.0	min.	t_c	6.0	min.
t_c	0.100	hr.	t_c	0.100	hr.
R_v	0.95		R_v	0.95	
90% WQv	0.306	ac-ft	90% WQv	0.572	ac-ft
90% WQv	13346.78	ft^3	90% WQv	24911.96	ft^3
Qa	1.425	in.	Qa	2.660	in.
CN	99.36		CN	98.81	
I_a	0.041		I_a	0.041	
I_a/P	0.027		I_a/P	0.015	
qu	650	(csm/in)	qu	650	(csm/in)
A	0.00403	$miles^2$	A	0.00403	$miles^2$
Qwq	3.73	cfs	Qwq	6.97	cfs



PLAN VIEW B-B
NOT TO SCALE



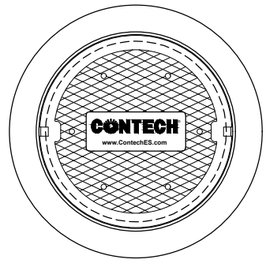
ELEVATION A-A
NOT TO SCALE

CASCADE
separator™

CASCADE SEPARATOR DESIGN NOTES

THE STANDARD CS-4 CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

CONFIGURATION DESCRIPTION
GRATED INLET ONLY (NO INLET PIPE)
GRATED INLET WITH INLET PIPE OR PIPES
CURB INLET ONLY (NO INLET PIPE)
CURB INLET WITH INLET PIPE OR PIPES



FRAME AND COVER
(DIAMETER VARIES)
NOT TO SCALE

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	
WATER QUALITY FLOW RATE (cfs [L/s])	
PEAK FLOW RATE (cfs [L/s])	
RETURN PERIOD OF PEAK FLOW (yrs)	
RIM ELEVATION	

PIPE DATA:	INVERT	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			

NOTES / SPECIAL REQUIREMENTS:

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR SITE SPECIFIC DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
3. CASCADE SEPARATOR WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
4. CASCADE SEPARATOR STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 2' [610], AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.
5. CASCADE SEPARATOR STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C478 AND AASHTO LOAD FACTOR DESIGN METHOD.
6. ALTERNATE UNITS ARE SHOWN IN MILLIMETERS [mm].

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CASCADE SEPARATOR MANHOLE STRUCTURE.
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT INLET AND OUTLET PIPE(S). MATCH PIPE INVERTS WITH ELEVATIONS SHOWN. ALL PIPE CENTERLINES TO MATCH PIPE OPENING CENTERLINES.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

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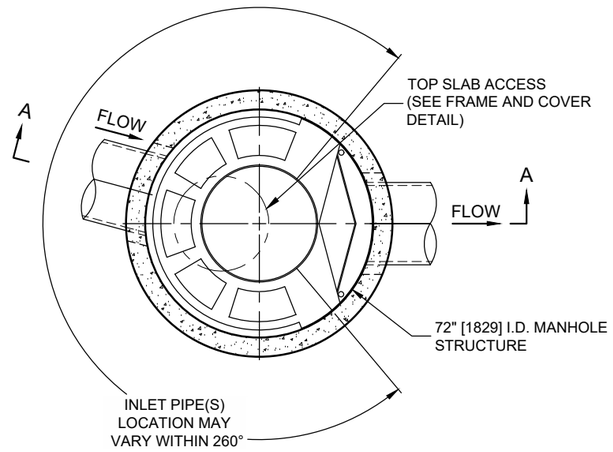
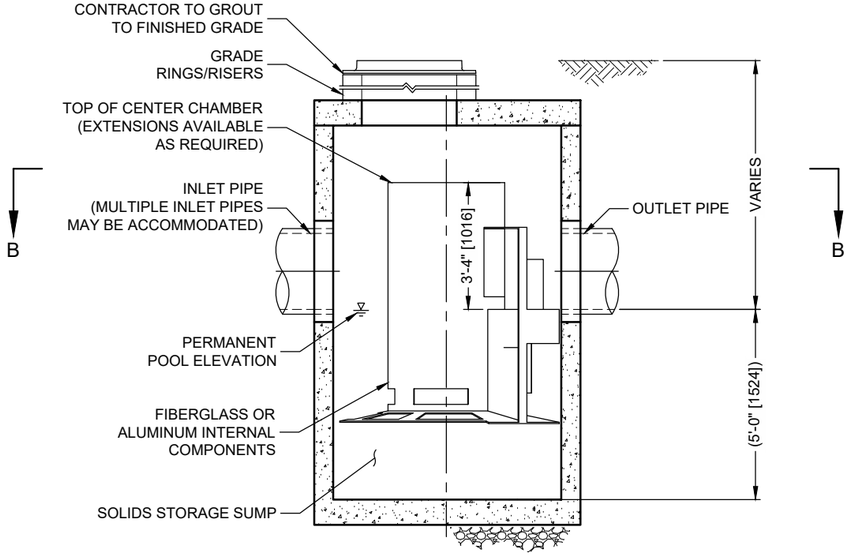
CS-4
CASCADE SEPARATOR
STANDARD DETAIL



PLAN VIEW B-B
NOT TO SCALE

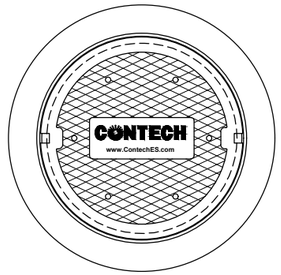


ELEVATION A-A
NOT TO SCALE

CASCADE SEPARATOR DESIGN NOTES

THE STANDARD CS-6 CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

CONFIGURATION DESCRIPTION
GRATED INLET ONLY (NO INLET PIPE)
GRATED INLET WITH INLET PIPE OR PIPES
CURB INLET ONLY (NO INLET PIPE)
CURB INLET WITH INLET PIPE OR PIPES



FRAME AND COVER
(DIAMETER VARIES)
NOT TO SCALE

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	
WATER QUALITY FLOW RATE (cfs [L/s])	
PEAK FLOW RATE (cfs [L/s])	
RETURN PERIOD OF PEAK FLOW (yrs)	
RIM ELEVATION	

PIPE DATA:	INVERT	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			

NOTES / SPECIAL REQUIREMENTS:

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR SITE SPECIFIC DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
3. CASCADE SEPARATOR WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
4. CASCADE SEPARATOR STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 2' [610], AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.
5. CASCADE SEPARATOR STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C478 AND AASHTO LOAD FACTOR DESIGN METHOD.
6. ALTERNATE UNITS ARE SHOWN IN MILLIMETERS [mm].

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CASCADE SEPARATOR MANHOLE STRUCTURE.
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT INLET AND OUTLET PIPE(S). MATCH PIPE INVERTS WITH ELEVATIONS SHOWN. ALL PIPE CENTERLINES TO MATCH PIPE OPENING CENTERLINES.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CASCADE separator™

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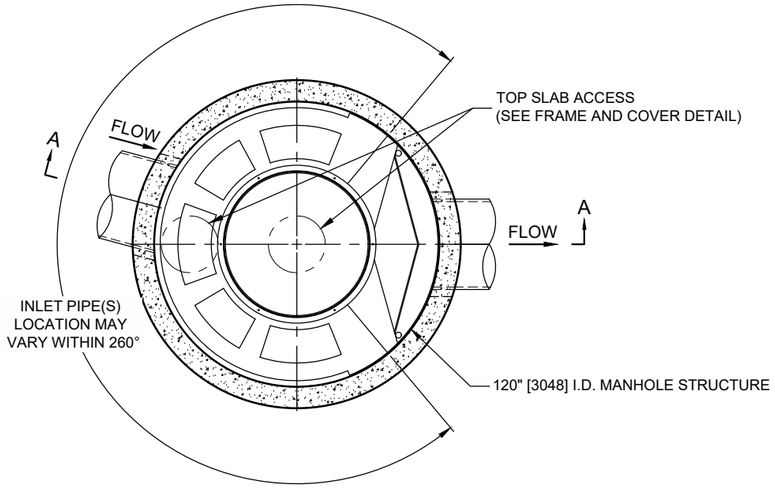
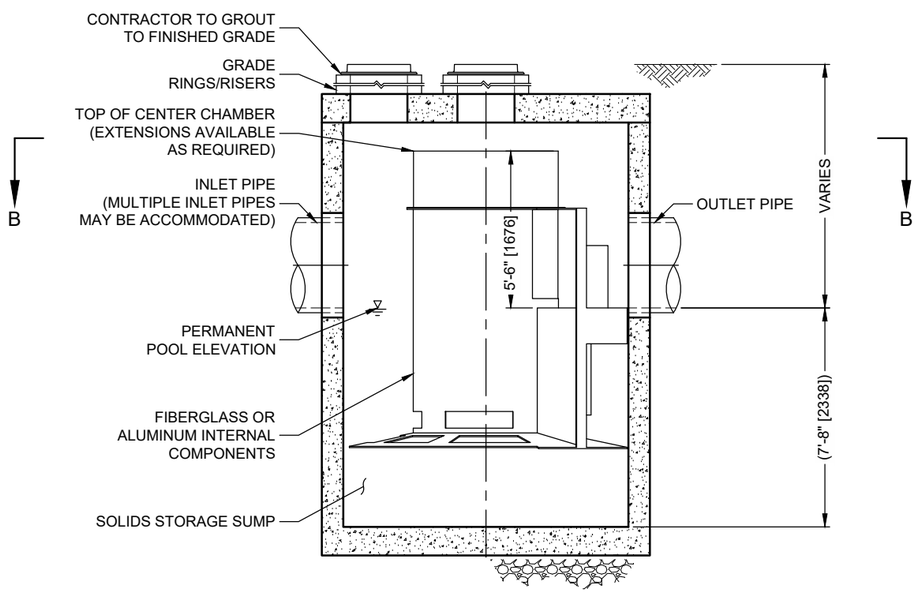
CS-6
CASCADE SEPARATOR
STANDARD DETAIL



PLAN VIEW B-B
NOT TO SCALE



ELEVATION A-A
NOT TO SCALE

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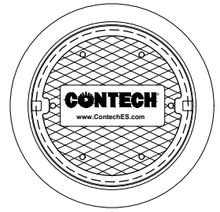
CASCADE SEPARATOR DESIGN NOTES

THE STANDARD CS-10 CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

INTERNAL COMPONENTS WILL BE FIELD INSTALLED. CONTACT YOUR CONTECH REPRESENTATIVE FOR ADDITIONAL INFORMATION.

CONFIGURATION DESCRIPTION
GRATED INLET ONLY (NO INLET PIPE)
GRATED INLET WITH INLET PIPE OR PIPES
CURB INLET ONLY (NO INLET PIPE)
CURB INLET WITH INLET PIPE OR PIPES



FRAME AND COVER
(DIAMETER VARIES)
NOT TO SCALE

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	
WATER QUALITY FLOW RATE (cfs [L/s])	
PEAK FLOW RATE (cfs [L/s])	
RETURN PERIOD OF PEAK FLOW (yrs)	
RIM ELEVATION	

PIPE DATA:	INVERT	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			

NOTES / SPECIAL REQUIREMENTS:

GENERAL NOTES
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CS-10
CASCADE SEPARATOR
STANDARD DETAIL

Cpv Required 24 hour extended detention of post-developed 1-year,

24-hour storm event;Developed Storm Flow, Detention Calculations

Site Developed Storm Flow in CFS

non-gn.rf.	*4965*	*paved*	*16247*	*grass*	*5360*	*plntd.,lndscpd.*	**A_S(ft²) 26572**
gn.rf.-4in.dpth.		*grvl. parking lot*		*bio-swale*		*synth. ath. fld.*	**C_{WT} 0.738**
prs. asphlt./conc.		*undeveloped*		*OtherArea*		*OtherC $_{RO}$*	**Q_{DEV}(cfs) 1.575**

4 - Sub- surface Detention Volume Required in ft³

non.gn.un-rst.rf.	*prs. asphlt./conc.*	*paved*	*plntd.,lndscpd.*		**A_t(ft²) 26572**
non-gn.ct.fl.rf.	*grvl. parking lot*	*grass*	*undeveloped*		**C_{WT} 0.738**
gn.rf.-4in.dpth.	*OtherDet.Area*	*bio-swale*	*synth. ath. fld.*		
gn.ct.fl.rf.-4in.	*OtherDet. C_{WE}*		*OtherArea*	*OtherC $_{RO}$*	
		Q_{DRR}(cfs) 1.500	*Aprx.Cnst.Orf.or*	*Avg.Pmp.Rt. Q_{DRR}(cfs)*	

t_V(min) 15.86
t_C(min) #DIV/0!

Req.Vol. - Varying Outflow; CP_V(ft³) 962

5 - Maximum Storage Depth in ft.

Max.Release Rate		d_O(*in.*)	**1.0 dia.Re-ent. Tube**			**Flush Tube**		
Q_{DRR}(*cfs*)	*1.500*	*12.00*	**S_{DR}**	**0.71**	**ft.**	**S_{DF}**	**0.65**	**ft.**

6 - Maximum Release Rate in cfs

Storage Depth		d_O(*in.*)	**1.0 dia.Re-ent. Tube**	**Flush Tube**
S_D(*ft.*)	*0.65*	*12.00*	**Q_{DRR}-*cfs* 1.277**	**Q_{DRR}-*cfs* 1.500**

7 - Maximum Release Rate in cfs

Provided Storage ***1 chamber =*** ***50.5 CF***

X 20 Chambers = **Provided Vol. - Varying Outflow; CP_V(CF)** ***1010.60***

The abbreviations are as follows:

Under **1 – Site Developed Storm Flow in CFS**

non-gn.rf. - non green roof area in ft²

gn.rf.-4in.dpth. - green roof area in ft² with at least 4 inch media depth;

prs. asphlt/conc. – porous asphalt or porous concrete pavement area in ft²

paved – non porous asphalt or concrete pavement area in ft²

grvl. parking lot – gravel parking lot area in ft²

plntd.,lndscpd – planted or landscaped area in ft²

synth. ath. fld. – synthetic turf athletic field area in ft² with gravel bed and under drains

Under **2 – Roof Detention Volume Required in ft³**

a) <u>Non-Green Roof:</u>

non-gn.ct.fl.rf. (*ft* ^{2}) – non green roof area in ft^2 with flow to be restricted by controlled flow drains

rf.ar.avil.-det.vol (*ft* ^{2}) – area in ft^2 of roof available for detention volume (area of roof to be restricted minus parapet walls, bulkheads, access hatches, and skylights)

 # drns. – number of controlled flow drains proposed

 # wrs/drn. – number of weirs or orifices per drain (normally 1)

gpm/in./wr. – flow rate in gallons per minute per inch of the controlled flow drain proposed

hgt.sec.drn./pri.drn. (*in.*) – height in inches of the secondary drains or scuppers above the primary drains (as per DOB minimum of 2 inches and maximum of 4 inches)

slope (*in./ft.*) – slope of the roof in inches per foot (normally 1/8 in/ft, 0.125, minimum 1/16 in/ft, 0.063)

b) <u>Green Roof: 4 in. media</u>

gn.ct.fl.rf.4in. (*ft* ^{2}) – area in ft^2 of green roof with at least 4 inches of media depth with flow to be restricted by controlled flow drains

Under **4 – <u>Sub-surface Detention Volume Required in ft^3</u>**

non.gn.un-rst.rf. – area in ft^2 of unrestricted non green roof discharging to the sub-surface detention facility

non.gn.ct.fl.rf. - area in ft^2 of restricted non green roof discharging to the sub-surface detention facility, (all information must be entered in **2- <u>Roof Detention Volume Required in ft^3</u>**, **a) <u>Non Green Roof:</u>**, above)

gn.rf.-4in.dpth. - unrestricted green roof area in ft^2 with at least 4 inch media depth discharging to the sub-surface detention facility

gn.ct.fl.rf.4in. - area in ft^2 of restricted green roof discharging to the sub-surface detention facility, (all information must be entered in **2- <u>Roof Detention Volume Required in ft^3</u>**, **b) <u>Green Roof: 4 in. media</u>**, above)

Existing Drainage Tributary Areas (Water-fowl Management Building)

	Total Area	Pervious	Non Pervious
Area 1	9,199.71	0.00	9,199.71
Area 2	6,767.86	168.29	6,599.57
Area 3	7,531.21	1,310.64	6,220.57
Area 4	9,107.26	604.34	8,502.92
Area 5	8,690.02	0.00	8,690.02
Area 6	14,746.81	1,731.99	13,014.82
Area 7	22,735.00	8,326.32	14,408.68
Area 8	12,743.15	903.08	11,840.07
Area 9	4,445.83	0.00	4,445.83
Area 10	5,443.39	1,918.97	3,524.42
Area 11	14,833.65	1,947.84	12,885.81
Area 12	9,434.11	0.00	9,434.11
Area 13	22,500.99	1,645.10	20,855.89
Area 14	11,792.23	422.46	11,369.77
Area 15	5,343.51	0.00	5,343.51
Area 16	6,773.17	949.41	5,823.76
Area 17	7,933.79	0.00	7,933.79
Area 18	278,682.74	277,884.12	798.62
Area 19	184,655.77	183,100.97	1,554.80
Area 20	9,571.31	0.00	9,571.31
Area 21	17,970.22	1,787.66	16,182.56
Area 22	19,359.23	2,708.54	16,650.69
Area 23	26,438.68	0.00	26,438.68
Area 24	19,495.66	0.00	19,495.66
Area 25	8,843.29	0.00	8,843.29
Area 26	118,815.18	91,549.54	27,265.64
Area 27	18,306.45	0.00	18,306.45
Area 28	43,695.50	43,539.80	155.70
Area 29	82,729.24	80,605.21	2,124.03
Area 30	6,878.18	362.88	6,515.30
Totals	1,015,463.14	701,467.16	313,995.98
Totals	23.31	16.10	7.21

Existing Drainage Tributary Areas (Laboratory Building)

	Total Area	Pervious	Non Pervious
Area 31	430,466.00	389,068.25	41,397.75
Area 32	158,195.25	158,195.25	0.00
	588,661.25	547,263.50	41,397.75
Total	13.51	12.56	0.95

Proposed Drainage Tributary Areas

	Total Area	Pervious	Non Pervious
Area 1	9,199.71	0.00	9,199.71
Area 2	6,767.86	168.29	6,599.57
Area 3	11,510.06	0.00	11,510.06
Area 4	14,608.74	0.00	14,608.74
Area 5	14,746.81	1,731.93	13,014.88
Area 6	22,735.00	8,326.32	14,408.68
Area 7	12,743.15	903.08	11,840.07
Area 8	4,445.83	0.00	4,445.83
Area 9	5,443.39	1,918.97	3,524.42
Area 10	15,262.11	1,947.85	13,314.26
Area 11	9,005.66	0.00	9,005.66
Area 12	22,500.99	1,645.21	20,855.78
Area 13	11,792.23	422.46	11,369.77
Area 14	5,343.51	0.00	5,343.51
Area 15	6,773.17	949.41	5,823.76
Area 16	7,933.79	0.00	7,933.79
Area 17	278,682.74	277,884.12	798.62
Area 18	184,655.77	183,100.97	1,554.80
Area 19	8,186.21	3,778.00	4,408.21
Area 20	22,653.64	5,222.54	17,431.10
Area 21	11,995.40	5,360.05	6,635.35
Area 22	15,268.51	1,787.66	13,480.85
Area 23	26,438.68	0.00	26,438.68
Area 24	19,495.66	0.00	19,495.66
Area 25	8,843.29	0.00	8,843.29
Area 26	118,815.18	91,549.54	27,265.64
Area 27	18,306.45	0.00	18,306.45
Area 28	43,692.50	43,539.80	152.70
Area 29	70,738.92	70,576.00	162.92
Area 30	6,878.18	362.88	6,515.30
Total	1,015,463.14	701,175.08	314,288.06
	23.31	16.10	7.22

Proposed Drainage Tributary Areas (Laboratory Building)

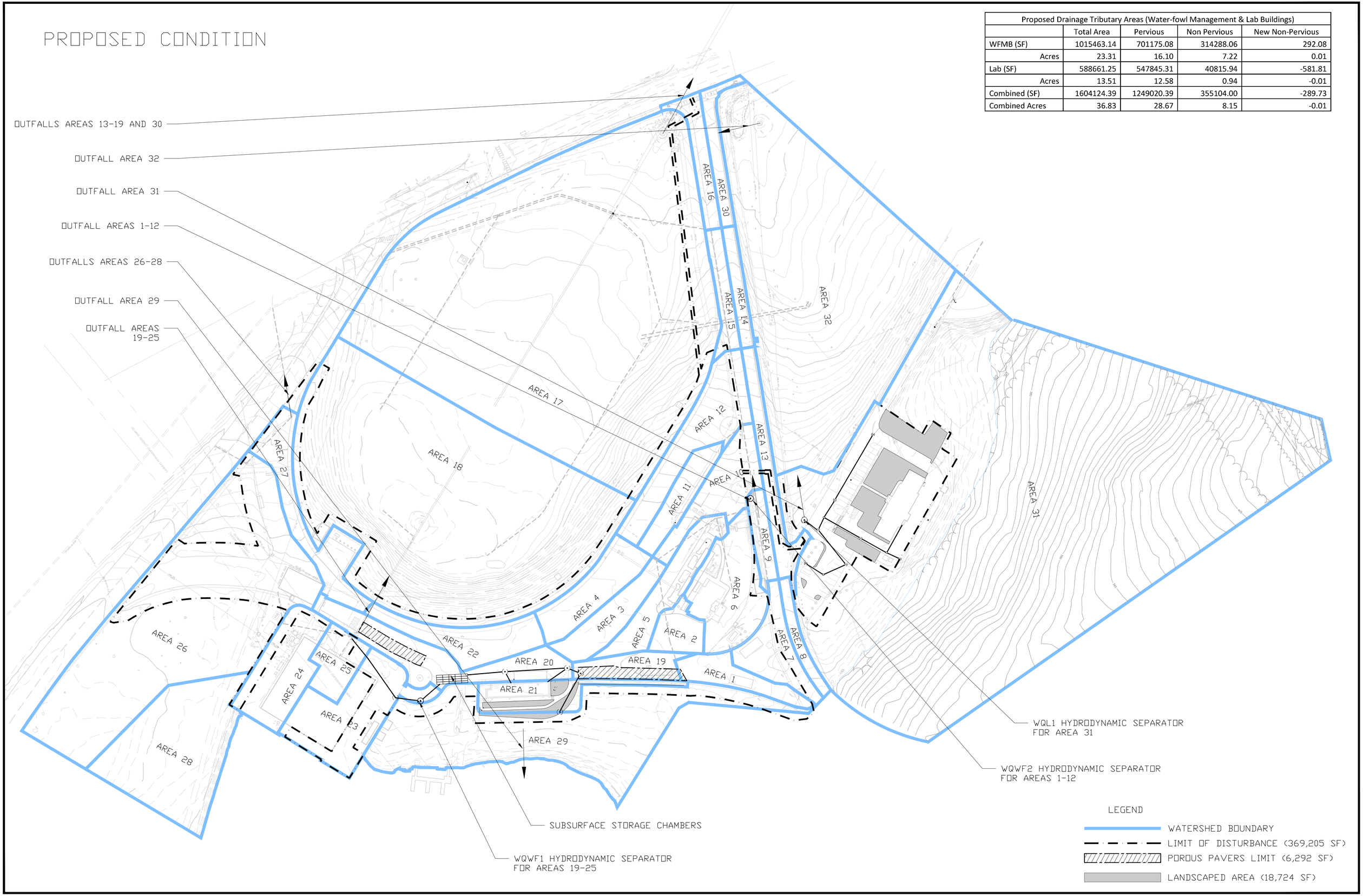
	Total Area	Pervious	Non Pervious
Area 31	430,466.00	389,650.06	40,815.94
Area 32	158,195.25	158,195.25	0.00
	588,661.25	547,845.31	40,815.94
Total	13.51	12.58	0.94

EXISTING CONDITION

Existing Drainage Tributary Areas (Water-fowl Management & Lab Buildings)			
	Total Area	Pervious	Non Pervious
WFMB (SF)	1015463.14	701467.16	313995.98
Acres	23.31	16.10	7.21
Lab (SF)	588,661.25	547,263.50	41,397.75
Acres	13.51	12.56	0.95
Combined (SF)	1,604,124.39	1,248,730.66	355,393.73
Acres	36.83	28.67	8.16

PROPOSED CONDITION

Proposed Drainage Tributary Areas (Water-fowl Management & Lab Buildings)				
	Total Area	Pervious	Non Pervious	New Non-Pervious
WFMB (SF)	1015463.14	701175.08	314288.06	292.08
Acres	23.31	16.10	7.22	0.01
Lab (SF)	588661.25	547845.31	40815.94	-581.81
Acres	13.51	12.58	0.94	-0.01
Combined (SF)	1604124.39	1249020.39	355104.00	-289.73
Combined Acres	36.83	28.67	8.15	-0.01



Hydraflow Table of Contents

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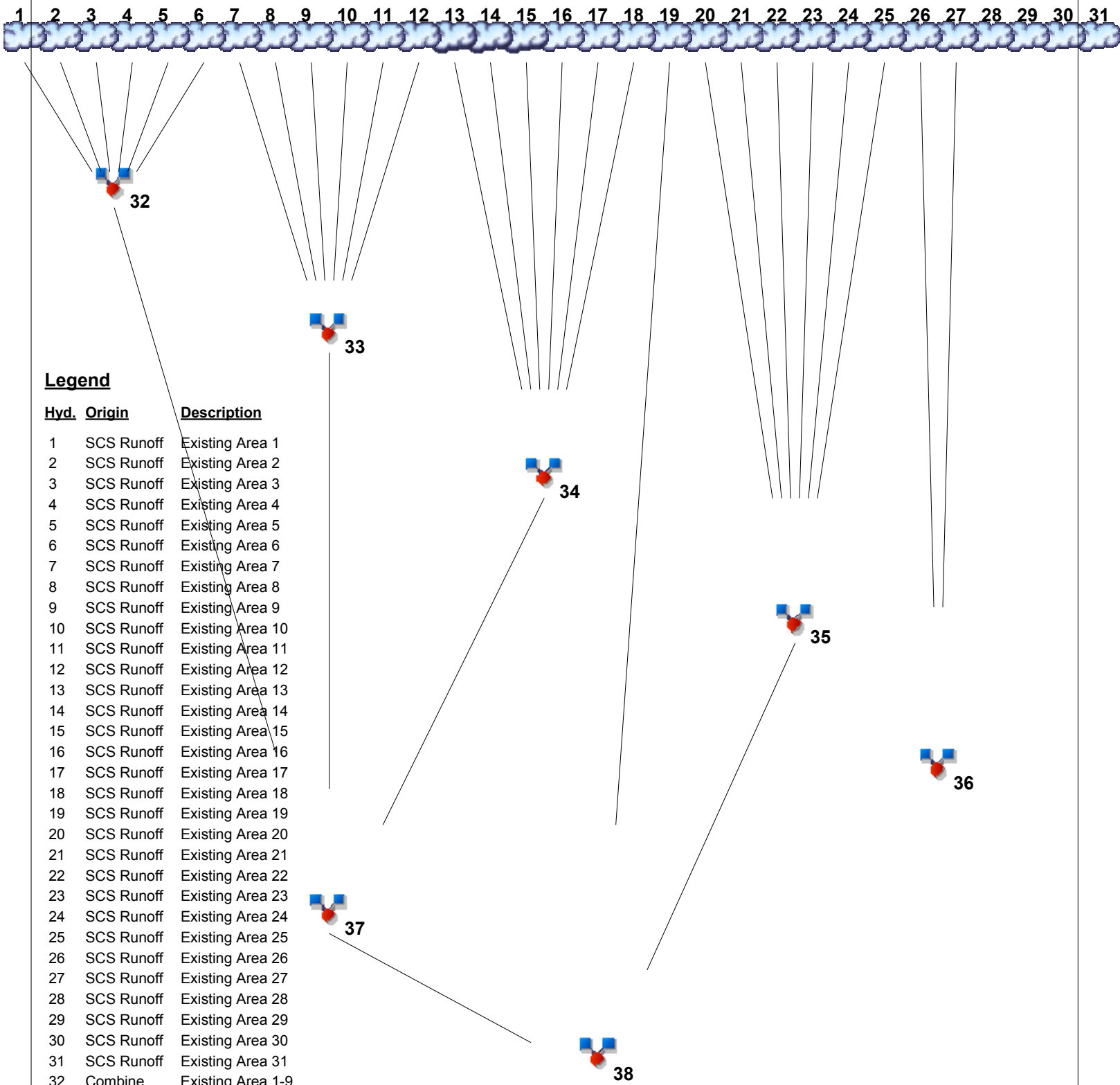
Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020



Legend

Hyd.	Origin	Description
1	SCS Runoff	Existing Area 1
2	SCS Runoff	Existing Area 2
3	SCS Runoff	Existing Area 3
4	SCS Runoff	Existing Area 4
5	SCS Runoff	Existing Area 5
6	SCS Runoff	Existing Area 6
7	SCS Runoff	Existing Area 7
8	SCS Runoff	Existing Area 8
9	SCS Runoff	Existing Area 9
10	SCS Runoff	Existing Area 10
11	SCS Runoff	Existing Area 11
12	SCS Runoff	Existing Area 12
13	SCS Runoff	Existing Area 13
14	SCS Runoff	Existing Area 14
15	SCS Runoff	Existing Area 15
16	SCS Runoff	Existing Area 16
17	SCS Runoff	Existing Area 17
18	SCS Runoff	Existing Area 18
19	SCS Runoff	Existing Area 19
20	SCS Runoff	Existing Area 20
21	SCS Runoff	Existing Area 21
22	SCS Runoff	Existing Area 22
23	SCS Runoff	Existing Area 23
24	SCS Runoff	Existing Area 24
25	SCS Runoff	Existing Area 25
26	SCS Runoff	Existing Area 26
27	SCS Runoff	Existing Area 27
28	SCS Runoff	Existing Area 28
29	SCS Runoff	Existing Area 29
30	SCS Runoff	Existing Area 30
31	SCS Runoff	Existing Area 31
32	Combine	Existing Area 1-9
33	Combine	Existing Area 7-12
34	Combine	Existing Area 13-18
35	Combine	Existing Area 20-25
36	Combine	Existing Area 26-27
37	Combine	Existing Area 1-18
38	Combine	Existing Area to Drainage Under Aerator

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	0.881	-------	-------	-------	1.589	1.910	-------	2.391	Existing Area 1
2	SCS Runoff	------	0.549	-------	-------	-------	1.002	1.207	-------	1.513	Existing Area 2
3	SCS Runoff	------	0.510	-------	-------	-------	0.959	1.161	-------	1.463	Existing Area 3
4	SCS Runoff	------	0.744	-------	-------	-------	1.357	1.634	-------	2.048	Existing Area 4
5	SCS Runoff	------	0.841	-------	-------	-------	1.517	1.823	-------	2.282	Existing Area 5
6	SCS Runoff	------	1.340	-------	-------	-------	2.477	2.989	-------	3.754	Existing Area 6
7	SCS Runoff	------	0.859	-------	-------	-------	1.766	2.176	-------	2.785	Existing Area 7
8	SCS Runoff	------	1.168	-------	-------	-------	2.130	2.565	-------	3.215	Existing Area 8
9	SCS Runoff	------	0.420	-------	-------	-------	0.757	0.910	-------	1.138	Existing Area 9
10	SCS Runoff	------	0.367	-------	-------	-------	0.745	0.915	-------	1.168	Existing Area 10
11	SCS Runoff	------	1.377	-------	-------	-------	2.543	3.068	-------	3.853	Existing Area 11
12	SCS Runoff	------	0.909	-------	-------	-------	1.639	1.970	-------	2.466	Existing Area 12
13	SCS Runoff	------	2.151	-------	-------	-------	3.921	4.720	-------	5.917	Existing Area 13
14	SCS Runoff	------	1.115	-------	-------	-------	2.032	2.445	-------	3.065	Existing Area 14
15	SCS Runoff	------	0.504	-------	-------	-------	0.908	1.091	-------	1.366	Existing Area 15
16	SCS Runoff	------	0.632	-------	-------	-------	1.185	1.433	-------	1.804	Existing Area 16
17	SCS Runoff	------	0.756	-------	-------	-------	1.362	1.637	-------	2.049	Existing Area 17
18	SCS Runoff	------	12.95	-------	-------	-------	33.98	44.11	-------	59.55	Existing Area 18
19	SCS Runoff	------	5.232	-------	-------	-------	14.39	18.84	-------	25.60	Existing Area 19
20	SCS Runoff	------	0.925	-------	-------	-------	1.669	2.006	-------	2.510	Existing Area 20
21	SCS Runoff	------	0.968	-------	-------	-------	1.802	2.177	-------	2.737	Existing Area 21
22	SCS Runoff	------	0.900	-------	-------	-------	1.705	2.067	-------	2.607	Existing Area 22
23	SCS Runoff	------	2.566	-------	-------	-------	4.628	5.561	-------	6.961	Existing Area 23
24	SCS Runoff	------	1.893	-------	-------	-------	3.414	4.103	-------	5.135	Existing Area 24
25	SCS Runoff	------	0.840	-------	-------	-------	1.514	1.819	-------	2.277	Existing Area 25
26	SCS Runoff	------	5.363	-------	-------	-------	13.08	16.69	-------	22.12	Existing Area 26
27	SCS Runoff	------	1.763	-------	-------	-------	3.179	3.820	-------	4.781	Existing Area 27
28	SCS Runoff	------	1.316	-------	-------	-------	3.611	4.724	-------	6.419	Existing Area 28
29	SCS Runoff	------	2.501	-------	-------	-------	6.860	8.975	-------	12.20	Existing Area 29
30	SCS Runoff	------	0.661	-------	-------	-------	1.204	1.449	-------	1.816	Existing Area 30
31	SCS Runoff	------	16.16	-------	-------	-------	39.37	50.35	-------	66.87	Existing Area 31
32	Combine	1, 2, 3,	4.607	-------	-------	-------	8.441	10.17	-------	12.76	Existing Area 1-9
33	Combine	4, 5, 6, 7, 8, 9,	4.526	-------	-------	-------	8.482	10.27	-------	12.94	Existing Area 7-12
34	Combine	10, 11, 12, 13, 14, 15, 16, 17, 18,	17.82	-------	-------	-------	43.25	55.33	-------	73.62	Existing Area 13-18

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)							Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
35	Combine	20, 21, 22, 23, 24, 25,	7.302	-------	-------	-------	13.29	16.00	-------	20.05	Existing Area 20-25
36	Combine	26, 27,	6.201	-------	-------	-------	14.61	18.55	-------	24.48	Existing Area 26-27
37	Combine	32, 33, 34,	26.94	-------	-------	-------	60.16	75.77	-------	99.32	Existing Area 1-18
38	Combine	19, 35, 37	38.78	-------	-------	-------	106.28	29.73	-------	168.23	Existing Area to Drainage Under Aera

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.881	1	715	1,836	------	------	------	Existing Area 1
2	SCS Runoff	0.549	1	718	1,306	------	------	------	Existing Area 2
3	SCS Runoff	0.510	1	721	1,369	------	------	------	Existing Area 3
4	SCS Runoff	0.744	1	719	1,875	------	------	------	Existing Area 4
5	SCS Runoff	0.841	1	716	1,865	------	------	------	Existing Area 5
6	SCS Runoff	1.340	1	717	2,998	------	------	------	Existing Area 6
7	SCS Runoff	0.859	1	732	3,583	------	------	------	Existing Area 7
8	SCS Runoff	1.168	1	717	2,671	------	------	------	Existing Area 8
9	SCS Runoff	0.420	1	715	874	------	------	------	Existing Area 9
10	SCS Runoff	0.367	1	720	906	------	------	------	Existing Area 10
11	SCS Runoff	1.377	1	716	2,907	------	------	------	Existing Area 11
12	SCS Runoff	0.909	1	715	1,894	------	------	------	Existing Area 12
13	SCS Runoff	2.151	1	716	4,644	------	------	------	Existing Area 13
14	SCS Runoff	1.115	1	715	2,261	------	------	------	Existing Area 14
15	SCS Runoff	0.504	1	715	1,049	------	------	------	Existing Area 15
16	SCS Runoff	0.632	1	716	1,309	------	------	------	Existing Area 16
17	SCS Runoff	0.756	1	715	1,574	------	------	------	Existing Area 17
18	SCS Runoff	12.95	1	717	24,264	------	------	------	Existing Area 18
19	SCS Runoff	5.232	1	725	15,892	------	------	------	Existing Area 19
20	SCS Runoff	0.925	1	716	2,052	------	------	------	Existing Area 20
21	SCS Runoff	0.968	1	726	3,474	------	------	------	Existing Area 21
22	SCS Runoff	0.900	1	730	3,574	------	------	------	Existing Area 22
23	SCS Runoff	2.566	1	716	5,689	------	------	------	Existing Area 23
24	SCS Runoff	1.893	1	716	4,197	------	------	------	Existing Area 24
25	SCS Runoff	0.840	1	715	1,749	------	------	------	Existing Area 25
26	SCS Runoff	5.363	1	720	12,985	------	------	------	Existing Area 26
27	SCS Runoff	1.763	1	715	3,672	------	------	------	Existing Area 27
28	SCS Runoff	1.316	1	724	3,839	------	------	------	Existing Area 28
29	SCS Runoff	2.501	1	724	7,293	------	------	------	Existing Area 29
30	SCS Runoff	0.661	1	715	1,340	------	------	------	Existing Area 30
31	SCS Runoff	16.16	1	717	30,333	------	------	------	Existing Area 31
32	Combine	4.607	1	717	11,250	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18,	------	------	Existing Area 1-9
33	Combine	4.526	1	716	12,834		------	------	Existing Area 7-12
34	Combine	17.82	1	716	35,101		------	------	Existing Area 13-18

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
35	Combine	7.302	1	716	20,735	20, 21, 22, 23, 24, 25,	------	------	Existing Area 20-25
36	Combine	6.201	1	718	16,657	26, 27,	------	------	Existing Area 26-27
37	Combine	26.94	1	716	59,185	32, 33, 34,	------	------	Existing Area 1-18
38	Combine	38.78	1	717	98,921	19, 35, 37	------	------	Existing Area to Drainage Under Aera

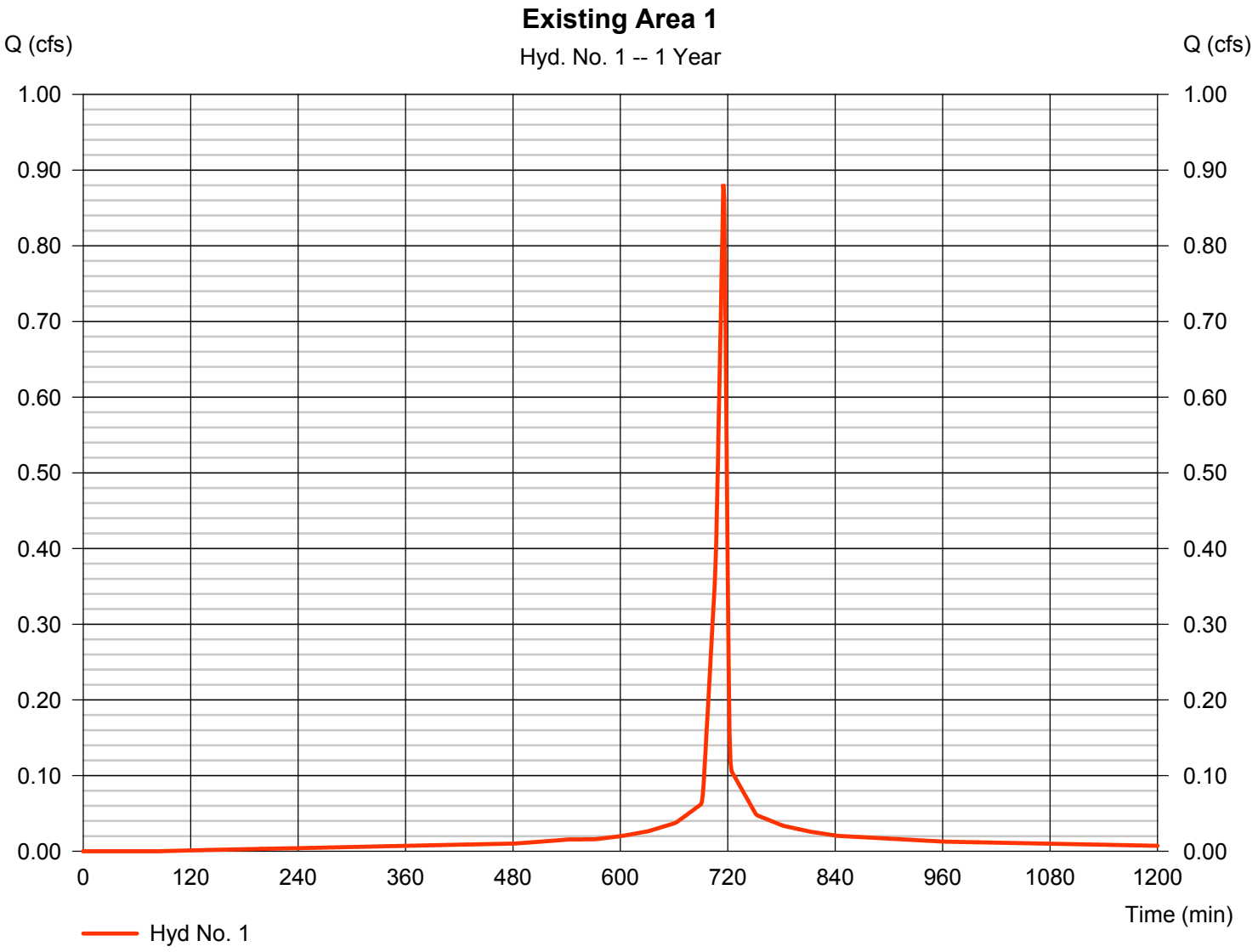
Hydrograph Report

Hyd. No. 1

Existing Area 1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.881 cfs
Storm frequency	= 1 yrs	Time to peak	= 715 min
Time interval	= 1 min	Hyd. volume	= 1,836 cuft
Drainage area	= 0.210 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.20 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.210 x 98)] / 0.210



TR55 Tc Worksheet

Hyd. No. 1

Existing Area 1

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 159.1		79.1		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 3.50		0.47		0.00		
Travel Time (min)	**= 1.38**	**+**	**1.77**	**+**	**0.00**	**=**	**3.15**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 3.20 min

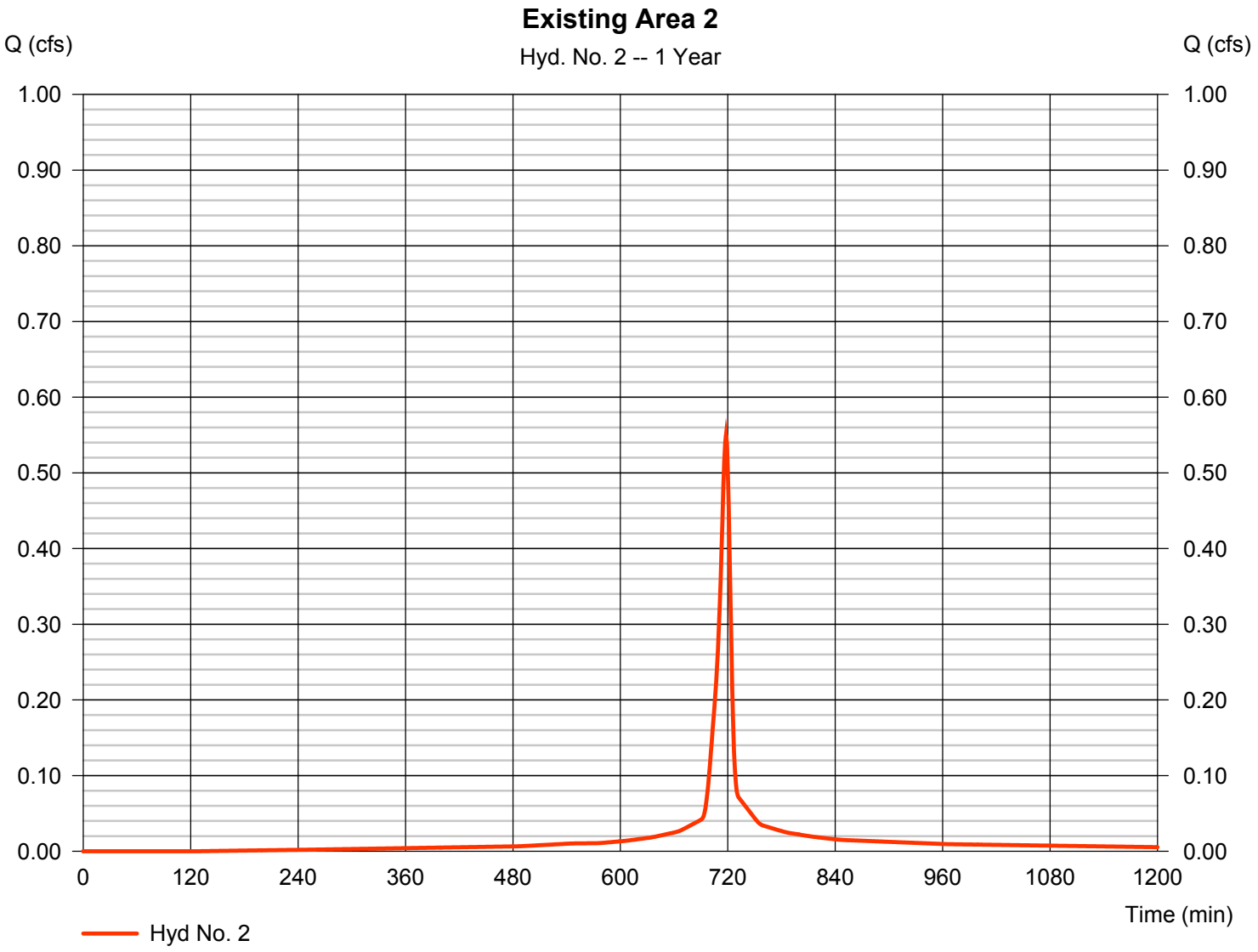
Hydrograph Report

Hyd. No. 2

Existing Area 2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.549 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 1,306 cuft
Drainage area	= 0.150 ac	Curve number	= 97*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.90 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.150 x 97)] / 0.150



TR55 Tc Worksheet

Hyd. No. 2

Existing Area 2

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 16.5		46.3		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 0.18		0.79		0.00		
Travel Time (min)	**= 5.98**	**+**	**0.93**	**+**	**0.00**	**=**	**6.91**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 6.90 min

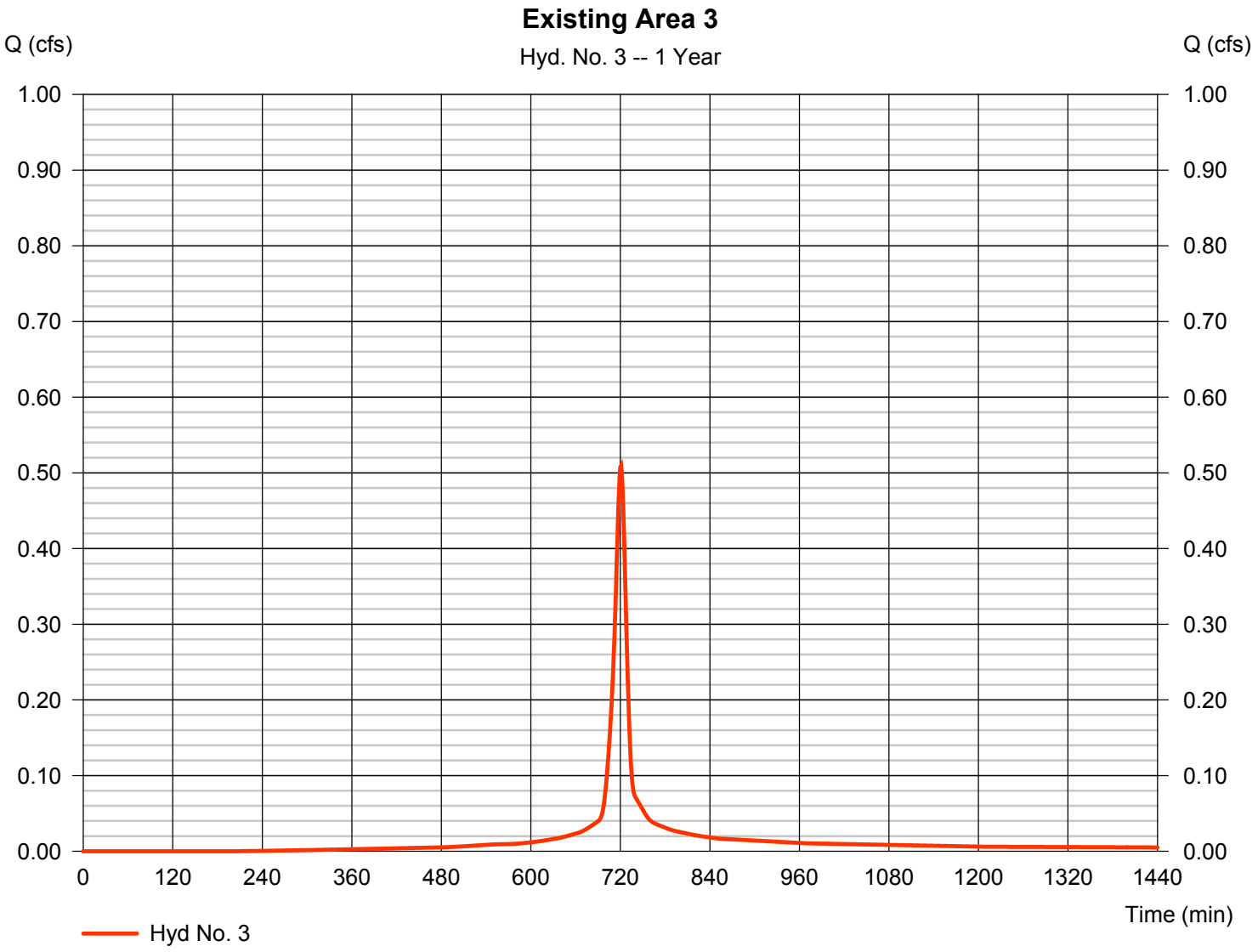
Hydrograph Report

Hyd. No. 3

Existing Area 3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.510 cfs
Storm frequency	= 1 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyd. volume	= 1,369 cuft
Drainage area	= 0.170 ac	Curve number	= 95*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 13.10 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.143 x 98) + (0.030 x 79)] / 0.170



TR55 Tc Worksheet

Hyd. No. 3

Existing Area 3

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 73.4		70.9		89.5		
Two-year 24-hr precip. (in)	= 3.30		3.30		3.30		
Land slope (%)	= 0.82		1.35		1.36		
Travel Time (min)	**= 10.77**	**+**	**1.06**	**+**	**1.27**	**=**	**13.10**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 13.10 min

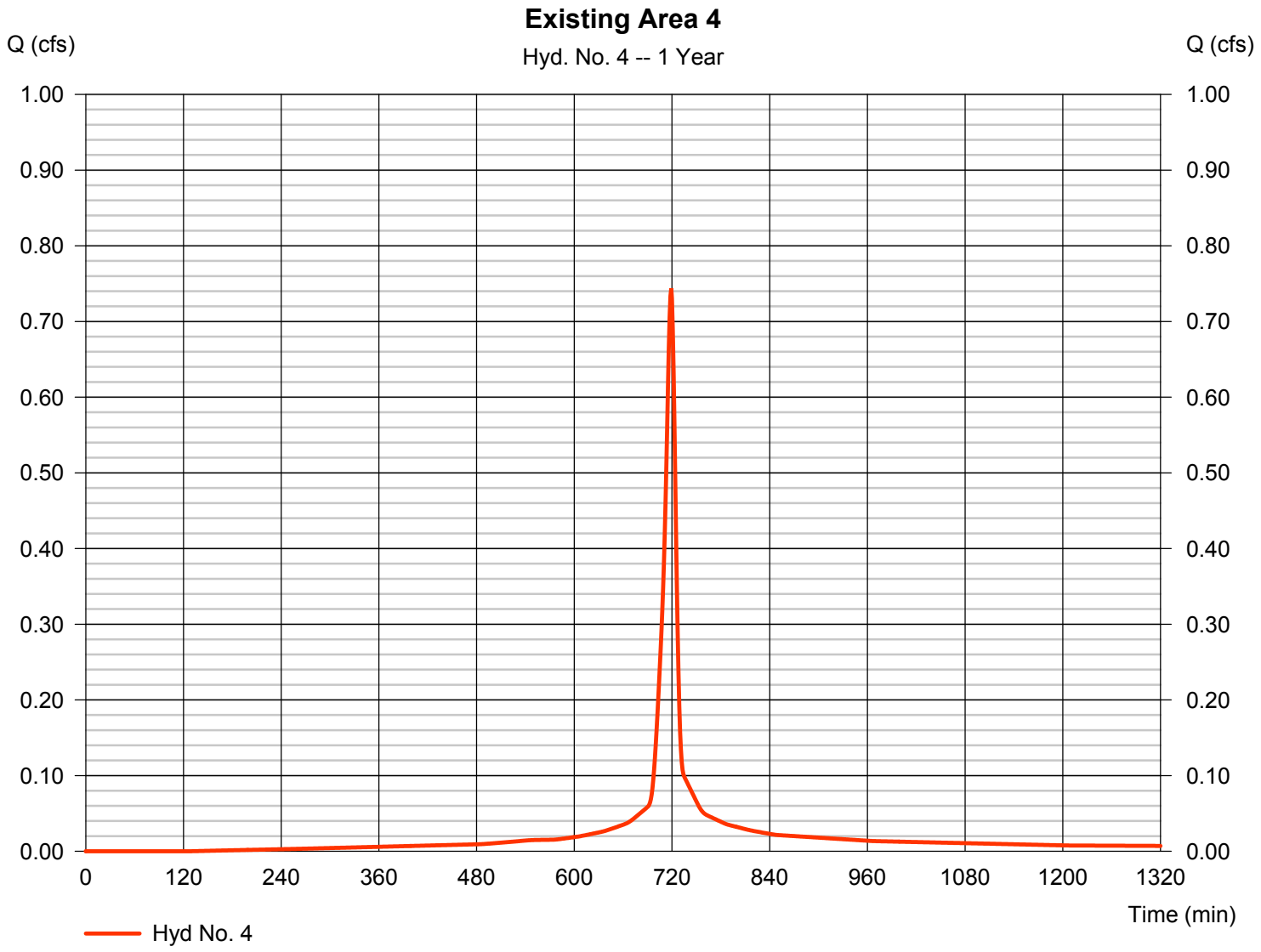
Hydrograph Report

Hyd. No. 4

Existing Area 4

Hydrograph type	= SCS Runoff	Peak discharge	= 0.744 cfs
Storm frequency	= 1 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 1,875 cuft
Drainage area	= 0.210 ac	Curve number	= 97*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.60 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.200 x 98) + (0.010 x 79)] / 0.210



TR55 Tc Worksheet

Hyd. No. 4

Existing Area 4

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 37.7		181.1		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 0.56		1.41		0.00		
Travel Time (min)	**= 7.36**	**+**	**2.20**	**+**	**0.00**	**=**	**9.57**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 9.60 min

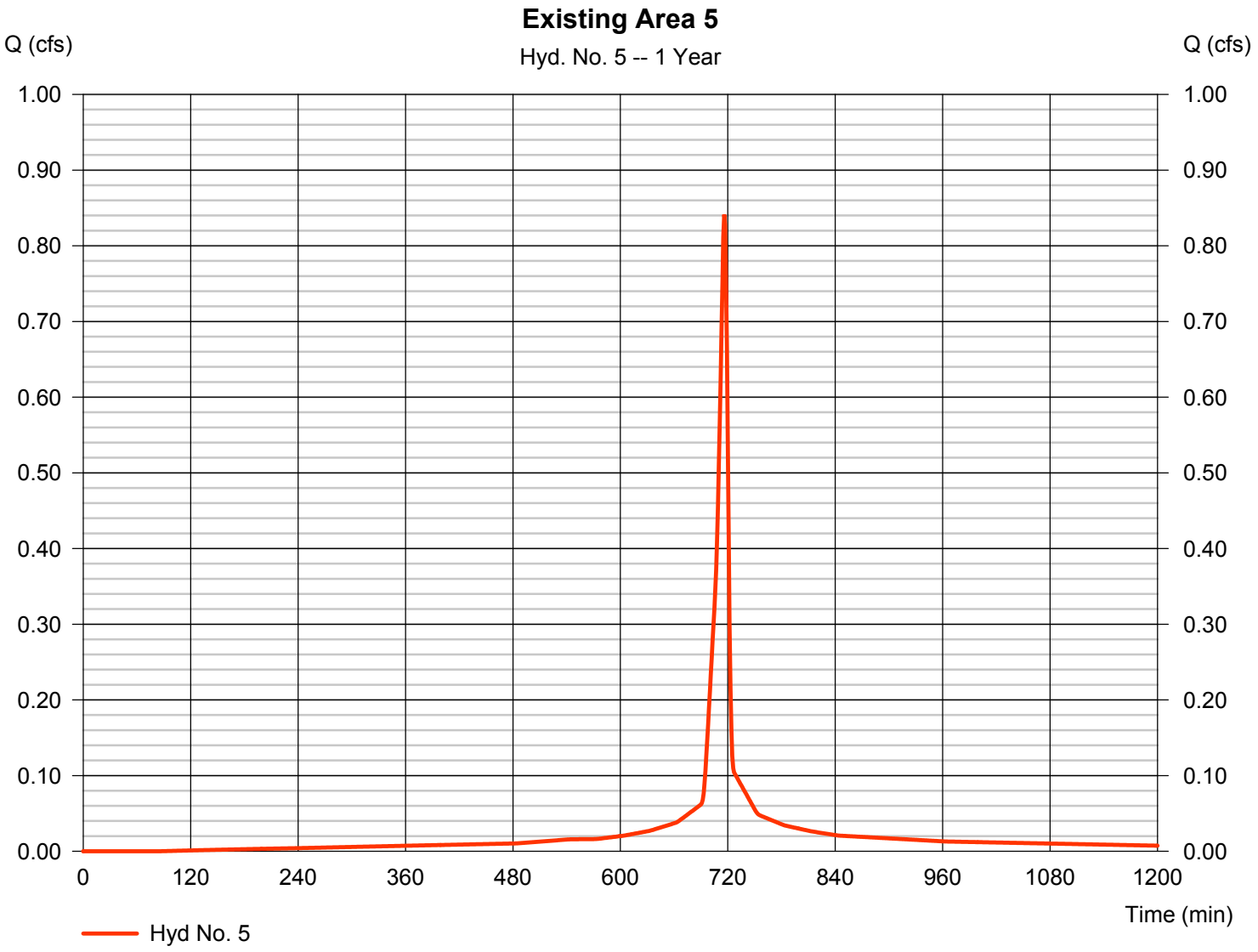
Hydrograph Report

Hyd. No. 5

Existing Area 5

Hydrograph type	= SCS Runoff	Peak discharge	= 0.841 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 1,865 cuft
Drainage area	= 0.200 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.30 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.199 x 98)] / 0.200



TR55 Tc Worksheet

Hyd. No. 5

Existing Area 5

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 74.6		49.5		83.7		
Two-year 24-hr precip. (in)	= 3.30		3.30		3.30		
Land slope (%)	= 0.82		2.02		1.30		
Travel Time (min)	**= 1.35**	**+**	**0.68**	**+**	**1.23**	**=**	**3.25**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 3.30 min

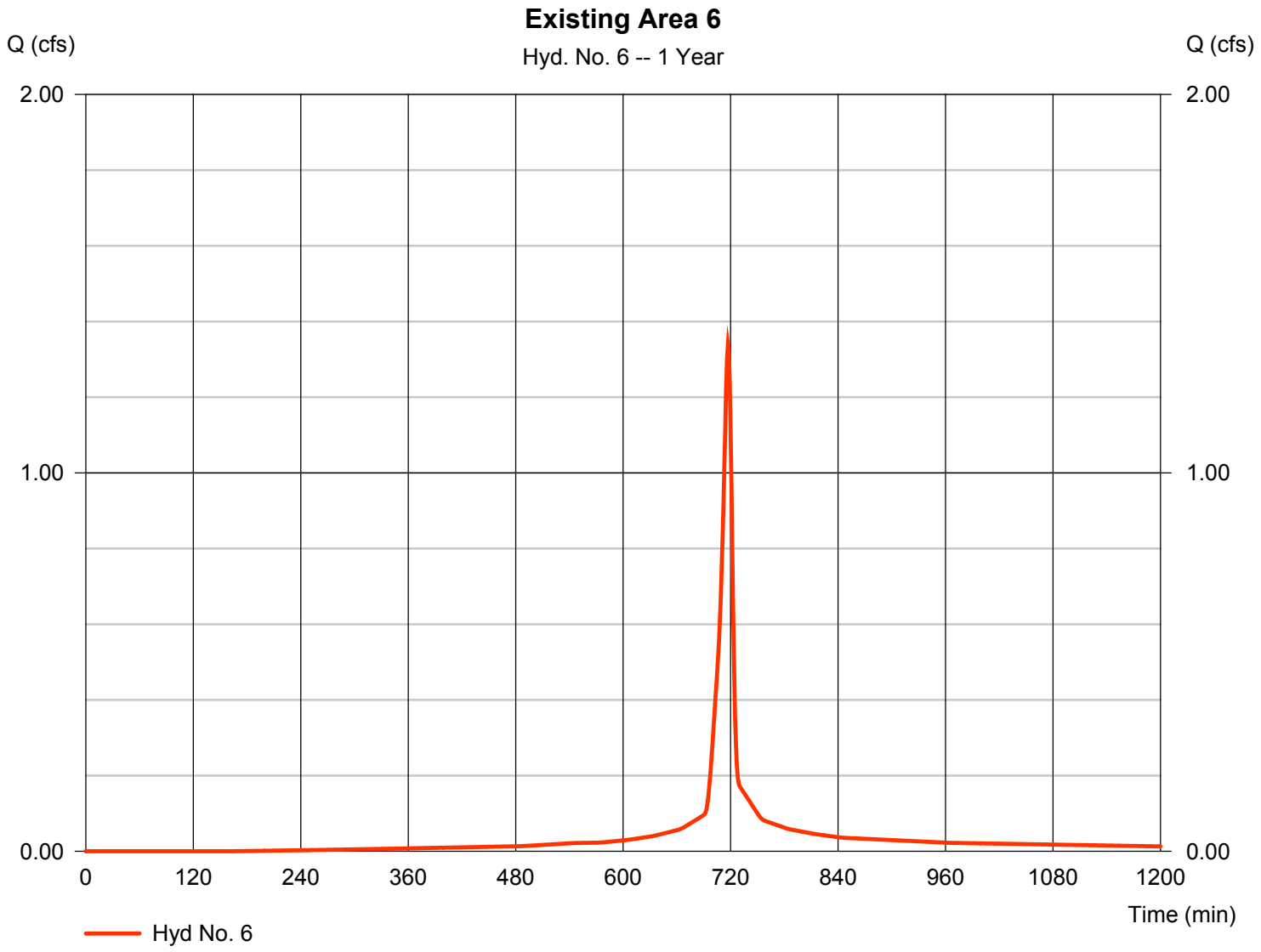
Hydrograph Report

Hyd. No. 6

Existing Area 6

Hydrograph type	= SCS Runoff	Peak discharge	= 1.340 cfs
Storm frequency	= 1 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 2,998 cuft
Drainage area	= 0.340 ac	Curve number	= 96*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.50 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.299 x 98) + (0.040 x 79)] / 0.340



TR55 Tc Worksheet

Hyd. No. 6

Existing Area 6

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 22.5		159.2		17.3		
Two-year 24-hr precip. (in)	= 3.30		3.30		3.30		
Land slope (%)	= 1.29		1.79		3.88		
Travel Time (min)	**= 3.48**	**+**	**1.81**	**+**	**0.22**	**=**	**5.51**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 5.50 min

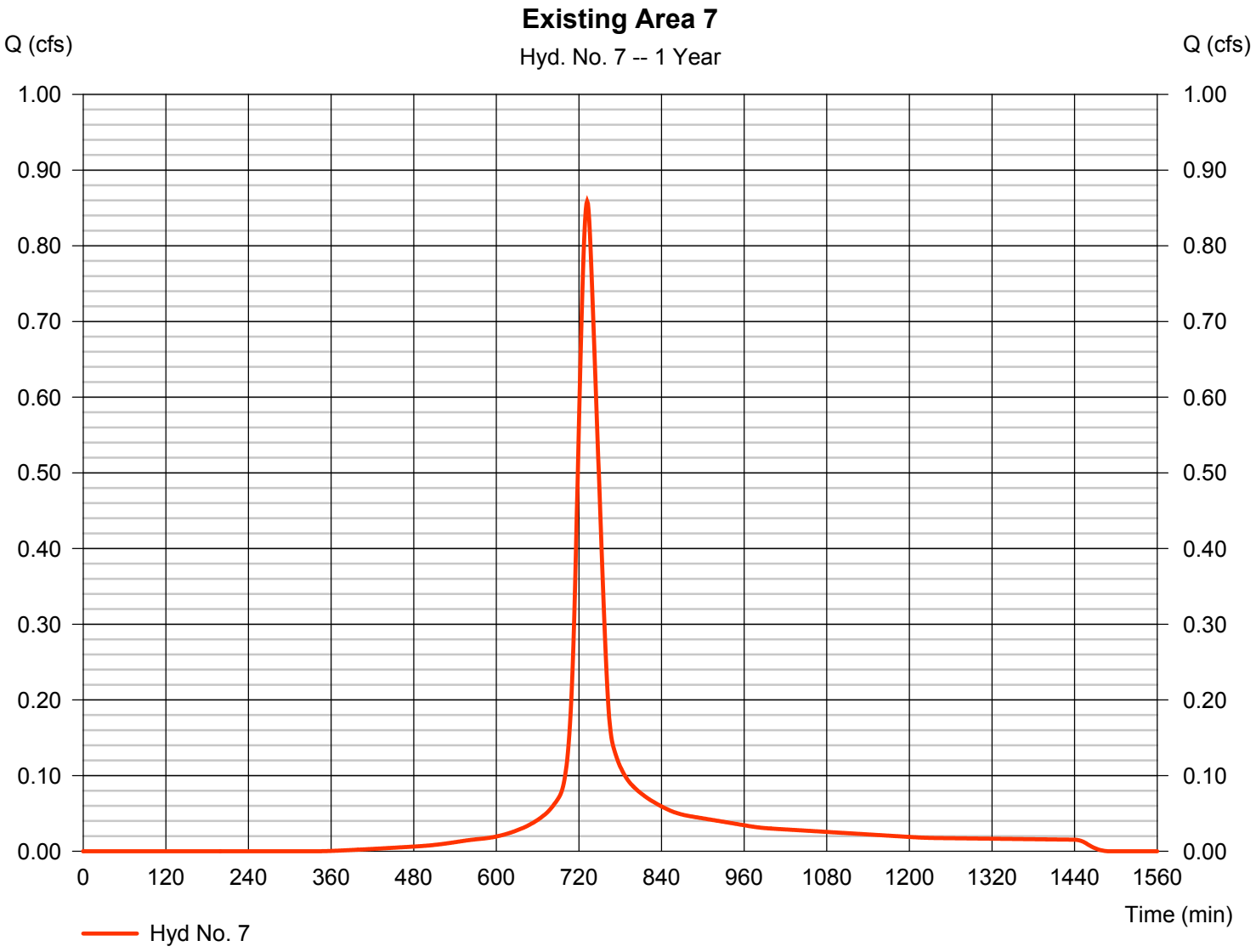
Hydrograph Report

Hyd. No. 7

Existing Area 7

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.859 cfs
Storm frequency	=	1 yrs	Time to peak	=	732 min
Time interval	=	1 min	Hyd. volume	=	3,583 cuft
Drainage area	=	0.520 ac	Curve number	=	91*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	30.80 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.331 x 98) + (0.191 x 79)] / 0.520



TR55 Tc Worksheet

Hyd. No. 7

Existing Area 7

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 43.0		7.3		139.6		
Two-year 24-hr precip. (in)	= 3.30		3.30		3.30		
Land slope (%)	= 0.02		5.99		2.55		
Travel Time (min)	**= 29.28**	**+**	**0.10**	**+**	**1.41**	**=**	**30.79**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 30.80 min

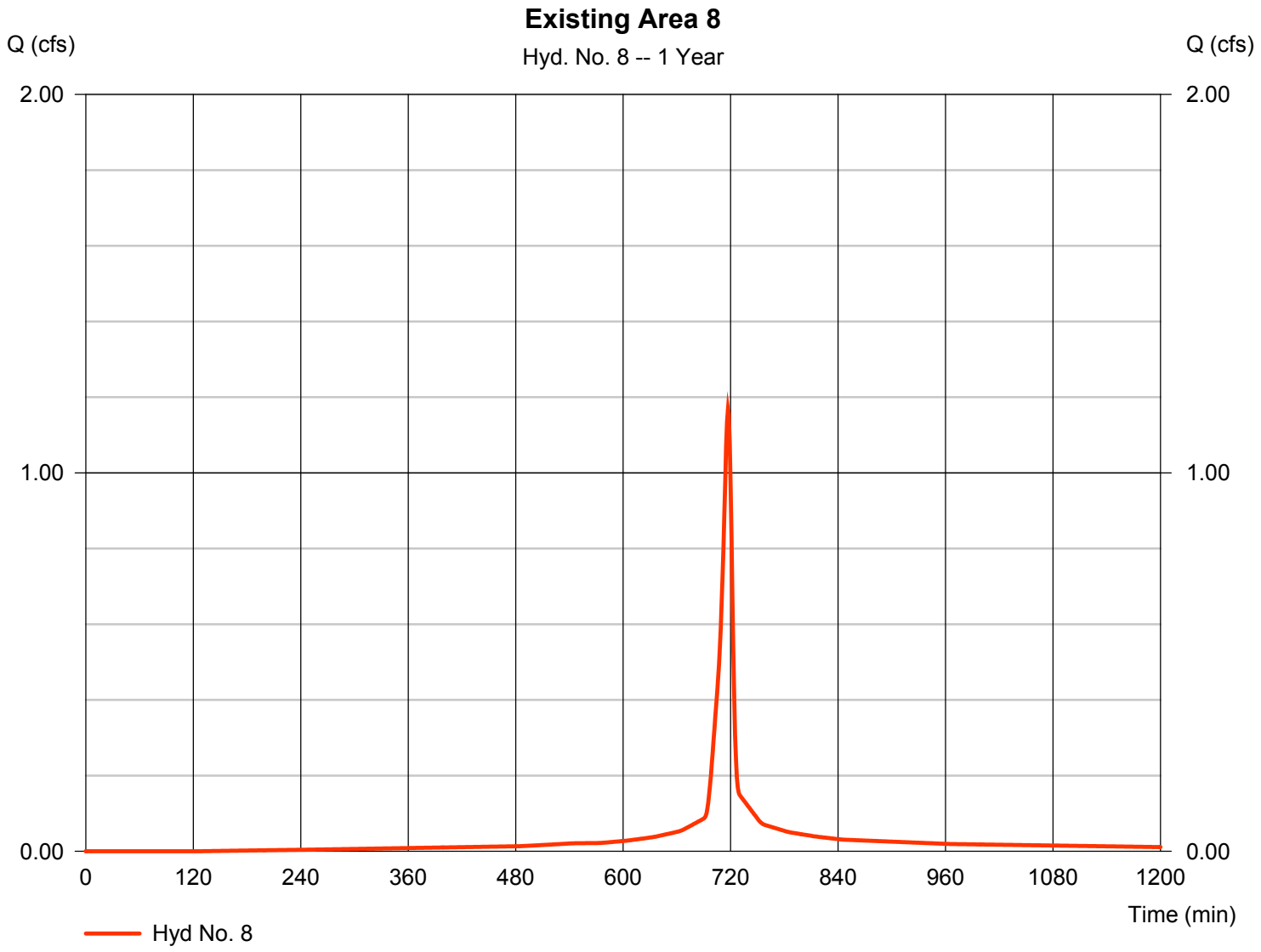
Hydrograph Report

Hyd. No. 8

Existing Area 8

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.168 cfs
Storm frequency	=	1 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	2,671 cuft
Drainage area	=	0.290 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.272 x 98) + (0.021 x 79)] / 0.290



TR55 Tc Worksheet

Hyd. No. 8

Existing Area 8

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 36.7		99.9		34.7		
Two-year 24-hr precip. (in)	= 3.30		3.30		3.30		
Land slope (%)	= 3.05		3.24		3.51		
Travel Time (min)	**= 3.65**	**+**	**0.98**	**+**	**0.41**	**=**	**5.04**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 5.00 min

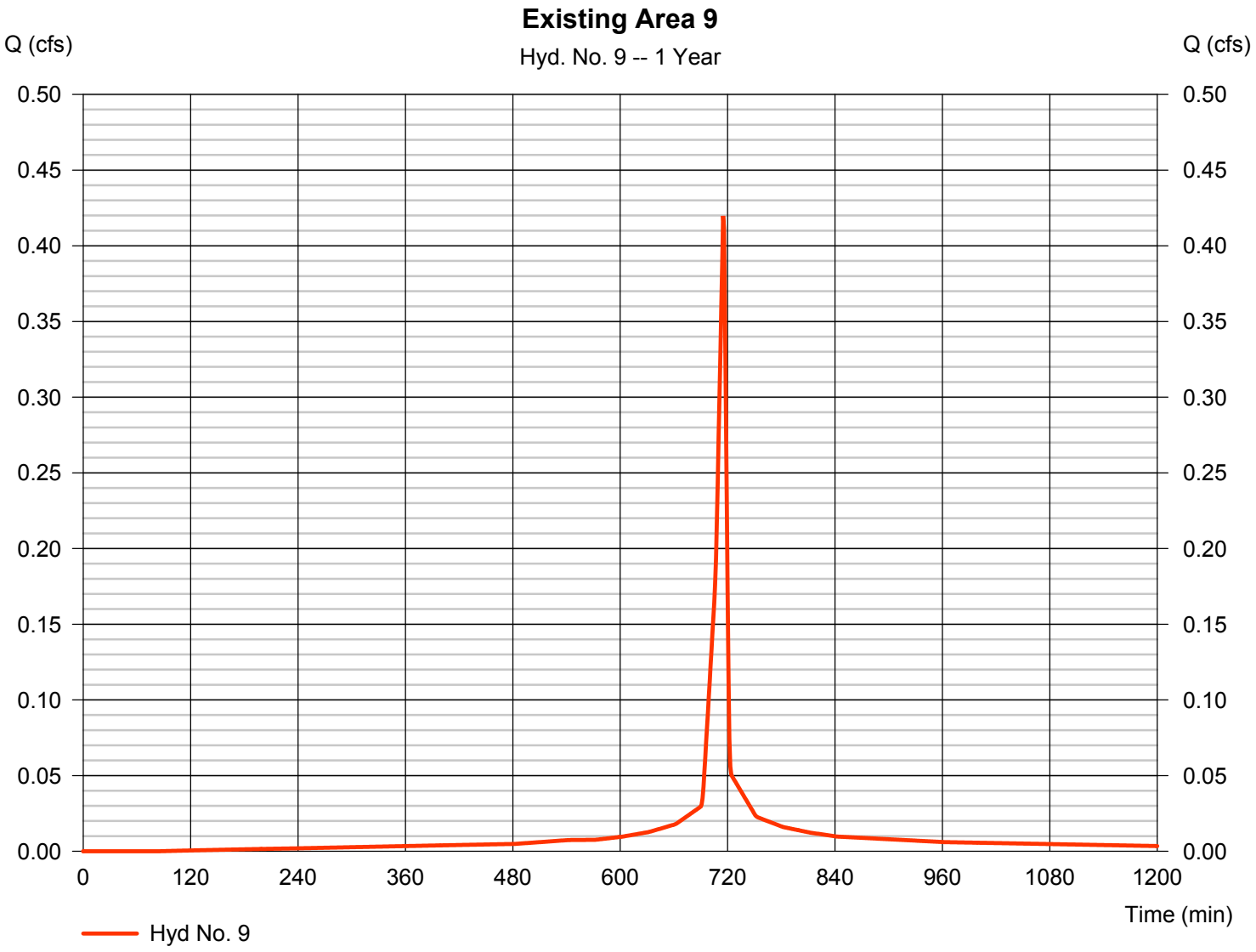
Hydrograph Report

Hyd. No. 9

Existing Area 9

Hydrograph type	= SCS Runoff	Peak discharge	= 0.420 cfs
Storm frequency	= 1 yrs	Time to peak	= 715 min
Time interval	= 1 min	Hyd. volume	= 874 cuft
Drainage area	= 0.100 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.10 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.100 x 98)] / 0.100



TR55 Tc Worksheet

Hyd. No. 9

Existing Area 9

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 57.8		60.0		105.3		
Two-year 24-hr precip. (in)	= 3.30		3.30		3.30		
Land slope (%)	= 5.19		3.33		3.93		
Travel Time (min)	**= 0.53**	**+**	**0.65**	**+**	**0.95**	**=**	**2.12**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 2.10 min

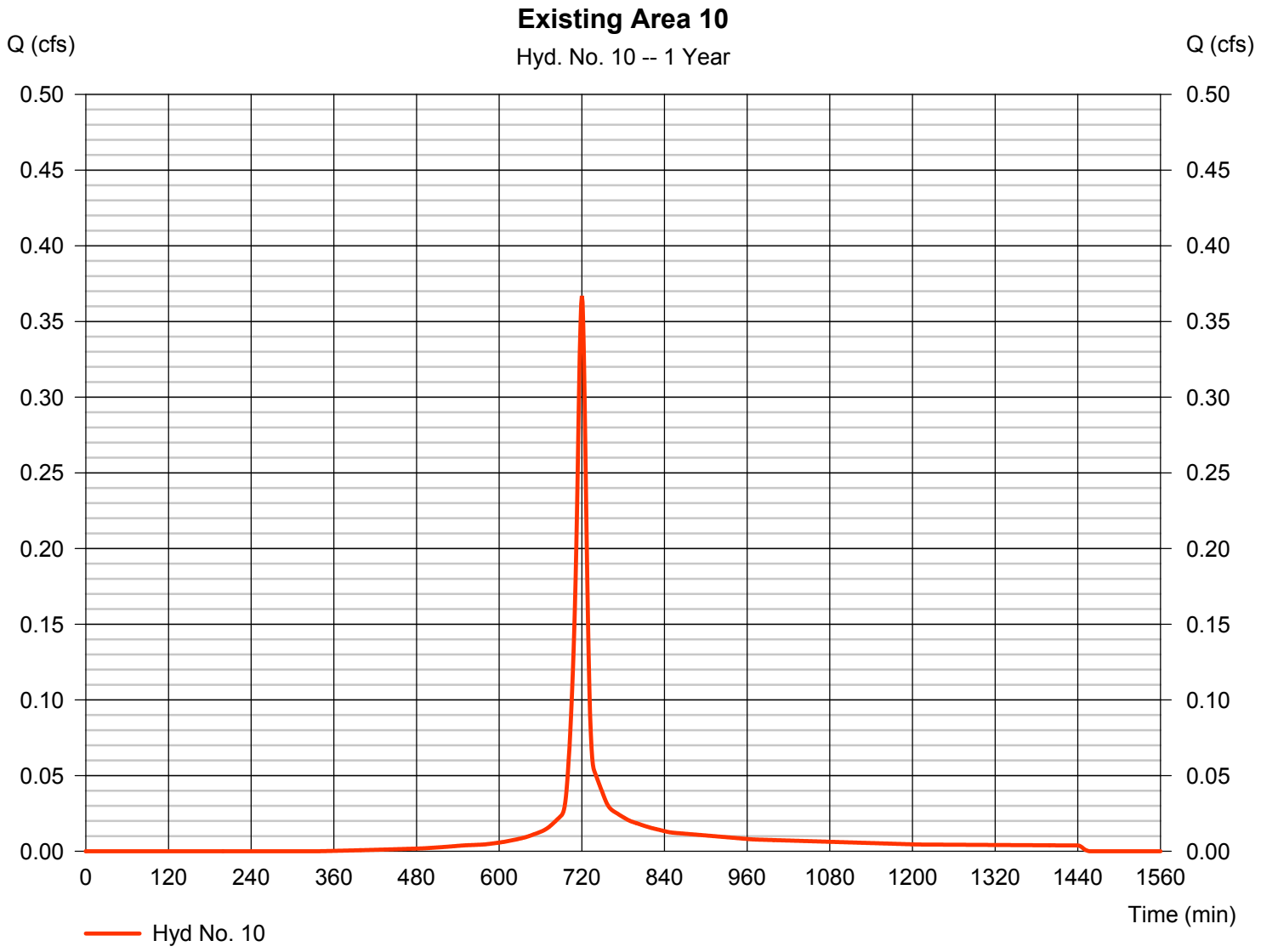
Hydrograph Report

Hyd. No. 10

Existing Area 10

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.367 cfs
Storm frequency	=	1 yrs	Time to peak	=	720 min
Time interval	=	1 min	Hyd. volume	=	906 cuft
Drainage area	=	0.130 ac	Curve number	=	91*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	10.20 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.081 x 98) + (0.044 x 79)] / 0.130



TR55 Tc Worksheet

Hyd. No. 10

Existing Area 10

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 141.4		5.1		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 3.59		3.91		0.00		
Travel Time (min)	**= 10.07**	**+**	**0.08**	**+**	**0.00**	**=**	**10.15**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 10.20 min

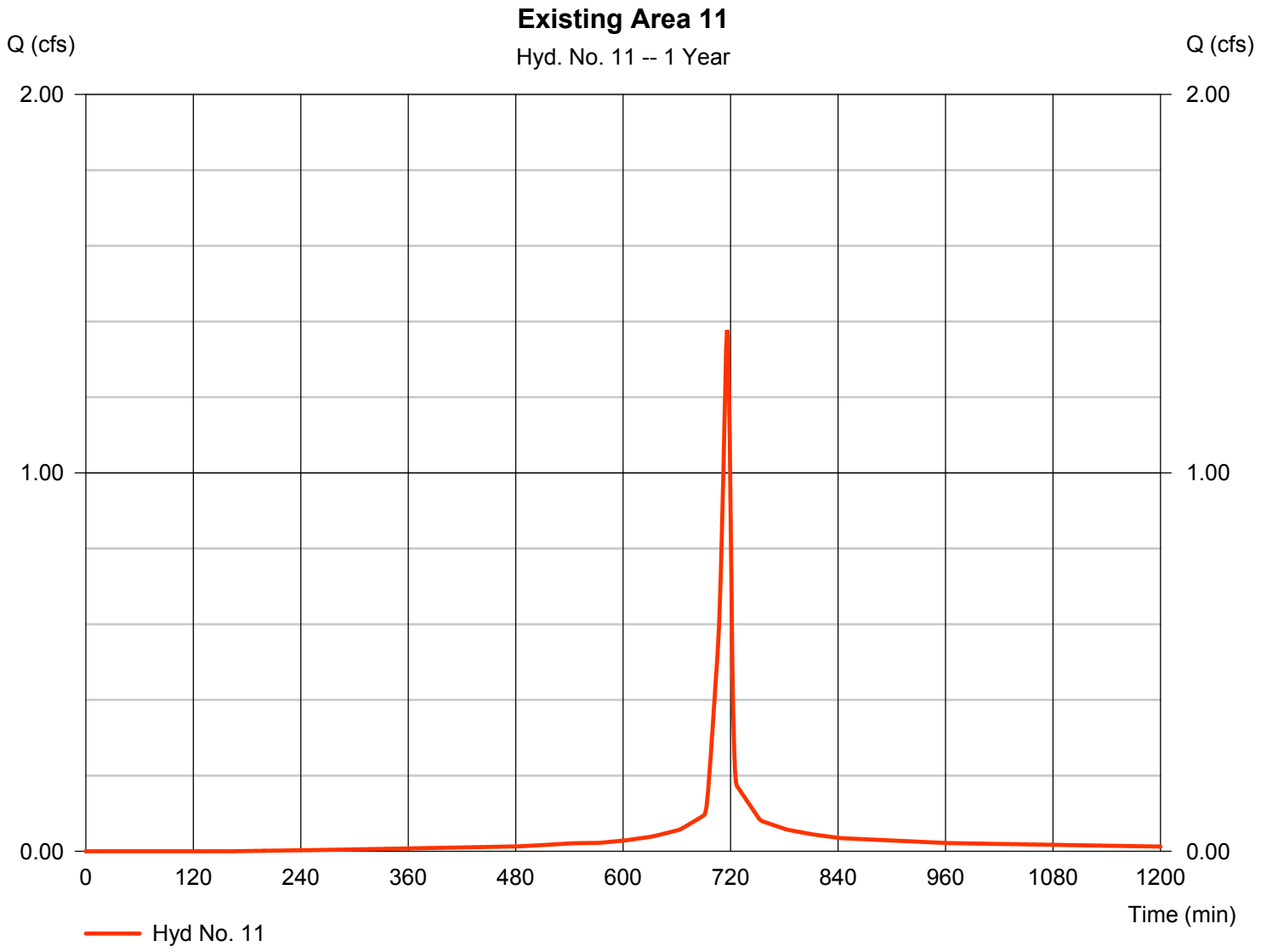
Hydrograph Report

Hyd. No. 11

Existing Area 11

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.377 cfs
Storm frequency	=	1 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	2,907 cuft
Drainage area	=	0.340 ac	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.50 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.296 x 98) + (0.045 x 79)] / 0.340



TR55 Tc Worksheet

Hyd. No. 11

Existing Area 11

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 58.3		2.0		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 4.55		5.10		0.00		
Travel Time (min)	**= 4.51**	**+**	**0.04**	**+**	**0.00**	**=**	**4.55**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

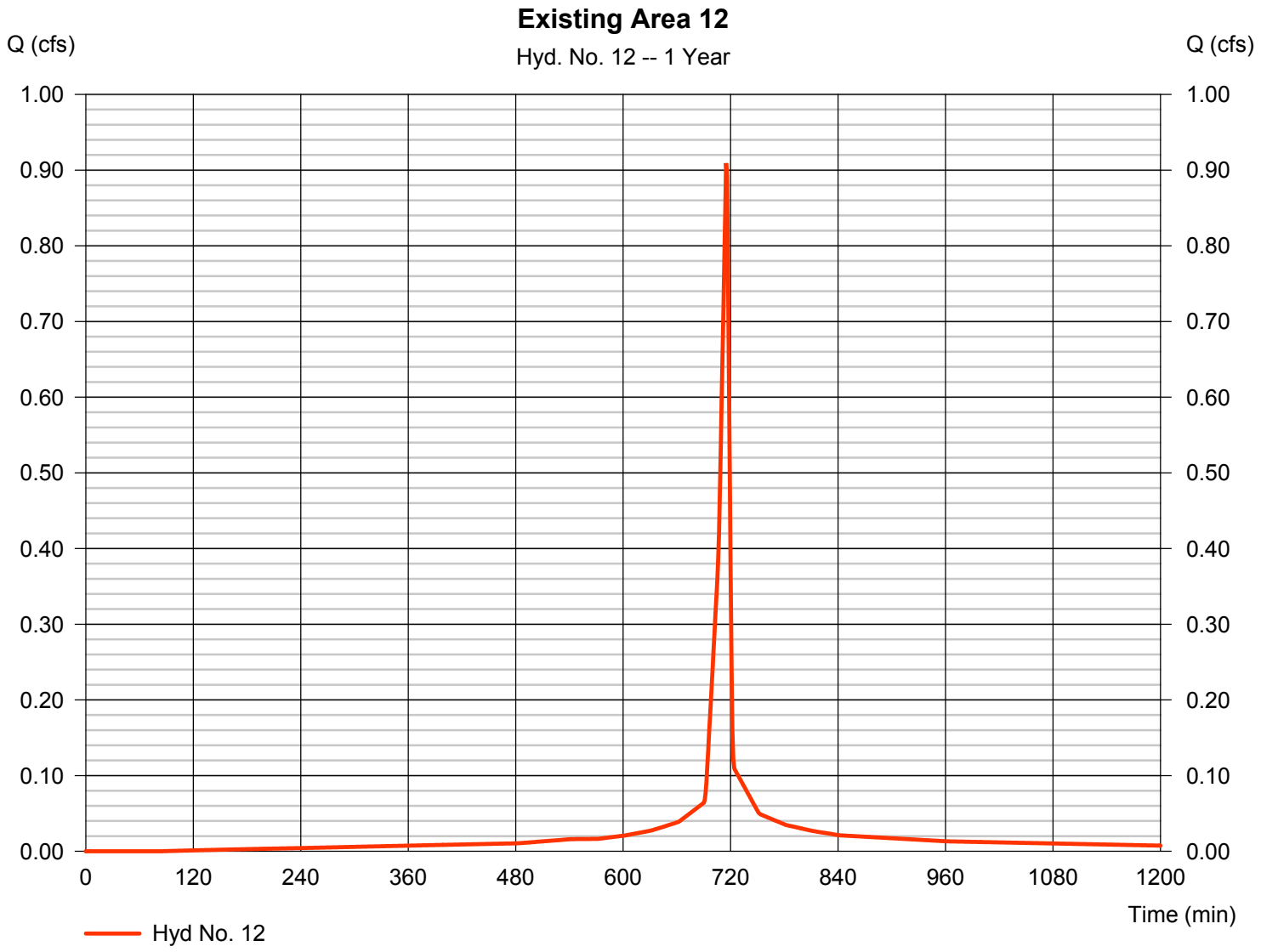
Total Travel Time, Tc ..... 4.50 min

Hydrograph Report

Hyd. No. 12

Existing Area 12

Hydrograph type	= SCS Runoff	Peak discharge	= 0.909 cfs
Storm frequency	= 1 yrs	Time to peak	= 715 min
Time interval	= 1 min	Hyd. volume	= 1,894 cuft
Drainage area	= 0.217 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.20 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 12

Existing Area 12

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 199.6		46.2		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 3.01		4.35		0.00		
Travel Time (min)	**= 1.76**	**+**	**0.47**	**+**	**0.00**	**=**	**2.23**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 2.20 min

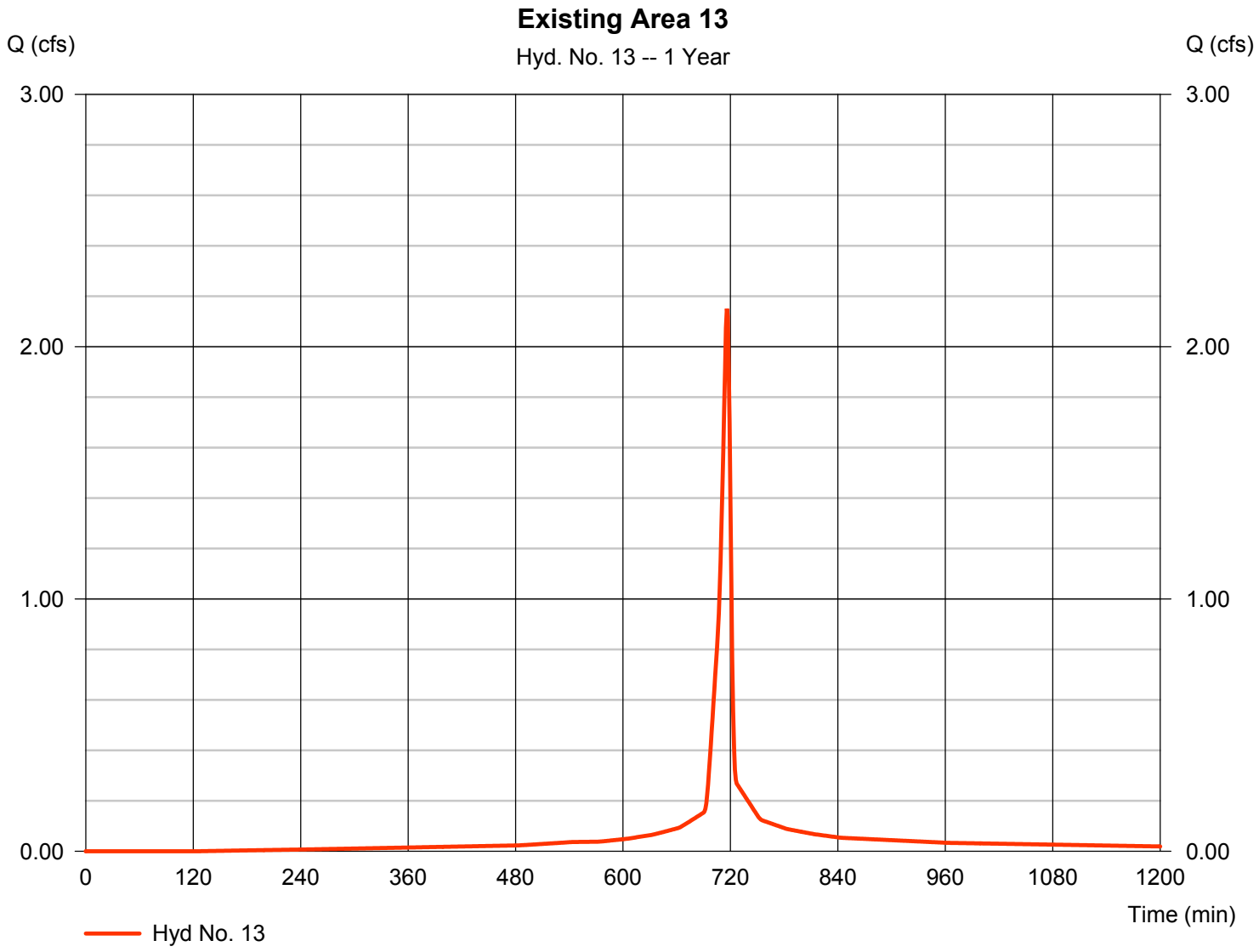
Hydrograph Report

Hyd. No. 13

Existing Area 13

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.151 cfs
Storm frequency	=	1 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	4,644 cuft
Drainage area	=	0.520 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.10 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.479 x 98) + (0.038 x 79)] / 0.520



TR55 Tc Worksheet

Hyd. No. 13

Existing Area 13

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 36.7		116.0		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 4.44		4.92		0.00		
Travel Time (min)	**= 3.14**	**+**	**0.94**	**+**	**0.00**	**=**	**4.08**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 4.10 min

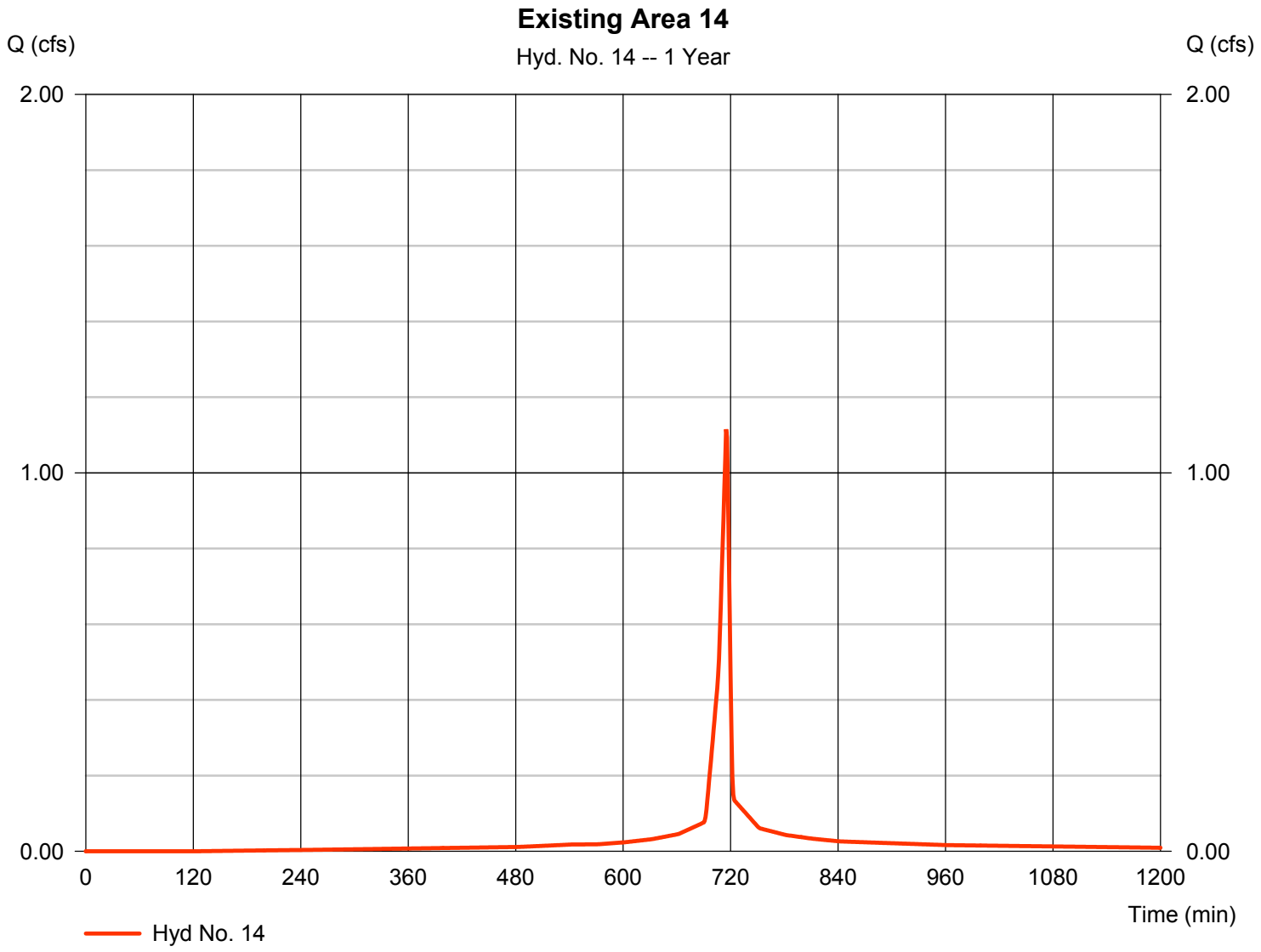
Hydrograph Report

Hyd. No. 14

Existing Area 14

Hydrograph type	= SCS Runoff	Peak discharge	= 1.115 cfs
Storm frequency	= 1 yrs	Time to peak	= 715 min
Time interval	= 1 min	Hyd. volume	= 2,261 cuft
Drainage area	= 0.270 ac	Curve number	= 97*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.50 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.260 x 98) + (0.010 x 79)] / 0.270



TR55 Tc Worksheet

Hyd. No. 14

Existing Area 14

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 0.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 0.00		0.00		0.00		
Land slope (%)	= 0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Shallow Concentrated Flow							
Flow length (ft)	= 47.11		28.69		347.85		
Watercourse slope (%)	= 0.17		3.20		4.25		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.84		3.64		4.19		
Travel Time (min)	**= 0.94**	**+**	**0.13**	**+**	**1.38**	**=**	**2.45**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 2.50 min

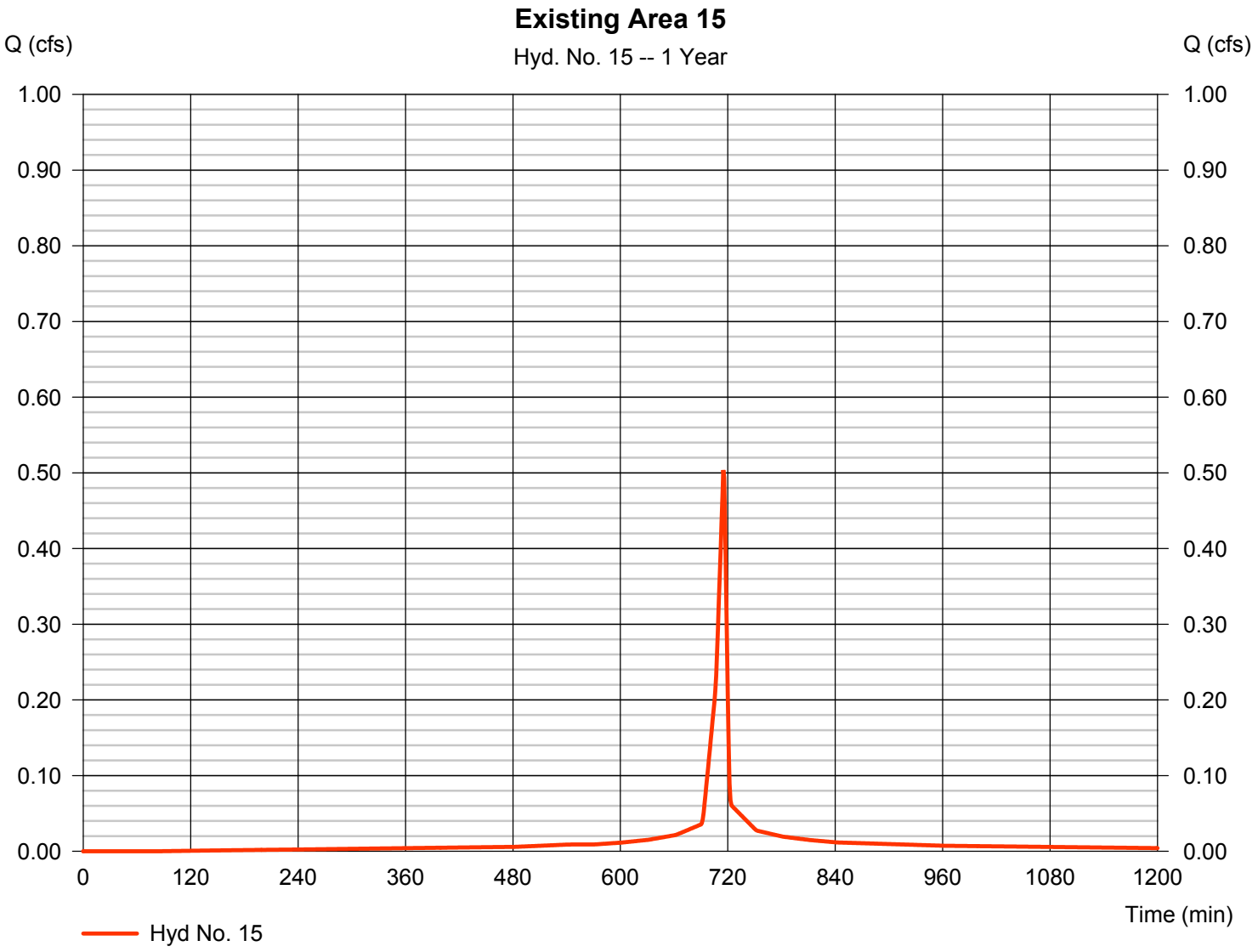
Hydrograph Report

Hyd. No. 15

Existing Area 15

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.504 cfs
Storm frequency	=	1 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	1,049 cuft
Drainage area	=	0.120 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	1.70 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.123 x 98)] / 0.120



TR55 Tc Worksheet

Hyd. No. 15

Existing Area 15

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 186.3		22.4		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 4.29		4.54		0.00		
Travel Time (min)	**= 1.45**	**+**	**0.26**	**+**	**0.00**	**=**	**1.71**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 1.70 min

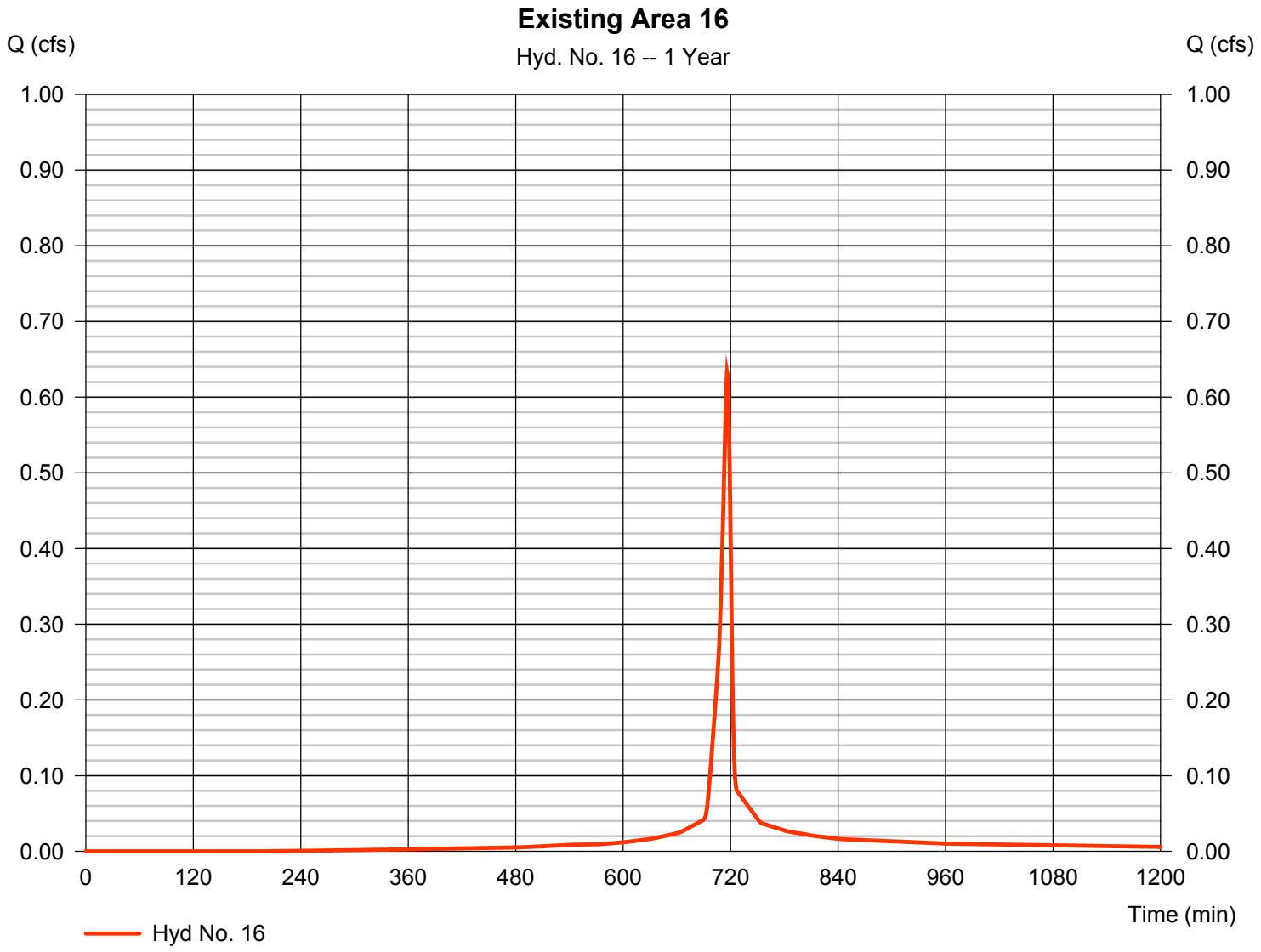
Hydrograph Report

Hyd. No. 16

Existing Area 16

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.632 cfs
Storm frequency	=	1 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	1,309 cuft
Drainage area	=	0.160 ac	Curve number	=	95*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.90 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.134 x 98) + (0.022 x 79)] / 0.160



TR55 Tc Worksheet

Hyd. No. 16

Existing Area 16

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 41.6		201.4		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 5.02		4.27		0.00		
Travel Time (min)	**= 3.31**	**+**	**1.54**	**+**	**0.00**	**=**	**4.85**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 4.90 min

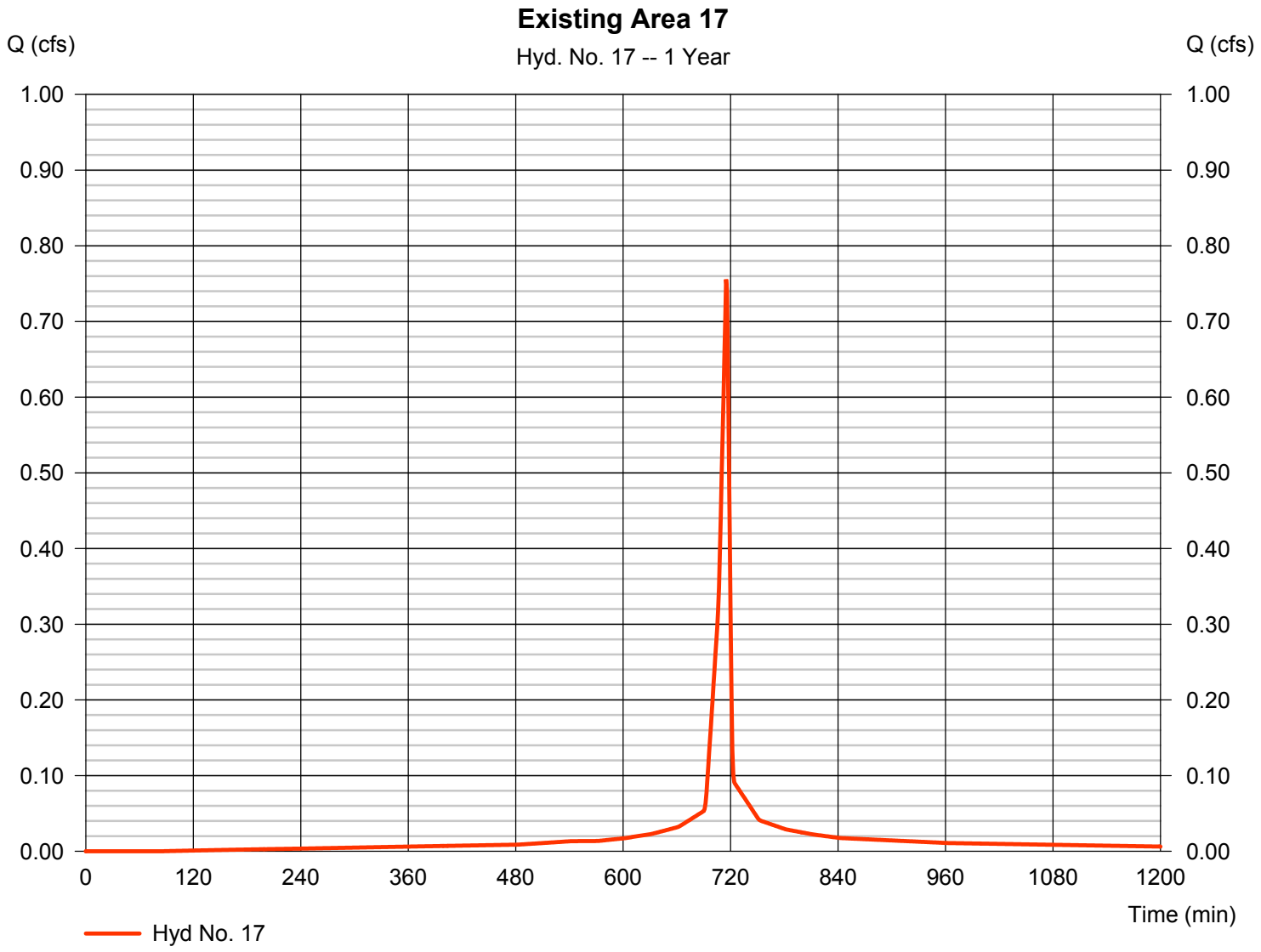
Hydrograph Report

Hyd. No. 17

Existing Area 17

Hydrograph type	= SCS Runoff	Peak discharge	= 0.756 cfs
Storm frequency	= 1 yrs	Time to peak	= 715 min
Time interval	= 1 min	Hyd. volume	= 1,574 cuft
Drainage area	= 0.180 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.40 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.182 x 98)] / 0.180



TR55 Tc Worksheet

Hyd. No. 17

Existing Area 17

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 146.9		63.8		11.4		
Two-year 24-hr precip. (in)	= 3.30		3.30		3.30		
Land slope (%)	= 3.40		1.97		1.05		
Travel Time (min)	**= 1.31**	**+**	**0.84**	**+**	**0.27**	**=**	**2.42**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 2.40 min

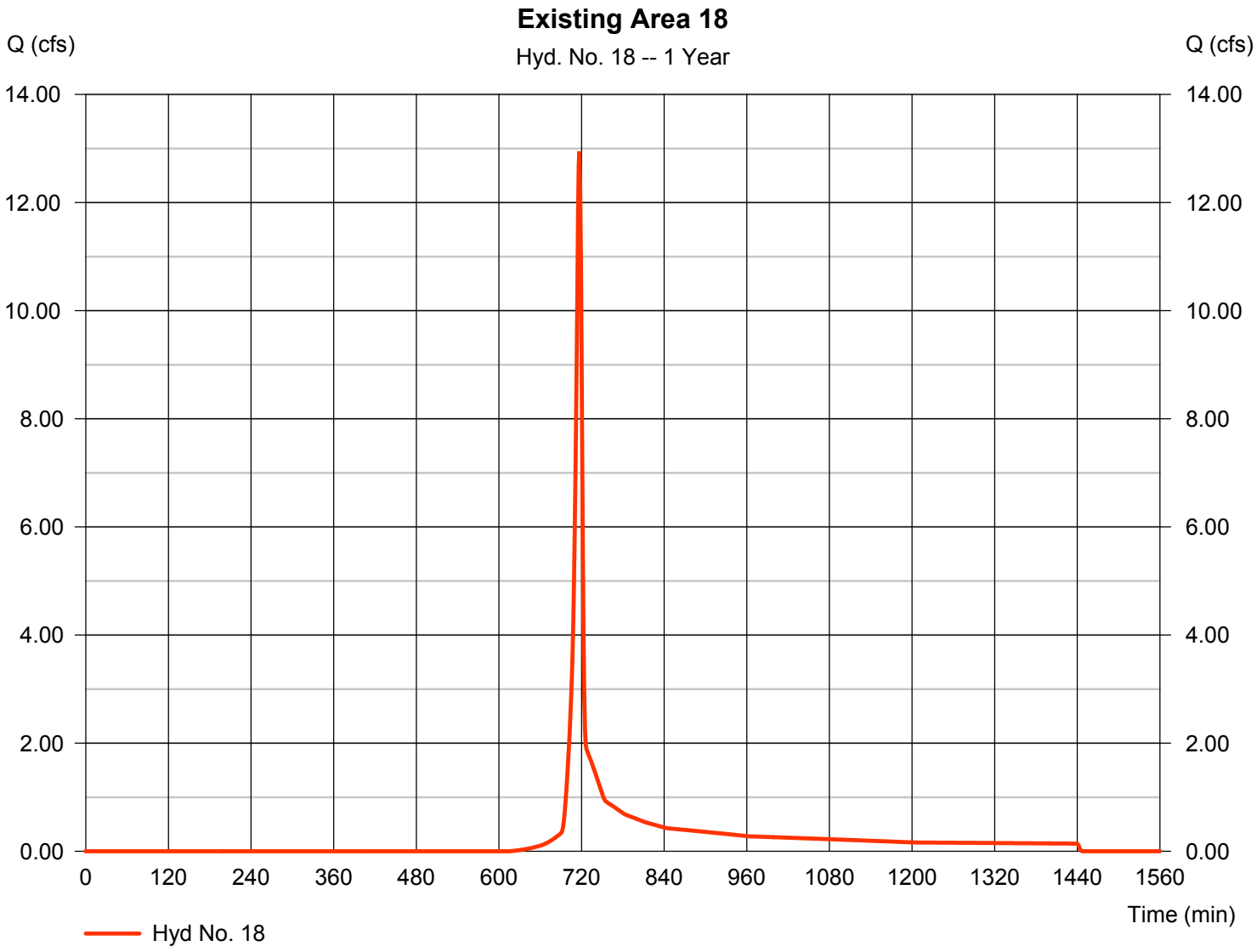
Hydrograph Report

Hyd. No. 18

Existing Area 18

Hydrograph type	=	SCS Runoff	Peak discharge	=	12.95 cfs
Storm frequency	=	1 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	24,264 cuft
Drainage area	=	6.400 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.90 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.018 x 98) + (6.379 x 79)] / 6.400



TR55 Tc Worksheet

Hyd. No. 18

Existing Area 18

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 0.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 0.00		0.00		0.00		
Land slope (%)	= 0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Shallow Concentrated Flow							
Flow length (ft)	= 334.72		320.91		0.00		
Watercourse slope (%)	= 1.49		2.49		0.00		
Surface description	= Unpaved		Unpaved		Paved		
Average velocity (ft/s)	=1.97		2.55		0.00		
Travel Time (min)	**= 2.83**	**+**	**2.10**	**+**	**0.00**	**=**	**4.93**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 4.90 min

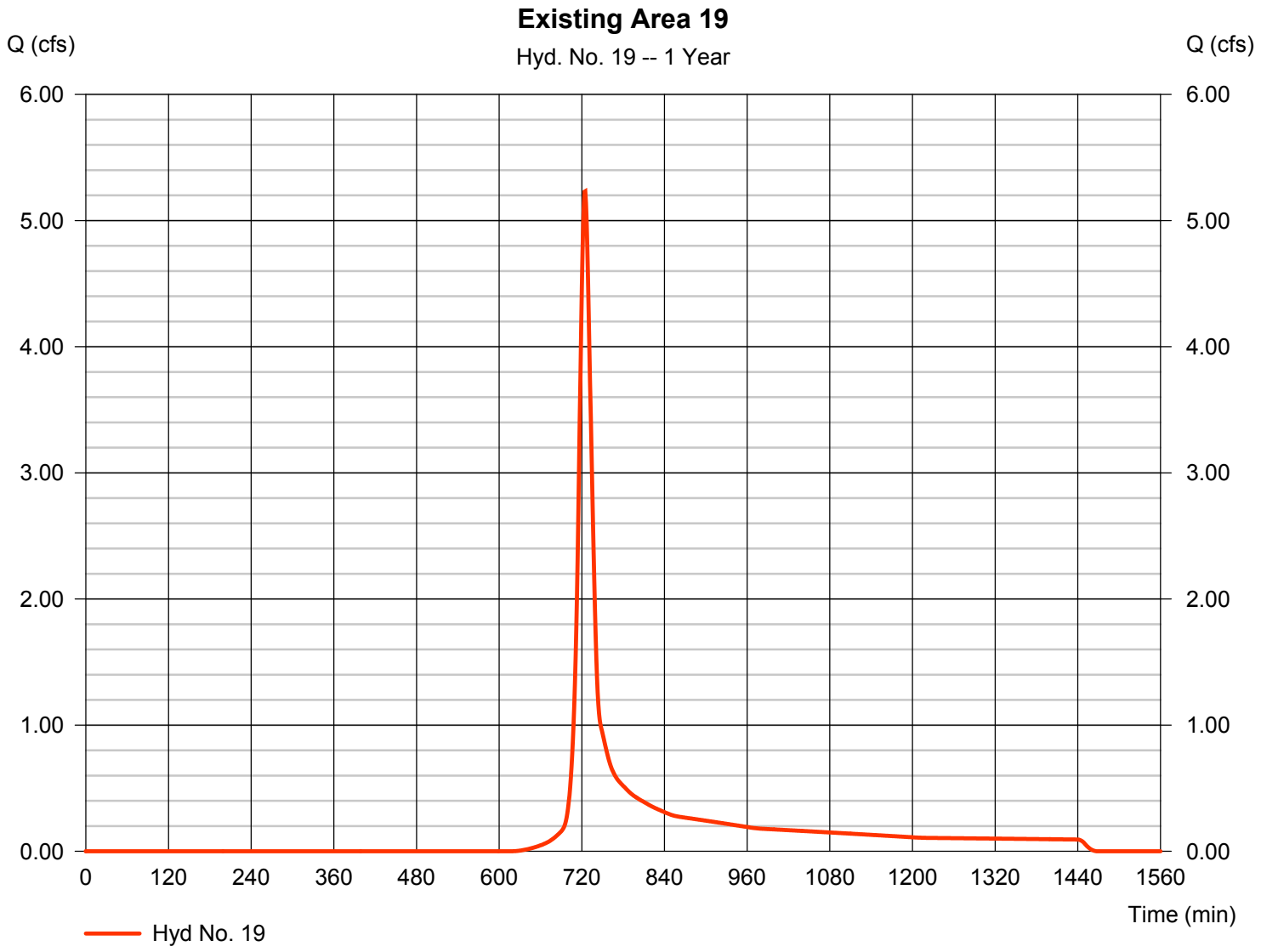
Hydrograph Report

Hyd. No. 19

Existing Area 19

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.232 cfs
Storm frequency	=	1 yrs	Time to peak	=	725 min
Time interval	=	1 min	Hyd. volume	=	15,892 cuft
Drainage area	=	4.240 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	17.40 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.036 x 98) + (4.203 x 79)] / 4.240



TR55 Tc Worksheet

Hyd. No. 19

Existing Area 19

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 212.1		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.30		0.00		0.00		
Land slope (%)	= 2.07		0.00		0.00		
Travel Time (min)	**= 17.36**	**+**	**0.00**	**+**	**0.00**	**=**	**17.36**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Unpaved		Unpaved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 17.40 min

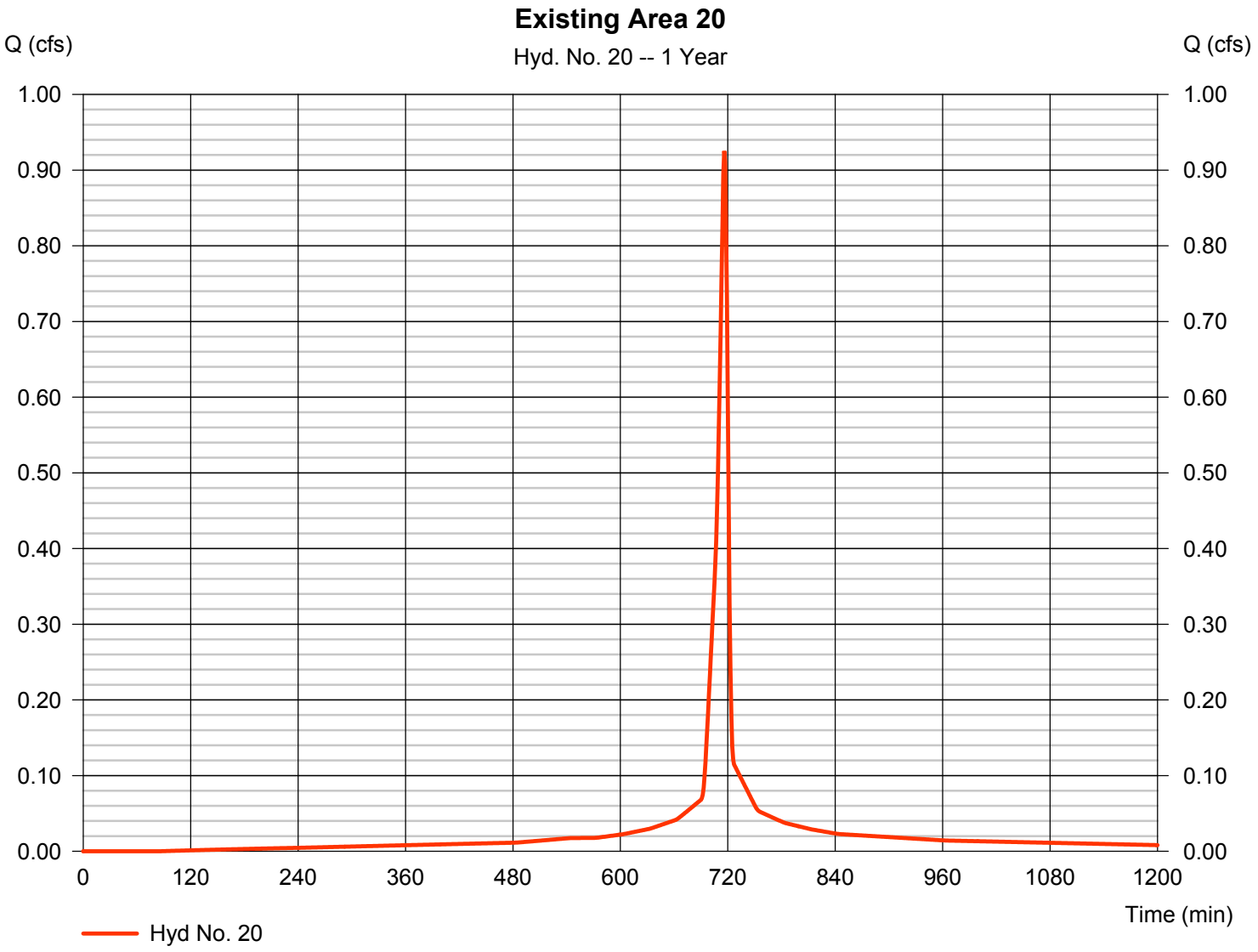
Hydrograph Report

Hyd. No. 20

Existing Area 20

Hydrograph type	= SCS Runoff	Peak discharge	= 0.925 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 2,052 cuft
Drainage area	= 0.220 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 4.70 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.220 x 98)] / 0.220



TR55 Tc Worksheet

Hyd. No. 20

Existing Area 20

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 93.5		146.0		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 1.00		0.37		0.00		
Travel Time (min)	**= 1.49**	**+**	**3.18**	**+**	**0.00**	**=**	**4.67**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 4.70 min

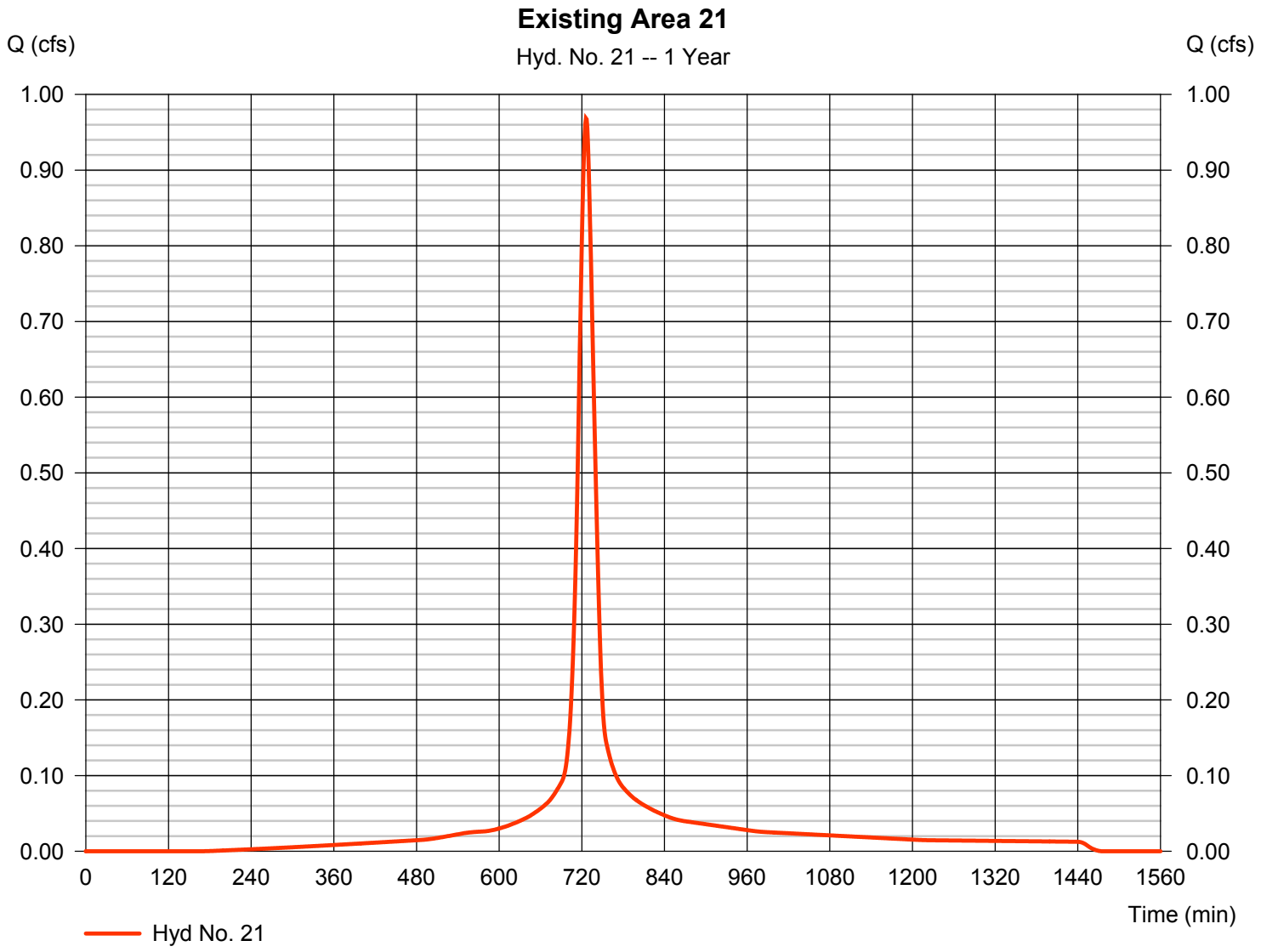
Hydrograph Report

Hyd. No. 21

Existing Area 21

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.968 cfs
Storm frequency	=	1 yrs	Time to peak	=	726 min
Time interval	=	1 min	Hyd. volume	=	3,474 cuft
Drainage area	=	0.410 ac	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	22.20 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.370 x 98) + (0.041 x 79)] / 0.410



TR55 Tc Worksheet

Hyd. No. 21

Existing Area 21

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 151.4		107.3		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 0.74		0.51		0.00		
Travel Time (min)	**= 20.01**	**+**	**2.18**	**+**	**0.00**	**=**	**22.19**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 22.20 min

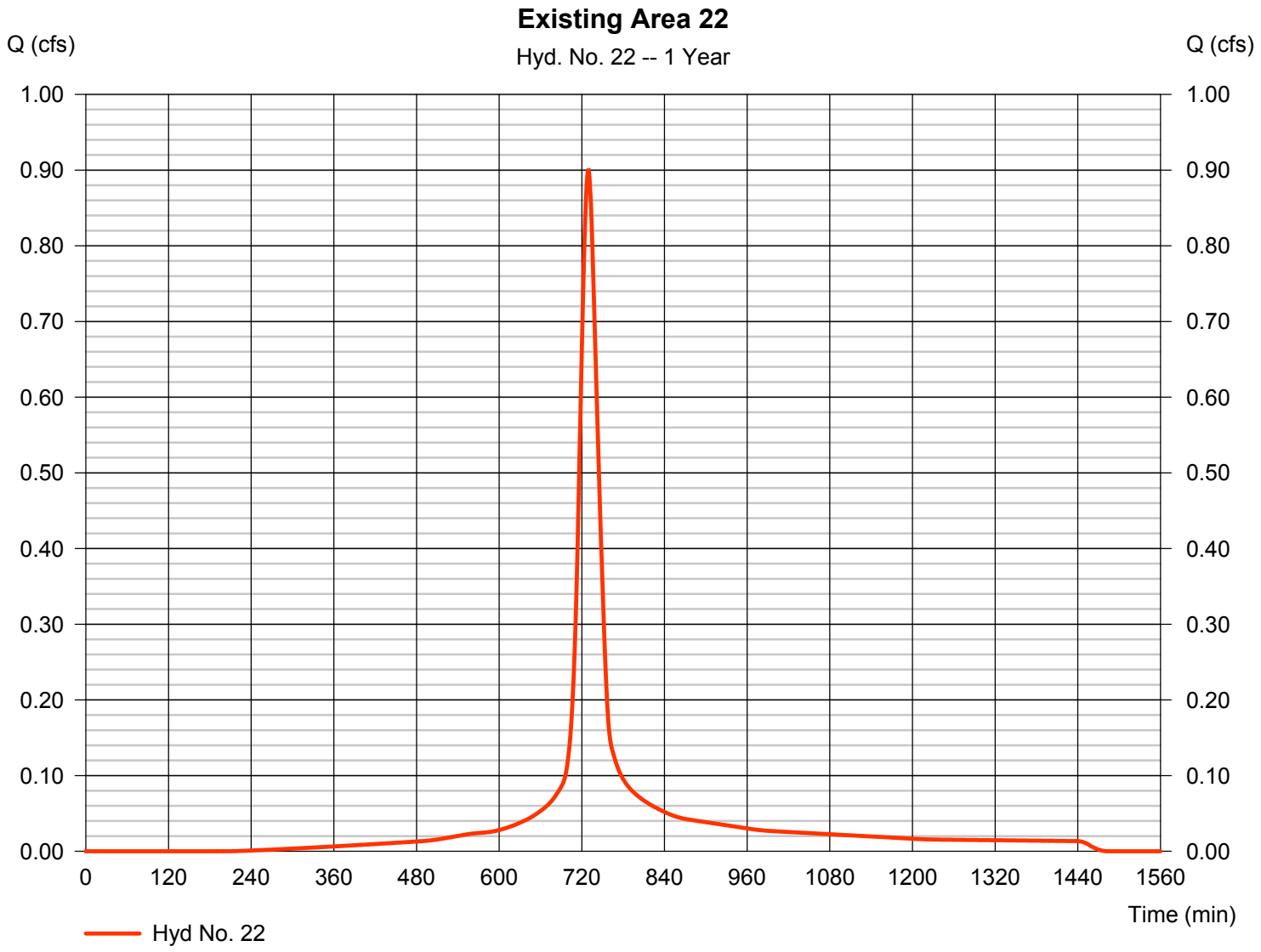
Hydrograph Report

Hyd. No. 22

Existing Area 22

Hydrograph type	= SCS Runoff	Peak discharge	= 0.900 cfs
Storm frequency	= 1 yrs	Time to peak	= 730 min
Time interval	= 1 min	Hyd. volume	= 3,574 cuft
Drainage area	= 0.440 ac	Curve number	= 95*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 27.80 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.382 x 98) + (0.062 x 79)] / 0.440



TR55 Tc Worksheet

Hyd. No. 22

Existing Area 22

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 144.3		11.5		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 0.31		0.17		0.00		
Travel Time (min)	**= 27.20**	**+**	**0.56**	**+**	**0.00**	**=**	**27.77**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 27.80 min

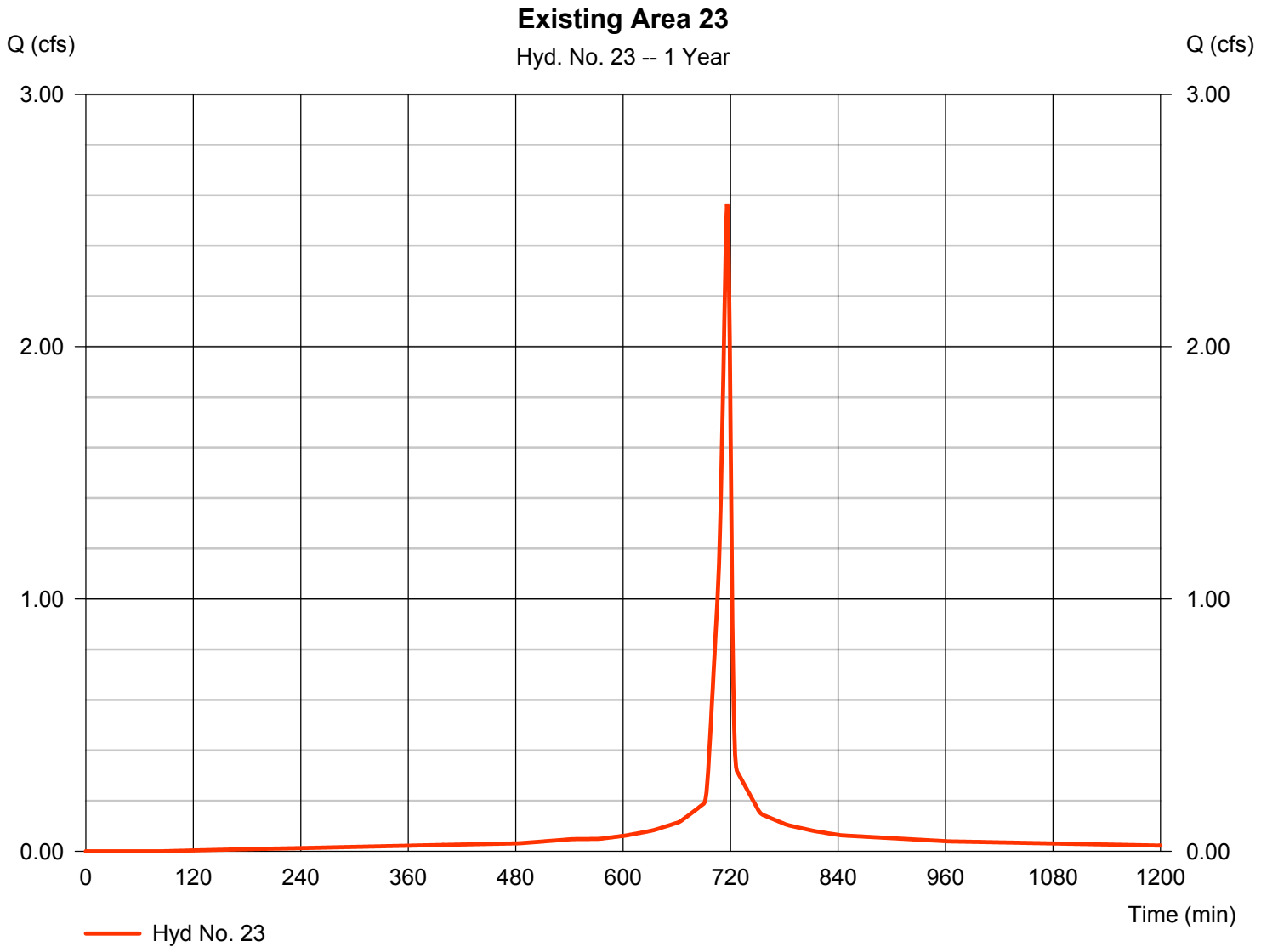
Hydrograph Report

Hyd. No. 23

Existing Area 23

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.566 cfs
Storm frequency	=	1 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	5,689 cuft
Drainage area	=	0.610 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.80 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.607 x 98)] / 0.610



TR55 Tc Worksheet

Hyd. No. 23

Existing Area 23

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 129.1		145.9		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 0.77		0.56		0.00		
Travel Time (min)	**= 2.14**	**+**	**2.68**	**+**	**0.00**	**=**	**4.82**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 4.80 min

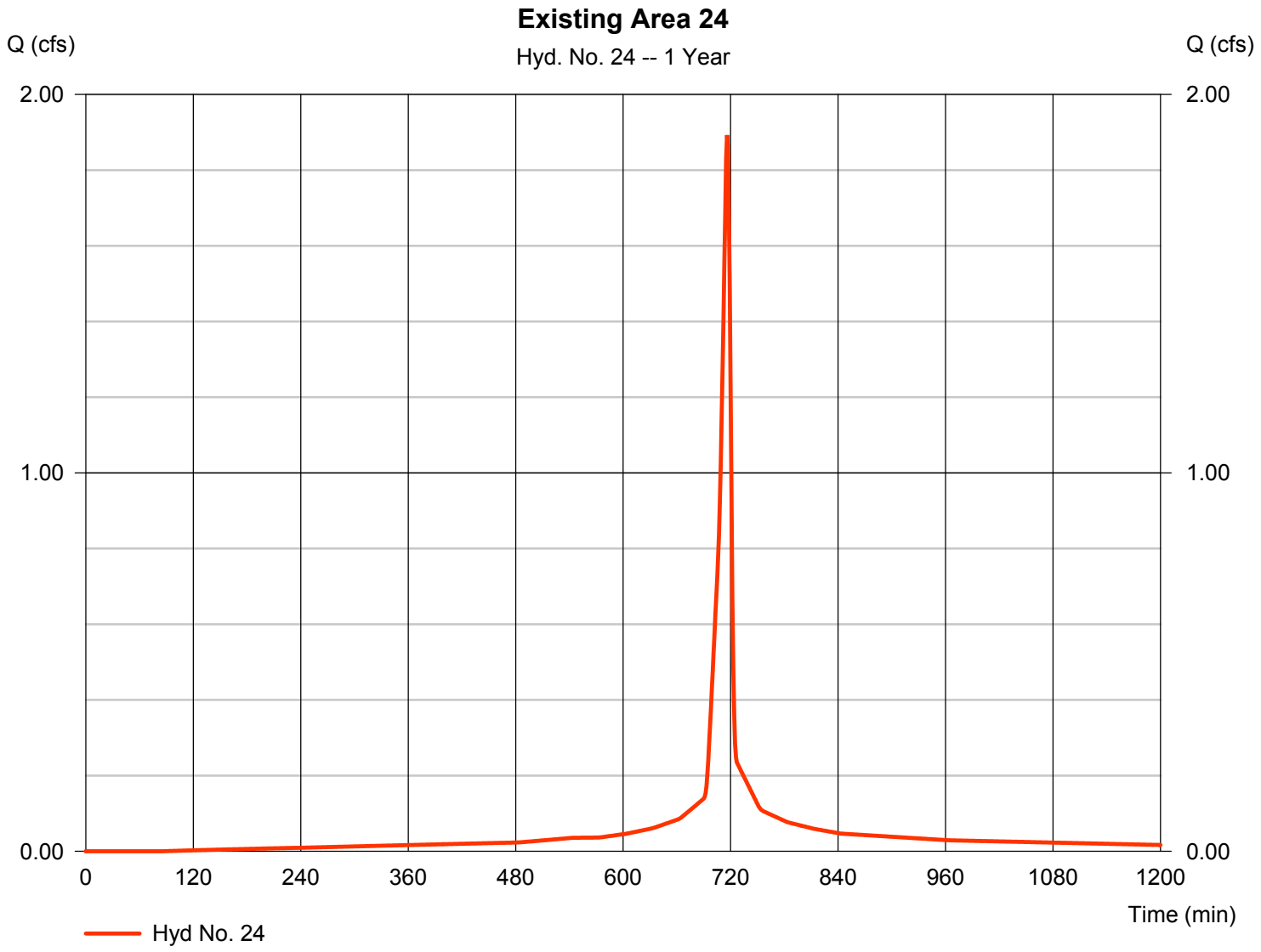
Hydrograph Report

Hyd. No. 24

Existing Area 24

Hydrograph type	= SCS Runoff	Peak discharge	= 1.893 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 4,197 cuft
Drainage area	= 0.450 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.90 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.450 x 98)] / 0.450



TR55 Tc Worksheet

Hyd. No. 24

Existing Area 24

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 70.0		153.2		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 1.43		0.54		0.00		
Travel Time (min)	**= 1.03**	**+**	**2.84**	**+**	**0.00**	**=**	**3.87**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 3.90 min

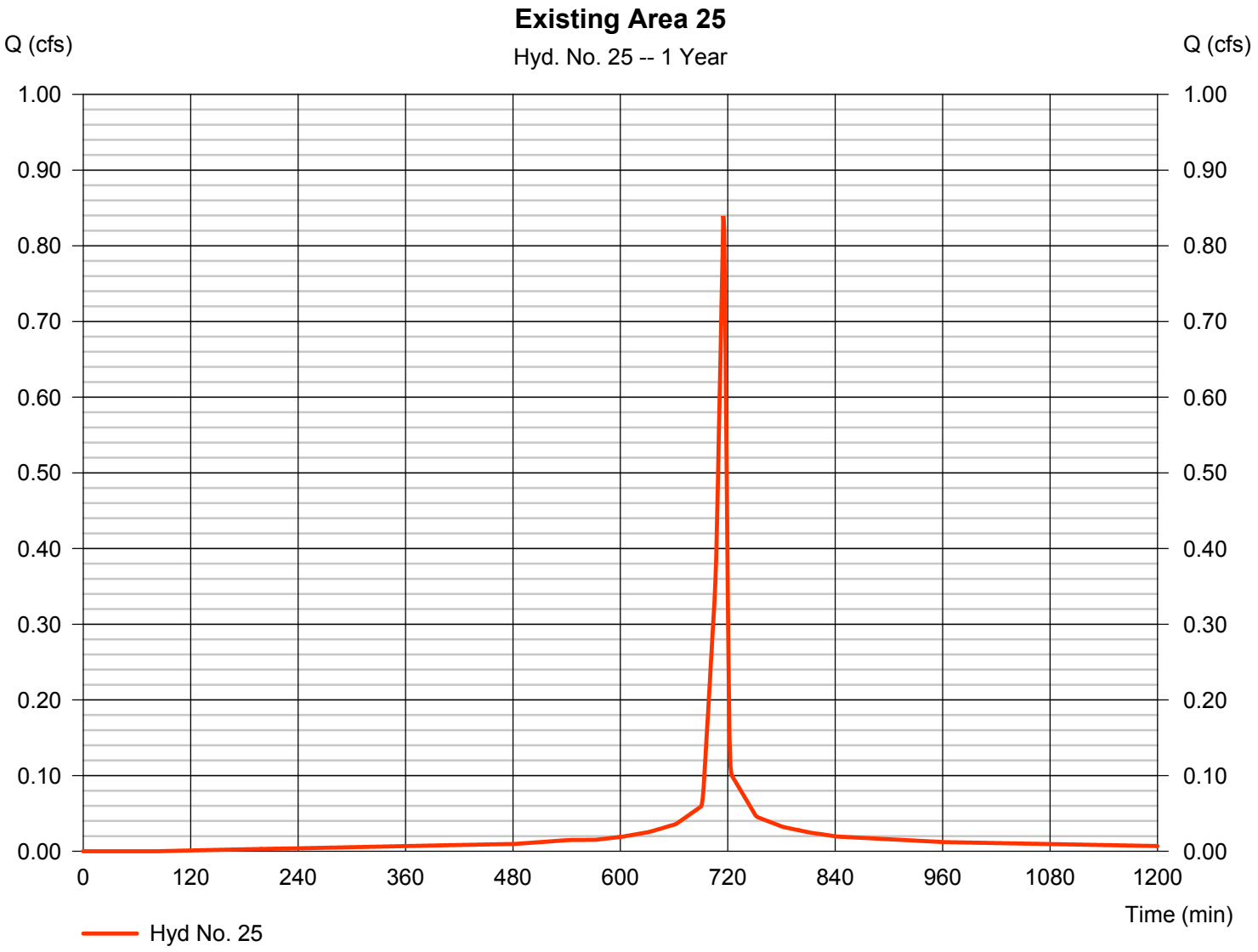
Hydrograph Report

Hyd. No. 25

Existing Area 25

Hydrograph type	= SCS Runoff	Peak discharge	= 0.840 cfs
Storm frequency	= 1 yrs	Time to peak	= 715 min
Time interval	= 1 min	Hyd. volume	= 1,749 cuft
Drainage area	= 0.200 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 1.60 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.203 x 98)] / 0.200



TR55 Tc Worksheet

Hyd. No. 25

Existing Area 25

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 20.0		42.4		28.2		
Two-year 24-hr precip. (in)	= 3.30		3.30		3.30		
Land slope (%)	= 0.70		1.17		2.76		
Travel Time (min)	**= 0.50**	**+**	**0.74**	**+**	**0.38**	**=**	**1.63**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 1.60 min

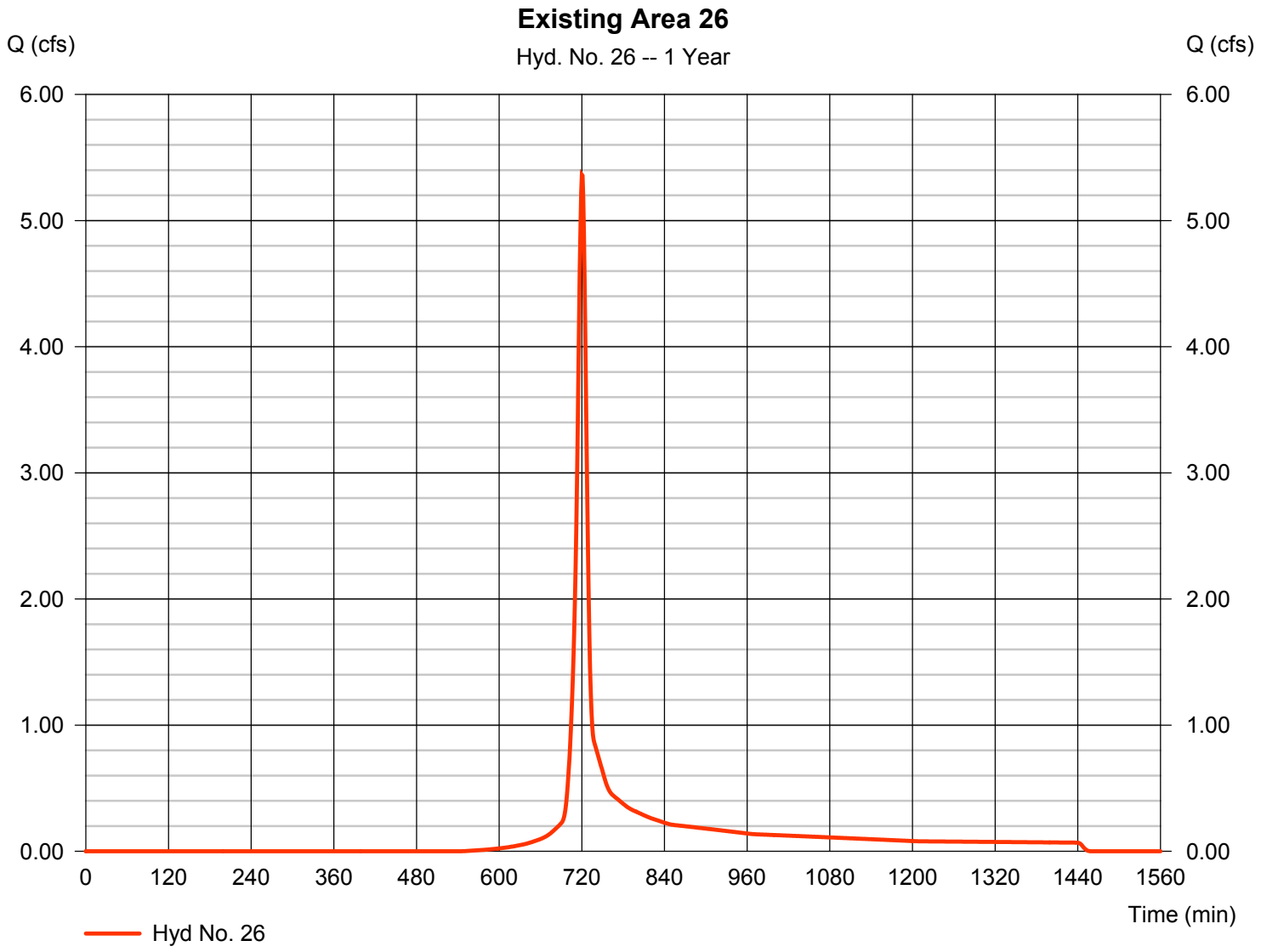
Hydrograph Report

Hyd. No. 26

Existing Area 26

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.363 cfs
Storm frequency	=	1 yrs	Time to peak	=	720 min
Time interval	=	1 min	Hyd. volume	=	12,985 cuft
Drainage area	=	2.730 ac	Curve number	=	83*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	10.40 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.626 x 98) + (2.102 x 79)] / 2.730



TR55 Tc Worksheet

Hyd. No. 26

Existing Area 26

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 166.5		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.30		0.00		0.00		
Land slope (%)	= 4.61		0.00		0.00		
Travel Time (min)	**= 10.39**	**+**	**0.00**	**+**	**0.00**	**=**	**10.39**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Unpaved		Paved		Unpaved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 10.40 min

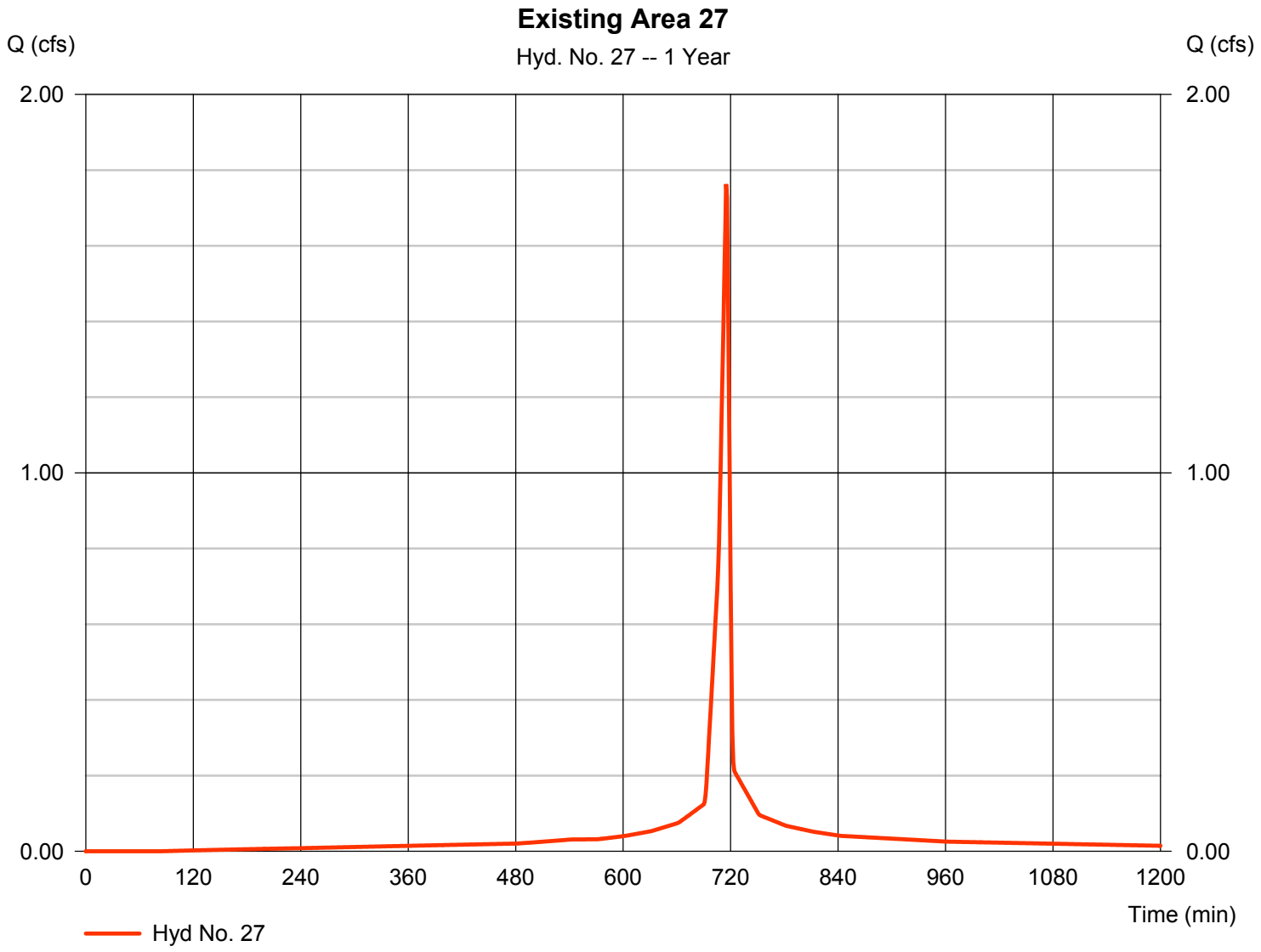
Hydrograph Report

Hyd. No. 27

Existing Area 27

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.763 cfs
Storm frequency	=	1 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	3,672 cuft
Drainage area	=	0.420 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.00 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.420 x 98)] / 0.420



TR55 Tc Worksheet

Hyd. No. 27

Existing Area 27

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 0.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 0.00		0.00		0.00		
Land slope (%)	= 0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Shallow Concentrated Flow							
Flow length (ft)	= 135.49		163.46		59.59		
Watercourse slope (%)	= 1.47		3.05		3.08		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=2.46		3.55		3.57		
Travel Time (min)	**= 0.92**	**+**	**0.77**	**+**	**0.28**	**=**	**1.96**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 2.00 min

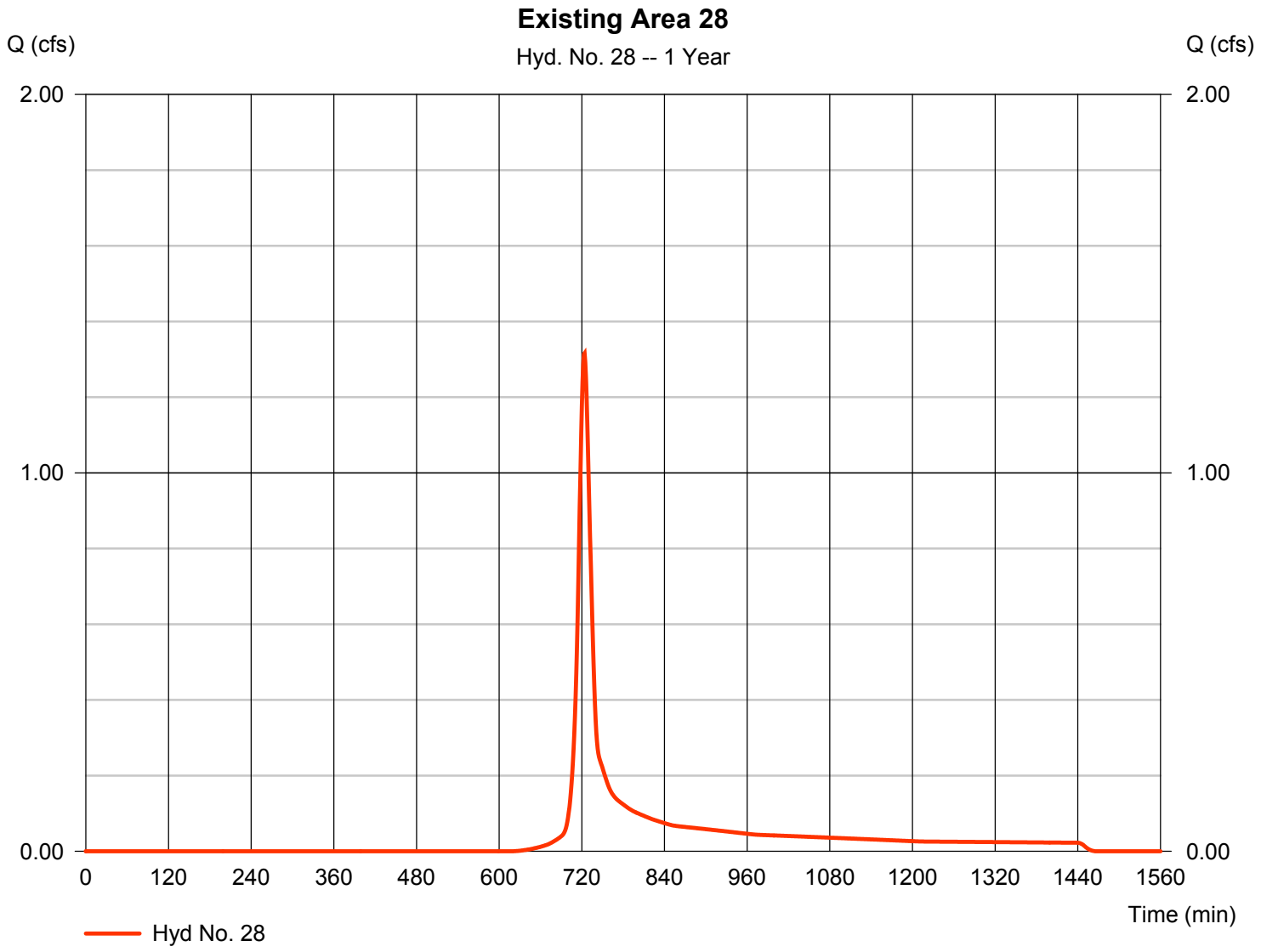
Hydrograph Report

Hyd. No. 28

Existing Area 28

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.316 cfs
Storm frequency	=	1 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	3,839 cuft
Drainage area	=	1.000 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	15.50 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.004 x 98) + (0.996 x 79)] / 1.000



TR55 Tc Worksheet

Hyd. No. 28

Existing Area 28

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.150		0.011		
Flow length (ft)	= 193.9		14.6		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		3.30		
Land slope (%)	= 2.58		34.17		0.00		
Travel Time (min)	**= 14.80**	**+**	**0.67**	**+**	**0.00**	**=**	**15.47**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 15.50 min

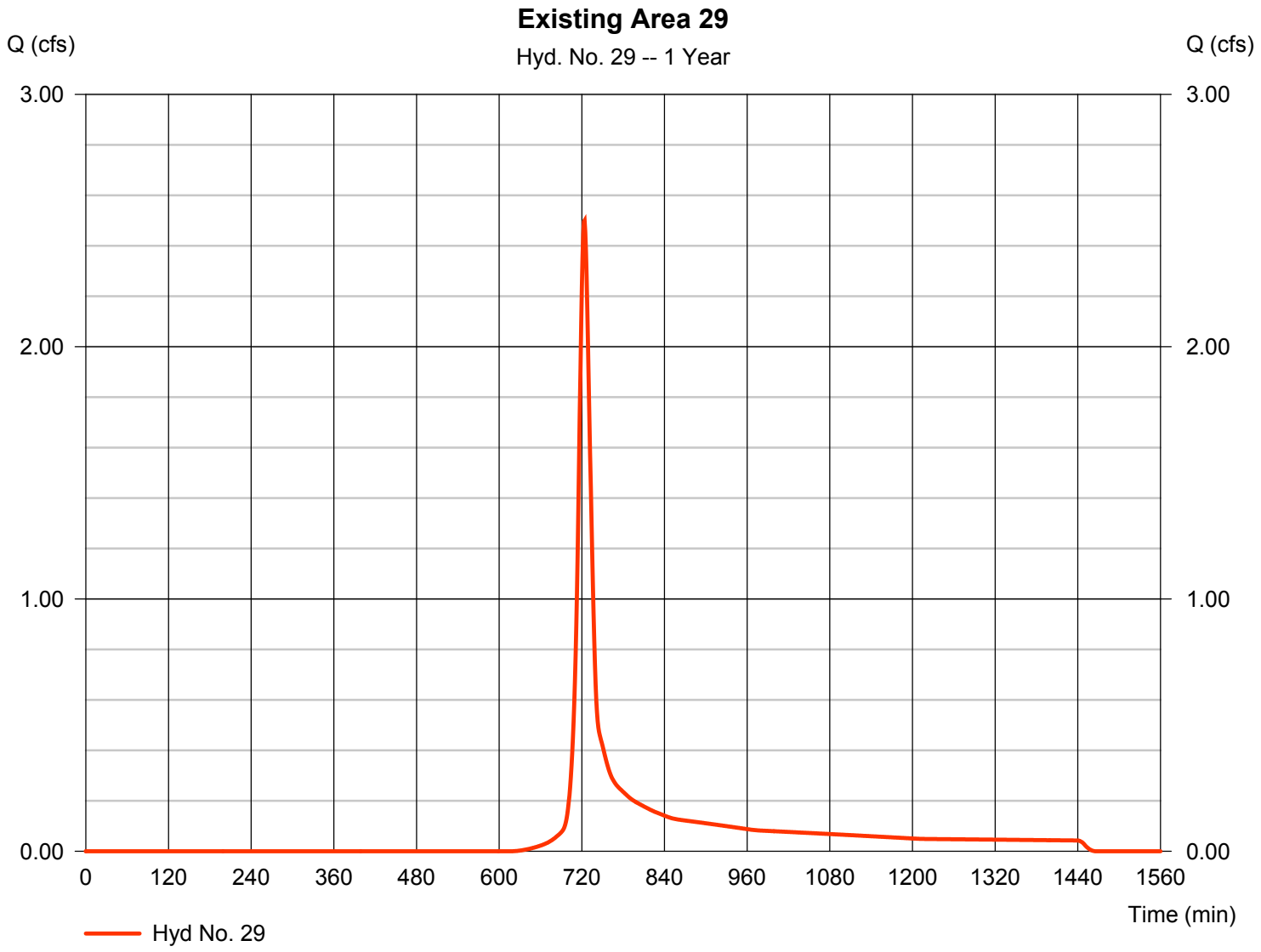
Hydrograph Report

Hyd. No. 29

Existing Area 29

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.501 cfs
Storm frequency	=	1 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	7,293 cuft
Drainage area	=	1.900 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	15.70 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.049 x 98) + (1.850 x 79)] / 1.900



TR55 Tc Worksheet

Hyd. No. 29

Existing Area 29

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 265.8		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.30		0.00		0.00		
Land slope (%)	= 4.21		0.00		0.00		
Travel Time (min)	**= 15.66**	**+**	**0.00**	**+**	**0.00**	**=**	**15.66**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 15.70 min

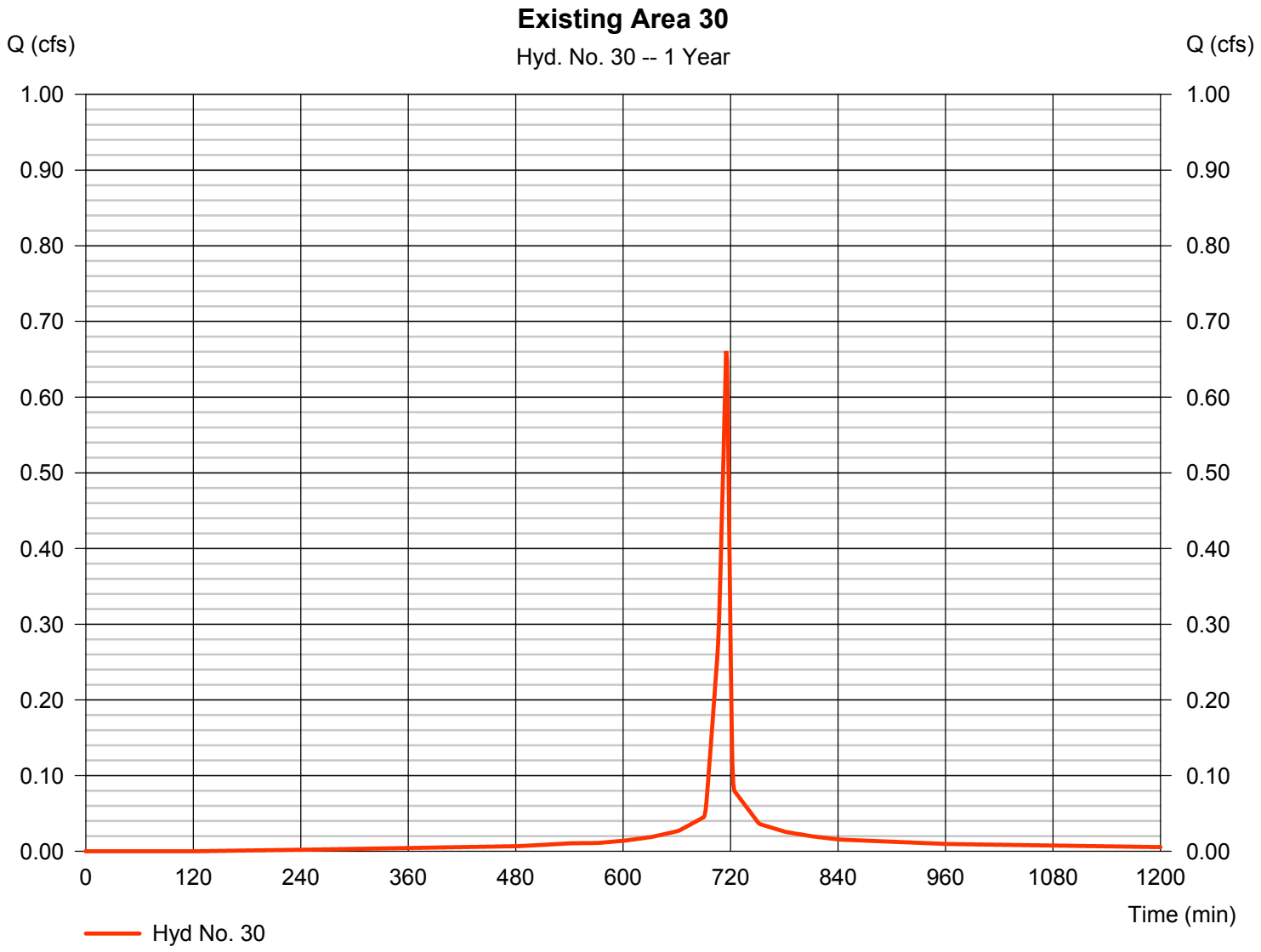
Hydrograph Report

Hyd. No. 30

Existing Area 30

Hydrograph type	= SCS Runoff	Peak discharge	= 0.661 cfs
Storm frequency	= 1 yrs	Time to peak	= 715 min
Time interval	= 1 min	Hyd. volume	= 1,340 cuft
Drainage area	= 0.160 ac	Curve number	= 97*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.20 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.150 x 98) + (0.008 x 79)] / 0.160



TR55 Tc Worksheet

Hyd. No. 30

Existing Area 30

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 237.8		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.30		0.00		0.00		
Land slope (%)	= 2.52		0.00		0.00		
Travel Time (min)	**= 2.17**	**+**	**0.00**	**+**	**0.00**	**=**	**2.17**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 2.20 min

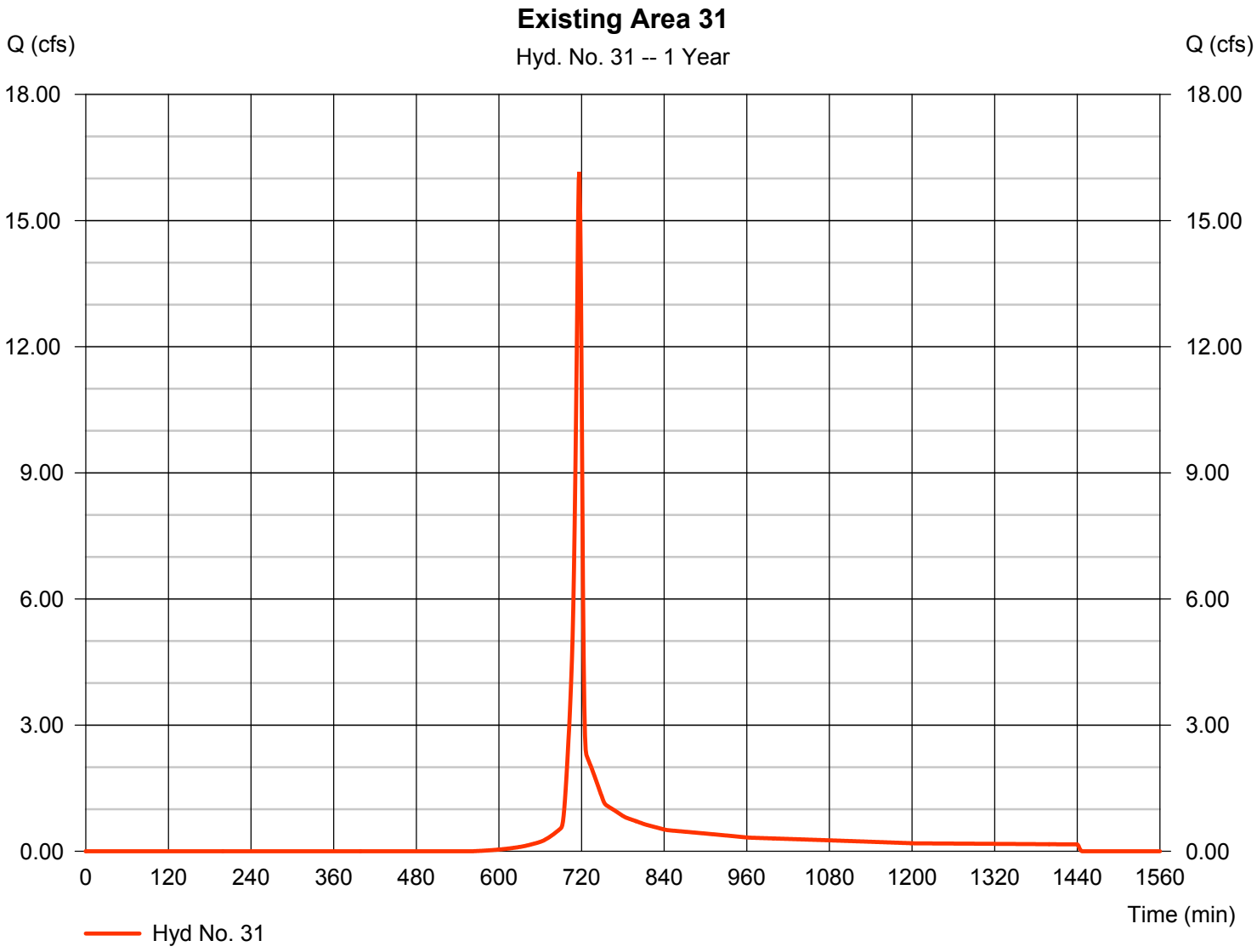
Hydrograph Report

Hyd. No. 31

Existing Area 31

Hydrograph type	= SCS Runoff	Peak discharge	= 16.16 cfs
Storm frequency	= 1 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 30,333 cuft
Drainage area	= 6.830 ac	Curve number	= 82*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 4.80 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.950 x 98) + (5.879 x 79)] / 6.830



TR55 Tc Worksheet

Hyd. No. 31

Existing Area 31

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 0.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 0.00		0.00		0.00		
Land slope (%)	= 0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Shallow Concentrated Flow							
Flow length (ft)	= 128.96		130.56		679.40		
Watercourse slope (%)	= 5.88		1.21		4.57		
Surface description	= Unpaved		Paved		Unpaved		
Average velocity (ft/s)	=3.91		2.23		3.45		
Travel Time (min)	**= 0.55**	**+**	**0.97**	**+**	**3.28**	**=**	**4.81**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

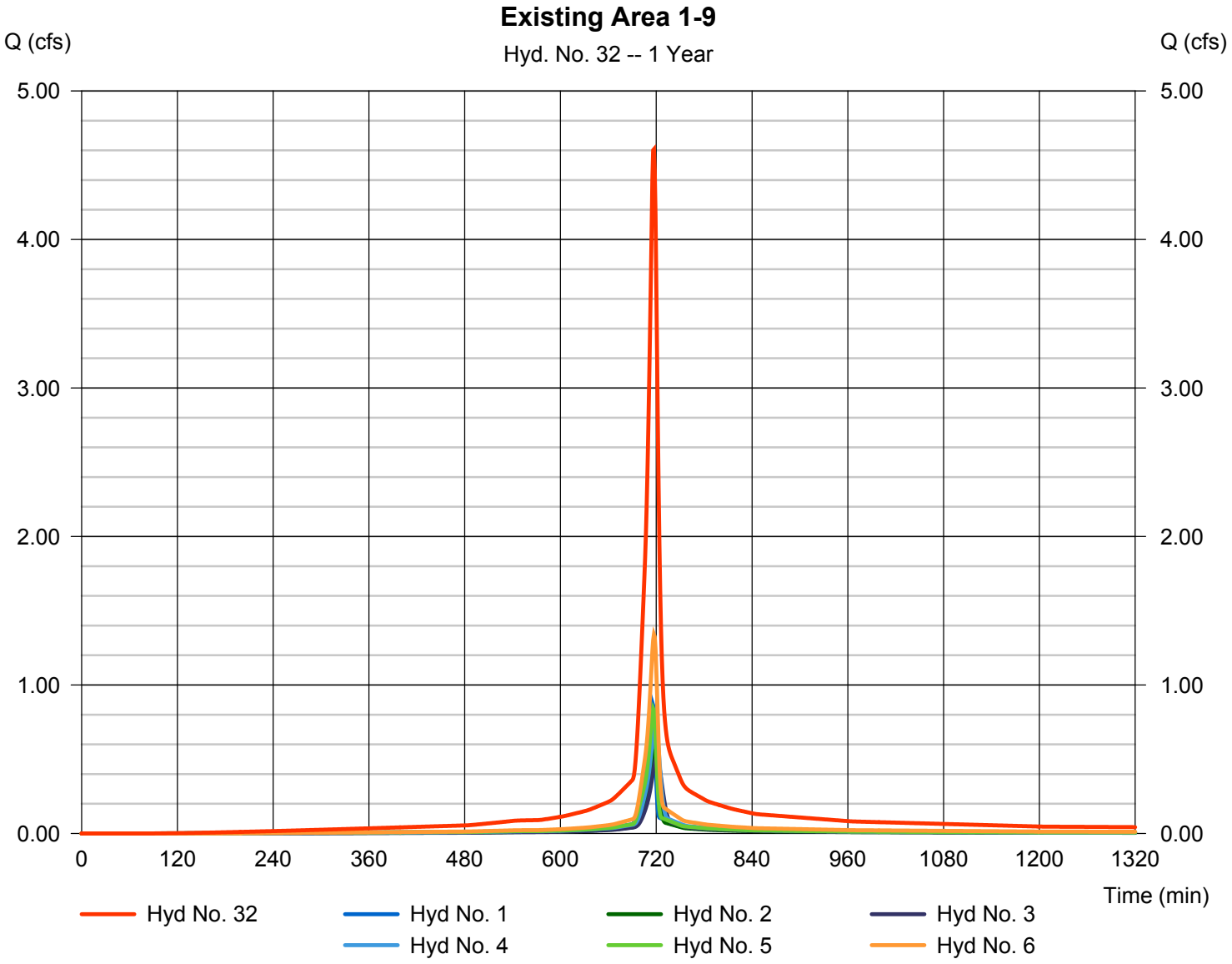
Total Travel Time, Tc ..... 4.80 min

Hydrograph Report

Hyd. No. 32

Existing Area 1-9

Hydrograph type	= Combine	Peak discharge	= 4.607 cfs
Storm frequency	= 1 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 11,250 cuft
Inflow hyds.	= 1, 2, 3, 4, 5, 6	Contrib. drain. area	= 1.280 ac

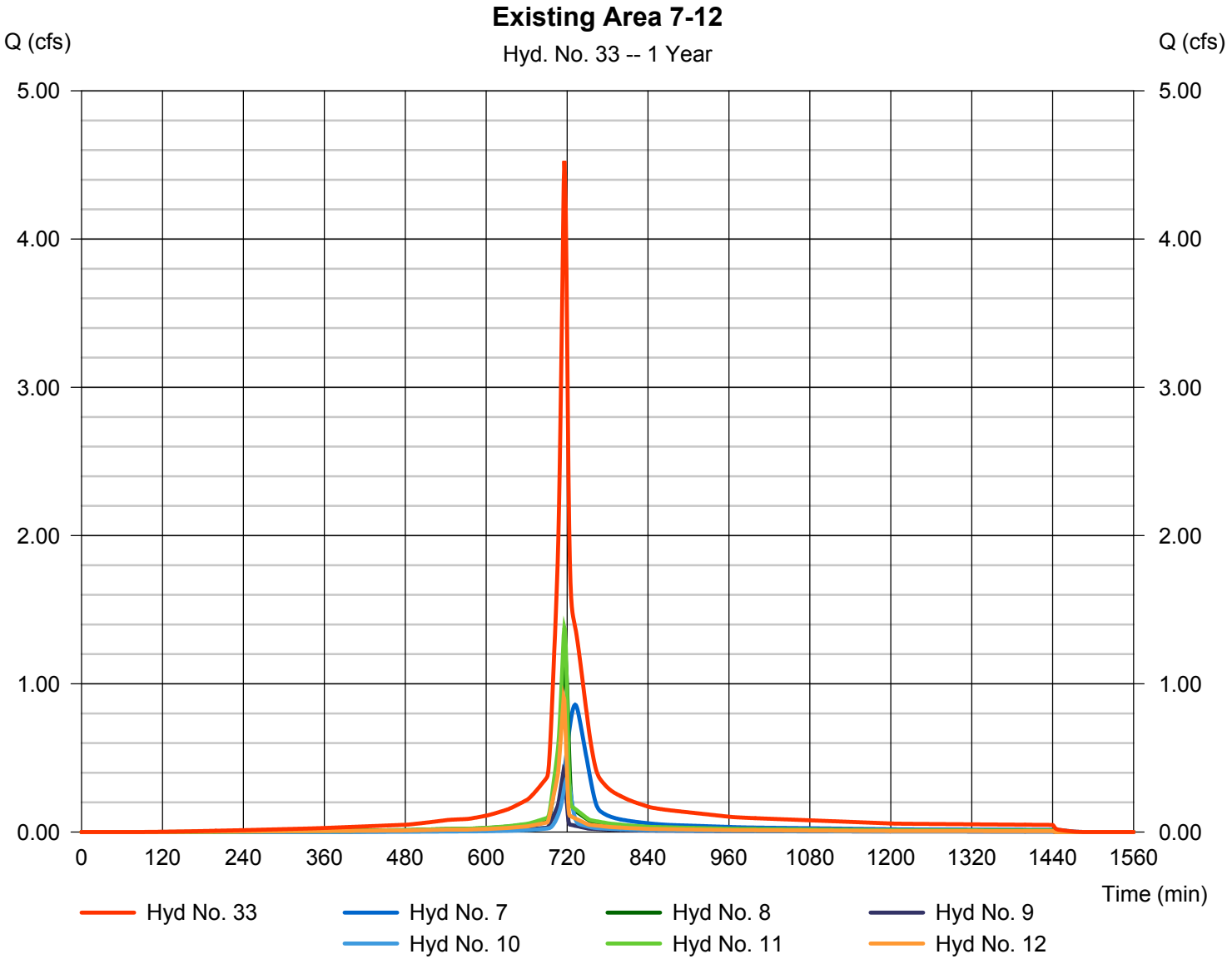


Hydrograph Report

Hyd. No. 33

Existing Area 7-12

Hydrograph type	= Combine	Peak discharge	= 4.526 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 12,834 cuft
Inflow hyds.	= 7, 8, 9, 10, 11, 12	Contrib. drain. area	= 1.597 ac

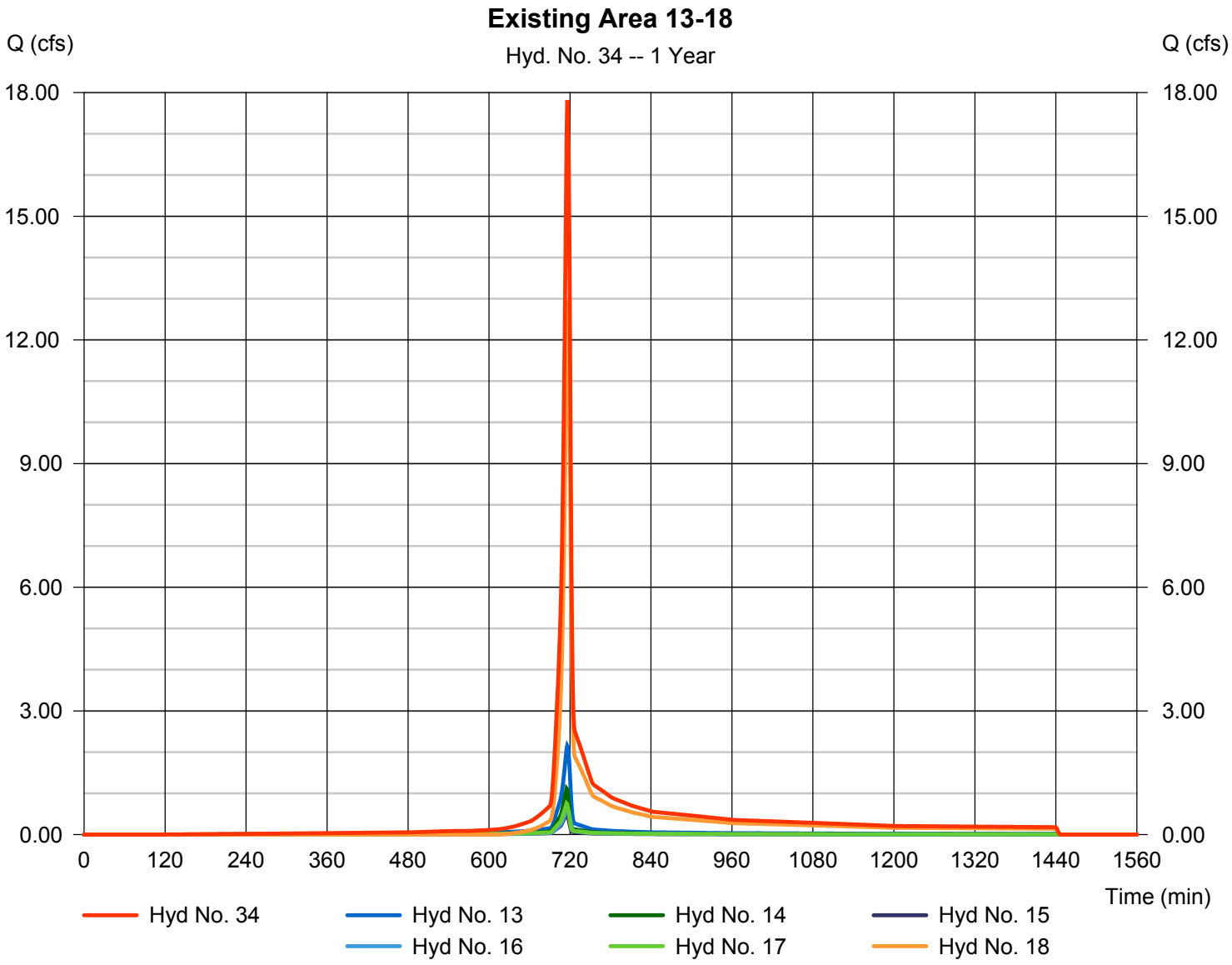


Hydrograph Report

Hyd. No. 34

Existing Area 13-18

Hydrograph type	= Combine	Peak discharge	= 17.82 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 35,101 cuft
Inflow hyds.	= 13, 14, 15, 16, 17, 18	Contrib. drain. area	= 7.650 ac

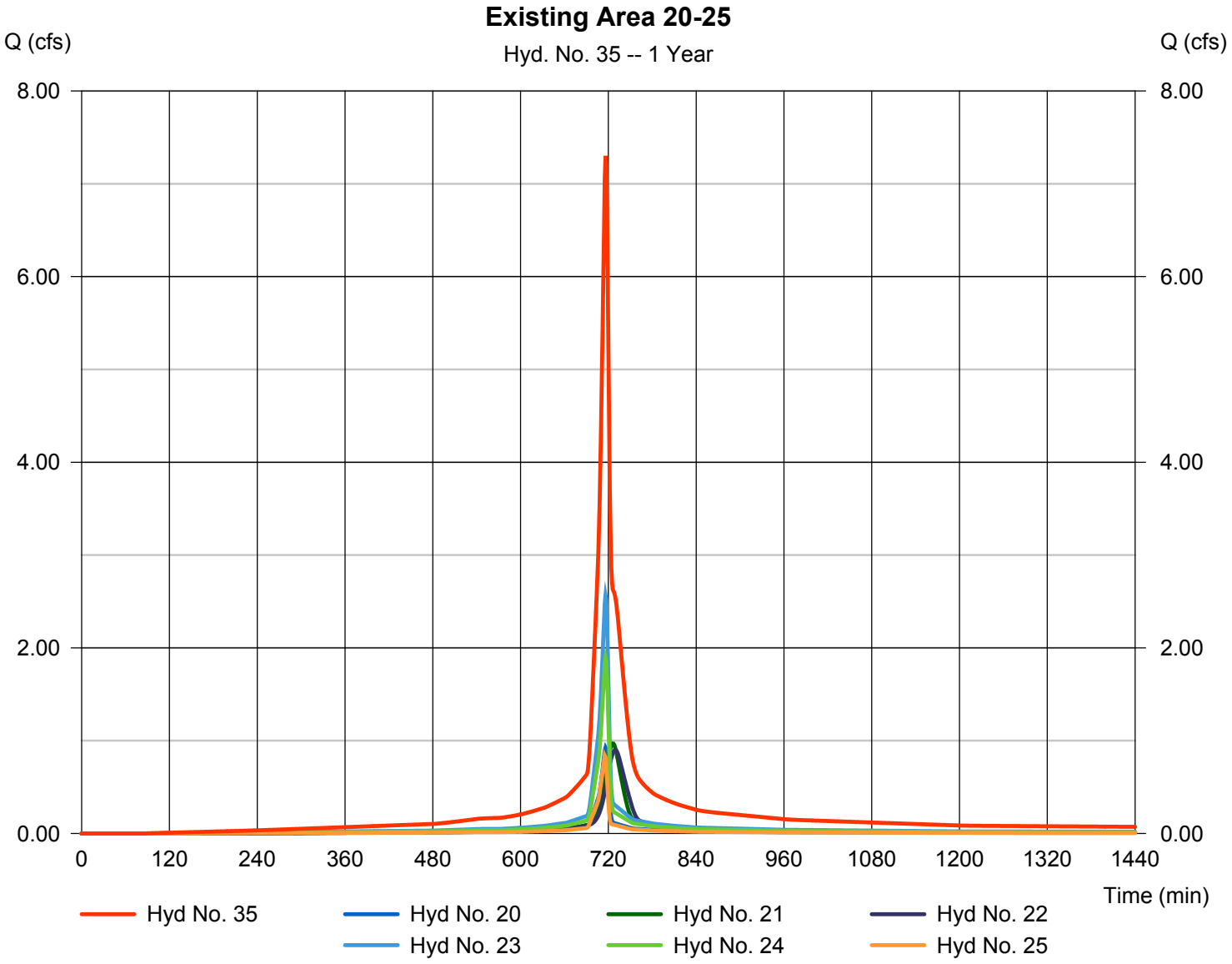


Hydrograph Report

Hyd. No. 35

Existing Area 20-25

Hydrograph type	= Combine	Peak discharge	= 7.302 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 20,735 cuft
Inflow hyds.	= 20, 21, 22, 23, 24, 25	Contrib. drain. area	= 2.330 ac

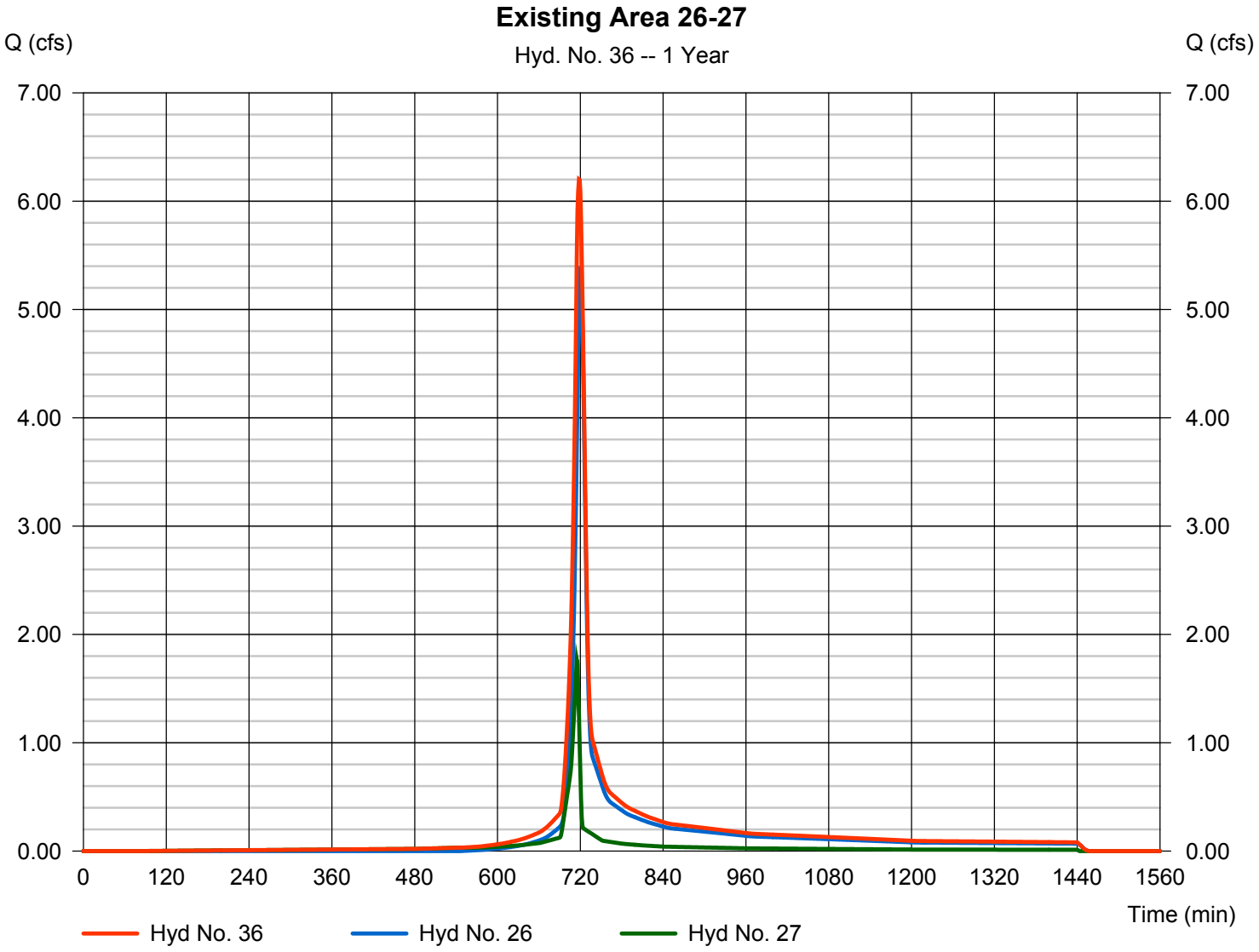


Hydrograph Report

Hyd. No. 36

Existing Area 26-27

Hydrograph type	=	Combine	Peak discharge	=	6.201 cfs
Storm frequency	=	1 yrs	Time to peak	=	718 min
Time interval	=	1 min	Hyd. volume	=	16,657 cuft
Inflow hyds.	=	26, 27	Contrib. drain. area	=	3.150 ac

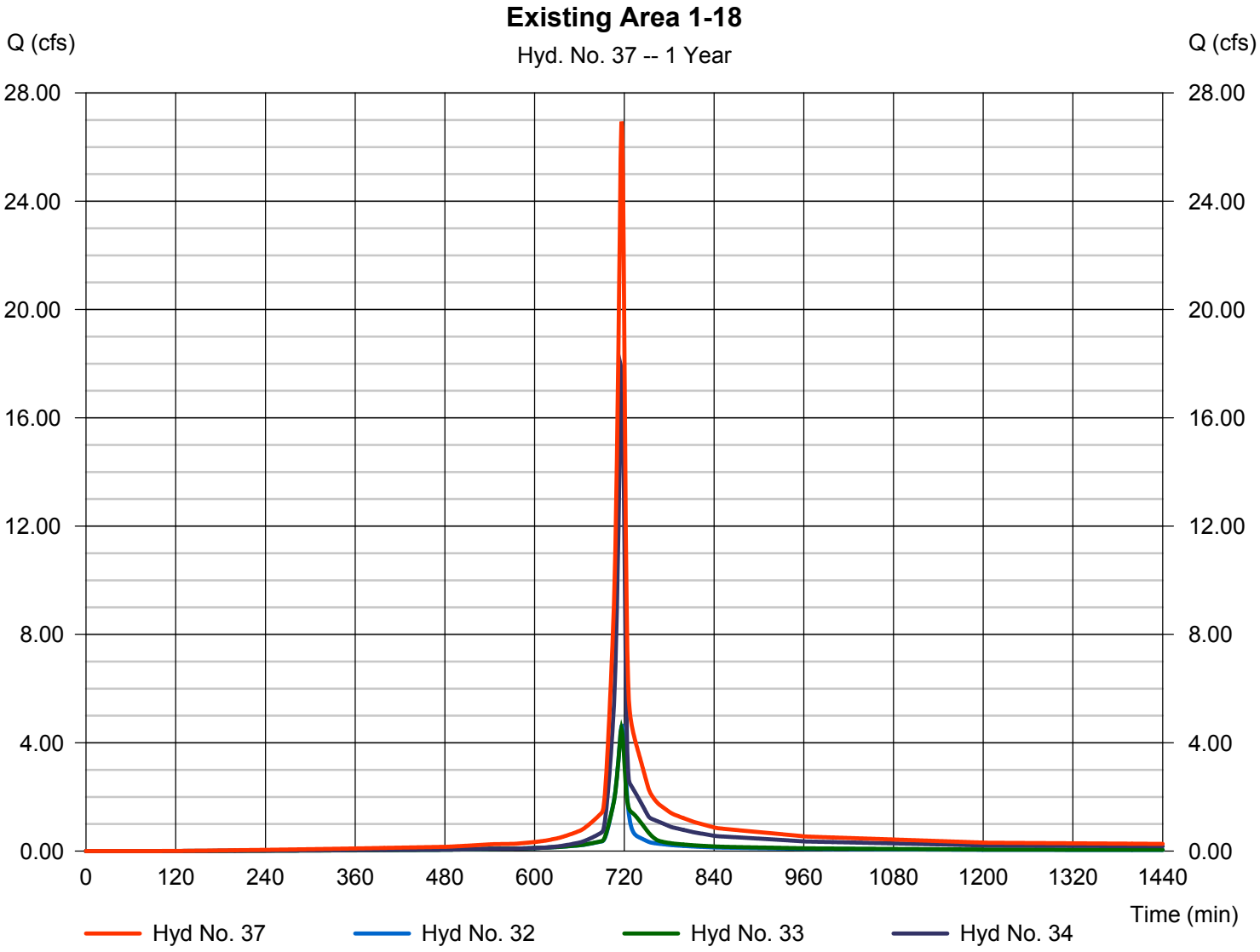


Hydrograph Report

Hyd. No. 37

Existing Area 1-18

Hydrograph type	= Combine	Peak discharge	= 26.94 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 59,185 cuft
Inflow hyds.	= 32, 33, 34	Contrib. drain. area	= 0.000 ac

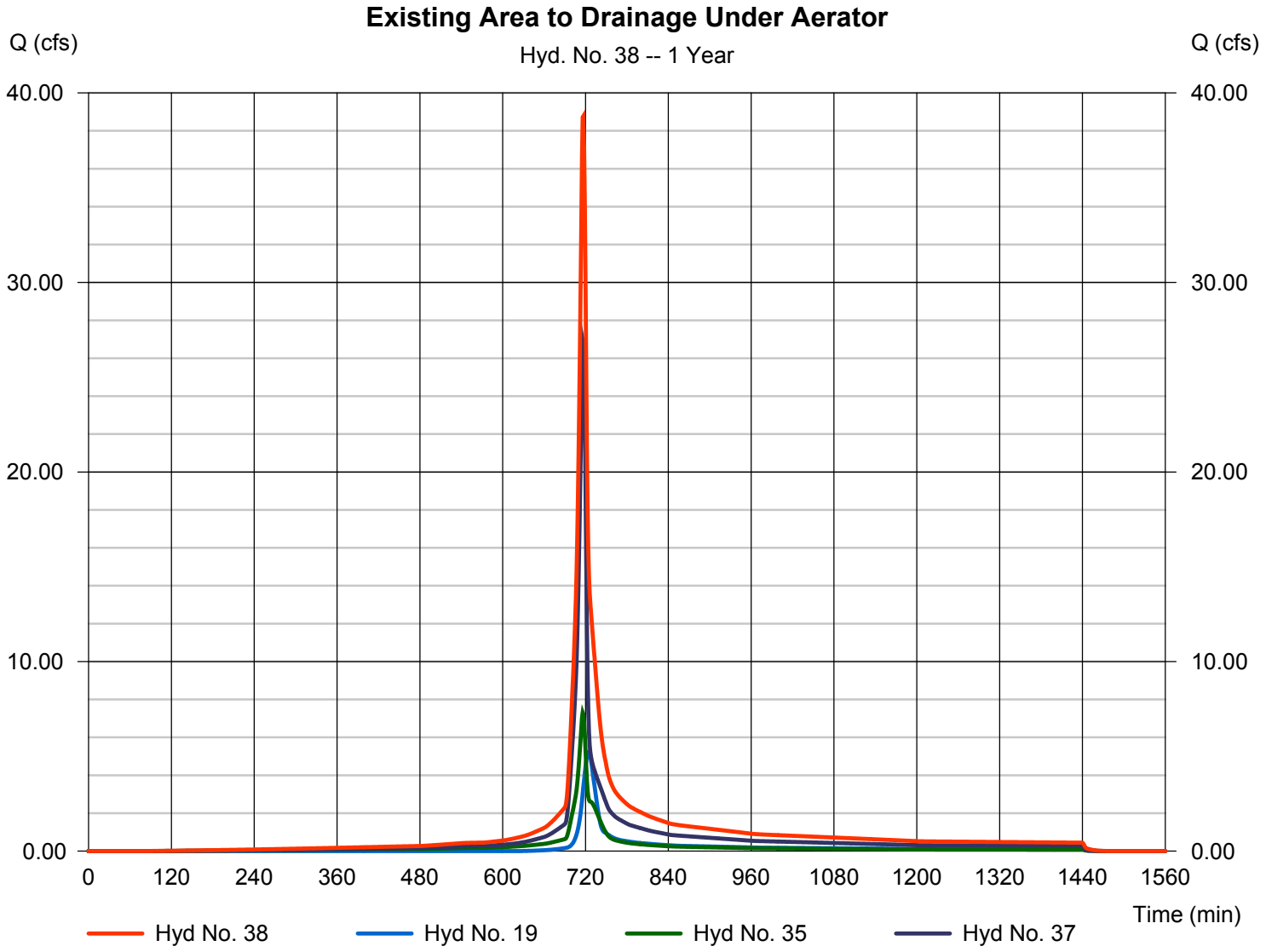


Hydrograph Report

Hyd. No. 38

Existing Area to Drainage Under Aerator

Hydrograph type	= Combine	Peak discharge	= 38.78 cfs
Storm frequency	= 1 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 98,921 cuft
Inflow hyds.	= 19, 35, 37	Contrib. drain. area	= 4.240 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1.589	1	715	3,404	------	------	------	Existing Area 1
2	SCS Runoff	1.002	1	718	2,467	------	------	------	Existing Area 2
3	SCS Runoff	0.959	1	721	2,685	------	------	------	Existing Area 3
4	SCS Runoff	1.357	1	719	3,542	------	------	------	Existing Area 4
5	SCS Runoff	1.517	1	716	3,458	------	------	------	Existing Area 5
6	SCS Runoff	2.477	1	717	5,769	------	------	------	Existing Area 6
7	SCS Runoff	1.766	1	732	7,566	------	------	------	Existing Area 7
8	SCS Runoff	2.130	1	717	5,045	------	------	------	Existing Area 8
9	SCS Runoff	0.757	1	715	1,621	------	------	------	Existing Area 9
10	SCS Runoff	0.745	1	720	1,913	------	------	------	Existing Area 10
11	SCS Runoff	2.543	1	716	5,594	------	------	------	Existing Area 11
12	SCS Runoff	1.639	1	715	3,511	------	------	------	Existing Area 12
13	SCS Runoff	3.921	1	716	8,772	------	------	------	Existing Area 13
14	SCS Runoff	2.032	1	715	4,270	------	------	------	Existing Area 14
15	SCS Runoff	0.908	1	715	1,945	------	------	------	Existing Area 15
16	SCS Runoff	1.185	1	716	2,567	------	------	------	Existing Area 16
17	SCS Runoff	1.362	1	715	2,918	------	------	------	Existing Area 17
18	SCS Runoff	33.98	1	717	65,088	------	------	------	Existing Area 18
19	SCS Runoff	14.39	1	724	42,631	------	------	------	Existing Area 19
20	SCS Runoff	1.669	1	716	3,804	------	------	------	Existing Area 20
21	SCS Runoff	1.802	1	726	6,686	------	------	------	Existing Area 21
22	SCS Runoff	1.705	1	729	7,007	------	------	------	Existing Area 22
23	SCS Runoff	4.628	1	716	10,547	------	------	------	Existing Area 23
24	SCS Runoff	3.414	1	716	7,781	------	------	------	Existing Area 24
25	SCS Runoff	1.514	1	715	3,242	------	------	------	Existing Area 25
26	SCS Runoff	13.08	1	720	32,017	------	------	------	Existing Area 26
27	SCS Runoff	3.179	1	715	6,808	------	------	------	Existing Area 27
28	SCS Runoff	3.611	1	723	10,297	------	------	------	Existing Area 28
29	SCS Runoff	6.860	1	723	19,565	------	------	------	Existing Area 29
30	SCS Runoff	1.204	1	715	2,530	------	------	------	Existing Area 30
31	SCS Runoff	39.37	1	716	76,339	------	------	------	Existing Area 31
32	Combine	8.441	1	717	21,325	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18,	------	------	Existing Area 1-9
33	Combine	8.482	1	716	25,250		------	------	Existing Area 7-12
34	Combine	43.25	1	716	85,559		------	------	Existing Area 13-18

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
35	Combine	13.29	1	716	39,066	20, 21, 22, 23, 24, 25, 26, 27,	------	------	Existing Area 20-25
36	Combine	14.61	1	719	38,825		------	------	Existing Area 26-27
37	Combine	60.16	1	716	132,134	32, 33, 34,	------	------	Existing Area 1-18
38	Combine	106.28	1	716	266,732	19, 35, 37	------	------	Existing Area to Drainage Under Aera

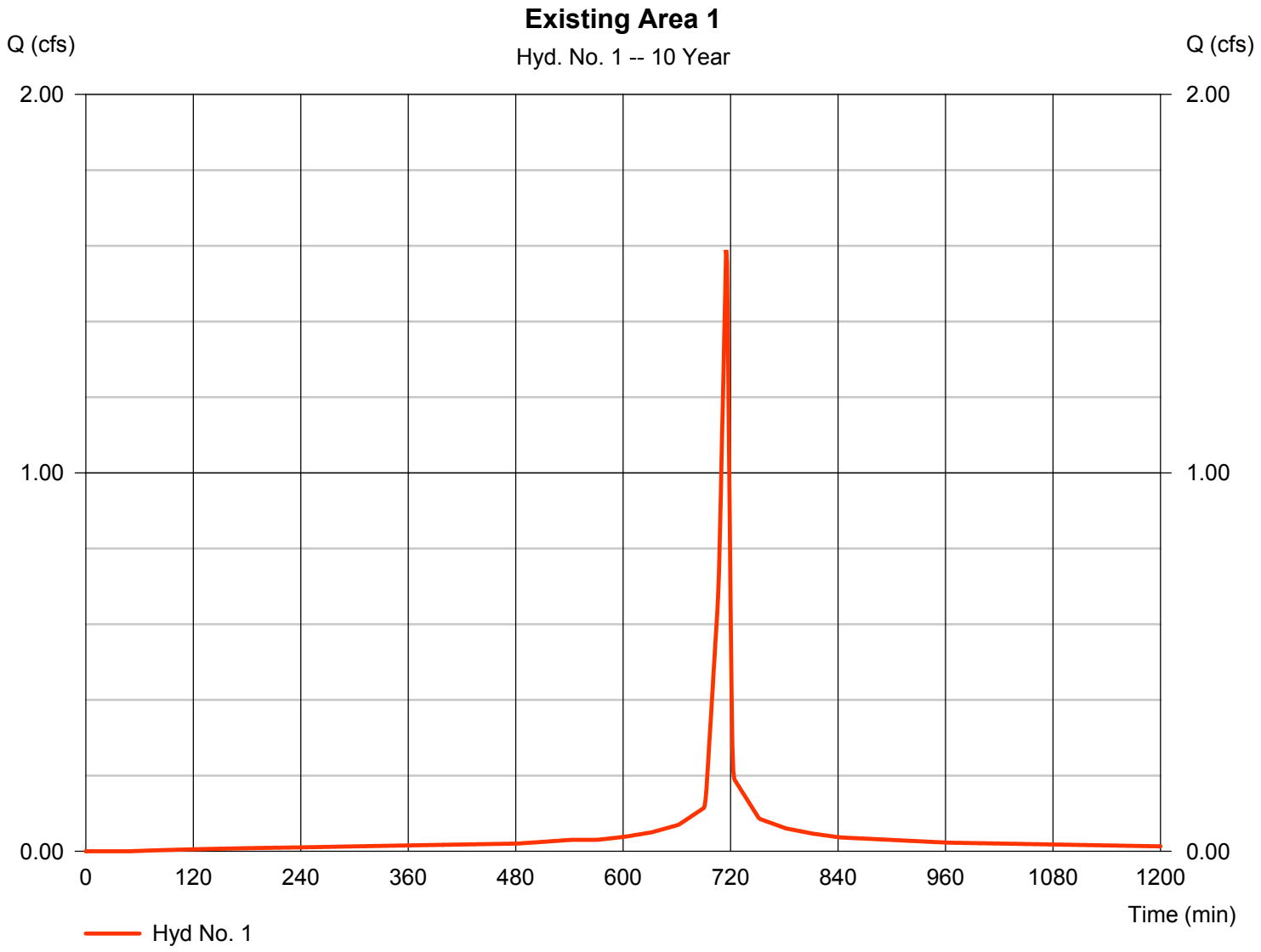
Hydrograph Report

Hyd. No. 1

Existing Area 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.589 cfs
Storm frequency	=	10 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	3,404 cuft
Drainage area	=	0.210 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	3.20 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.210 x 98)] / 0.210



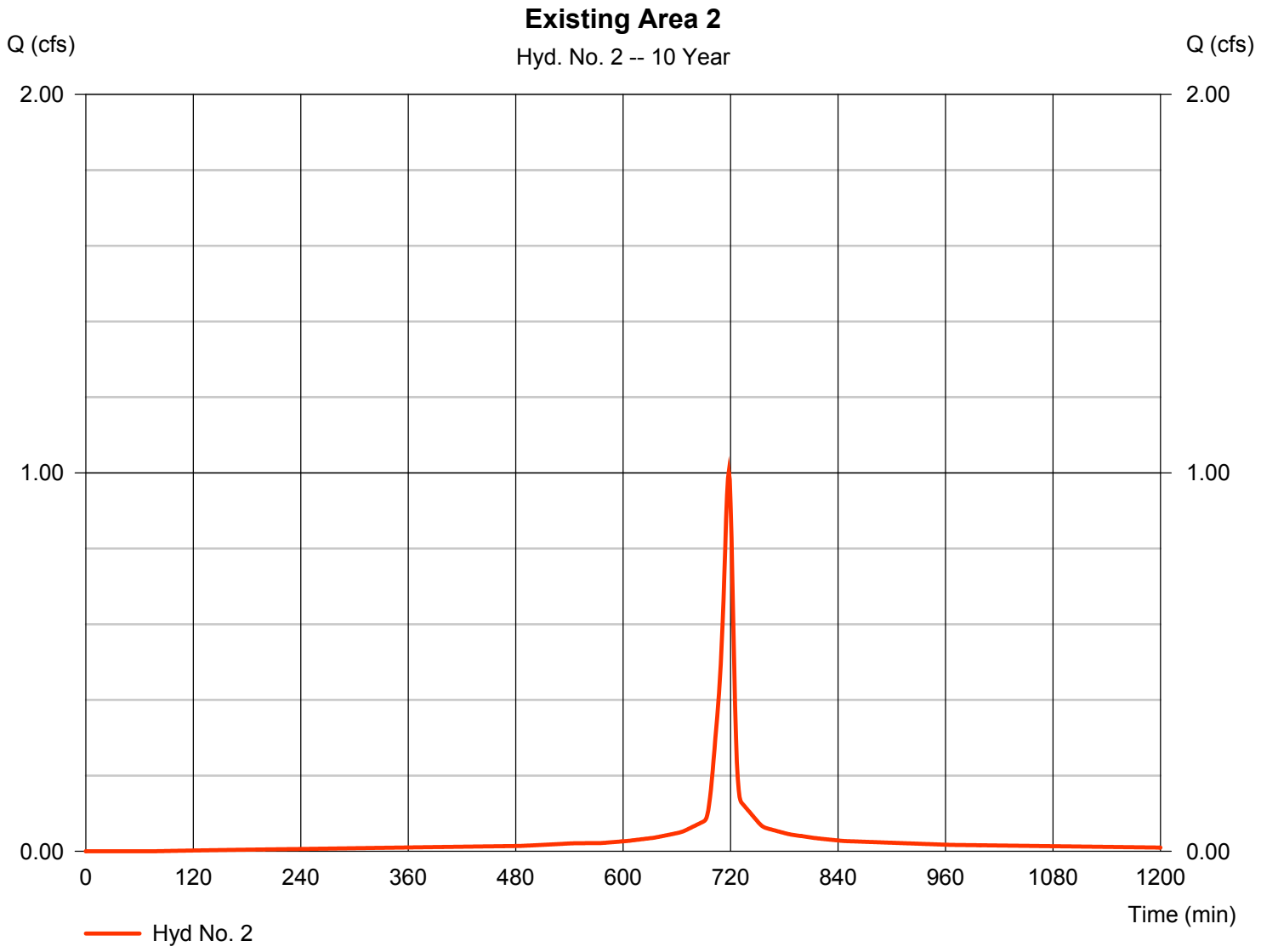
Hydrograph Report

Hyd. No. 2

Existing Area 2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.002 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 2,467 cuft
Drainage area	= 0.150 ac	Curve number	= 97*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.90 min
Total precip.	= 5.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.150 x 97)] / 0.150



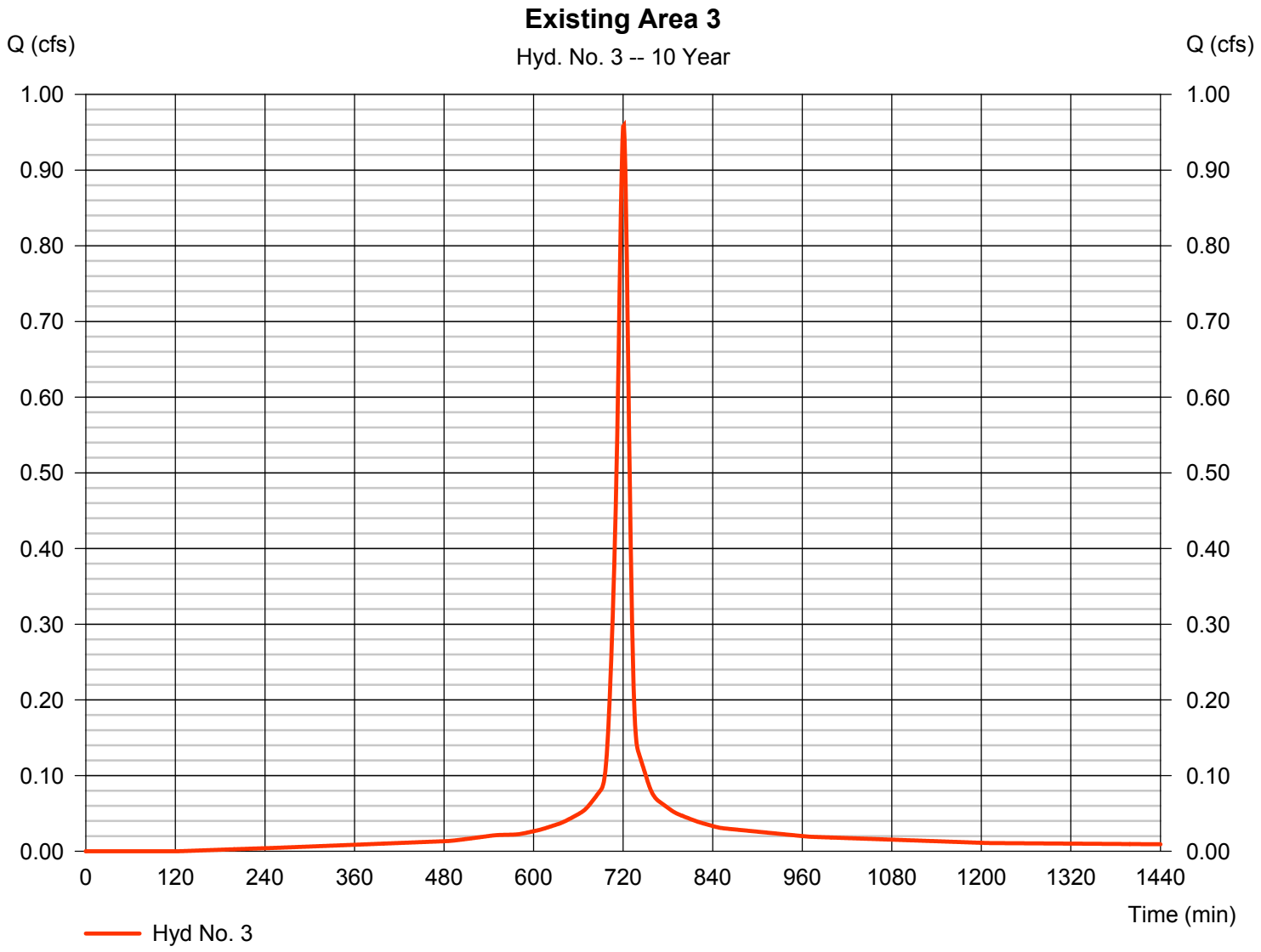
Hydrograph Report

Hyd. No. 3

Existing Area 3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.959 cfs
Storm frequency	= 10 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyd. volume	= 2,685 cuft
Drainage area	= 0.170 ac	Curve number	= 95*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 13.10 min
Total precip.	= 5.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.143 x 98) + (0.030 x 79)] / 0.170



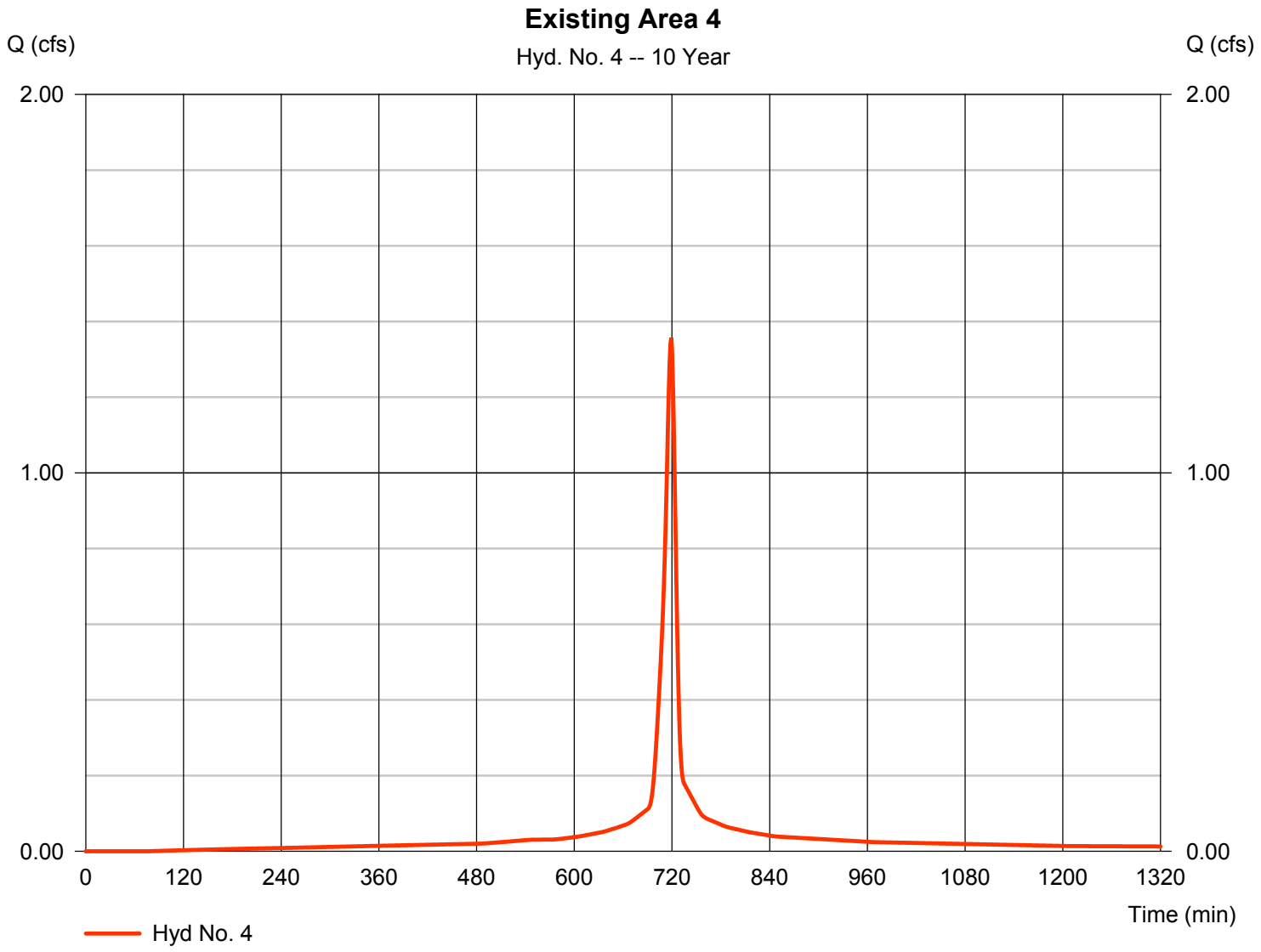
Hydrograph Report

Hyd. No. 4

Existing Area 4

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.357 cfs
Storm frequency	=	10 yrs	Time to peak	=	719 min
Time interval	=	1 min	Hyd. volume	=	3,542 cuft
Drainage area	=	0.210 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	9.60 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.200 x 98) + (0.010 x 79)] / 0.210



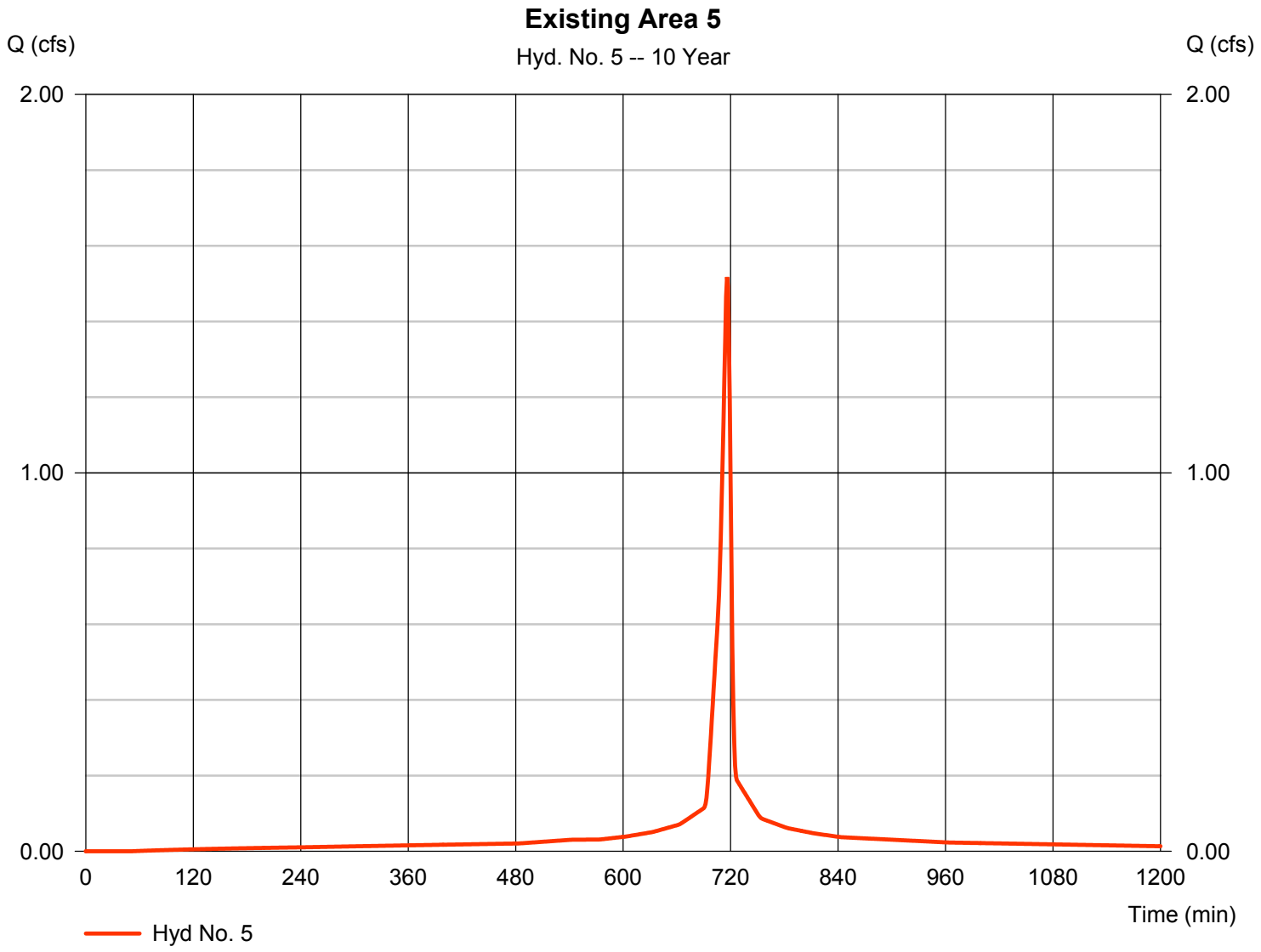
Hydrograph Report

Hyd. No. 5

Existing Area 5

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.517 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	3,458 cuft
Drainage area	=	0.200 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	3.30 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.199 x 98)] / 0.200



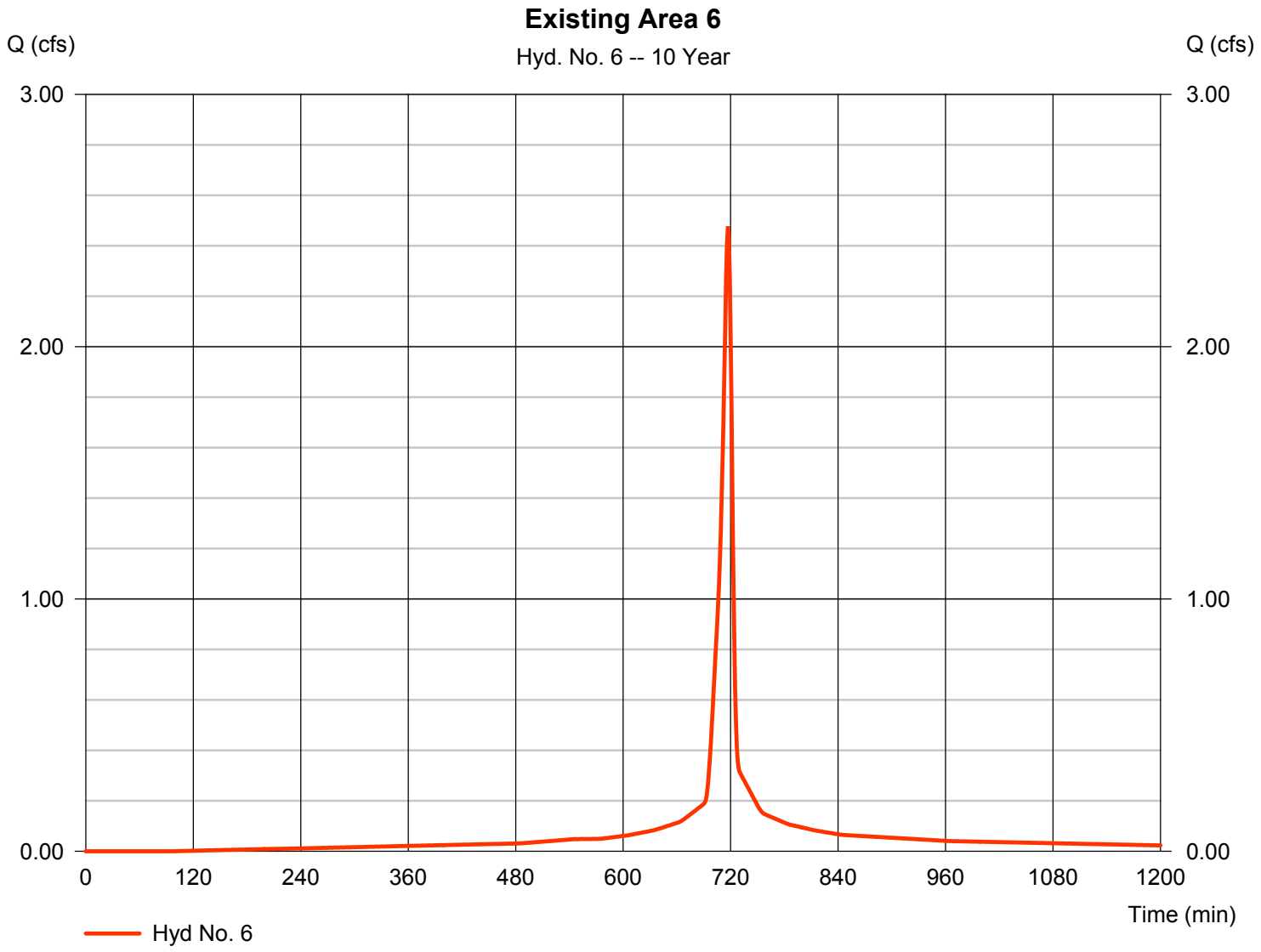
Hydrograph Report

Hyd. No. 6

Existing Area 6

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.477 cfs
Storm frequency	=	10 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	5,769 cuft
Drainage area	=	0.340 ac	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.50 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.299 x 98) + (0.040 x 79)] / 0.340



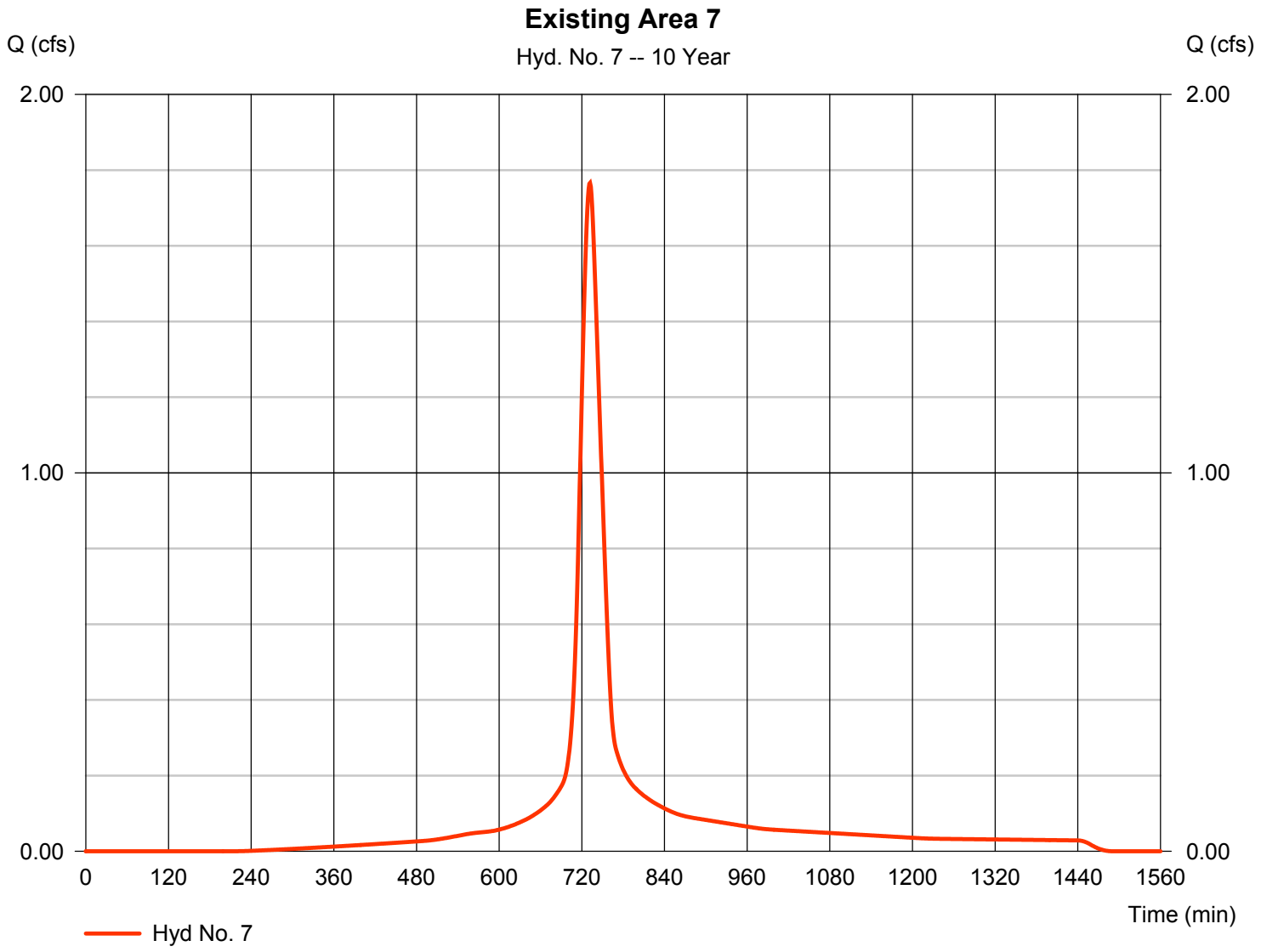
Hydrograph Report

Hyd. No. 7

Existing Area 7

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.766 cfs
Storm frequency	=	10 yrs	Time to peak	=	732 min
Time interval	=	1 min	Hyd. volume	=	7,566 cuft
Drainage area	=	0.520 ac	Curve number	=	91*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	30.80 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.331 x 98) + (0.191 x 79)] / 0.520



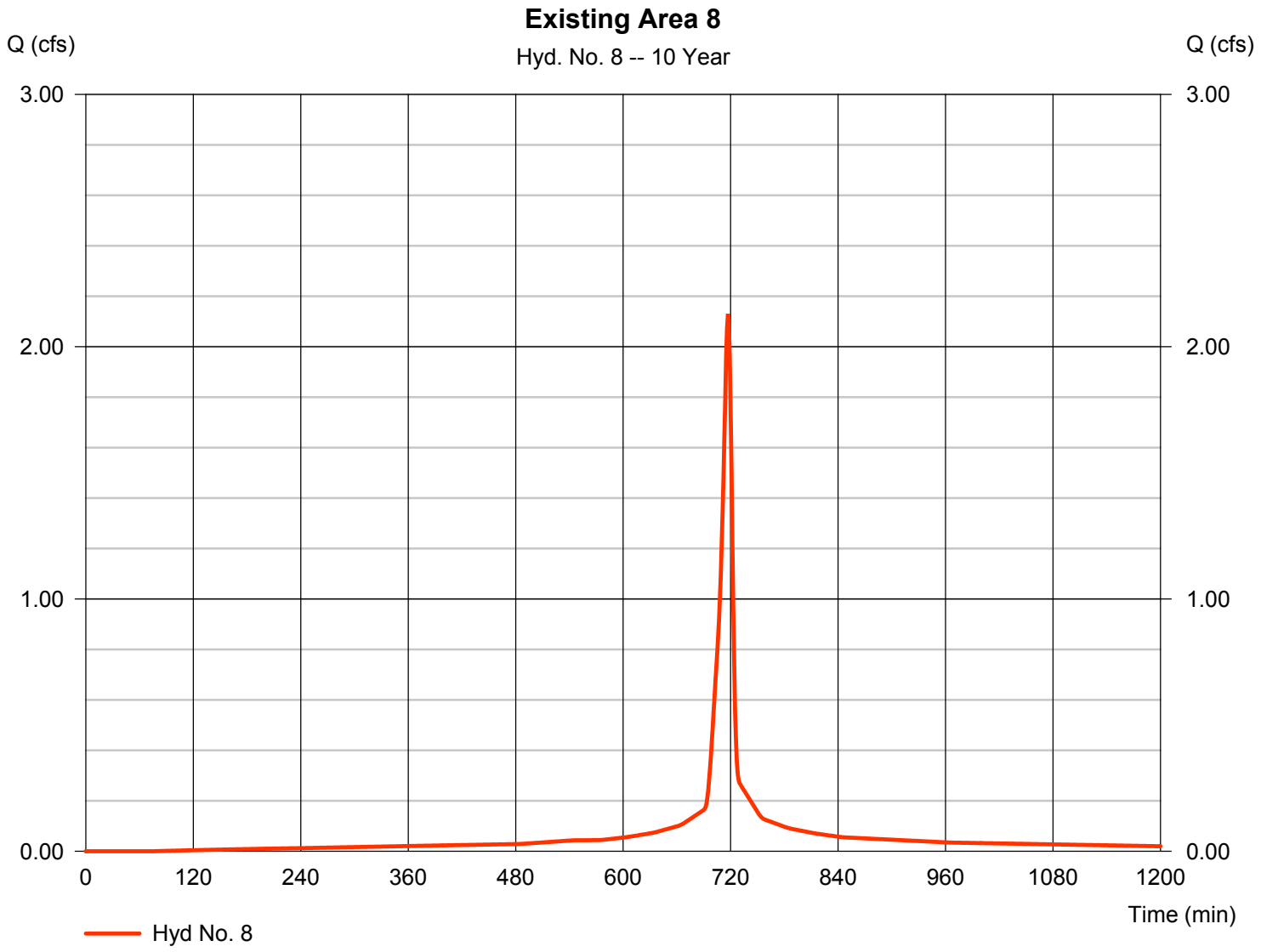
Hydrograph Report

Hyd. No. 8

Existing Area 8

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.130 cfs
Storm frequency	=	10 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	5,045 cuft
Drainage area	=	0.290 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.272 x 98) + (0.021 x 79)] / 0.290



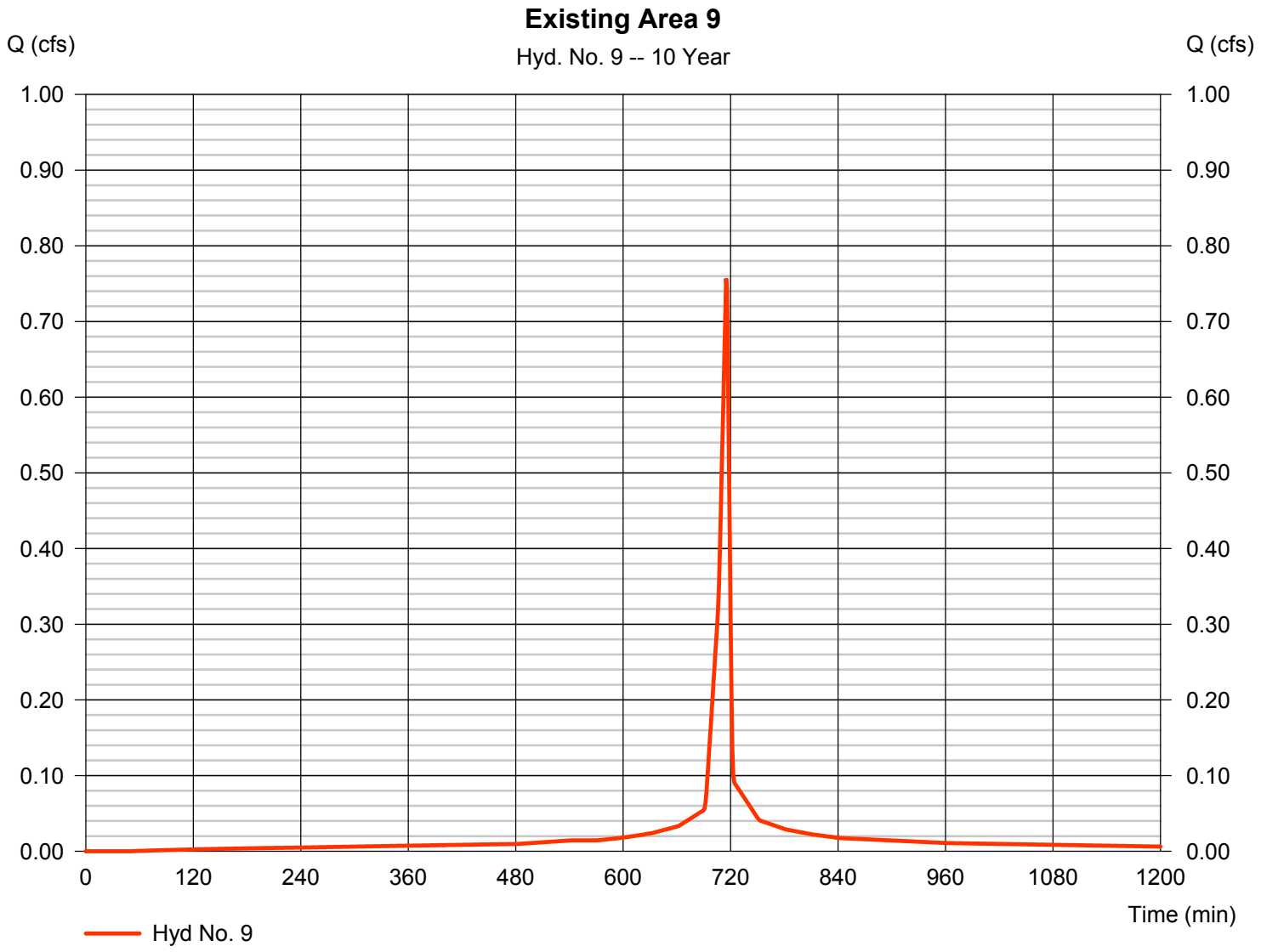
Hydrograph Report

Hyd. No. 9

Existing Area 9

Hydrograph type	= SCS Runoff	Peak discharge	= 0.757 cfs
Storm frequency	= 10 yrs	Time to peak	= 715 min
Time interval	= 1 min	Hyd. volume	= 1,621 cuft
Drainage area	= 0.100 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.10 min
Total precip.	= 5.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.100 x 98)] / 0.100



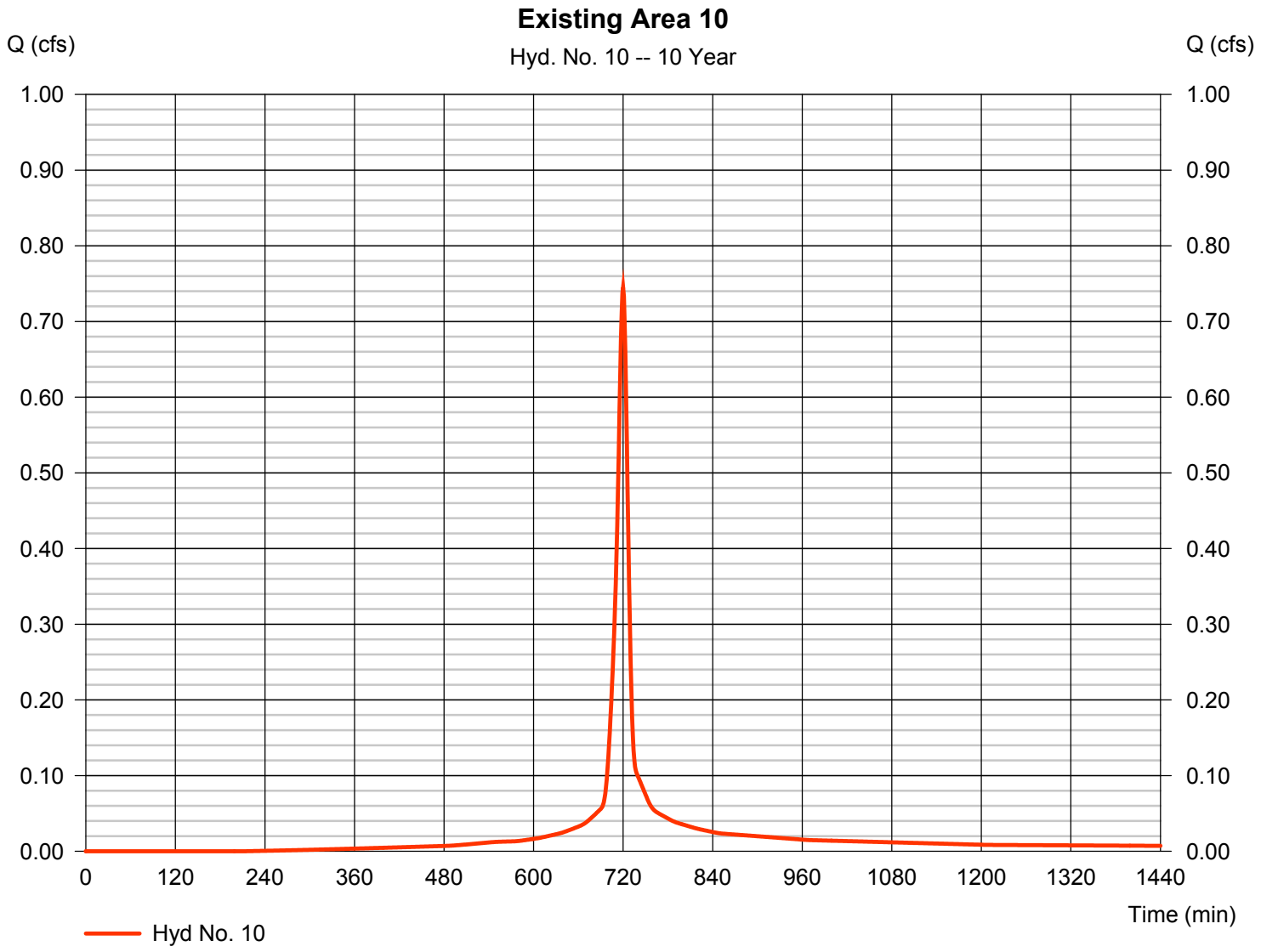
Hydrograph Report

Hyd. No. 10

Existing Area 10

Hydrograph type	= SCS Runoff	Peak discharge	= 0.745 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 1,913 cuft
Drainage area	= 0.130 ac	Curve number	= 91*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.20 min
Total precip.	= 5.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.081 x 98) + (0.044 x 79)] / 0.130



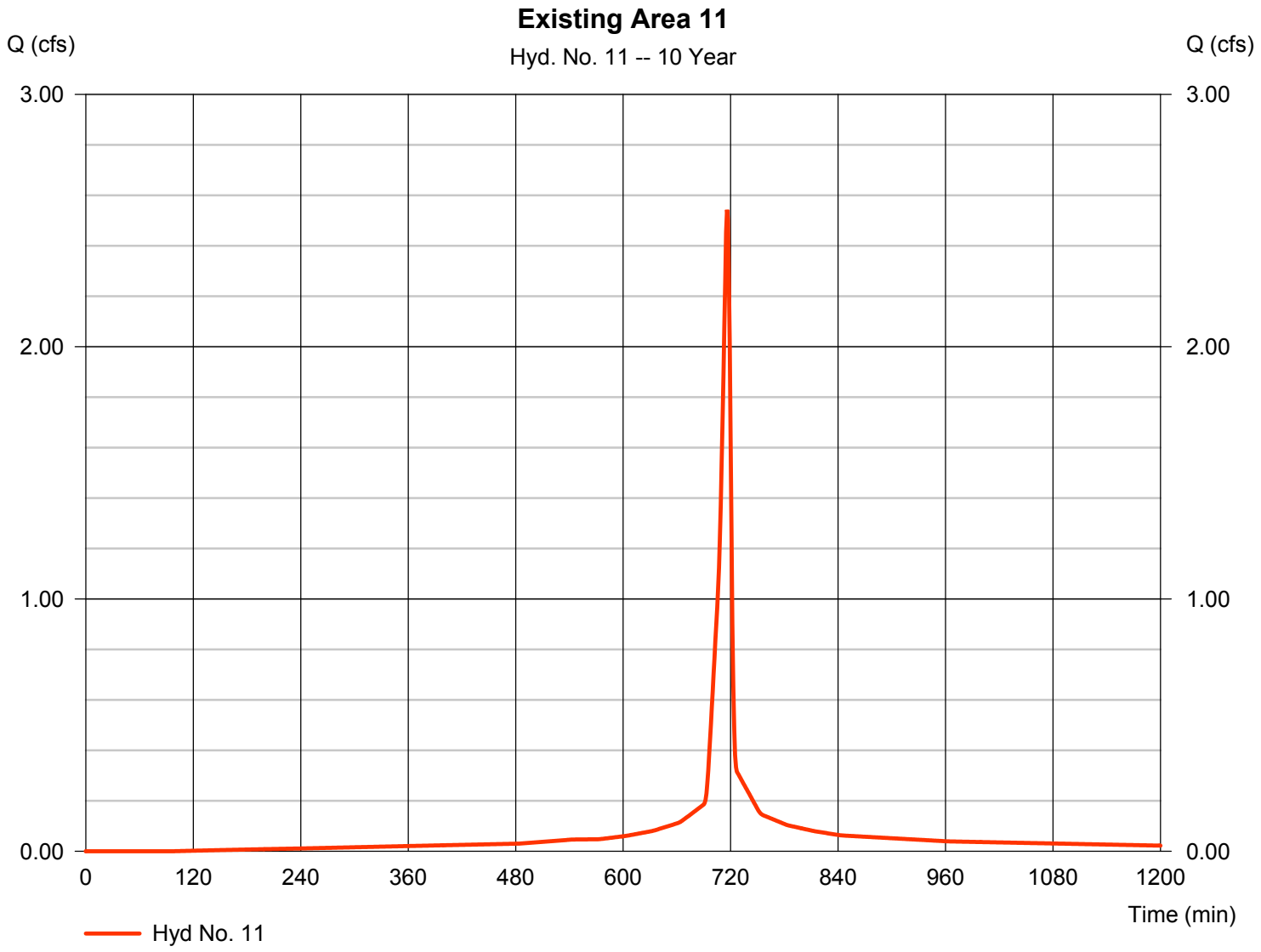
Hydrograph Report

Hyd. No. 11

Existing Area 11

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.543 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	5,594 cuft
Drainage area	=	0.340 ac	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.50 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.296 x 98) + (0.045 x 79)] / 0.340

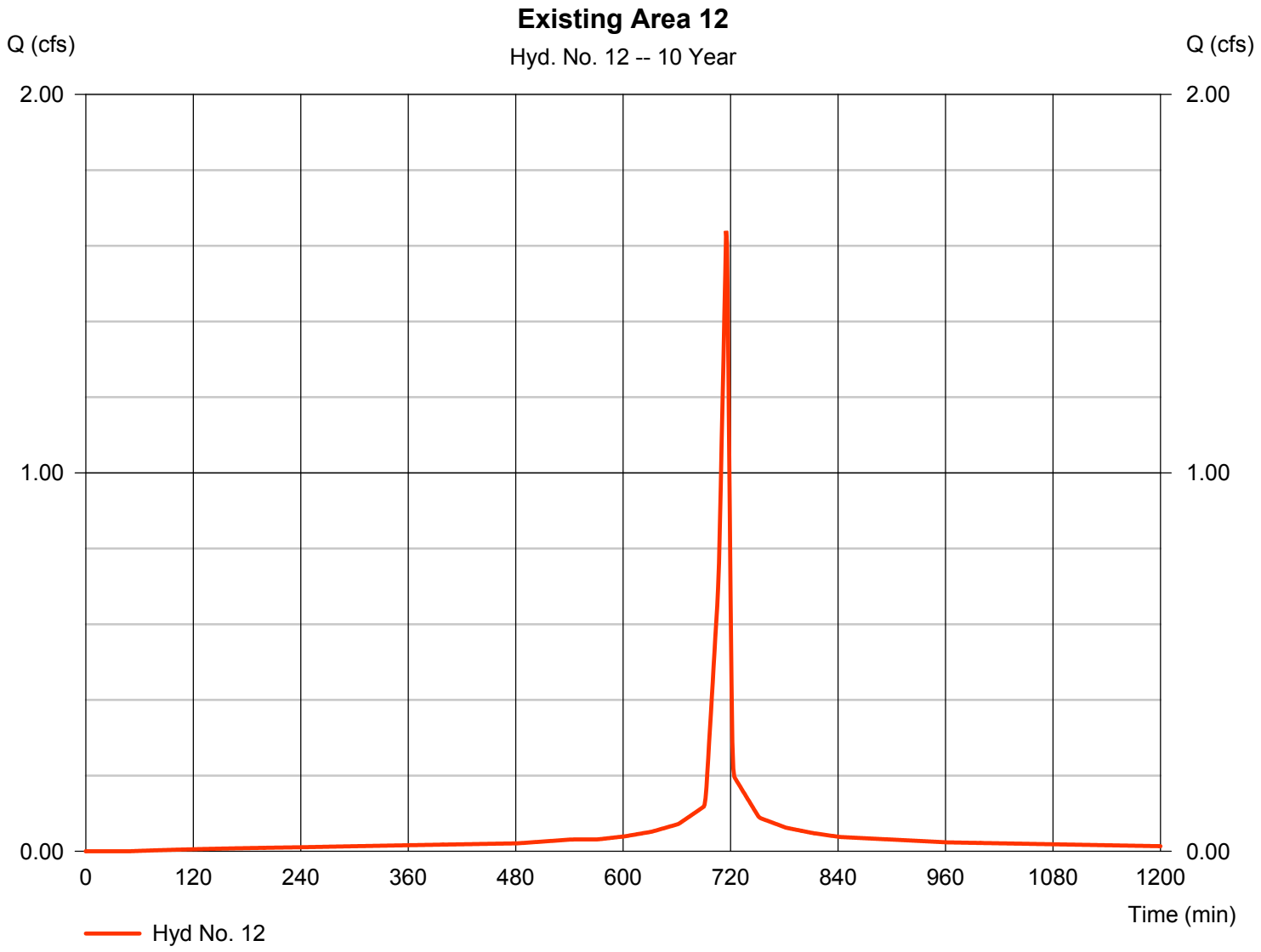


Hydrograph Report

Hyd. No. 12

Existing Area 12

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.639 cfs
Storm frequency	=	10 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	3,511 cuft
Drainage area	=	0.217 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.20 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



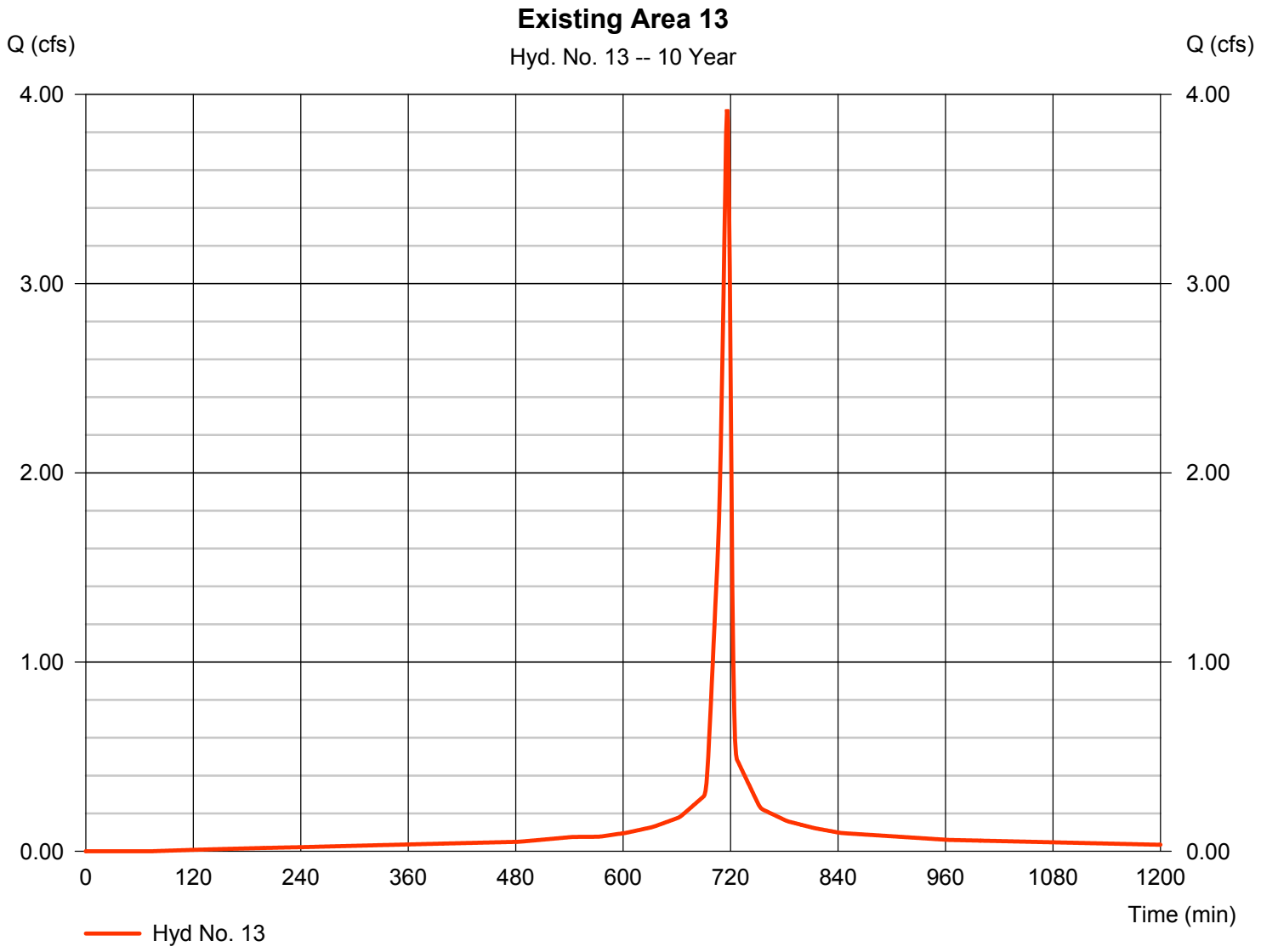
Hydrograph Report

Hyd. No. 13

Existing Area 13

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.921 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	8,772 cuft
Drainage area	=	0.520 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.10 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.479 x 98) + (0.038 x 79)] / 0.520



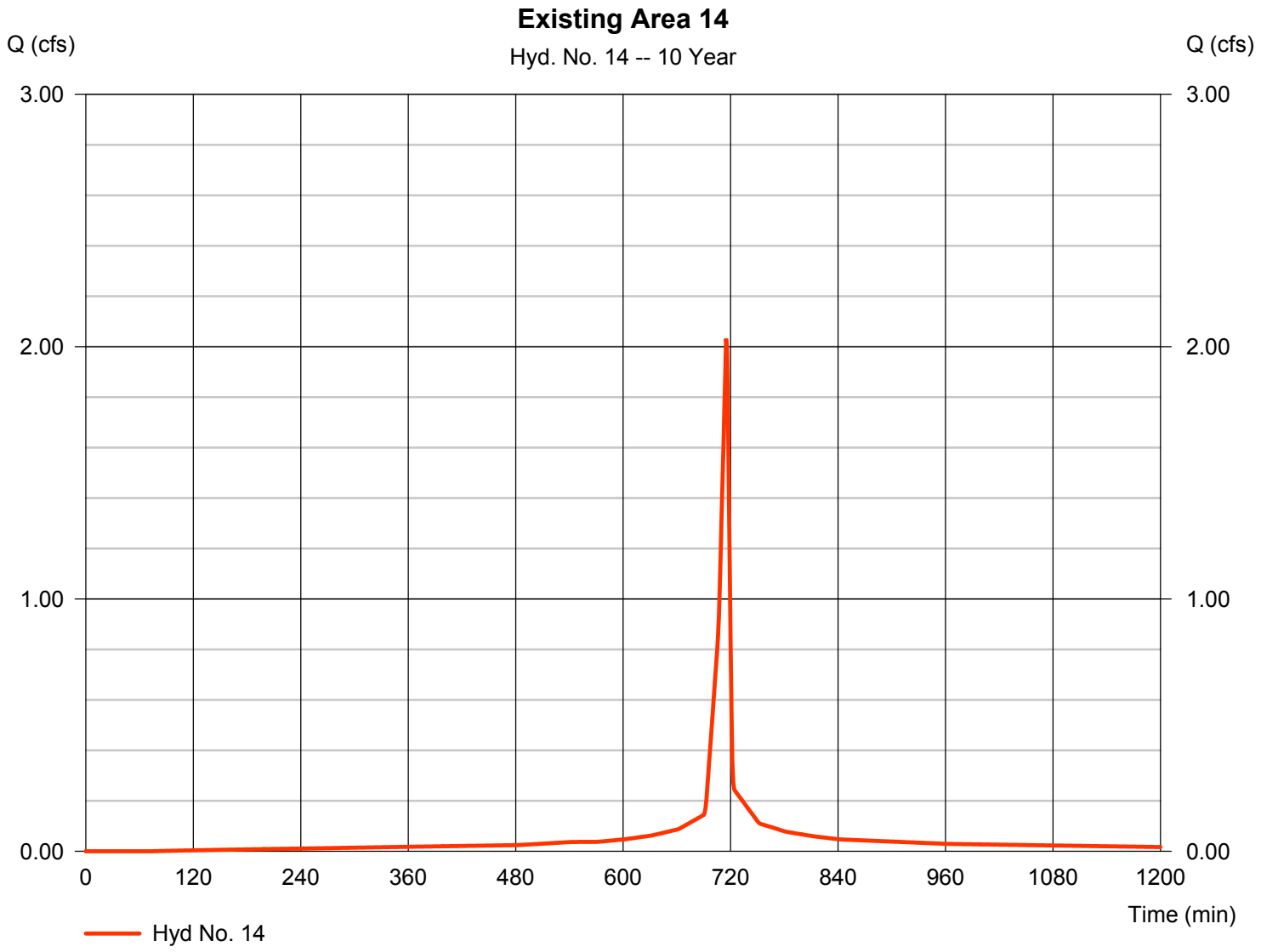
Hydrograph Report

Hyd. No. 14

Existing Area 14

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.032 cfs
Storm frequency	=	10 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	4,270 cuft
Drainage area	=	0.270 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.50 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.260 x 98) + (0.010 x 79)] / 0.270



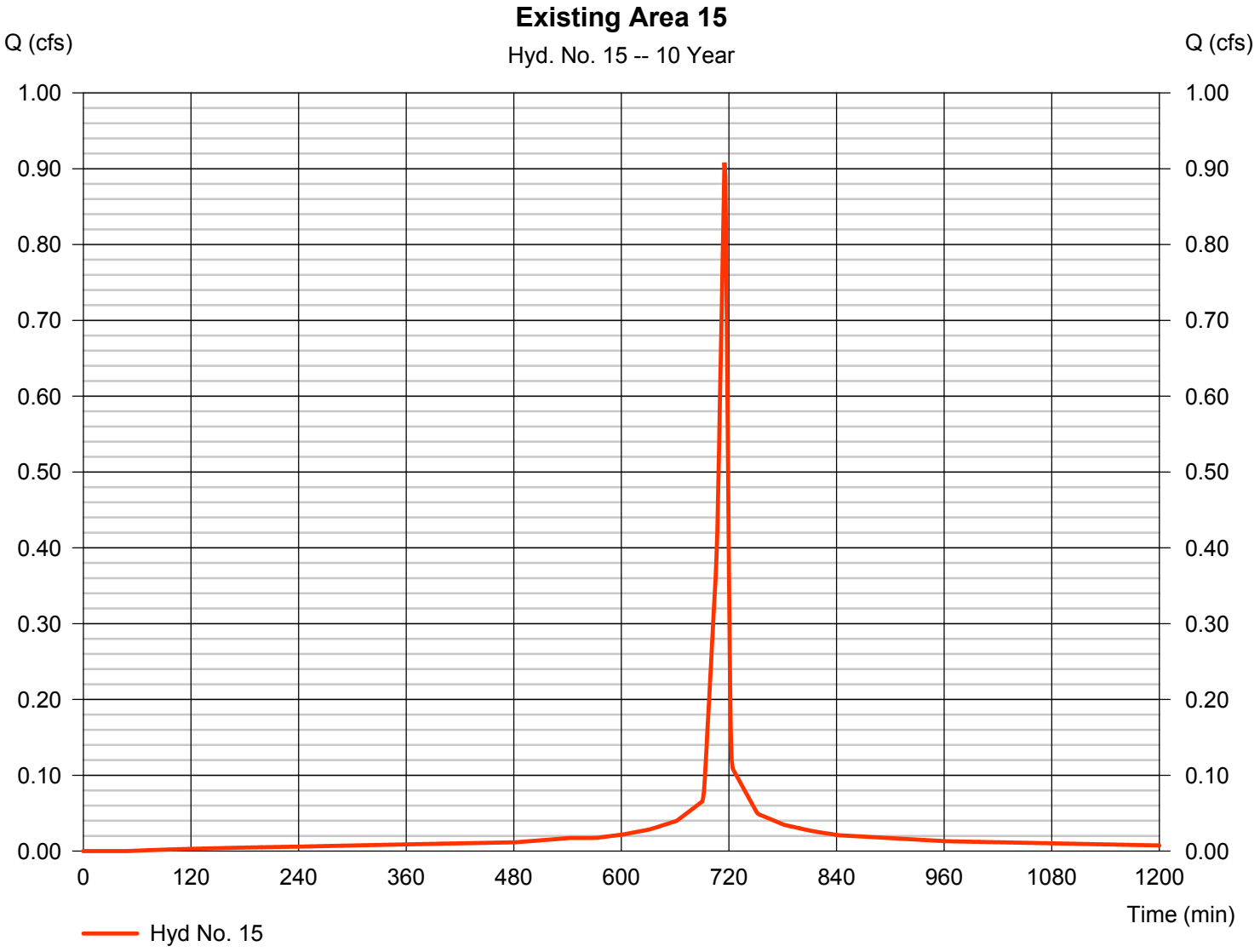
Hydrograph Report

Hyd. No. 15

Existing Area 15

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.908 cfs
Storm frequency	=	10 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	1,945 cuft
Drainage area	=	0.120 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	1.70 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.123 x 98)] / 0.120



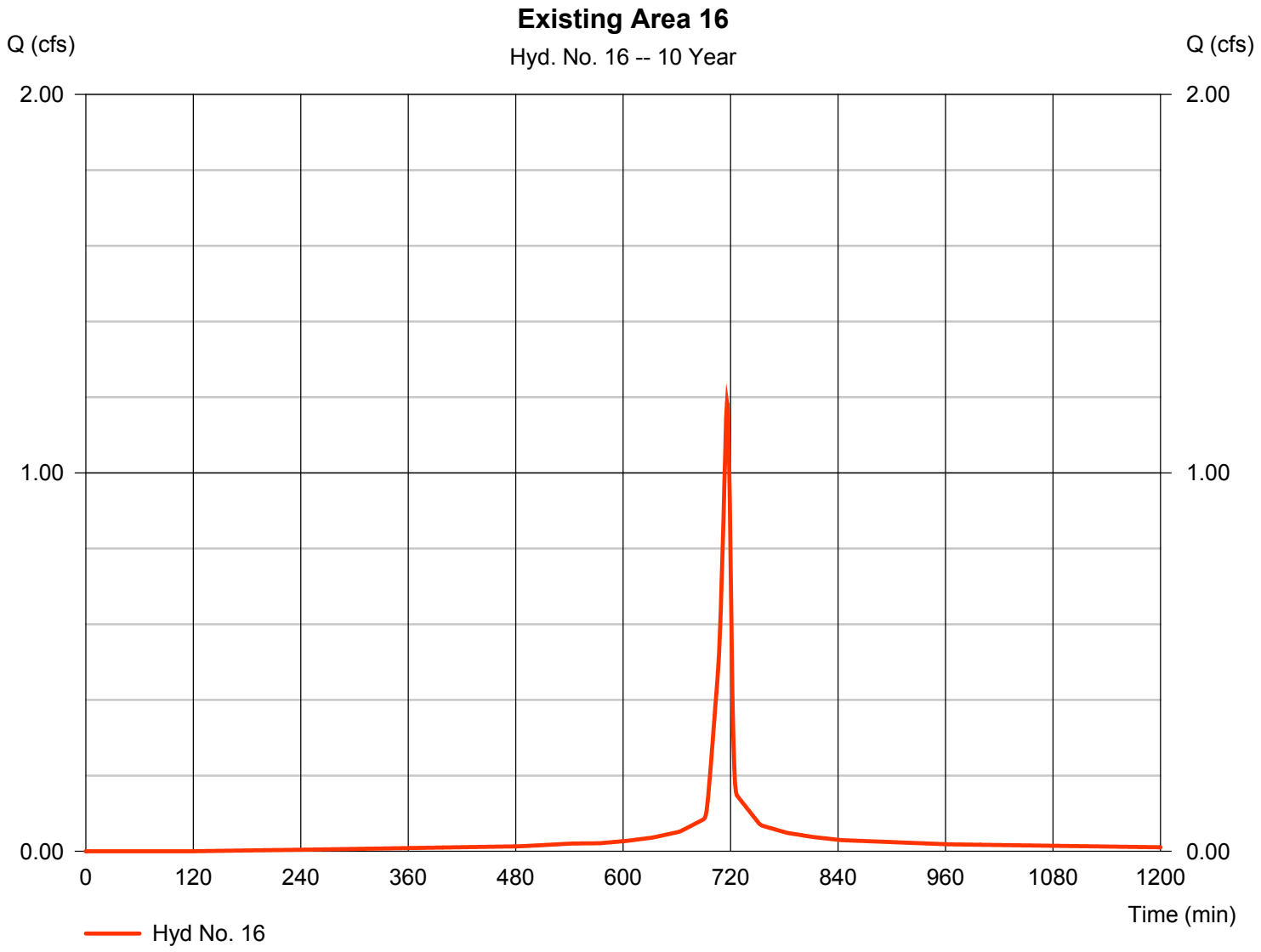
Hydrograph Report

Hyd. No. 16

Existing Area 16

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.185 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	2,567 cuft
Drainage area	=	0.160 ac	Curve number	=	95*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.90 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.134 x 98) + (0.022 x 79)] / 0.160



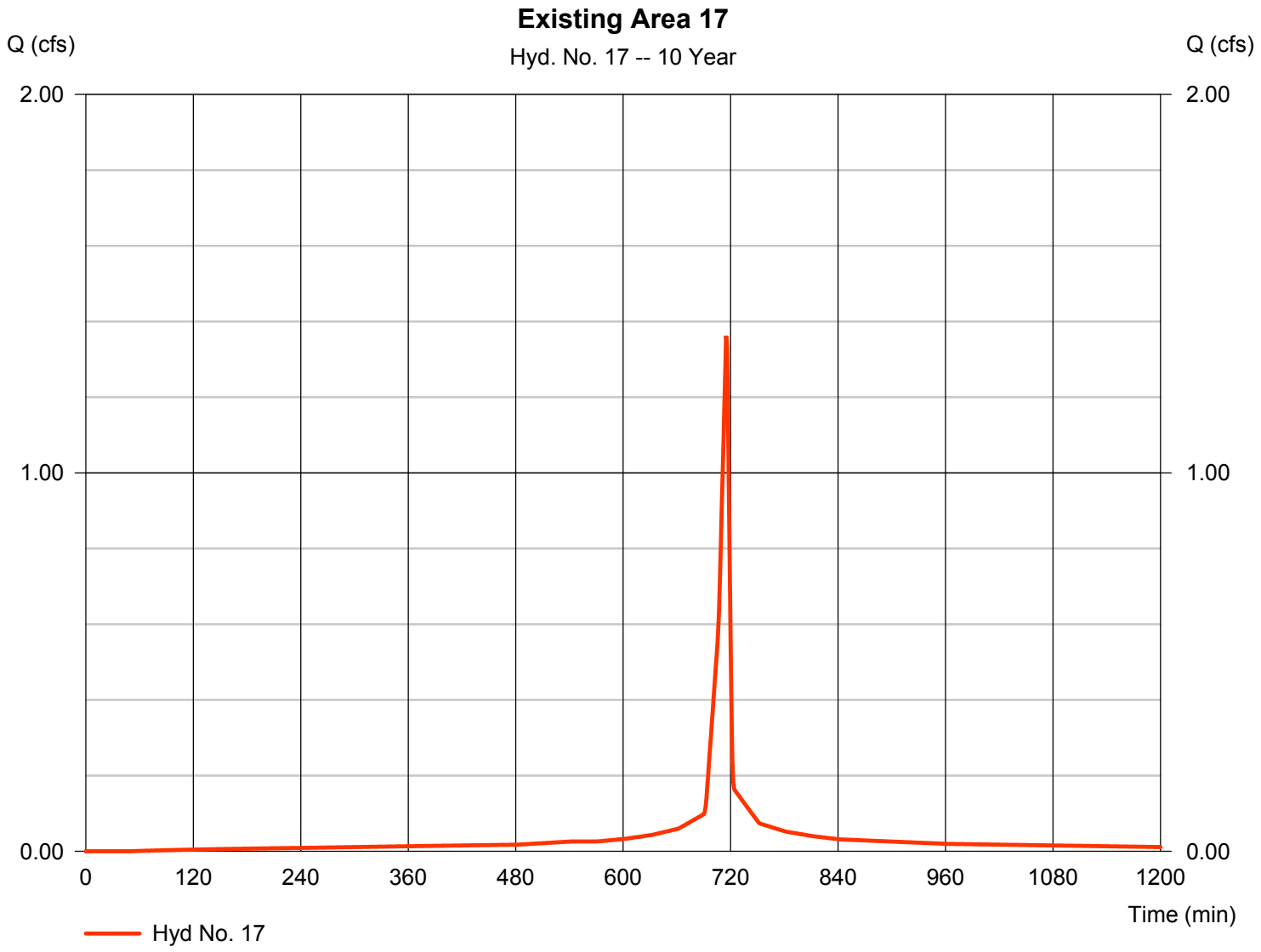
Hydrograph Report

Hyd. No. 17

Existing Area 17

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.362 cfs
Storm frequency	=	10 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	2,918 cuft
Drainage area	=	0.180 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.40 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.182 x 98)] / 0.180



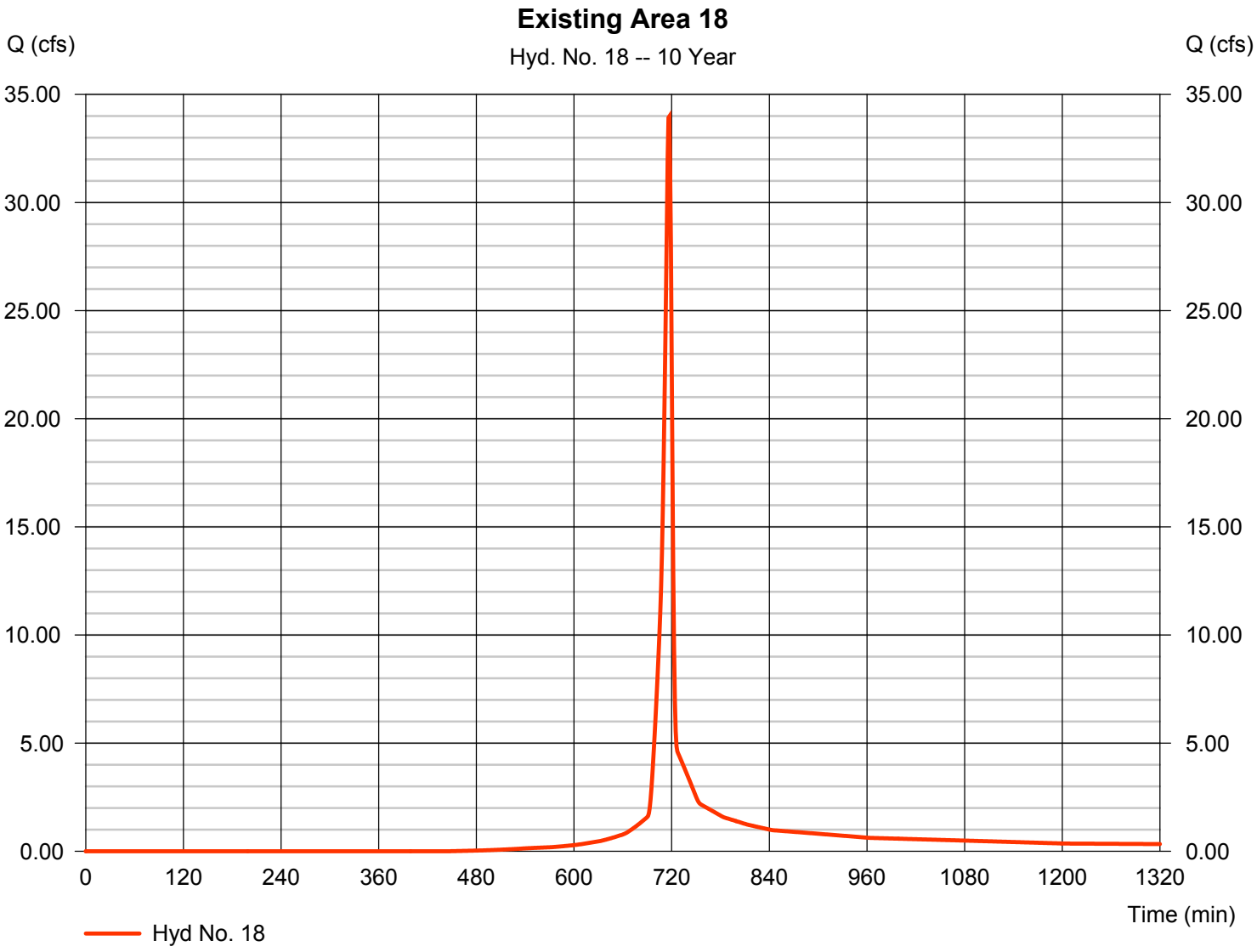
Hydrograph Report

Hyd. No. 18

Existing Area 18

Hydrograph type	=	SCS Runoff	Peak discharge	=	33.98 cfs
Storm frequency	=	10 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	65,088 cuft
Drainage area	=	6.400 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.90 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.018 x 98) + (6.379 x 79)] / 6.400



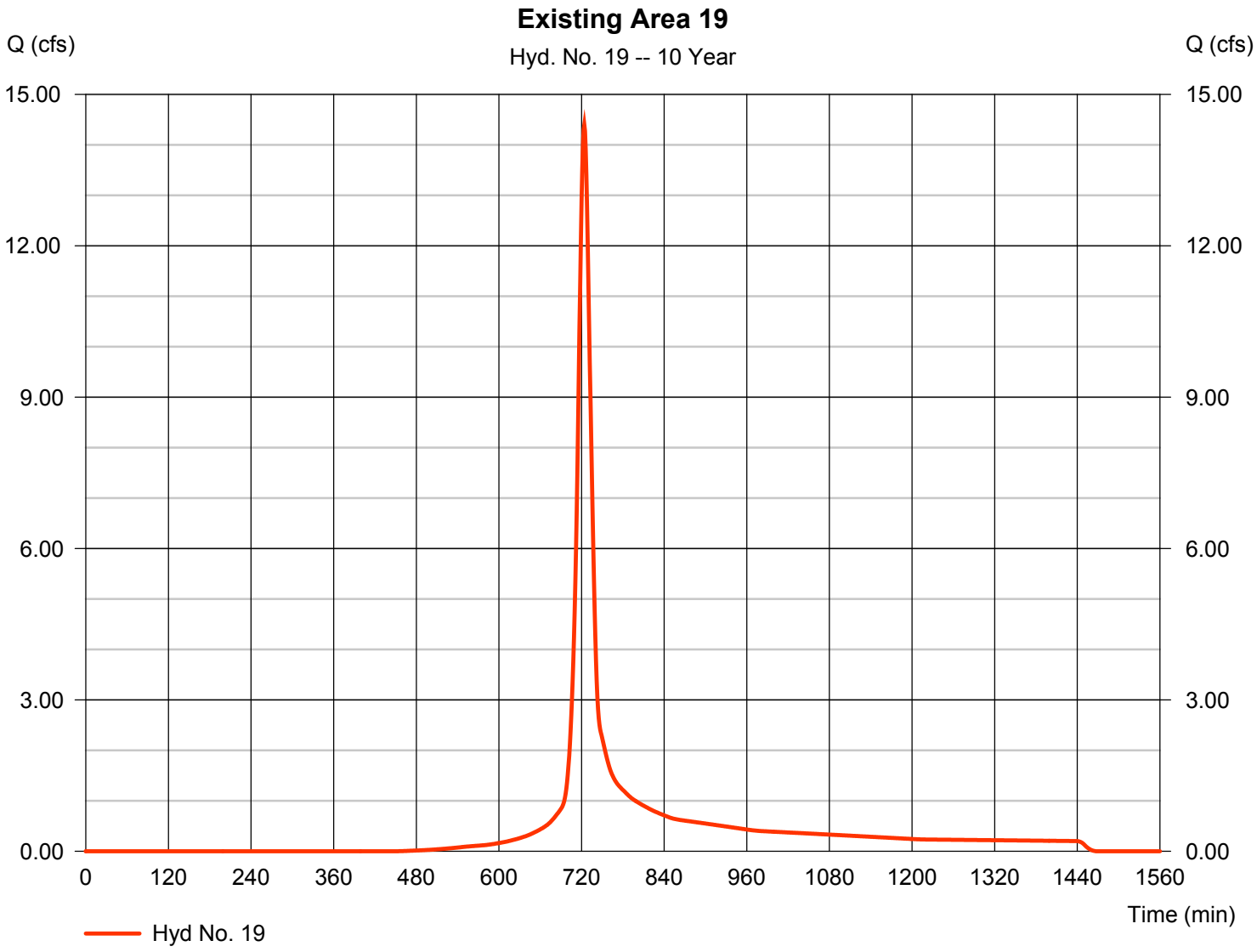
Hydrograph Report

Hyd. No. 19

Existing Area 19

Hydrograph type	=	SCS Runoff	Peak discharge	=	14.39 cfs
Storm frequency	=	10 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	42,631 cuft
Drainage area	=	4.240 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	17.40 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.036 x 98) + (4.203 x 79)] / 4.240



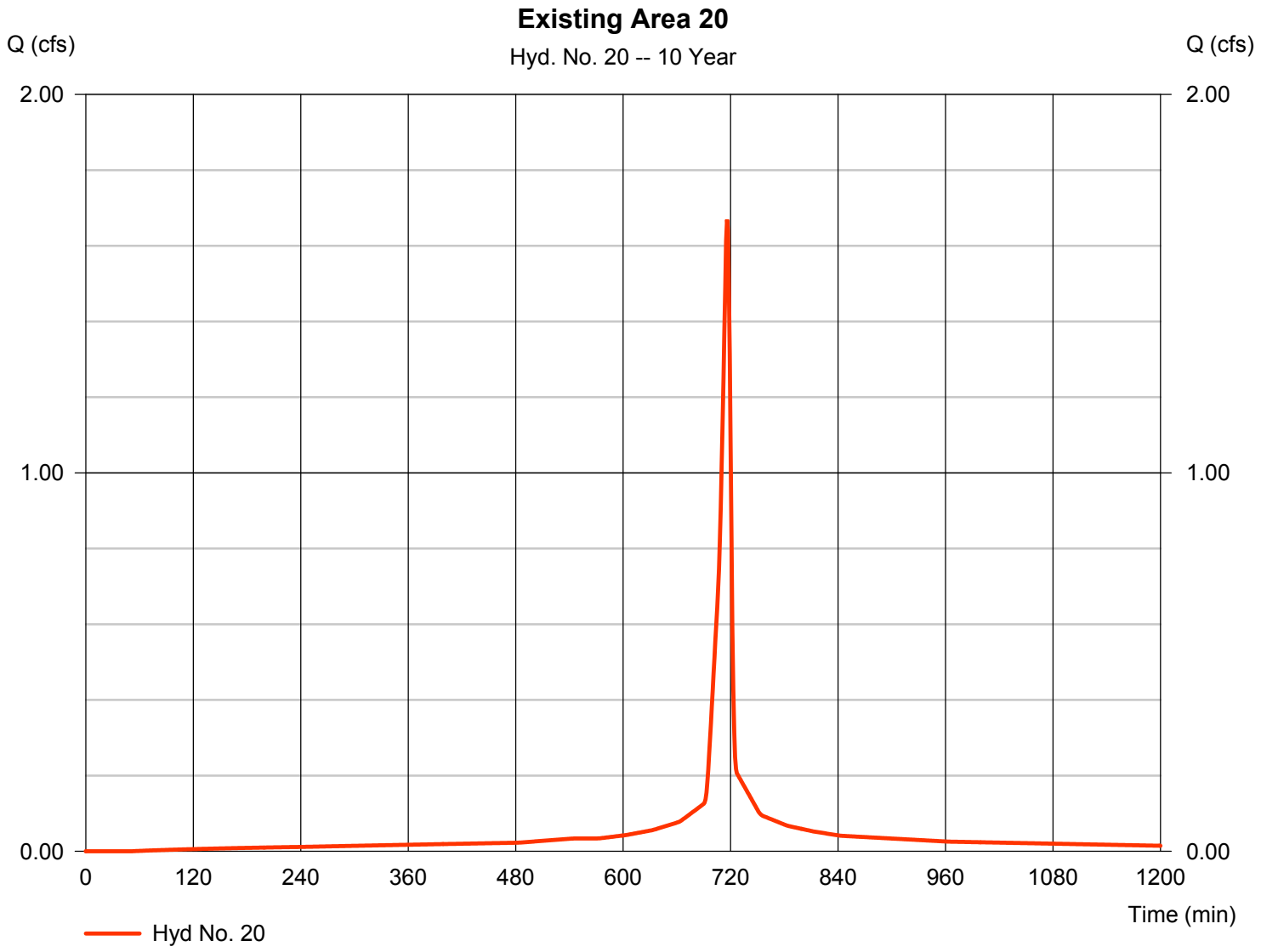
Hydrograph Report

Hyd. No. 20

Existing Area 20

Hydrograph type	= SCS Runoff	Peak discharge	= 1.669 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 3,804 cuft
Drainage area	= 0.220 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 4.70 min
Total precip.	= 5.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.220 x 98)] / 0.220



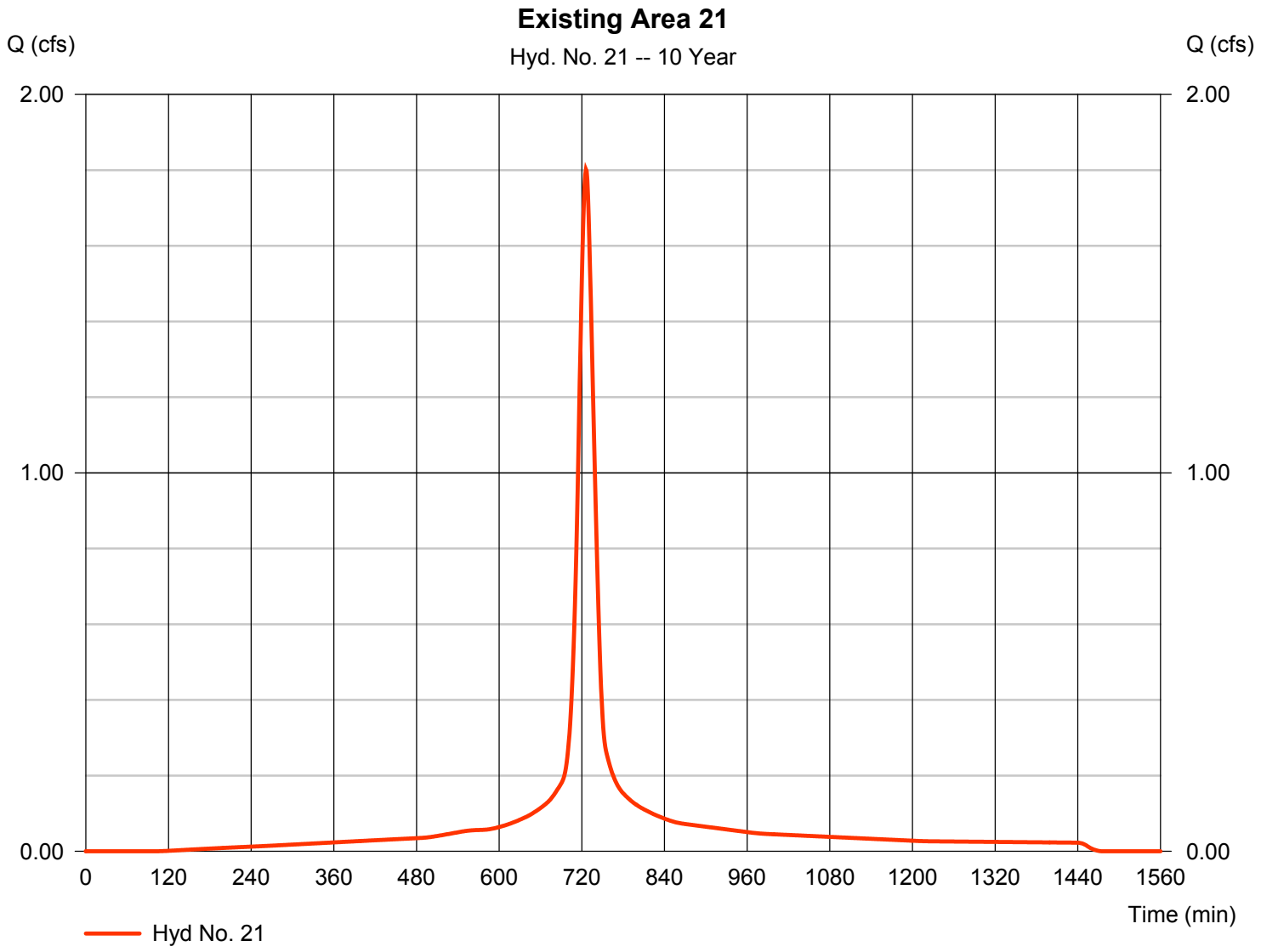
Hydrograph Report

Hyd. No. 21

Existing Area 21

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.802 cfs
Storm frequency	=	10 yrs	Time to peak	=	726 min
Time interval	=	1 min	Hyd. volume	=	6,686 cuft
Drainage area	=	0.410 ac	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	22.20 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.370 x 98) + (0.041 x 79)] / 0.410



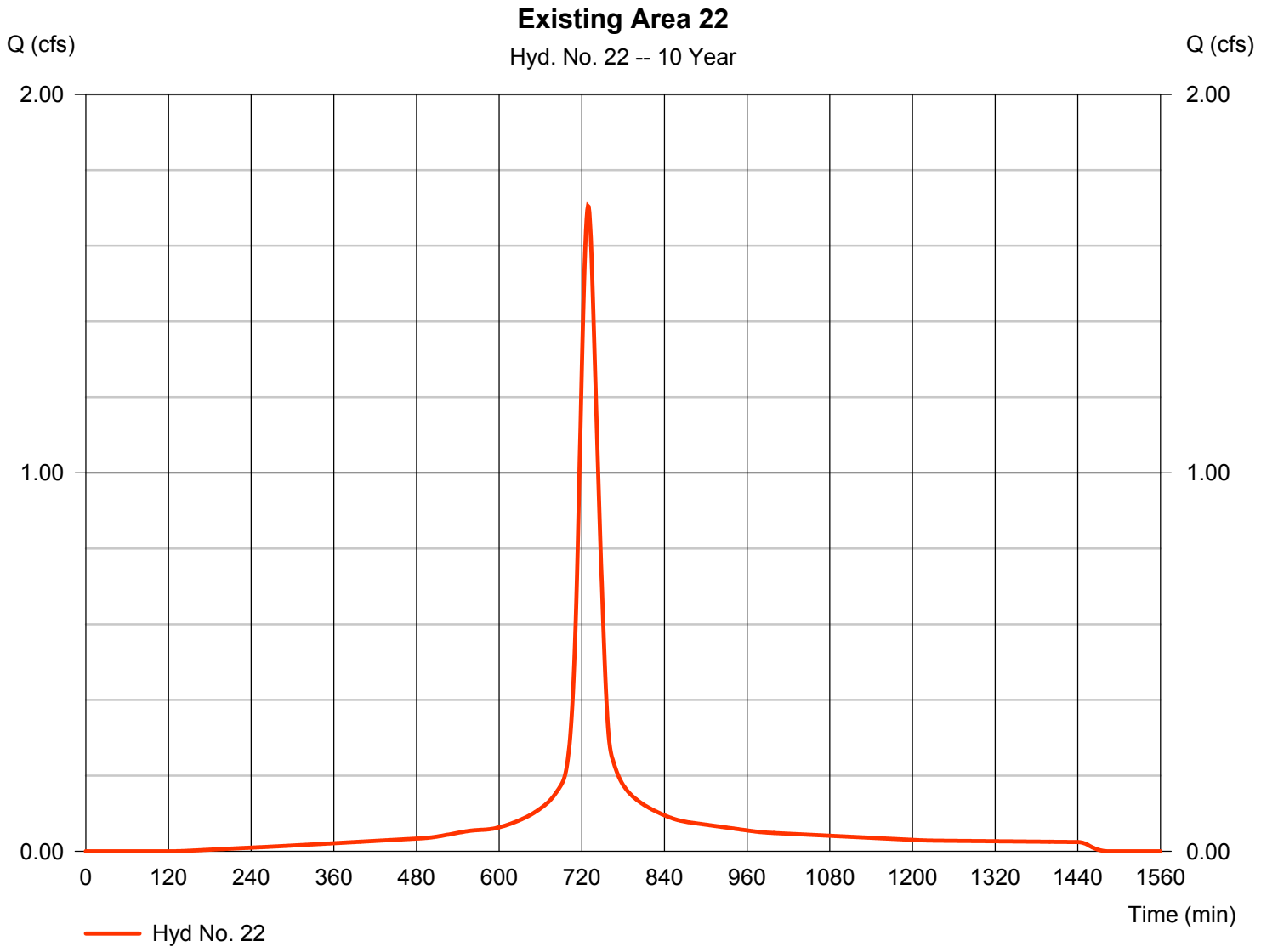
Hydrograph Report

Hyd. No. 22

Existing Area 22

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.705 cfs
Storm frequency	=	10 yrs	Time to peak	=	729 min
Time interval	=	1 min	Hyd. volume	=	7,007 cuft
Drainage area	=	0.440 ac	Curve number	=	95*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	27.80 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.382 x 98) + (0.062 x 79)] / 0.440



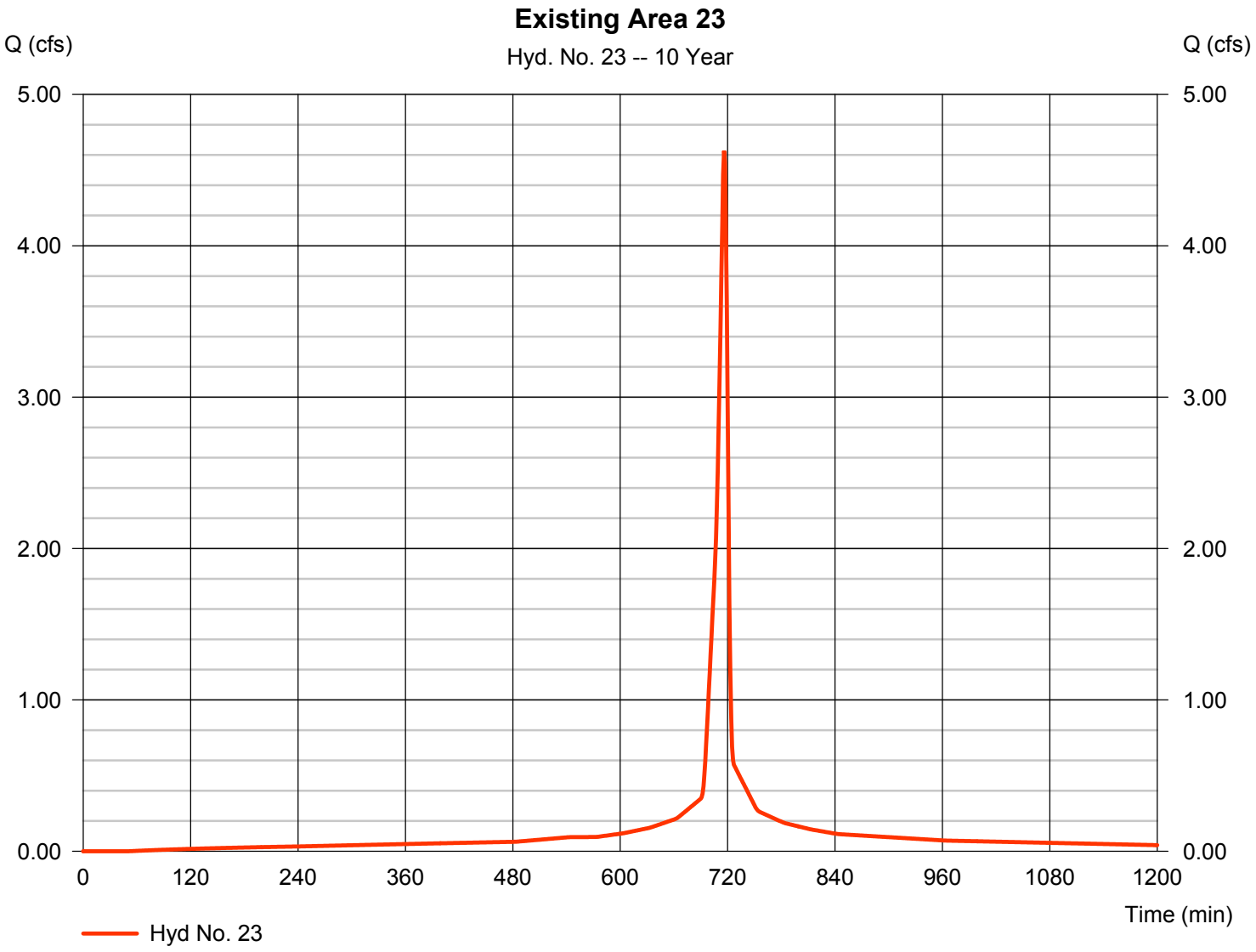
Hydrograph Report

Hyd. No. 23

Existing Area 23

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.628 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	10,547 cuft
Drainage area	=	0.610 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.80 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.607 x 98)] / 0.610



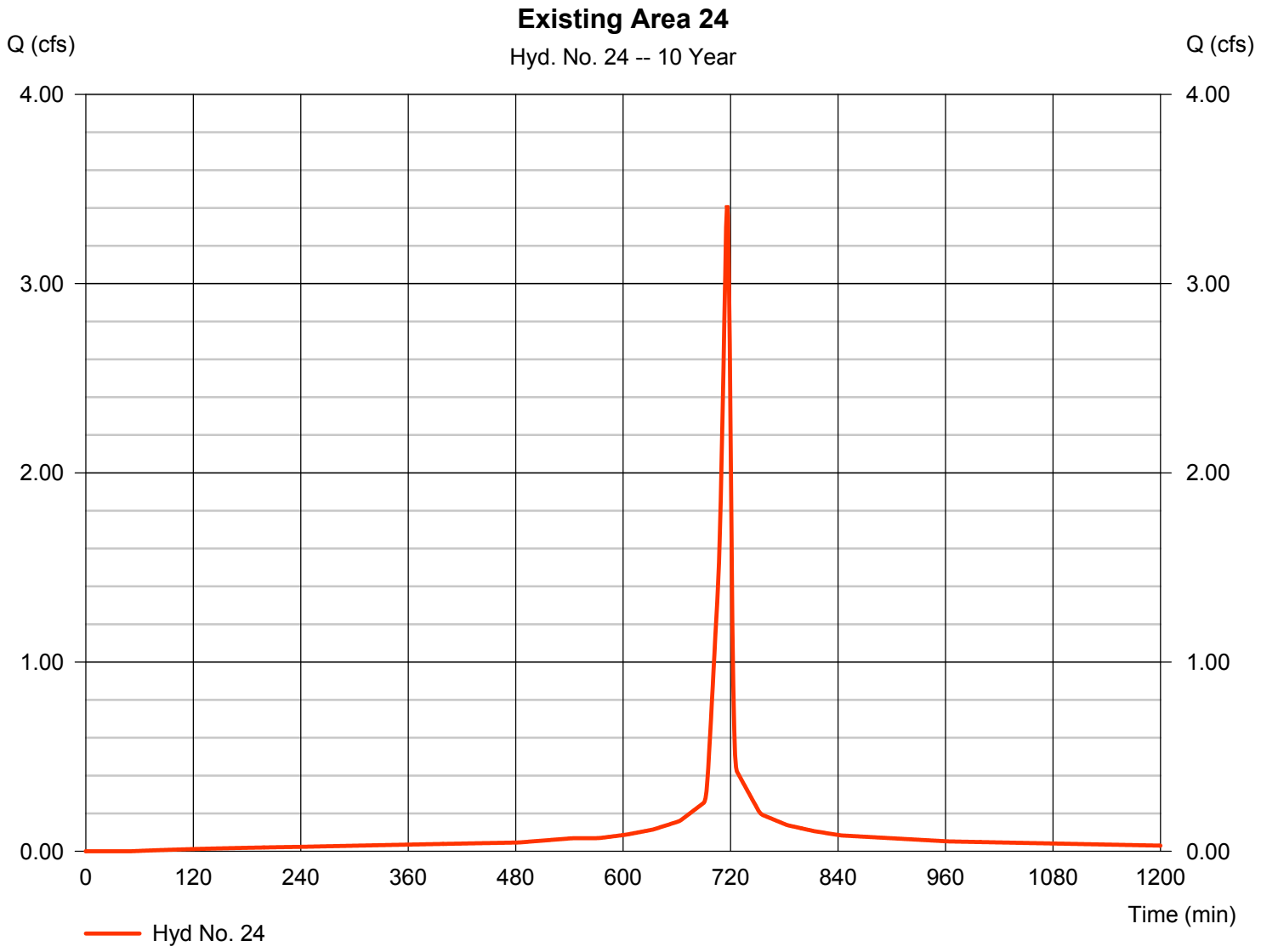
Hydrograph Report

Hyd. No. 24

Existing Area 24

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.414 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	7,781 cuft
Drainage area	=	0.450 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	3.90 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.450 x 98)] / 0.450



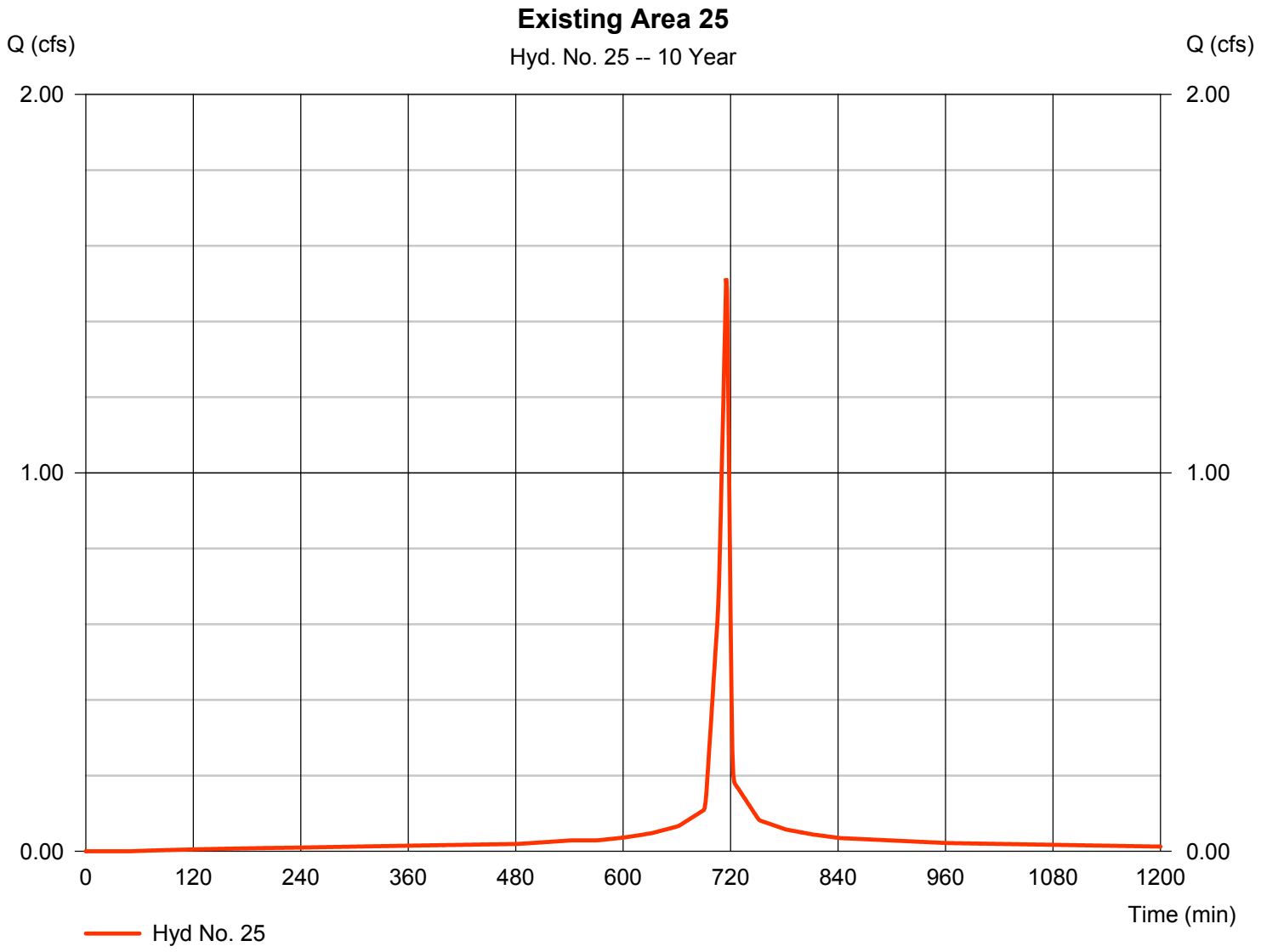
Hydrograph Report

Hyd. No. 25

Existing Area 25

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.514 cfs
Storm frequency	=	10 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	3,242 cuft
Drainage area	=	0.200 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	1.60 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.203 x 98)] / 0.200



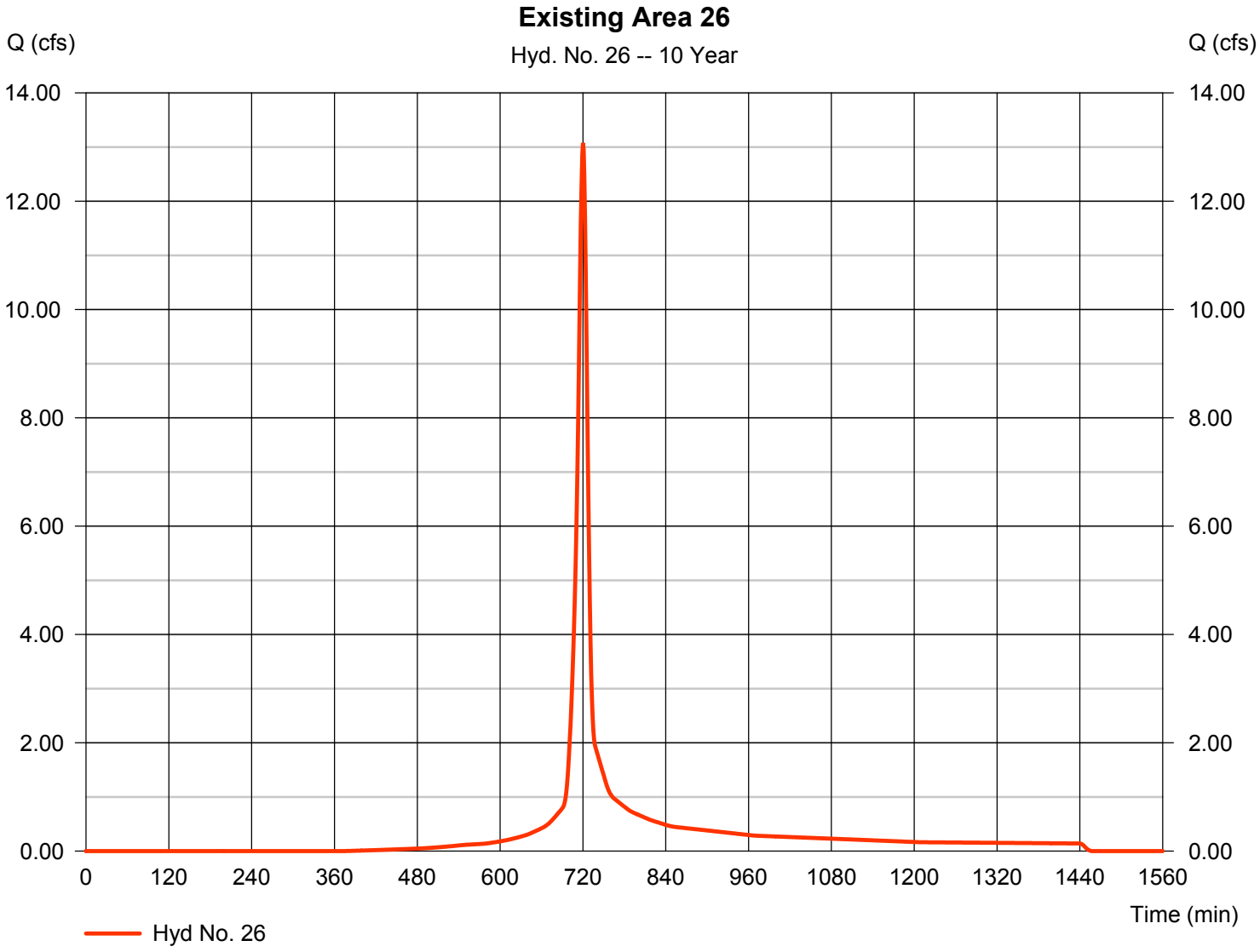
Hydrograph Report

Hyd. No. 26

Existing Area 26

Hydrograph type	=	SCS Runoff	Peak discharge	=	13.08 cfs
Storm frequency	=	10 yrs	Time to peak	=	720 min
Time interval	=	1 min	Hyd. volume	=	32,017 cuft
Drainage area	=	2.730 ac	Curve number	=	83*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	10.40 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.626 x 98) + (2.102 x 79)] / 2.730



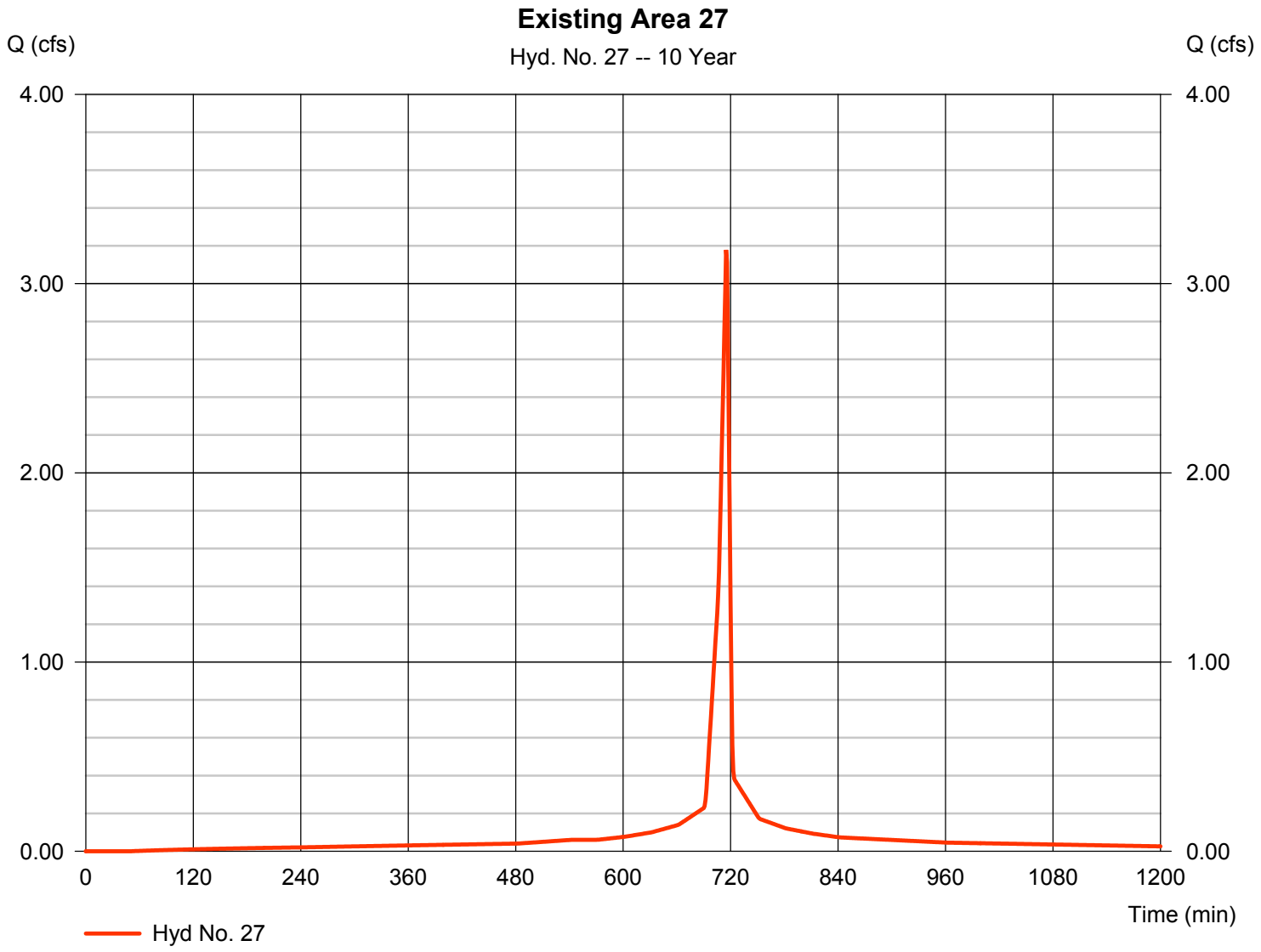
Hydrograph Report

Hyd. No. 27

Existing Area 27

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.179 cfs
Storm frequency	=	10 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	6,808 cuft
Drainage area	=	0.420 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.00 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.420 x 98)] / 0.420



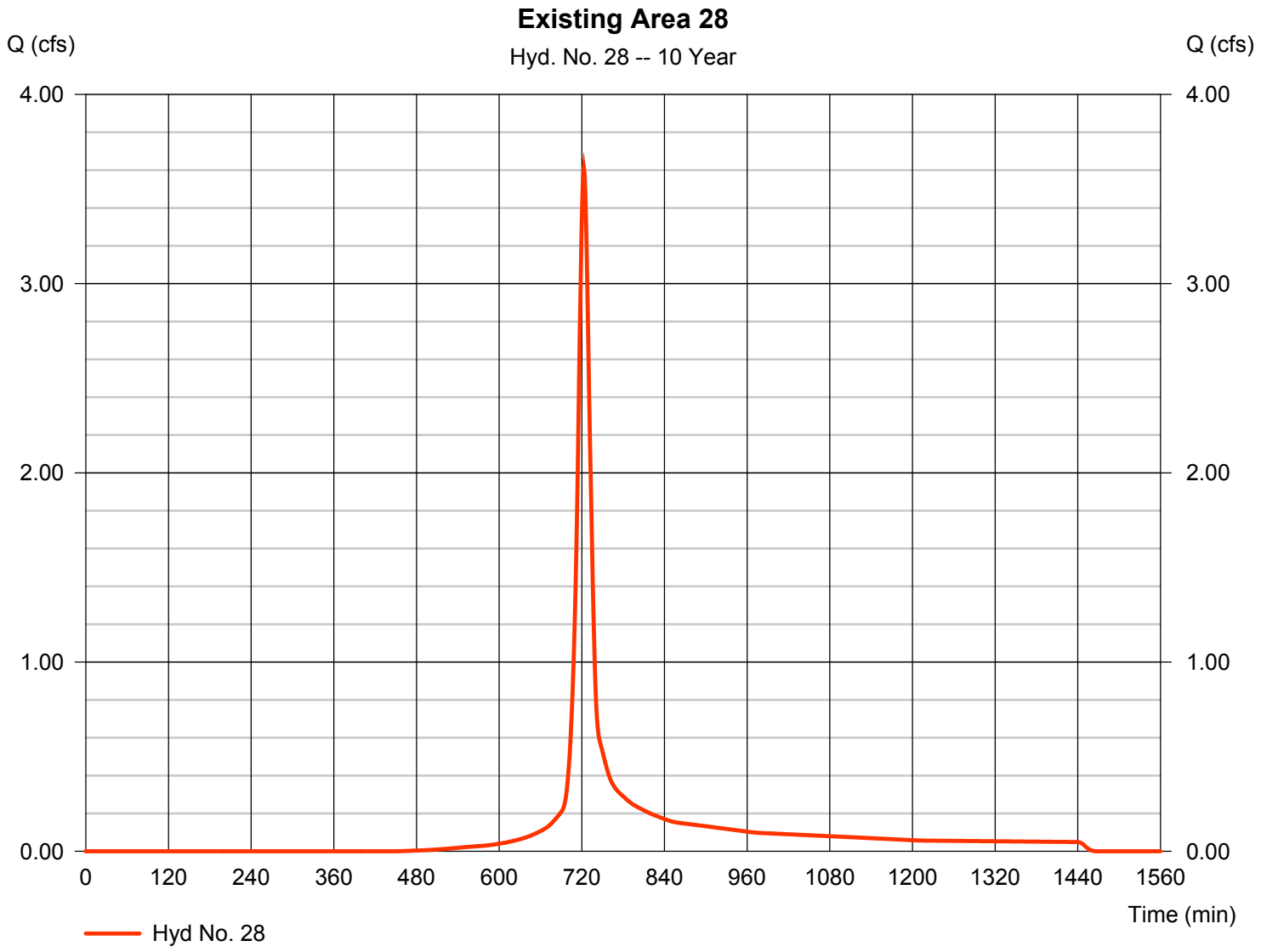
Hydrograph Report

Hyd. No. 28

Existing Area 28

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.611 cfs
Storm frequency	=	10 yrs	Time to peak	=	723 min
Time interval	=	1 min	Hyd. volume	=	10,297 cuft
Drainage area	=	1.000 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	15.50 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.004 x 98) + (0.996 x 79)] / 1.000



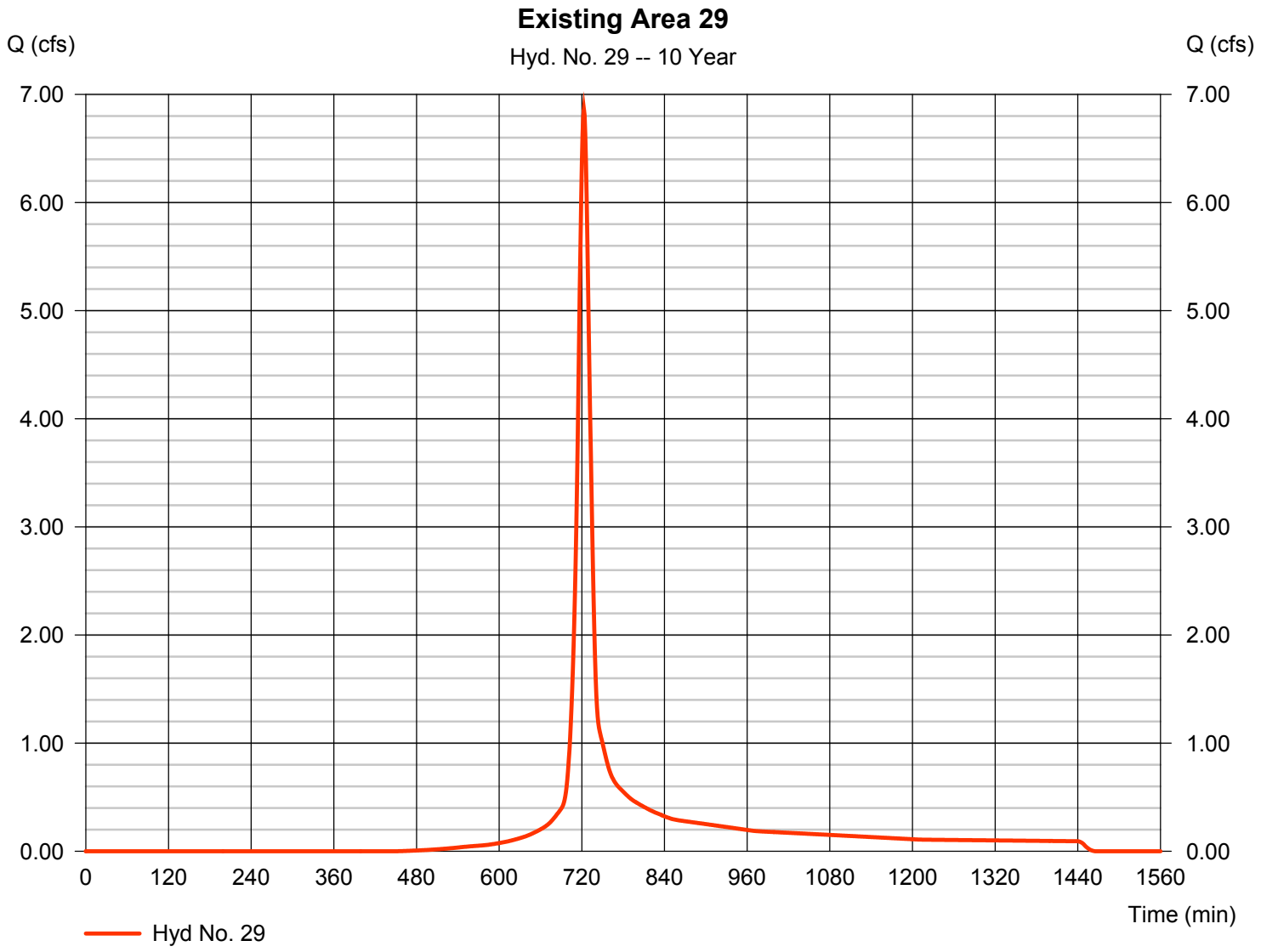
Hydrograph Report

Hyd. No. 29

Existing Area 29

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.860 cfs
Storm frequency	=	10 yrs	Time to peak	=	723 min
Time interval	=	1 min	Hyd. volume	=	19,565 cuft
Drainage area	=	1.900 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	15.70 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.049 x 98) + (1.850 x 79)] / 1.900



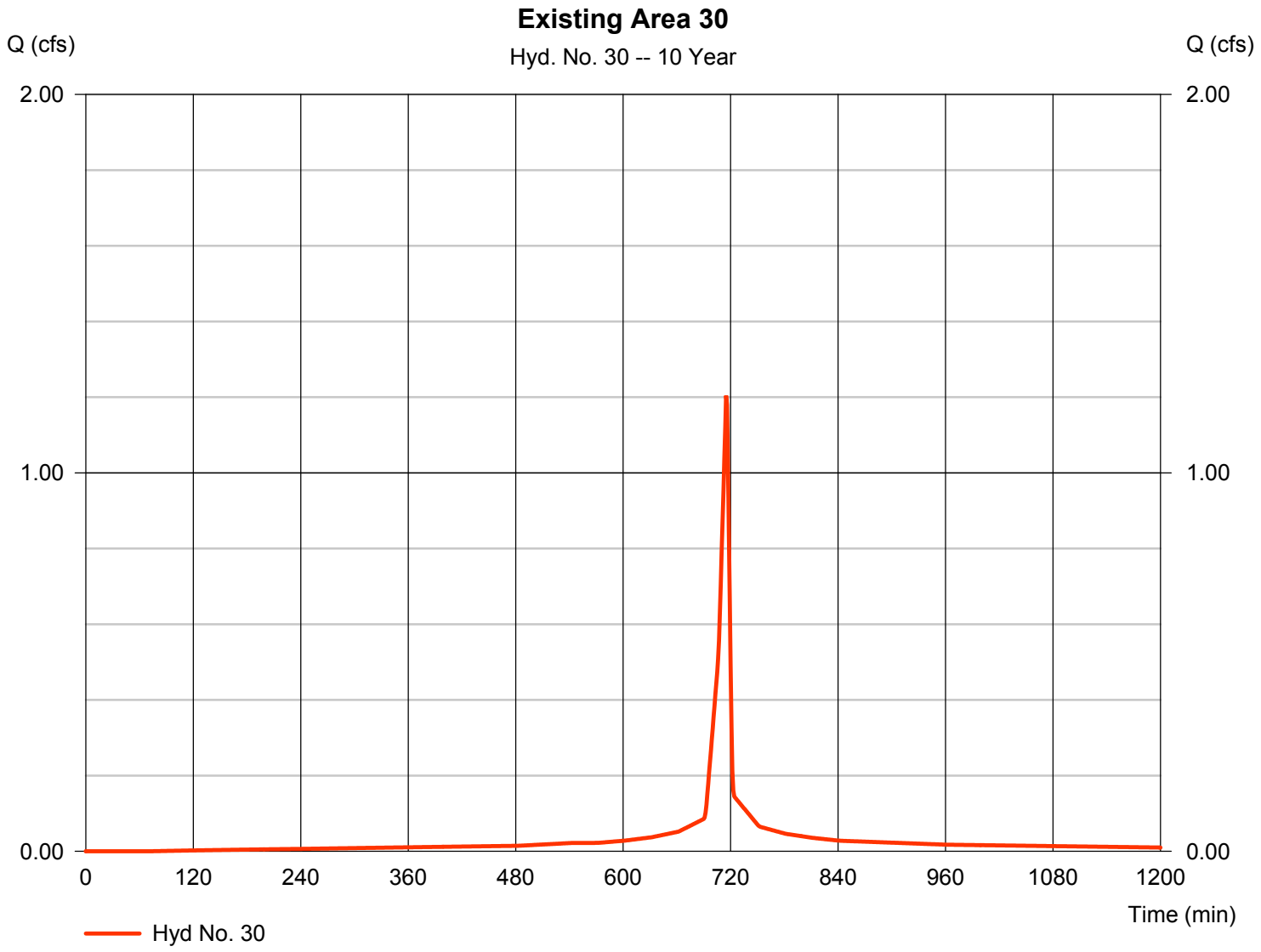
Hydrograph Report

Hyd. No. 30

Existing Area 30

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.204 cfs
Storm frequency	=	10 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	2,530 cuft
Drainage area	=	0.160 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.20 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.150 x 98) + (0.008 x 79)] / 0.160



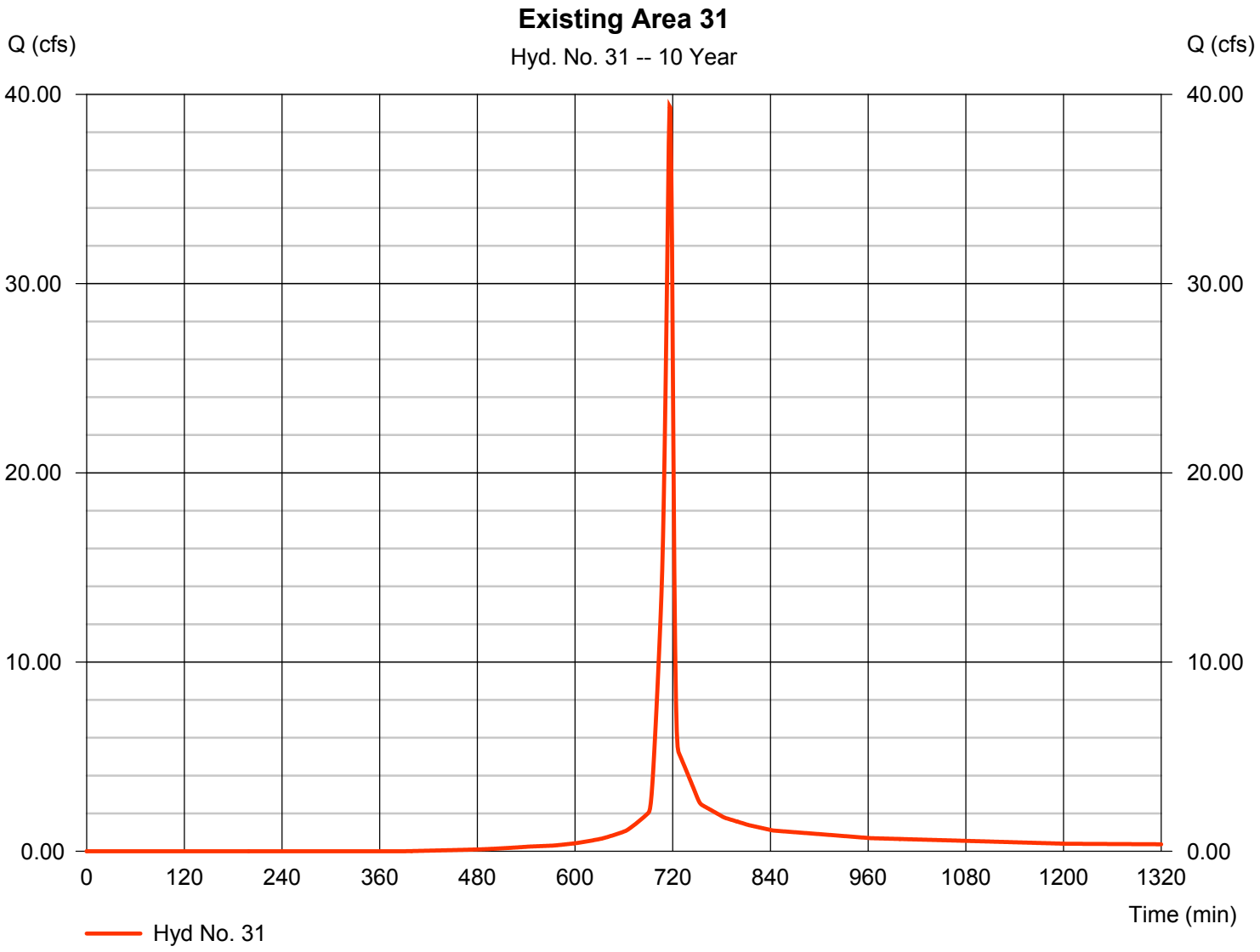
Hydrograph Report

Hyd. No. 31

Existing Area 31

Hydrograph type	=	SCS Runoff	Peak discharge	=	39.37 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	76,339 cuft
Drainage area	=	6.830 ac	Curve number	=	82*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.80 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.950 x 98) + (5.879 x 79)] / 6.830

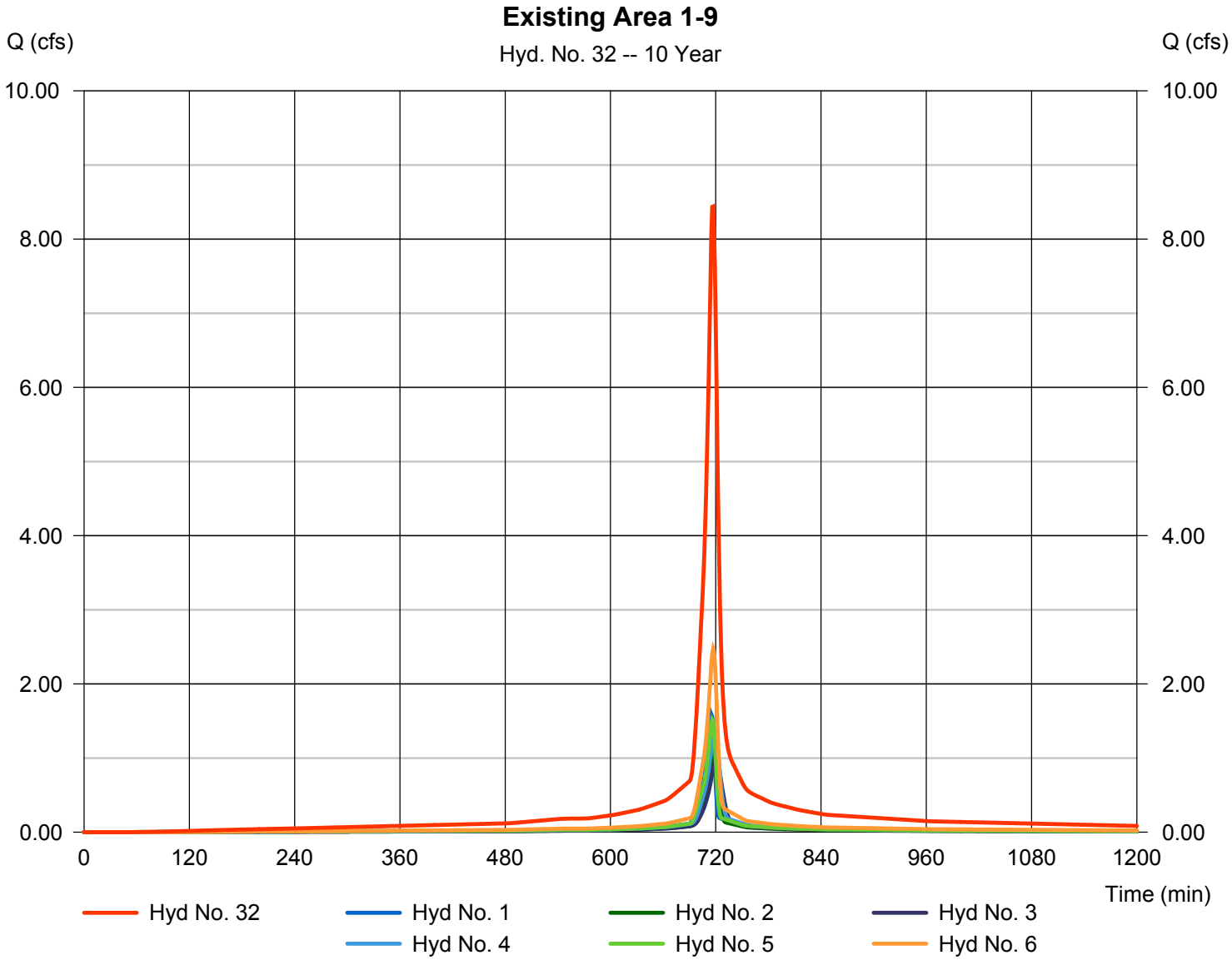


Hydrograph Report

Hyd. No. 32

Existing Area 1-9

Hydrograph type	= Combine	Peak discharge	= 8.441 cfs
Storm frequency	= 10 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 21,325 cuft
Inflow hyds.	= 1, 2, 3, 4, 5, 6	Contrib. drain. area	= 1.280 ac

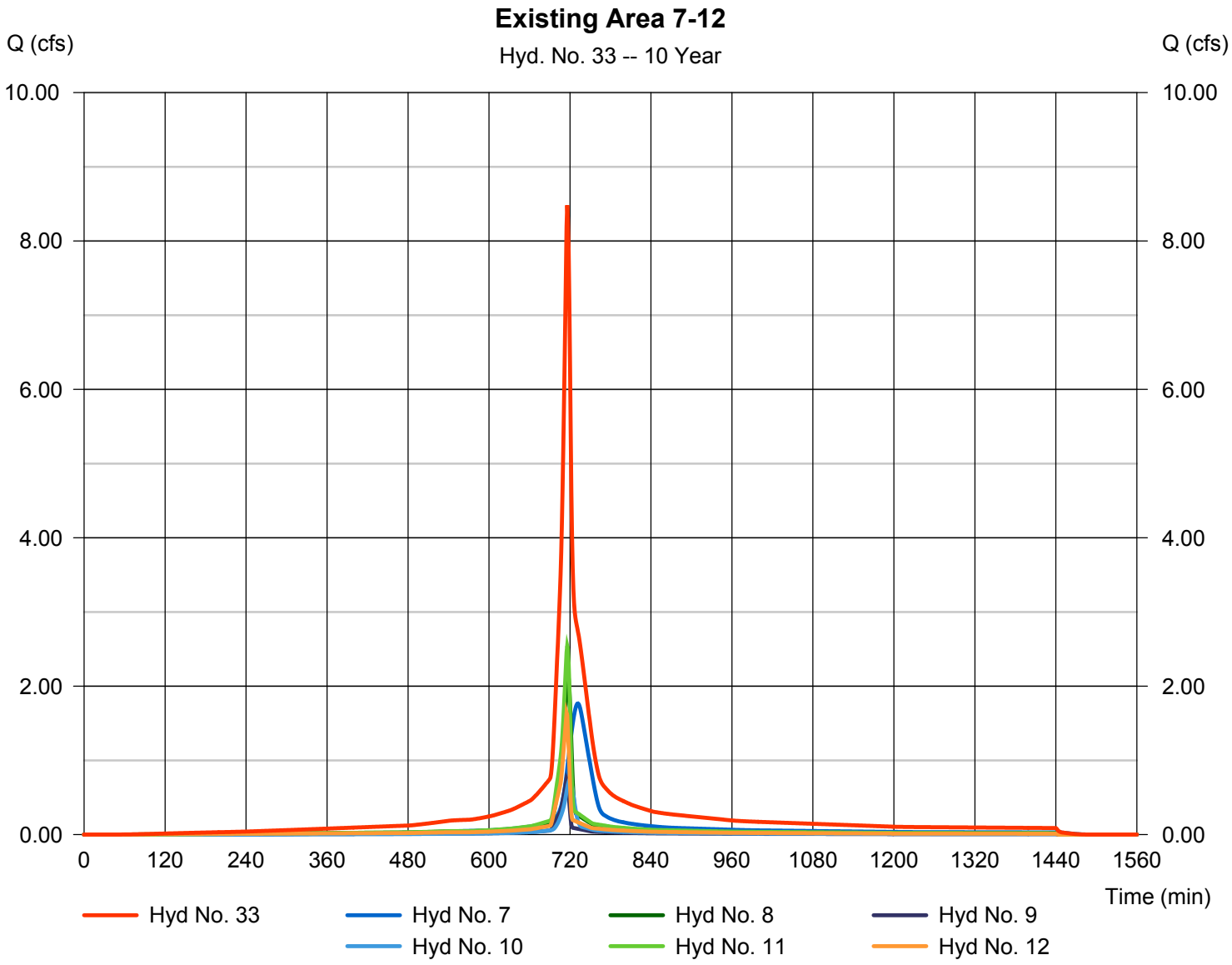


Hydrograph Report

Hyd. No. 33

Existing Area 7-12

Hydrograph type	= Combine	Peak discharge	= 8.482 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 25,250 cuft
Inflow hyds.	= 7, 8, 9, 10, 11, 12	Contrib. drain. area	= 1.597 ac

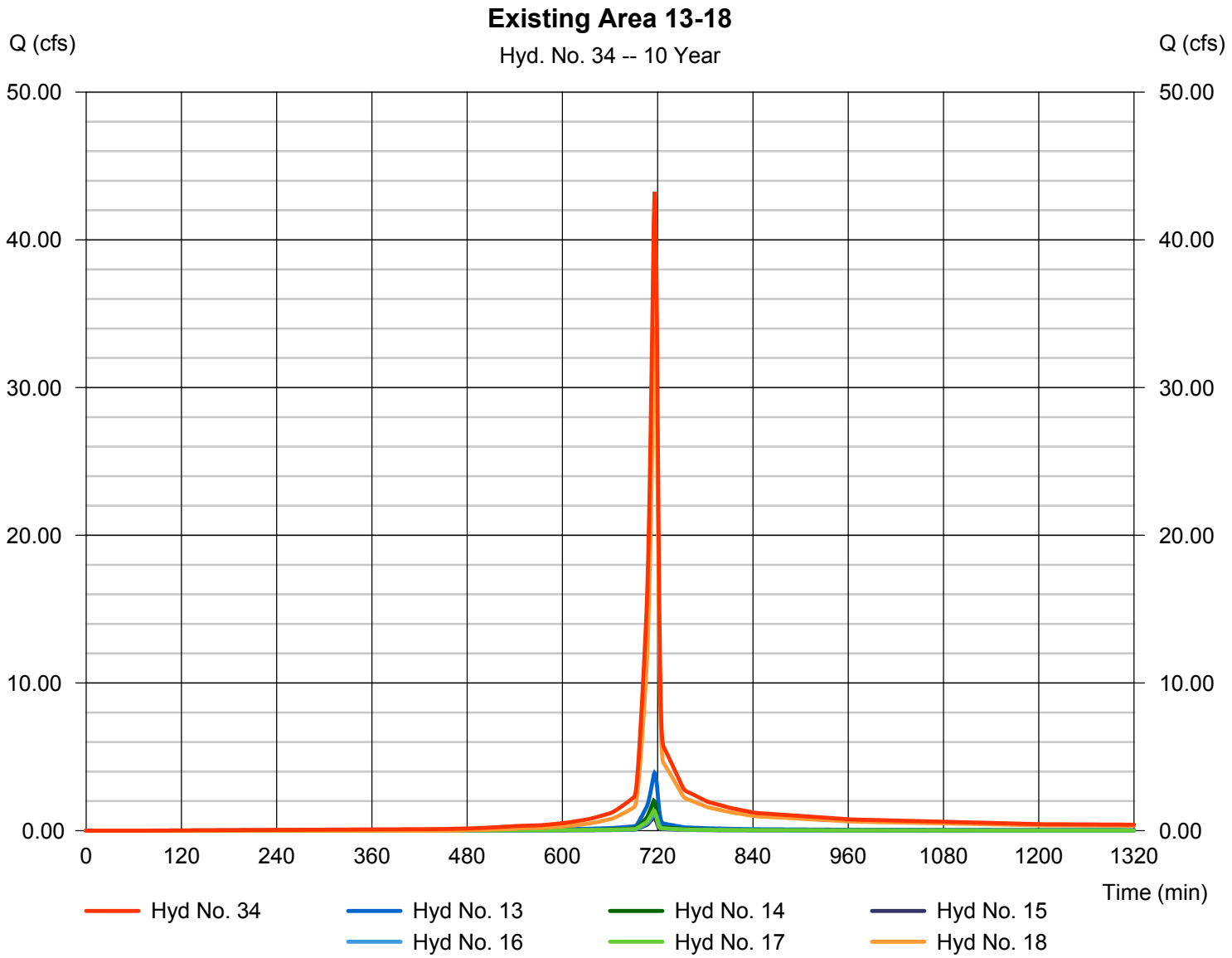


Hydrograph Report

Hyd. No. 34

Existing Area 13-18

Hydrograph type	= Combine	Peak discharge	= 43.25 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 85,559 cuft
Inflow hyds.	= 13, 14, 15, 16, 17, 18	Contrib. drain. area	= 7.650 ac

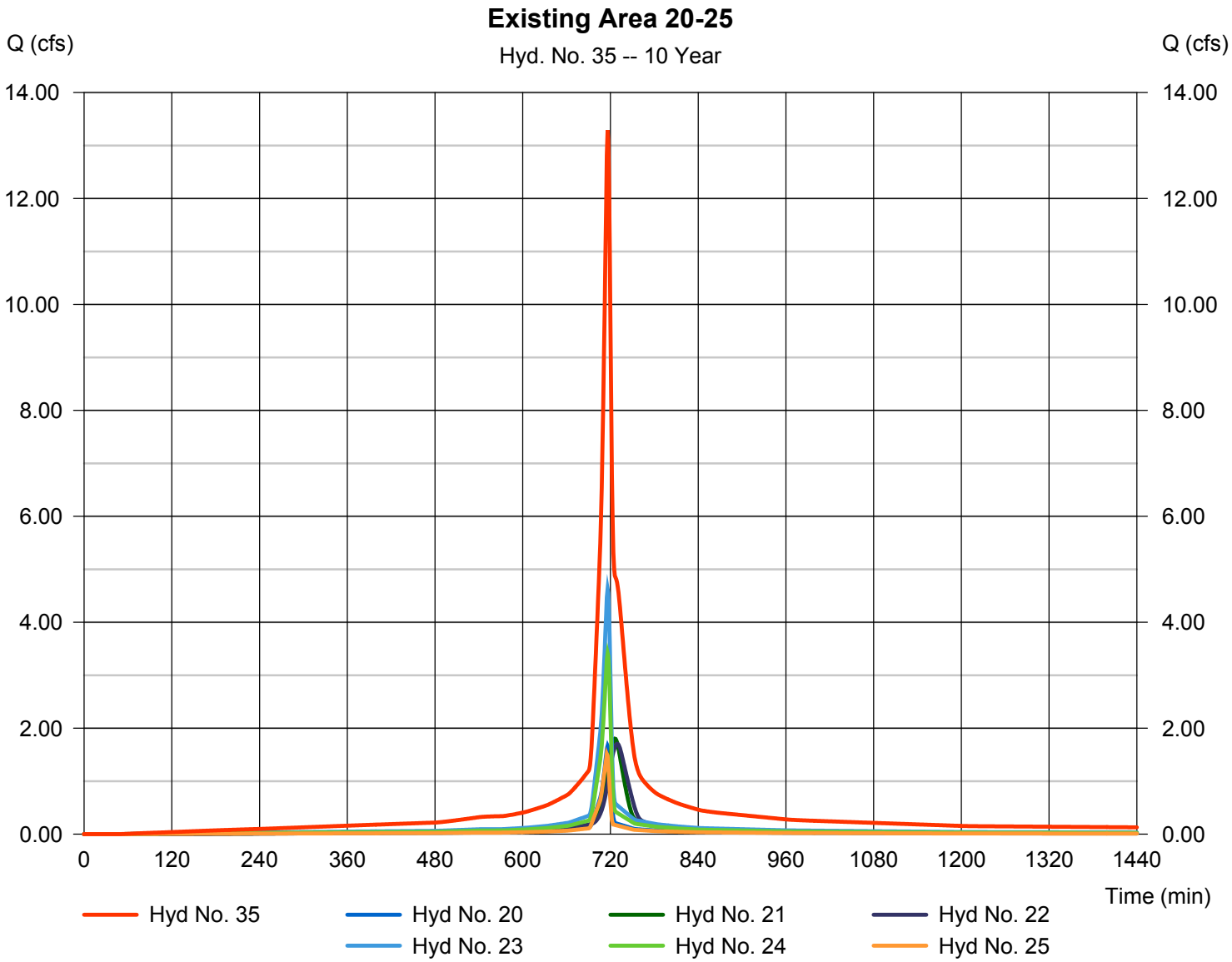


Hydrograph Report

Hyd. No. 35

Existing Area 20-25

Hydrograph type	=	Combine	Peak discharge	=	13.29 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	39,066 cuft
Inflow hyds.	=	20, 21, 22, 23, 24, 25	Contrib. drain. area	=	2.330 ac

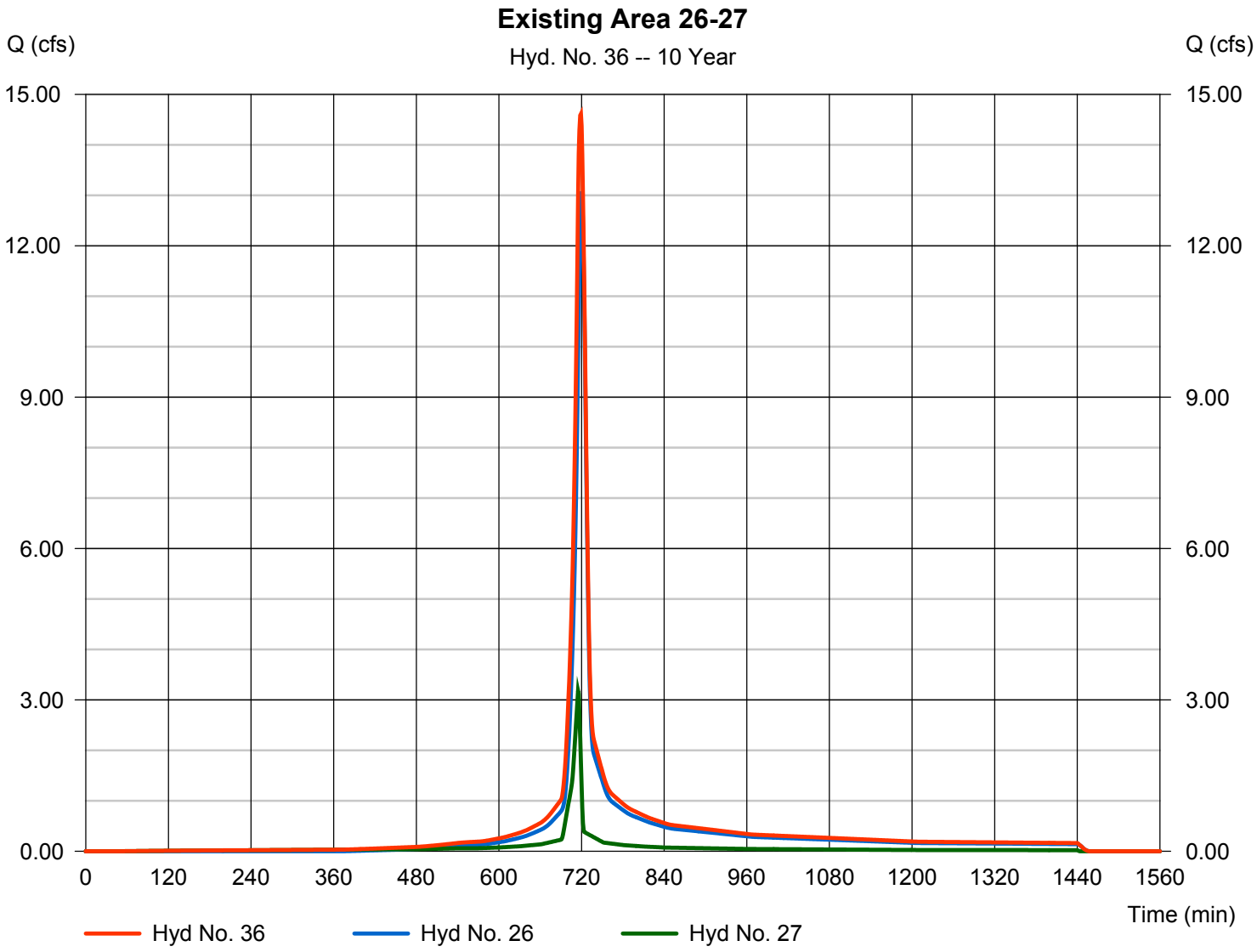


Hydrograph Report

Hyd. No. 36

Existing Area 26-27

Hydrograph type	= Combine	Peak discharge	= 14.61 cfs
Storm frequency	= 10 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 38,825 cuft
Inflow hyds.	= 26, 27	Contrib. drain. area	= 3.150 ac

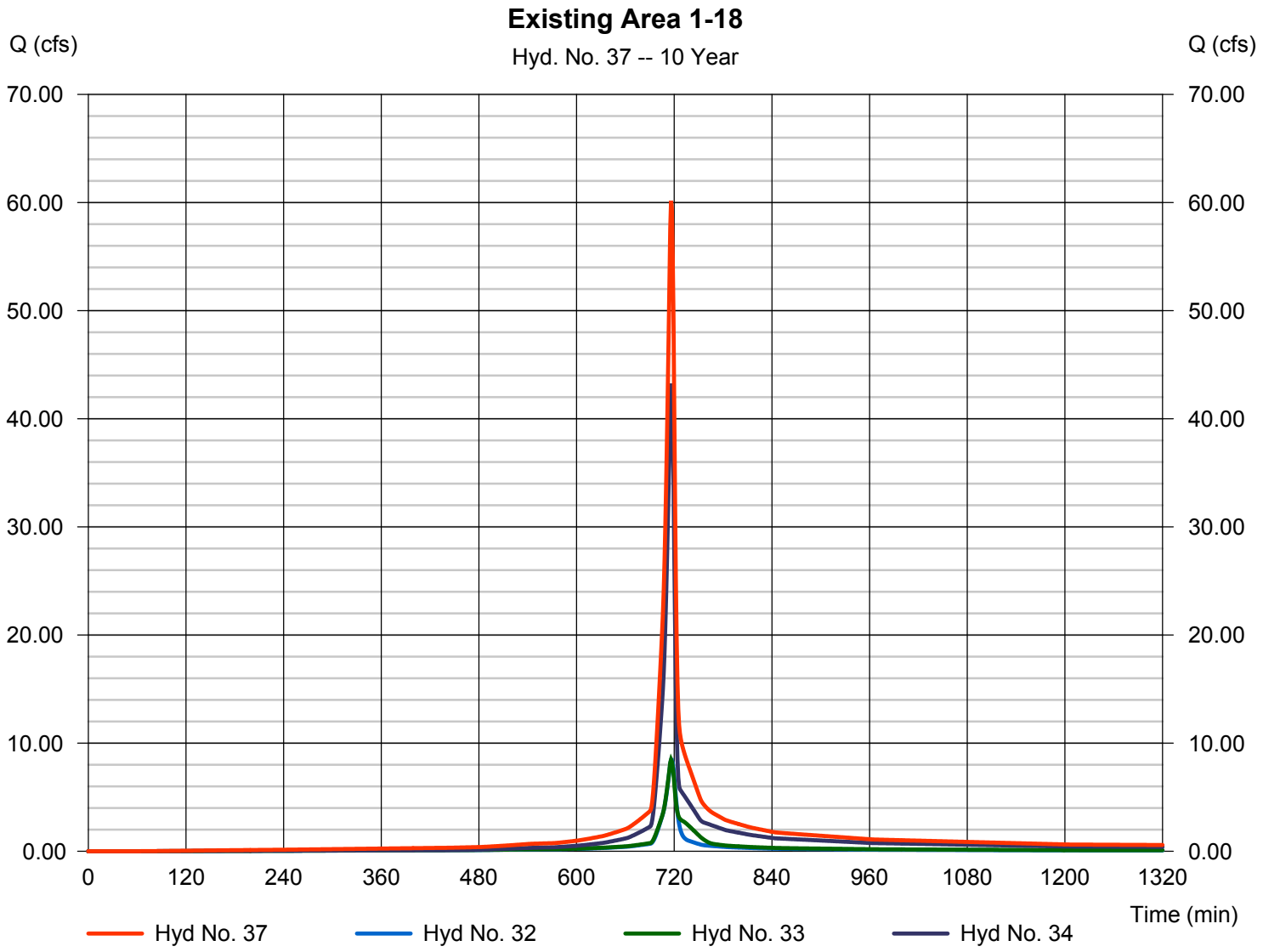


Hydrograph Report

Hyd. No. 37

Existing Area 1-18

Hydrograph type	=	Combine	Peak discharge	=	60.16 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	132,134 cuft
Inflow hyds.	=	32, 33, 34	Contrib. drain. area	=	0.000 ac

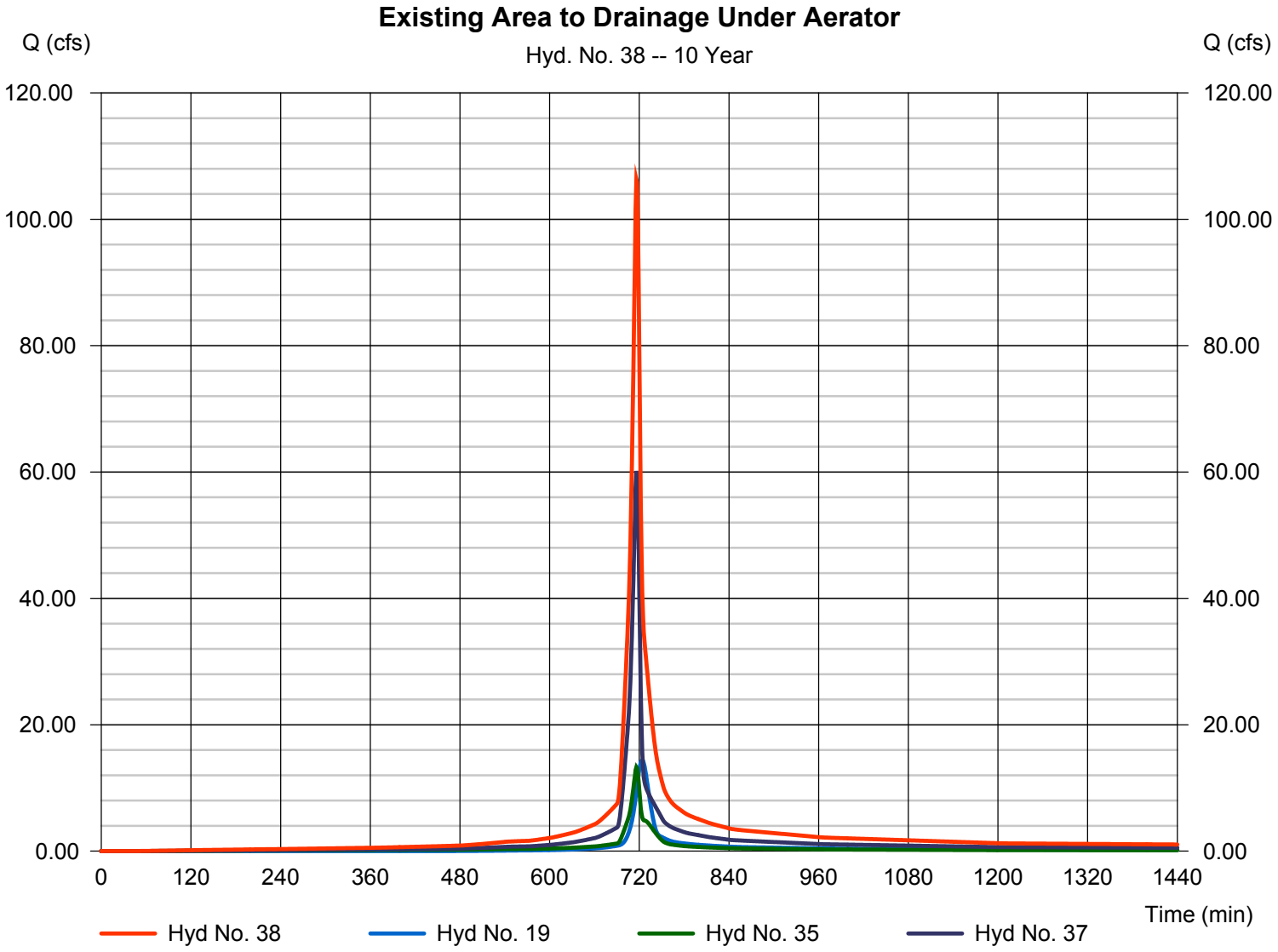


Hydrograph Report

Hyd. No. 38

Existing Area to Drainage Under Aerator

Hydrograph type	= Combine	Peak discharge	= 106.28 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 266,732 cuft
Inflow hyds.	= 19, 35, 37	Contrib. drain. area	= 4.240 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1.910	1	715	4,118	------	------	------	Existing Area 1
2	SCS Runoff	1.207	1	718	2,996	------	------	------	Existing Area 2
3	SCS Runoff	1.161	1	721	3,287	------	------	------	Existing Area 3
4	SCS Runoff	1.634	1	719	4,303	------	------	------	Existing Area 4
5	SCS Runoff	1.823	1	716	4,183	------	------	------	Existing Area 5
6	SCS Runoff	2.989	1	717	7,035	------	------	------	Existing Area 6
7	SCS Runoff	2.176	1	732	9,419	------	------	------	Existing Area 7
8	SCS Runoff	2.565	1	717	6,127	------	------	------	Existing Area 8
9	SCS Runoff	0.910	1	715	1,961	------	------	------	Existing Area 9
10	SCS Runoff	0.915	1	720	2,381	------	------	------	Existing Area 10
11	SCS Runoff	3.068	1	716	6,822	------	------	------	Existing Area 11
12	SCS Runoff	1.970	1	715	4,247	------	------	------	Existing Area 12
13	SCS Runoff	4.720	1	716	10,654	------	------	------	Existing Area 13
14	SCS Runoff	2.445	1	715	5,186	------	------	------	Existing Area 14
15	SCS Runoff	1.091	1	715	2,353	------	------	------	Existing Area 15
16	SCS Runoff	1.433	1	716	3,143	------	------	------	Existing Area 16
17	SCS Runoff	1.637	1	715	3,530	------	------	------	Existing Area 17
18	SCS Runoff	44.11	1	716	85,485	------	------	------	Existing Area 18
19	SCS Runoff	18.84	1	724	55,991	------	------	------	Existing Area 19
20	SCS Runoff	2.006	1	716	4,601	------	------	------	Existing Area 20
21	SCS Runoff	2.177	1	726	8,153	------	------	------	Existing Area 21
22	SCS Runoff	2.067	1	729	8,580	------	------	------	Existing Area 22
23	SCS Runoff	5.561	1	716	12,758	------	------	------	Existing Area 23
24	SCS Runoff	4.103	1	716	9,412	------	------	------	Existing Area 24
25	SCS Runoff	1.819	1	715	3,922	------	------	------	Existing Area 25
26	SCS Runoff	16.69	1	720	41,269	------	------	------	Existing Area 26
27	SCS Runoff	3.820	1	715	8,235	------	------	------	Existing Area 27
28	SCS Runoff	4.724	1	723	13,524	------	------	------	Existing Area 28
29	SCS Runoff	8.975	1	723	25,696	------	------	------	Existing Area 29
30	SCS Runoff	1.449	1	715	3,073	------	------	------	Existing Area 30
31	SCS Runoff	50.35	1	716	98,852	------	------	------	Existing Area 31
32	Combine	10.17	1	717	25,922	1, 2, 3,	------	------	Existing Area 1-9
33	Combine	10.27	1	716	30,957	4, 5, 6, 7, 8, 9,	------	------	Existing Area 7-12
34	Combine	55.33	1	716	110,351	10, 11, 12, 13, 14, 15, 16, 17, 18,	------	------	Existing Area 13-18

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
35	Combine	16.00	1	716	47,426	20, 21, 22, 23, 24, 25,	------	------	Existing Area 20-25
36	Combine	18.55	1	719	49,505	26, 27,	------	------	Existing Area 26-27
37	Combine	75.77	1	716	167,230	32, 33, 34,	------	------	Existing Area 1-18
38	Combine	29.73	1	718	103,417	19, 35, 37	------	------	Existing Area to Drainage Under Aera

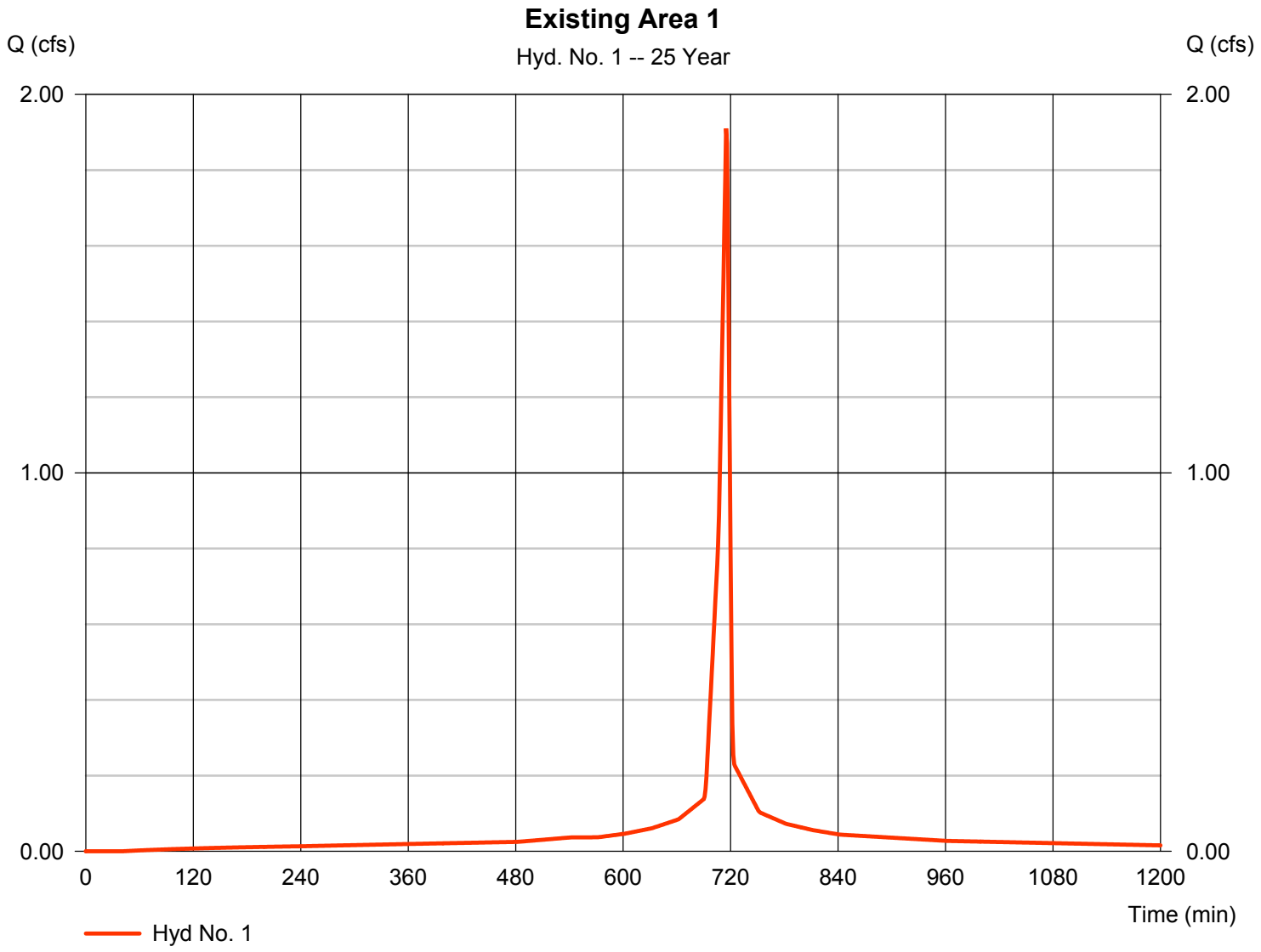
Hydrograph Report

Hyd. No. 1

Existing Area 1

Hydrograph type	= SCS Runoff	Peak discharge	= 1.910 cfs
Storm frequency	= 25 yrs	Time to peak	= 715 min
Time interval	= 1 min	Hyd. volume	= 4,118 cuft
Drainage area	= 0.210 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.20 min
Total precip.	= 6.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.210 x 98)] / 0.210



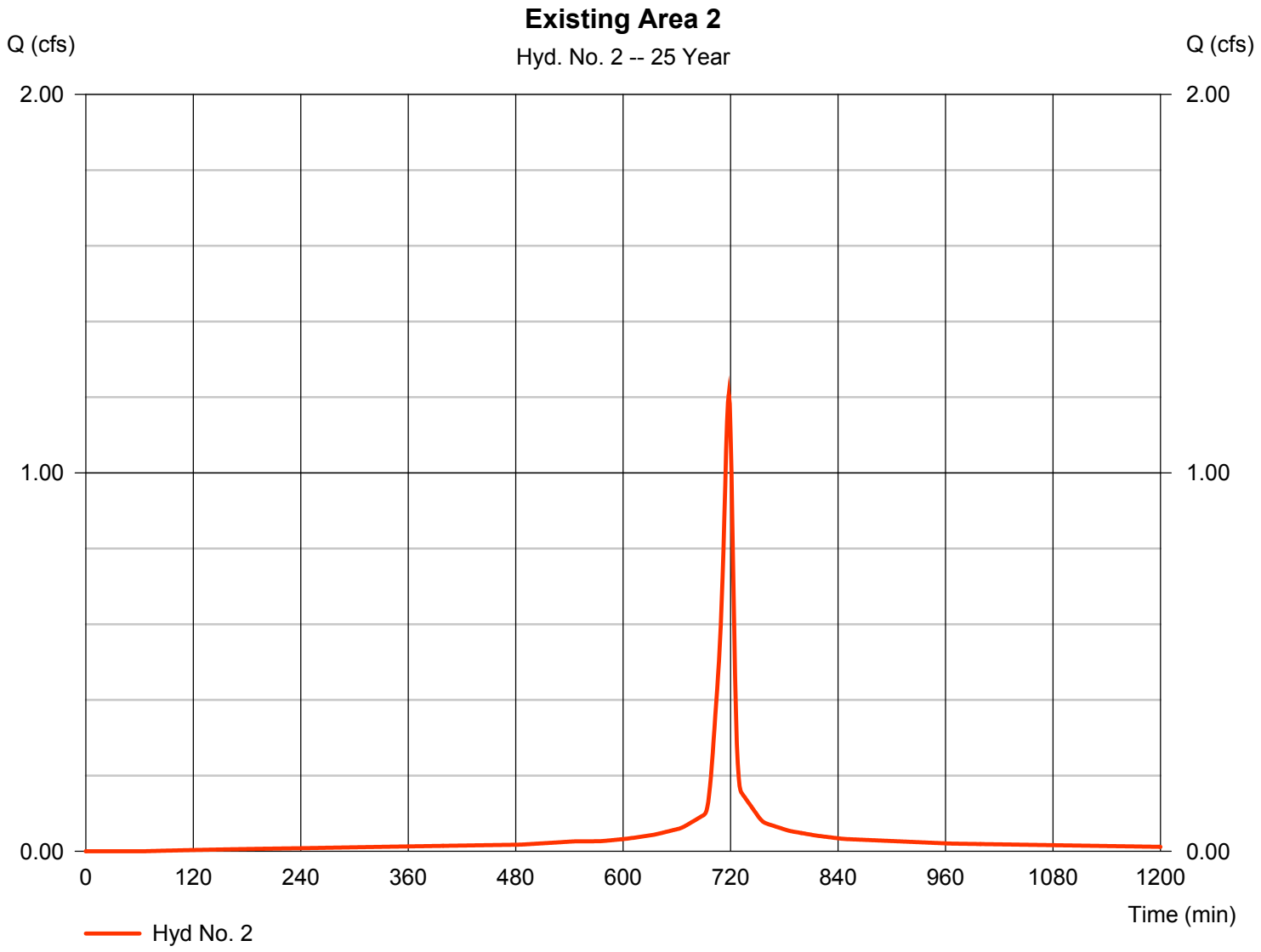
Hydrograph Report

Hyd. No. 2

Existing Area 2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.207 cfs
Storm frequency	= 25 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 2,996 cuft
Drainage area	= 0.150 ac	Curve number	= 97*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.90 min
Total precip.	= 6.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.150 x 97)] / 0.150



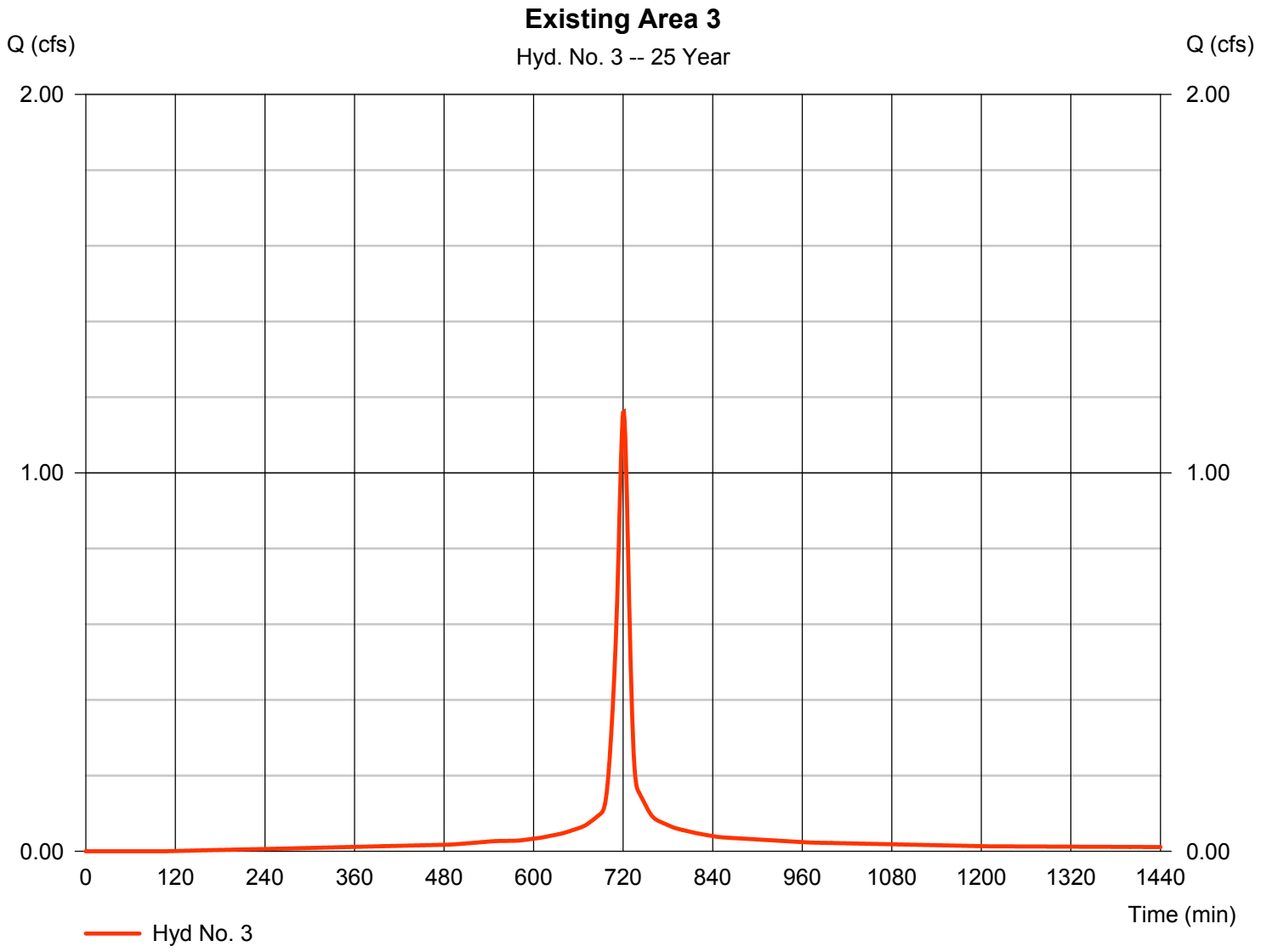
Hydrograph Report

Hyd. No. 3

Existing Area 3

Hydrograph type	= SCS Runoff	Peak discharge	= 1.161 cfs
Storm frequency	= 25 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyd. volume	= 3,287 cuft
Drainage area	= 0.170 ac	Curve number	= 95*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 13.10 min
Total precip.	= 6.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.143 x 98) + (0.030 x 79)] / 0.170



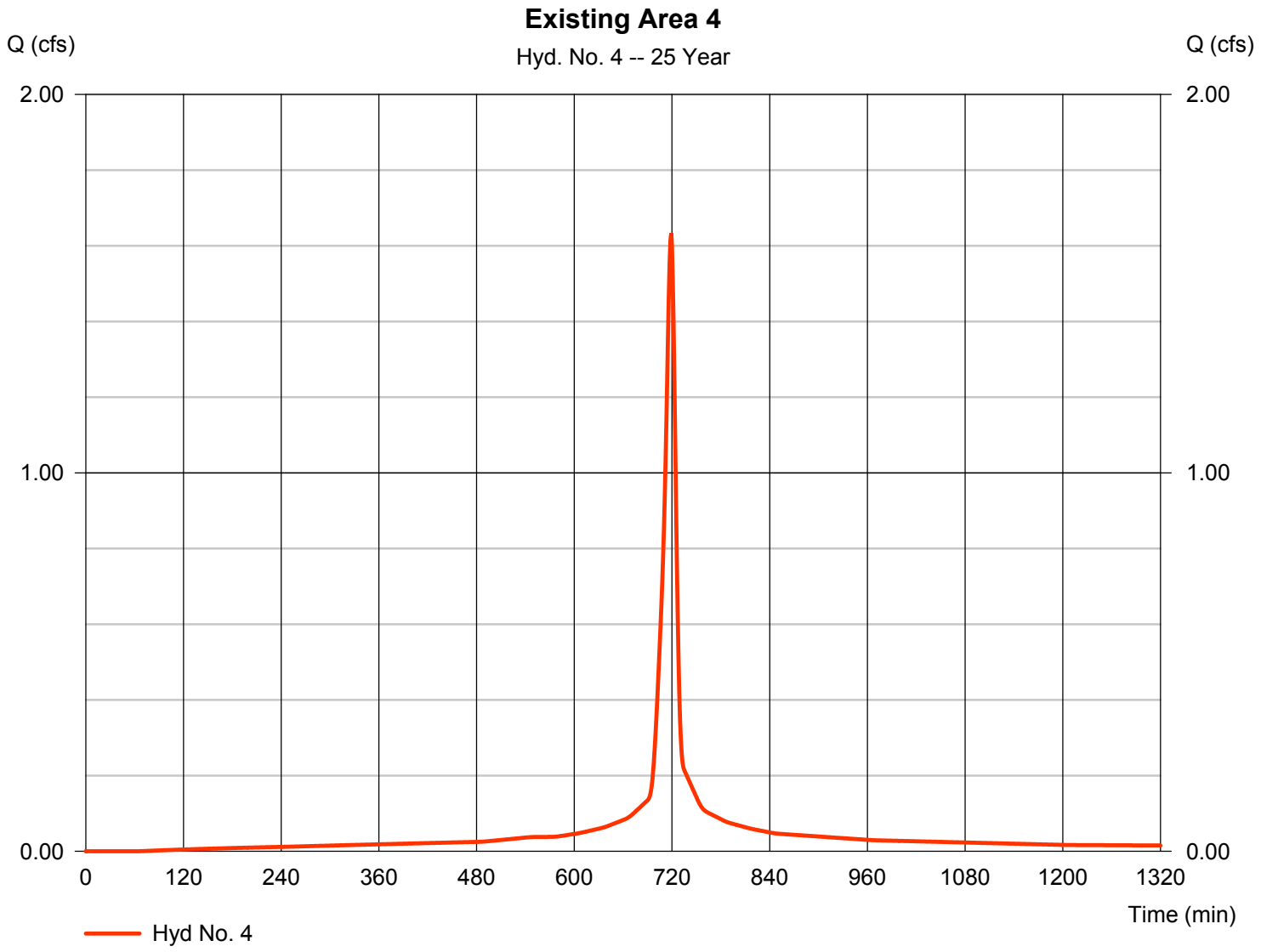
Hydrograph Report

Hyd. No. 4

Existing Area 4

Hydrograph type	= SCS Runoff	Peak discharge	= 1.634 cfs
Storm frequency	= 25 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 4,303 cuft
Drainage area	= 0.210 ac	Curve number	= 97*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.60 min
Total precip.	= 6.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.200 x 98) + (0.010 x 79)] / 0.210



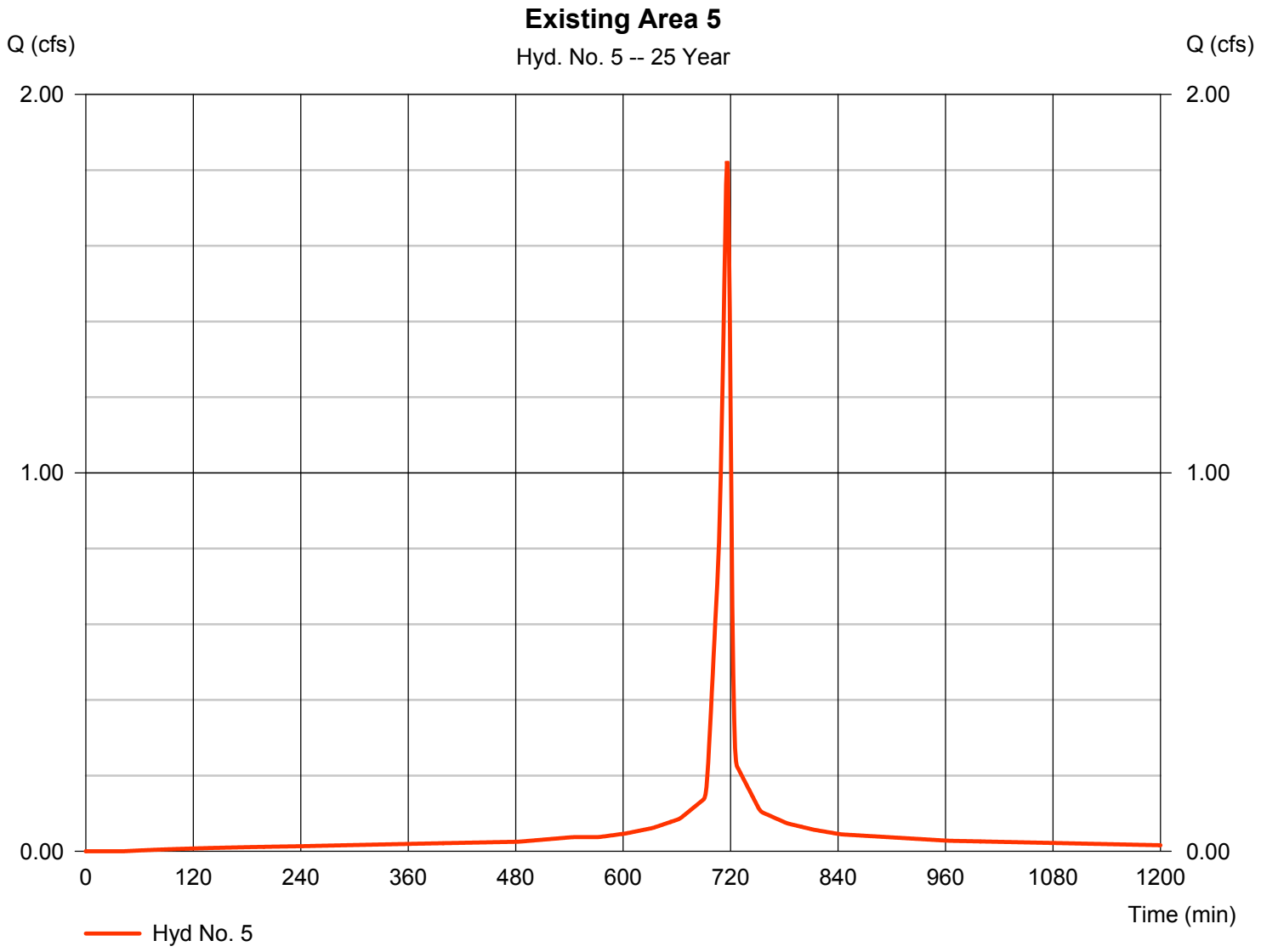
Hydrograph Report

Hyd. No. 5

Existing Area 5

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.823 cfs
Storm frequency	=	25 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	4,183 cuft
Drainage area	=	0.200 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	3.30 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.199 x 98)] / 0.200



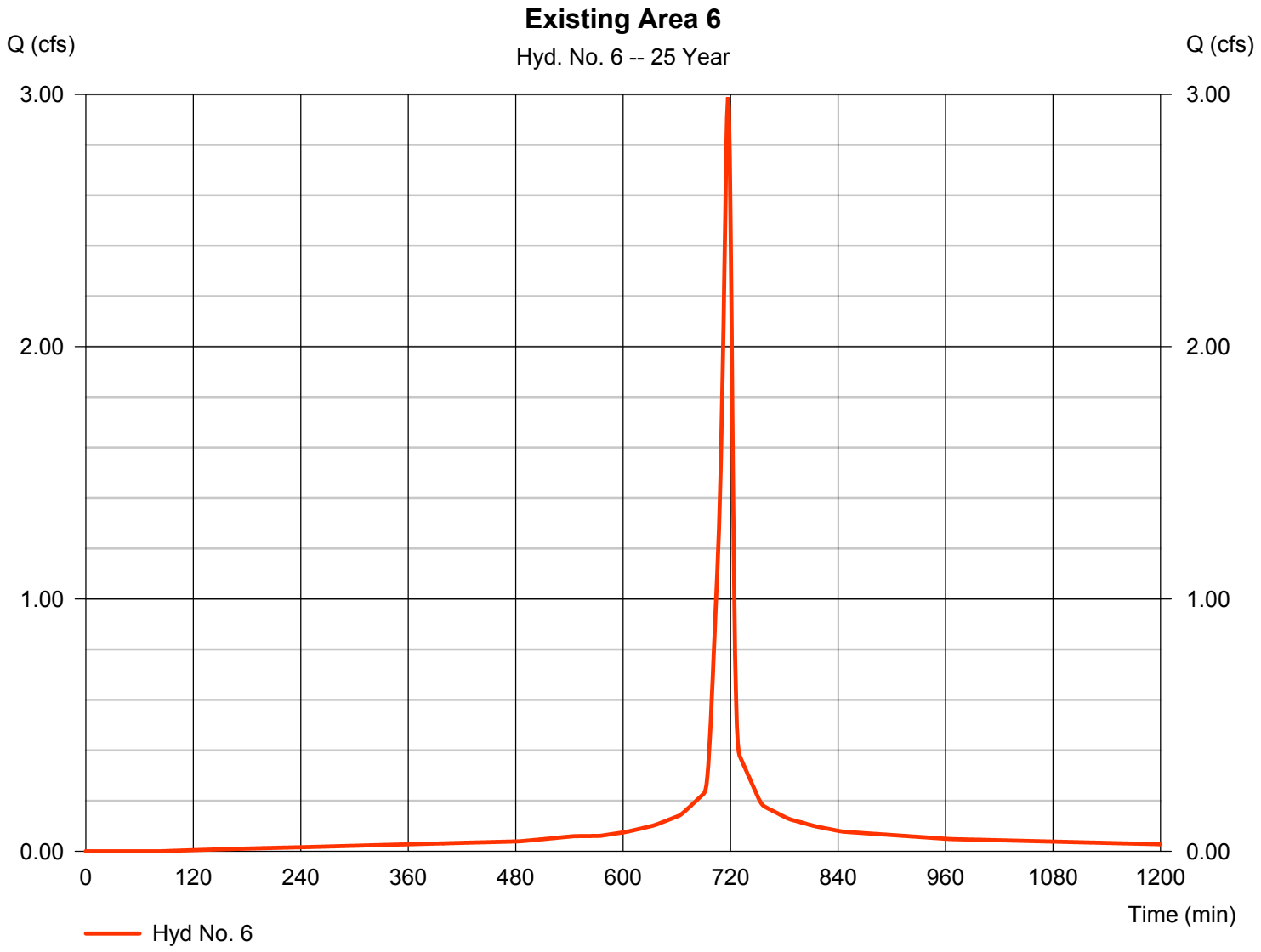
Hydrograph Report

Hyd. No. 6

Existing Area 6

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.989 cfs
Storm frequency	=	25 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	7,035 cuft
Drainage area	=	0.340 ac	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.50 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.299 x 98) + (0.040 x 79)] / 0.340



Hydrograph Report

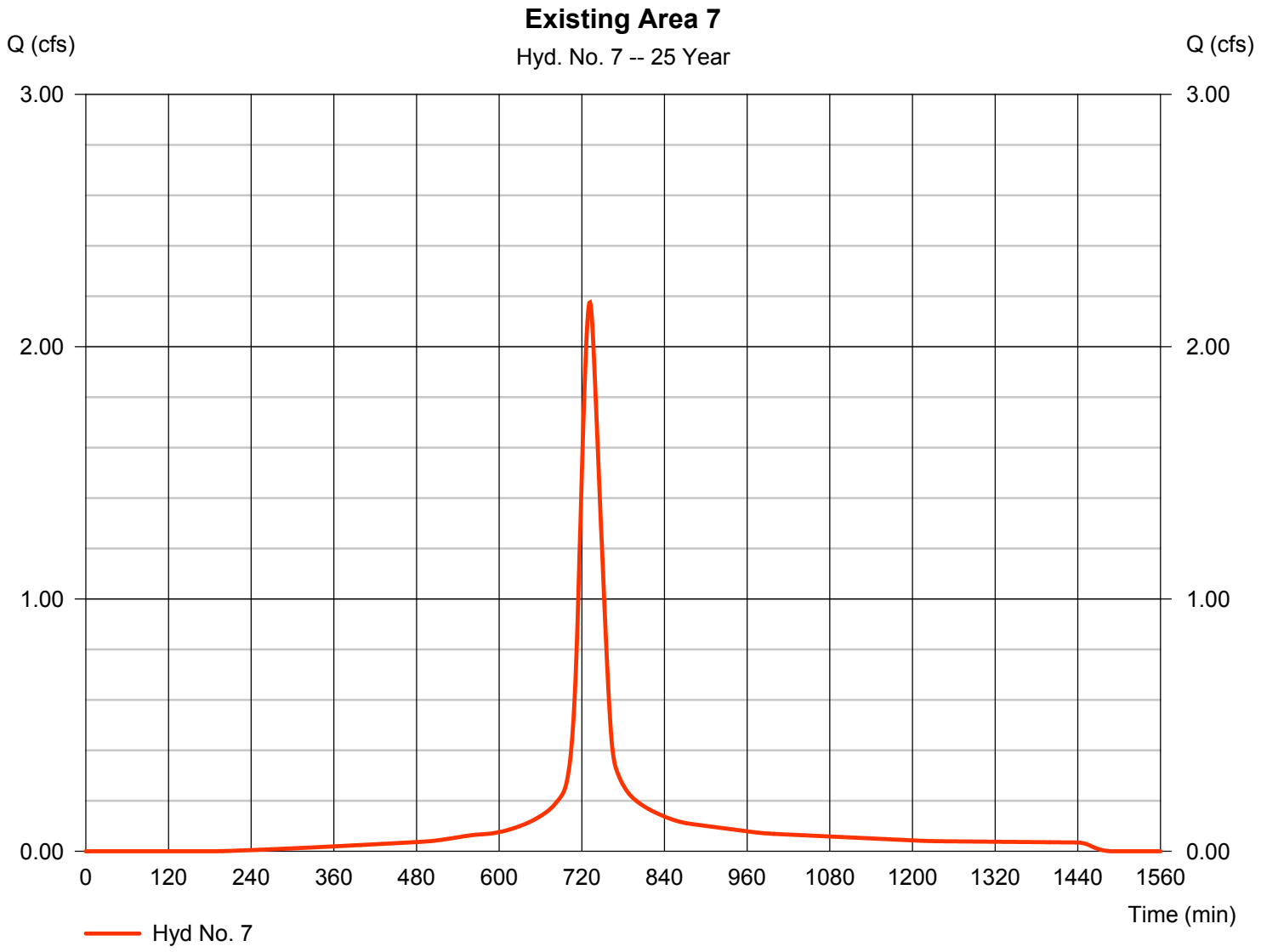
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 7

Existing Area 7

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.176 cfs
Storm frequency	=	25 yrs	Time to peak	=	732 min
Time interval	=	1 min	Hyd. volume	=	9,419 cuft
Drainage area	=	0.520 ac	Curve number	=	91*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	30.80 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.331 x 98) + (0.191 x 79)] / 0.520



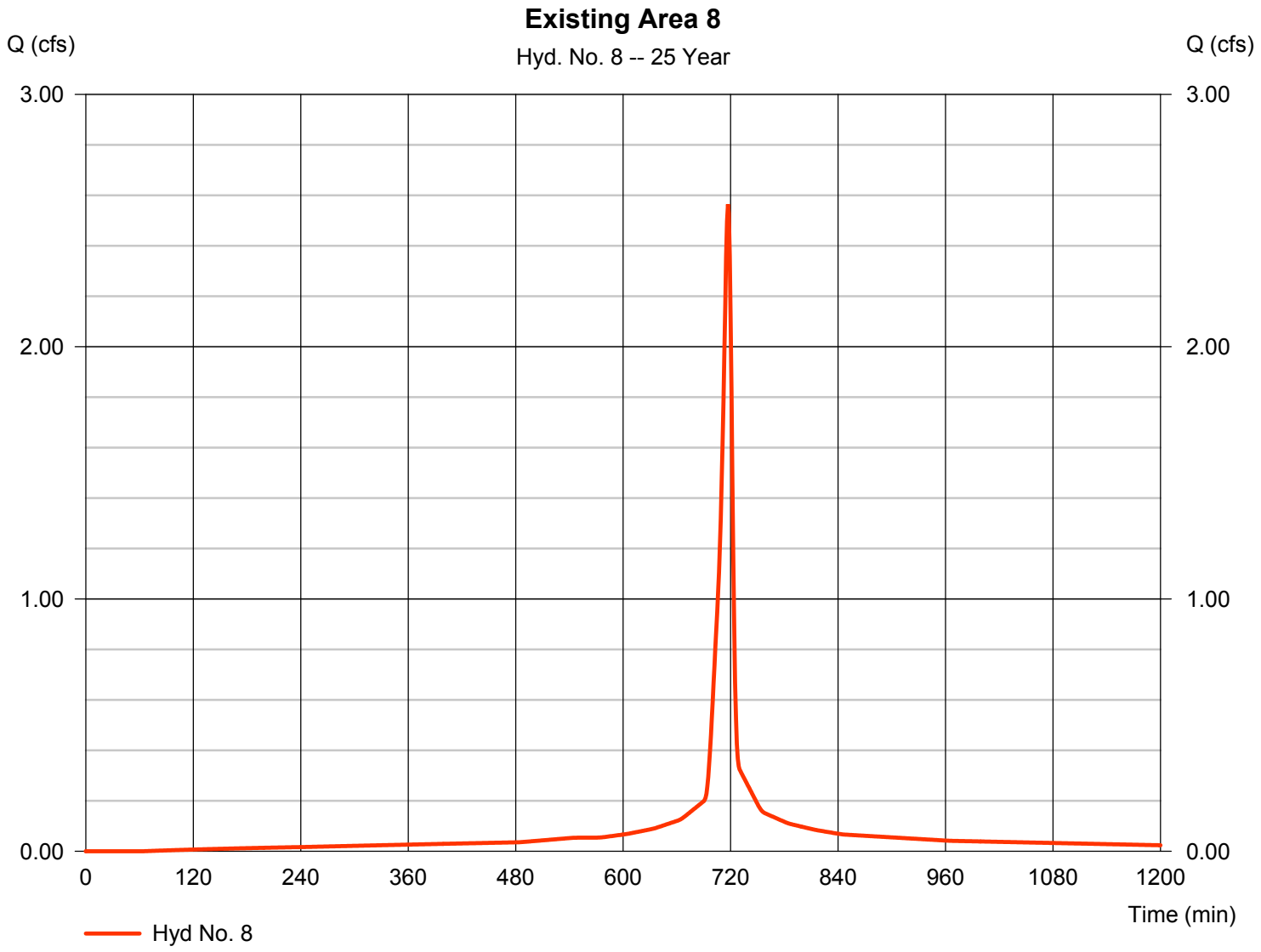
Hydrograph Report

Hyd. No. 8

Existing Area 8

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.565 cfs
Storm frequency	=	25 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	6,127 cuft
Drainage area	=	0.290 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.272 x 98) + (0.021 x 79)] / 0.290



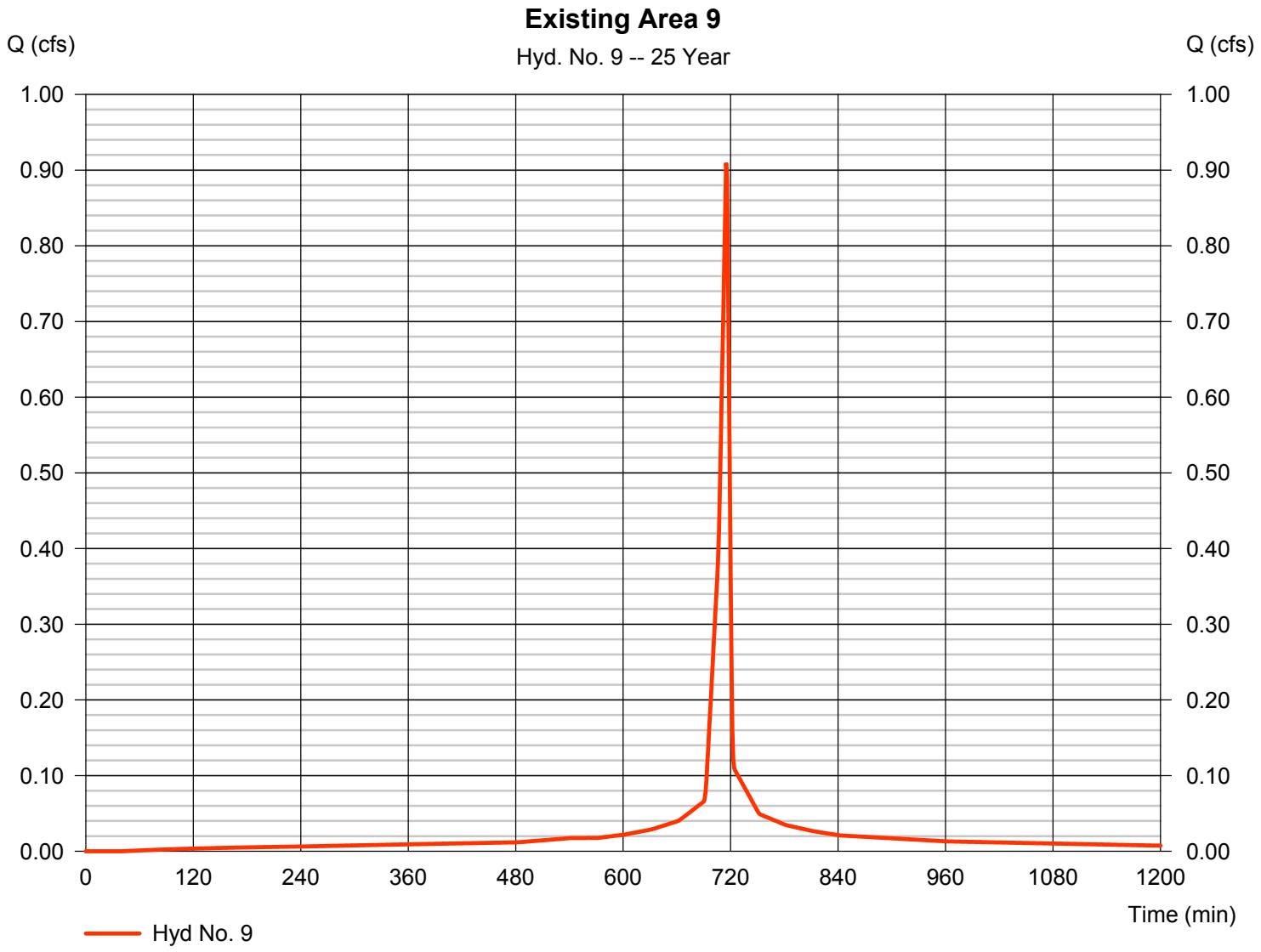
Hydrograph Report

Hyd. No. 9

Existing Area 9

Hydrograph type	= SCS Runoff	Peak discharge	= 0.910 cfs
Storm frequency	= 25 yrs	Time to peak	= 715 min
Time interval	= 1 min	Hyd. volume	= 1,961 cuft
Drainage area	= 0.100 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.10 min
Total precip.	= 6.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.100 x 98)] / 0.100



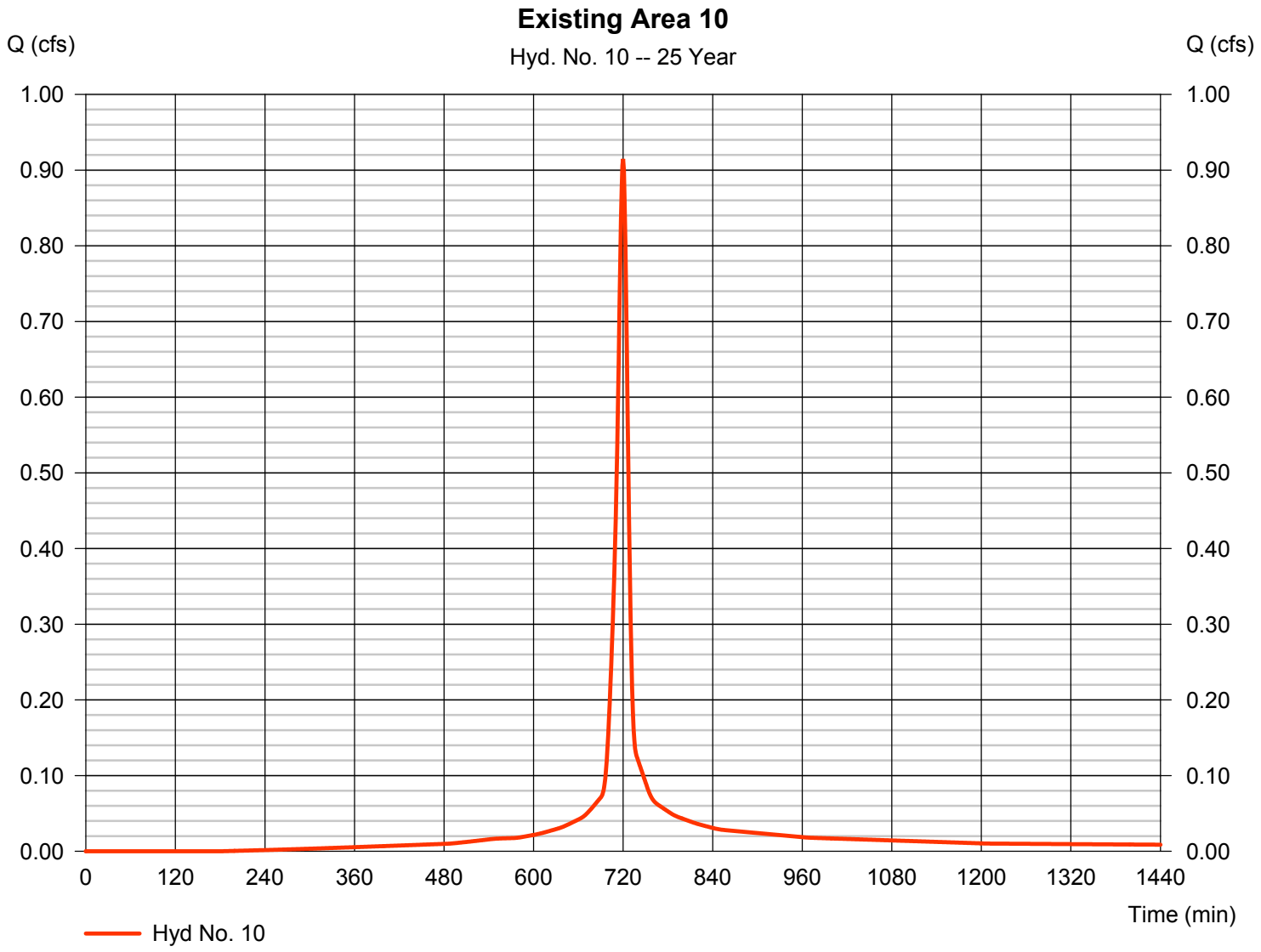
Hydrograph Report

Hyd. No. 10

Existing Area 10

Hydrograph type	= SCS Runoff	Peak discharge	= 0.915 cfs
Storm frequency	= 25 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 2,381 cuft
Drainage area	= 0.130 ac	Curve number	= 91*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.20 min
Total precip.	= 6.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.081 x 98) + (0.044 x 79)] / 0.130



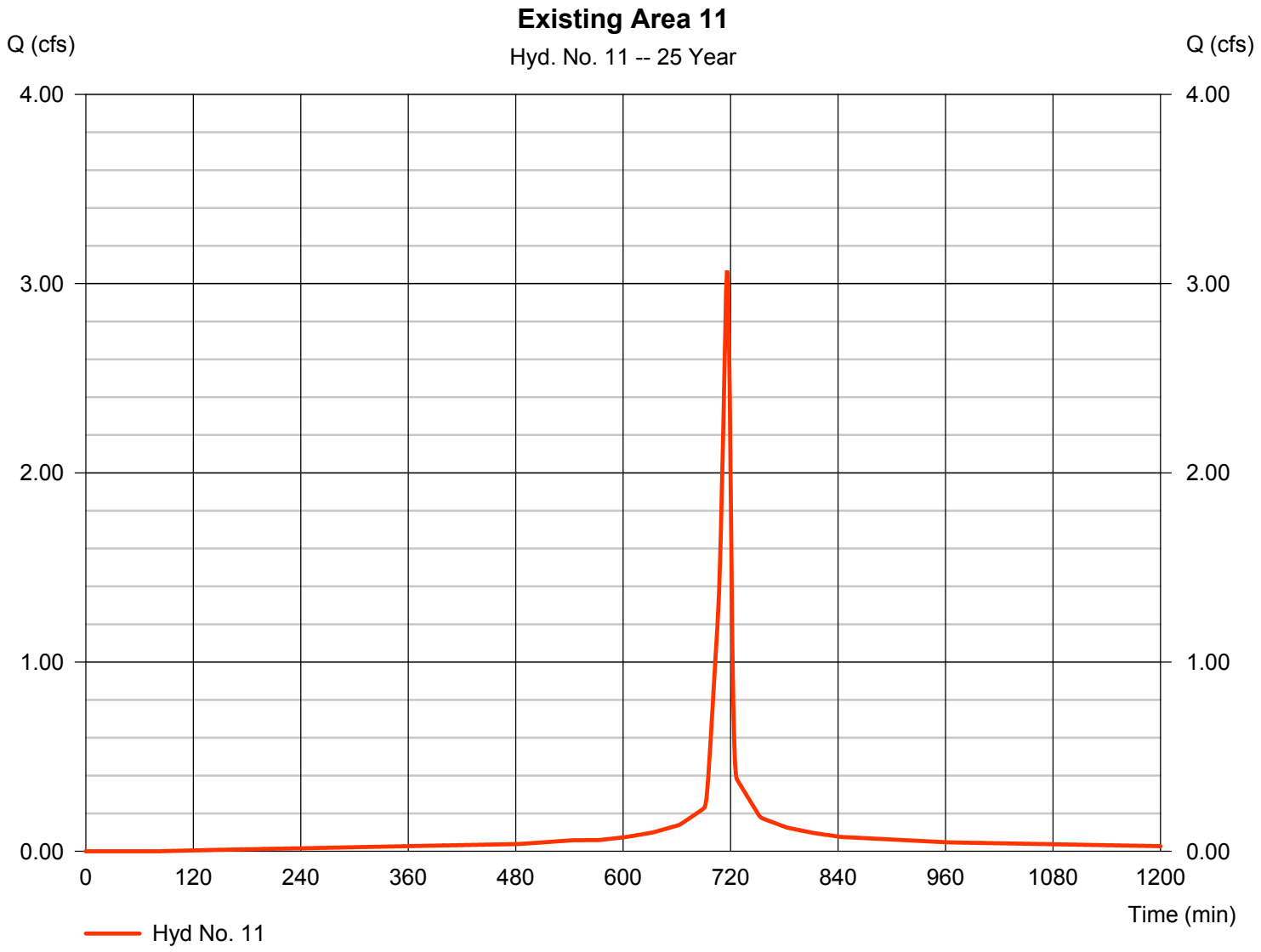
Hydrograph Report

Hyd. No. 11

Existing Area 11

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.068 cfs
Storm frequency	=	25 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	6,822 cuft
Drainage area	=	0.340 ac	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.50 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.296 x 98) + (0.045 x 79)] / 0.340

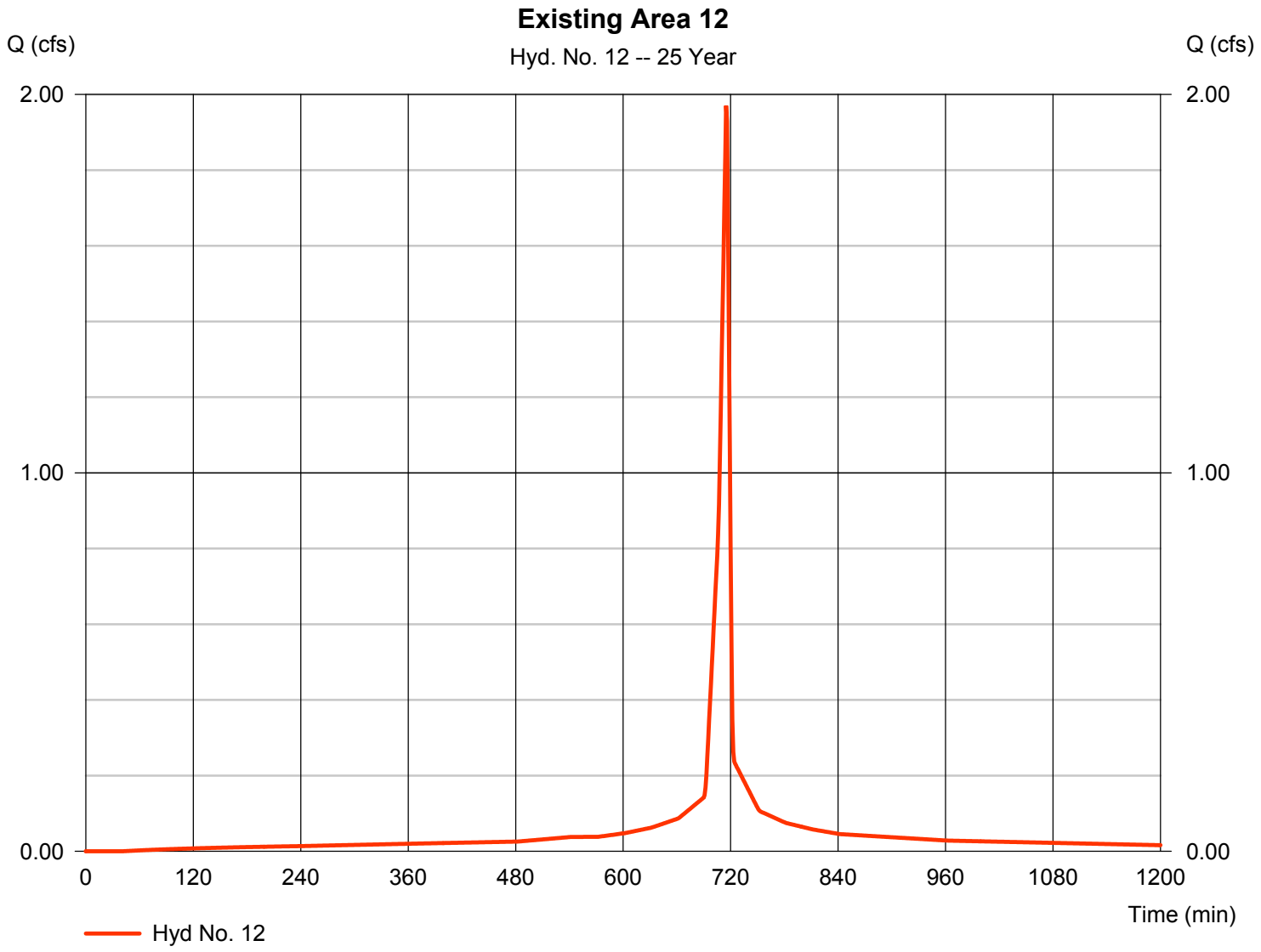


Hydrograph Report

Hyd. No. 12

Existing Area 12

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.970 cfs
Storm frequency	=	25 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	4,247 cuft
Drainage area	=	0.217 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.20 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



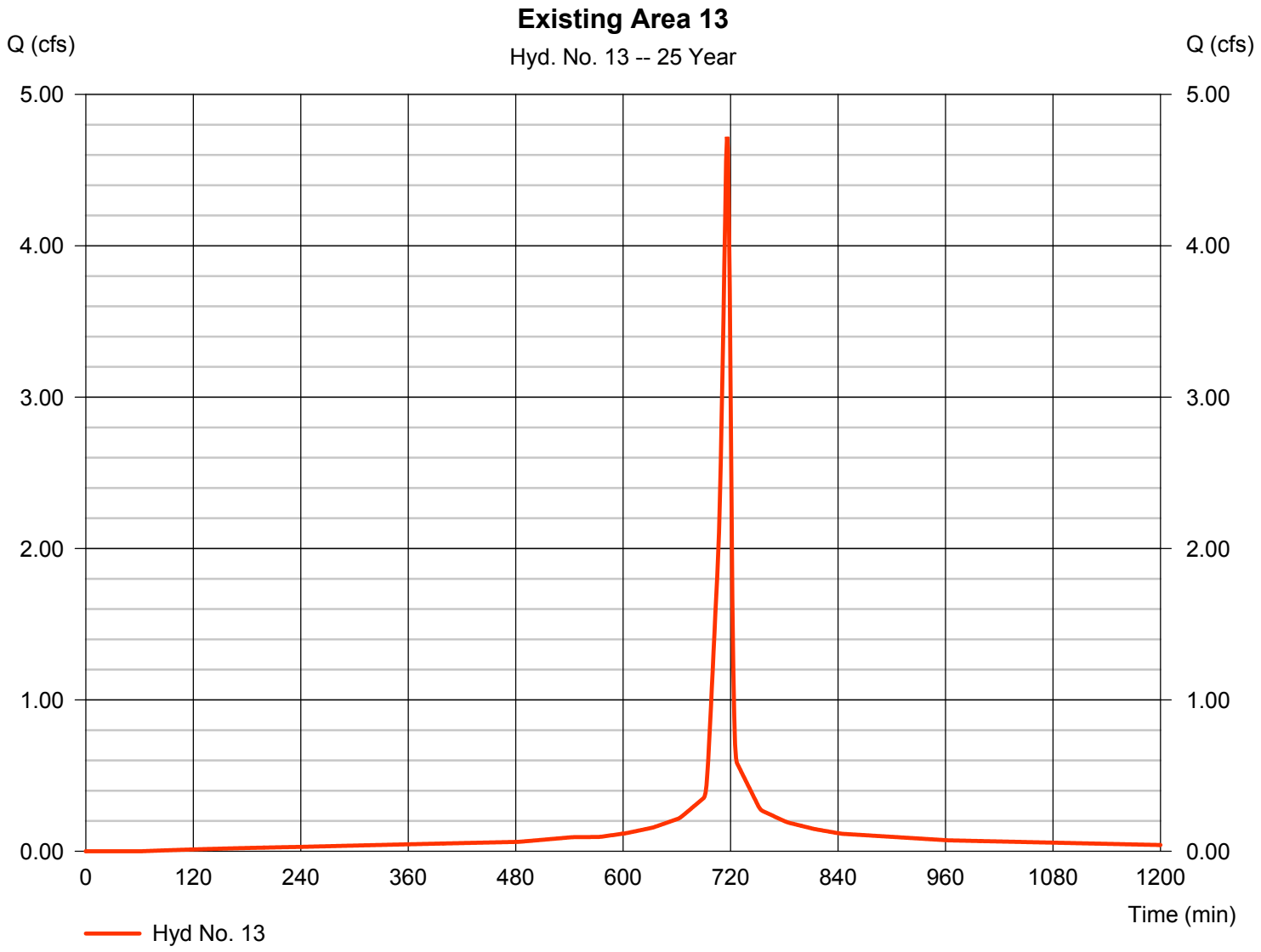
Hydrograph Report

Hyd. No. 13

Existing Area 13

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.720 cfs
Storm frequency	=	25 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	10,654 cuft
Drainage area	=	0.520 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.10 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.479 x 98) + (0.038 x 79)] / 0.520



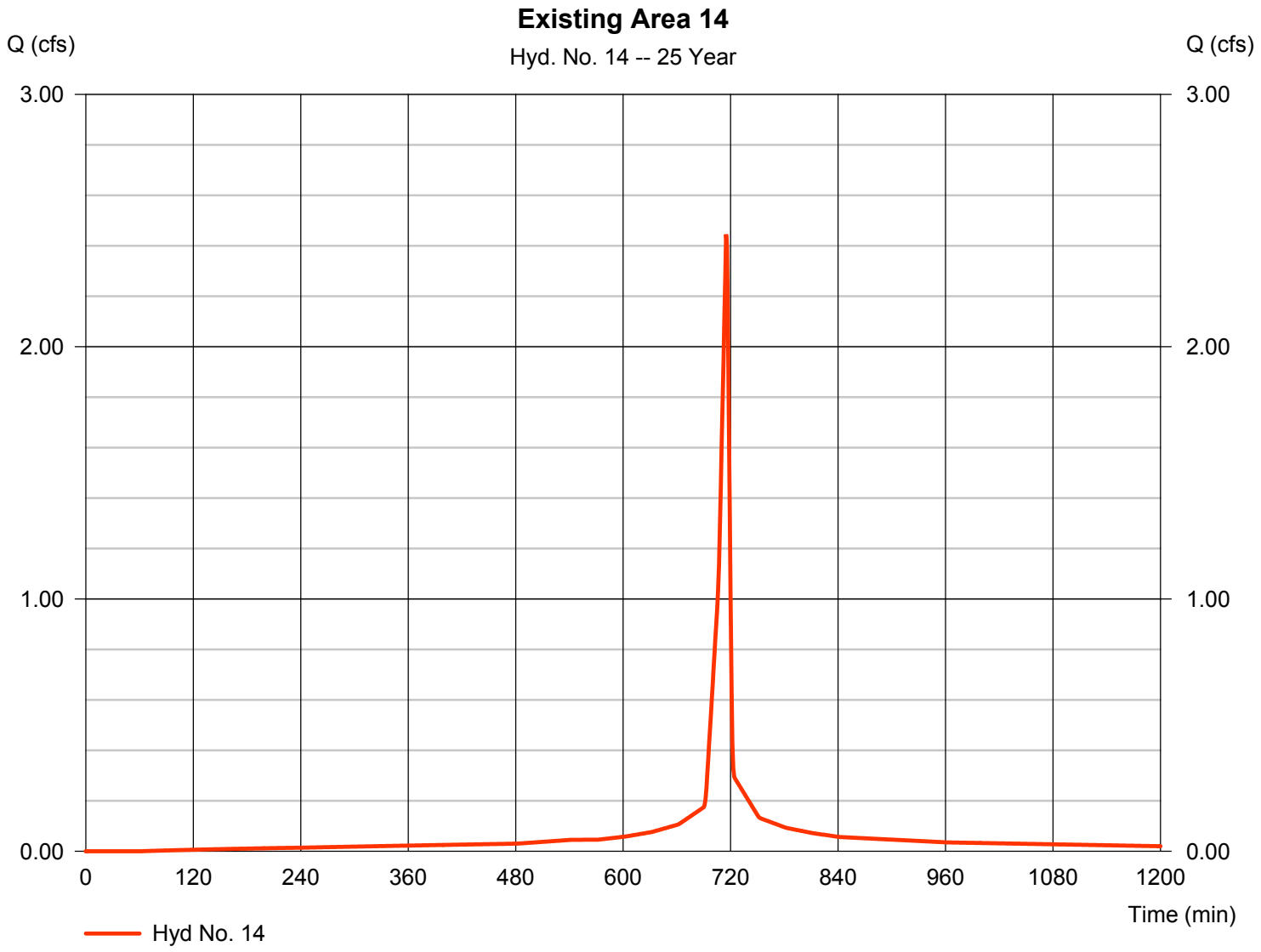
Hydrograph Report

Hyd. No. 14

Existing Area 14

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.445 cfs
Storm frequency	=	25 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	5,186 cuft
Drainage area	=	0.270 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.50 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.260 x 98) + (0.010 x 79)] / 0.270



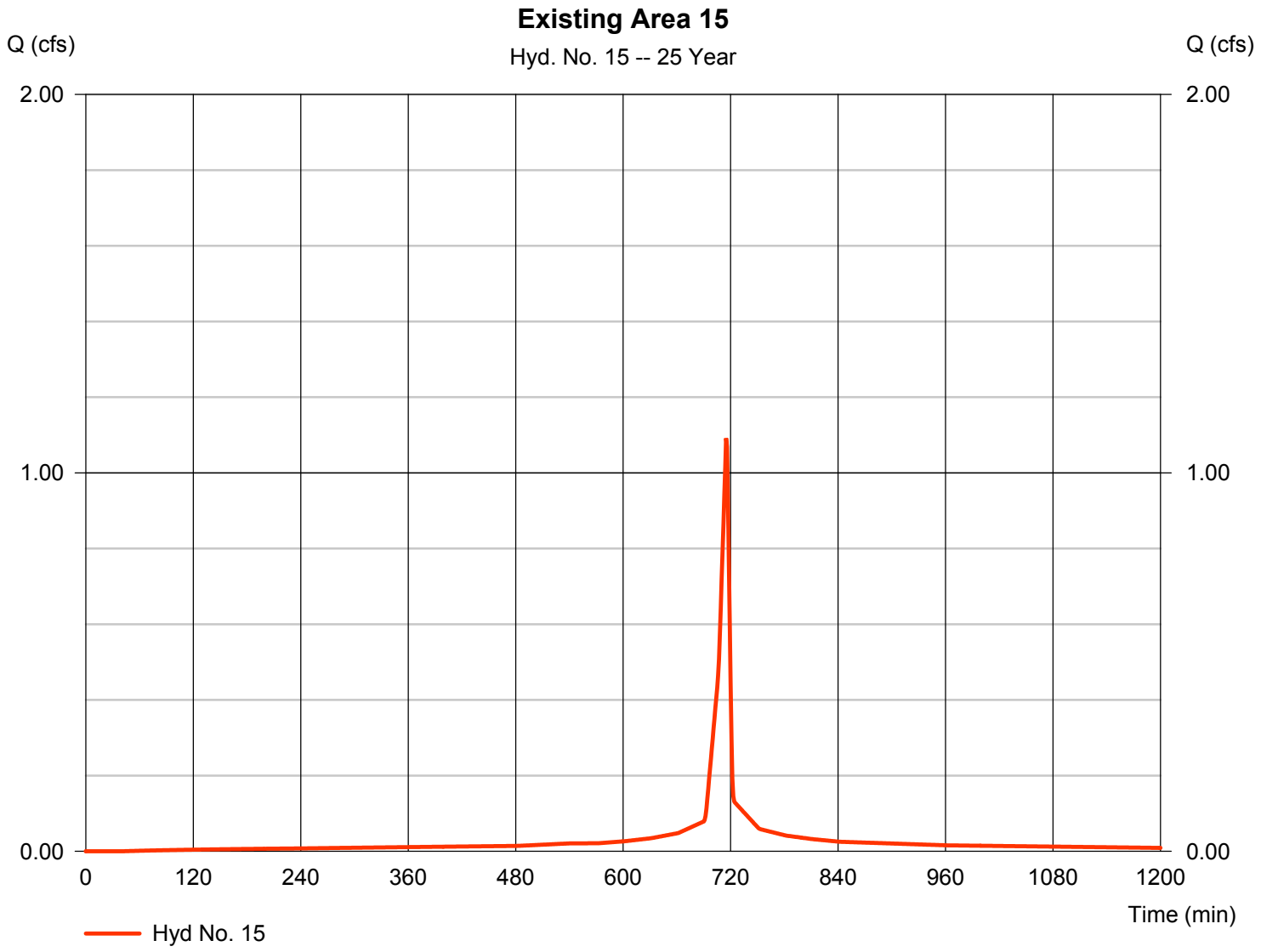
Hydrograph Report

Hyd. No. 15

Existing Area 15

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.091 cfs
Storm frequency	=	25 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	2,353 cuft
Drainage area	=	0.120 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	1.70 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.123 x 98)] / 0.120



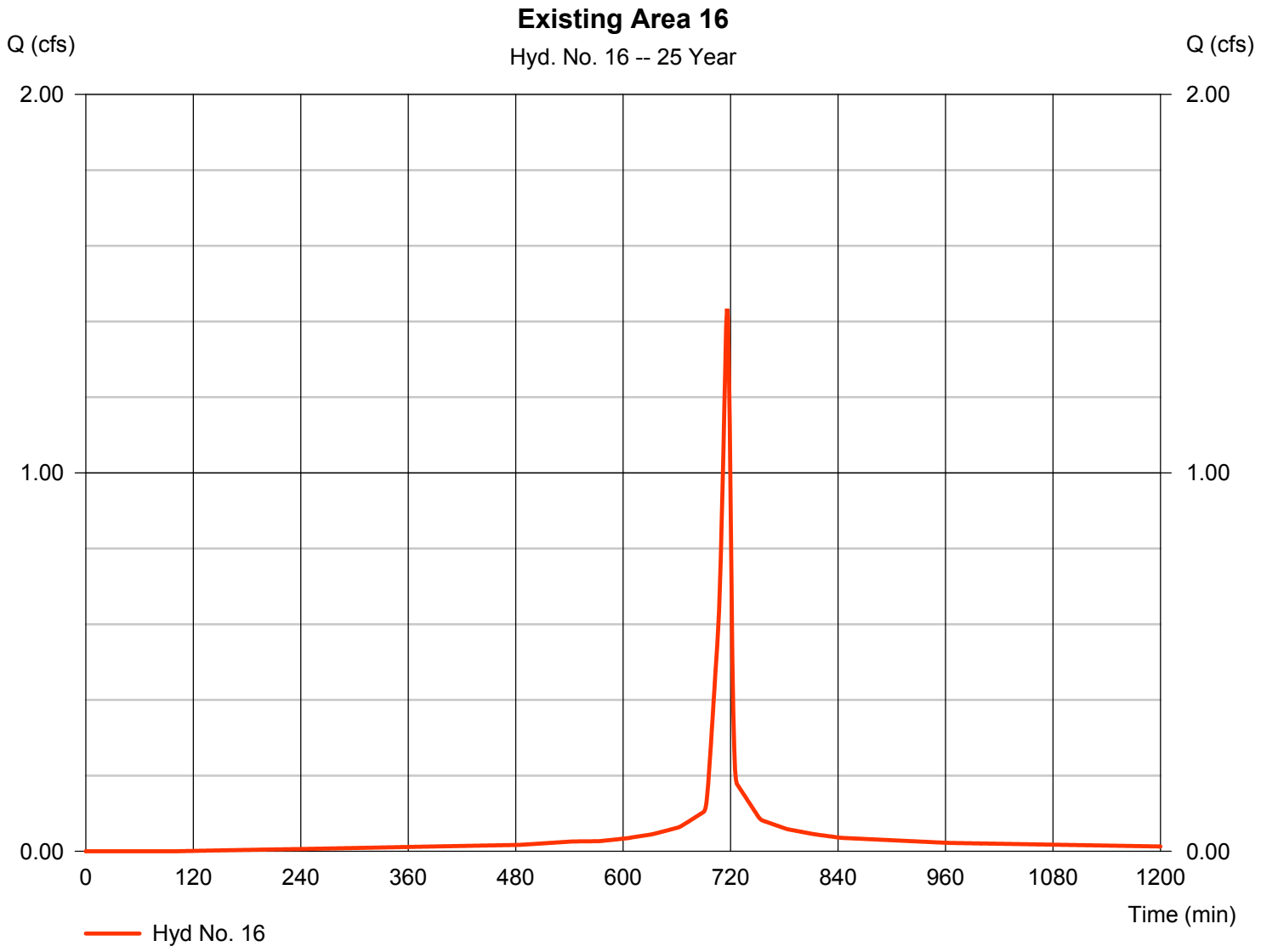
Hydrograph Report

Hyd. No. 16

Existing Area 16

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.433 cfs
Storm frequency	=	25 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	3,143 cuft
Drainage area	=	0.160 ac	Curve number	=	95*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.90 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.134 x 98) + (0.022 x 79)] / 0.160



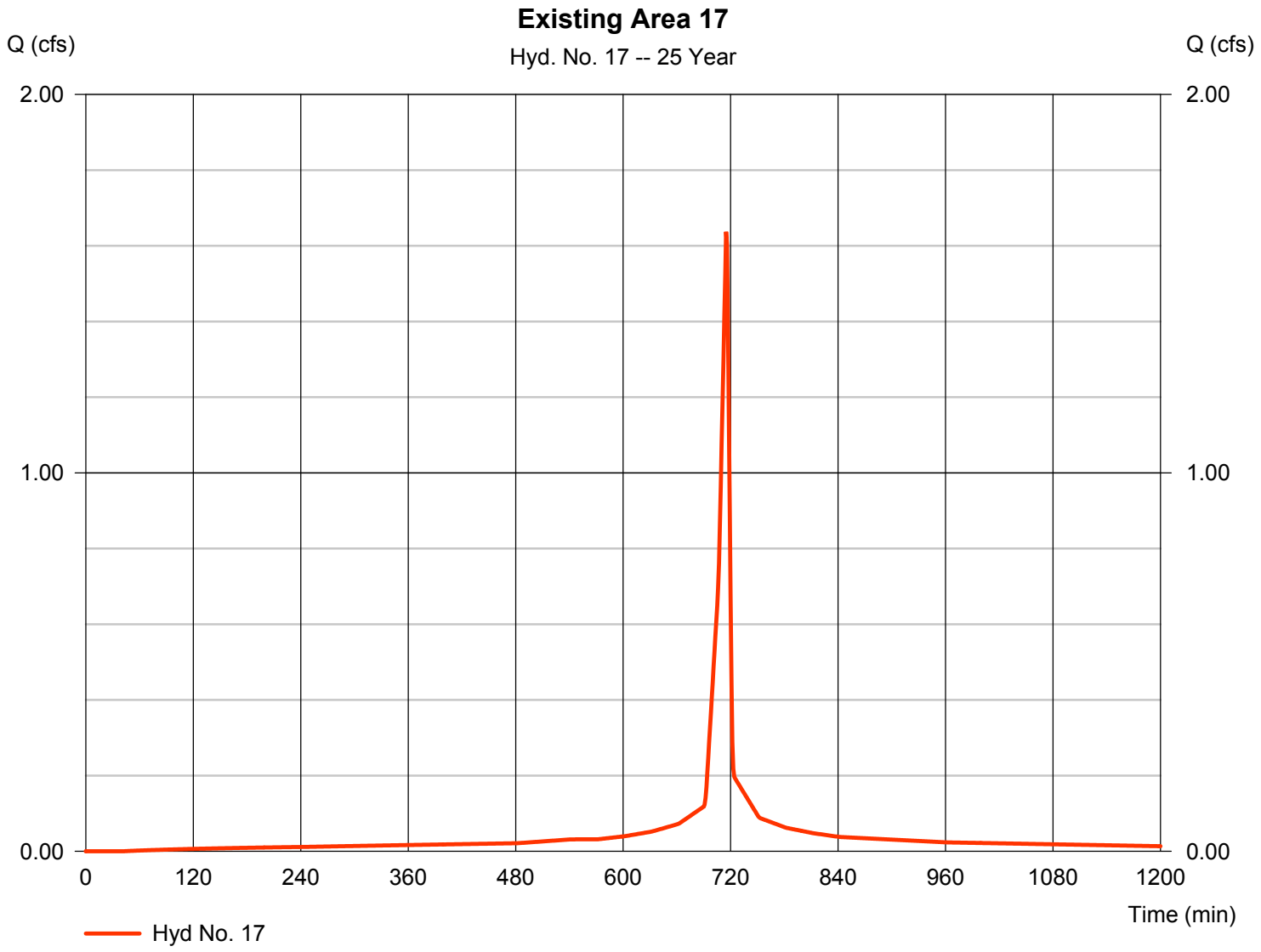
Hydrograph Report

Hyd. No. 17

Existing Area 17

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.637 cfs
Storm frequency	=	25 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	3,530 cuft
Drainage area	=	0.180 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.40 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.182 x 98)] / 0.180



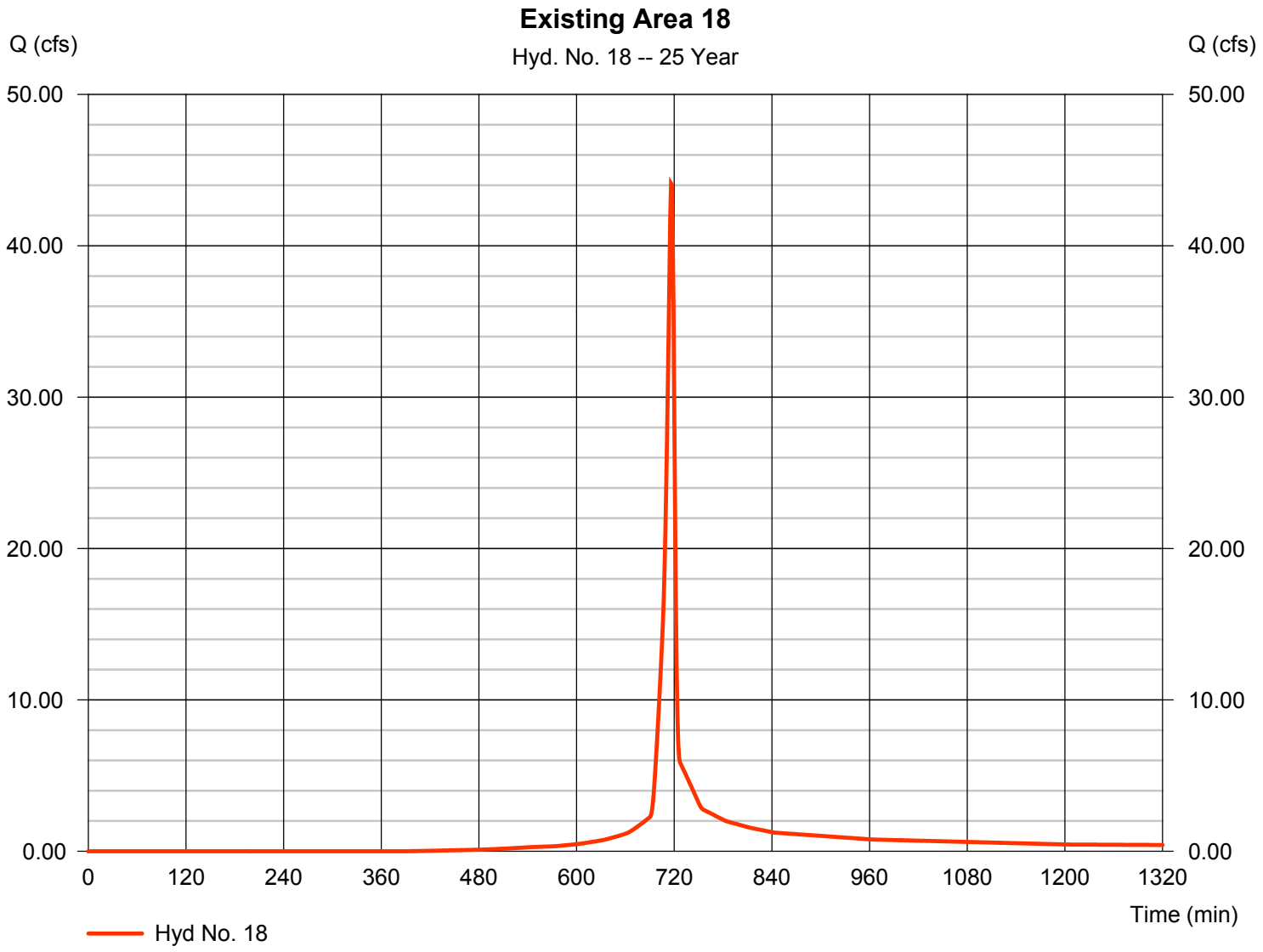
Hydrograph Report

Hyd. No. 18

Existing Area 18

Hydrograph type	=	SCS Runoff	Peak discharge	=	44.11 cfs
Storm frequency	=	25 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	85,485 cuft
Drainage area	=	6.400 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.90 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.018 x 98) + (6.379 x 79)] / 6.400



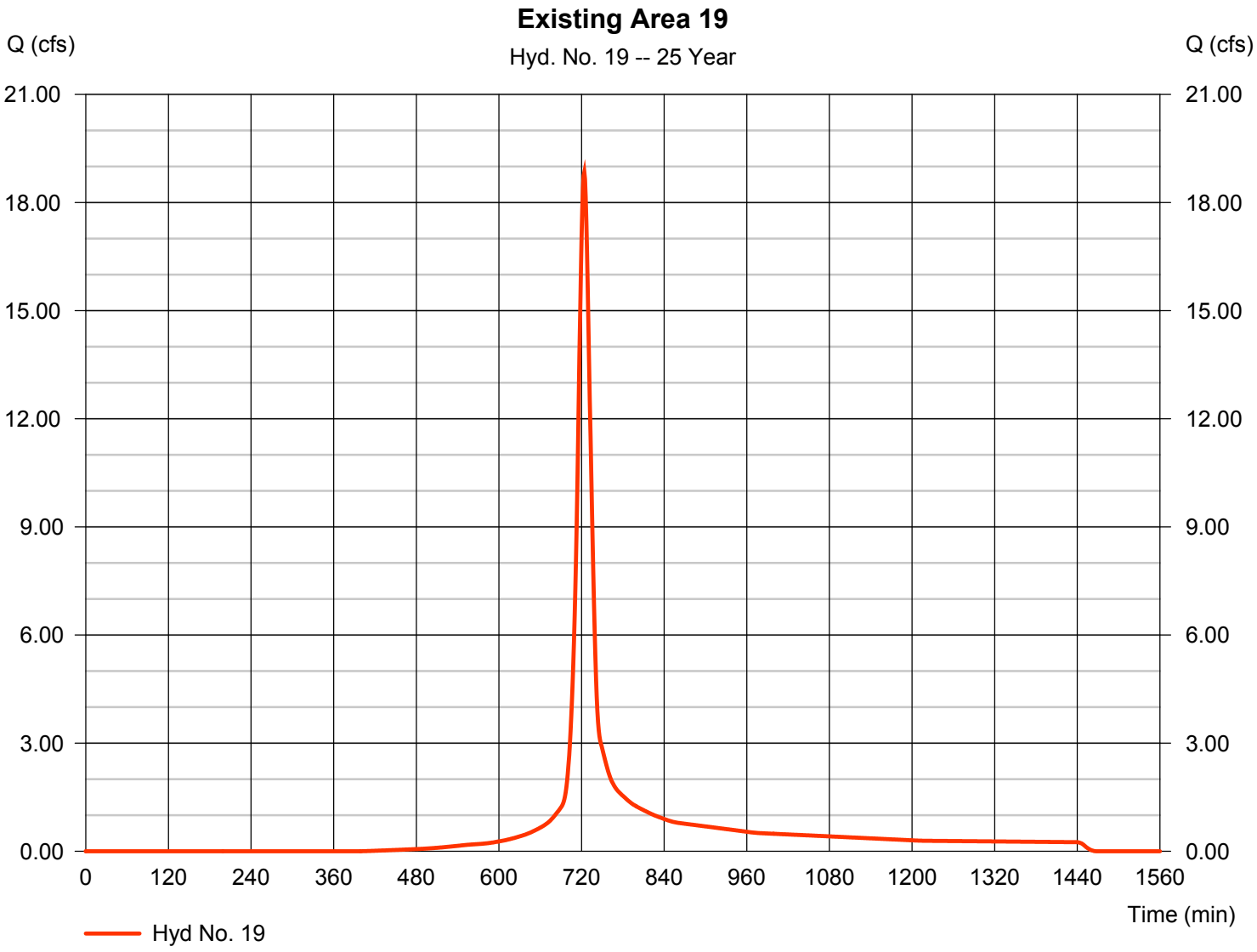
Hydrograph Report

Hyd. No. 19

Existing Area 19

Hydrograph type	=	SCS Runoff	Peak discharge	=	18.84 cfs
Storm frequency	=	25 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	55,991 cuft
Drainage area	=	4.240 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	17.40 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.036 x 98) + (4.203 x 79)] / 4.240



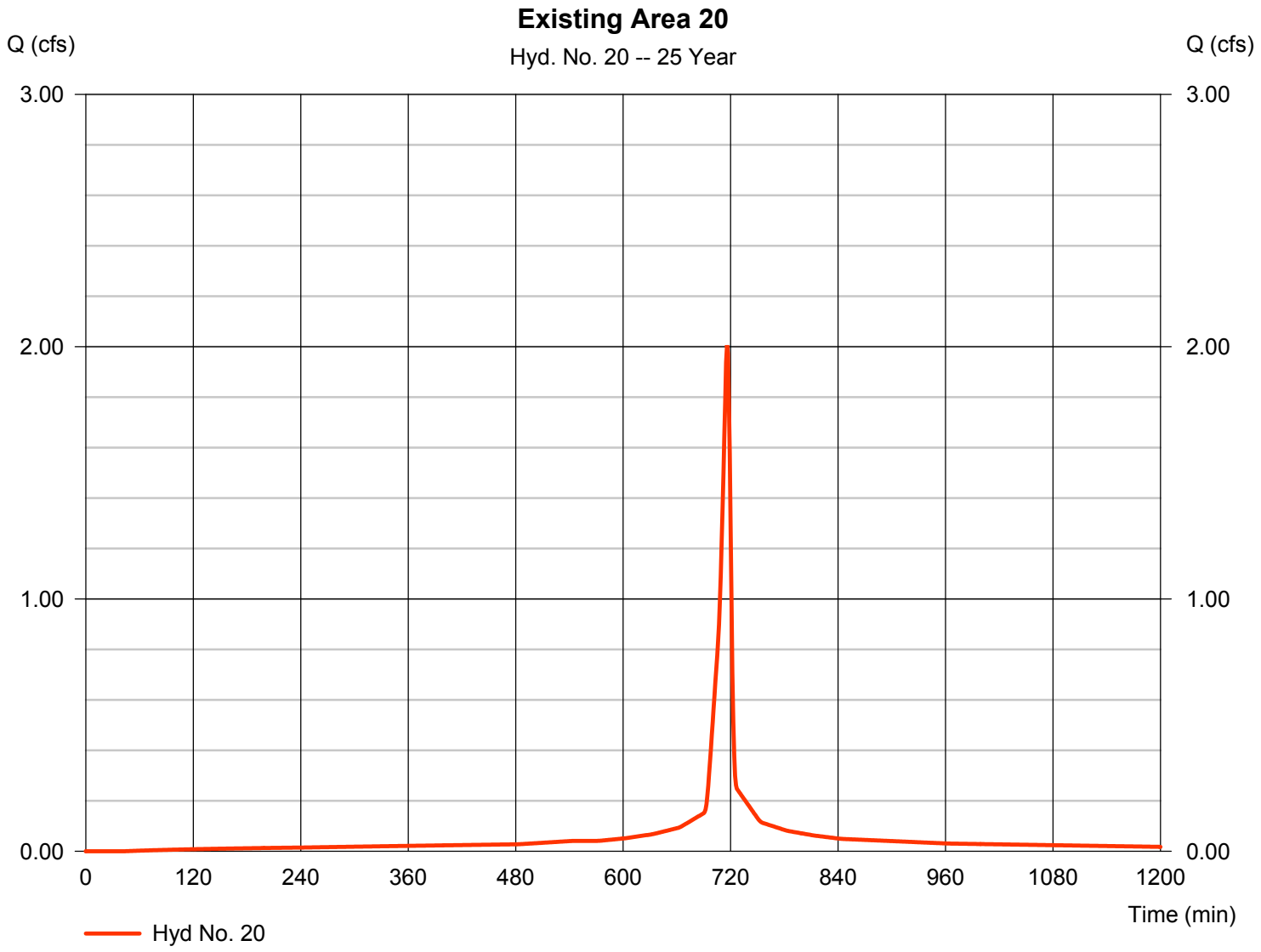
Hydrograph Report

Hyd. No. 20

Existing Area 20

Hydrograph type	= SCS Runoff	Peak discharge	= 2.006 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 4,601 cuft
Drainage area	= 0.220 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 4.70 min
Total precip.	= 6.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.220 x 98)] / 0.220



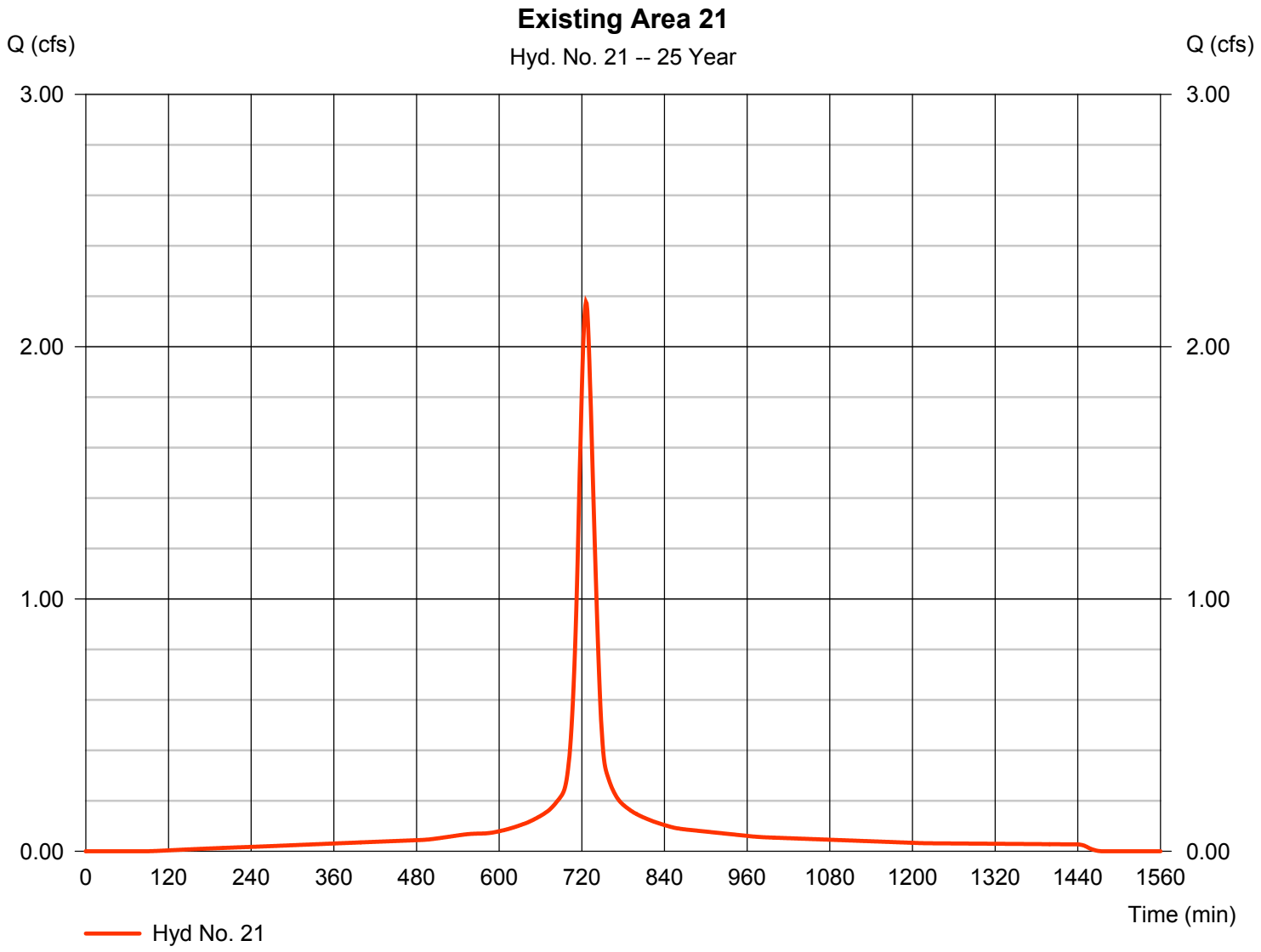
Hydrograph Report

Hyd. No. 21

Existing Area 21

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.177 cfs
Storm frequency	=	25 yrs	Time to peak	=	726 min
Time interval	=	1 min	Hyd. volume	=	8,153 cuft
Drainage area	=	0.410 ac	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	22.20 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.370 x 98) + (0.041 x 79)] / 0.410



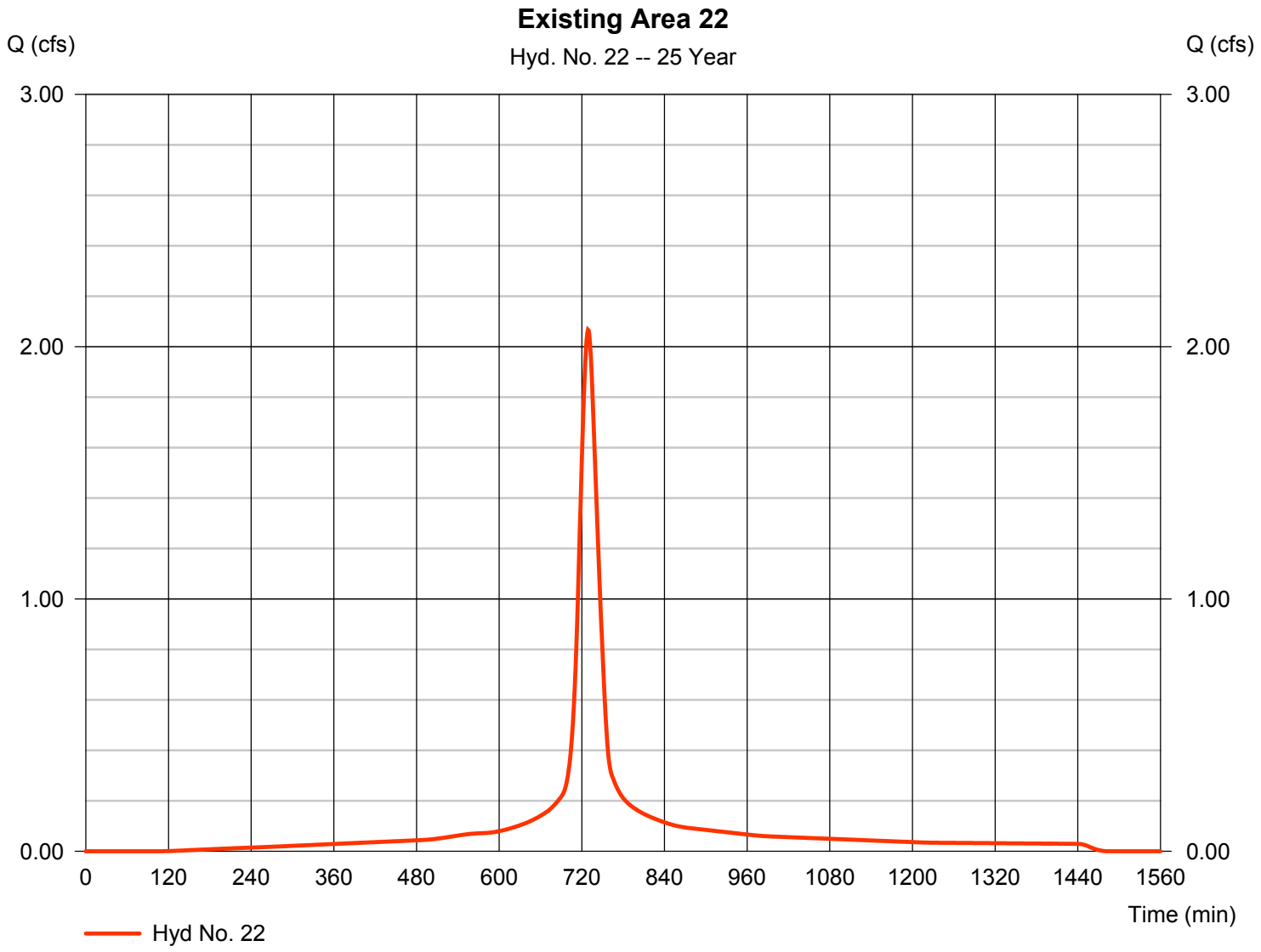
Hydrograph Report

Hyd. No. 22

Existing Area 22

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.067 cfs
Storm frequency	=	25 yrs	Time to peak	=	729 min
Time interval	=	1 min	Hyd. volume	=	8,580 cuft
Drainage area	=	0.440 ac	Curve number	=	95*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	27.80 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.382 x 98) + (0.062 x 79)] / 0.440



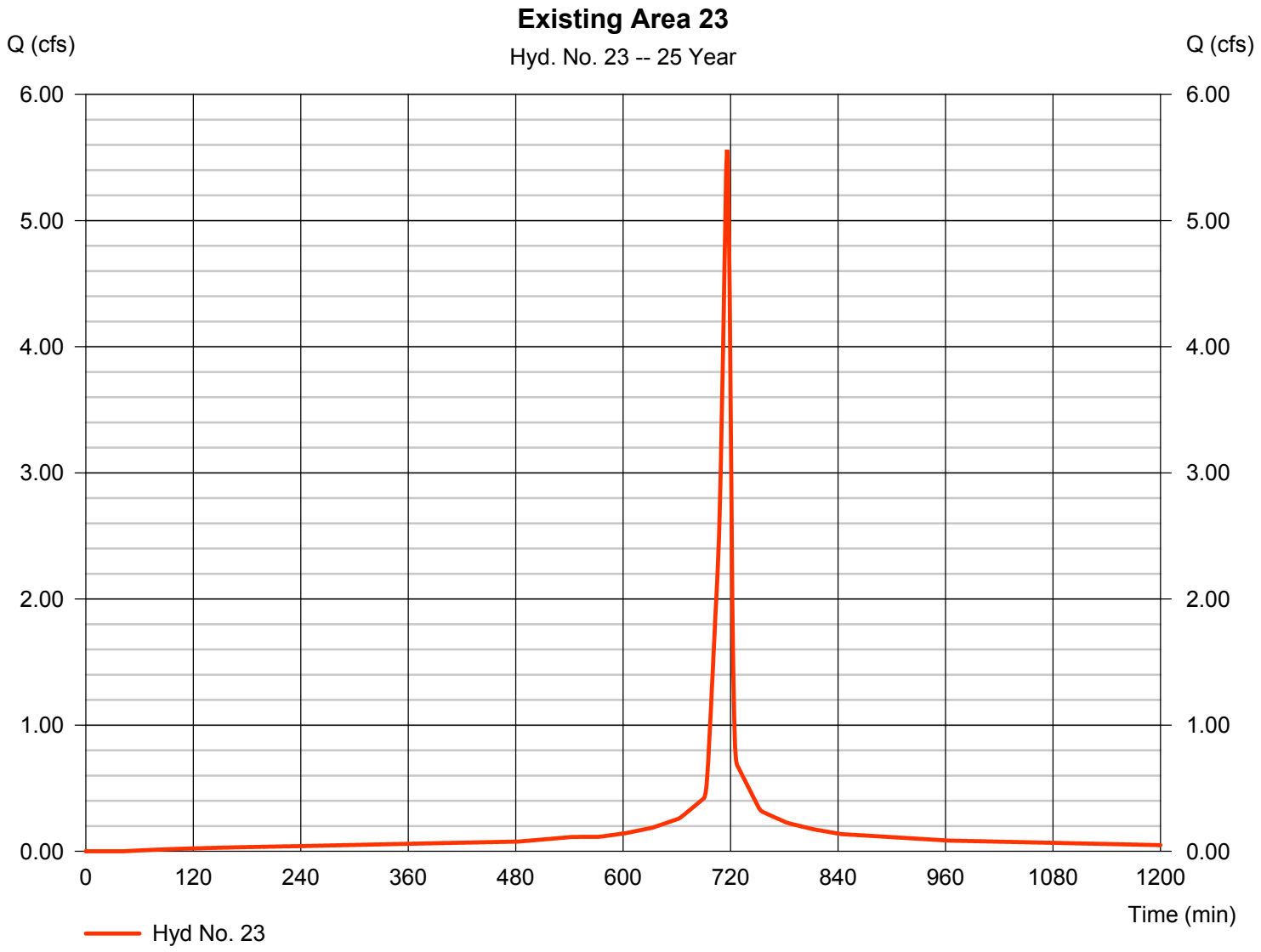
Hydrograph Report

Hyd. No. 23

Existing Area 23

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.561 cfs
Storm frequency	=	25 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	12,758 cuft
Drainage area	=	0.610 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.80 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.607 x 98)] / 0.610



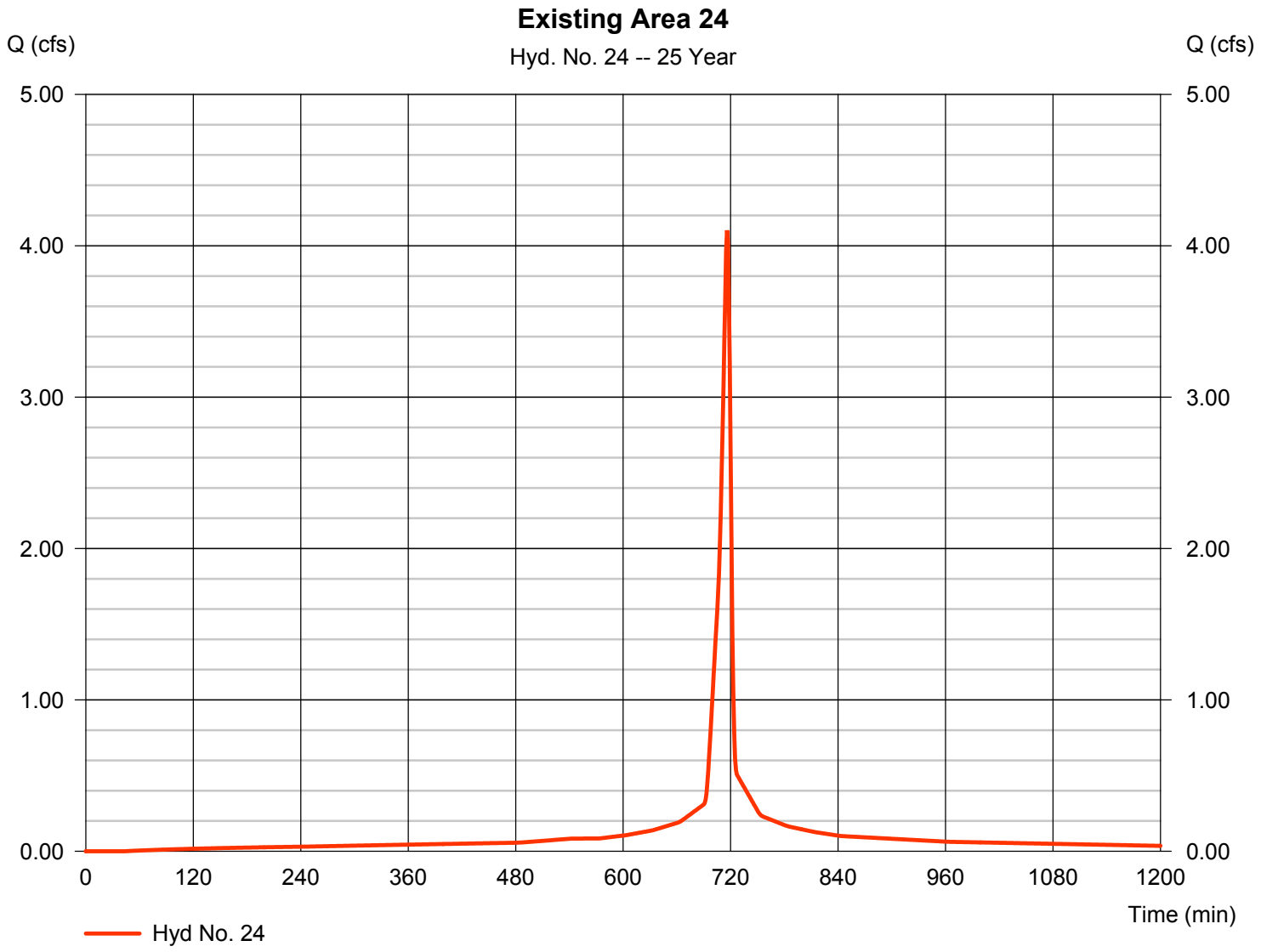
Hydrograph Report

Hyd. No. 24

Existing Area 24

Hydrograph type	= SCS Runoff	Peak discharge	= 4.103 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 9,412 cuft
Drainage area	= 0.450 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.90 min
Total precip.	= 6.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.450 x 98)] / 0.450



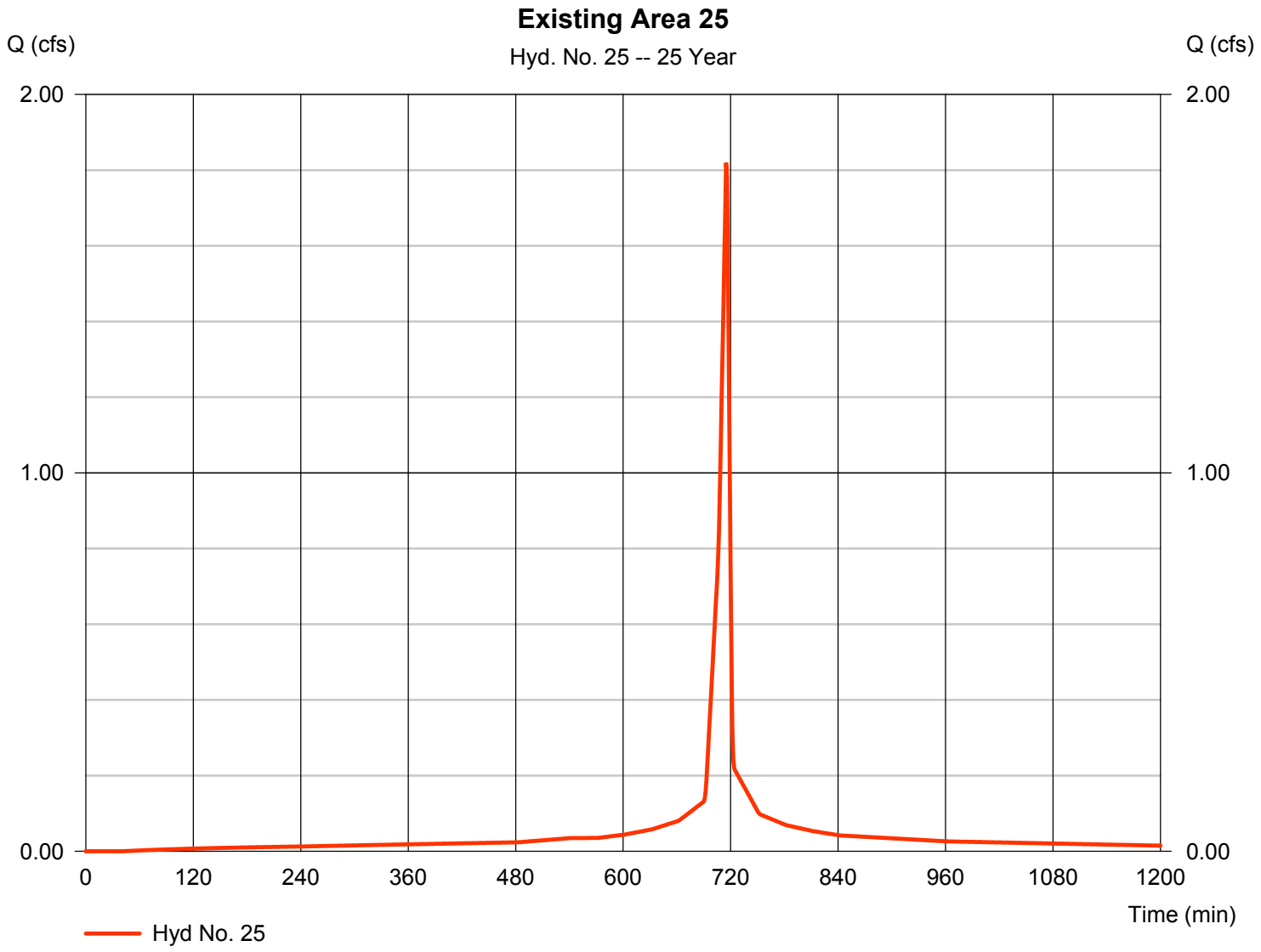
Hydrograph Report

Hyd. No. 25

Existing Area 25

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.819 cfs
Storm frequency	=	25 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	3,922 cuft
Drainage area	=	0.200 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	1.60 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.203 x 98)] / 0.200



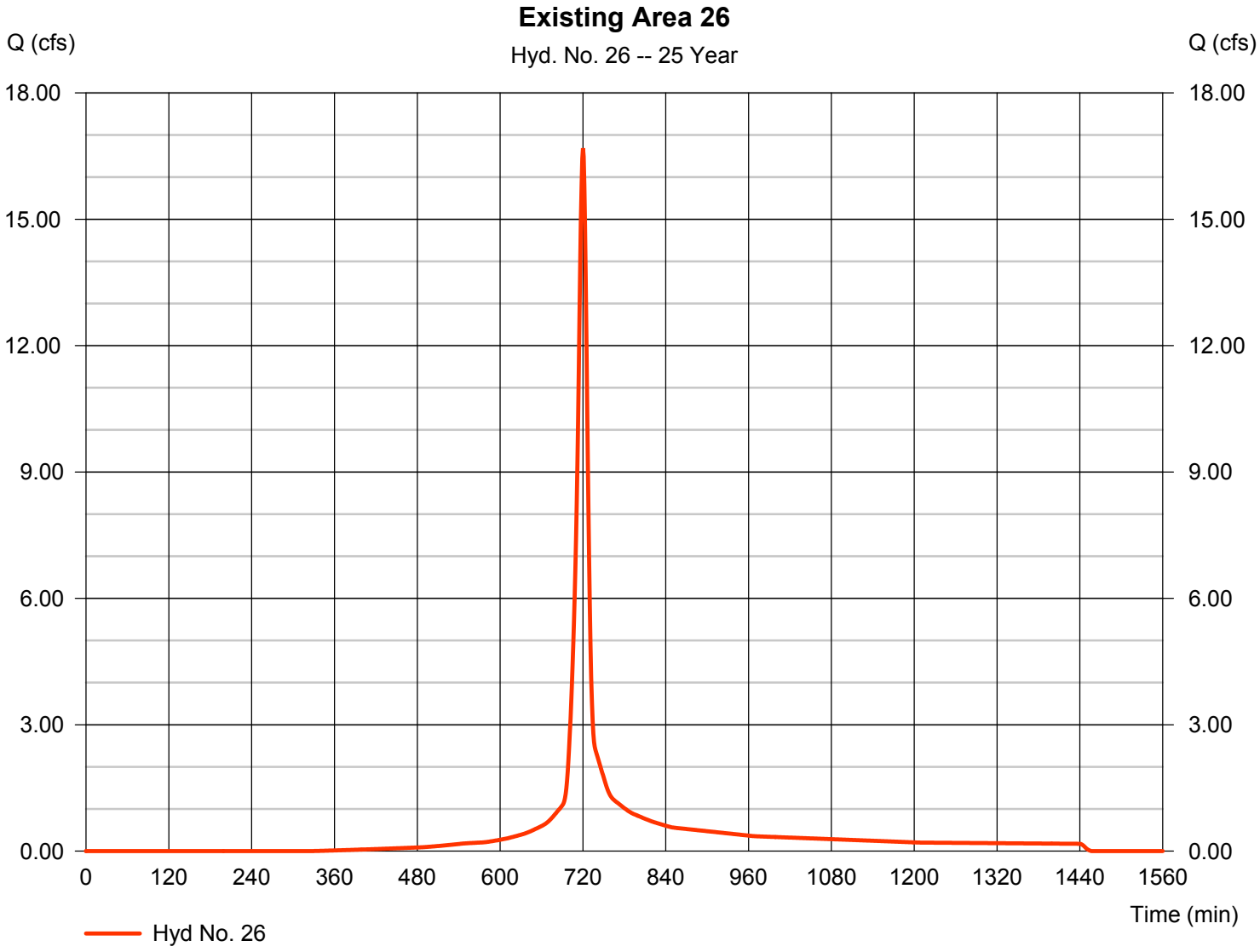
Hydrograph Report

Hyd. No. 26

Existing Area 26

Hydrograph type	=	SCS Runoff	Peak discharge	=	16.69 cfs
Storm frequency	=	25 yrs	Time to peak	=	720 min
Time interval	=	1 min	Hyd. volume	=	41,269 cuft
Drainage area	=	2.730 ac	Curve number	=	83*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	10.40 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.626 x 98) + (2.102 x 79)] / 2.730



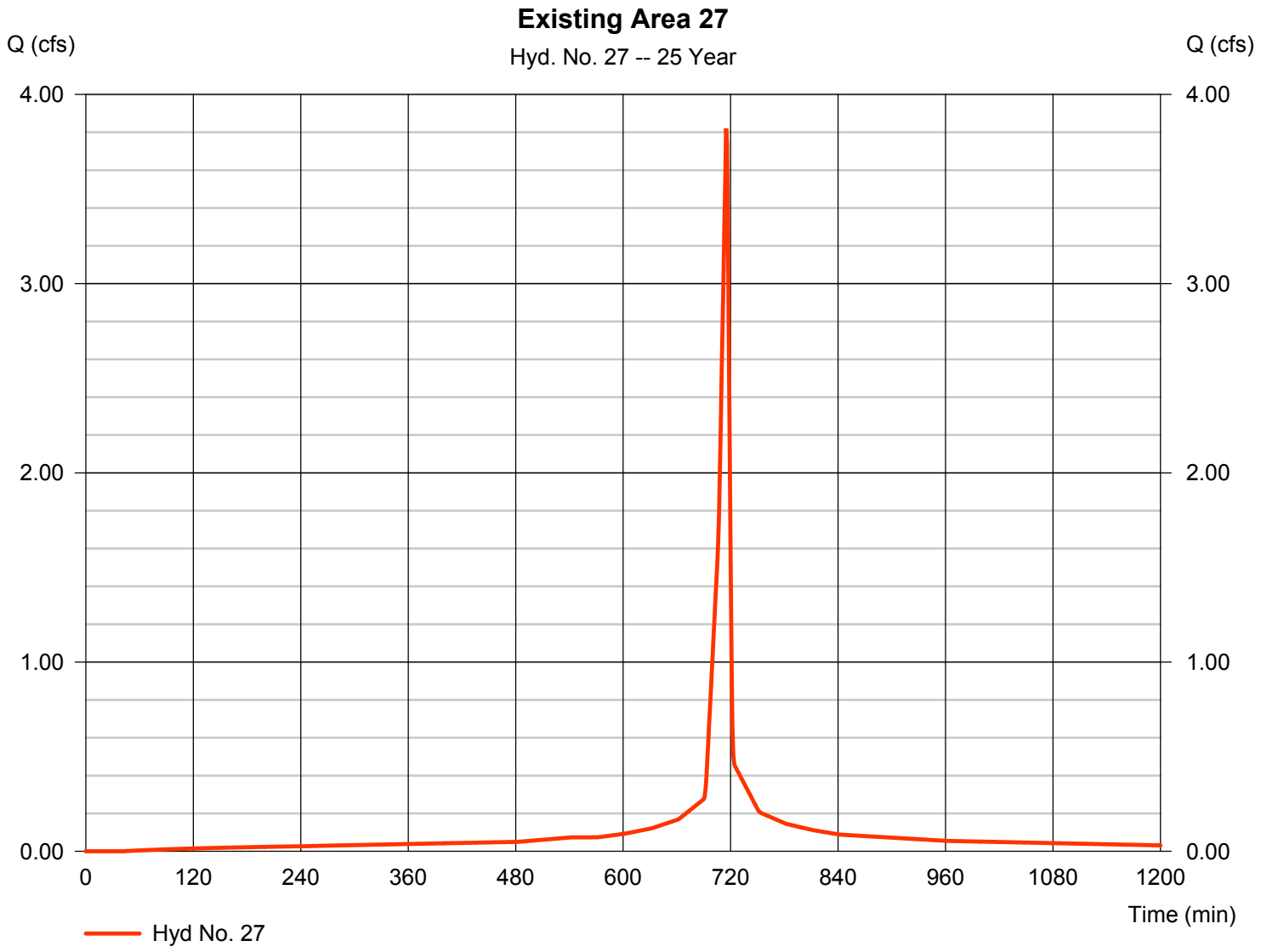
Hydrograph Report

Hyd. No. 27

Existing Area 27

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.820 cfs
Storm frequency	=	25 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	8,235 cuft
Drainage area	=	0.420 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.00 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.420 x 98)] / 0.420



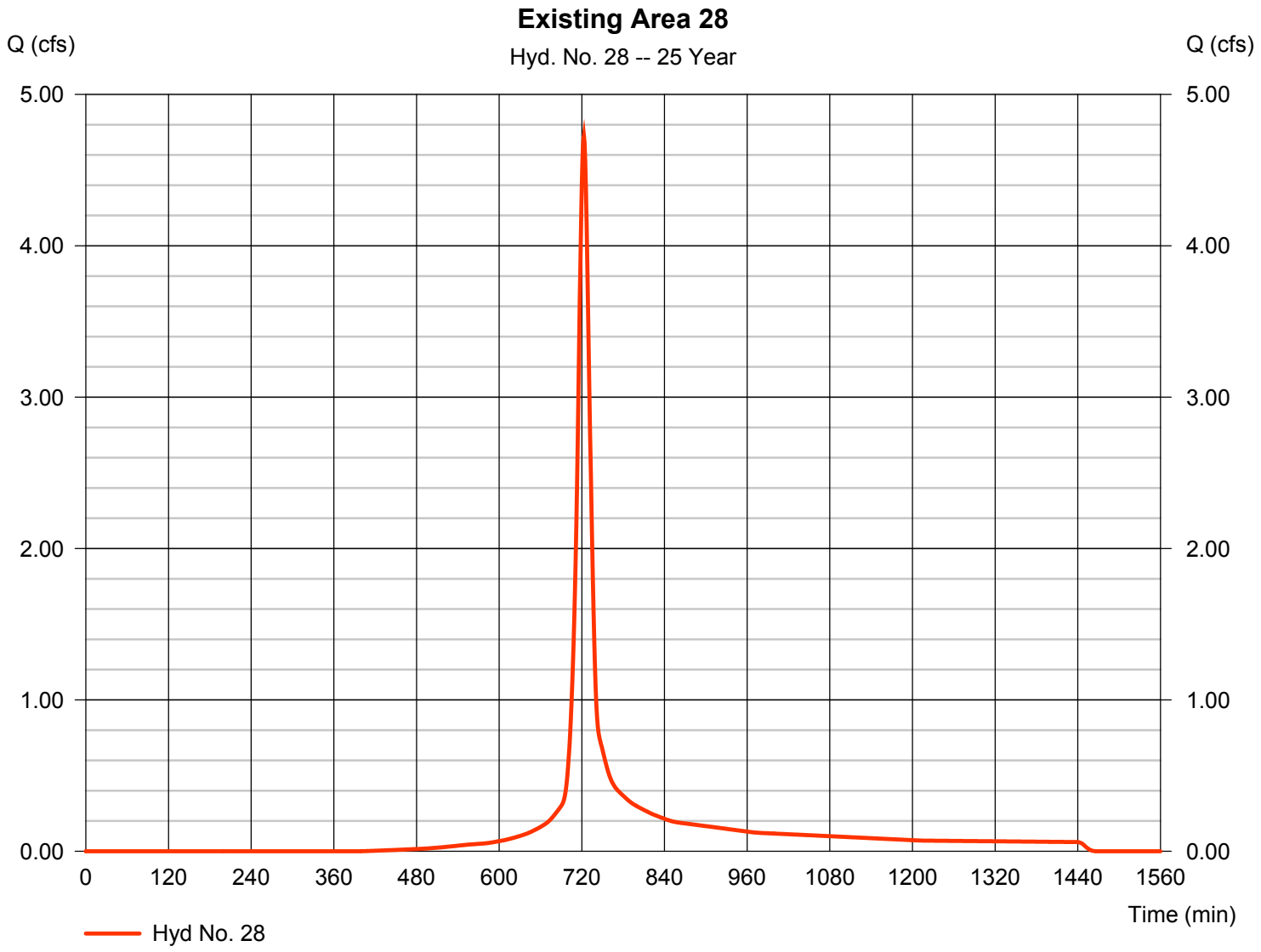
Hydrograph Report

Hyd. No. 28

Existing Area 28

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.724 cfs
Storm frequency	=	25 yrs	Time to peak	=	723 min
Time interval	=	1 min	Hyd. volume	=	13,524 cuft
Drainage area	=	1.000 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	15.50 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.004 x 98) + (0.996 x 79)] / 1.000



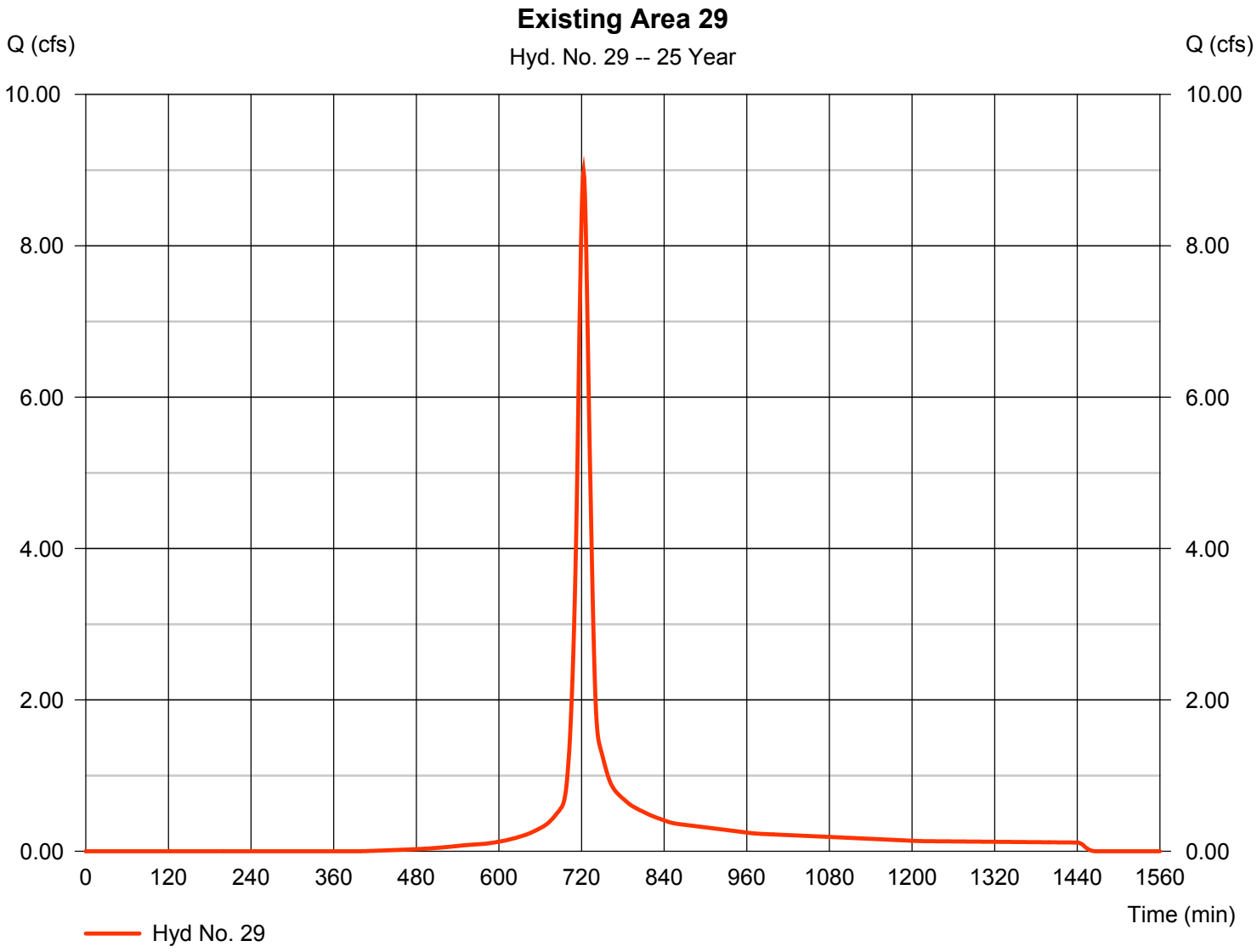
Hydrograph Report

Hyd. No. 29

Existing Area 29

Hydrograph type	=	SCS Runoff	Peak discharge	=	8.975 cfs
Storm frequency	=	25 yrs	Time to peak	=	723 min
Time interval	=	1 min	Hyd. volume	=	25,696 cuft
Drainage area	=	1.900 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	15.70 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.049 x 98) + (1.850 x 79)] / 1.900



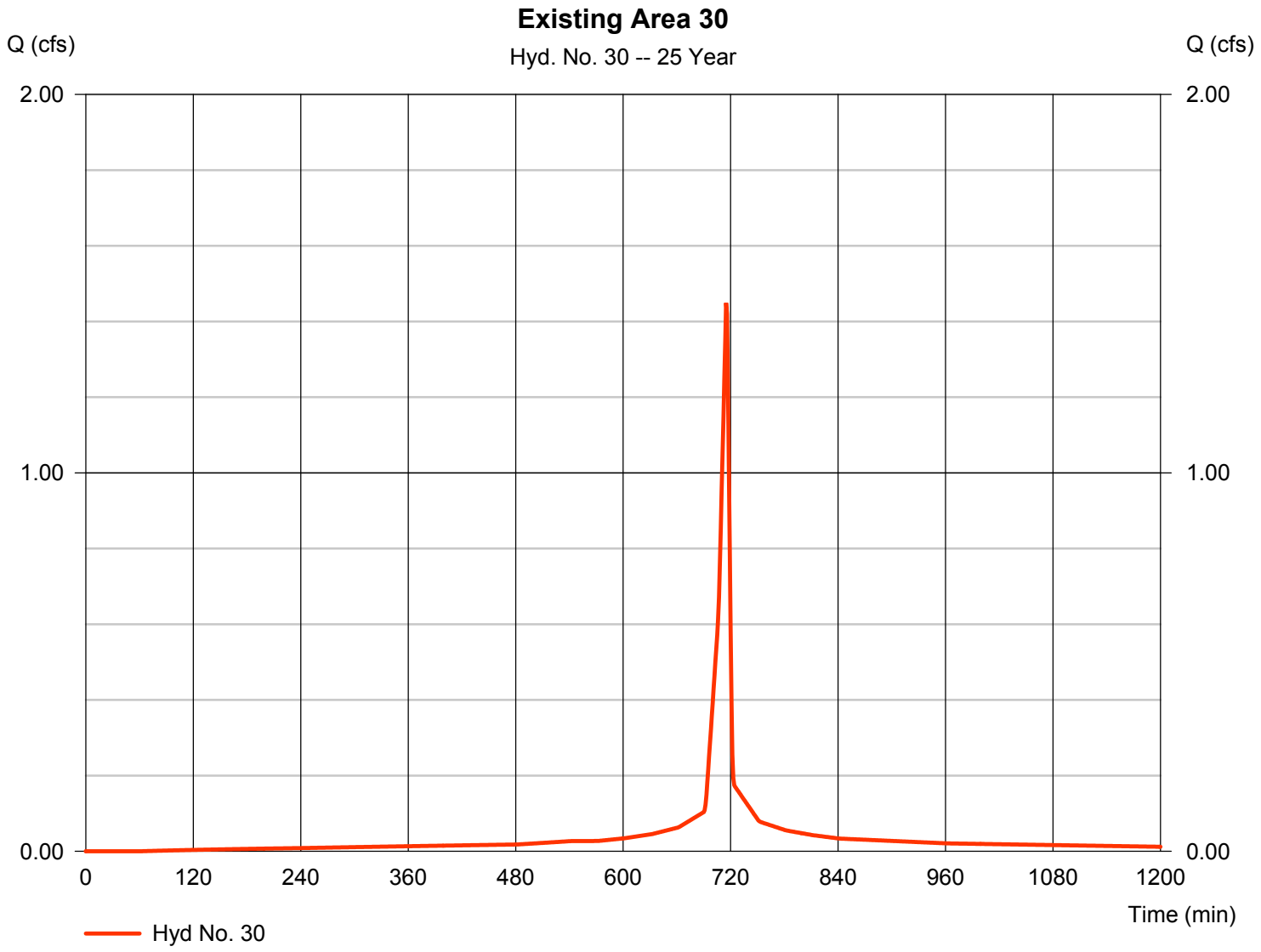
Hydrograph Report

Hyd. No. 30

Existing Area 30

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.449 cfs
Storm frequency	=	25 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	3,073 cuft
Drainage area	=	0.160 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.20 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.150 x 98) + (0.008 x 79)] / 0.160



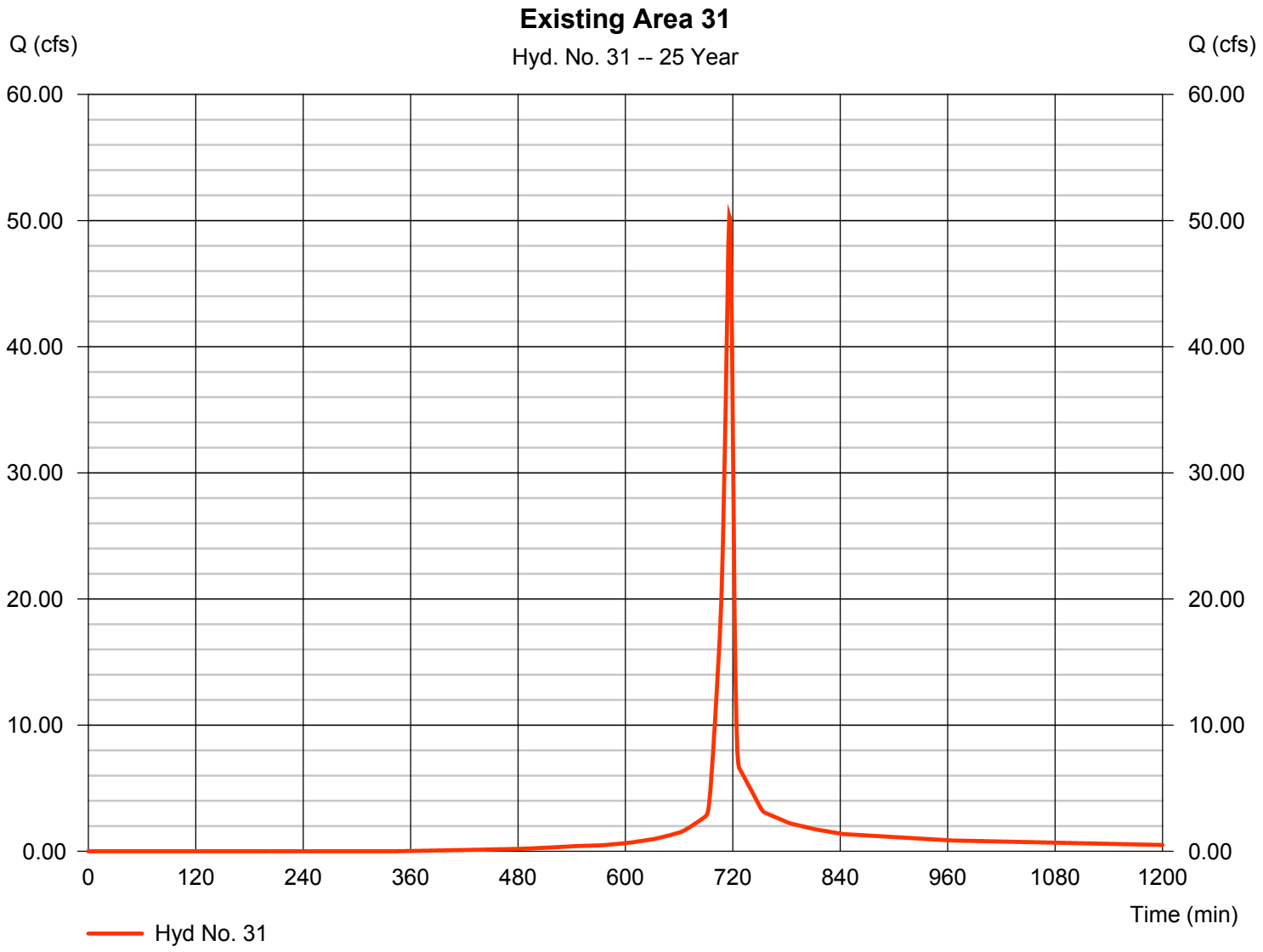
Hydrograph Report

Hyd. No. 31

Existing Area 31

Hydrograph type	= SCS Runoff	Peak discharge	= 50.35 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 98,852 cuft
Drainage area	= 6.830 ac	Curve number	= 82*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 4.80 min
Total precip.	= 6.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.950 x 98) + (5.879 x 79)] / 6.830

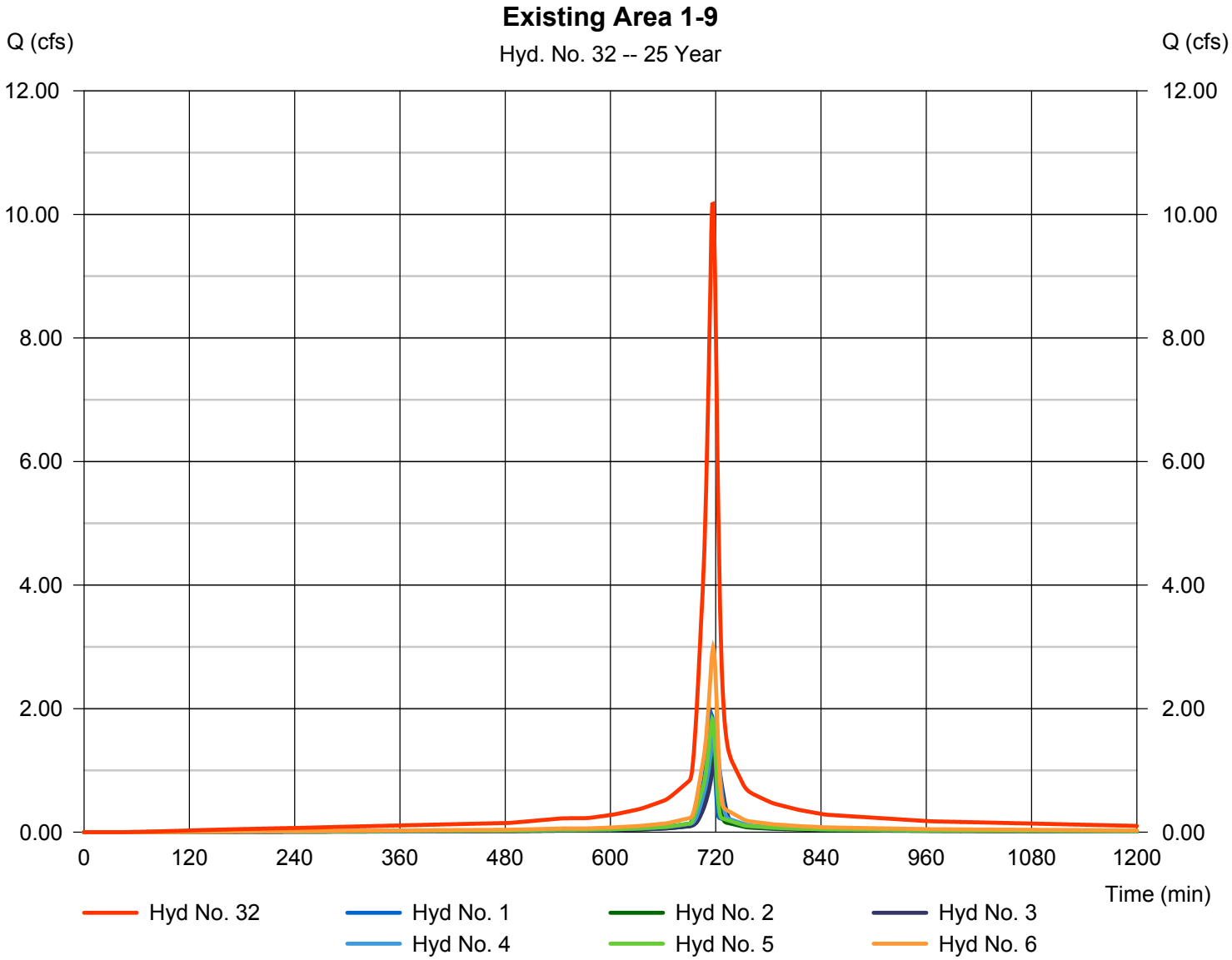


Hydrograph Report

Hyd. No. 32

Existing Area 1-9

Hydrograph type	= Combine	Peak discharge	= 10.17 cfs
Storm frequency	= 25 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 25,922 cuft
Inflow hyds.	= 1, 2, 3, 4, 5, 6	Contrib. drain. area	= 1.280 ac

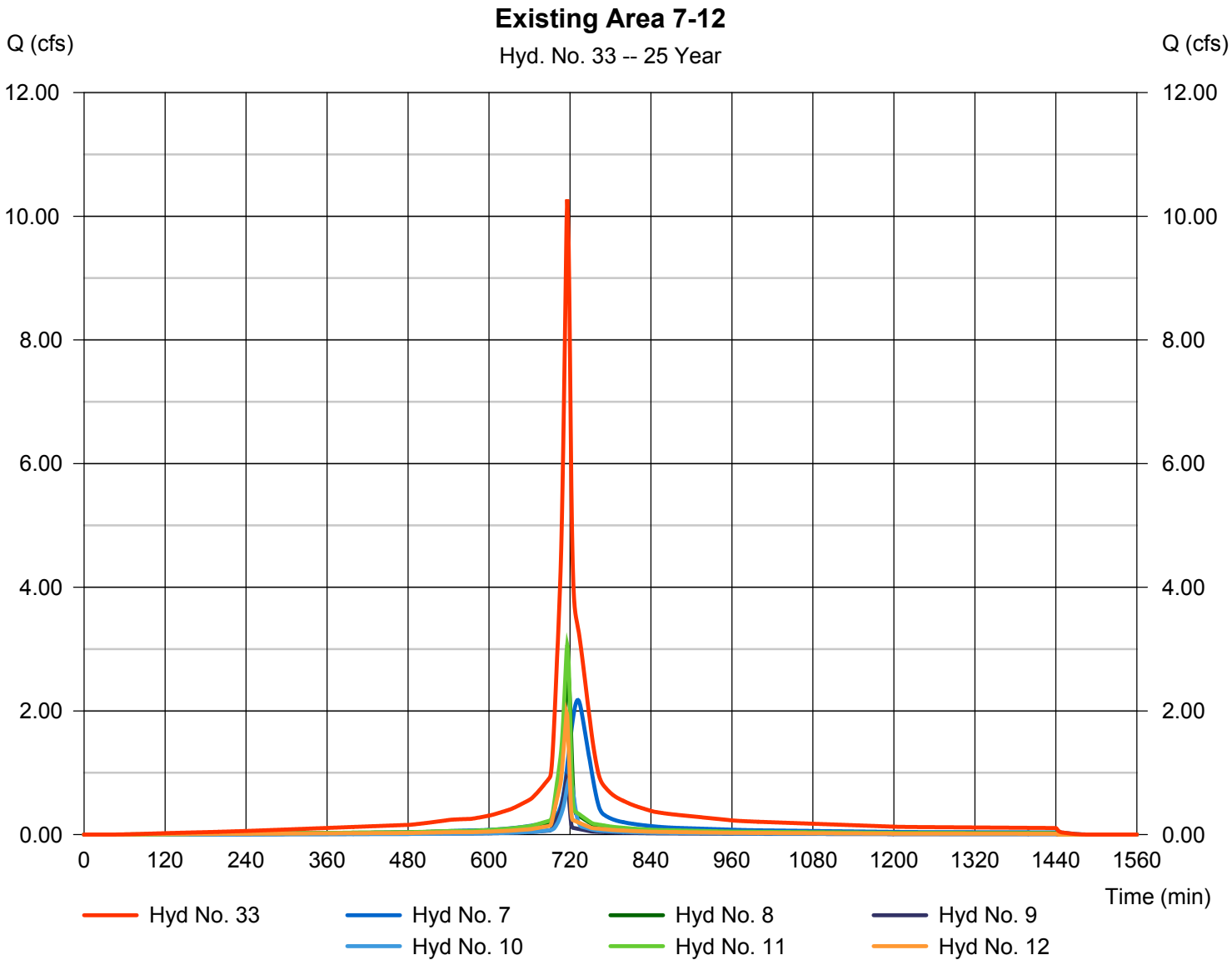


Hydrograph Report

Hyd. No. 33

Existing Area 7-12

Hydrograph type	= Combine	Peak discharge	= 10.27 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 30,957 cuft
Inflow hyds.	= 7, 8, 9, 10, 11, 12	Contrib. drain. area	= 1.597 ac

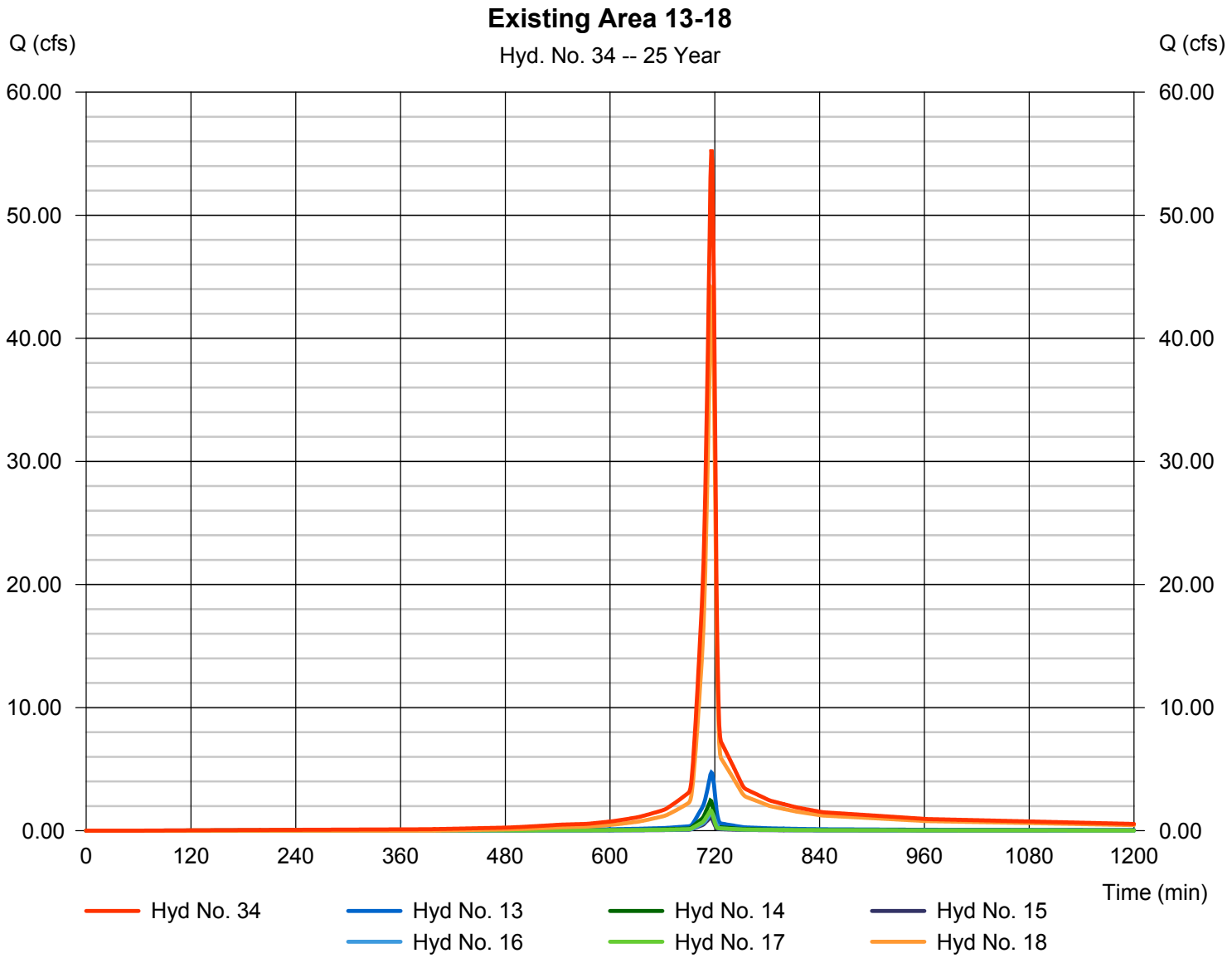


Hydrograph Report

Hyd. No. 34

Existing Area 13-18

Hydrograph type	= Combine	Peak discharge	= 55.33 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 110,351 cuft
Inflow hyds.	= 13, 14, 15, 16, 17, 18	Contrib. drain. area	= 7.650 ac

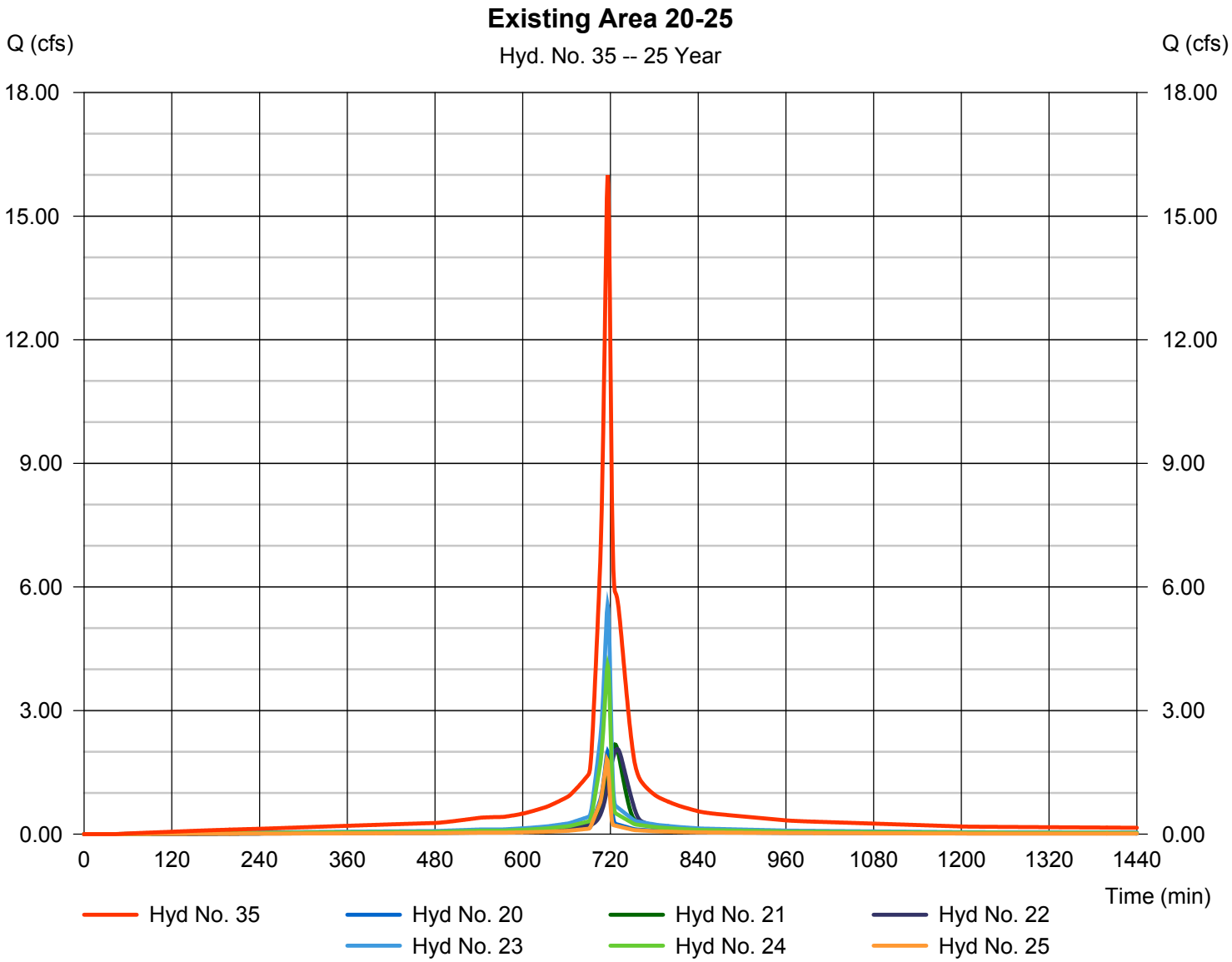


Hydrograph Report

Hyd. No. 35

Existing Area 20-25

Hydrograph type	= Combine	Peak discharge	= 16.00 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 47,426 cuft
Inflow hyds.	= 20, 21, 22, 23, 24, 25	Contrib. drain. area	= 2.330 ac

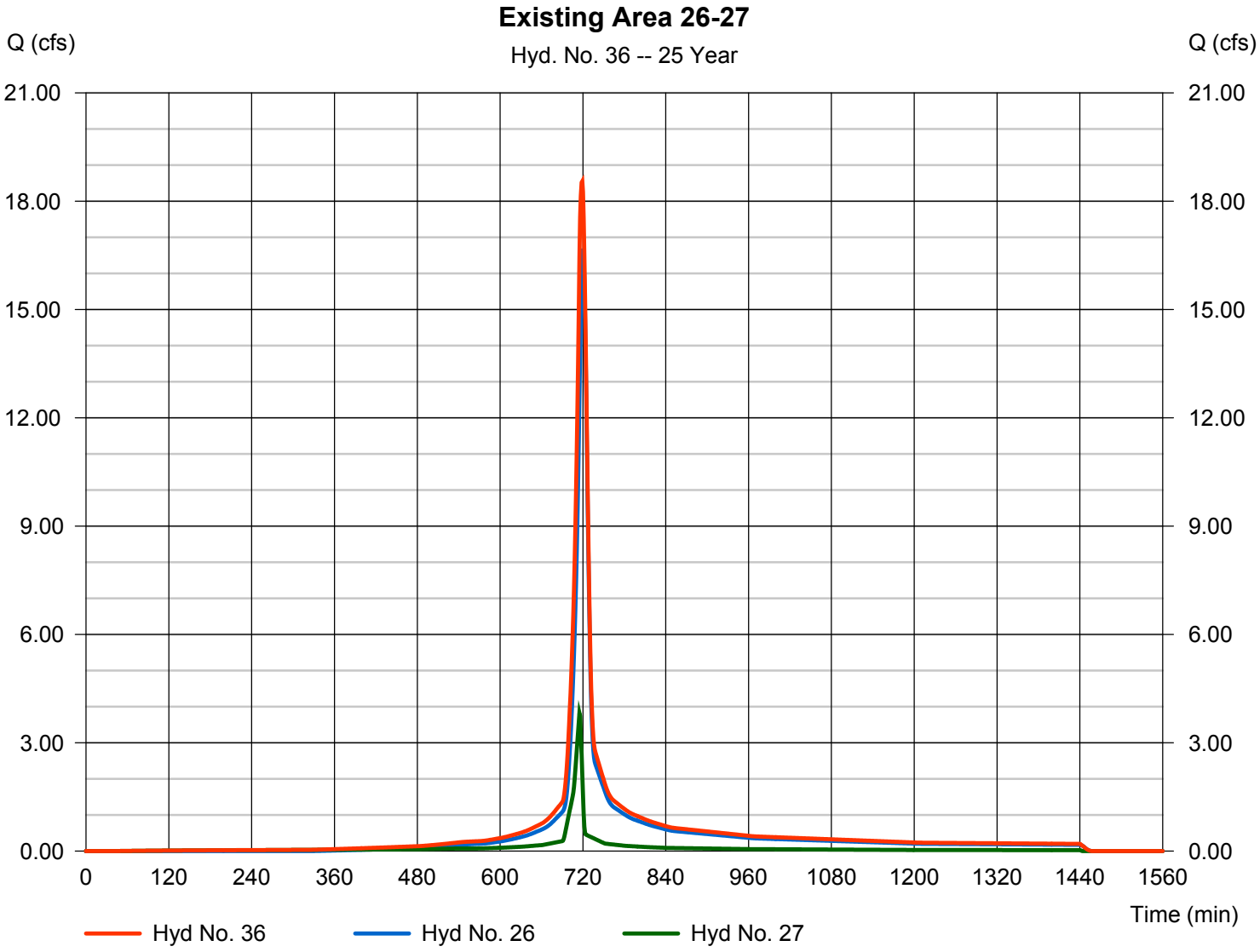


Hydrograph Report

Hyd. No. 36

Existing Area 26-27

Hydrograph type	=	Combine	Peak discharge	=	18.55 cfs
Storm frequency	=	25 yrs	Time to peak	=	719 min
Time interval	=	1 min	Hyd. volume	=	49,505 cuft
Inflow hyds.	=	26, 27	Contrib. drain. area	=	3.150 ac

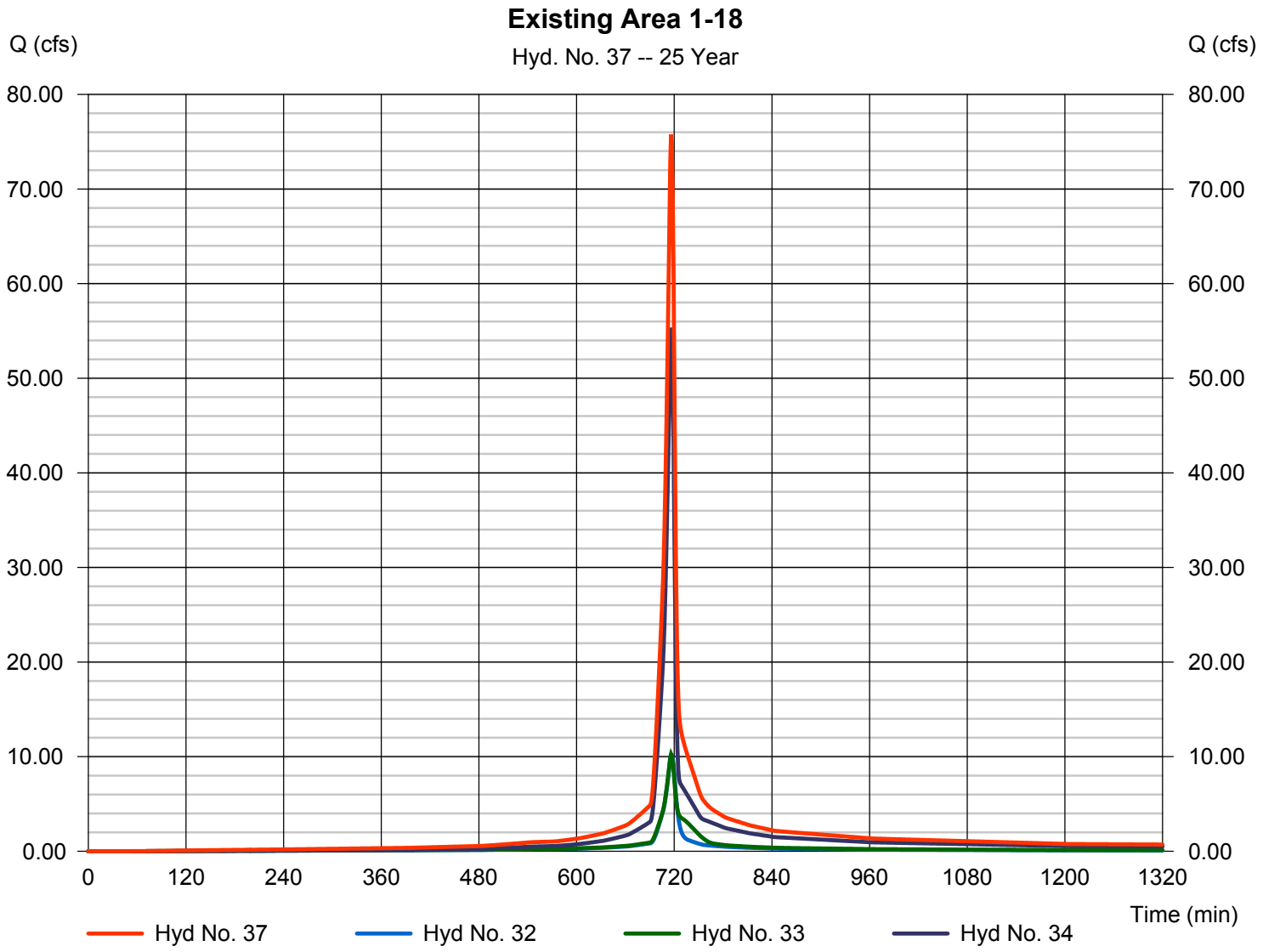


Hydrograph Report

Hyd. No. 37

Existing Area 1-18

Hydrograph type	= Combine	Peak discharge	= 75.77 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 167,230 cuft
Inflow hyds.	= 32, 33, 34	Contrib. drain. area	= 0.000 ac

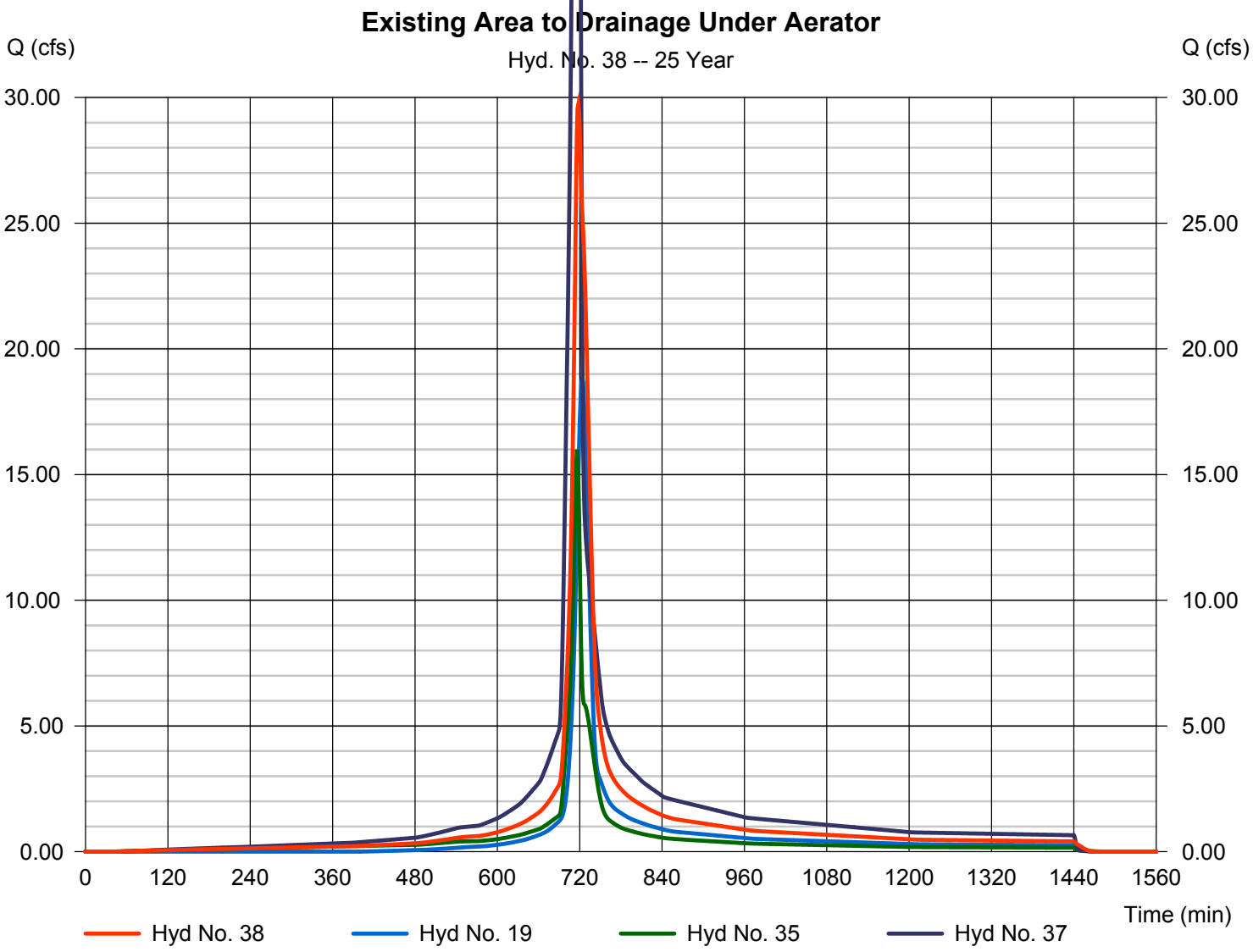


Hydrograph Report

Hyd. No. 38

Existing Area to Drainage Under Aerator

Hydrograph type	= Combine	Peak discharge	= 29.73 cfs
Storm frequency	= 25 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 103,417 cuft
Inflow hyds.	= 19, 35, 37	Contrib. drain. area	= 4.240 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	2.391	1	715	5,189	------	------	------	Existing Area 1
2	SCS Runoff	1.513	1	718	3,791	------	------	------	Existing Area 2
3	SCS Runoff	1.463	1	721	4,194	------	------	------	Existing Area 3
4	SCS Runoff	2.048	1	719	5,444	------	------	------	Existing Area 4
5	SCS Runoff	2.282	1	716	5,271	------	------	------	Existing Area 5
6	SCS Runoff	3.754	1	717	8,938	------	------	------	Existing Area 6
7	SCS Runoff	2.785	1	732	12,219	------	------	------	Existing Area 7
8	SCS Runoff	3.215	1	717	7,752	------	------	------	Existing Area 8
9	SCS Runoff	1.138	1	715	2,471	------	------	------	Existing Area 9
10	SCS Runoff	1.168	1	720	3,089	------	------	------	Existing Area 10
11	SCS Runoff	3.853	1	716	8,667	------	------	------	Existing Area 11
12	SCS Runoff	2.466	1	715	5,352	------	------	------	Existing Area 12
13	SCS Runoff	5.917	1	716	13,480	------	------	------	Existing Area 13
14	SCS Runoff	3.065	1	715	6,562	------	------	------	Existing Area 14
15	SCS Runoff	1.366	1	715	2,965	------	------	------	Existing Area 15
16	SCS Runoff	1.804	1	716	4,009	------	------	------	Existing Area 16
17	SCS Runoff	2.049	1	715	4,448	------	------	------	Existing Area 17
18	SCS Runoff	59.55	1	716	117,186	------	------	------	Existing Area 18
19	SCS Runoff	25.60	1	724	76,753	------	------	------	Existing Area 19
20	SCS Runoff	2.510	1	716	5,798	------	------	------	Existing Area 20
21	SCS Runoff	2.737	1	726	10,358	------	------	------	Existing Area 21
22	SCS Runoff	2.607	1	729	10,945	------	------	------	Existing Area 22
23	SCS Runoff	6.961	1	716	16,077	------	------	------	Existing Area 23
24	SCS Runoff	5.135	1	716	11,860	------	------	------	Existing Area 24
25	SCS Runoff	2.277	1	715	4,942	------	------	------	Existing Area 25
26	SCS Runoff	22.12	1	720	55,490	------	------	------	Existing Area 26
27	SCS Runoff	4.781	1	715	10,378	------	------	------	Existing Area 27
28	SCS Runoff	6.419	1	723	18,539	------	------	------	Existing Area 28
29	SCS Runoff	12.20	1	723	35,224	------	------	------	Existing Area 29
30	SCS Runoff	1.816	1	715	3,888	------	------	------	Existing Area 30
31	SCS Runoff	66.87	1	716	133,545	------	------	------	Existing Area 31
32	Combine	12.76	1	717	32,826	1, 2, 3,	------	------	Existing Area 1-9
33	Combine	12.94	1	716	39,550	4, 5, 6, 7, 8, 9,	------	------	Existing Area 7-12
34	Combine	73.62	1	716	148,649	10, 11, 12, 13, 14, 15, 16, 17, 18,	------	------	Existing Area 13-18

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
35	Combine	20.05	1	716	59,980	20, 21, 22, 23, 24, 25, 26, 27,	------	------	Existing Area 20-25
36	Combine	24.48	1	719	65,868		------	------	Existing Area 26-27
37	Combine	99.32	1	716	221,025	32, 33, 34,	------	------	Existing Area 1-18
38	Combine	168.23	1	716	430,798	19, 35, 37	------	------	Existing Area to Drainage Under Aera

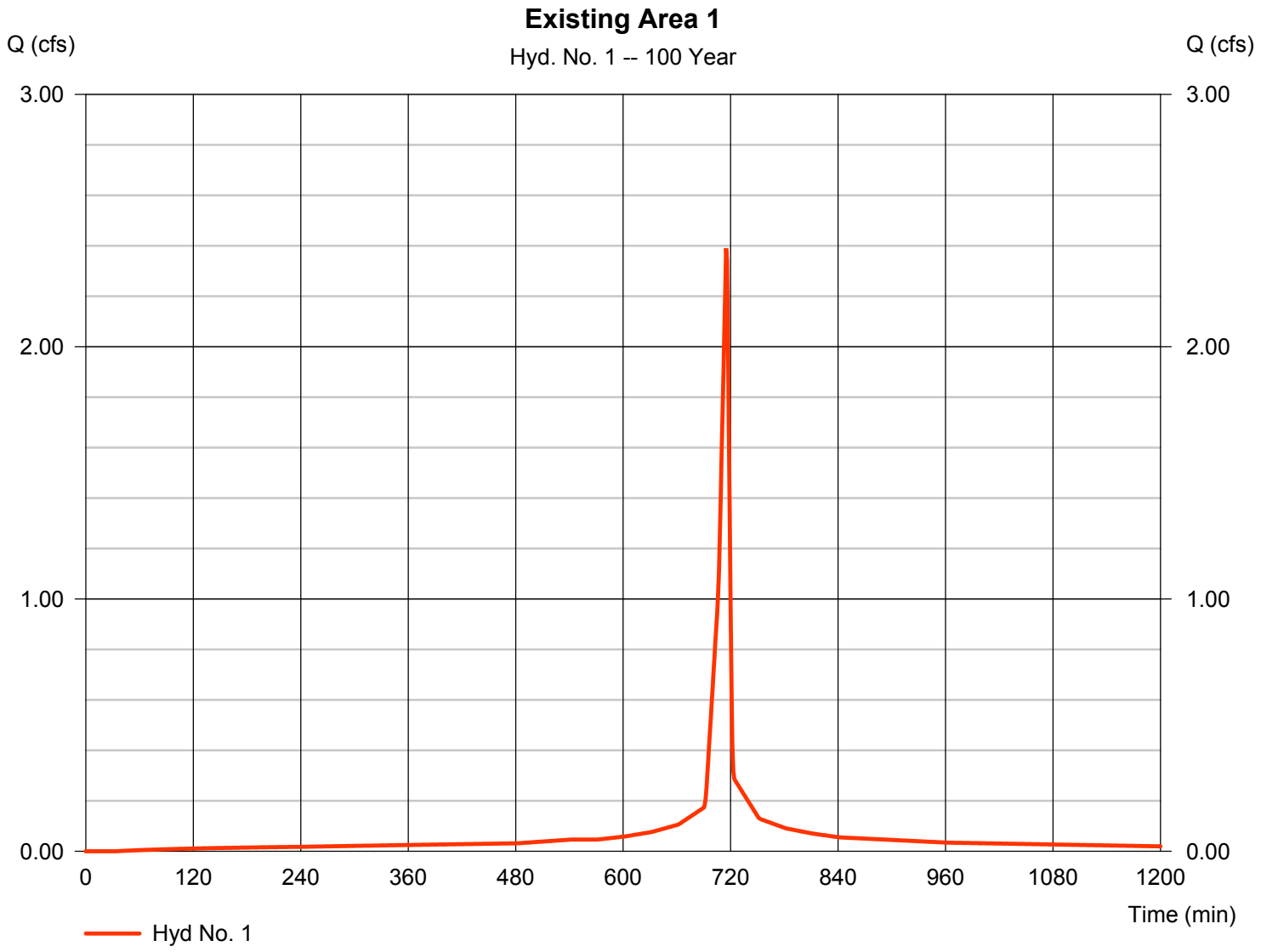
Hydrograph Report

Hyd. No. 1

Existing Area 1

Hydrograph type	= SCS Runoff	Peak discharge	= 2.391 cfs
Storm frequency	= 100 yrs	Time to peak	= 715 min
Time interval	= 1 min	Hyd. volume	= 5,189 cuft
Drainage area	= 0.210 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.20 min
Total precip.	= 7.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.210 x 98)] / 0.210



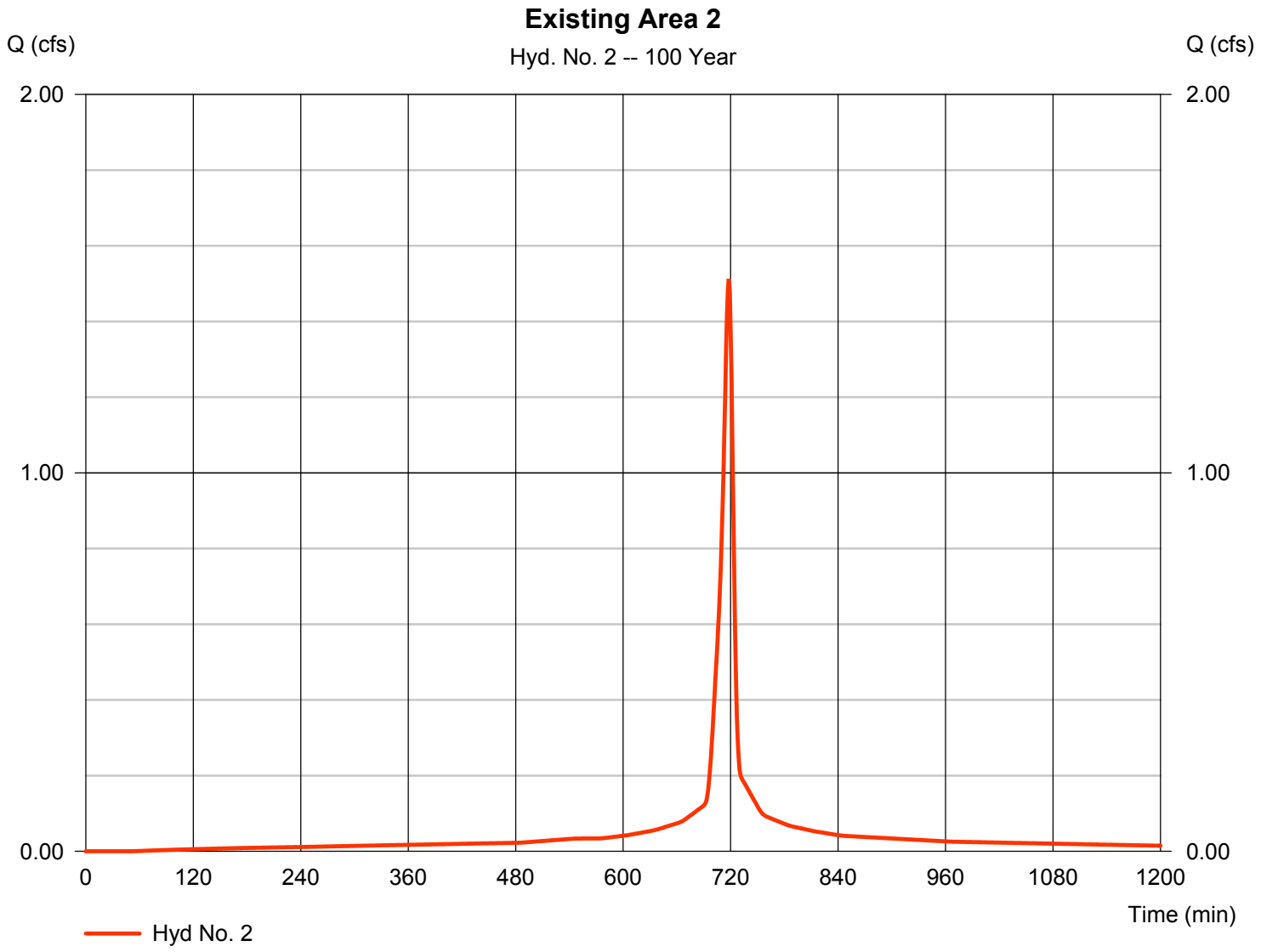
Hydrograph Report

Hyd. No. 2

Existing Area 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.513 cfs
Storm frequency	=	100 yrs	Time to peak	=	718 min
Time interval	=	1 min	Hyd. volume	=	3,791 cuft
Drainage area	=	0.150 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	6.90 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.150 x 97)] / 0.150



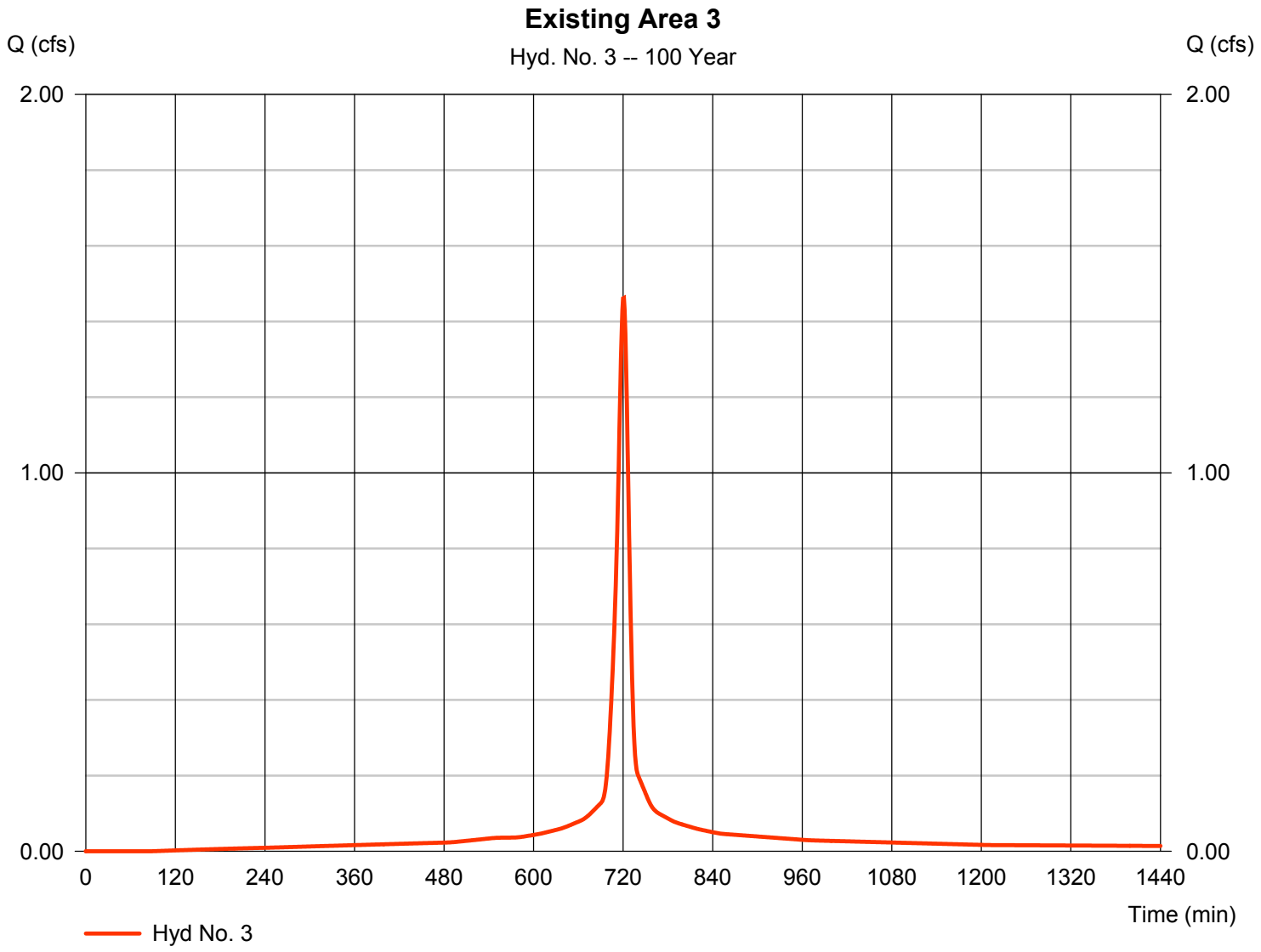
Hydrograph Report

Hyd. No. 3

Existing Area 3

Hydrograph type	= SCS Runoff	Peak discharge	= 1.463 cfs
Storm frequency	= 100 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyd. volume	= 4,194 cuft
Drainage area	= 0.170 ac	Curve number	= 95*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 13.10 min
Total precip.	= 7.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.143 x 98) + (0.030 x 79)] / 0.170



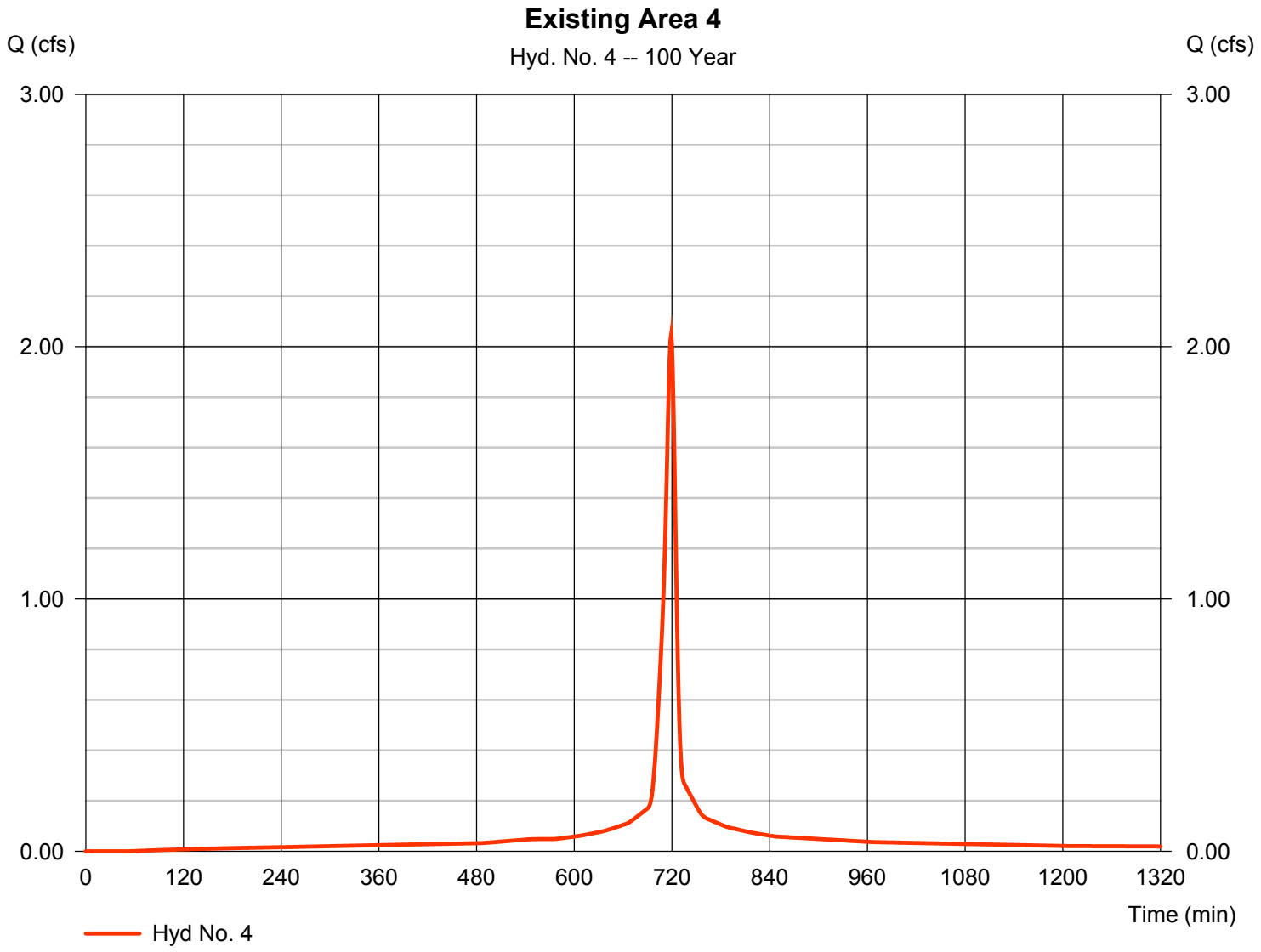
Hydrograph Report

Hyd. No. 4

Existing Area 4

Hydrograph type	= SCS Runoff	Peak discharge	= 2.048 cfs
Storm frequency	= 100 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 5,444 cuft
Drainage area	= 0.210 ac	Curve number	= 97*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.60 min
Total precip.	= 7.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.200 x 98) + (0.010 x 79)] / 0.210



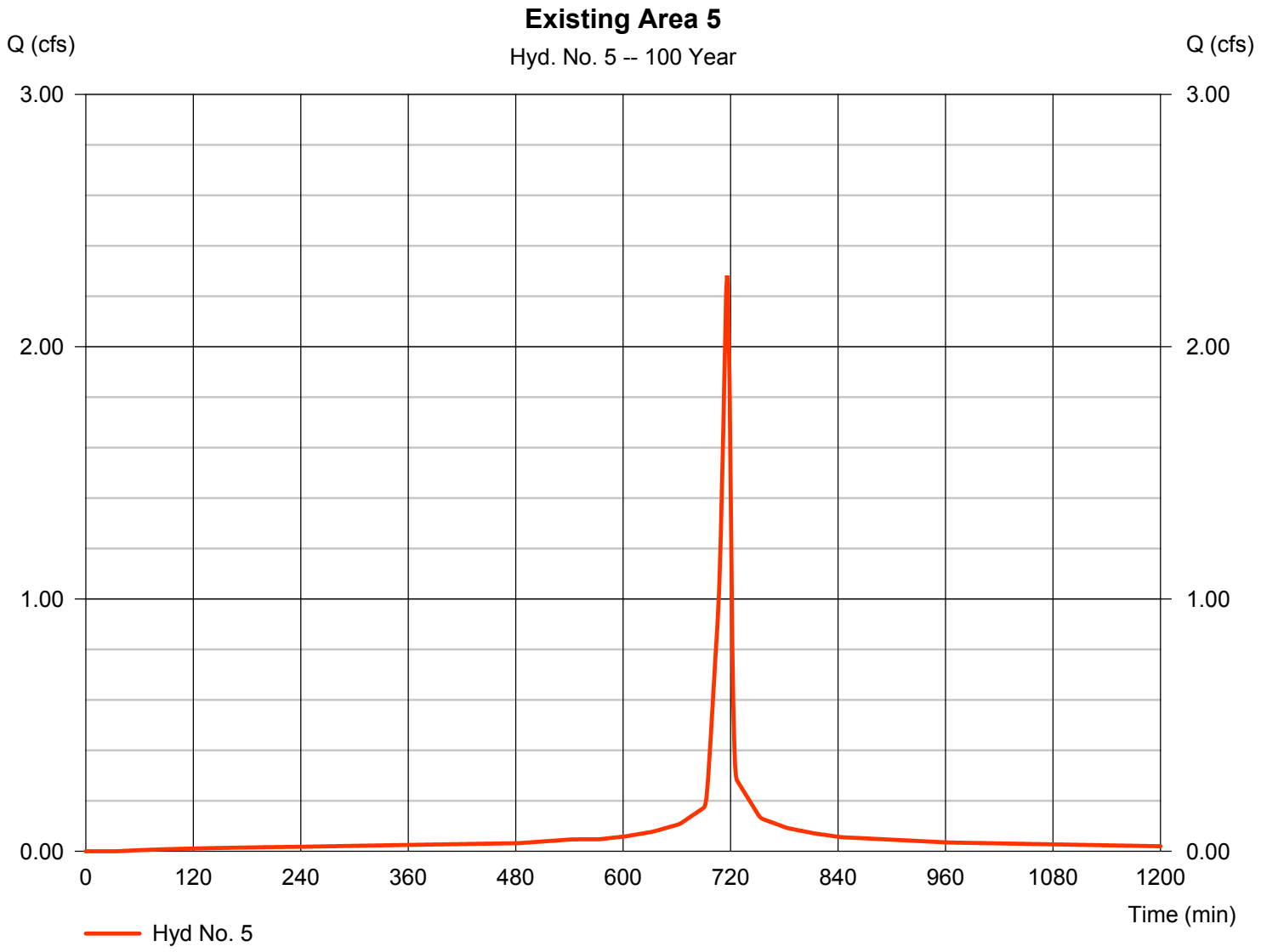
Hydrograph Report

Hyd. No. 5

Existing Area 5

Hydrograph type	= SCS Runoff	Peak discharge	= 2.282 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 5,271 cuft
Drainage area	= 0.200 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.30 min
Total precip.	= 7.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.199 x 98)] / 0.200



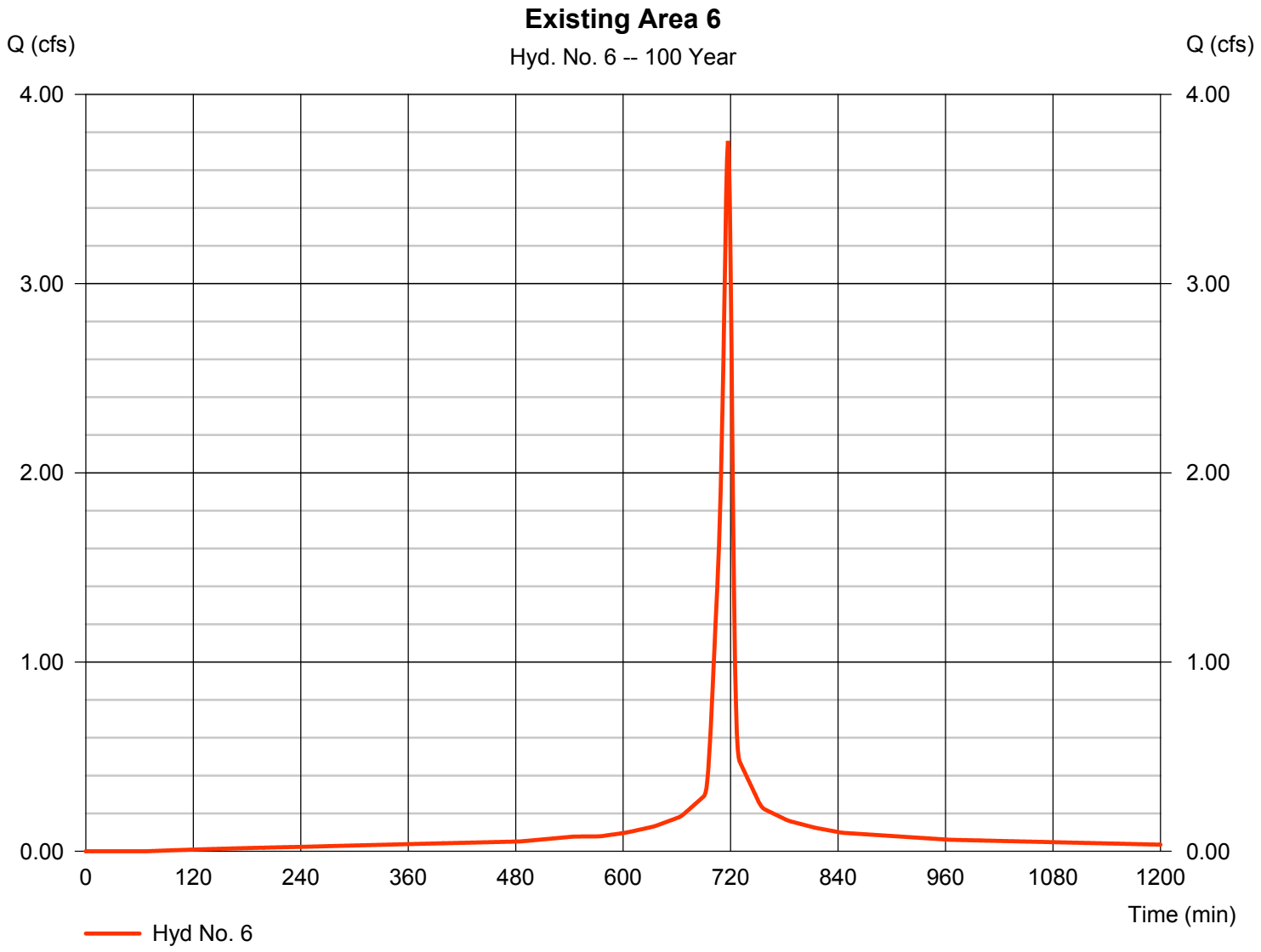
Hydrograph Report

Hyd. No. 6

Existing Area 6

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.754 cfs
Storm frequency	=	100 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	8,938 cuft
Drainage area	=	0.340 ac	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.50 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.299 x 98) + (0.040 x 79)] / 0.340



Hydrograph Report

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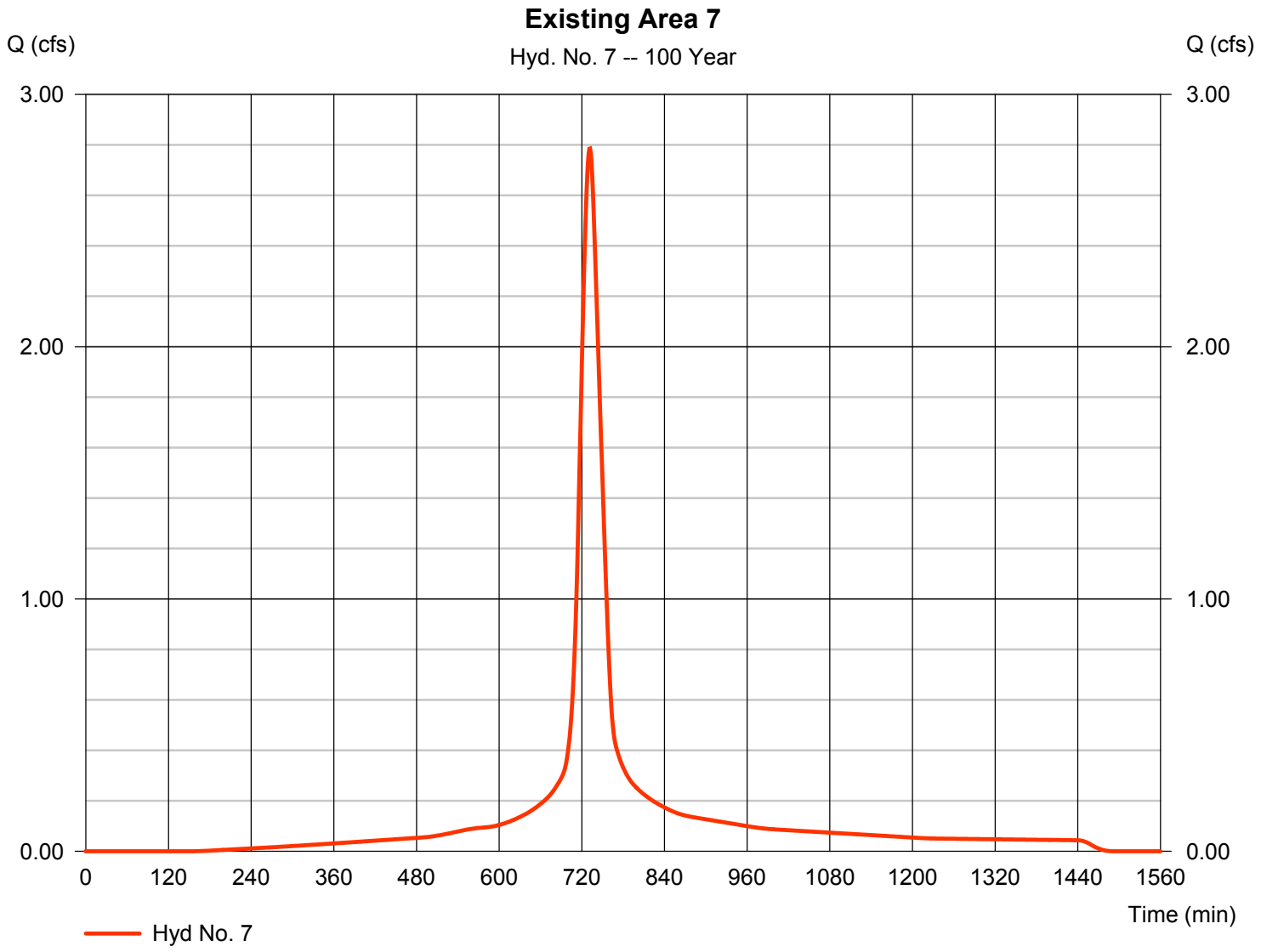
Hyd. No. 7

Existing Area 7

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.785 cfs
Storm frequency	=	100 yrs	Time to peak	=	732 min
Time interval	=	1 min	Hyd. volume	=	12,219 cuft
Drainage area	=	0.520 ac	Curve number	=	91*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	30.80 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.331 x 98) + (0.191 x 79)] / 0.520



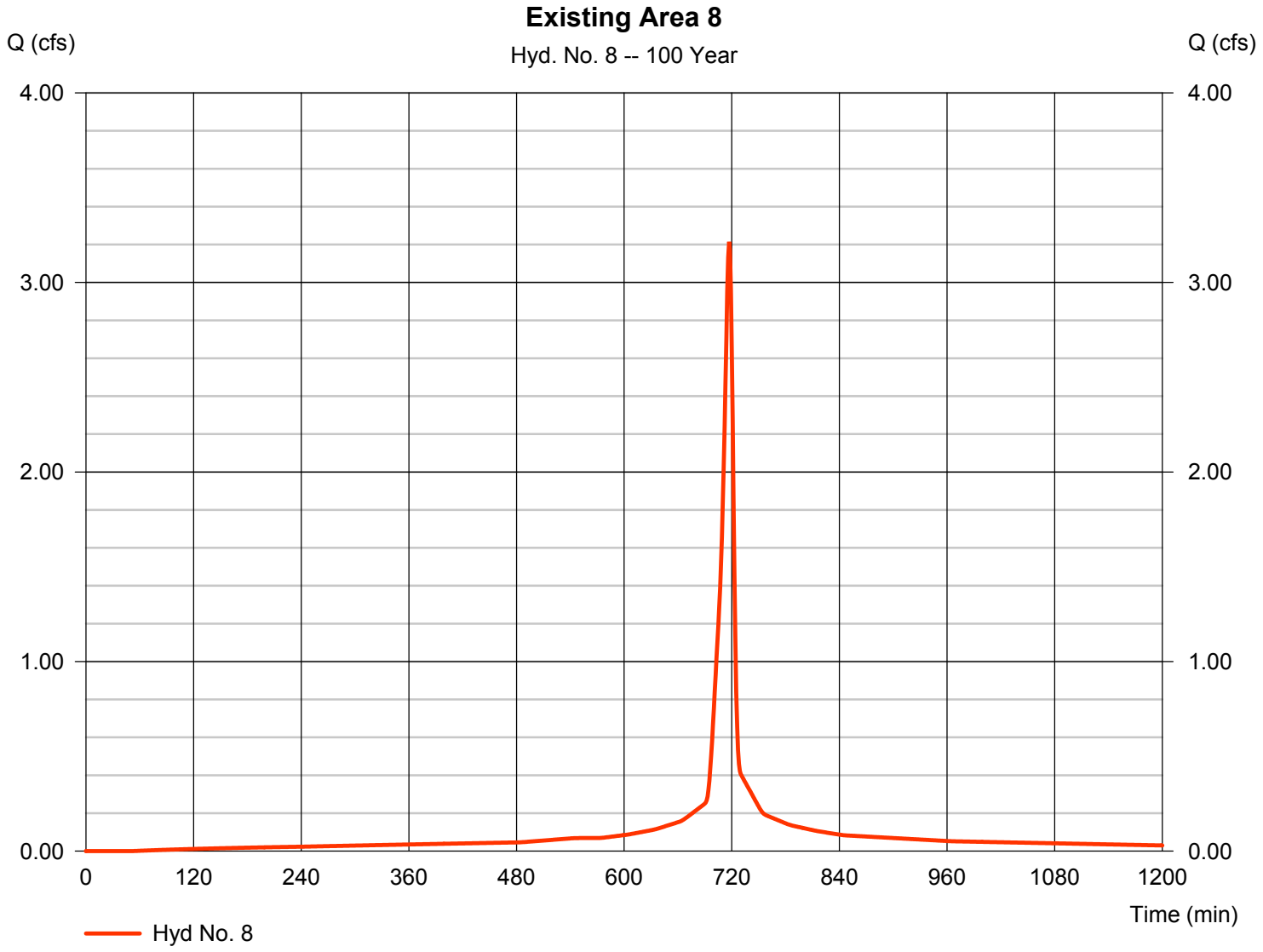
Hydrograph Report

Hyd. No. 8

Existing Area 8

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.215 cfs
Storm frequency	=	100 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	7,752 cuft
Drainage area	=	0.290 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.00 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.272 x 98) + (0.021 x 79)] / 0.290



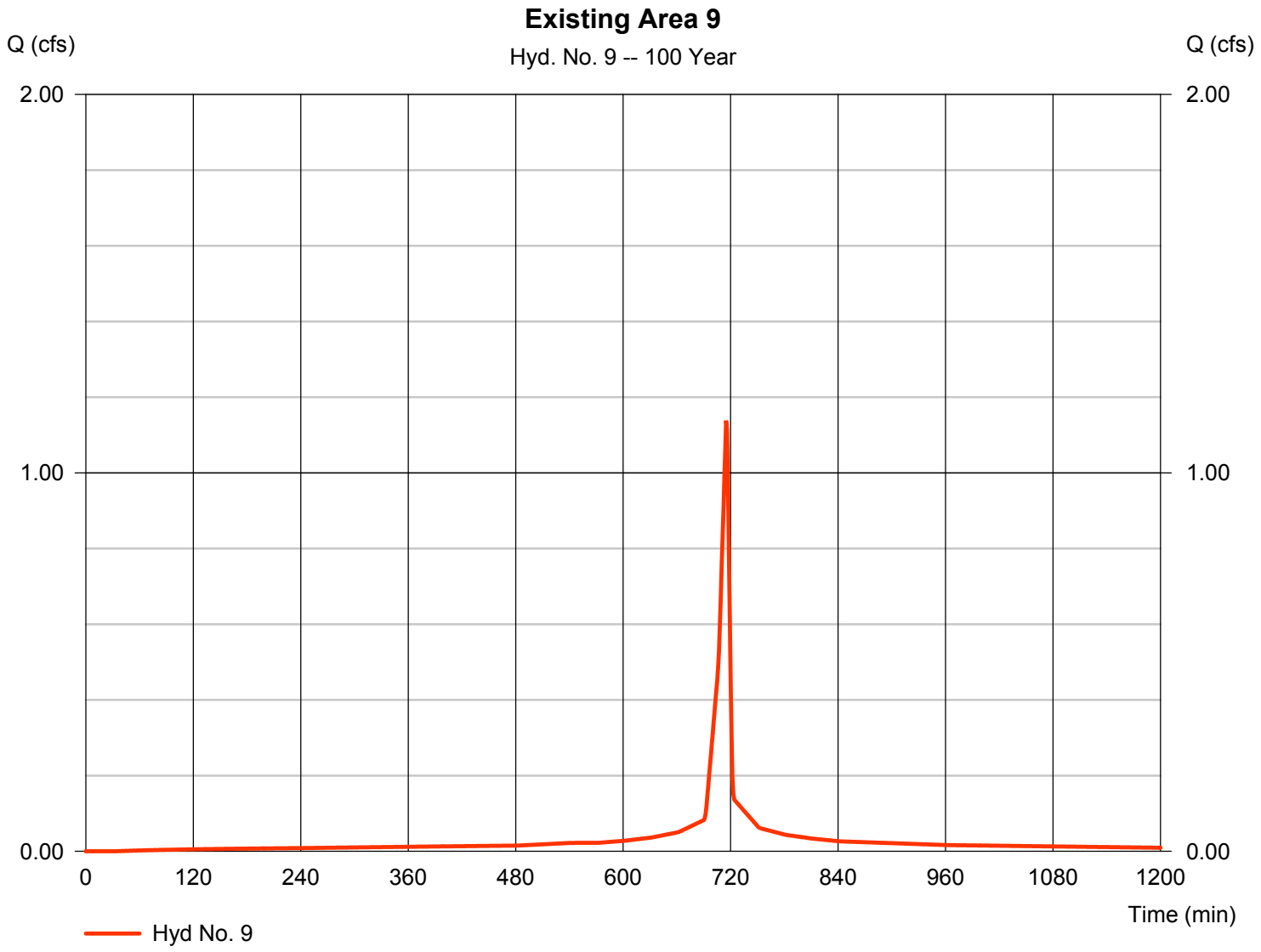
Hydrograph Report

Hyd. No. 9

Existing Area 9

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.138 cfs
Storm frequency	=	100 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	2,471 cuft
Drainage area	=	0.100 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.10 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.100 x 98)] / 0.100



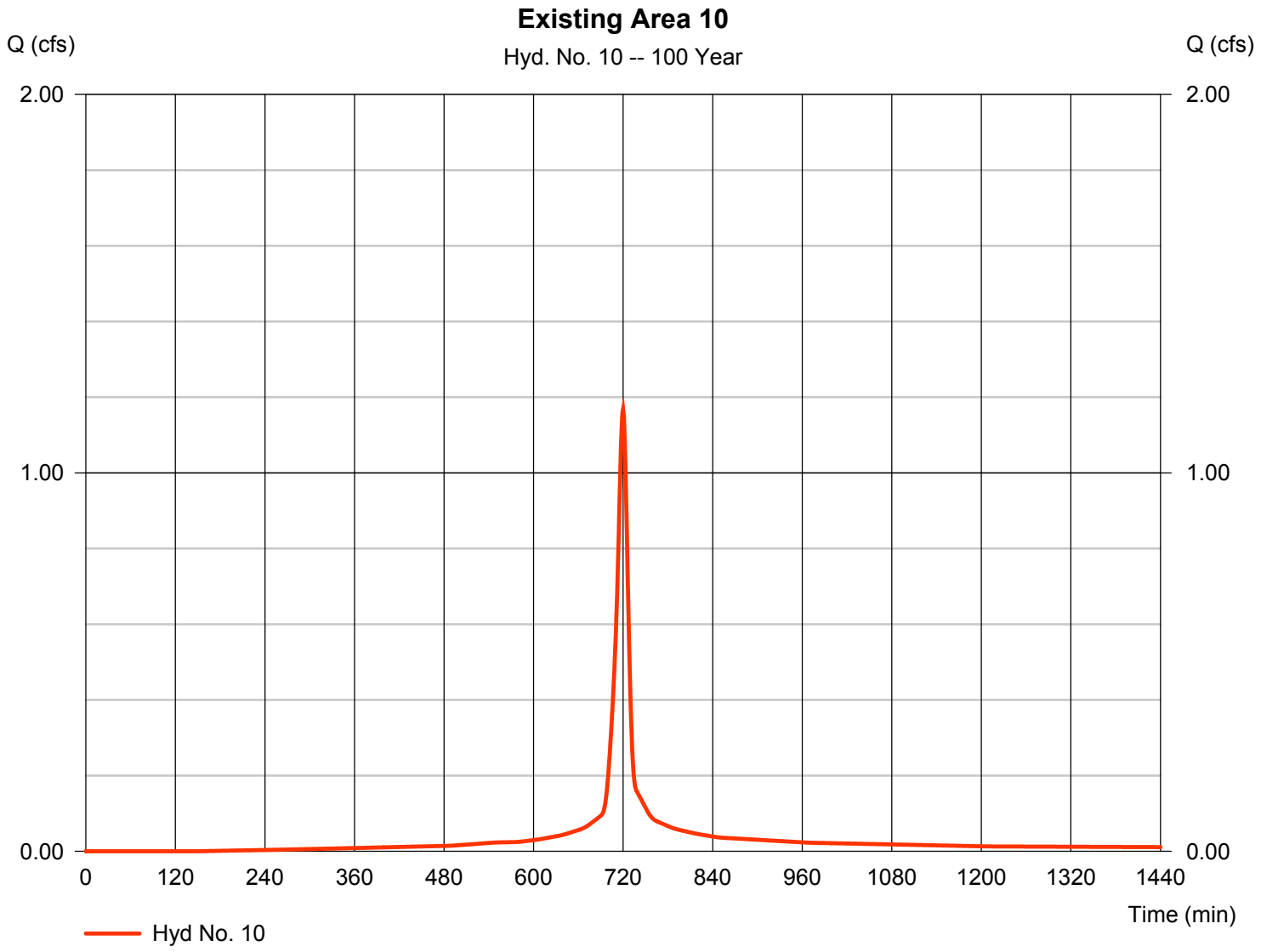
Hydrograph Report

Hyd. No. 10

Existing Area 10

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.168 cfs
Storm frequency	=	100 yrs	Time to peak	=	720 min
Time interval	=	1 min	Hyd. volume	=	3,089 cuft
Drainage area	=	0.130 ac	Curve number	=	91*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	10.20 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.081 x 98) + (0.044 x 79)] / 0.130



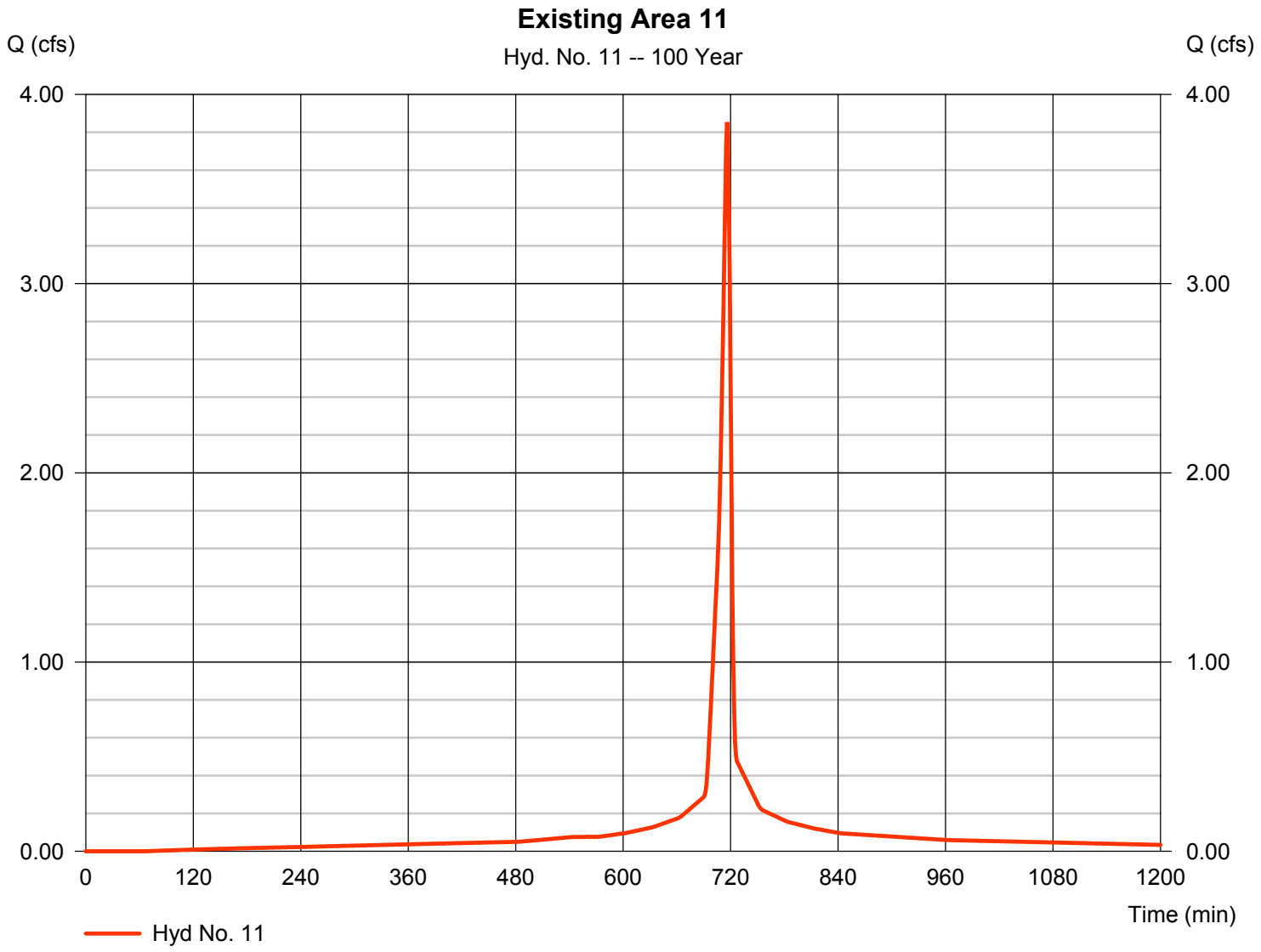
Hydrograph Report

Hyd. No. 11

Existing Area 11

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.853 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	8,667 cuft
Drainage area	=	0.340 ac	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.50 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.296 x 98) + (0.045 x 79)] / 0.340

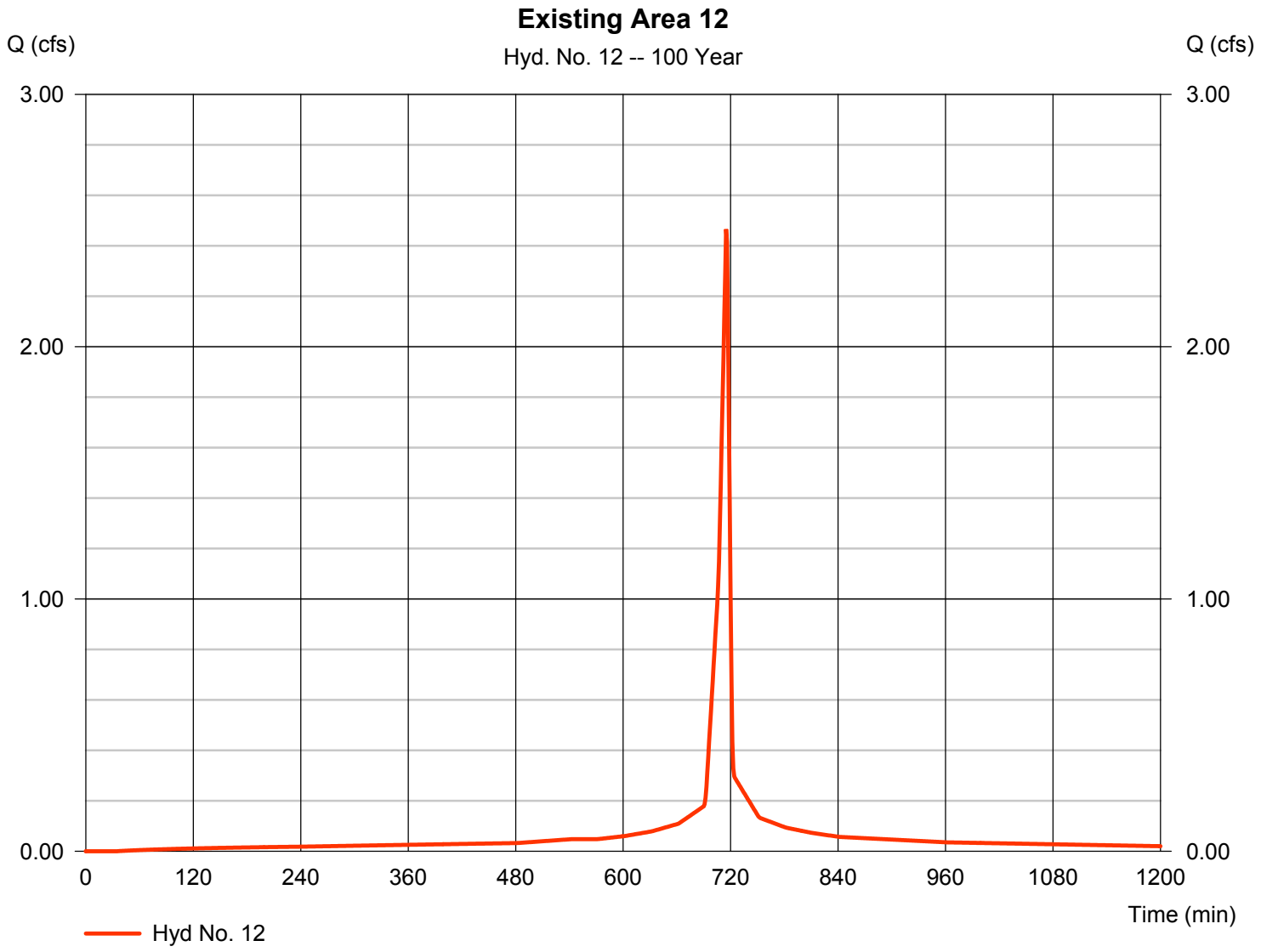


Hydrograph Report

Hyd. No. 12

Existing Area 12

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.466 cfs
Storm frequency	=	100 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	5,352 cuft
Drainage area	=	0.217 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.20 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



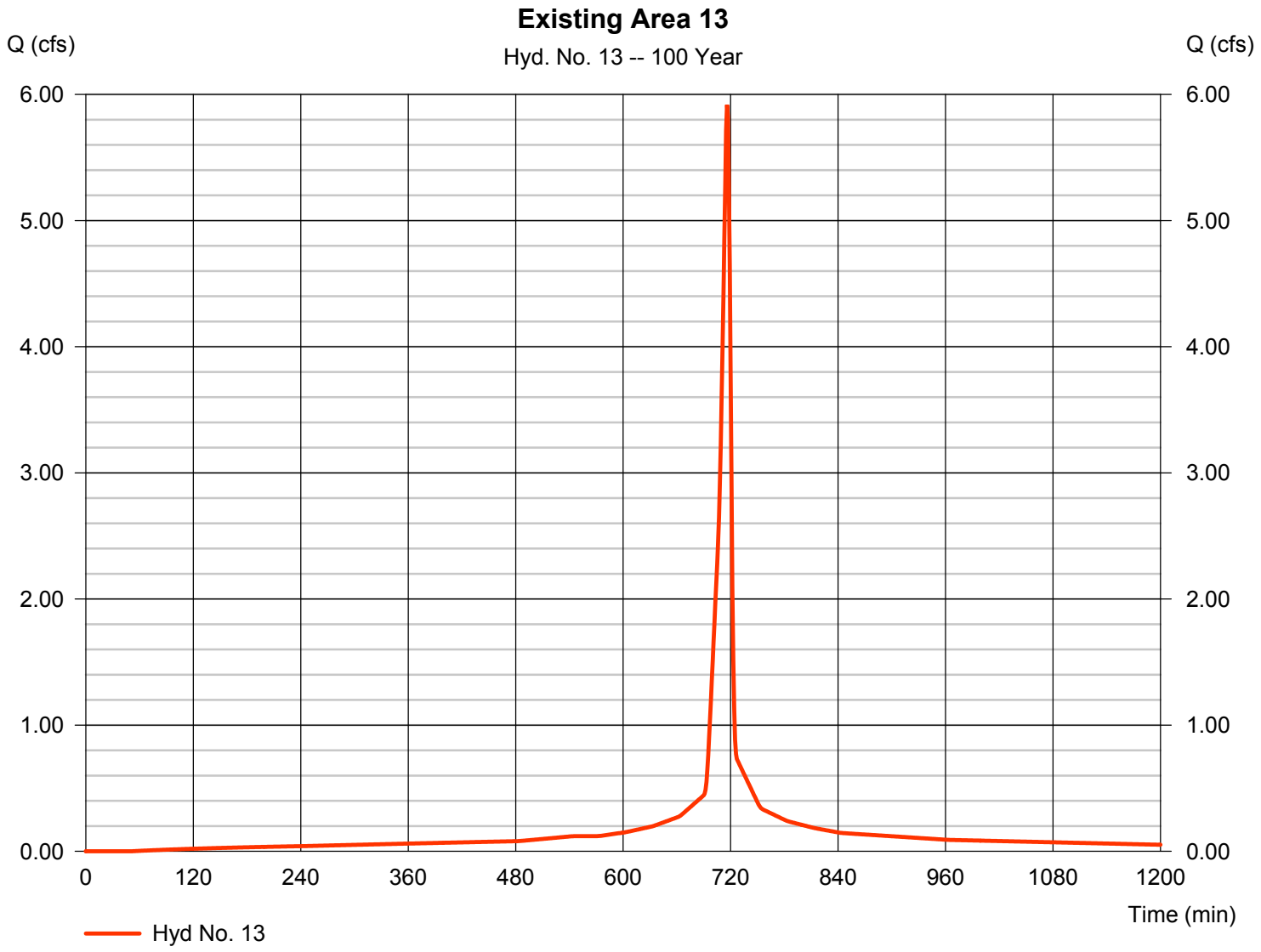
Hydrograph Report

Hyd. No. 13

Existing Area 13

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.917 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	13,480 cuft
Drainage area	=	0.520 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.10 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.479 x 98) + (0.038 x 79)] / 0.520



Hydrograph Report

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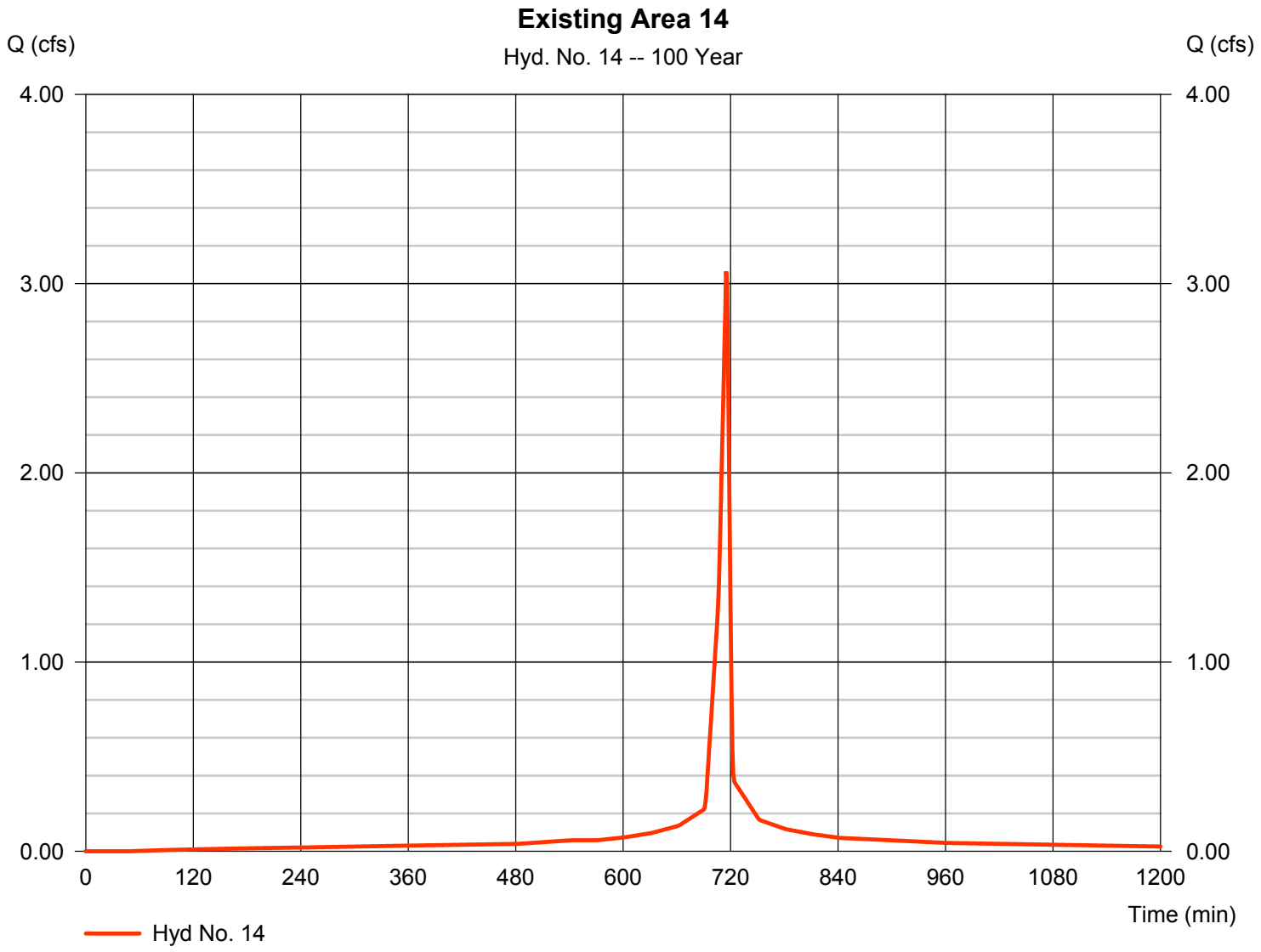
Hyd. No. 14

Existing Area 14

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.065 cfs
Storm frequency	=	100 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	6,562 cuft
Drainage area	=	0.270 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.50 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.260 x 98) + (0.010 x 79)] / 0.270



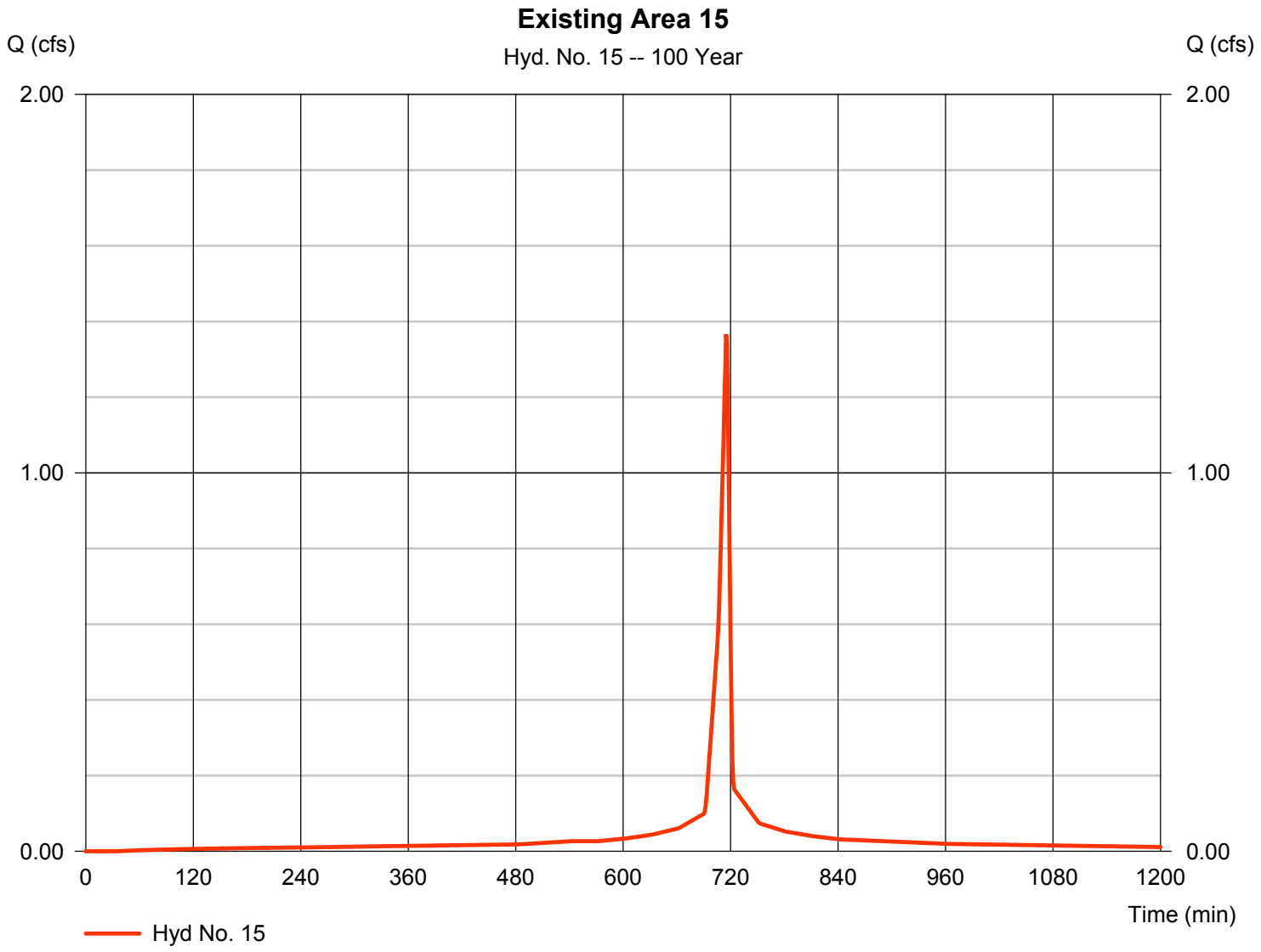
Hydrograph Report

Hyd. No. 15

Existing Area 15

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.366 cfs
Storm frequency	=	100 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	2,965 cuft
Drainage area	=	0.120 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	1.70 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.123 x 98)] / 0.120



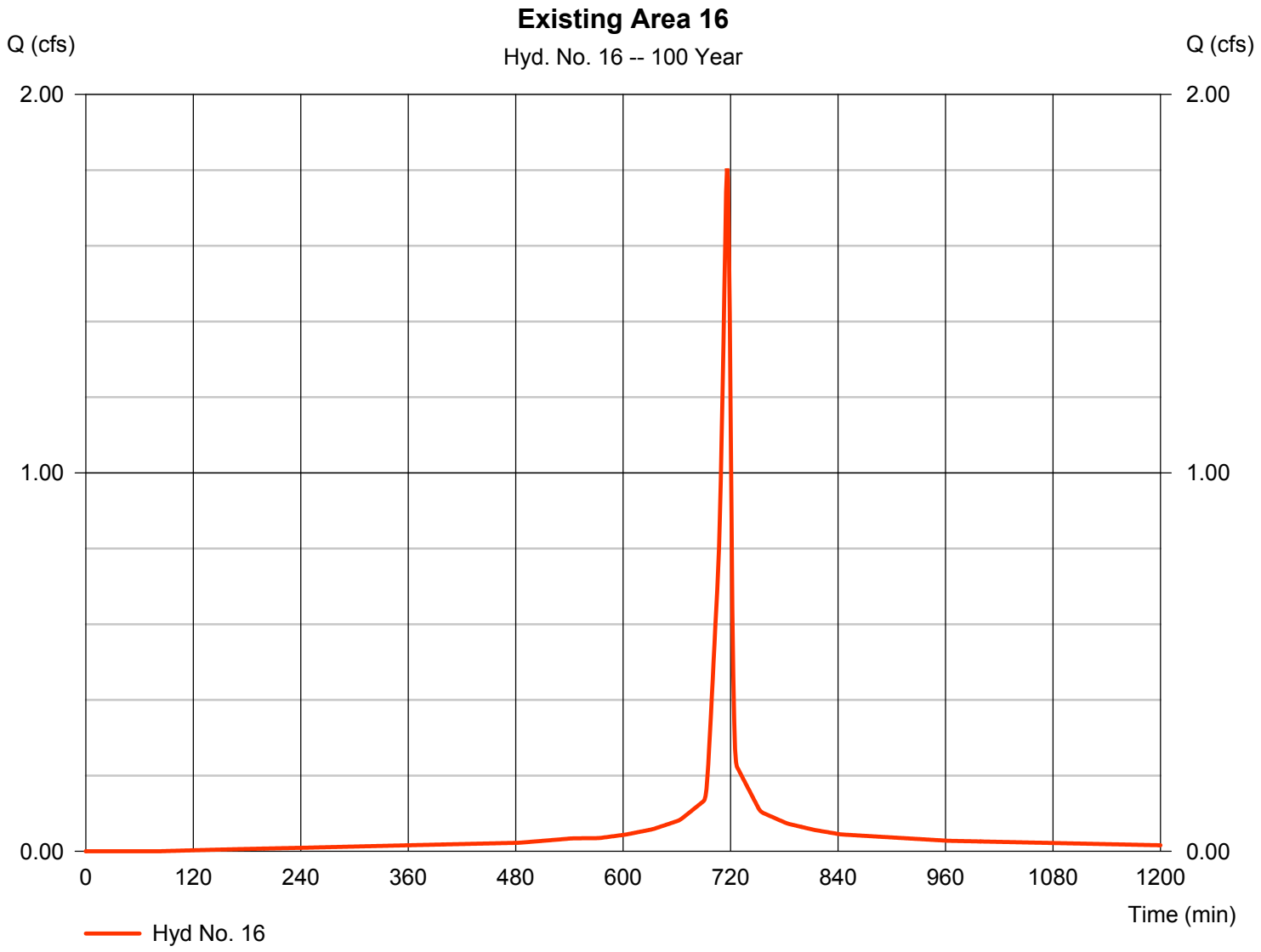
Hydrograph Report

Hyd. No. 16

Existing Area 16

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.804 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	4,009 cuft
Drainage area	=	0.160 ac	Curve number	=	95*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.90 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.134 x 98) + (0.022 x 79)] / 0.160



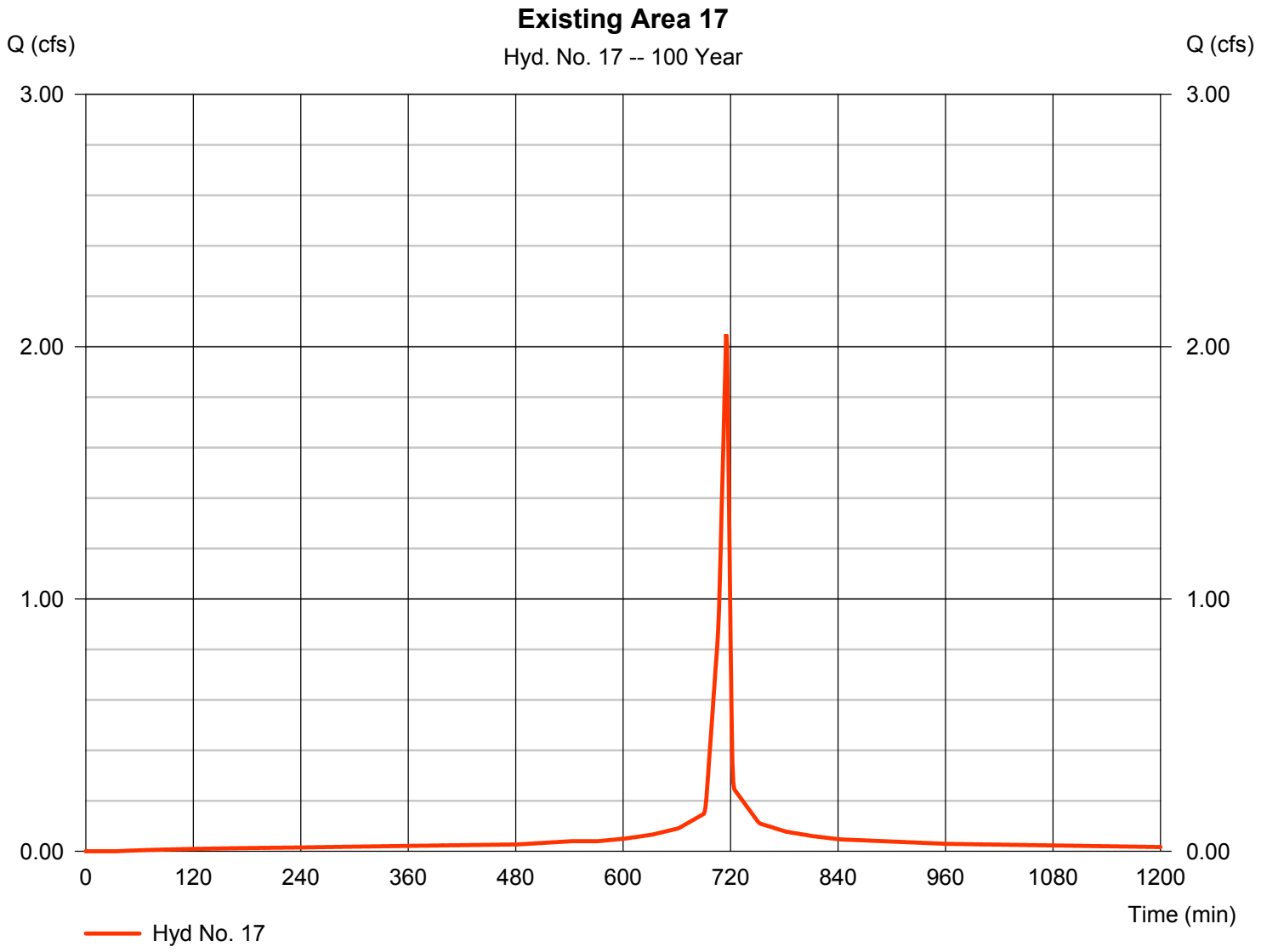
Hydrograph Report

Hyd. No. 17

Existing Area 17

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.049 cfs
Storm frequency	=	100 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	4,448 cuft
Drainage area	=	0.180 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.40 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.182 x 98)] / 0.180



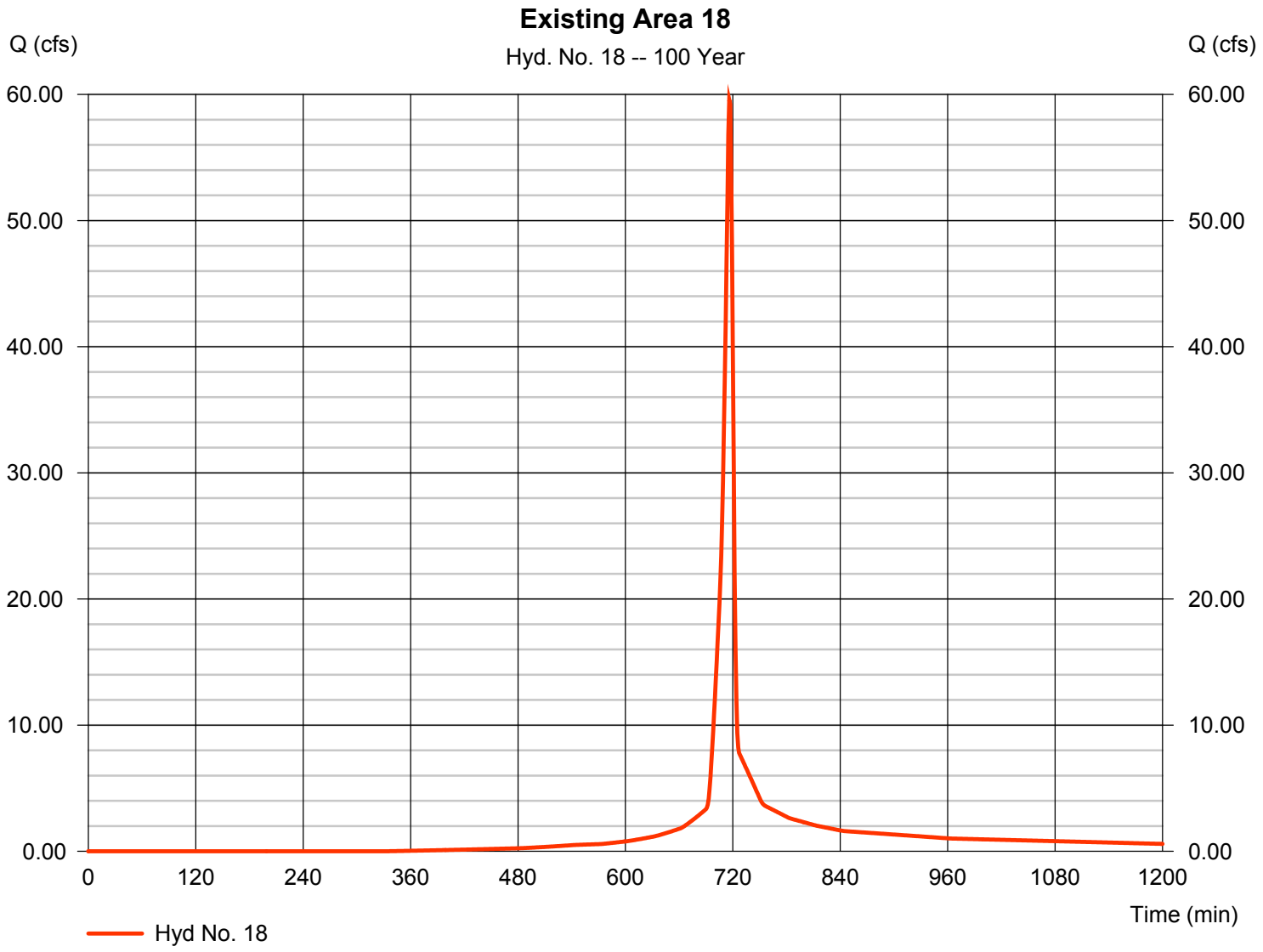
Hydrograph Report

Hyd. No. 18

Existing Area 18

Hydrograph type	=	SCS Runoff	Peak discharge	=	59.55 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	117,186 cuft
Drainage area	=	6.400 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.90 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.018 x 98) + (6.379 x 79)] / 6.400



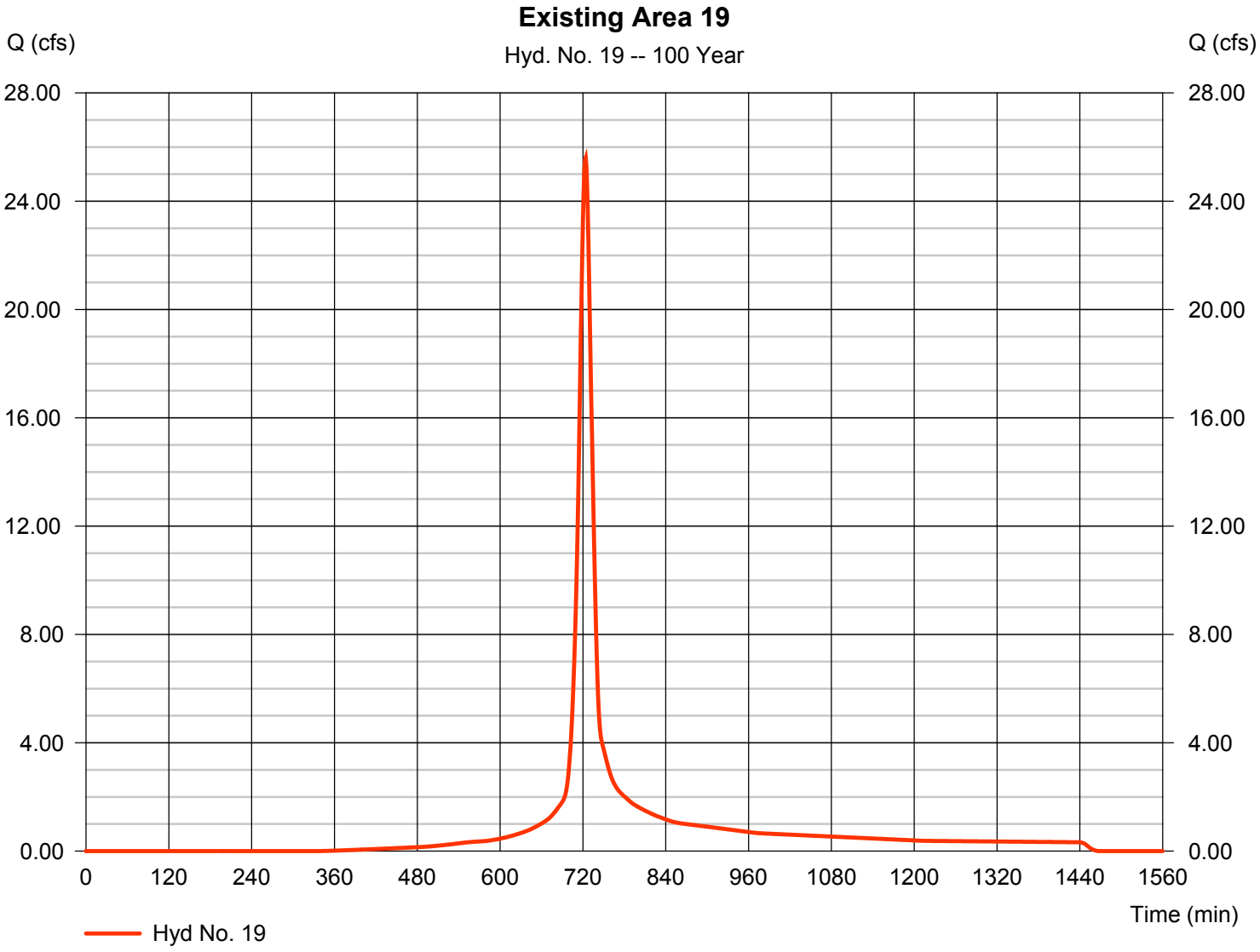
Hydrograph Report

Hyd. No. 19

Existing Area 19

Hydrograph type	=	SCS Runoff	Peak discharge	=	25.60 cfs
Storm frequency	=	100 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	76,753 cuft
Drainage area	=	4.240 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	17.40 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.036 x 98) + (4.203 x 79)] / 4.240



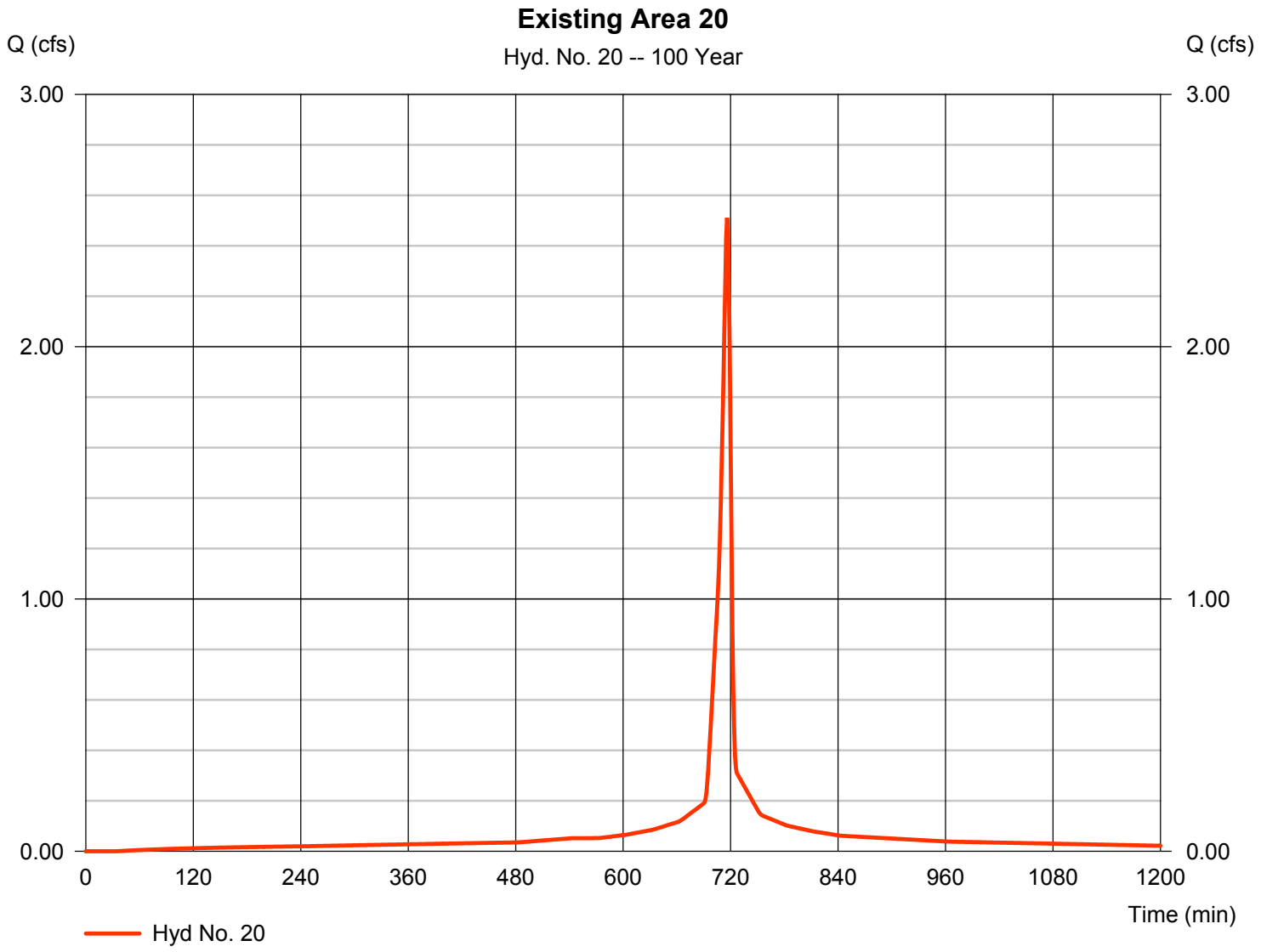
Hydrograph Report

Hyd. No. 20

Existing Area 20

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.510 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	5,798 cuft
Drainage area	=	0.220 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.70 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.220 x 98)] / 0.220



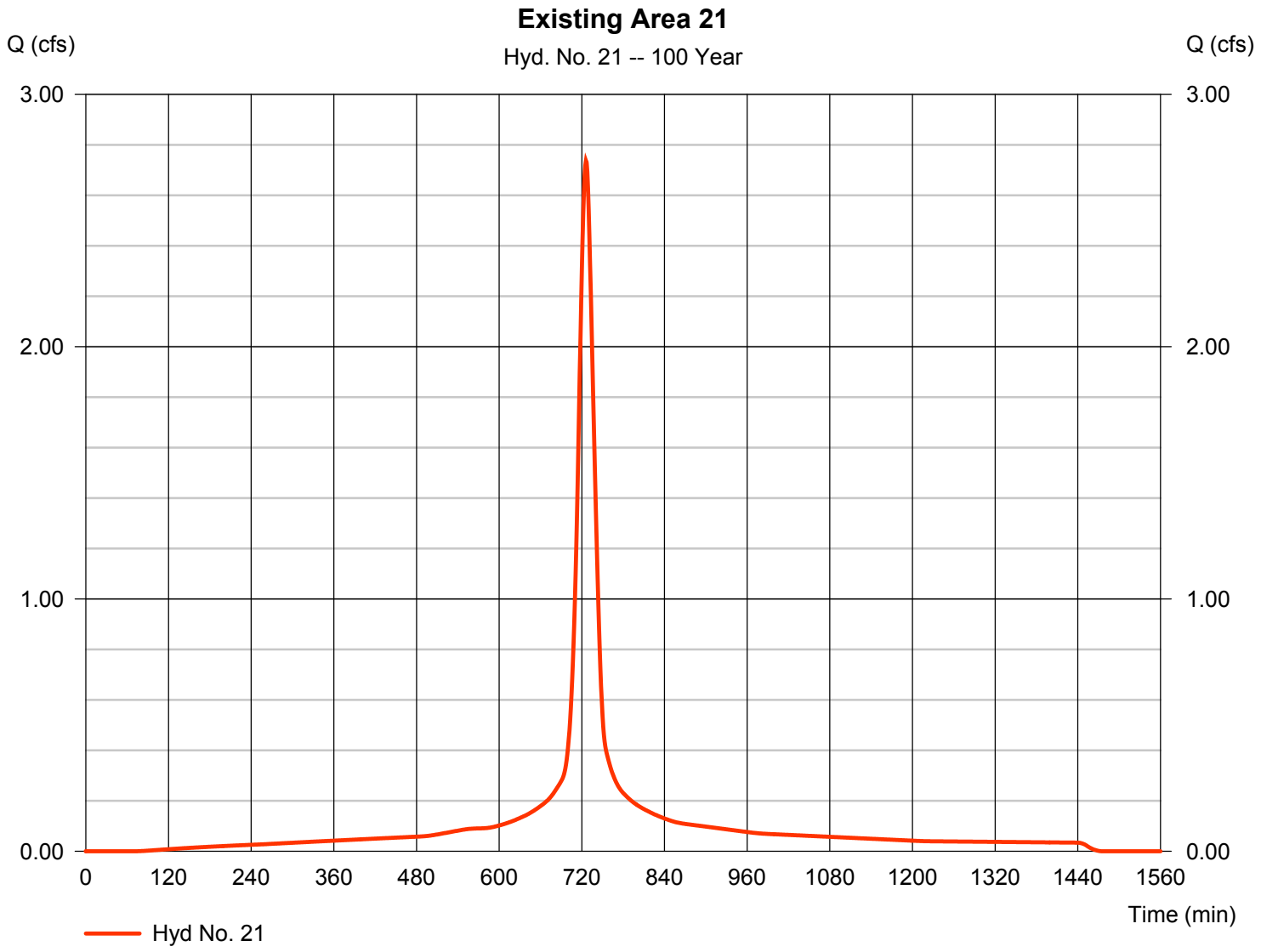
Hydrograph Report

Hyd. No. 21

Existing Area 21

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.737 cfs
Storm frequency	=	100 yrs	Time to peak	=	726 min
Time interval	=	1 min	Hyd. volume	=	10,358 cuft
Drainage area	=	0.410 ac	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	22.20 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.370 x 98) + (0.041 x 79)] / 0.410



Hydrograph Report

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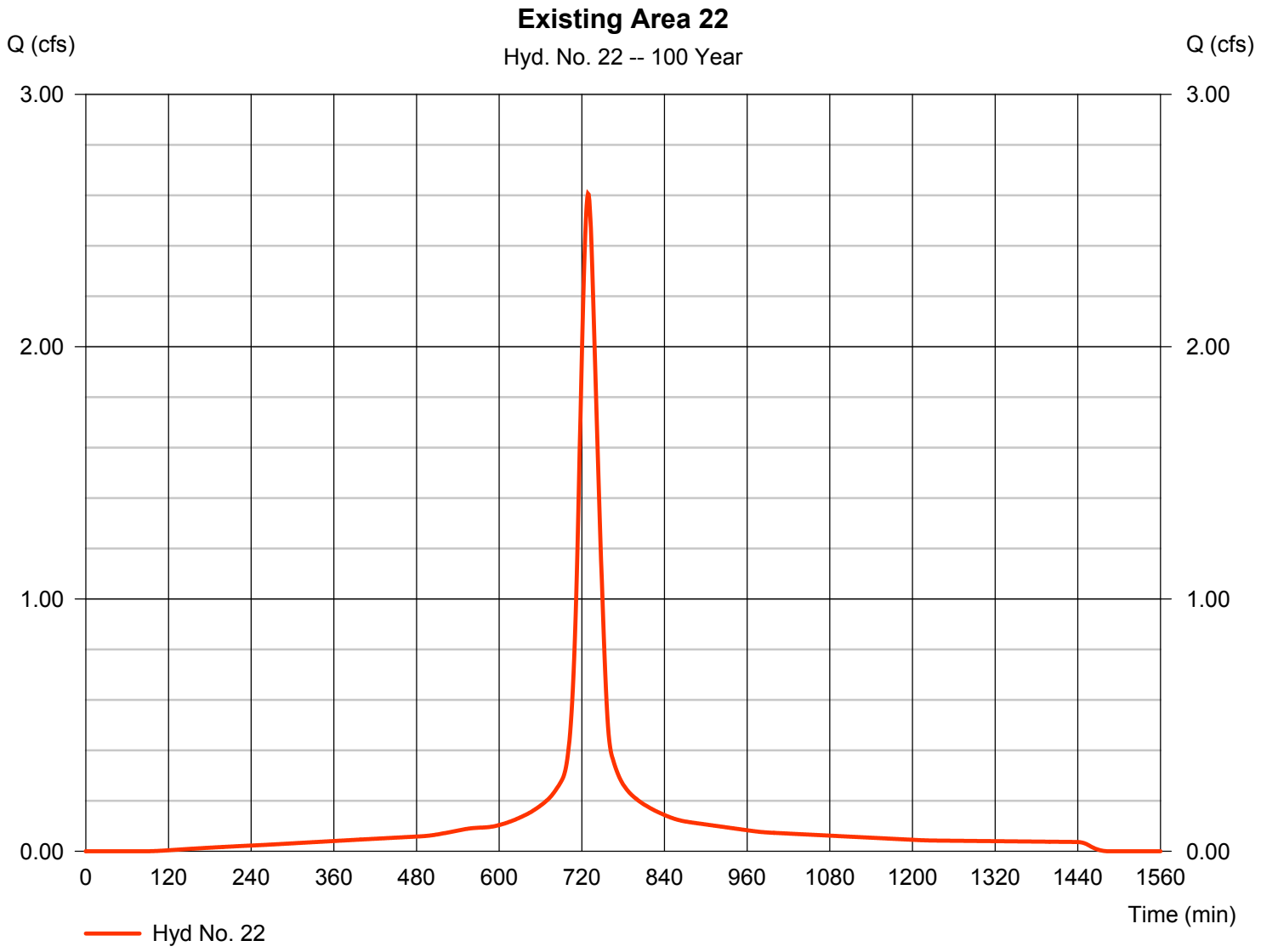
Hyd. No. 22

Existing Area 22

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.607 cfs
Storm frequency	=	100 yrs	Time to peak	=	729 min
Time interval	=	1 min	Hyd. volume	=	10,945 cuft
Drainage area	=	0.440 ac	Curve number	=	95*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	27.80 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.382 x 98) + (0.062 x 79)] / 0.440



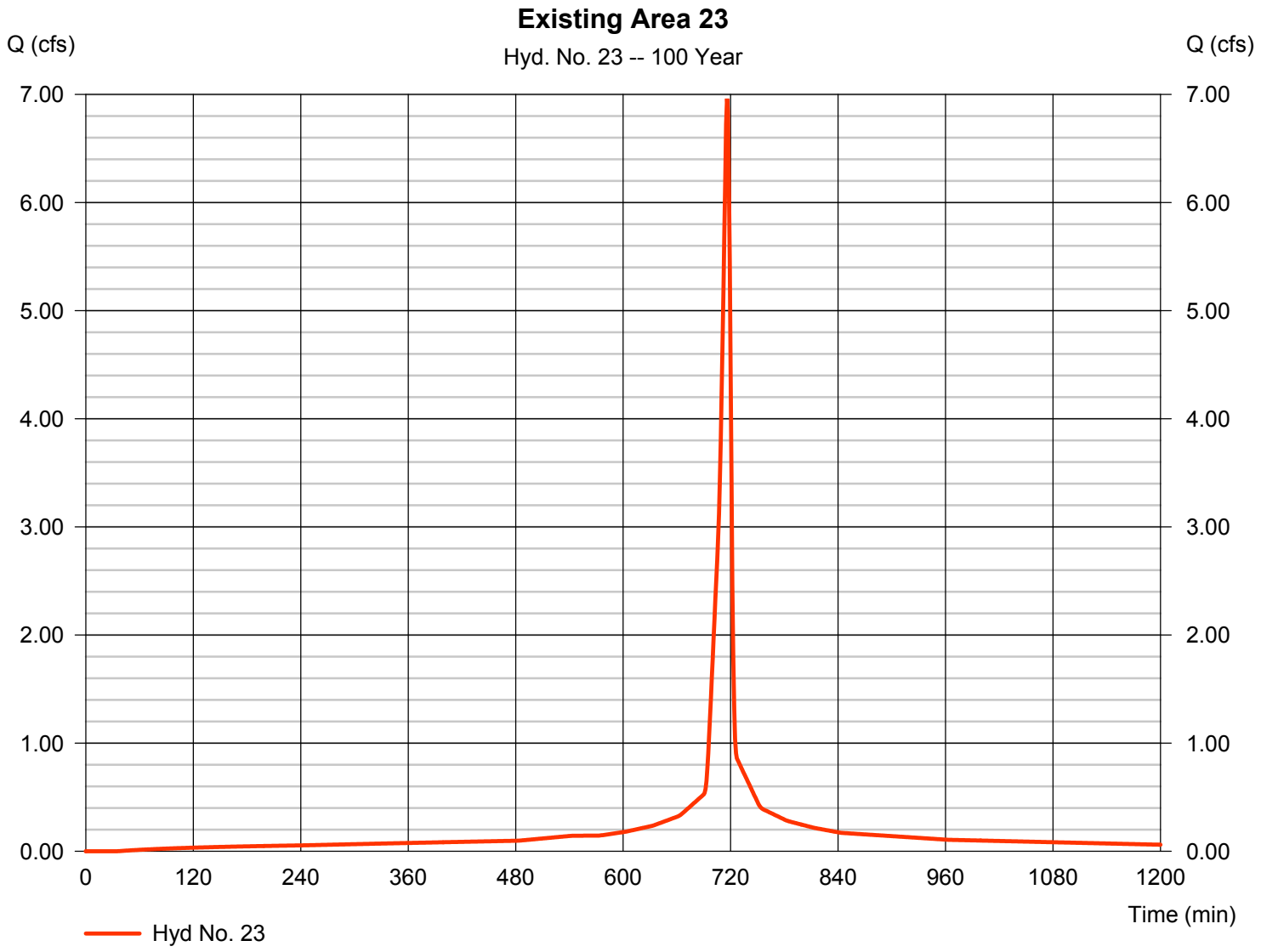
Hydrograph Report

Hyd. No. 23

Existing Area 23

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.961 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	16,077 cuft
Drainage area	=	0.610 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.80 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.607 x 98)] / 0.610



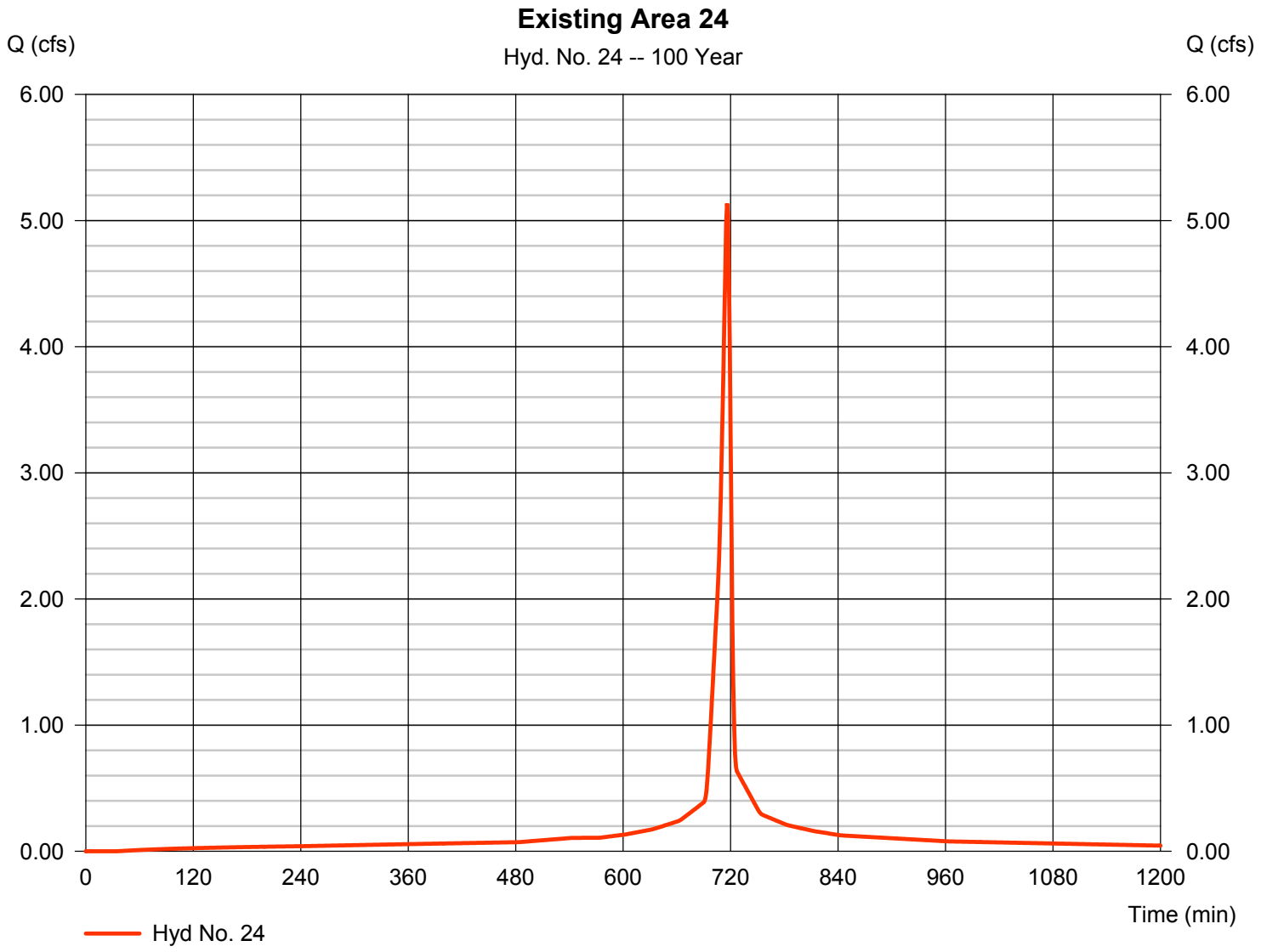
Hydrograph Report

Hyd. No. 24

Existing Area 24

Hydrograph type	= SCS Runoff	Peak discharge	= 5.135 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 11,860 cuft
Drainage area	= 0.450 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.90 min
Total precip.	= 7.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.450 x 98)] / 0.450



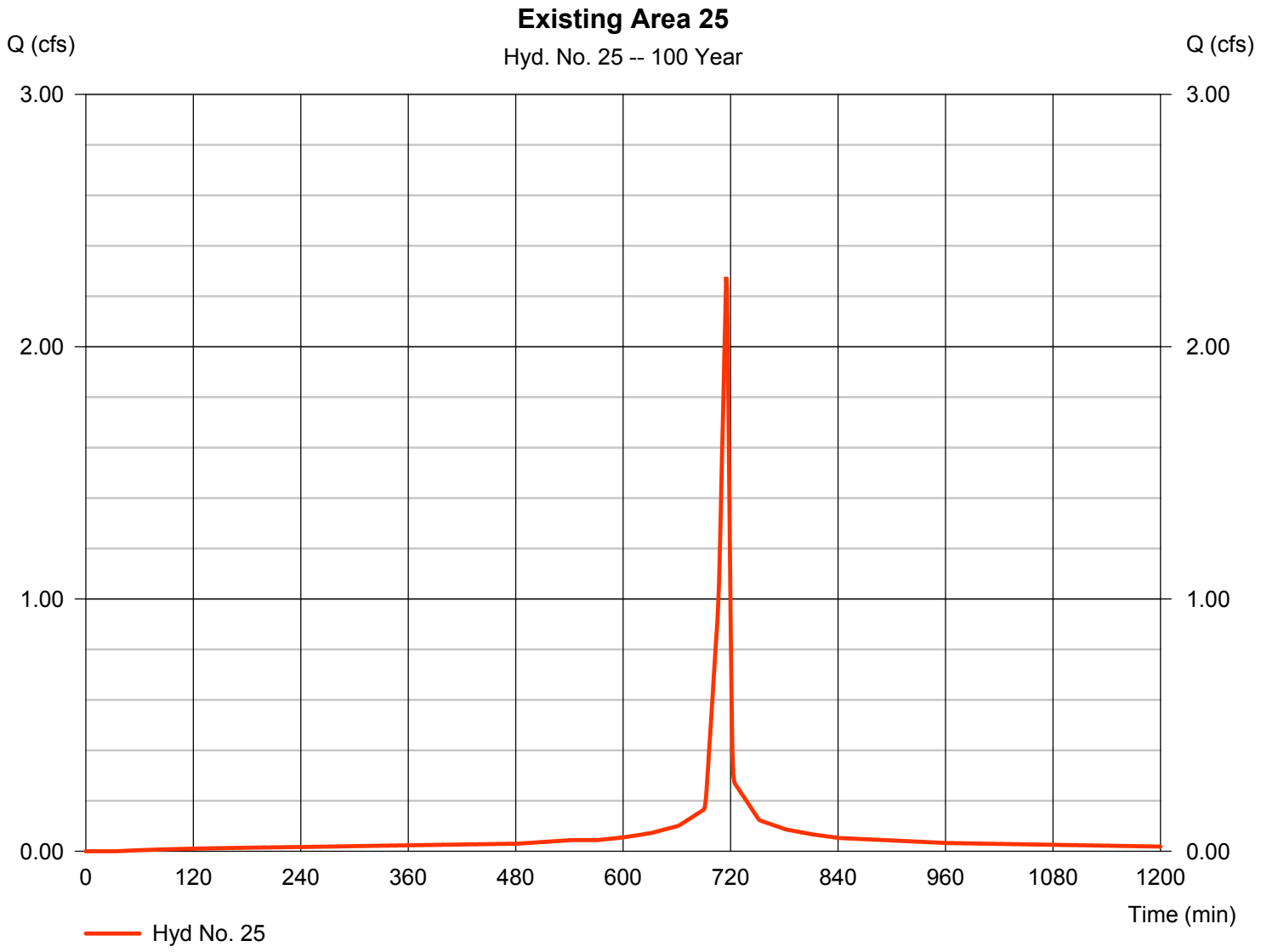
Hydrograph Report

Hyd. No. 25

Existing Area 25

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.277 cfs
Storm frequency	=	100 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	4,942 cuft
Drainage area	=	0.200 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	1.60 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.203 x 98)] / 0.200



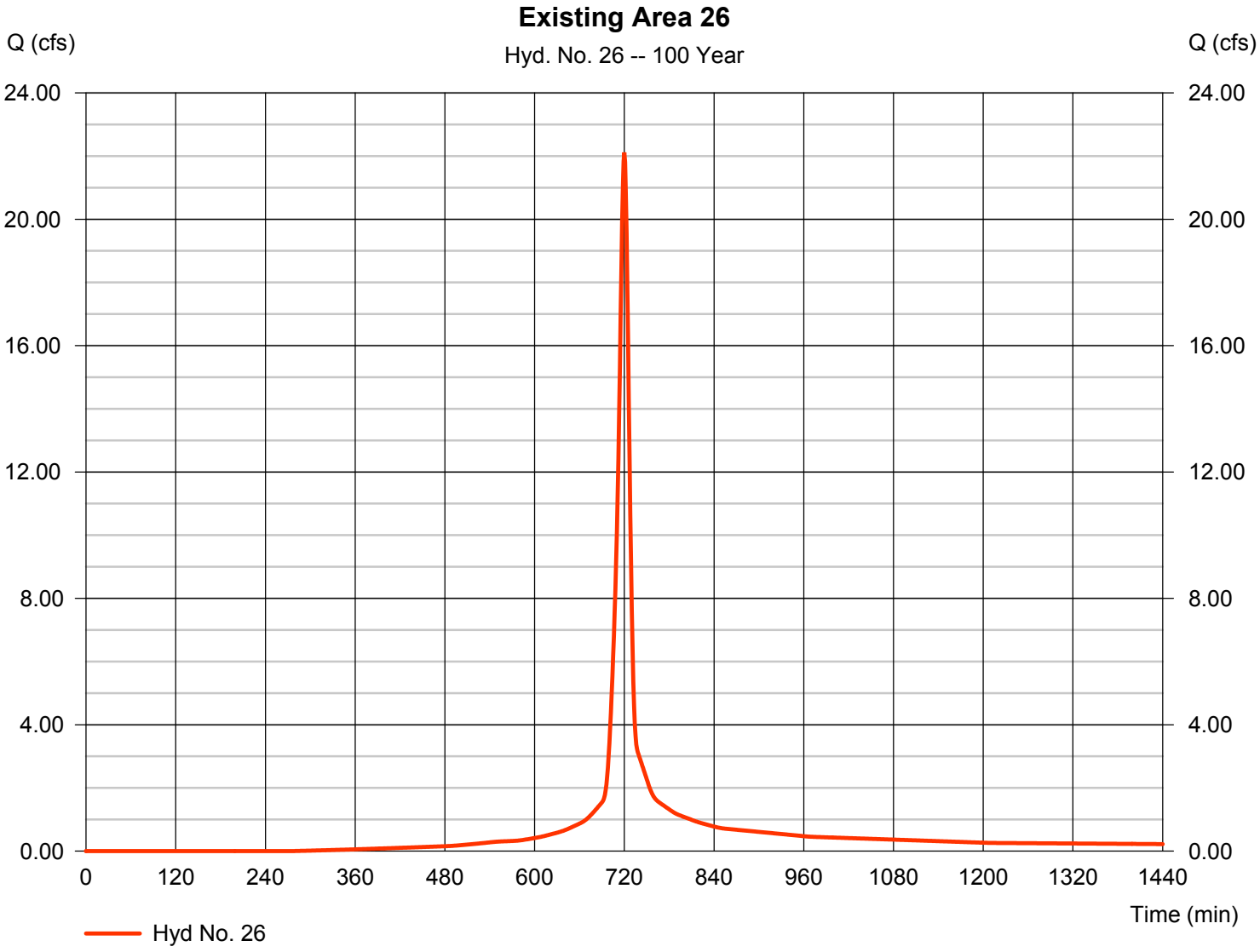
Hydrograph Report

Hyd. No. 26

Existing Area 26

Hydrograph type	=	SCS Runoff	Peak discharge	=	22.12 cfs
Storm frequency	=	100 yrs	Time to peak	=	720 min
Time interval	=	1 min	Hyd. volume	=	55,490 cuft
Drainage area	=	2.730 ac	Curve number	=	83*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	10.40 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.626 x 98) + (2.102 x 79)] / 2.730



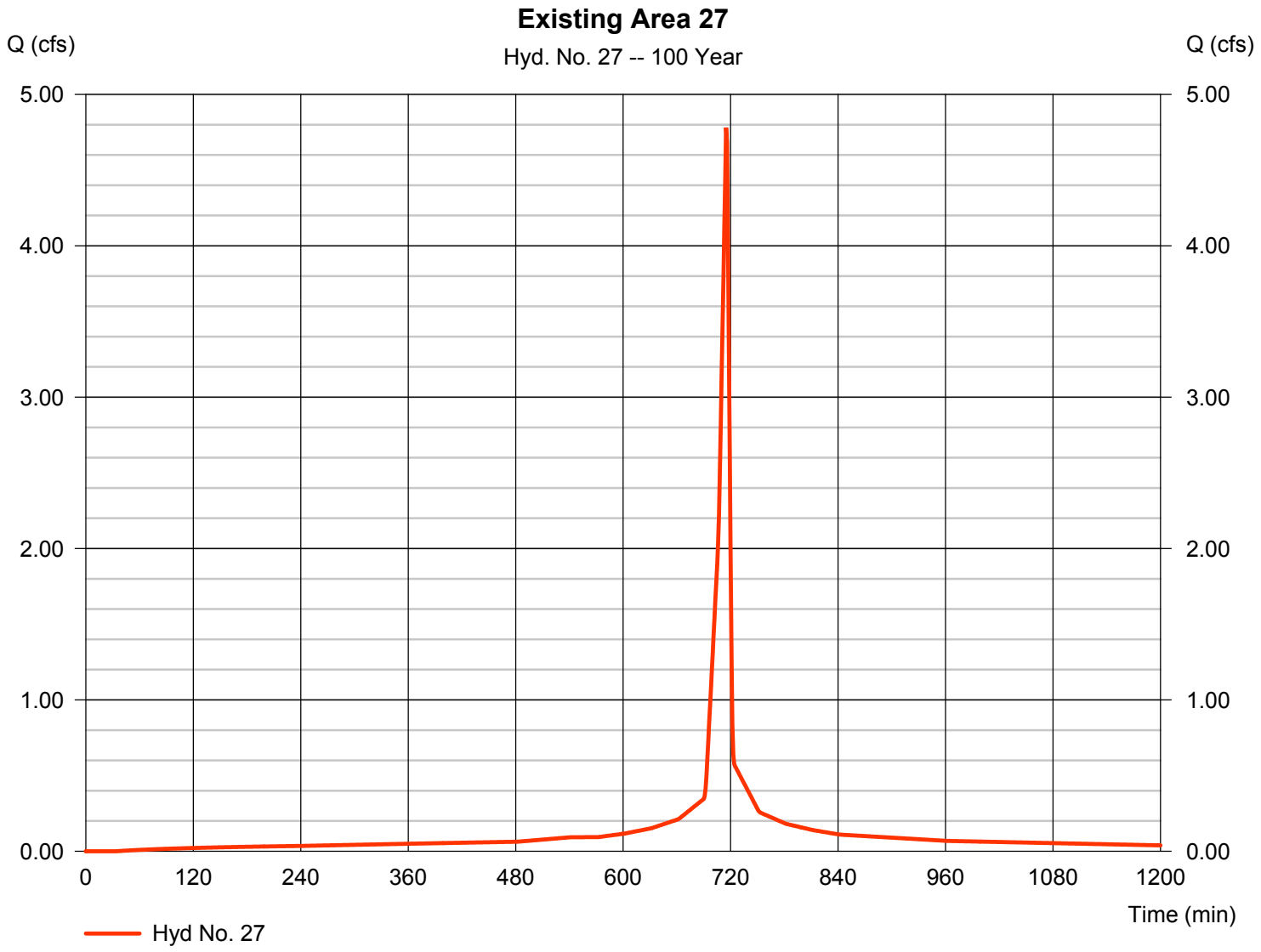
Hydrograph Report

Hyd. No. 27

Existing Area 27

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.781 cfs
Storm frequency	=	100 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	10,378 cuft
Drainage area	=	0.420 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.00 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.420 x 98)] / 0.420



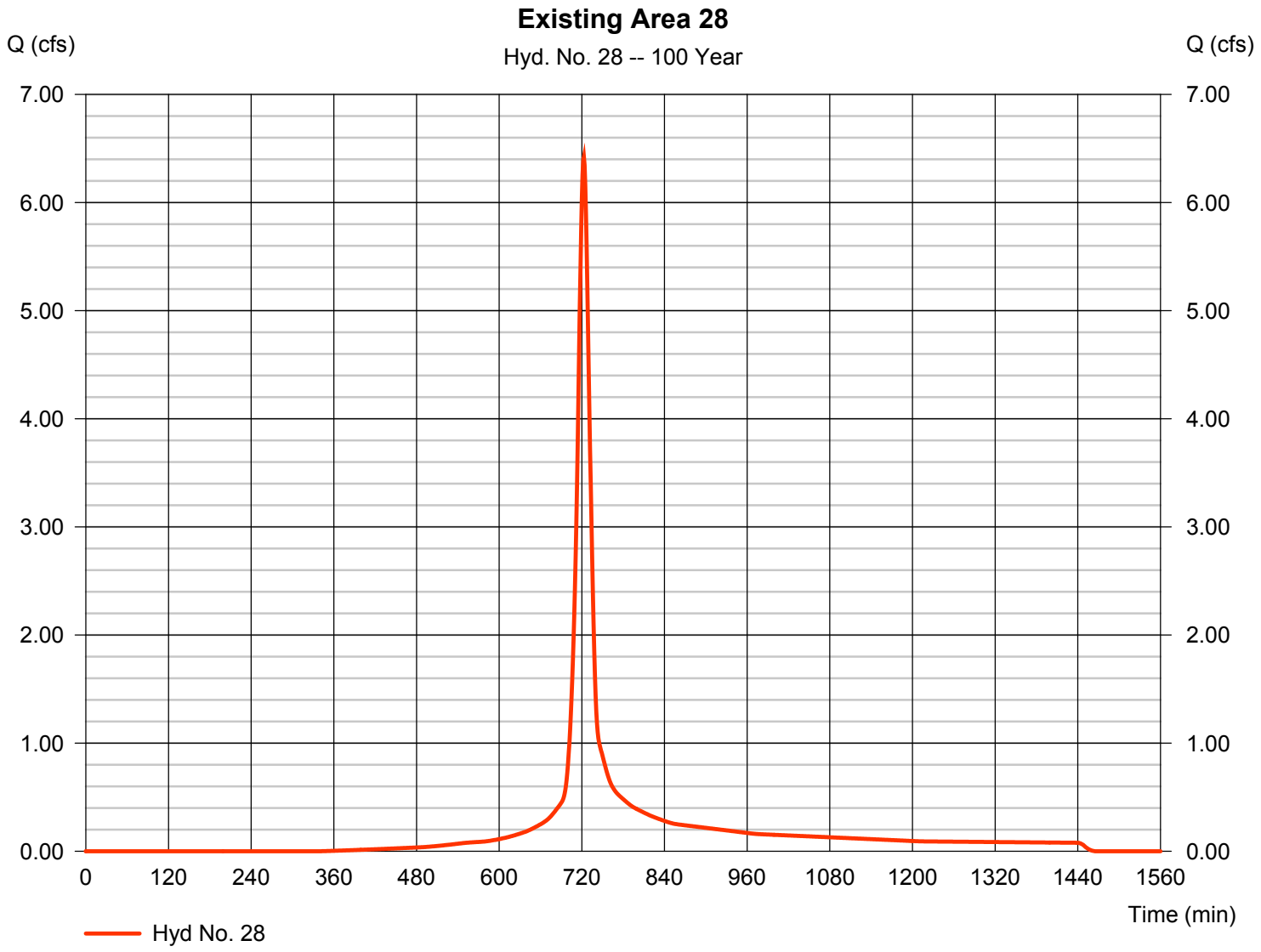
Hydrograph Report

Hyd. No. 28

Existing Area 28

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.419 cfs
Storm frequency	=	100 yrs	Time to peak	=	723 min
Time interval	=	1 min	Hyd. volume	=	18,539 cuft
Drainage area	=	1.000 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	15.50 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.004 x 98) + (0.996 x 79)] / 1.000



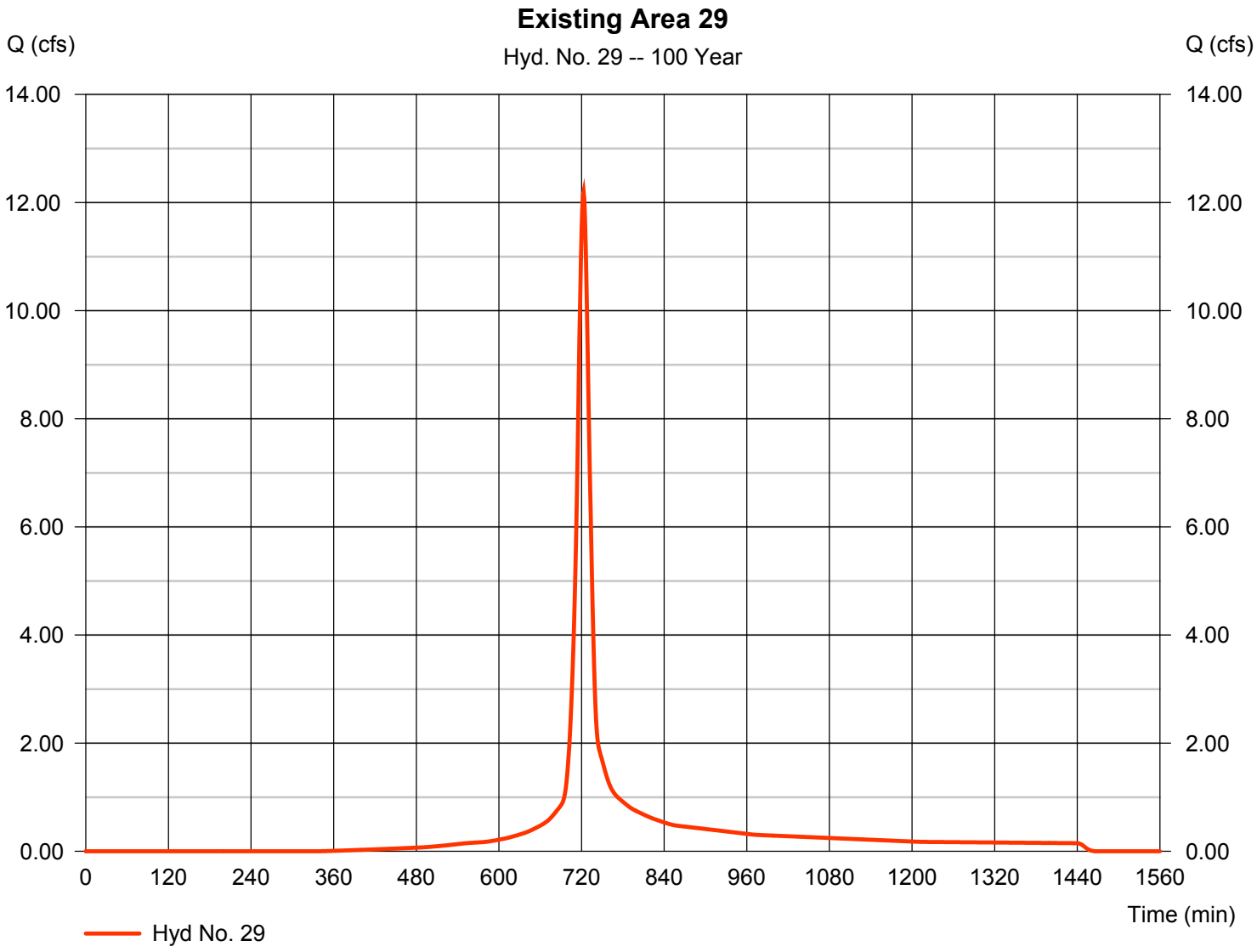
Hydrograph Report

Hyd. No. 29

Existing Area 29

Hydrograph type	=	SCS Runoff	Peak discharge	=	12.20 cfs
Storm frequency	=	100 yrs	Time to peak	=	723 min
Time interval	=	1 min	Hyd. volume	=	35,224 cuft
Drainage area	=	1.900 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	15.70 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.049 x 98) + (1.850 x 79)] / 1.900



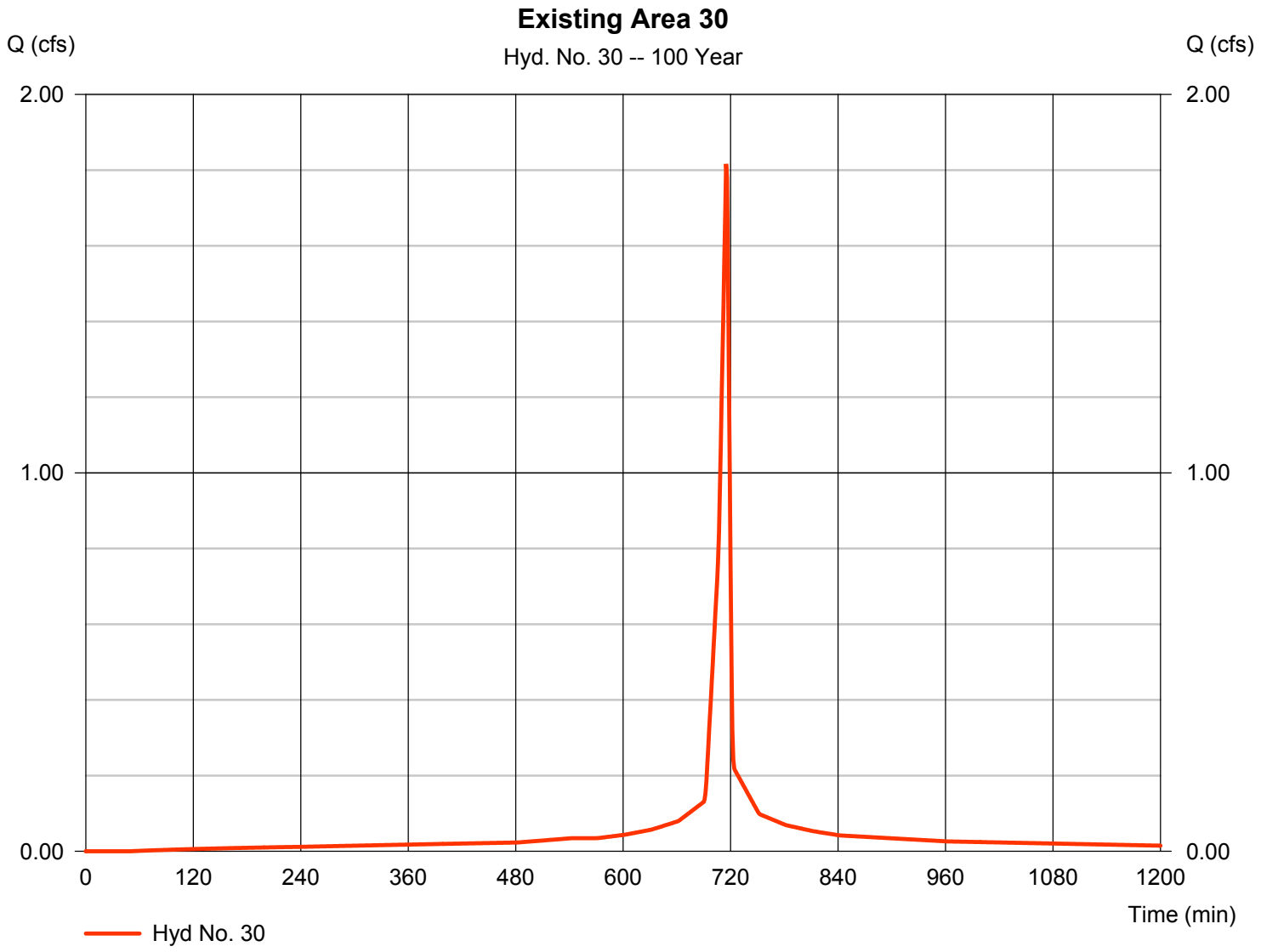
Hydrograph Report

Hyd. No. 30

Existing Area 30

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.816 cfs
Storm frequency	=	100 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	3,888 cuft
Drainage area	=	0.160 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.20 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.150 x 98) + (0.008 x 79)] / 0.160



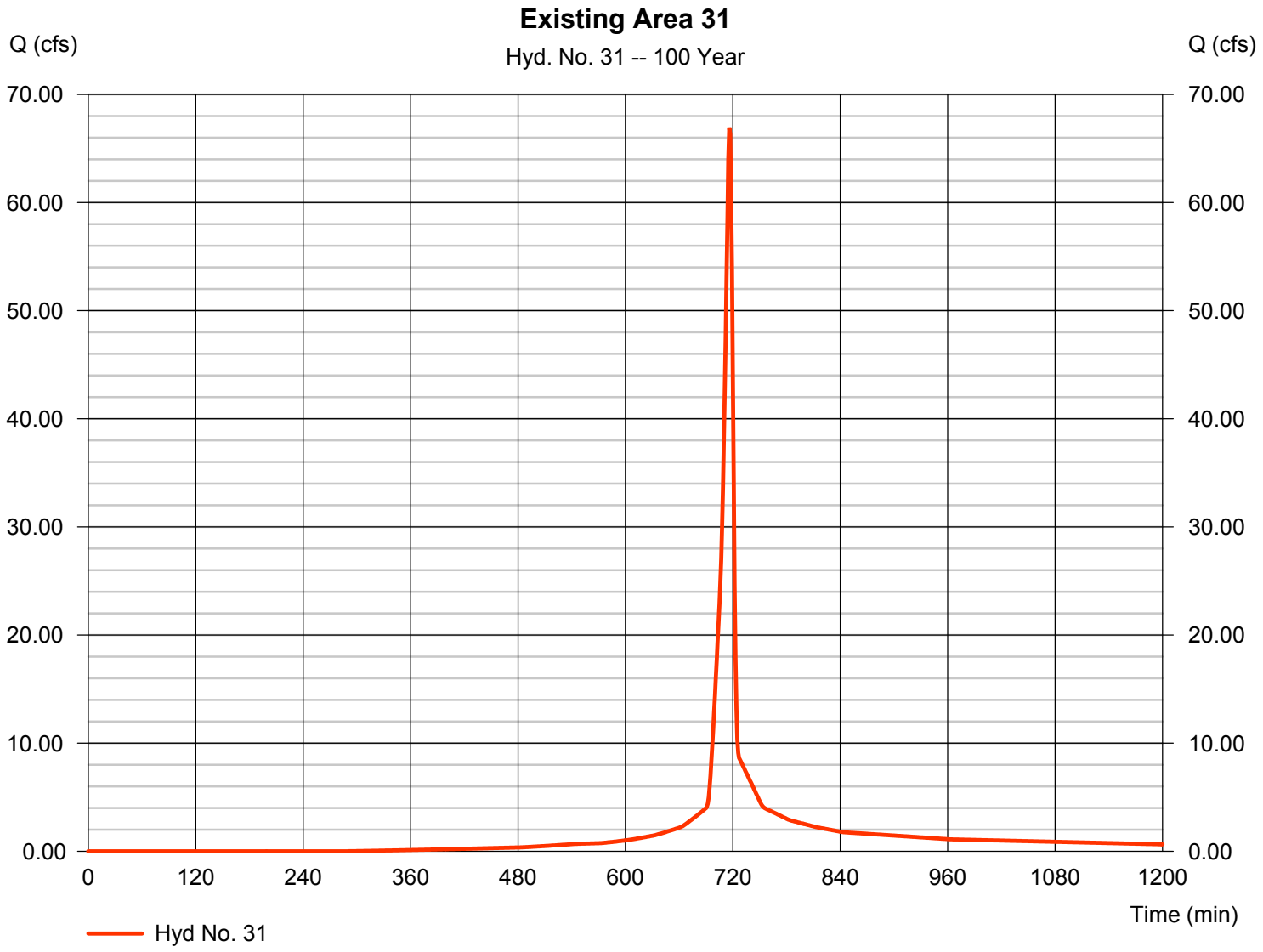
Hydrograph Report

Hyd. No. 31

Existing Area 31

Hydrograph type	=	SCS Runoff	Peak discharge	=	66.87 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	133,545 cuft
Drainage area	=	6.830 ac	Curve number	=	82*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.80 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.950 x 98) + (5.879 x 79)] / 6.830

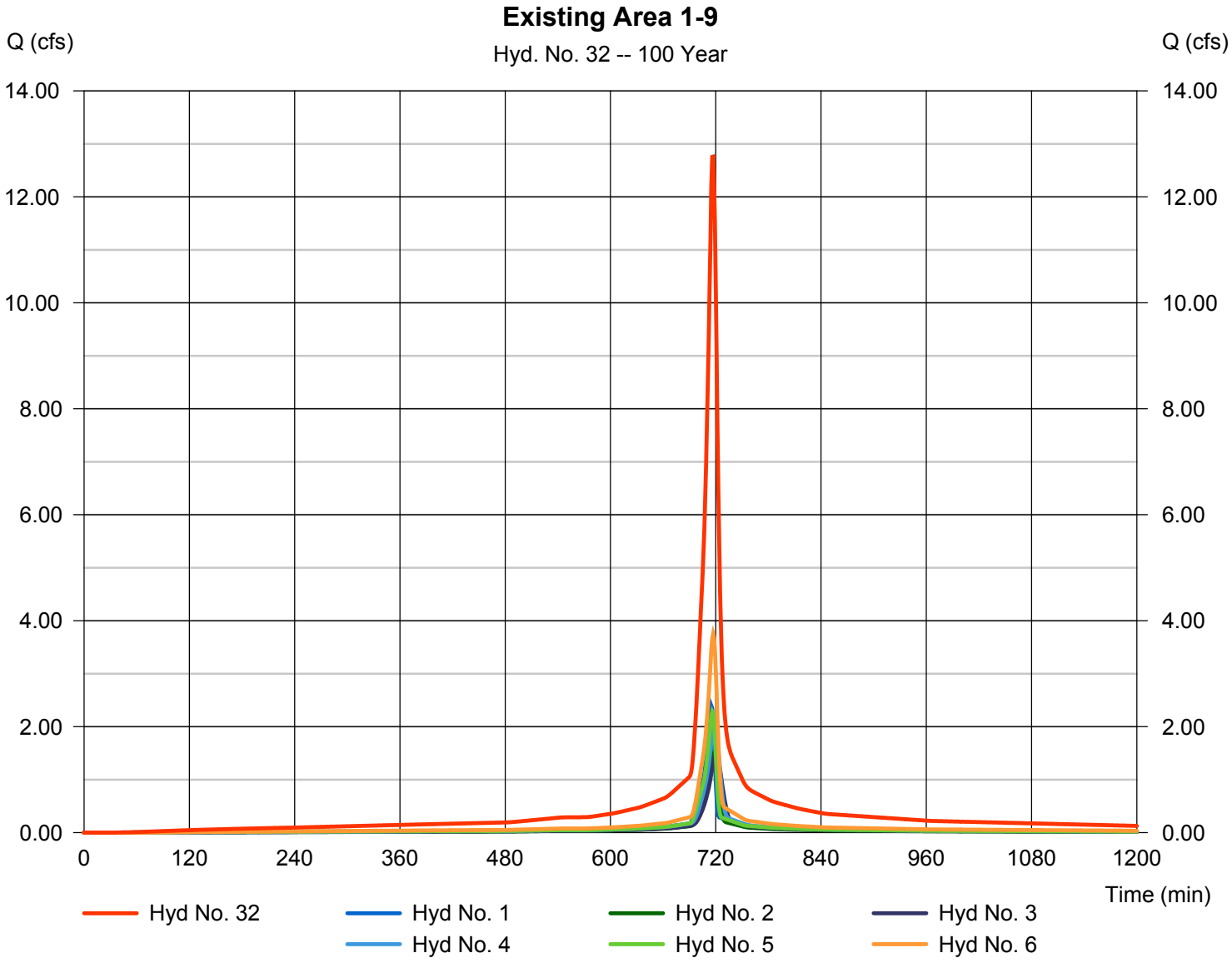


Hydrograph Report

Hyd. No. 32

Existing Area 1-9

Hydrograph type	= Combine	Peak discharge	= 12.76 cfs
Storm frequency	= 100 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 32,826 cuft
Inflow hyds.	= 1, 2, 3, 4, 5, 6	Contrib. drain. area	= 1.280 ac

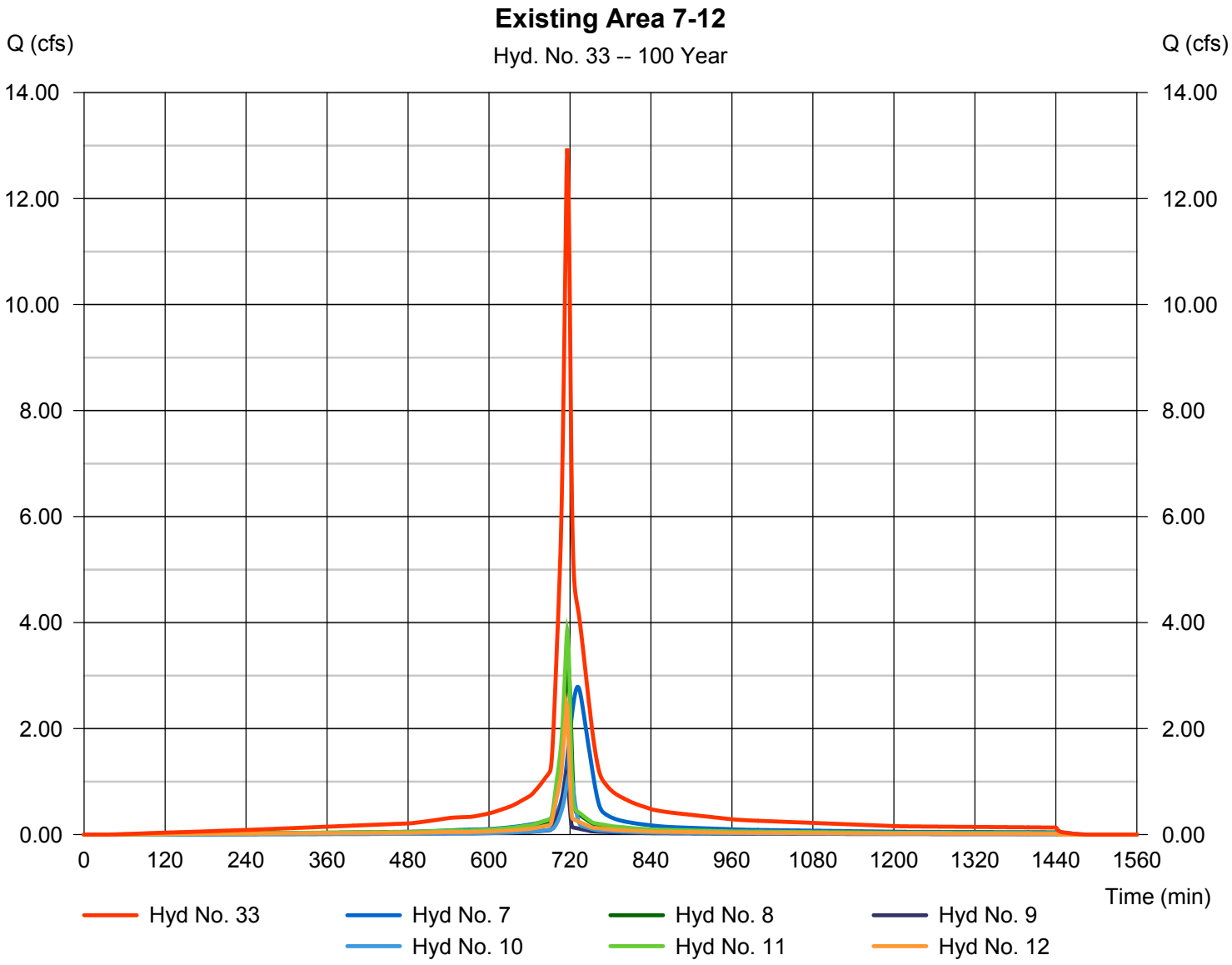


Hydrograph Report

Hyd. No. 33

Existing Area 7-12

Hydrograph type	= Combine	Peak discharge	= 12.94 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 39,550 cuft
Inflow hyds.	= 7, 8, 9, 10, 11, 12	Contrib. drain. area	= 1.597 ac

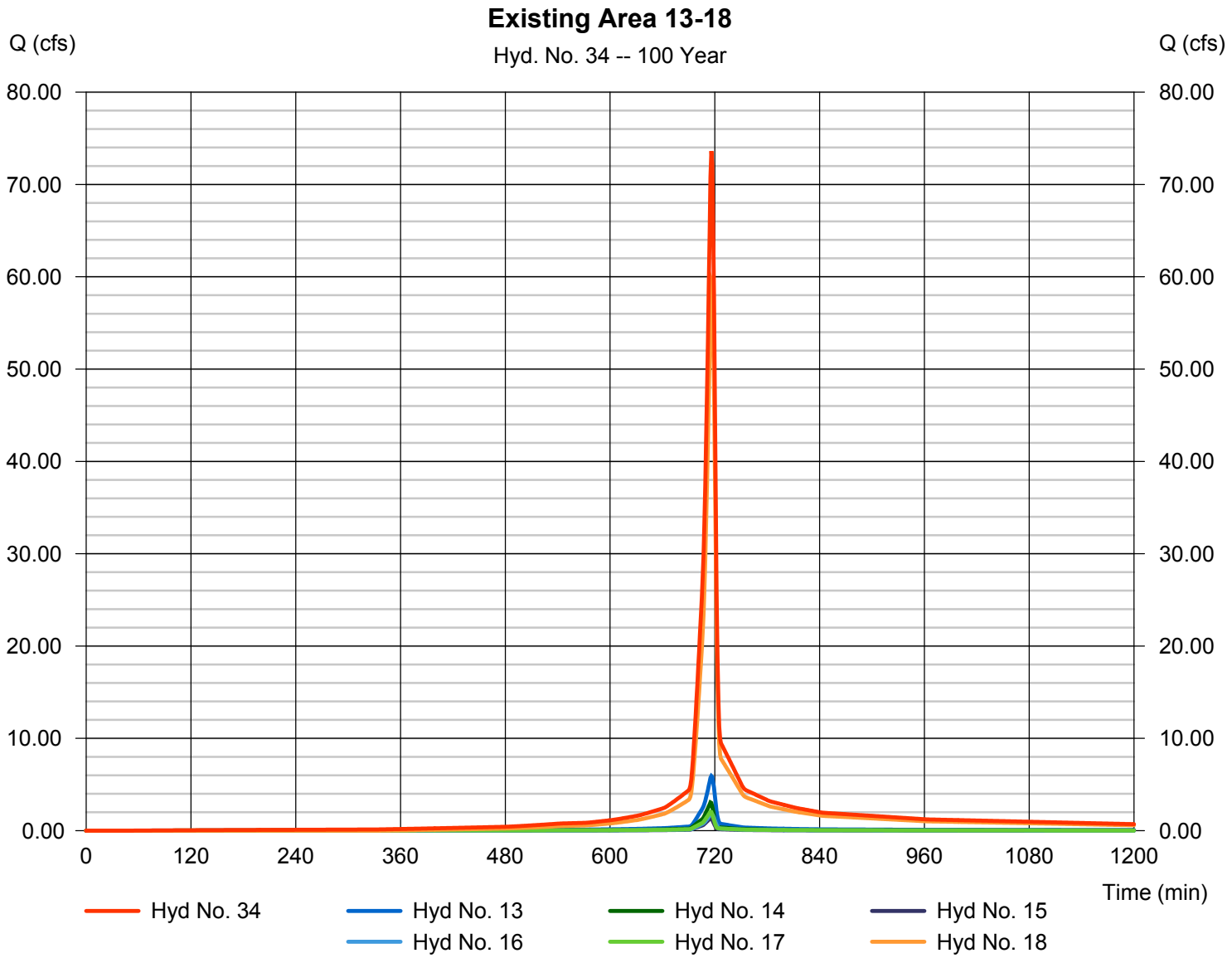


Hydrograph Report

Hyd. No. 34

Existing Area 13-18

Hydrograph type	= Combine	Peak discharge	= 73.62 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 148,649 cuft
Inflow hyds.	= 13, 14, 15, 16, 17, 18	Contrib. drain. area	= 7.650 ac

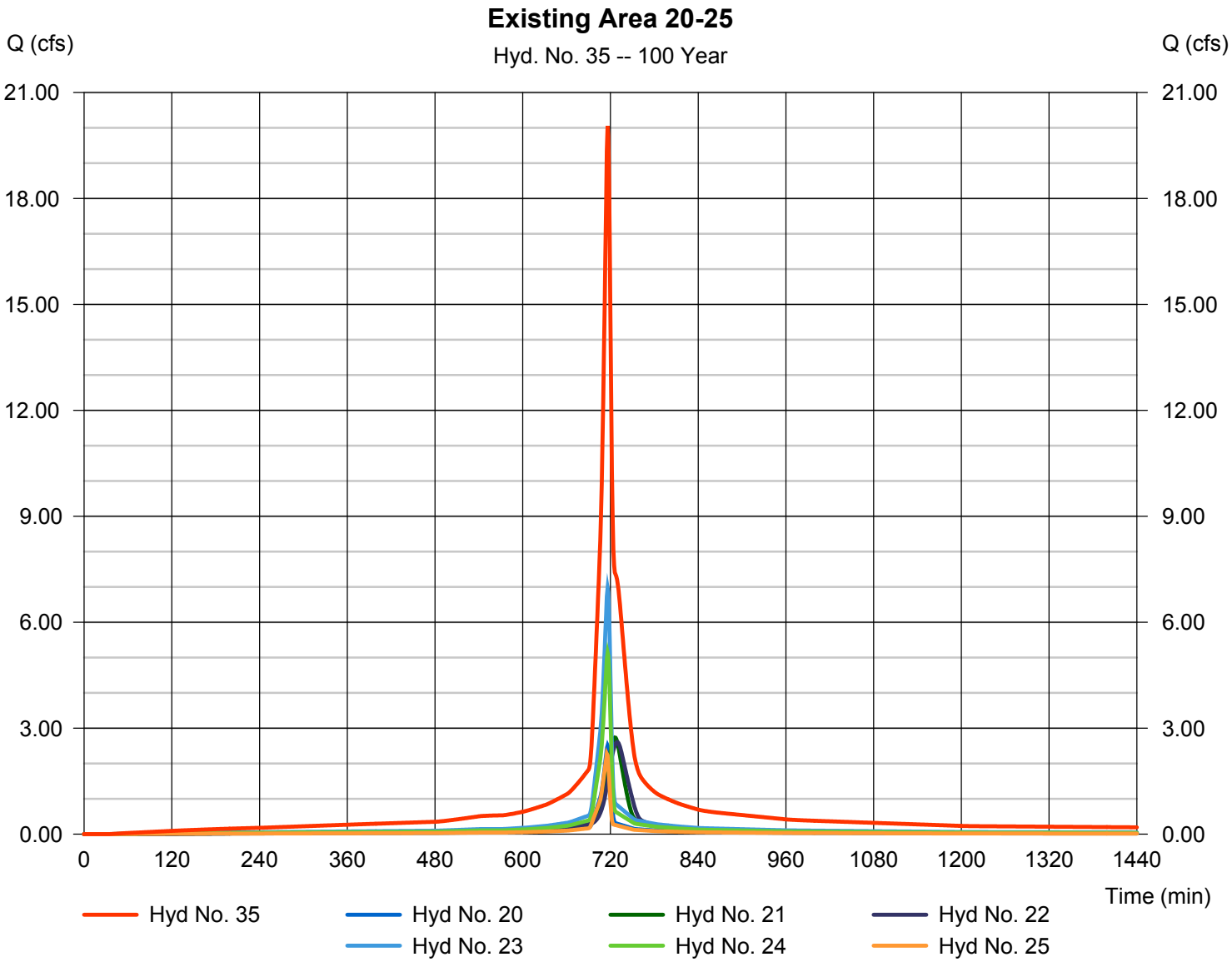


Hydrograph Report

Hyd. No. 35

Existing Area 20-25

Hydrograph type	= Combine	Peak discharge	= 20.05 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 59,980 cuft
Inflow hyds.	= 20, 21, 22, 23, 24, 25	Contrib. drain. area	= 2.330 ac

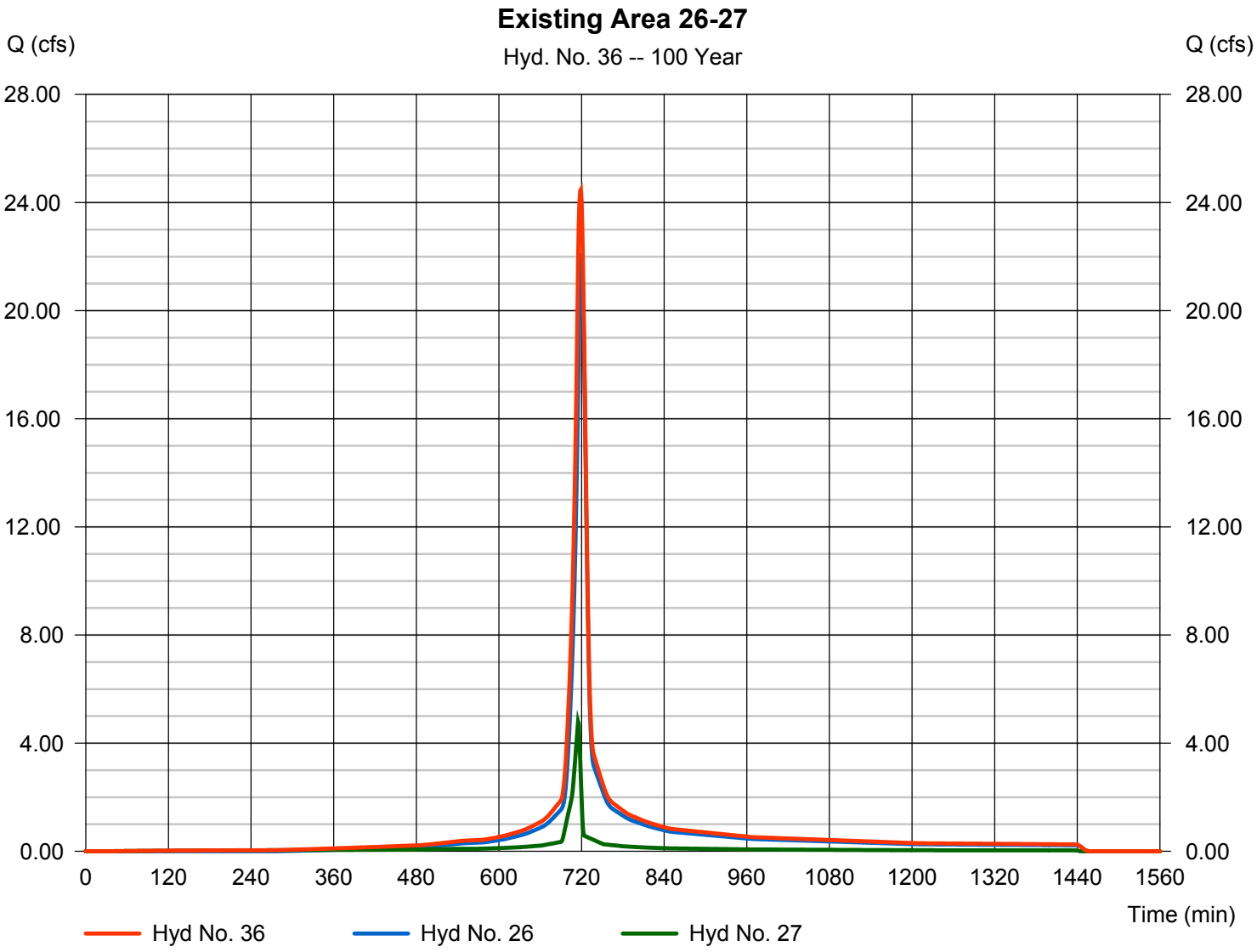


Hydrograph Report

Hyd. No. 36

Existing Area 26-27

Hydrograph type	= Combine	Peak discharge	= 24.48 cfs
Storm frequency	= 100 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 65,868 cuft
Inflow hyds.	= 26, 27	Contrib. drain. area	= 3.150 ac

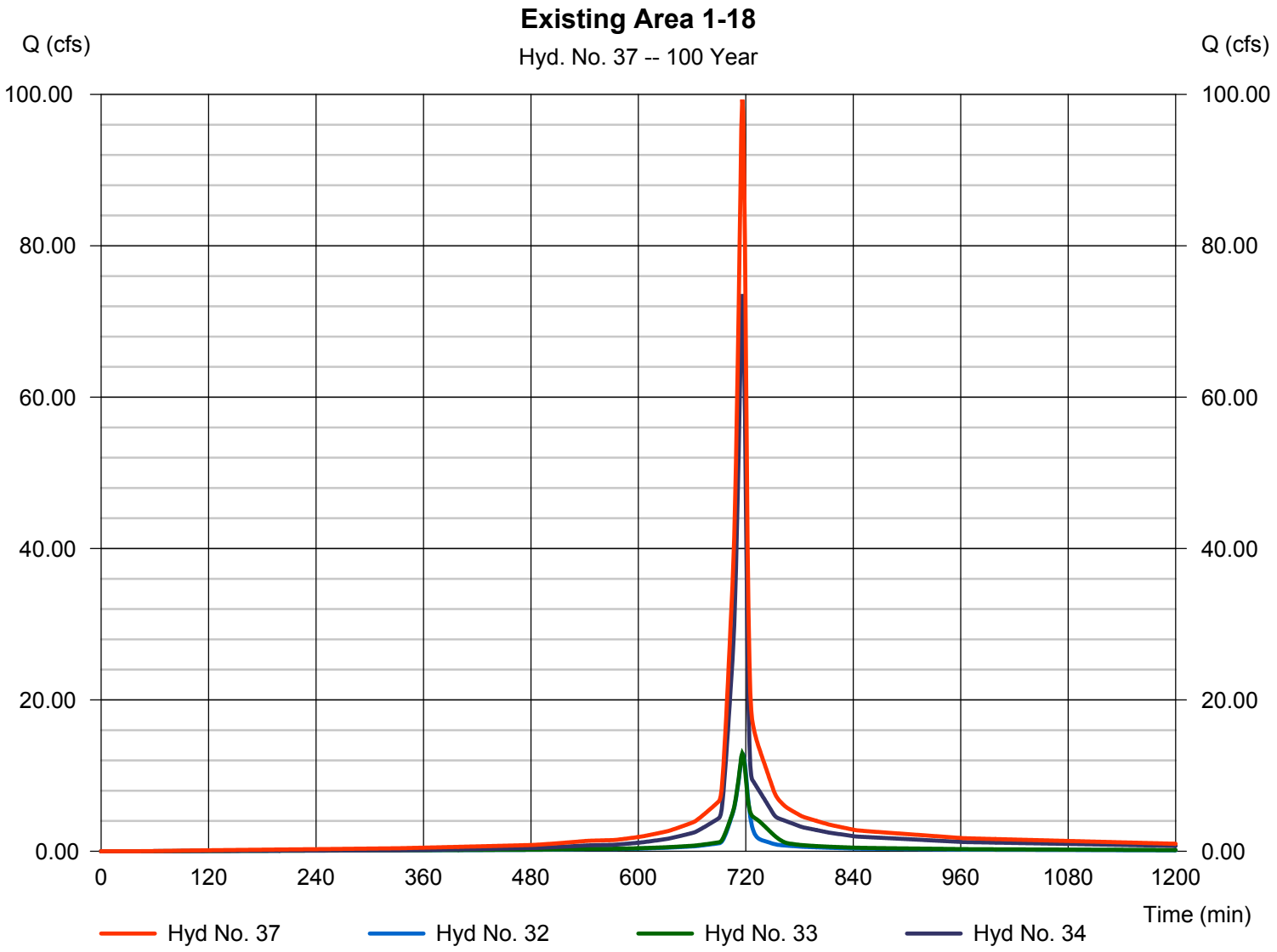


Hydrograph Report

Hyd. No. 37

Existing Area 1-18

Hydrograph type	=	Combine	Peak discharge	=	99.32 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	221,025 cuft
Inflow hyds.	=	32, 33, 34	Contrib. drain. area	=	0.000 ac

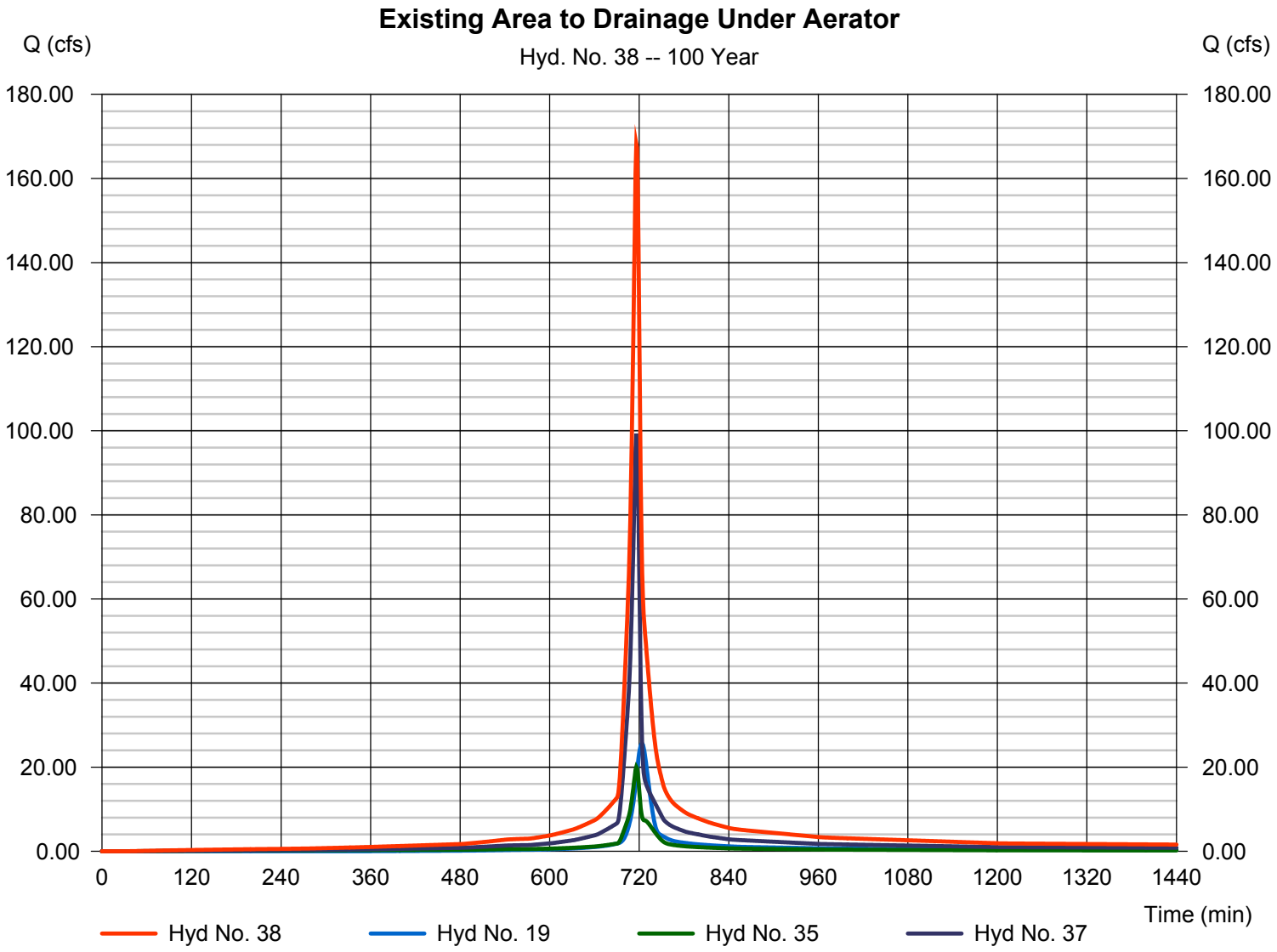


Hydrograph Report

Hyd. No. 38

Existing Area to Drainage Under Aerator

Hydrograph type	= Combine	Peak discharge	= 168.23 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 430,798 cuft
Inflow hyds.	= 19, 35, 37	Contrib. drain. area	= 4.240 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	69.8703	13.1000	0.8658	--------
3	0.0000	0.0000	0.0000	--------
5	79.2597	14.6000	0.8369	--------
10	88.2351	15.5000	0.8279	--------
25	102.6072	16.5000	0.8217	--------
50	114.8193	17.2000	0.8199	--------
100	127.1596	17.8000	0.8186	--------

File name: SampleFHA.idf

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.69	4.61	3.89	3.38	2.99	2.69	2.44	2.24	2.07	1.93	1.81	1.70
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.57	5.43	4.65	4.08	3.65	3.30	3.02	2.79	2.59	2.42	2.27	2.15
10	7.24	6.04	5.21	4.59	4.12	3.74	3.43	3.17	2.95	2.77	2.60	2.46
25	8.25	6.95	6.03	5.34	4.80	4.38	4.02	3.73	3.48	3.26	3.07	2.91
50	9.04	7.65	6.66	5.92	5.34	4.87	4.49	4.16	3.88	3.65	3.44	3.25
100	9.83	8.36	7.30	6.50	5.87	5.36	4.94	4.59	4.29	4.03	3.80	3.60

Tc = time in minutes. Values may exceed 60.

Precip. file name: Sample.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	2.80	3.50	0.00	4.50	5.00	6.00	7.00	7.50
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

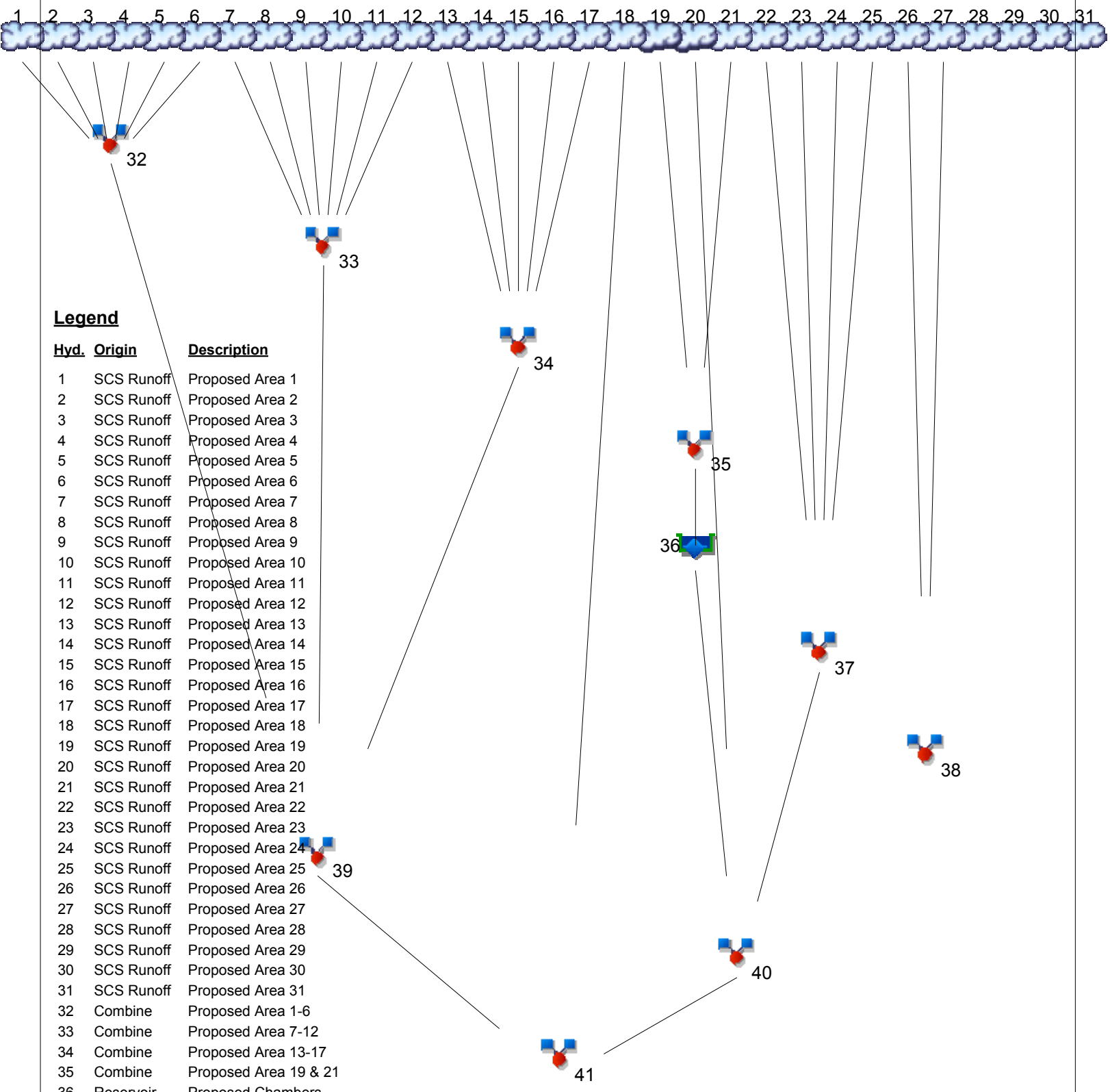
Hydraflow Table of Contents

10 - Year

25 - Year

Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020



Legend

Hyd.	Origin	Description
1	SCS Runoff	Proposed Area 1
2	SCS Runoff	Proposed Area 2
3	SCS Runoff	Proposed Area 3
4	SCS Runoff	Proposed Area 4
5	SCS Runoff	Proposed Area 5
6	SCS Runoff	Proposed Area 6
7	SCS Runoff	Proposed Area 7
8	SCS Runoff	Proposed Area 8
9	SCS Runoff	Proposed Area 9
10	SCS Runoff	Proposed Area 10
11	SCS Runoff	Proposed Area 11
12	SCS Runoff	Proposed Area 12
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19	SCS Runoff	Proposed Area 19
20	SCS Runoff	Proposed Area 20
21	SCS Runoff	Proposed Area 21
22	SCS Runoff	Proposed Area 22
23	SCS Runoff	Proposed Area 23
24	SCS Runoff	Proposed Area 24
25	SCS Runoff	Proposed Area 25
26	SCS Runoff	Proposed Area 26
27	SCS Runoff	Proposed Area 27
28	SCS Runoff	Proposed Area 28
29	SCS Runoff	Proposed Area 29
30	SCS Runoff	Proposed Area 30
31	SCS Runoff	Proposed Area 31
32	Combine	Proposed Area 1-6
33	Combine	Proposed Area 7-12
34	Combine	Proposed Area 13-17
35	Combine	Proposed Area 19 & 21
36	Reservoir	Proposed Chambers
37	Combine	Proposed Area 22-25
38	Combine	Proposed Area 26-27
39	Combine	Proposed Area 1-17
40	Combine	Proposed Area 19-25
41	Combine	Proposed Area to Drainage Under Aerator

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	0.881	-------	-------	-------	1.589	1.910	-------	2.391	Proposed Area 1
2	SCS Runoff	------	0.596	-------	-------	-------	1.076	1.293	-------	1.618	Proposed Area 2
3	SCS Runoff	------	1.094	-------	-------	-------	1.972	2.370	-------	2.967	Proposed Area 3
4	SCS Runoff	------	1.430	-------	-------	-------	2.579	3.100	-------	3.880	Proposed Area 4
5	SCS Runoff	------	1.340	-------	-------	-------	2.477	2.989	-------	3.754	Proposed Area 5
6	SCS Runoff	------	0.859	-------	-------	-------	1.766	2.176	-------	2.785	Proposed Area 6
7	SCS Runoff	------	1.168	-------	-------	-------	2.130	2.565	-------	3.215	Proposed Area 7
8	SCS Runoff	------	0.420	-------	-------	-------	0.757	0.910	-------	1.138	Proposed Area 8
9	SCS Runoff	------	0.367	-------	-------	-------	0.745	0.915	-------	1.168	Proposed Area 9
10	SCS Runoff	------	1.418	-------	-------	-------	2.618	3.159	-------	3.967	Proposed Area 10
11	SCS Runoff	------	0.881	-------	-------	-------	1.589	1.910	-------	2.391	Proposed Area 11
12	SCS Runoff	------	2.151	-------	-------	-------	3.921	4.720	-------	5.917	Proposed Area 12
13	SCS Runoff	------	1.115	-------	-------	-------	2.032	2.445	-------	3.065	Proposed Area 13
14	SCS Runoff	------	0.504	-------	-------	-------	0.908	1.091	-------	1.366	Proposed Area 14
15	SCS Runoff	------	0.632	-------	-------	-------	1.185	1.433	-------	1.804	Proposed Area 15
16	SCS Runoff	------	0.756	-------	-------	-------	1.362	1.637	-------	2.049	Proposed Area 16
17	SCS Runoff	------	12.95	-------	-------	-------	33.98	44.11	-------	59.55	Proposed Area 17
18	SCS Runoff	------	5.232	-------	-------	-------	14.39	18.84	-------	25.60	Proposed Area 18
19	SCS Runoff	------	0.708	-------	-------	-------	1.278	1.535	-------	1.922	Proposed Area 19
20	SCS Runoff	------	1.096	-------	-------	-------	2.040	2.465	-------	3.100	Proposed Area 20
21	SCS Runoff	------	0.443	-------	-------	-------	0.932	1.153	-------	1.483	Proposed Area 21
22	SCS Runoff	------	0.827	-------	-------	-------	1.538	1.858	-------	2.336	Proposed Area 22
23	SCS Runoff	------	2.566	-------	-------	-------	4.628	5.561	-------	6.961	Proposed Area 23
24	SCS Runoff	------	1.893	-------	-------	-------	3.414	4.103	-------	5.135	Proposed Area 24
25	SCS Runoff	------	0.840	-------	-------	-------	1.514	1.819	-------	2.277	Proposed Area 25
26	SCS Runoff	------	5.363	-------	-------	-------	13.08	16.69	-------	22.12	Proposed Area 26
27	SCS Runoff	------	1.763	-------	-------	-------	3.179	3.820	-------	4.781	Proposed Area 27
28	SCS Runoff	------	1.316	-------	-------	-------	3.611	4.724	-------	6.419	Proposed Area 28
29	SCS Runoff	------	0.661	-------	-------	-------	1.204	1.449	-------	1.816	Proposed Area 29
30	SCS Runoff	------	2.132	-------	-------	-------	5.849	7.653	-------	10.40	Proposed Area 30
31	SCS Runoff	------	16.16	-------	-------	-------	39.37	50.35	-------	66.87	Proposed Area 31
32	Combine	1, 2, 3,	5.656	-------	-------	-------	10.42	12.57	-------	15.80	Proposed Area 1-6
33	Combine	4, 5, 6, 7, 8, 9,	6.283	-------	-------	-------	11.54	13.92	-------	17.47	Proposed Area 7-12
34	Combine	10, 11, 12, 13, 14, 15, 16, 17,	15.66	-------	-------	-------	39.33	50.61	-------	67.70	Proposed Area 13-17

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)							Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
35	Combine	19, 21,	0.963	-------	-------	-------	1.844	2.244	-------	2.843	Proposed Area 19 & 21
36	Reservoir	35	0.928	-------	-------	-------	1.794	2.171	-------	2.555	Proposed Chambers
37	Combine	22, 23, 24,	5.797	-------	-------	-------	10.50	12.63	-------	15.81	Proposed Area 22-25
38	Combine	25, 26, 27,	6.201	-------	-------	-------	14.61	18.55	-------	24.48	Proposed Area 26-27
39	Combine	32, 33, 34,	27.60	-------	-------	-------	61.29	77.10	-------	100.97	Proposed Area 1-17
40	Combine	20, 36, 37,	7.146	-------	-------	-------	13.12	15.82	-------	19.82	Proposed Area 19-25
41	Combine	18, 39, 40	37.85	-------	-------	-------	83.79	30.05	-------	138.24	Proposed Area to Drainage Under Ae

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.881	1	715	1,836	------	------	------	Proposed Area 1
2	SCS Runoff	0.596	1	718	1,455	------	------	------	Proposed Area 2
3	SCS Runoff	1.094	1	716	2,425	------	------	------	Proposed Area 3
4	SCS Runoff	1.430	1	716	3,171	------	------	------	Proposed Area 4
5	SCS Runoff	1.340	1	717	2,998	------	------	------	Proposed Area 5
6	SCS Runoff	0.859	1	732	3,583	------	------	------	Proposed Area 6
7	SCS Runoff	1.168	1	717	2,671	------	------	------	Proposed Area 7
8	SCS Runoff	0.420	1	715	874	------	------	------	Proposed Area 8
9	SCS Runoff	0.367	1	720	906	------	------	------	Proposed Area 9
10	SCS Runoff	1.418	1	716	2,993	------	------	------	Proposed Area 10
11	SCS Runoff	0.881	1	715	1,836	------	------	------	Proposed Area 11
12	SCS Runoff	2.151	1	716	4,644	------	------	------	Proposed Area 12
13	SCS Runoff	1.115	1	715	2,261	------	------	------	Proposed Area 13
14	SCS Runoff	0.504	1	715	1,049	------	------	------	Proposed Area 14
15	SCS Runoff	0.632	1	716	1,309	------	------	------	Proposed Area 15
16	SCS Runoff	0.756	1	715	1,574	------	------	------	Proposed Area 16
17	SCS Runoff	12.95	1	717	24,264	------	------	------	Proposed Area 17
18	SCS Runoff	5.232	1	725	15,892	------	------	------	Proposed Area 18
19	SCS Runoff	0.708	1	718	1,728	------	------	------	Proposed Area 19
20	SCS Runoff	1.096	1	729	4,413	------	------	------	Proposed Area 20
21	SCS Runoff	0.443	1	732	1,843	------	------	------	Proposed Area 21
22	SCS Runoff	0.827	1	726	2,966	------	------	------	Proposed Area 22
23	SCS Runoff	2.566	1	716	5,689	------	------	------	Proposed Area 23
24	SCS Runoff	1.893	1	716	4,197	------	------	------	Proposed Area 24
25	SCS Runoff	0.840	1	715	1,749	------	------	------	Proposed Area 25
26	SCS Runoff	5.363	1	720	12,985	------	------	------	Proposed Area 26
27	SCS Runoff	1.763	1	715	3,672	------	------	------	Proposed Area 27
28	SCS Runoff	1.316	1	724	3,839	------	------	------	Proposed Area 28
29	SCS Runoff	0.661	1	715	1,340	------	------	------	Proposed Area 29
30	SCS Runoff	2.132	1	724	6,219	------	------	------	Proposed Area 30
31	SCS Runoff	16.16	1	717	30,333	------	------	------	Proposed Area 31
32	Combine	5.656	1	716	15,467	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17,	------	------	Proposed Area 1-6
33	Combine	6.283	1	716	13,923		------	------	Proposed Area 7-12
34	Combine	15.66	1	716	30,457		------	------	Proposed Area 13-17

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
35	Combine	0.963	1	719	3,571	19, 21,	------	------	Proposed Area 19 & 21
36	Reservoir	0.928	1	720	3,568	35	352.10	169	Proposed Chambers
37	Combine	5.797	1	716	14,600	22, 23, 24,	------	------	Proposed Area 22-25
38	Combine	6.201	1	718	16,657	25, 26, 27,	------	------	Proposed Area 26-27
39	Combine	27.60	1	716	59,847	32, 33, 34,	------	------	Proposed Area 1-17
40	Combine	7.146	1	716	22,581	20, 36, 37,	------	------	Proposed Area 19-25
41	Combine	37.85	1	717	98,321	18, 39, 40	------	------	Proposed Area to Drainage Under Ae

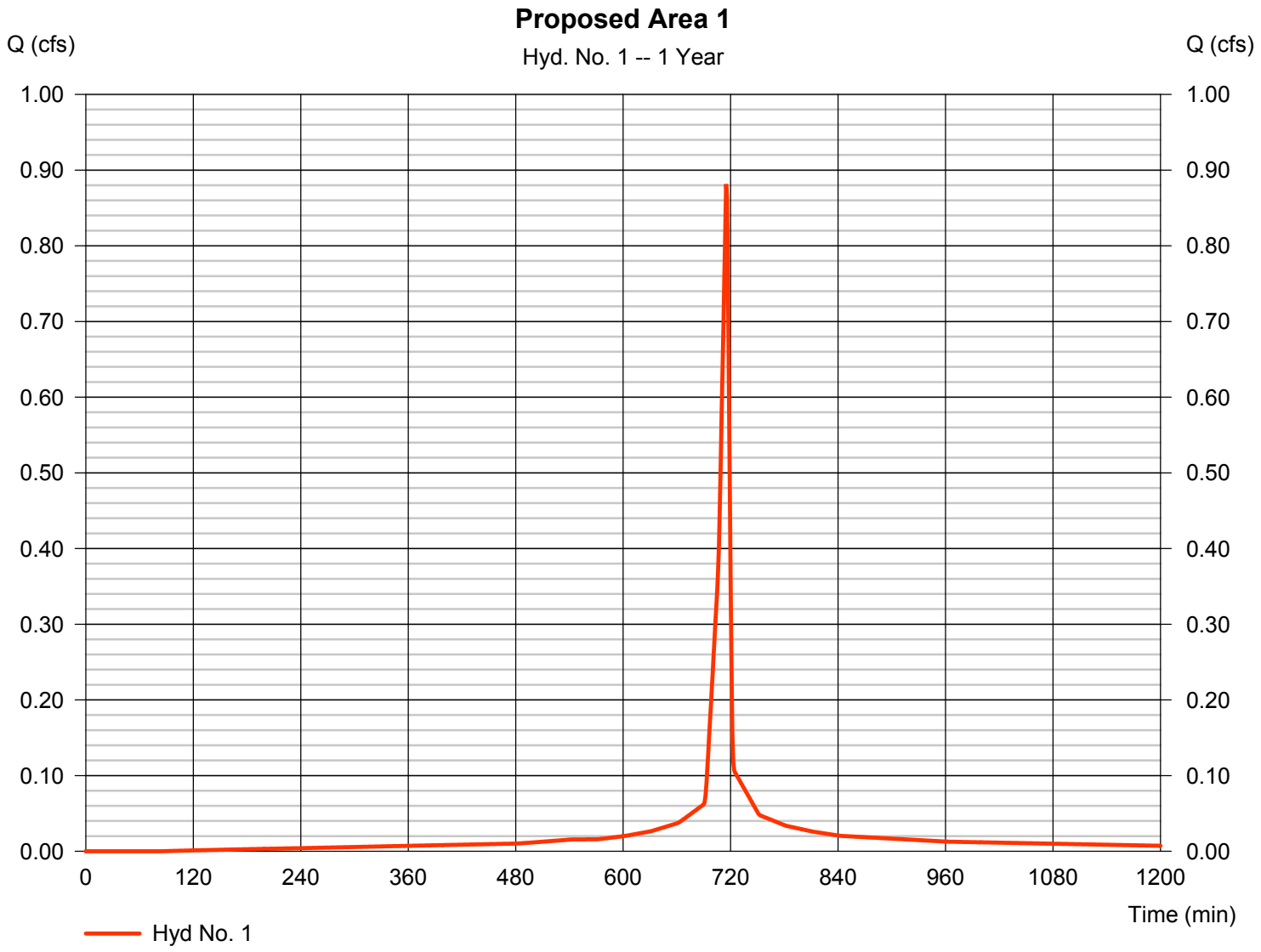
Hydrograph Report

Hyd. No. 1

Proposed Area 1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.881 cfs
Storm frequency	= 1 yrs	Time to peak	= 715 min
Time interval	= 1 min	Hyd. volume	= 1,836 cuft
Drainage area	= 0.210 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.20 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.211 x 98)] / 0.210



TR55 Tc Worksheet

Hyd. No. 1

Proposed Area 1

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 154.5		80.4		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 3.23		0.46		0.00		
Travel Time (min)	**= 1.39**	**+**	**1.81**	**+**	**0.00**	**=**	**3.20**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 3.20 min

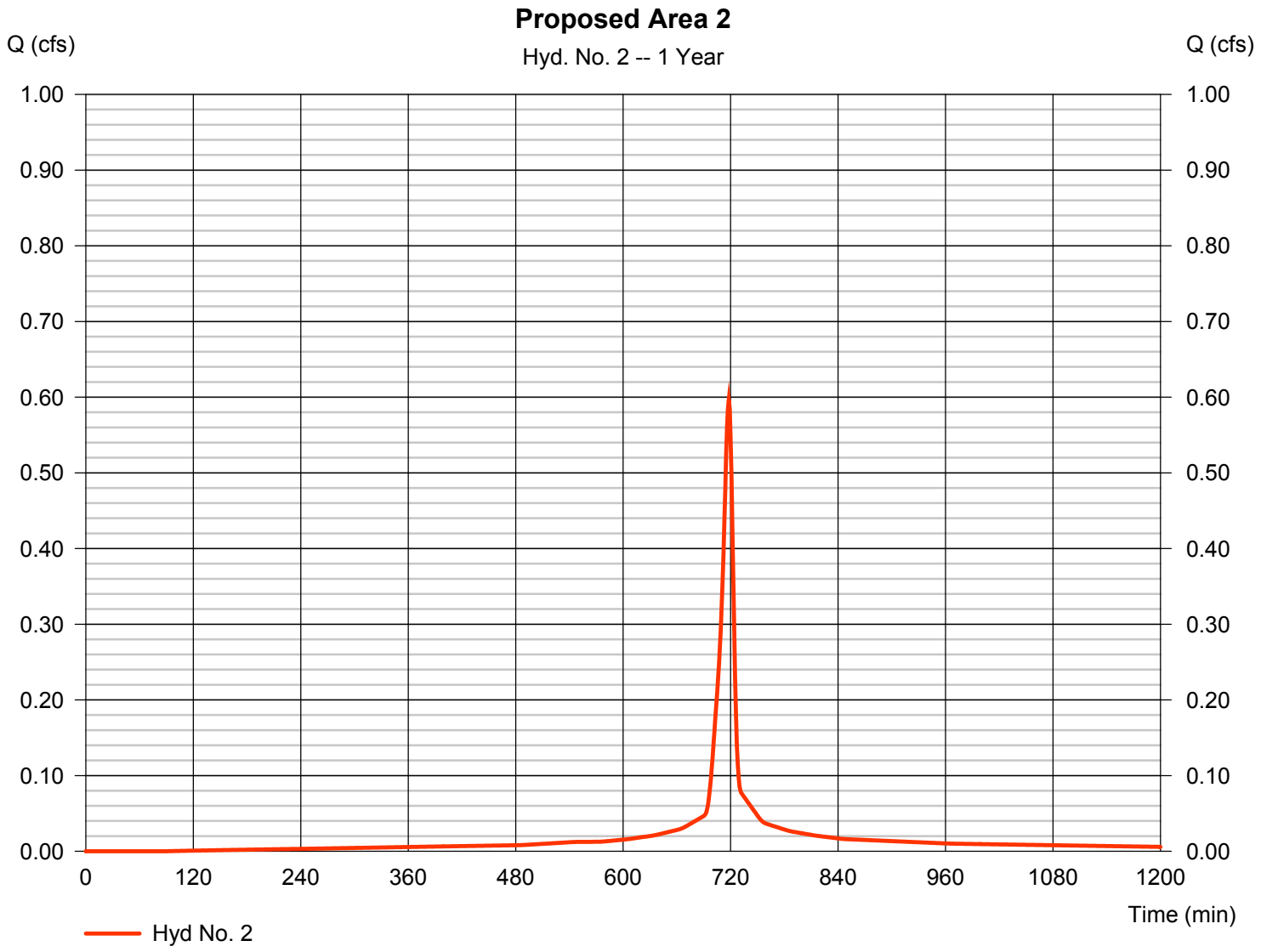
Hydrograph Report

Hyd. No. 2

Proposed Area 2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.596 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 1,455 cuft
Drainage area	= 0.160 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.90 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.152 x 98) + (0.004 x 79)] / 0.160



TR55 Tc Worksheet

Hyd. No. 2

Proposed Area 2

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 16.5		46.1		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 0.18		0.80		0.00		
Travel Time (min)	**= 5.96**	**+**	**0.93**	**+**	**0.00**	**=**	**6.88**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 6.90 min

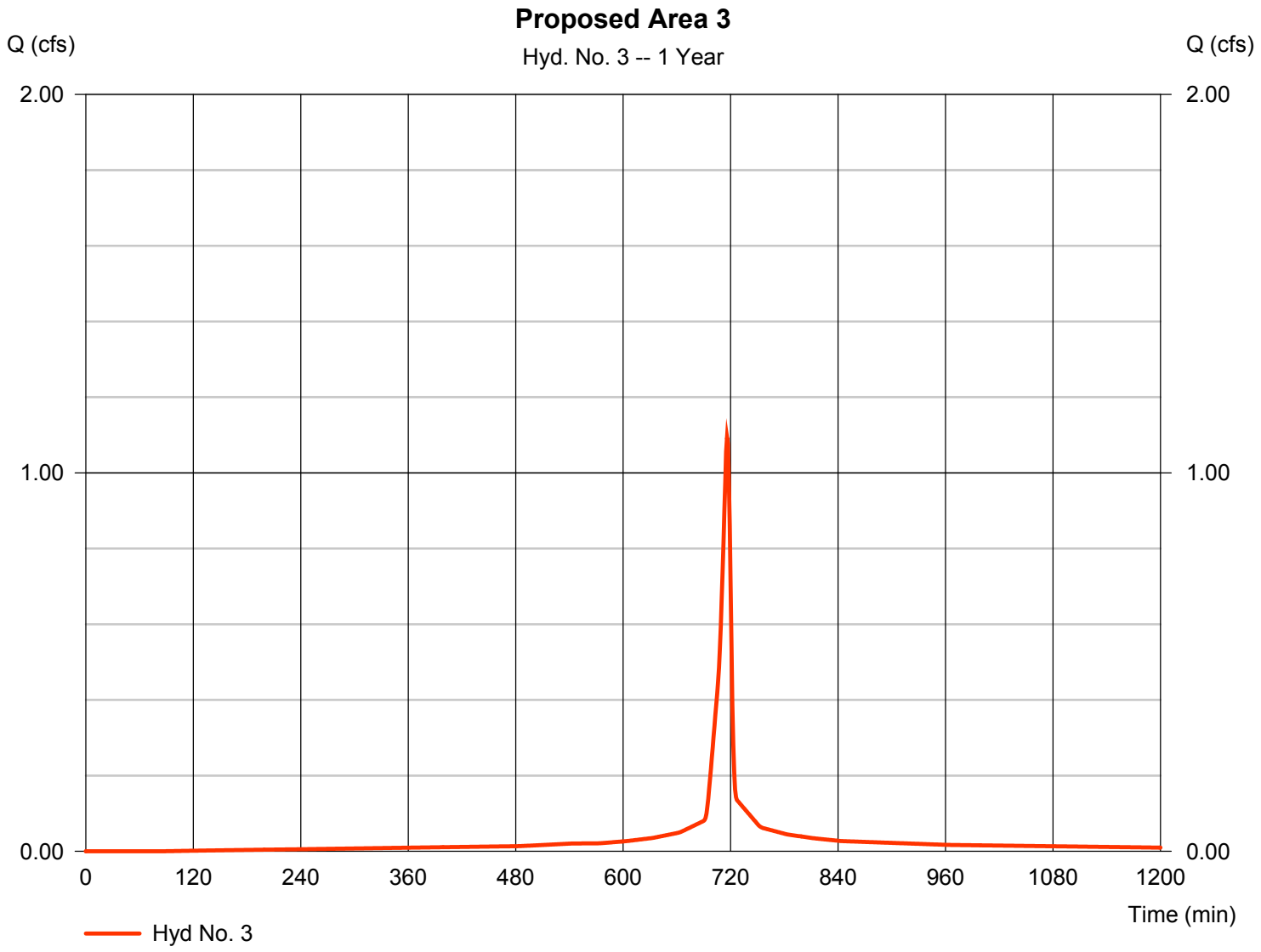
Hydrograph Report

Hyd. No. 3

Proposed Area 3

Hydrograph type	= SCS Runoff	Peak discharge	= 1.094 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 2,425 cuft
Drainage area	= 0.260 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.70 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.264 x 98)] / 0.260



TR55 Tc Worksheet

Hyd. No. 3

Proposed Area 3

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 63.1		181.6		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 0.63		1.13		0.00		
Travel Time (min)	**= 1.31**	**+**	**2.42**	**+**	**0.00**	**=**	**3.72**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 3.70 min

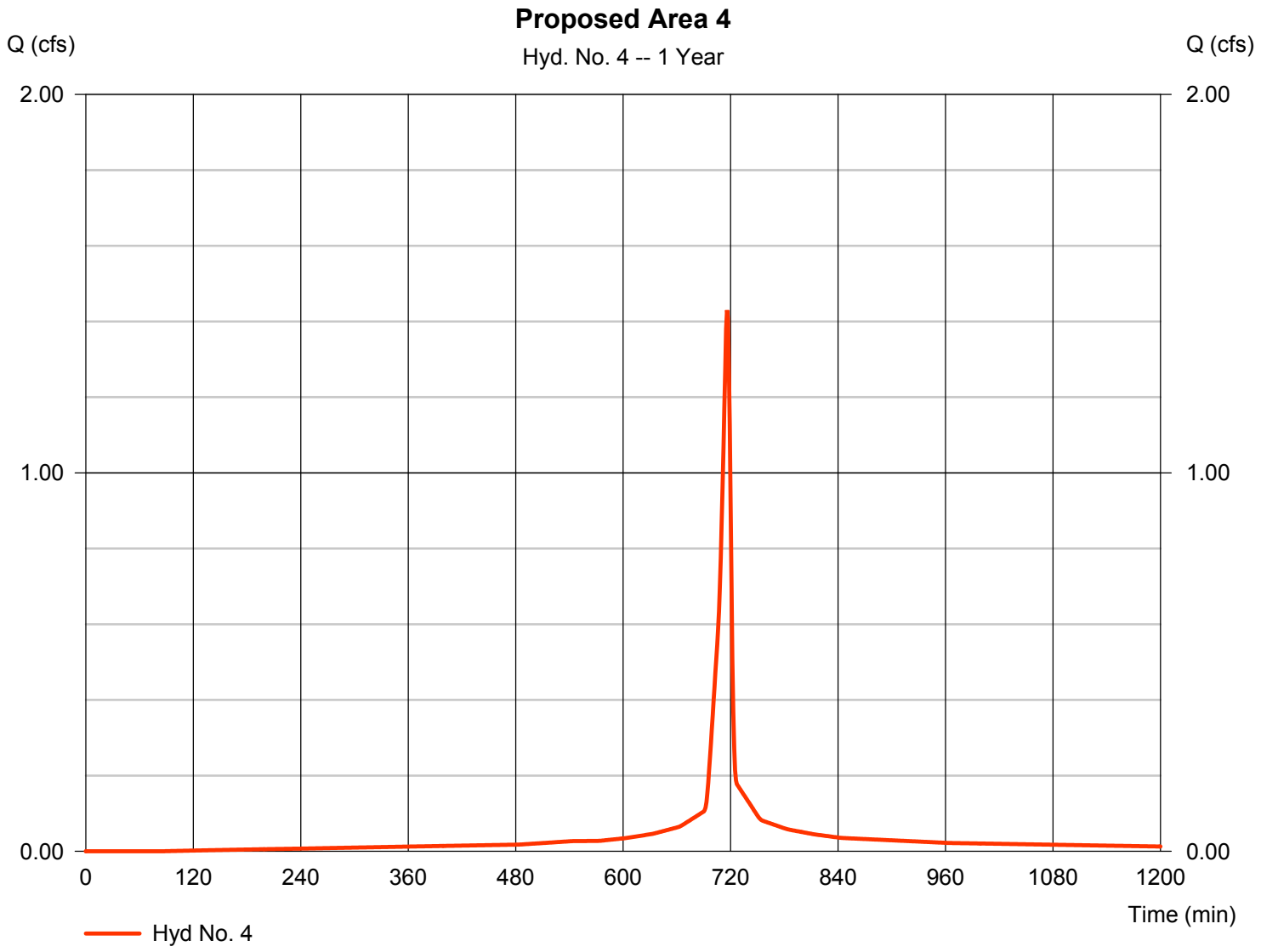
Hydrograph Report

Hyd. No. 4

Proposed Area 4

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.430 cfs
Storm frequency	=	1 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	3,171 cuft
Drainage area	=	0.340 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	3.60 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.335 x 98)] / 0.340



TR55 Tc Worksheet

Hyd. No. 4

Proposed Area 4

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 126.5		92.1		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 0.68		1.18		0.00		
Travel Time (min)	**= 2.22**	**+**	**1.38**	**+**	**0.00**	**=**	**3.60**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 3.60 min

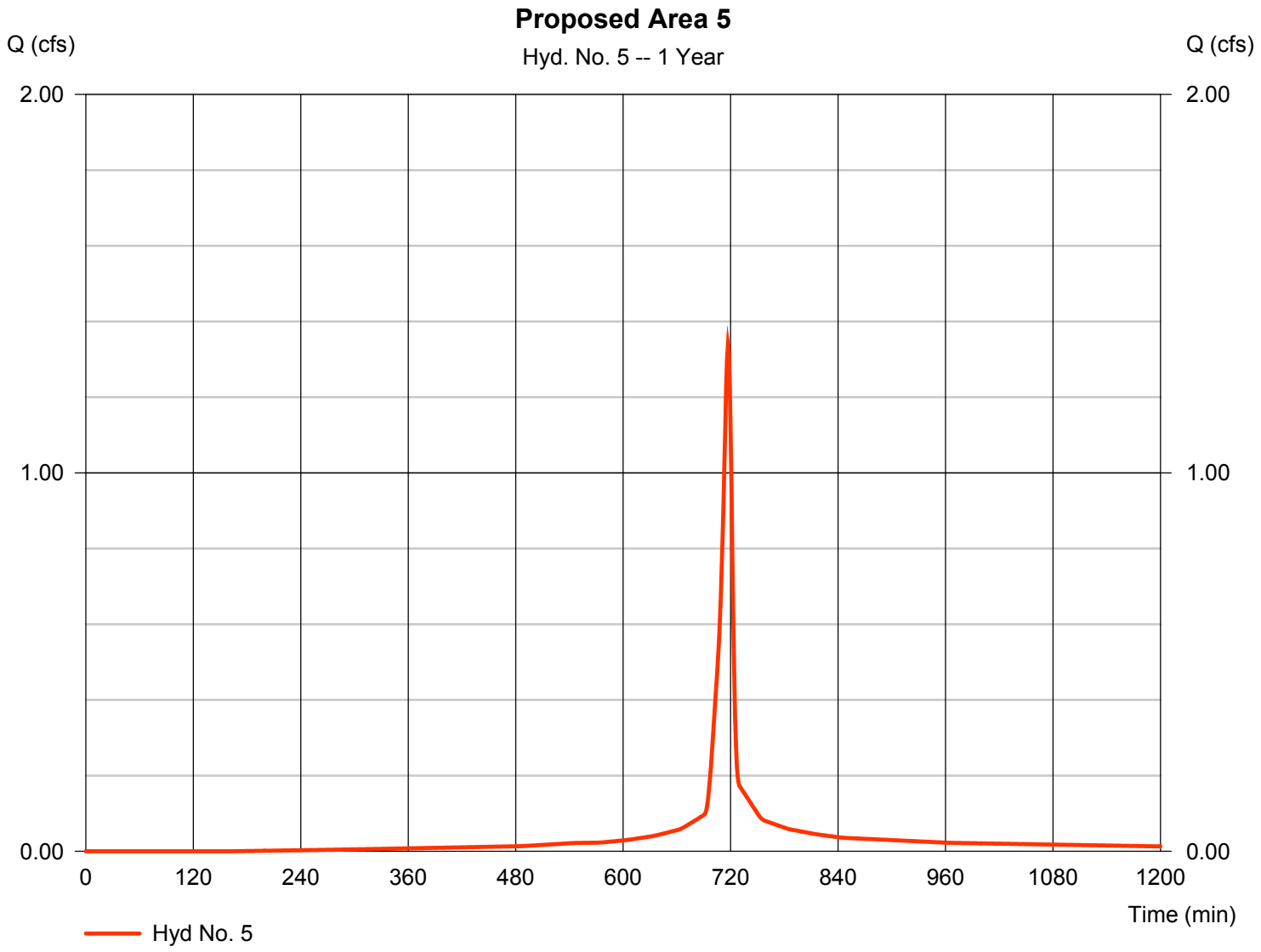
Hydrograph Report

Hyd. No. 5

Proposed Area 5

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.340 cfs
Storm frequency	=	1 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	2,998 cuft
Drainage area	=	0.340 ac	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.50 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.299 x 98) + (0.040 x 79)] / 0.340



TR55 Tc Worksheet

Hyd. No. 5

Proposed Area 5

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 22.5		159.2		17.3		
Two-year 24-hr precip. (in)	= 3.30		3.30		3.30		
Land slope (%)	= 1.29		1.79		3.88		
Travel Time (min)	**= 3.48**	**+**	**1.81**	**+**	**0.22**	**=**	**5.51**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 5.50 min

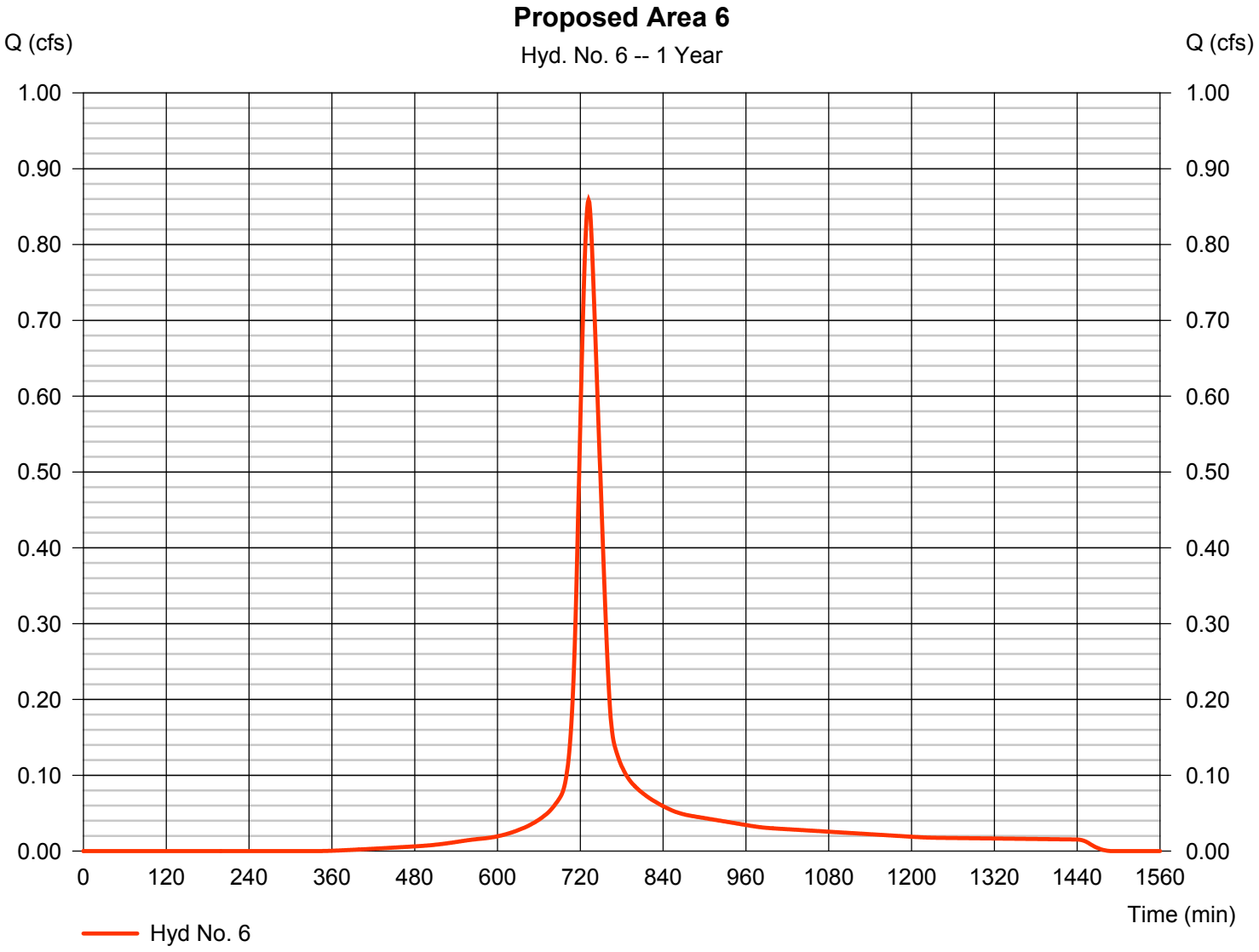
Hydrograph Report

Hyd. No. 6

Proposed Area 6

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.859 cfs
Storm frequency	=	1 yrs	Time to peak	=	732 min
Time interval	=	1 min	Hyd. volume	=	3,583 cuft
Drainage area	=	0.520 ac	Curve number	=	91*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	30.80 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.331 x 98) + (0.191 x 79)] / 0.520



TR55 Tc Worksheet

Hyd. No. 6

Proposed Area 6

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 43.0		7.3		139.6		
Two-year 24-hr precip. (in)	= 3.30		3.30		3.30		
Land slope (%)	= 0.02		5.99		2.55		
Travel Time (min)	**= 29.28**	**+**	**0.10**	**+**	**1.41**	**=**	**30.79**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 30.80 min

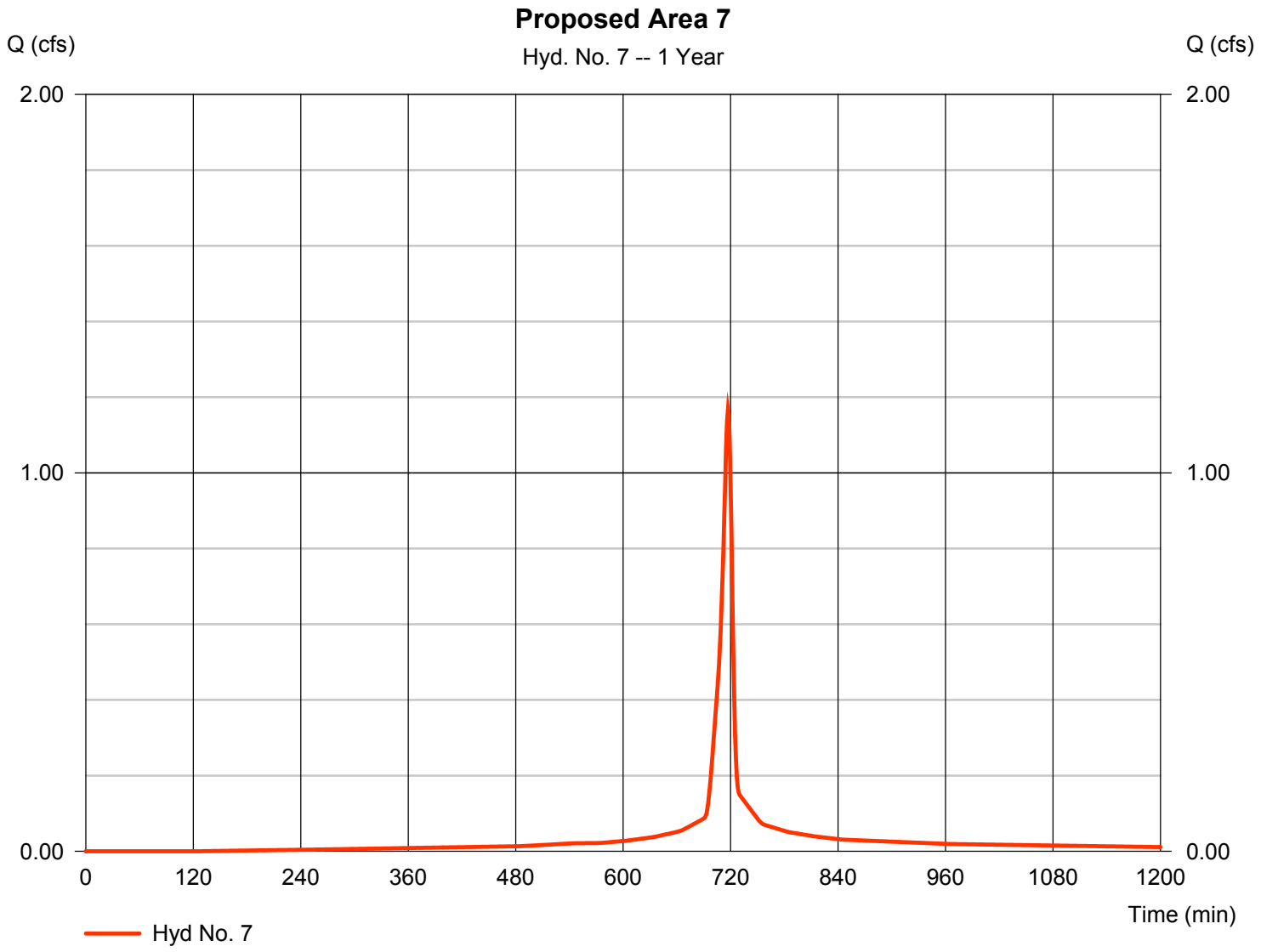
Hydrograph Report

Hyd. No. 7

Proposed Area 7

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.168 cfs
Storm frequency	=	1 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	2,671 cuft
Drainage area	=	0.290 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.272 x 98) + (0.021 x 79)] / 0.290



TR55 Tc Worksheet

Hyd. No. 7

Proposed Area 7

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 36.4		99.9		34.7		
Two-year 24-hr precip. (in)	= 3.30		3.30		3.30		
Land slope (%)	= 3.05		3.24		3.51		
Travel Time (min)	**= 3.63**	**+**	**0.98**	**+**	**0.41**	**=**	**5.02**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 5.00 min

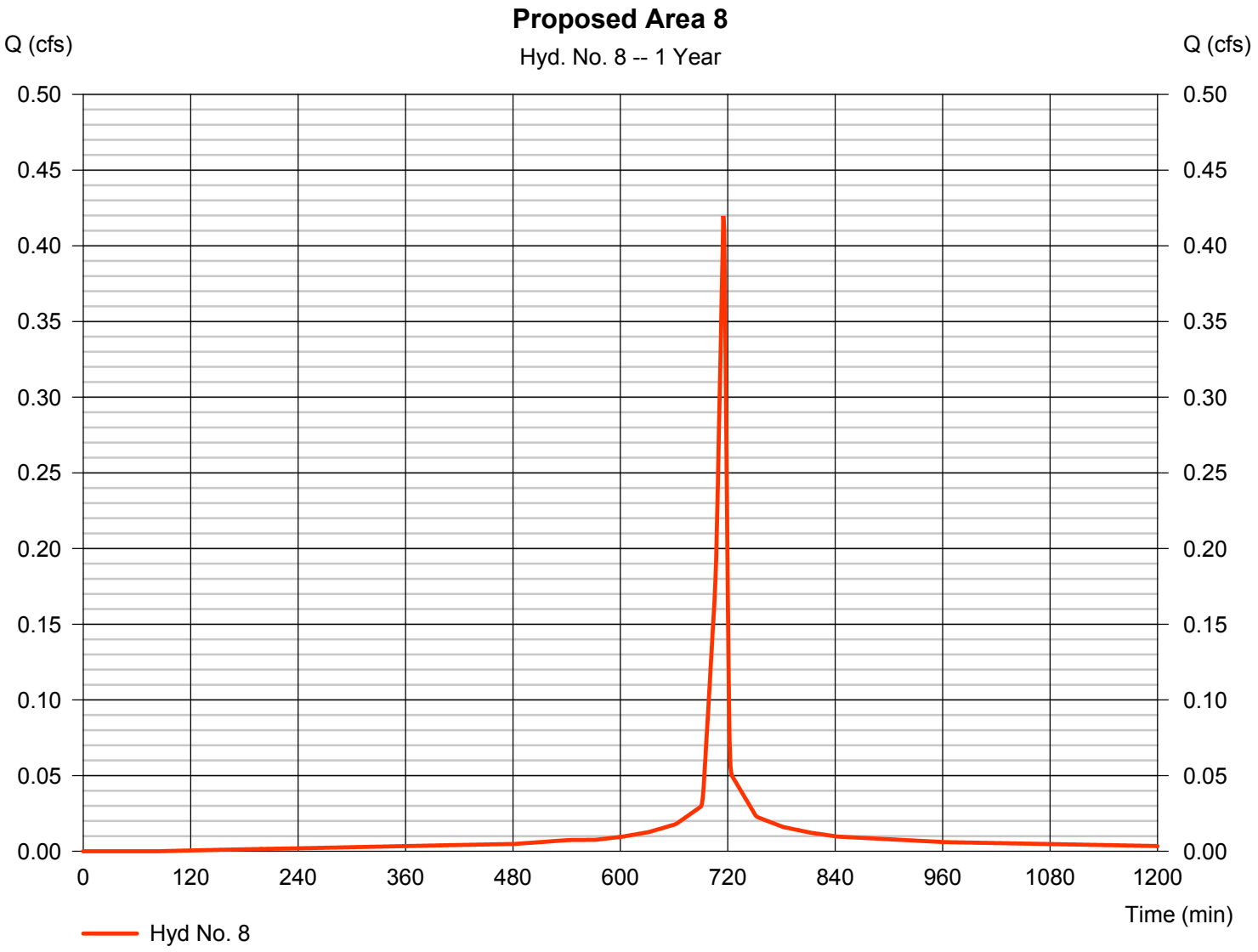
Hydrograph Report

Hyd. No. 8

Proposed Area 8

Hydrograph type	= SCS Runoff	Peak discharge	= 0.420 cfs
Storm frequency	= 1 yrs	Time to peak	= 715 min
Time interval	= 1 min	Hyd. volume	= 874 cuft
Drainage area	= 0.100 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.10 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.102 x 98)] / 0.100



TR55 Tc Worksheet

Hyd. No. 8

Proposed Area 8

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 57.8		60.0		105.3		
Two-year 24-hr precip. (in)	= 3.30		3.30		3.30		
Land slope (%)	= 5.19		3.33		3.93		
Travel Time (min)	**= 0.53**	**+**	**0.65**	**+**	**0.95**	**=**	**2.12**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 2.10 min

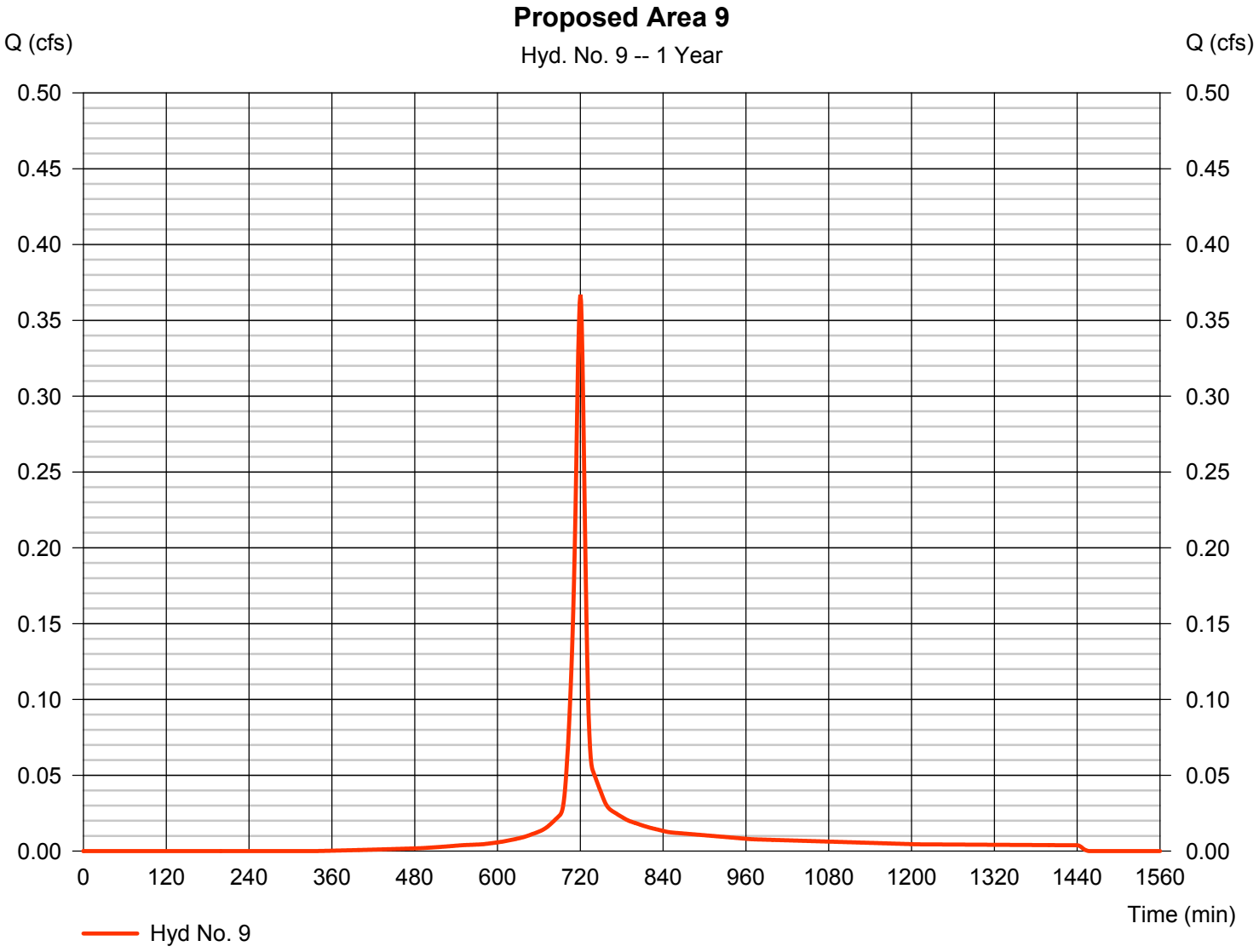
Hydrograph Report

Hyd. No. 9

Proposed Area 9

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.367 cfs
Storm frequency	=	1 yrs	Time to peak	=	720 min
Time interval	=	1 min	Hyd. volume	=	906 cuft
Drainage area	=	0.130 ac	Curve number	=	91*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	10.20 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.081 x 98) + (0.044 x 79)] / 0.130



TR55 Tc Worksheet

Hyd. No. 9

Proposed Area 9

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 141.4		5.1		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 3.59		3.91		0.00		
Travel Time (min)	**= 10.07**	**+**	**0.08**	**+**	**0.00**	**=**	**10.15**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 10.20 min

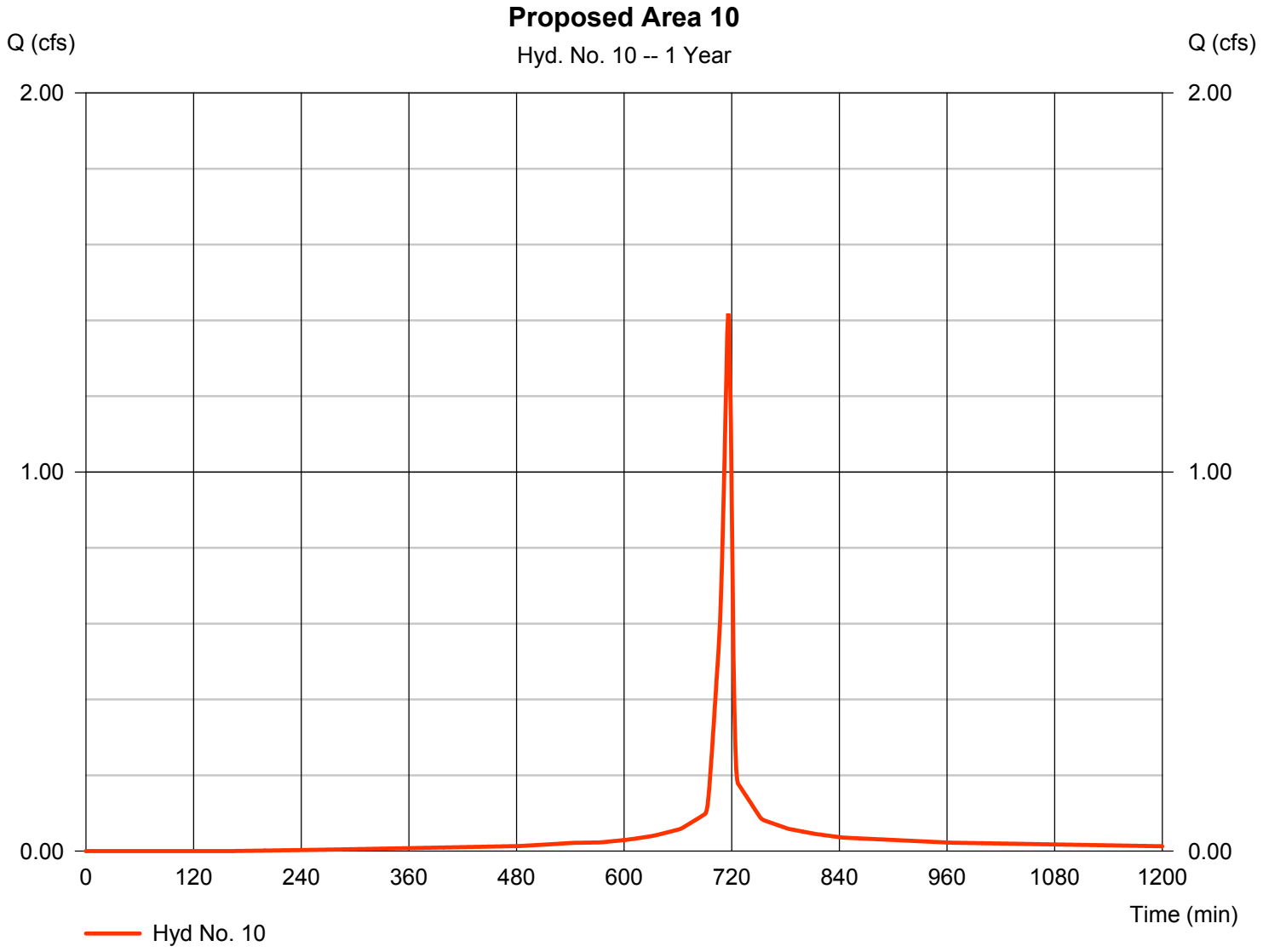
Hydrograph Report

Hyd. No. 10

Proposed Area 10

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.418 cfs
Storm frequency	=	1 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	2,993 cuft
Drainage area	=	0.350 ac	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.50 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.310 x 98) + (0.040 x 79)] / 0.350



TR55 Tc Worksheet

Hyd. No. 10

Proposed Area 10

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 58.3		2.0		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 4.55		5.10		0.00		
Travel Time (min)	**= 4.51**	**+**	**0.04**	**+**	**0.00**	**=**	**4.55**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 4.50 min

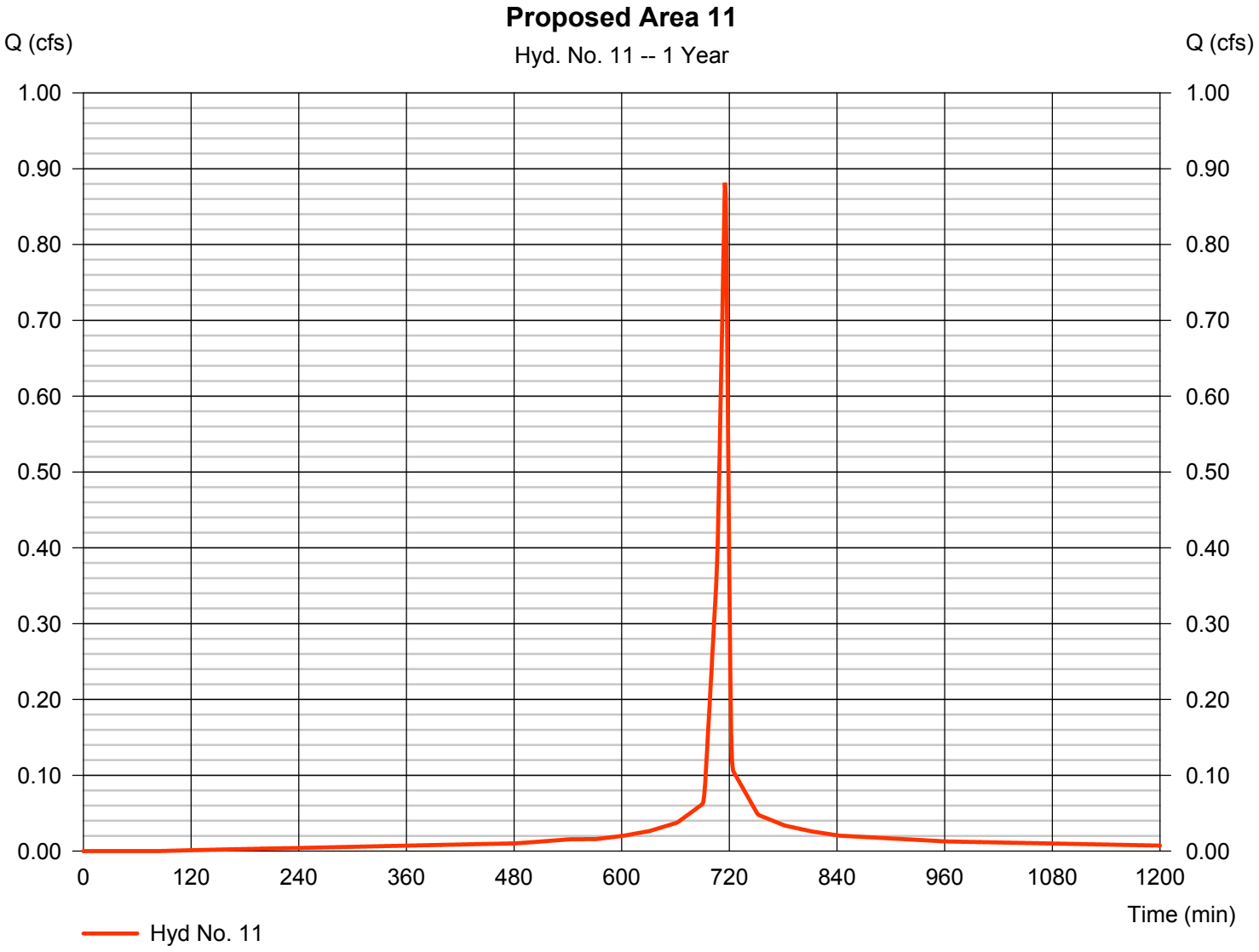
Hydrograph Report

Hyd. No. 11

Proposed Area 11

Hydrograph type	= SCS Runoff	Peak discharge	= 0.881 cfs
Storm frequency	= 1 yrs	Time to peak	= 715 min
Time interval	= 1 min	Hyd. volume	= 1,836 cuft
Drainage area	= 0.210 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.50 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.207 x 98)] / 0.210



TR55 Tc Worksheet

Hyd. No. 11

Proposed Area 11

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 49.6		148.9		46.2		
Two-year 24-hr precip. (in)	= 3.30		3.30		3.30		
Land slope (%)	= 1.70		3.36		4.35		
Travel Time (min)	**= 0.73**	**+**	**1.33**	**+**	**0.47**	**=**	**2.53**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 2.50 min

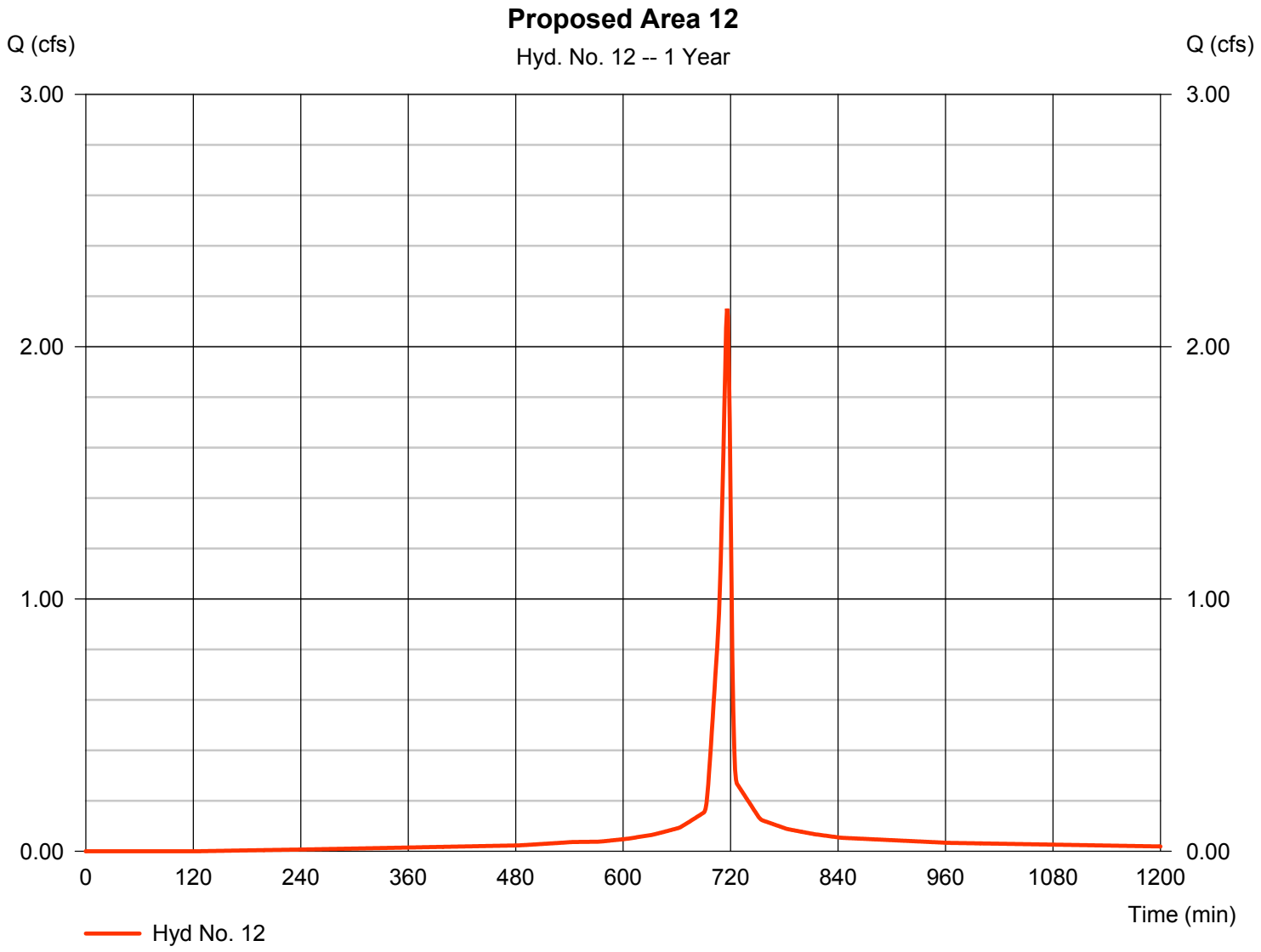
Hydrograph Report

Hyd. No. 12

Proposed Area 12

Hydrograph type	= SCS Runoff	Peak discharge	= 2.151 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 4,644 cuft
Drainage area	= 0.520 ac	Curve number	= 97*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 4.10 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.480 x 98) + (0.040 x 79)] / 0.520



TR55 Tc Worksheet

Hyd. No. 12

Proposed Area 12

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 36.7		116.0		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 4.44		4.92		0.00		
Travel Time (min)	**= 3.14**	**+**	**0.94**	**+**	**0.00**	**=**	**4.08**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 4.10 min

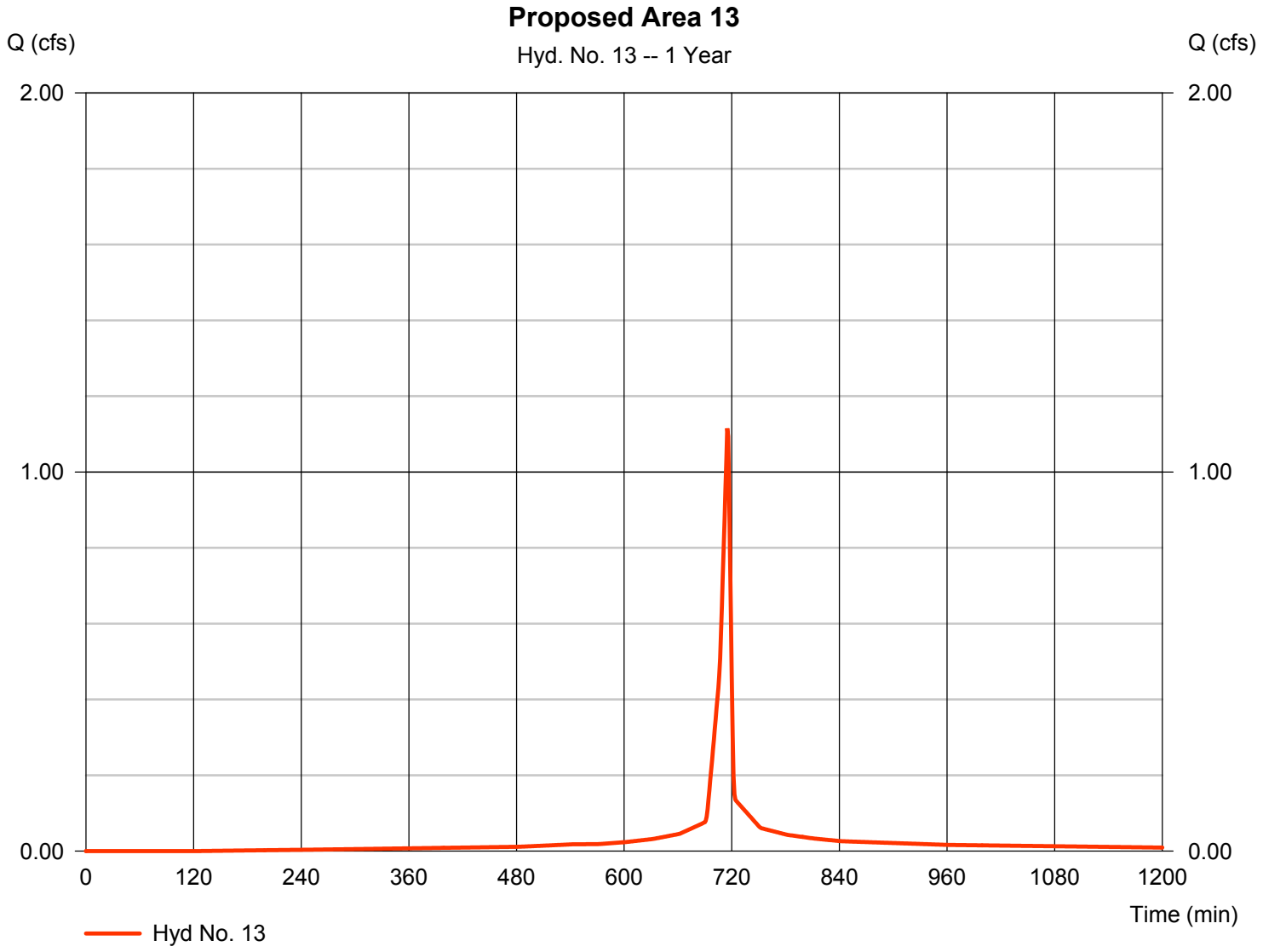
Hydrograph Report

Hyd. No. 13

Proposed Area 13

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.115 cfs
Storm frequency	=	1 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	2,261 cuft
Drainage area	=	0.270 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.50 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.260 x 98) + (0.010 x 79)] / 0.270



TR55 Tc Worksheet

Hyd. No. 13

Proposed Area 13

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 0.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 0.00		0.00		0.00		
Land slope (%)	= 0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Shallow Concentrated Flow							
Flow length (ft)	= 47.11		28.69		347.85		
Watercourse slope (%)	= 0.17		3.20		4.25		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.84		3.64		4.19		
Travel Time (min)	**= 0.94**	**+**	**0.13**	**+**	**1.38**	**=**	**2.45**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 2.50 min

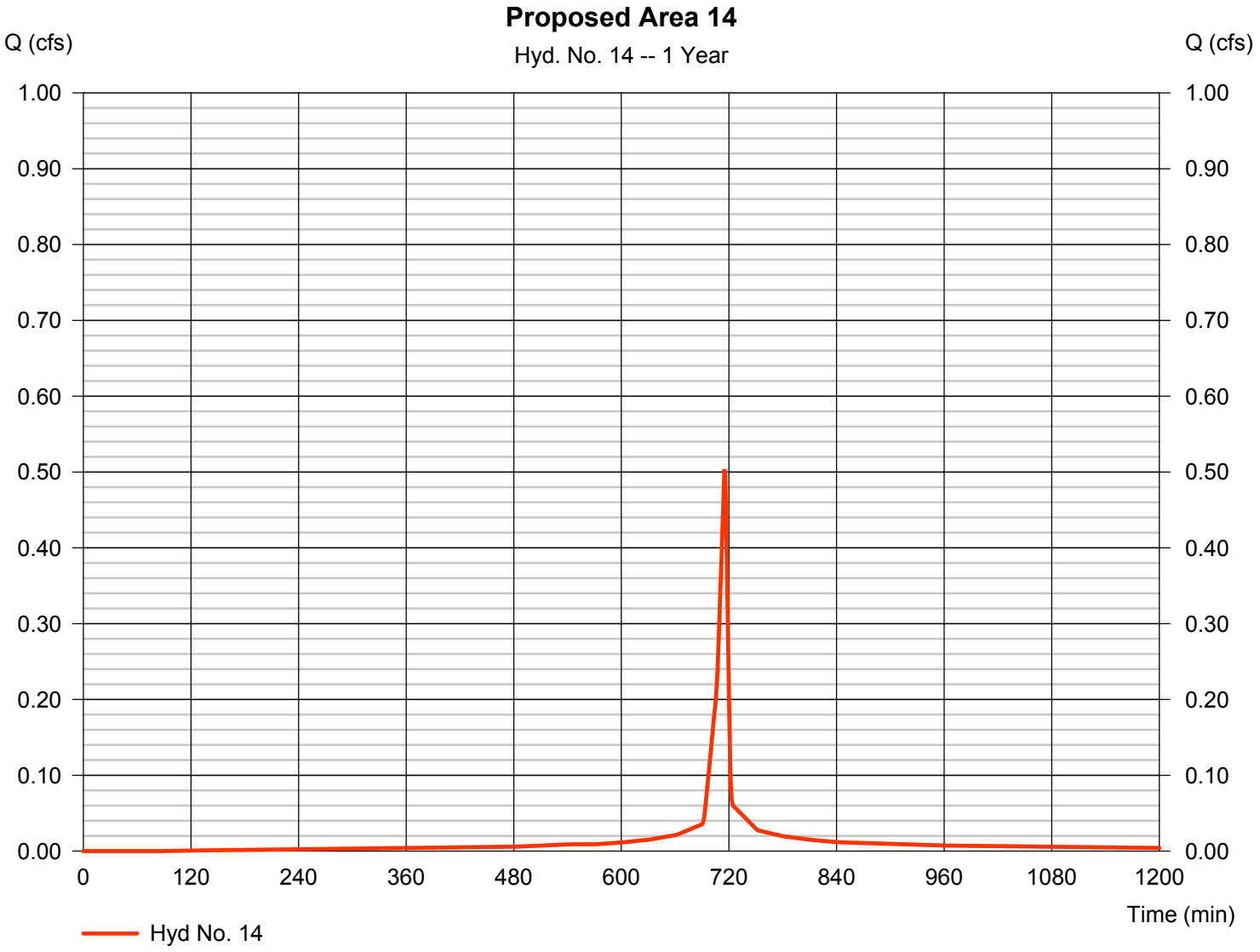
Hydrograph Report

Hyd. No. 14

Proposed Area 14

Hydrograph type	= SCS Runoff	Peak discharge	= 0.504 cfs
Storm frequency	= 1 yrs	Time to peak	= 715 min
Time interval	= 1 min	Hyd. volume	= 1,049 cuft
Drainage area	= 0.120 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 1.70 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.123 x 98)] / 0.120



TR55 Tc Worksheet

Hyd. No. 14

Proposed Area 14

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 186.3		22.4		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 4.29		4.54		0.00		
Travel Time (min)	**= 1.45**	**+**	**0.26**	**+**	**0.00**	**=**	**1.71**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 1.70 min

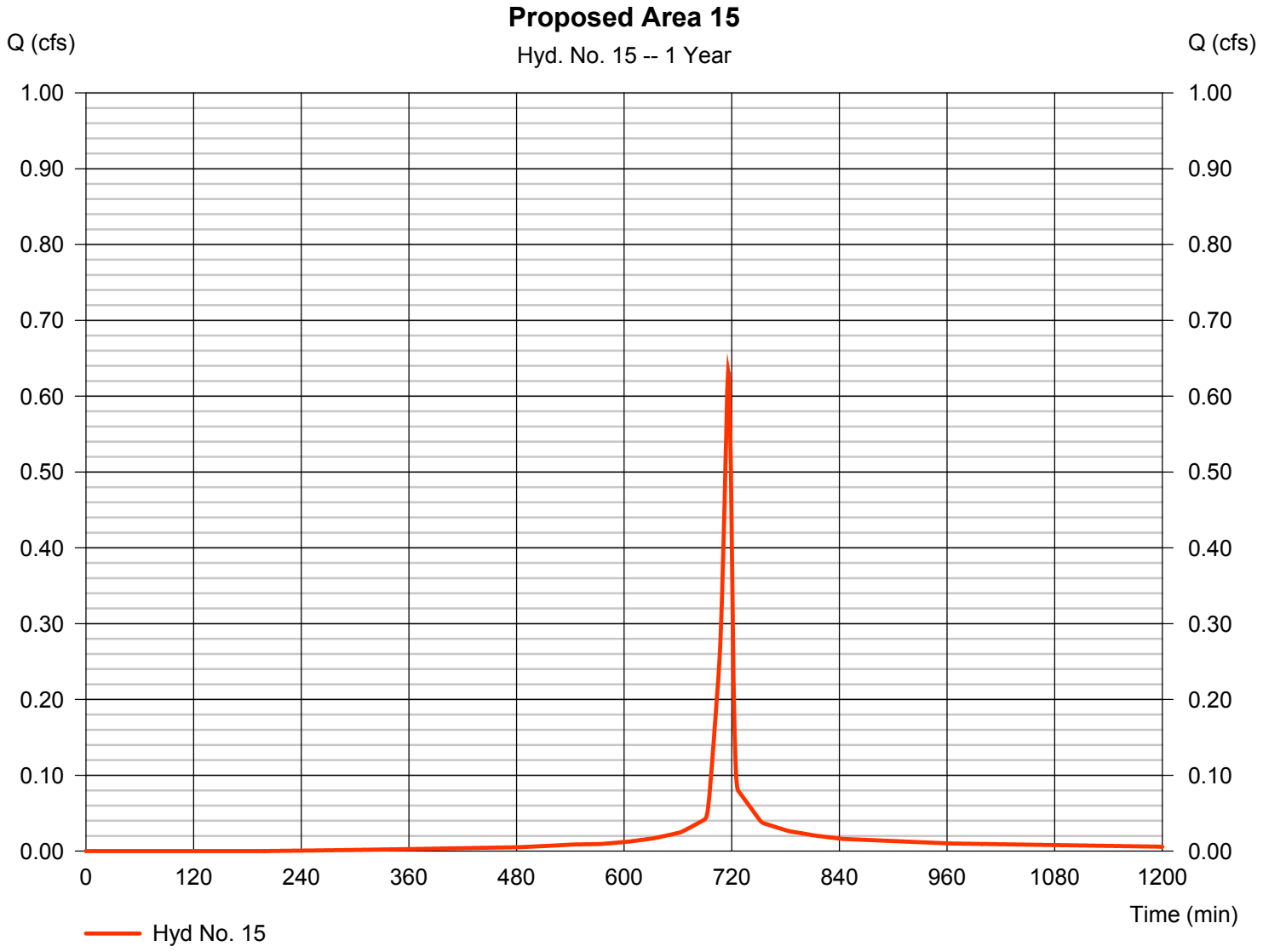
Hydrograph Report

Hyd. No. 15

Proposed Area 15

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.632 cfs
Storm frequency	=	1 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	1,309 cuft
Drainage area	=	0.160 ac	Curve number	=	95*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.90 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.134 x 98) + (0.022 x 79)] / 0.160



TR55 Tc Worksheet

Hyd. No. 15

Proposed Area 15

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 41.6		201.4		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 5.02		4.27		0.00		
Travel Time (min)	**= 3.31**	**+**	**1.54**	**+**	**0.00**	**=**	**4.85**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 4.90 min

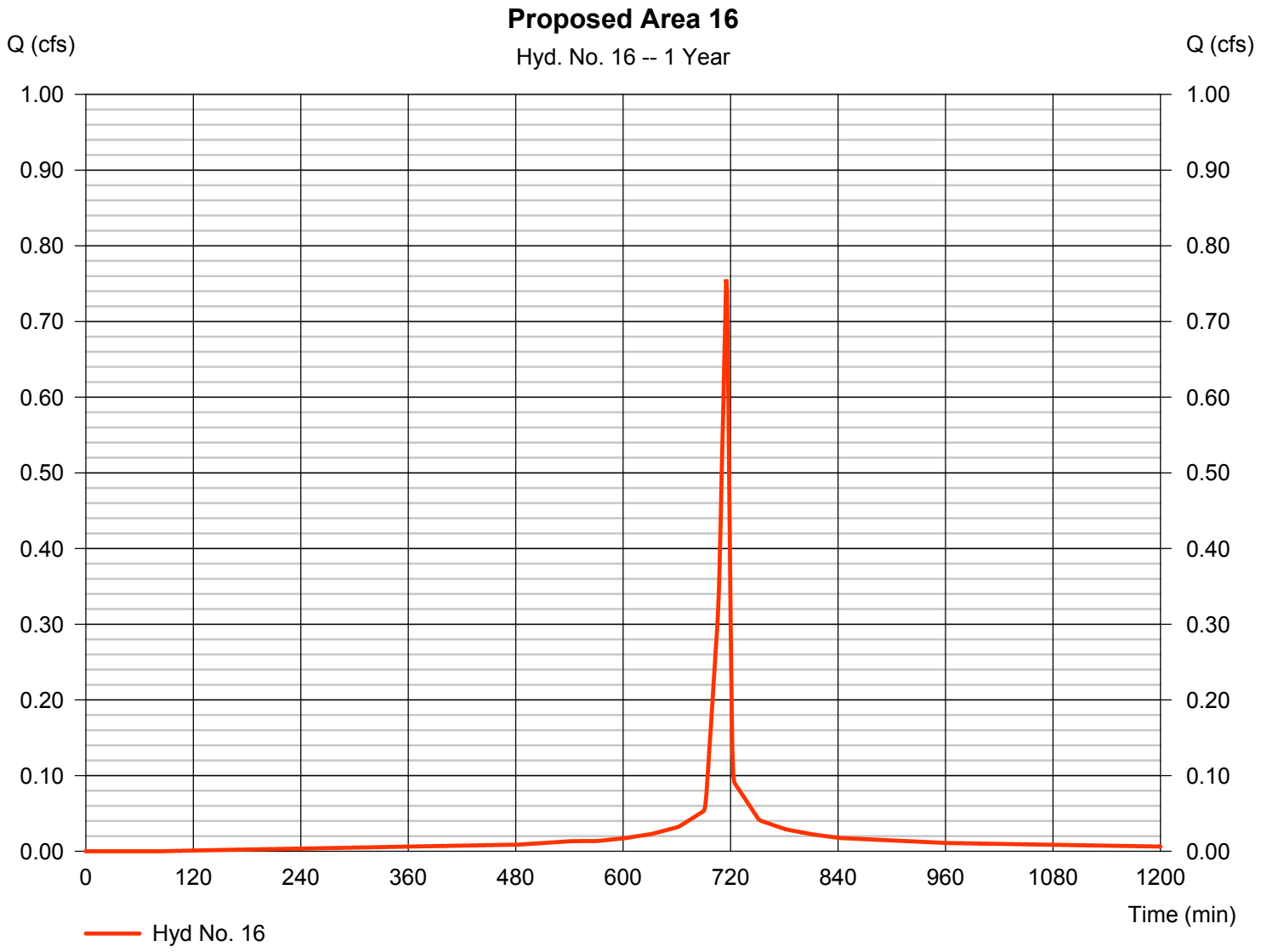
Hydrograph Report

Hyd. No. 16

Proposed Area 16

Hydrograph type	= SCS Runoff	Peak discharge	= 0.756 cfs
Storm frequency	= 1 yrs	Time to peak	= 715 min
Time interval	= 1 min	Hyd. volume	= 1,574 cuft
Drainage area	= 0.180 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.40 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.182 x 98)] / 0.180



TR55 Tc Worksheet

Hyd. No. 16

Proposed Area 16

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 146.9		63.8		11.4		
Two-year 24-hr precip. (in)	= 3.30		3.30		3.30		
Land slope (%)	= 3.40		1.97		1.05		
Travel Time (min)	**= 1.31**	**+**	**0.84**	**+**	**0.27**	**=**	**2.42**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 2.40 min

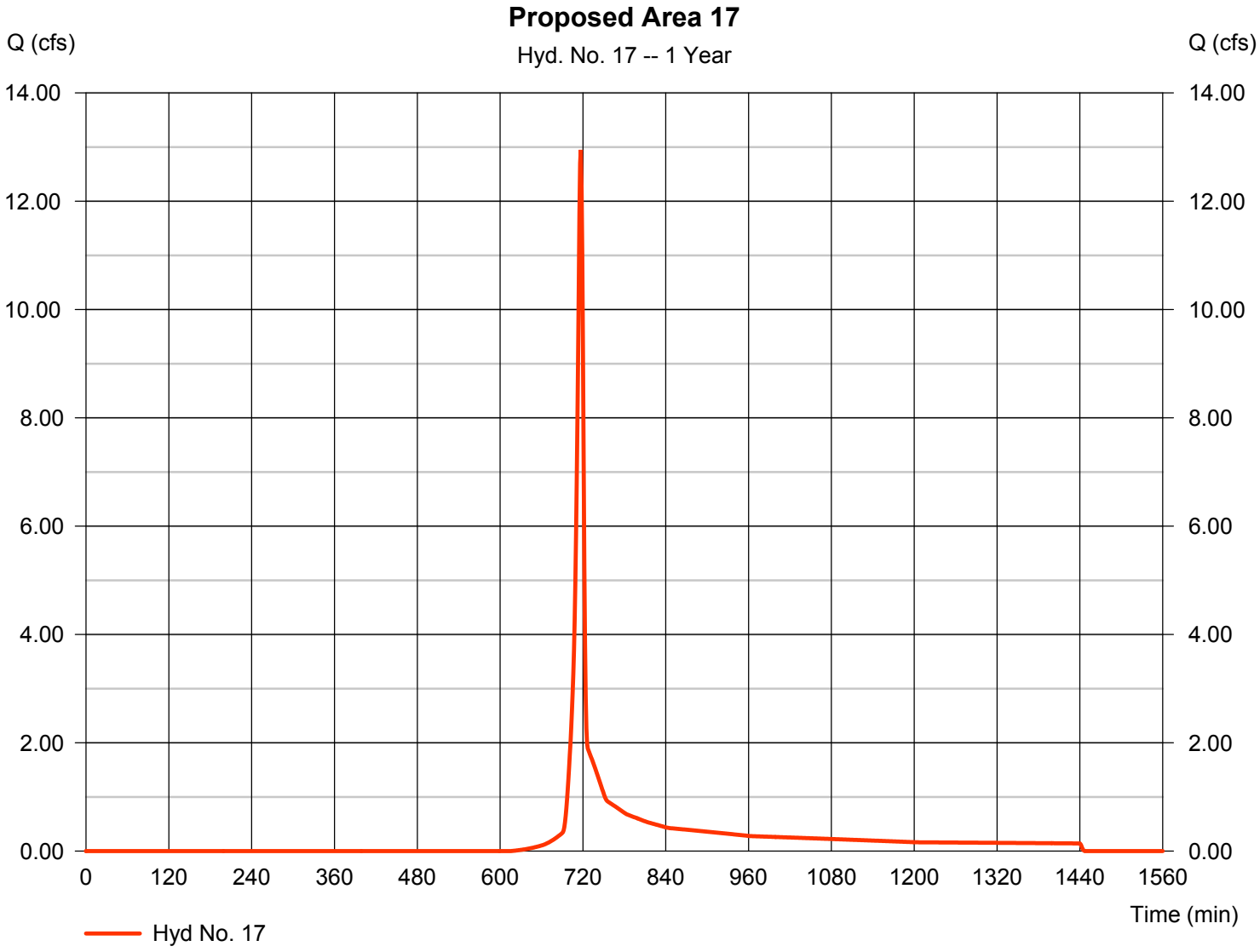
Hydrograph Report

Hyd. No. 17

Proposed Area 17

Hydrograph type	=	SCS Runoff	Peak discharge	=	12.95 cfs
Storm frequency	=	1 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	24,264 cuft
Drainage area	=	6.400 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.90 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.018 x 98) + (6.379 x 79)] / 6.400



TR55 Tc Worksheet

Hyd. No. 17

Proposed Area 17

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 0.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 0.00		0.00		0.00		
Land slope (%)	= 0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Shallow Concentrated Flow							
Flow length (ft)	= 334.72		320.91		0.00		
Watercourse slope (%)	= 1.49		2.49		0.00		
Surface description	= Unpaved		Unpaved		Paved		
Average velocity (ft/s)	=1.97		2.55		0.00		
Travel Time (min)	**= 2.83**	**+**	**2.10**	**+**	**0.00**	**=**	**4.93**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 4.90 min

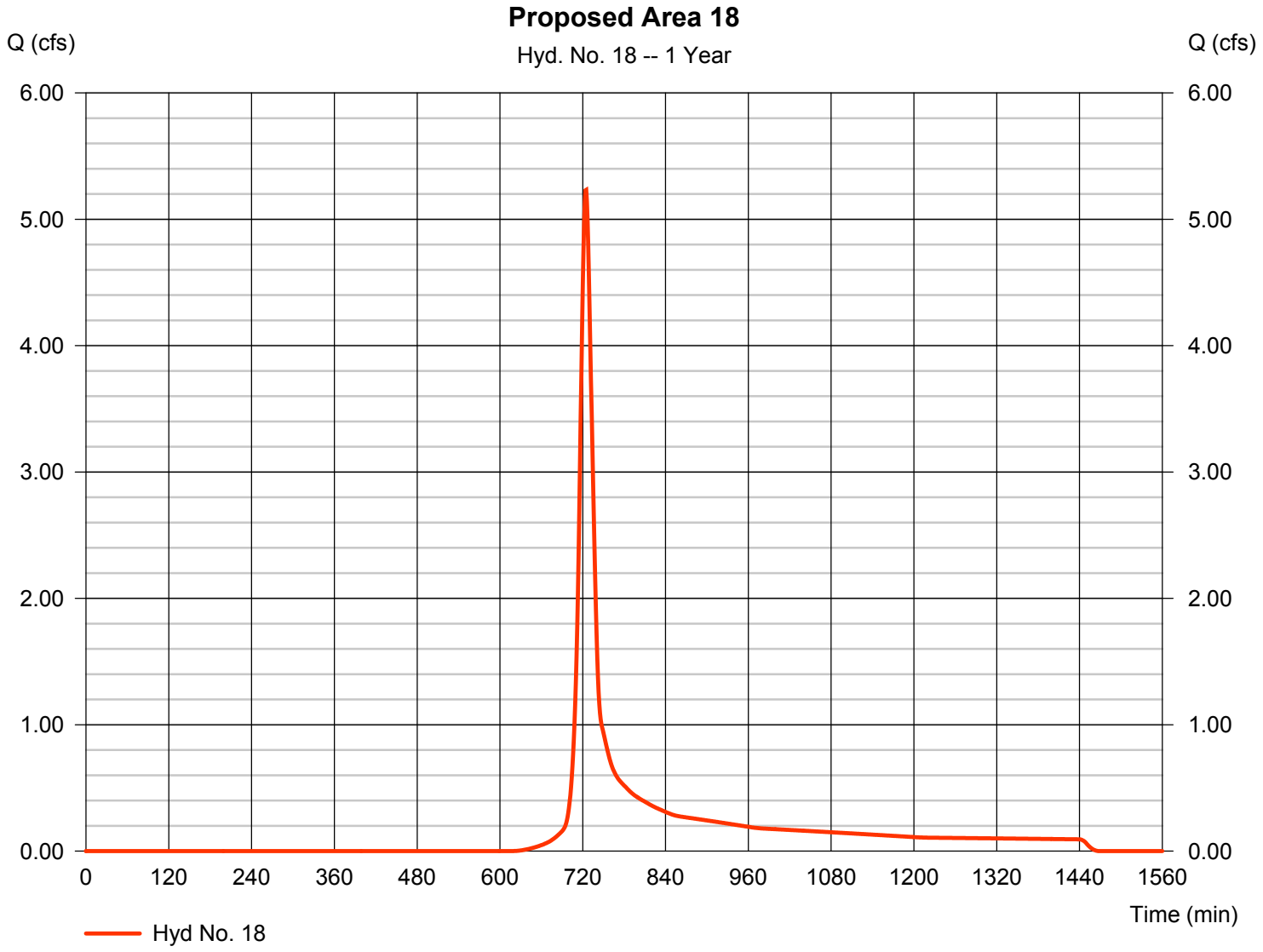
Hydrograph Report

Hyd. No. 18

Proposed Area 18

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.232 cfs
Storm frequency	=	1 yrs	Time to peak	=	725 min
Time interval	=	1 min	Hyd. volume	=	15,892 cuft
Drainage area	=	4.240 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	17.40 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.036 x 98) + (4.203 x 79)] / 4.240



TR55 Tc Worksheet

Hyd. No. 18

Proposed Area 18

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 212.1		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.30		0.00		0.00		
Land slope (%)	= 2.07		0.00		0.00		
Travel Time (min)	**= 17.36**	**+**	**0.00**	**+**	**0.00**	**=**	**17.36**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 17.40 min

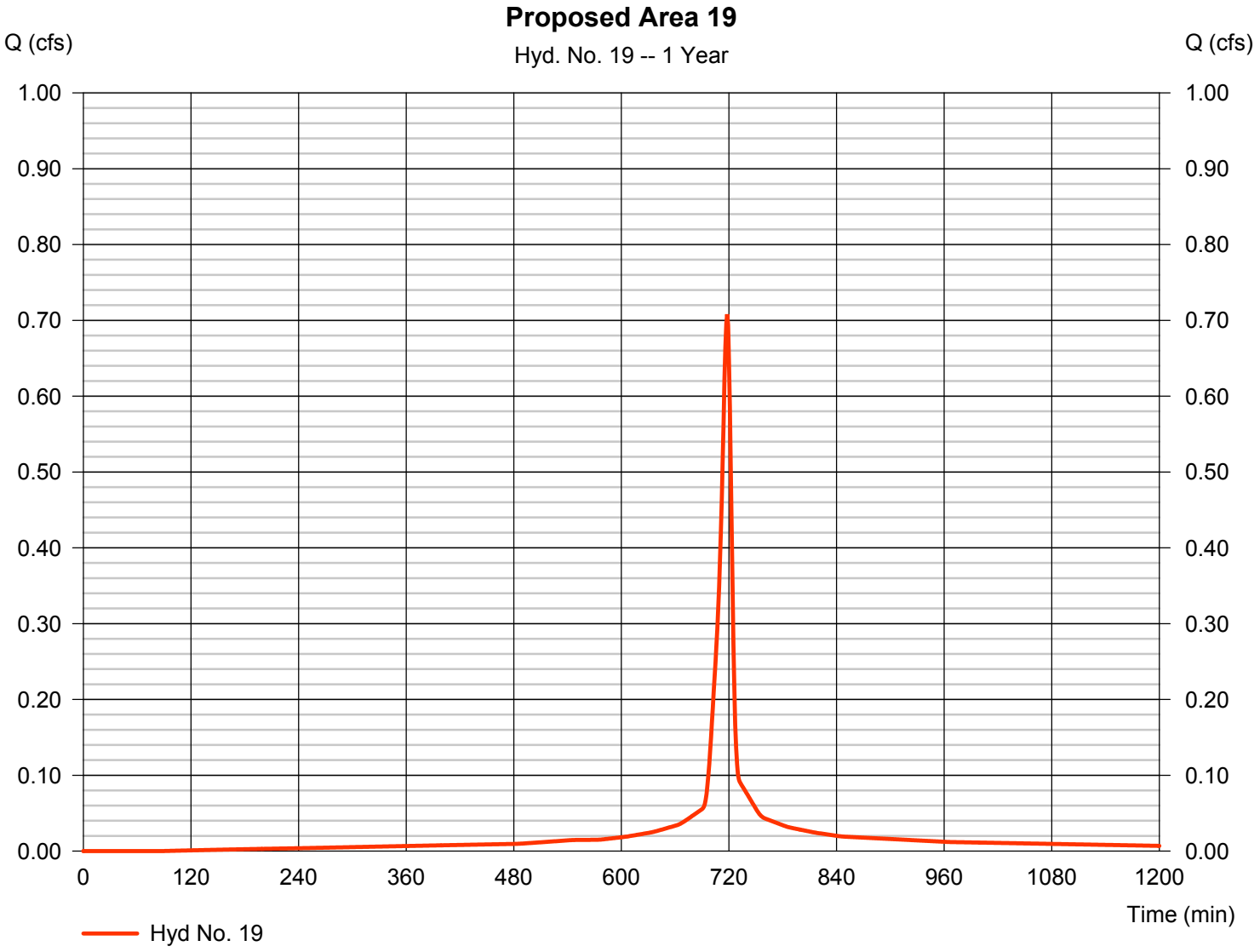
Hydrograph Report

Hyd. No. 19

Proposed Area 19

Hydrograph type	= SCS Runoff	Peak discharge	= 0.708 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 1,728 cuft
Drainage area	= 0.190 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 7.10 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.188 x 98)] / 0.190



TR55 Tc Worksheet

Hyd. No. 19

Proposed Area 19

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 202.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.30		0.00		0.00		
Land slope (%)	= 0.09		0.00		0.00		
Travel Time (min)	**= 7.11**	**+**	**0.00**	**+**	**0.00**	**=**	**7.11**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 7.10 min

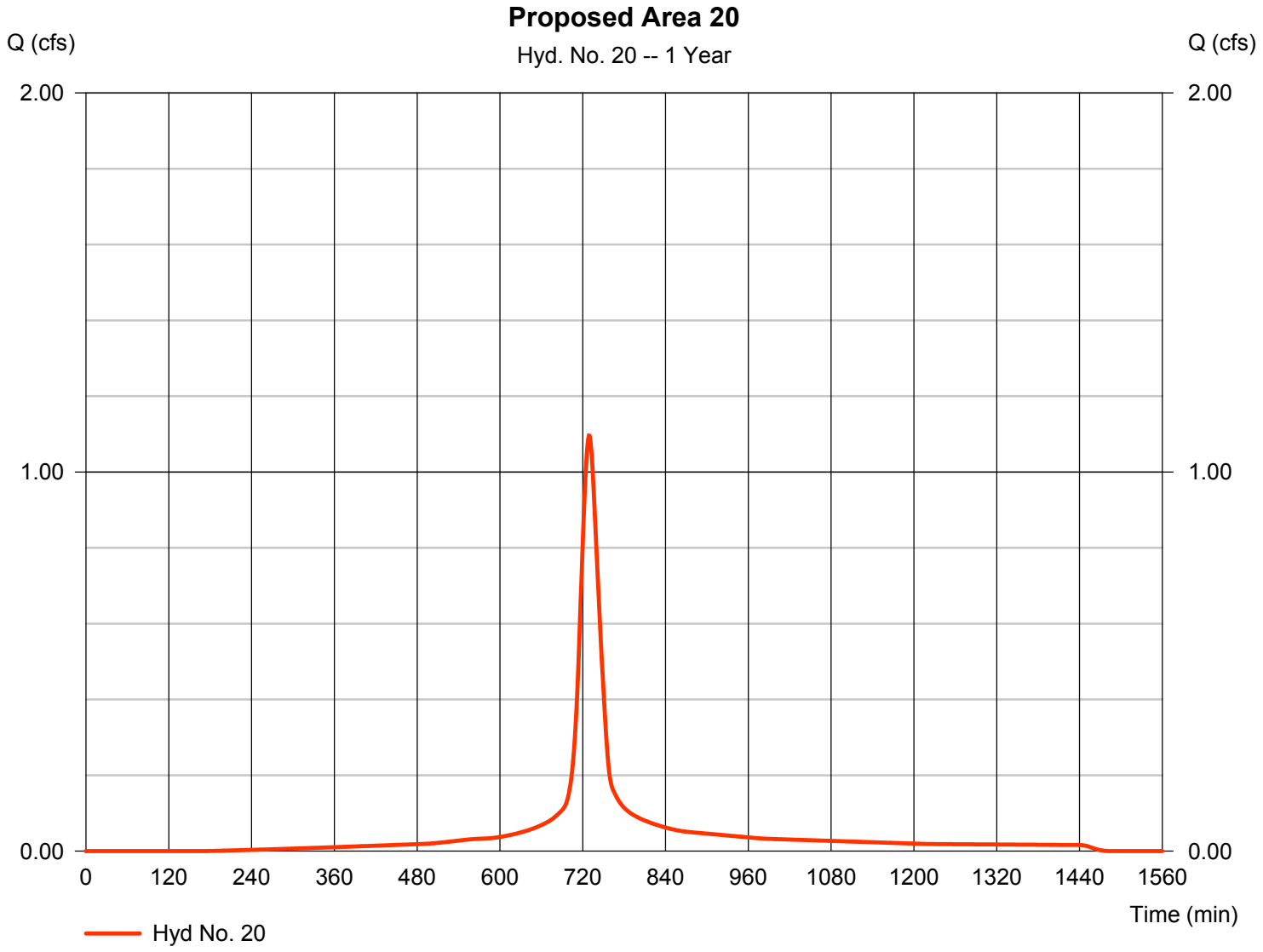
Hydrograph Report

Hyd. No. 20

Proposed Area 20

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.096 cfs
Storm frequency	=	1 yrs	Time to peak	=	729 min
Time interval	=	1 min	Hyd. volume	=	4,413 cuft
Drainage area	=	0.520 ac	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	27.80 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.458 x 98) + (0.060 x 79)] / 0.520



TR55 Tc Worksheet

Hyd. No. 20

Proposed Area 20

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 144.3		11.5		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 0.31		0.17		0.00		
Travel Time (min)	**= 27.20**	**+**	**0.56**	**+**	**0.00**	**=**	**27.77**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 27.80 min

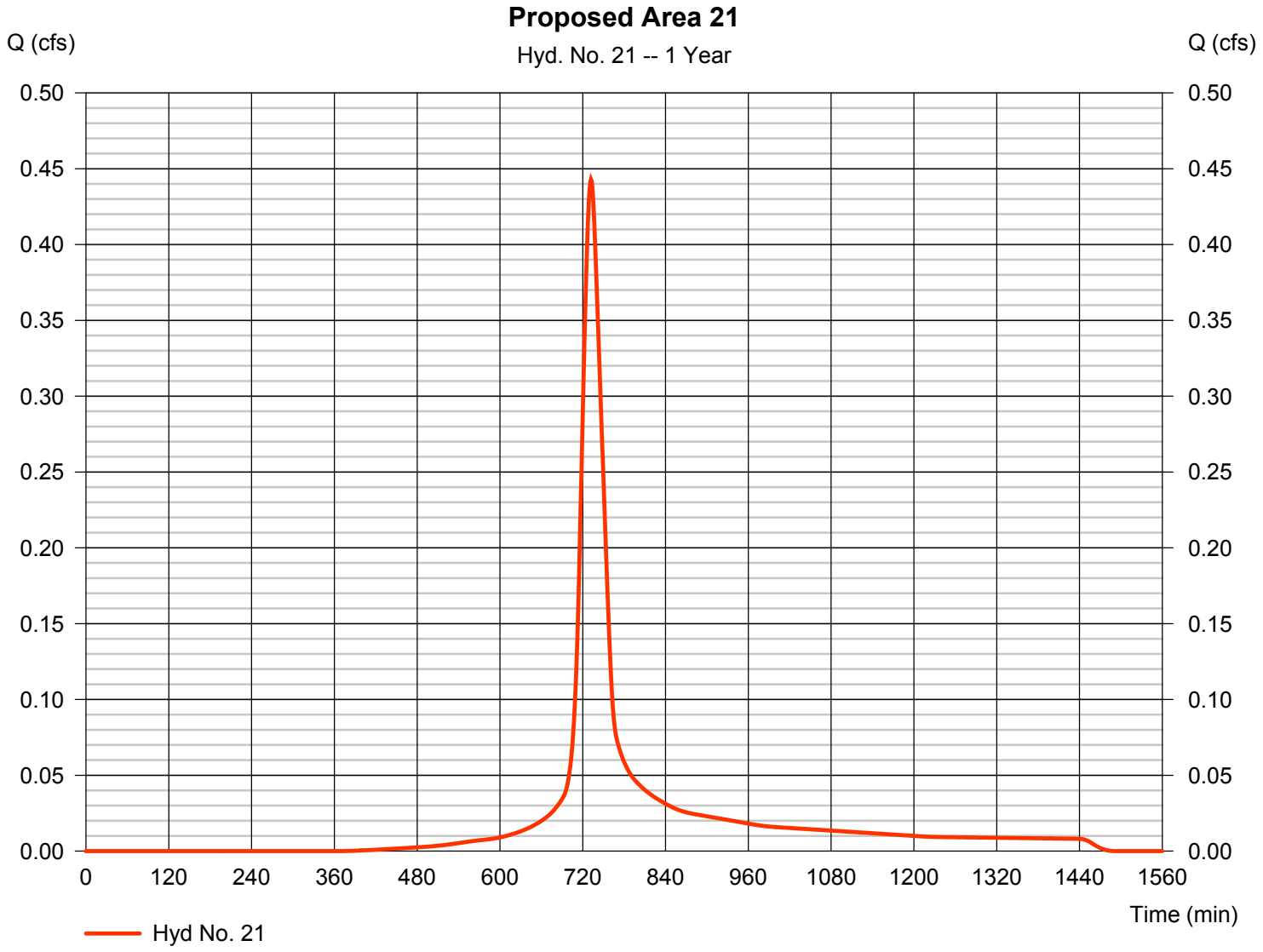
Hydrograph Report

Hyd. No. 21

Proposed Area 21

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.443 cfs
Storm frequency	=	1 yrs	Time to peak	=	732 min
Time interval	=	1 min	Hyd. volume	=	1,843 cuft
Drainage area	=	0.280 ac	Curve number	=	90*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	31.80 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.152 x 98) + (0.123 x 79)] / 0.280



TR55 Tc Worksheet

Hyd. No. 21

Proposed Area 21

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.150		0.011		
Flow length (ft)	= 187.3		58.8		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 0.53		4.03		0.00		
Travel Time (min)	**= 27.03**	**+**	**4.77**	**+**	**0.00**	**=**	**31.79**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 31.80 min

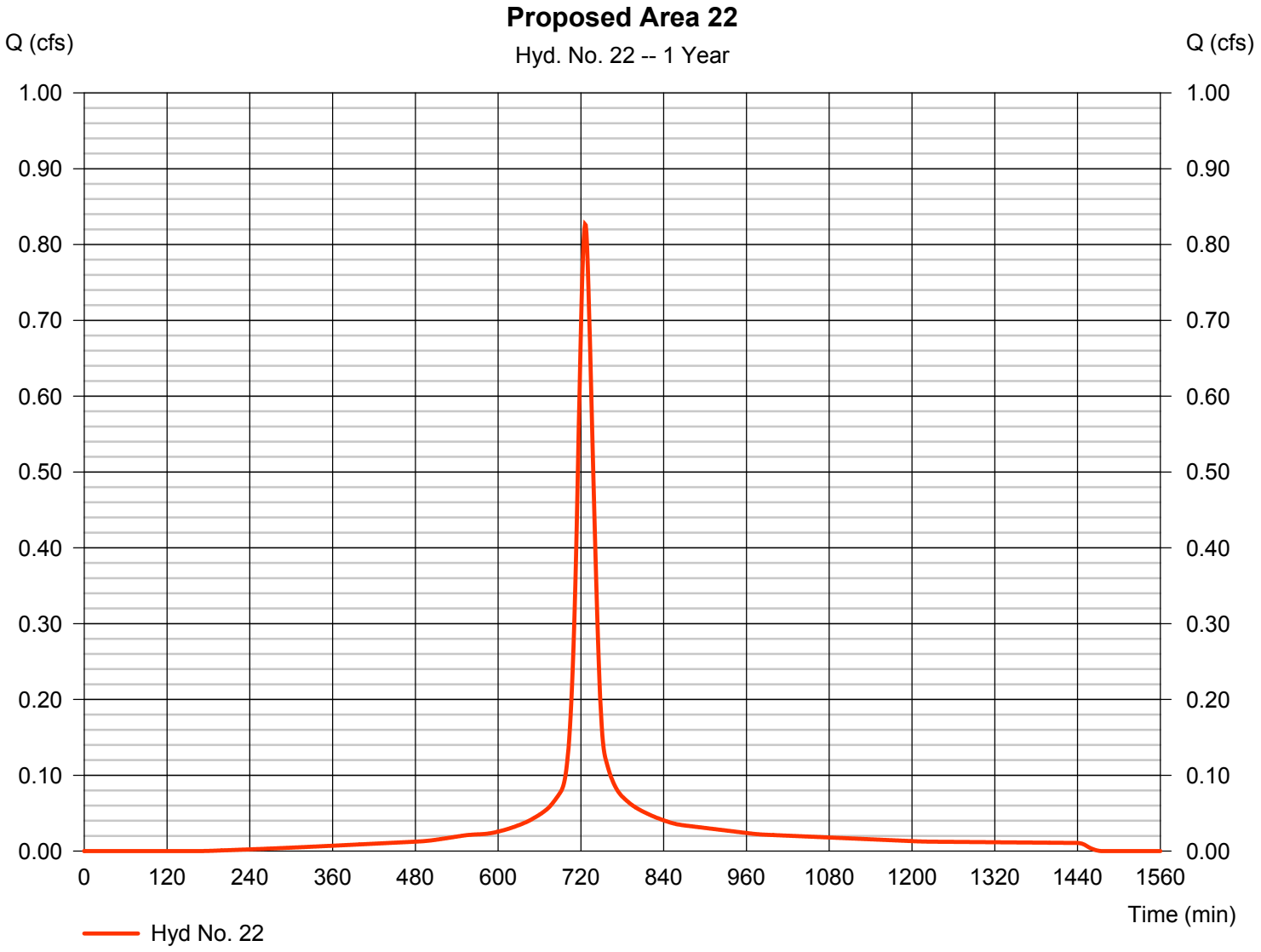
Hydrograph Report

Hyd. No. 22

Proposed Area 22

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.827 cfs
Storm frequency	=	1 yrs	Time to peak	=	726 min
Time interval	=	1 min	Hyd. volume	=	2,966 cuft
Drainage area	=	0.350 ac	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	22.20 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.310 x 98) + (0.040 x 79)] / 0.350



TR55 Tc Worksheet

Hyd. No. 22

Proposed Area 22

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 151.4		107.3		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 0.74		0.51		0.00		
Travel Time (min)	**= 20.01**	**+**	**2.18**	**+**	**0.00**	**=**	**22.19**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 22.20 min

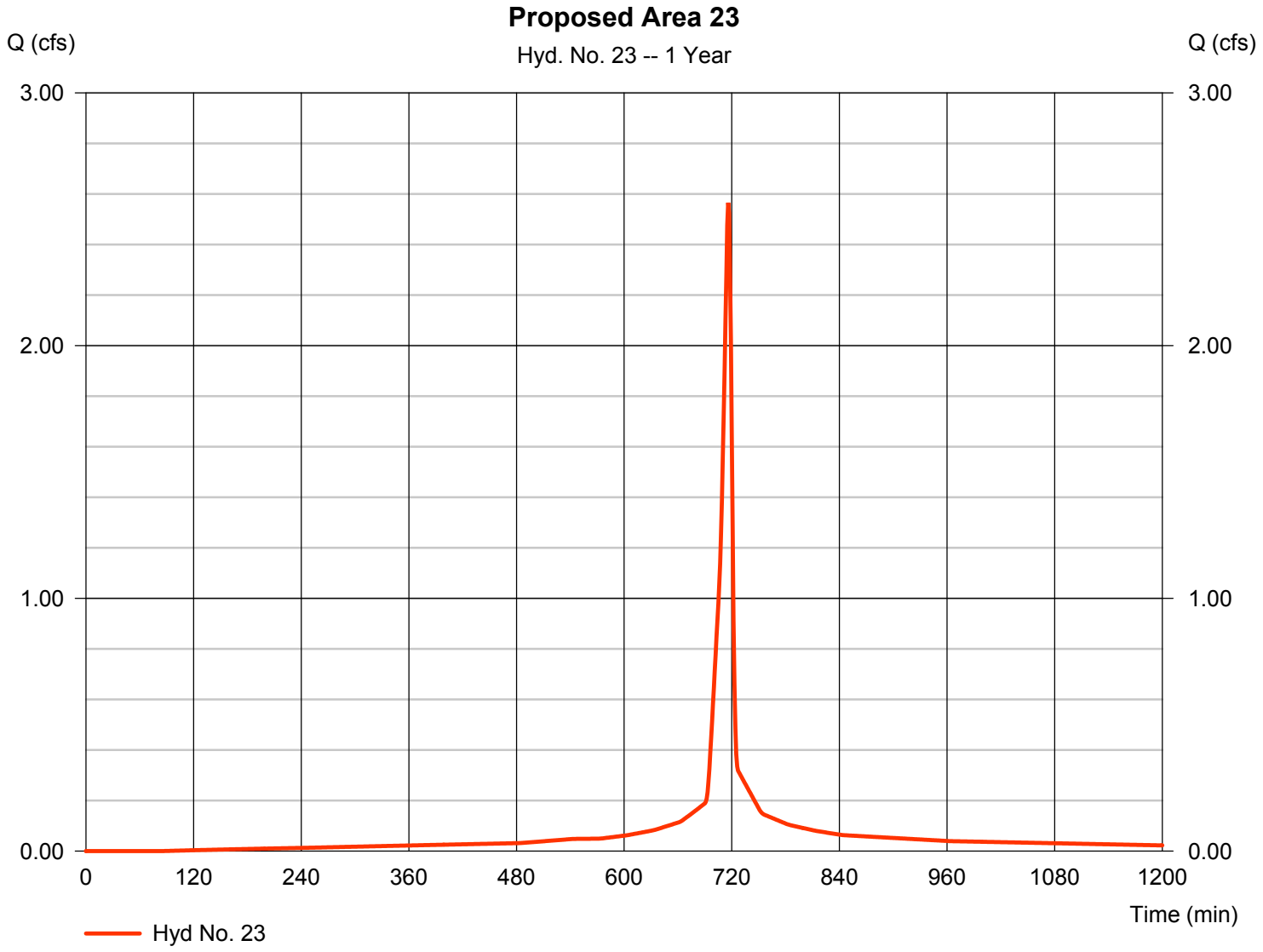
Hydrograph Report

Hyd. No. 23

Proposed Area 23

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.566 cfs
Storm frequency	=	1 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	5,689 cuft
Drainage area	=	0.610 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.80 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.607 x 98)] / 0.610



TR55 Tc Worksheet

Hyd. No. 23

Proposed Area 23

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 129.1		145.9		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 0.77		0.56		0.00		
Travel Time (min)	**= 2.14**	**+**	**2.68**	**+**	**0.00**	**=**	**4.82**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 4.80 min

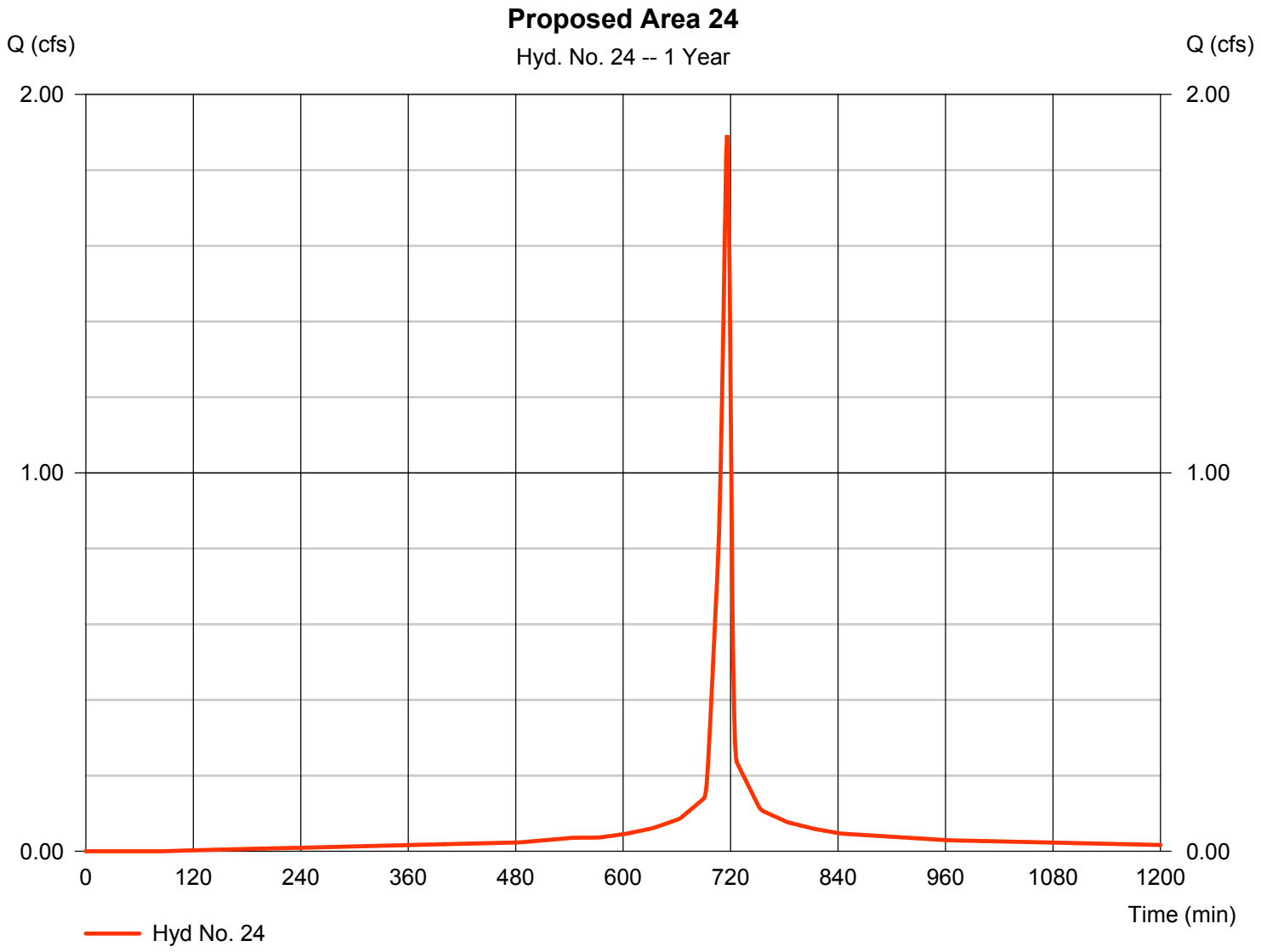
Hydrograph Report

Hyd. No. 24

Proposed Area 24

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.893 cfs
Storm frequency	=	1 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	4,197 cuft
Drainage area	=	0.450 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	3.90 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.447 x 98)] / 0.450



TR55 Tc Worksheet

Hyd. No. 24

Proposed Area 24

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 70.0		153.2		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 1.43		0.54		0.00		
Travel Time (min)	**= 1.03**	**+**	**2.84**	**+**	**0.00**	**=**	**3.87**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 3.90 min

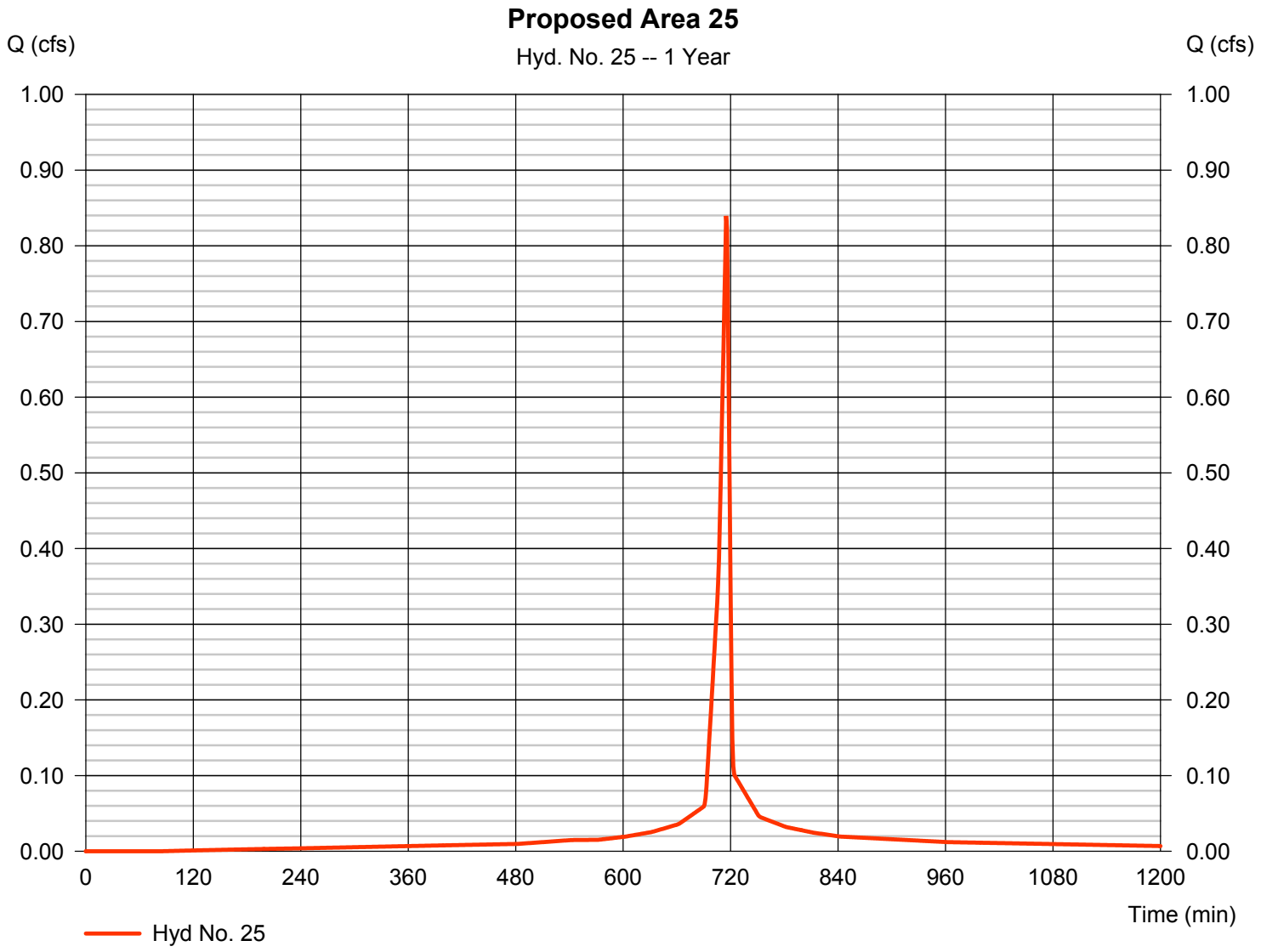
Hydrograph Report

Hyd. No. 25

Proposed Area 25

Hydrograph type	= SCS Runoff	Peak discharge	= 0.840 cfs
Storm frequency	= 1 yrs	Time to peak	= 715 min
Time interval	= 1 min	Hyd. volume	= 1,749 cuft
Drainage area	= 0.200 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 1.60 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.203 x 98)] / 0.200



TR55 Tc Worksheet

Hyd. No. 25

Proposed Area 25

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 20.0		42.4		28.2		
Two-year 24-hr precip. (in)	= 3.30		3.30		3.30		
Land slope (%)	= 0.70		1.17		2.76		
Travel Time (min)	**= 0.50**	**+**	**0.74**	**+**	**0.38**	**=**	**1.63**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 1.60 min

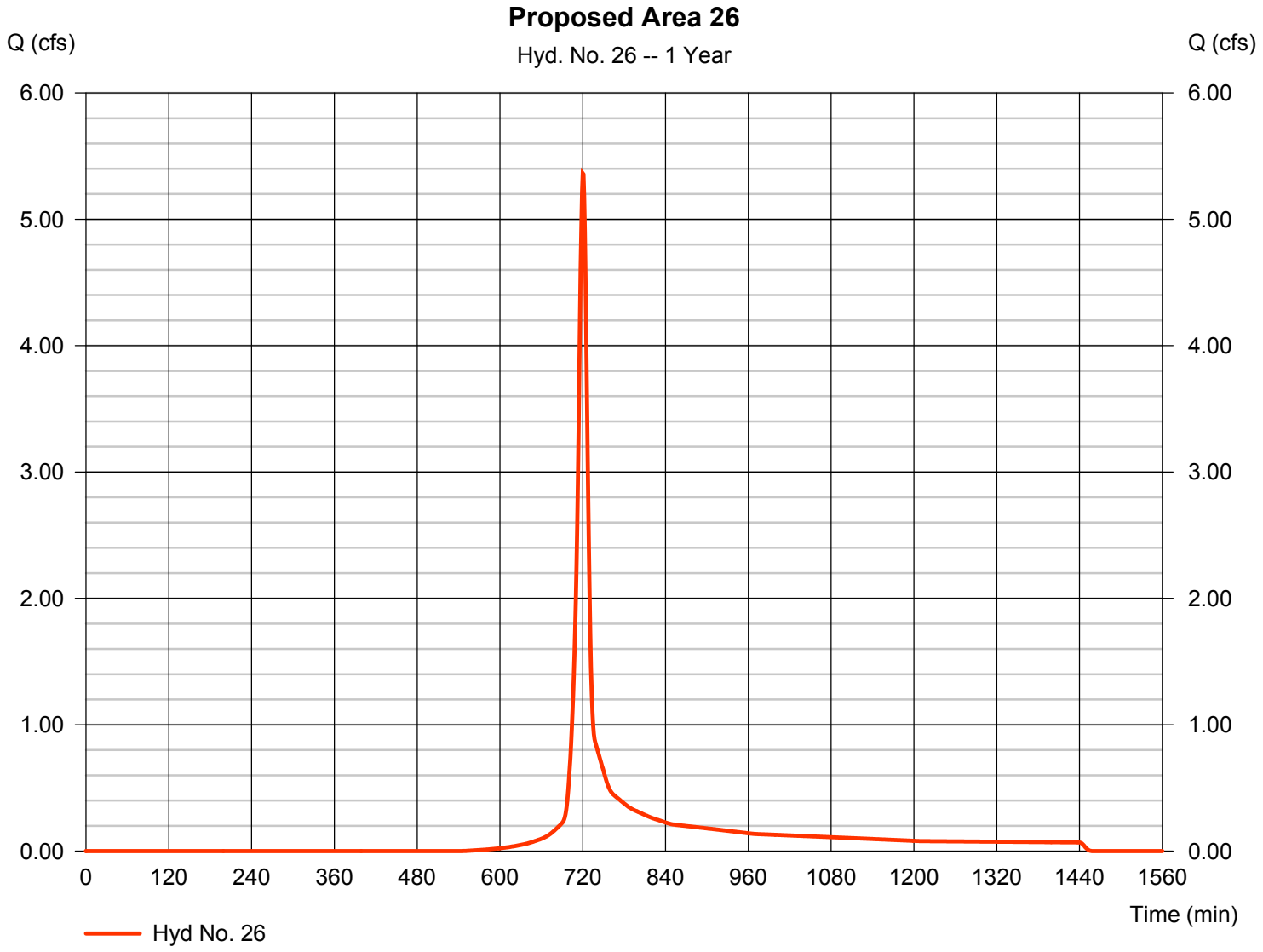
Hydrograph Report

Hyd. No. 26

Proposed Area 26

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.363 cfs
Storm frequency	=	1 yrs	Time to peak	=	720 min
Time interval	=	1 min	Hyd. volume	=	12,985 cuft
Drainage area	=	2.730 ac	Curve number	=	83*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	10.40 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.626 x 98) + (2.102 x 79)] / 2.730



TR55 Tc Worksheet

Hyd. No. 26

Proposed Area 26

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 166.5		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.30		0.00		0.00		
Land slope (%)	= 4.61		0.00		0.00		
Travel Time (min)	**= 10.39**	**+**	**0.00**	**+**	**0.00**	**=**	**10.39**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 10.40 min

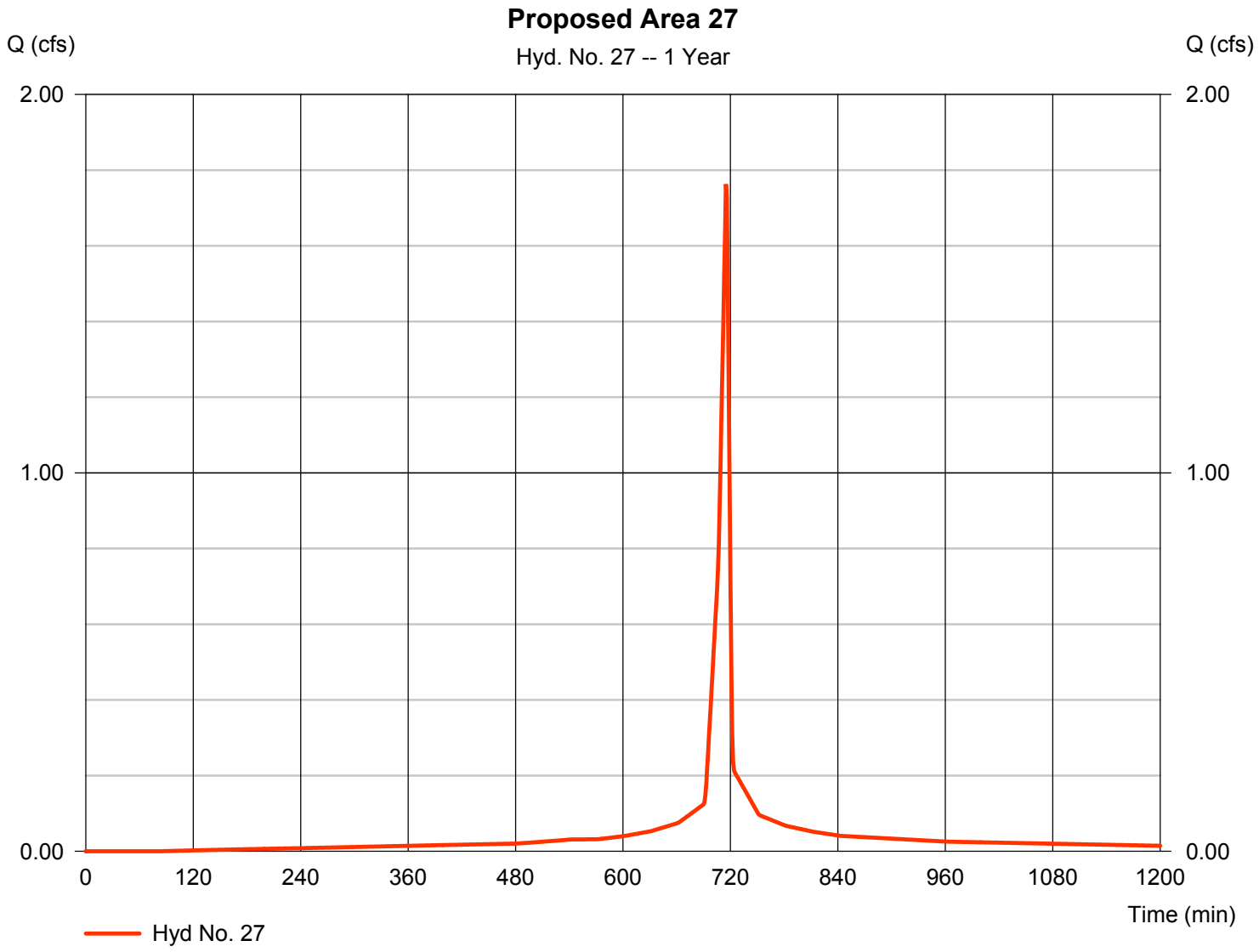
Hydrograph Report

Hyd. No. 27

Proposed Area 27

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.763 cfs
Storm frequency	=	1 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	3,672 cuft
Drainage area	=	0.420 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.00 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.420 x 98)] / 0.420



TR55 Tc Worksheet

Hyd. No. 27

Proposed Area 27

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 0.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 0.00		0.00		0.00		
Land slope (%)	= 0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Shallow Concentrated Flow							
Flow length (ft)	= 135.49		163.49		59.59		
Watercourse slope (%)	= 1.47		3.05		3.08		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=2.46		3.55		3.57		
Travel Time (min)	**= 0.92**	**+**	**0.77**	**+**	**0.28**	**=**	**1.96**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 2.00 min

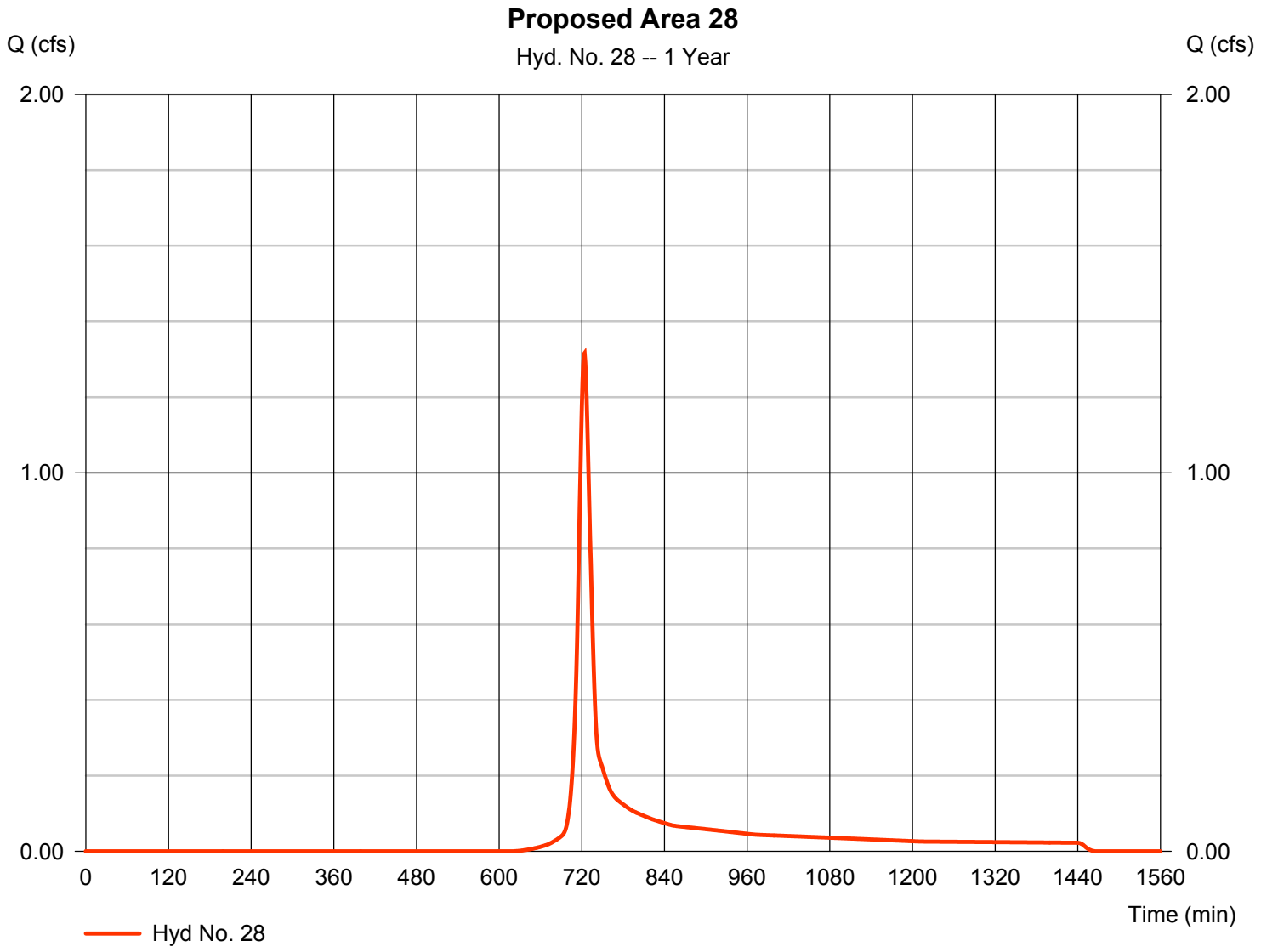
Hydrograph Report

Hyd. No. 28

Proposed Area 28

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.316 cfs
Storm frequency	=	1 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	3,839 cuft
Drainage area	=	1.000 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	15.50 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.004 x 98) + (0.999 x 79)] / 1.000



TR55 Tc Worksheet

Hyd. No. 28

Proposed Area 28

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.150		0.011		
Flow length (ft)	= 193.9		14.6		0.0		
Two-year 24-hr precip. (in)	= 3.30		3.30		0.00		
Land slope (%)	= 2.58		34.17		0.00		
Travel Time (min)	**= 14.80**	**+**	**0.67**	**+**	**0.00**	**=**	**15.47**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 15.50 min

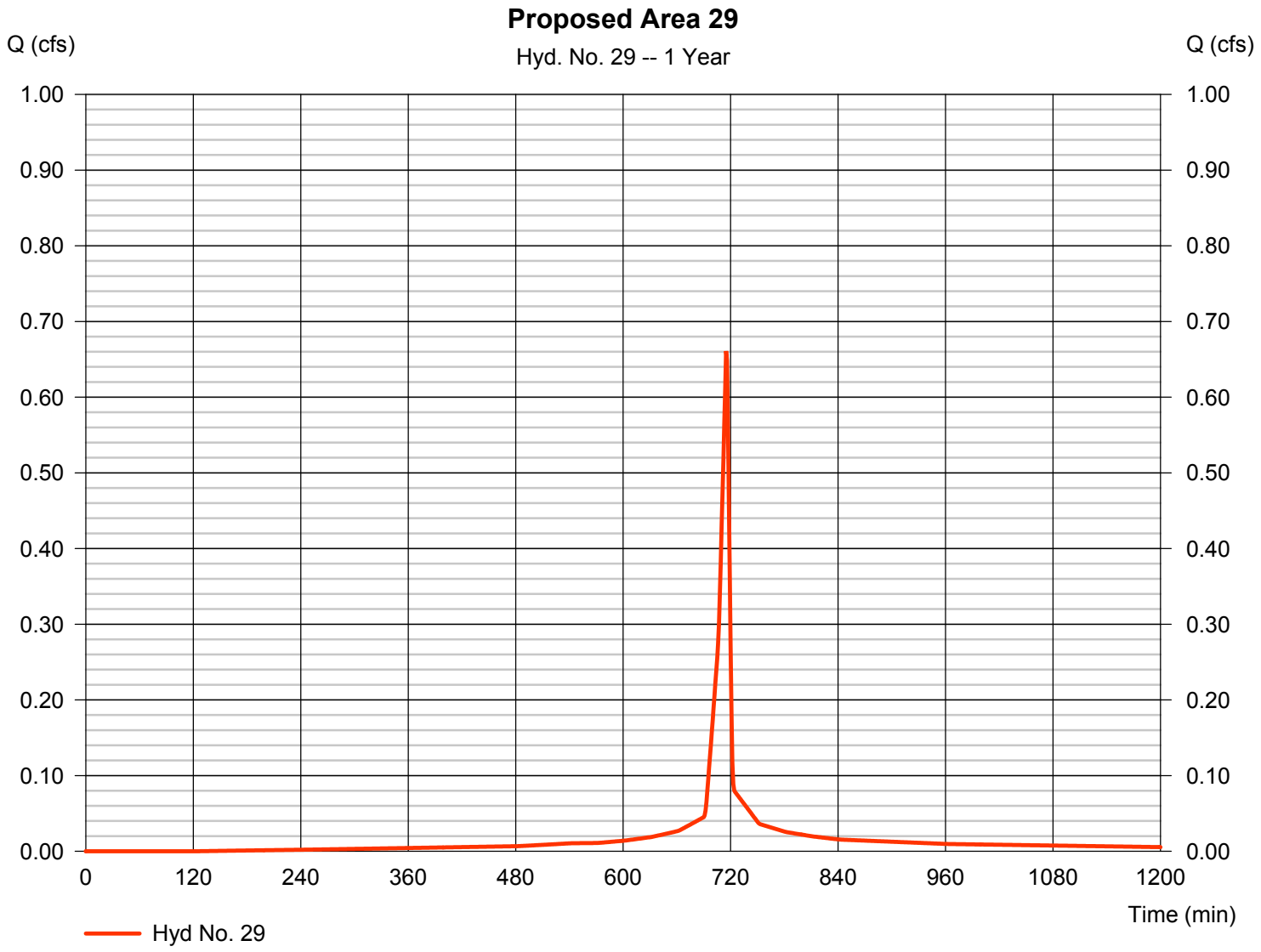
Hydrograph Report

Hyd. No. 29

Proposed Area 29

Hydrograph type	= SCS Runoff	Peak discharge	= 0.661 cfs
Storm frequency	= 1 yrs	Time to peak	= 715 min
Time interval	= 1 min	Hyd. volume	= 1,340 cuft
Drainage area	= 0.160 ac	Curve number	= 97*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.20 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.150 x 98) + (0.008 x 79)] / 0.160



TR55 Tc Worksheet

Hyd. No. 29

Proposed Area 29

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 237.8		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.30		0.00		0.00		
Land slope (%)	= 2.52		0.00		0.00		
Travel Time (min)	**= 2.17**	**+**	**0.00**	**+**	**0.00**	**=**	**2.17**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 2.20 min

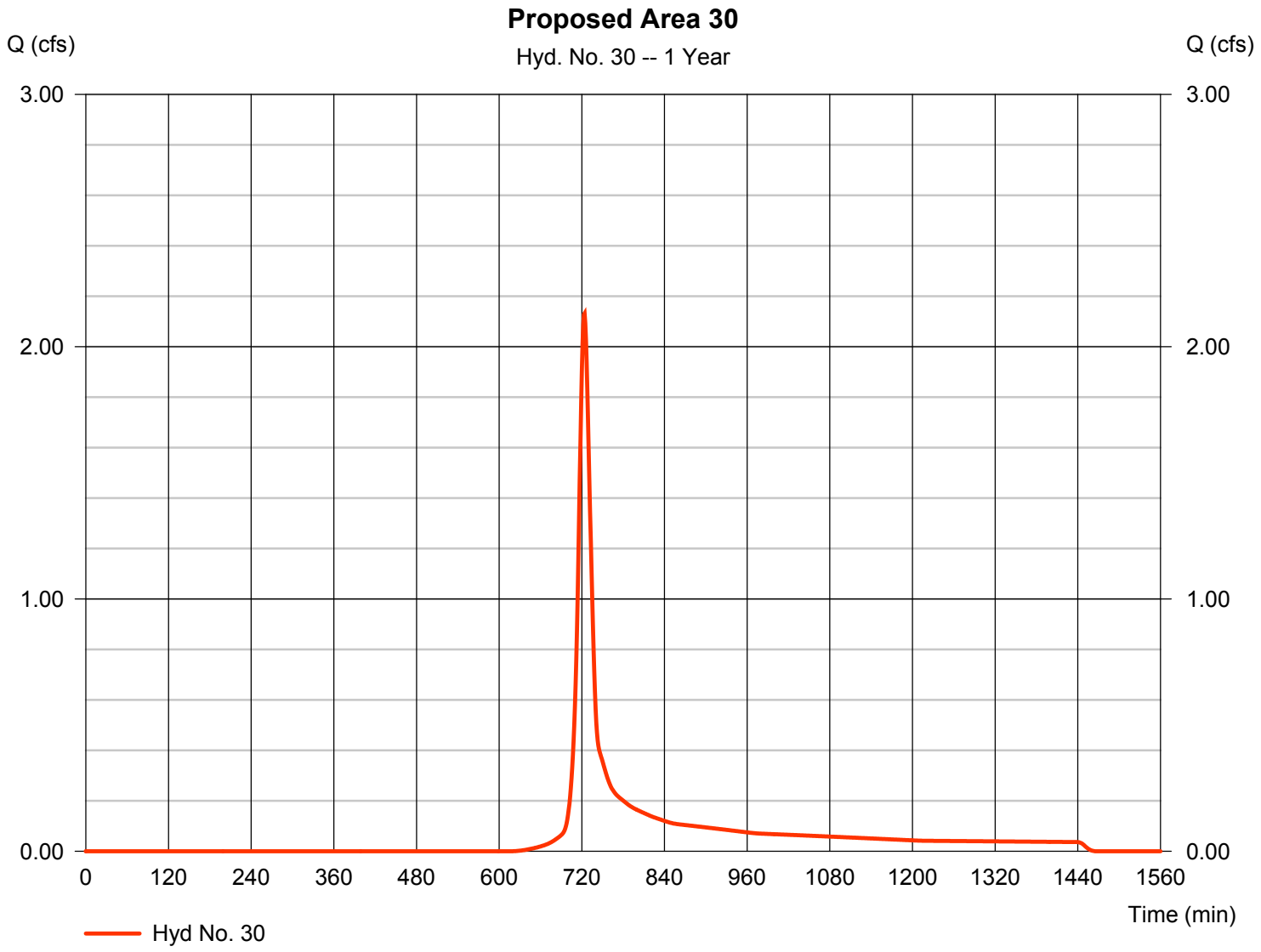
Hydrograph Report

Hyd. No. 30

Proposed Area 30

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.132 cfs
Storm frequency	=	1 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	6,219 cuft
Drainage area	=	1.620 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	15.70 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.004 x 98) + (1.620 x 79)] / 1.620



TR55 Tc Worksheet

Hyd. No. 30

Proposed Area 30

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 265.8		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.30		0.00		0.00		
Land slope (%)	= 4.21		0.00		0.00		
Travel Time (min)	**= 15.66**	**+**	**0.00**	**+**	**0.00**	**=**	**15.66**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 15.70 min

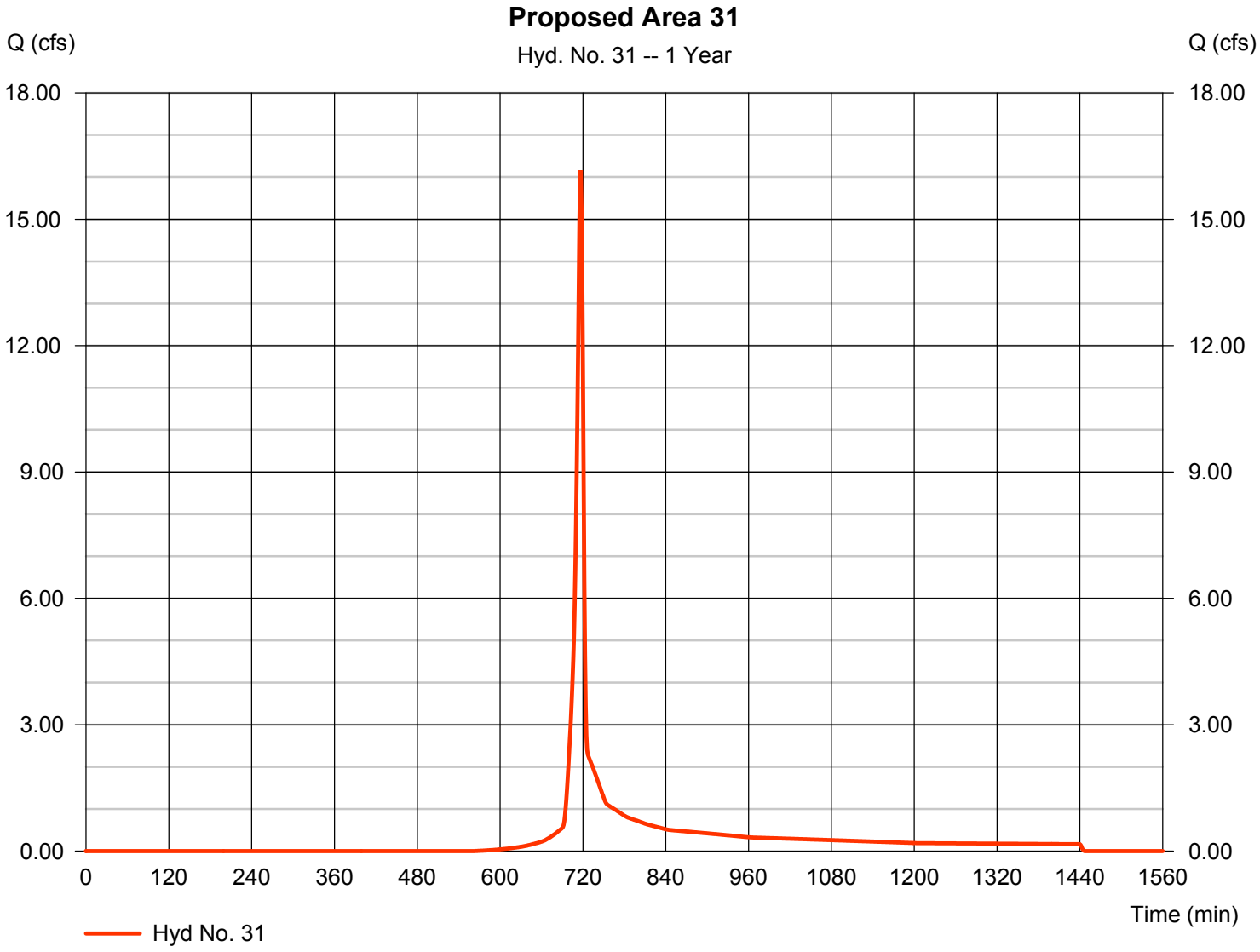
Hydrograph Report

Hyd. No. 31

Proposed Area 31

Hydrograph type	=	SCS Runoff	Peak discharge	=	16.16 cfs
Storm frequency	=	1 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	30,333 cuft
Drainage area	=	6.830 ac	Curve number	=	82*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.80 min
Total precip.	=	2.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.937 x 98) + (5.893 x 79)] / 6.830



TR55 Tc Worksheet

Hyd. No. 31

Proposed Area 31

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 0.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 0.00		0.00		0.00		
Land slope (%)	= 0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Shallow Concentrated Flow							
Flow length (ft)	= 128.96		130.56		679.40		
Watercourse slope (%)	= 5.88		1.21		4.57		
Surface description	= Unpaved		Paved		Unpaved		
Average velocity (ft/s)	=3.91		2.23		3.45		
Travel Time (min)	**= 0.55**	**+**	**0.97**	**+**	**3.28**	**=**	**4.81**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

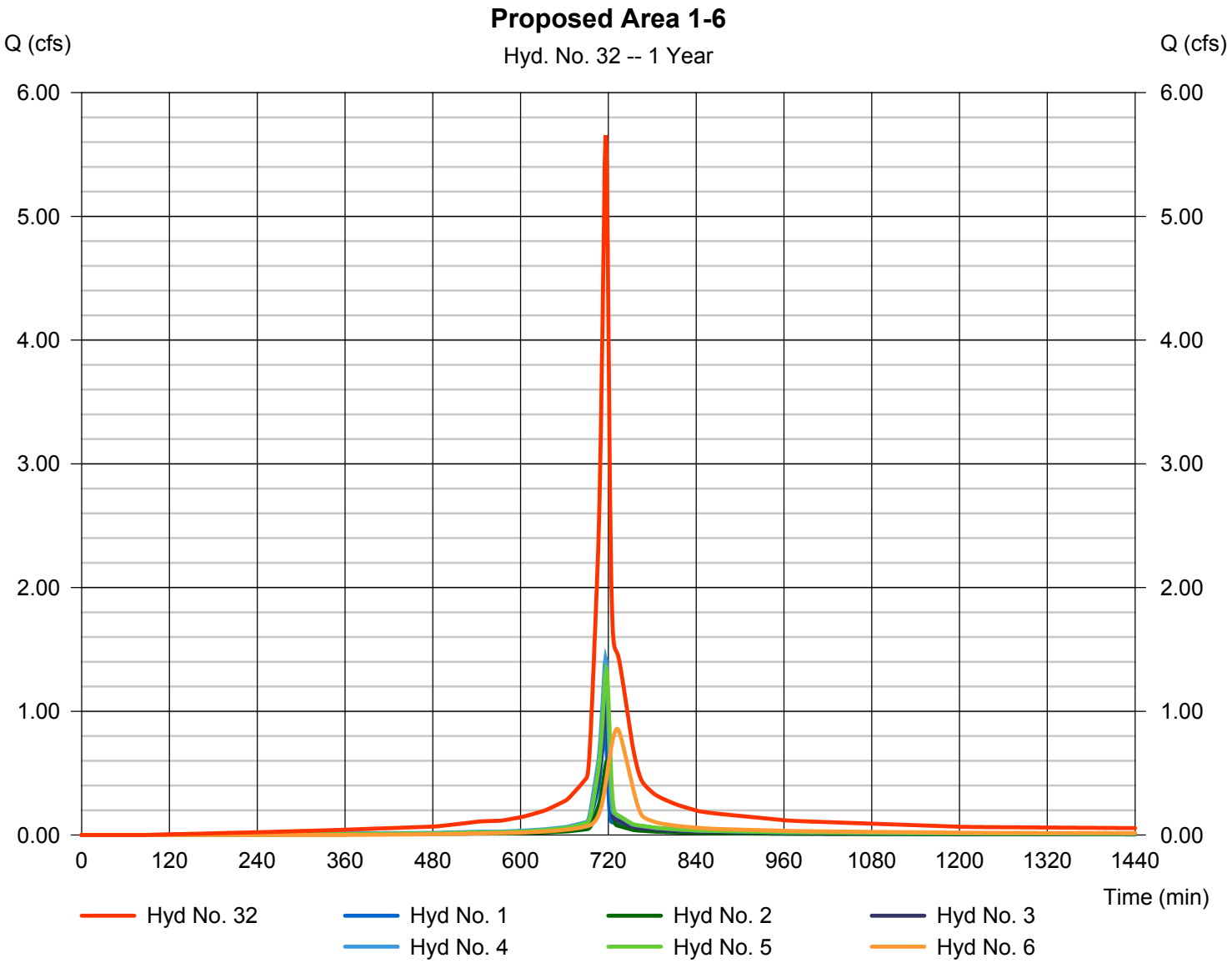
Total Travel Time, Tc ..... 4.80 min

Hydrograph Report

Hyd. No. 32

Proposed Area 1-6

Hydrograph type	= Combine	Peak discharge	= 5.656 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 15,467 cuft
Inflow hyds.	= 1, 2, 3, 4, 5, 6	Contrib. drain. area	= 1.830 ac

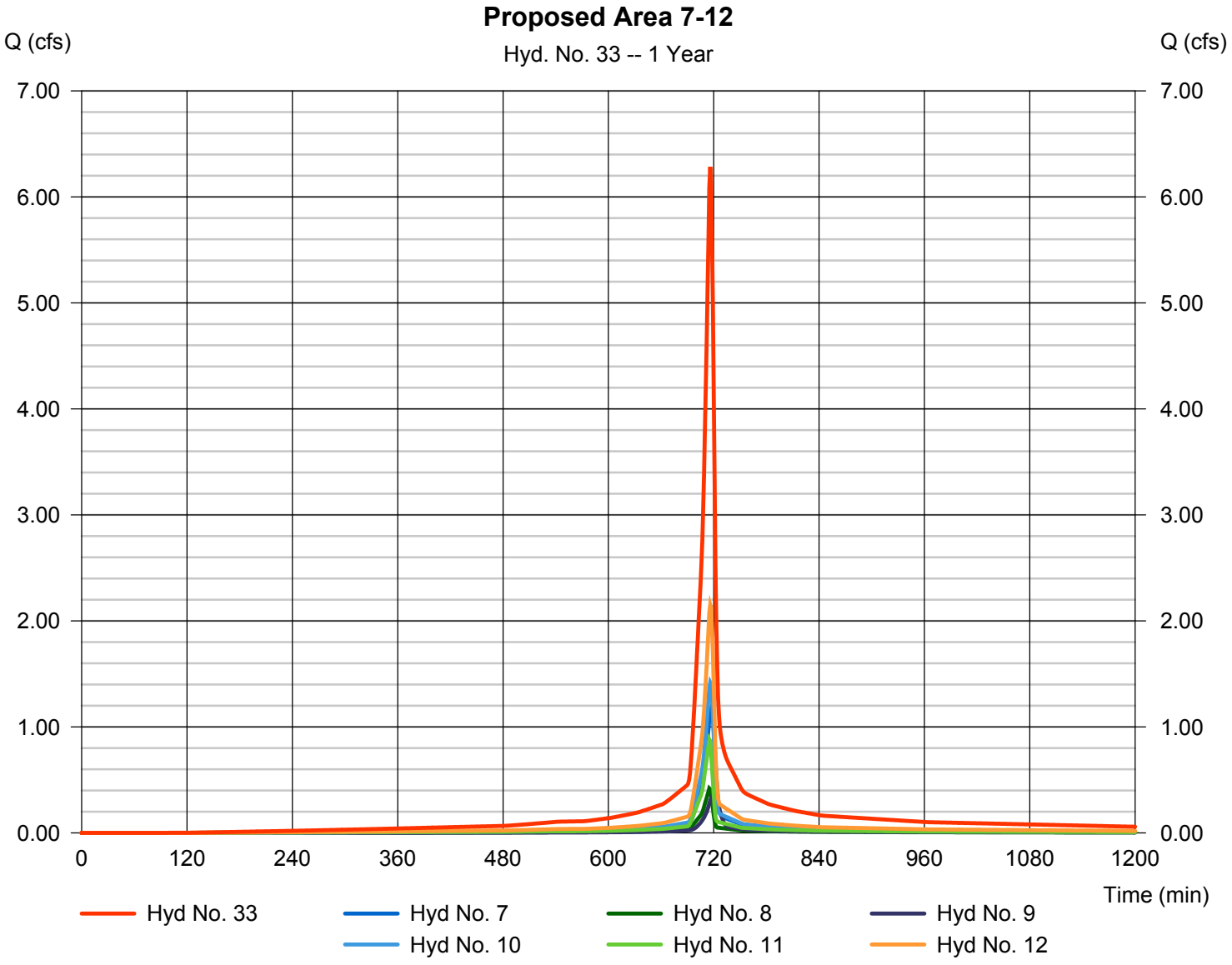


Hydrograph Report

Hyd. No. 33

Proposed Area 7-12

Hydrograph type	= Combine	Peak discharge	= 6.283 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 13,923 cuft
Inflow hyds.	= 7, 8, 9, 10, 11, 12	Contrib. drain. area	= 1.600 ac

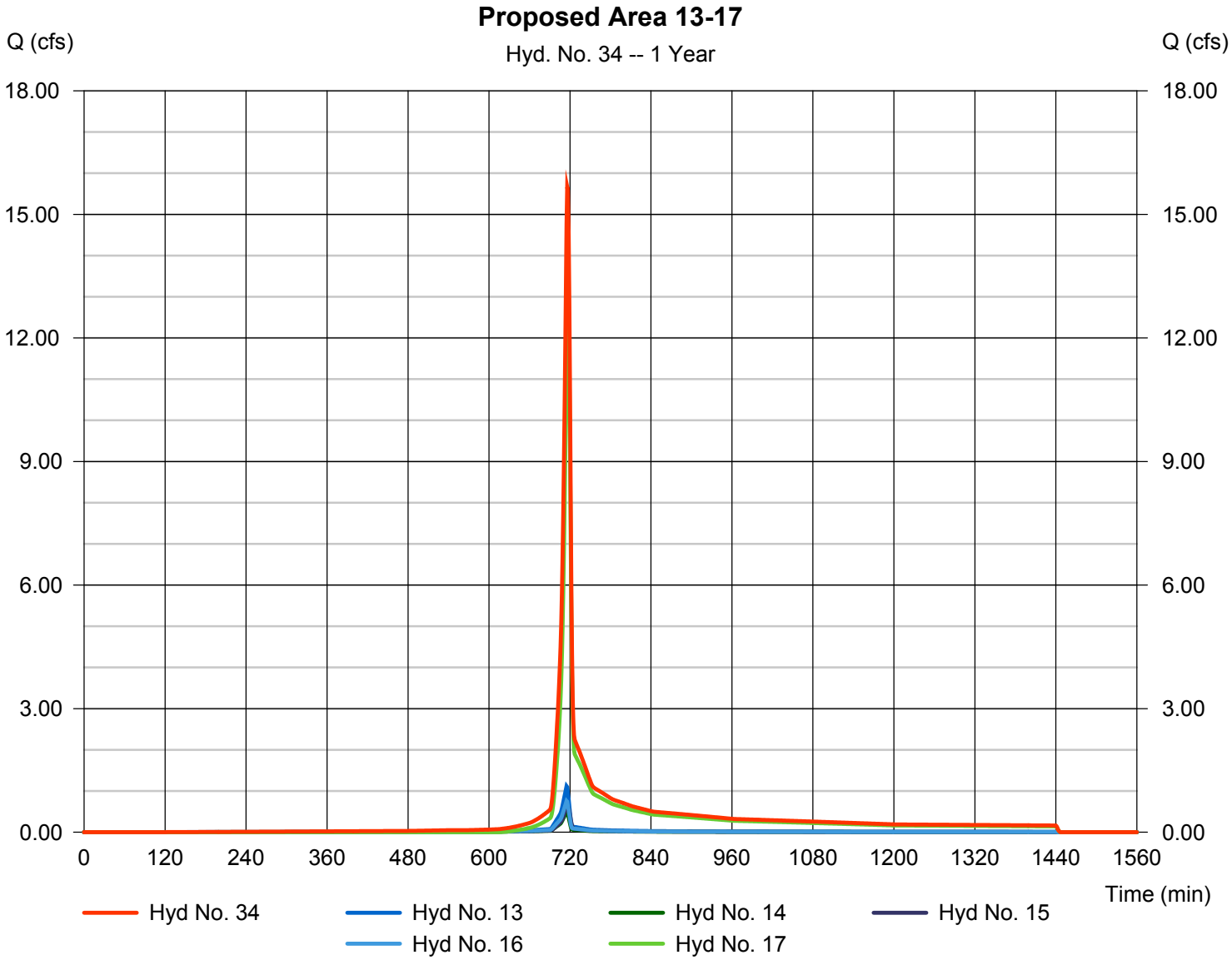


Hydrograph Report

Hyd. No. 34

Proposed Area 13-17

Hydrograph type	= Combine	Peak discharge	= 15.66 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 30,457 cuft
Inflow hyds.	= 13, 14, 15, 16, 17	Contrib. drain. area	= 7.130 ac

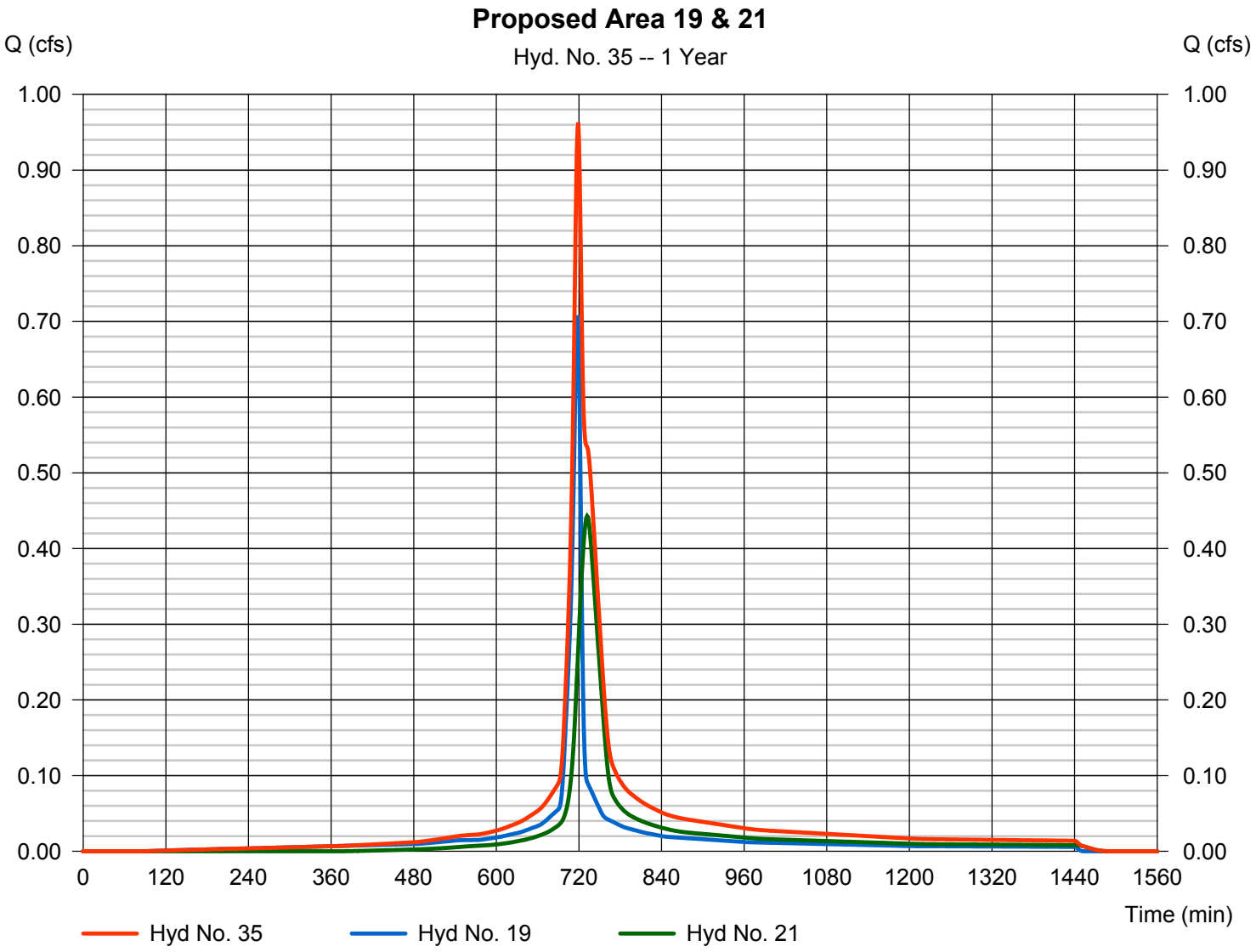


Hydrograph Report

Hyd. No. 35

Proposed Area 19 & 21

Hydrograph type	= Combine	Peak discharge	= 0.963 cfs
Storm frequency	= 1 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 3,571 cuft
Inflow hyds.	= 19, 21	Contrib. drain. area	= 0.470 ac



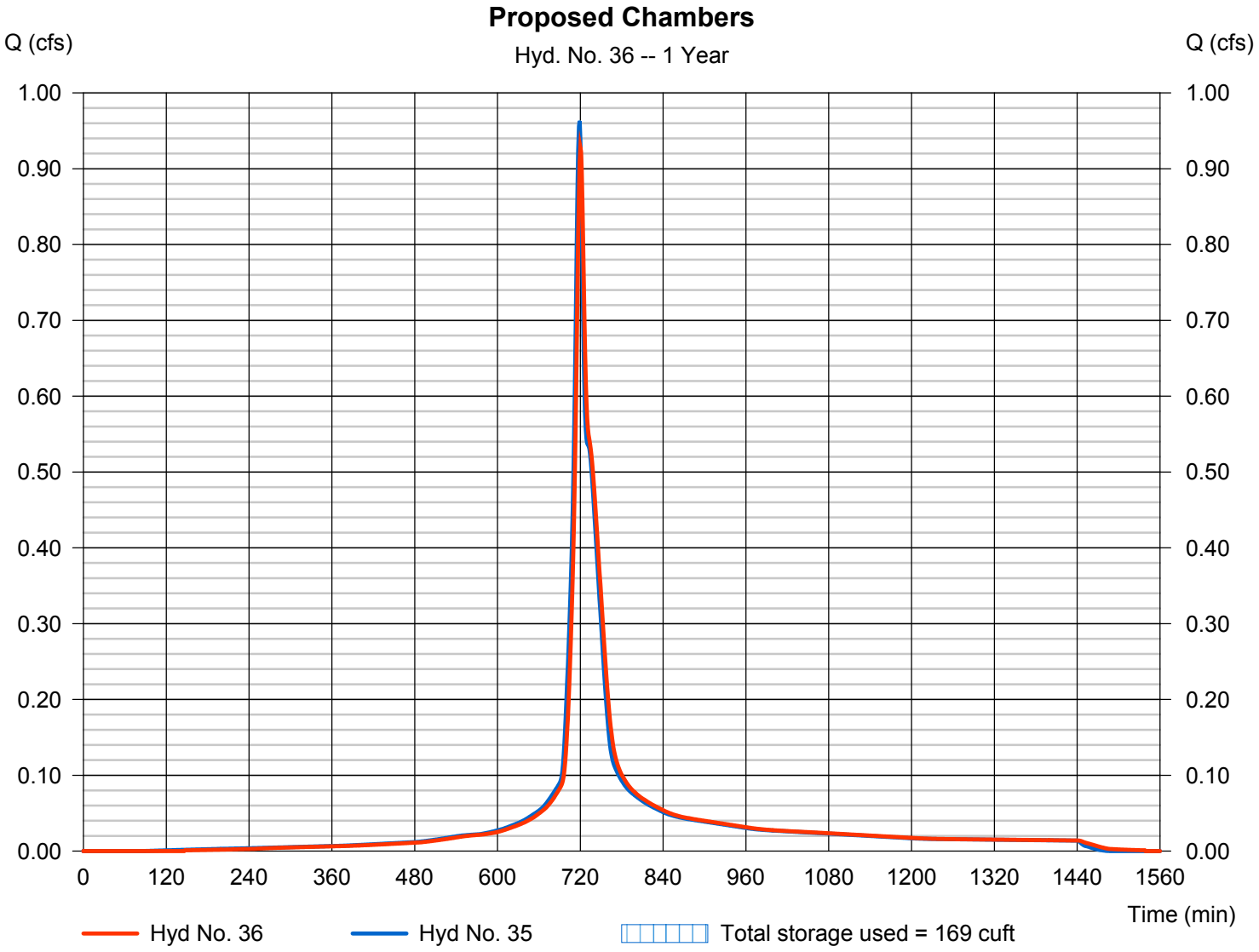
Hydrograph Report

Hyd. No. 36

Proposed Chambers

Hydrograph type	=	Reservoir	Peak discharge	=	0.928 cfs
Storm frequency	=	1 yrs	Time to peak	=	720 min
Time interval	=	1 min	Hyd. volume	=	3,568 cuft
Inflow hyd. No.	=	35 - Proposed Area 19 & 21	Max. Elevation	=	352.10 ft
Reservoir name	=	Proposed Chambers	Max. Storage	=	169 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Proposed Chambers

Pond Data

UG Chambers -Invert elev. = 352.60 ft, Rise x Span = 1.54 x 2.75 ft, Barrel Len = 11.00 ft, No. Barrels = 20, Slope = 0.00%, Headers = Yes
Encasement -Invert elev. = 351.60 ft, Width = 3.25 ft, Height = 2.54 ft, Voids = 30.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	351.60	n/a	0	0
0.25	351.85	n/a	87	87
0.51	352.11	n/a	87	173
0.76	352.36	n/a	87	260
1.02	352.62	n/a	97	358
1.27	352.87	n/a	257	614
1.52	353.12	n/a	252	866
1.78	353.38	n/a	242	1,108
2.03	353.63	n/a	225	1,333
2.29	353.89	n/a	199	1,531
2.54	354.14	n/a	151	1,682

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 351.60	0.00	0.00	0.00
Length (ft)	= 40.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	351.60	0.00	---	---	---	---	---	---	---	---	---	0.000
0.03	9	351.63	0.00 ic	---	---	---	---	---	---	---	---	---	0.003
0.05	17	351.65	0.01 ic	---	---	---	---	---	---	---	---	---	0.012
0.08	26	351.68	0.03 ic	---	---	---	---	---	---	---	---	---	0.026
0.10	35	351.70	0.05 ic	---	---	---	---	---	---	---	---	---	0.045
0.13	43	351.73	0.07 ic	---	---	---	---	---	---	---	---	---	0.070
0.15	52	351.75	0.10 ic	---	---	---	---	---	---	---	---	---	0.101
0.18	61	351.78	0.14 ic	---	---	---	---	---	---	---	---	---	0.136
0.20	69	351.80	0.18 ic	---	---	---	---	---	---	---	---	---	0.176
0.23	78	351.83	0.22 ic	---	---	---	---	---	---	---	---	---	0.220
0.25	87	351.85	0.27 ic	---	---	---	---	---	---	---	---	---	0.270
0.28	95	351.88	0.32 ic	---	---	---	---	---	---	---	---	---	0.324
0.30	104	351.90	0.38 ic	---	---	---	---	---	---	---	---	---	0.381
0.33	113	351.93	0.44 ic	---	---	---	---	---	---	---	---	---	0.443
0.36	121	351.96	0.51 ic	---	---	---	---	---	---	---	---	---	0.509
0.38	130	351.98	0.58 ic	---	---	---	---	---	---	---	---	---	0.578
0.41	139	352.01	0.65 ic	---	---	---	---	---	---	---	---	---	0.652
0.43	147	352.03	0.73 ic	---	---	---	---	---	---	---	---	---	0.727
0.46	156	352.06	0.81 ic	---	---	---	---	---	---	---	---	---	0.807
0.48	165	352.08	0.89 ic	---	---	---	---	---	---	---	---	---	0.888
0.51	173	352.11	0.97 ic	---	---	---	---	---	---	---	---	---	0.974
0.53	182	352.13	1.06 ic	---	---	---	---	---	---	---	---	---	1.060
0.56	191	352.16	1.15 ic	---	---	---	---	---	---	---	---	---	1.151
0.58	199	352.18	1.24 ic	---	---	---	---	---	---	---	---	---	1.241
0.61	208	352.21	1.33 ic	---	---	---	---	---	---	---	---	---	1.333
0.64	217	352.23	1.43 ic	---	---	---	---	---	---	---	---	---	1.427
0.66	225	352.26	1.52 ic	---	---	---	---	---	---	---	---	---	1.523
0.69	234	352.29	1.62 ic	---	---	---	---	---	---	---	---	---	1.620
0.71	243	352.31	1.72 ic	---	---	---	---	---	---	---	---	---	1.716
0.74	251	352.34	1.81 ic	---	---	---	---	---	---	---	---	---	1.812
0.76	260	352.36	1.91 ic	---	---	---	---	---	---	---	---	---	1.910
0.79	270	352.39	2.00 ic	---	---	---	---	---	---	---	---	---	2.004

Continues on next page...

Proposed Chambers

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.81	280	352.41	2.10 ic	---	---	---	---	---	---	---	---	---	2.100
0.84	289	352.44	2.19 ic	---	---	---	---	---	---	---	---	---	2.191
0.86	299	352.46	2.28 ic	---	---	---	---	---	---	---	---	---	2.282
0.89	309	352.49	2.37 ic	---	---	---	---	---	---	---	---	---	2.369
0.91	319	352.51	2.42 oc	---	---	---	---	---	---	---	---	---	2.421
0.94	328	352.54	2.45 oc	---	---	---	---	---	---	---	---	---	2.450
0.97	338	352.57	2.46 oc	---	---	---	---	---	---	---	---	---	2.463
0.99	348	352.59	2.45 oc	---	---	---	---	---	---	---	---	---	2.449
1.02	358	352.62	2.46 oc	---	---	---	---	---	---	---	---	---	2.456
1.04	383	352.64	2.53 oc	---	---	---	---	---	---	---	---	---	2.530
1.07	409	352.67	2.60 oc	---	---	---	---	---	---	---	---	---	2.601
1.09	435	352.69	2.67 oc	---	---	---	---	---	---	---	---	---	2.671
1.12	460	352.72	2.74 oc	---	---	---	---	---	---	---	---	---	2.739
1.14	486	352.74	2.81 oc	---	---	---	---	---	---	---	---	---	2.806
1.17	512	352.77	2.87 oc	---	---	---	---	---	---	---	---	---	2.871
1.19	537	352.79	2.93 oc	---	---	---	---	---	---	---	---	---	2.934
1.22	563	352.82	3.00 oc	---	---	---	---	---	---	---	---	---	2.996
1.24	589	352.84	3.06 oc	---	---	---	---	---	---	---	---	---	3.057
1.27	614	352.87	3.12 oc	---	---	---	---	---	---	---	---	---	3.117
1.30	640	352.90	3.18 oc	---	---	---	---	---	---	---	---	---	3.175
1.32	665	352.92	3.23 oc	---	---	---	---	---	---	---	---	---	3.233
1.35	690	352.95	3.29 oc	---	---	---	---	---	---	---	---	---	3.289
1.37	715	352.97	3.34 oc	---	---	---	---	---	---	---	---	---	3.345
1.40	740	353.00	3.40 oc	---	---	---	---	---	---	---	---	---	3.399
1.42	766	353.02	3.45 oc	---	---	---	---	---	---	---	---	---	3.453
1.45	791	353.05	3.51 oc	---	---	---	---	---	---	---	---	---	3.506
1.47	816	353.07	3.56 oc	---	---	---	---	---	---	---	---	---	3.558
1.50	841	353.10	3.61 oc	---	---	---	---	---	---	---	---	---	3.609
1.52	866	353.12	3.66 oc	---	---	---	---	---	---	---	---	---	3.660
1.55	890	353.15	3.71 oc	---	---	---	---	---	---	---	---	---	3.710
1.57	915	353.17	3.76 oc	---	---	---	---	---	---	---	---	---	3.759
1.60	939	353.20	3.81 oc	---	---	---	---	---	---	---	---	---	3.808
1.63	963	353.23	3.86 oc	---	---	---	---	---	---	---	---	---	3.856
1.65	987	353.25	3.90 oc	---	---	---	---	---	---	---	---	---	3.904
1.68	1,011	353.28	3.95 oc	---	---	---	---	---	---	---	---	---	3.950
1.70	1,035	353.30	4.00 oc	---	---	---	---	---	---	---	---	---	3.997
1.73	1,060	353.33	4.04 oc	---	---	---	---	---	---	---	---	---	4.043
1.75	1,084	353.35	4.09 oc	---	---	---	---	---	---	---	---	---	4.088
1.78	1,108	353.38	4.13 oc	---	---	---	---	---	---	---	---	---	4.133
1.80	1,130	353.40	4.18 oc	---	---	---	---	---	---	---	---	---	4.177
1.83	1,153	353.43	4.22 oc	---	---	---	---	---	---	---	---	---	4.221
1.85	1,175	353.45	4.26 oc	---	---	---	---	---	---	---	---	---	4.264
1.88	1,198	353.48	4.31 oc	---	---	---	---	---	---	---	---	---	4.307
1.91	1,220	353.51	4.35 oc	---	---	---	---	---	---	---	---	---	4.350
1.93	1,243	353.53	4.39 oc	---	---	---	---	---	---	---	---	---	4.392
1.96	1,265	353.56	4.43 oc	---	---	---	---	---	---	---	---	---	4.434
1.98	1,288	353.58	4.47 oc	---	---	---	---	---	---	---	---	---	4.475
2.01	1,310	353.61	4.52 oc	---	---	---	---	---	---	---	---	---	4.516
2.03	1,333	353.63	4.56 oc	---	---	---	---	---	---	---	---	---	4.557
2.06	1,353	353.66	4.60 oc	---	---	---	---	---	---	---	---	---	4.597
2.08	1,372	353.68	4.64 oc	---	---	---	---	---	---	---	---	---	4.637
2.11	1,392	353.71	4.68 oc	---	---	---	---	---	---	---	---	---	4.676
2.13	1,412	353.73	4.72 oc	---	---	---	---	---	---	---	---	---	4.715
2.16	1,432	353.76	4.75 oc	---	---	---	---	---	---	---	---	---	4.754
2.18	1,452	353.78	4.79 oc	---	---	---	---	---	---	---	---	---	4.793
2.21	1,472	353.81	4.83 oc	---	---	---	---	---	---	---	---	---	4.831
2.24	1,492	353.84	4.87 oc	---	---	---	---	---	---	---	---	---	4.869
2.26	1,511	353.86	4.91 oc	---	---	---	---	---	---	---	---	---	4.907
2.29	1,531	353.89	4.94 oc	---	---	---	---	---	---	---	---	---	4.944
2.31	1,546	353.91	4.98 oc	---	---	---	---	---	---	---	---	---	4.981
2.34	1,561	353.94	5.02 oc	---	---	---	---	---	---	---	---	---	5.018
2.36	1,576	353.96	5.05 oc	---	---	---	---	---	---	---	---	---	5.055
2.39	1,592	353.99	5.09 oc	---	---	---	---	---	---	---	---	---	5.091
2.41	1,607	354.01	5.13 oc	---	---	---	---	---	---	---	---	---	5.127
2.44	1,622	354.04	5.16 oc	---	---	---	---	---	---	---	---	---	5.163
2.46	1,637	354.06	5.20 oc	---	---	---	---	---	---	---	---	---	5.198
2.49	1,652	354.09	5.23 oc	---	---	---	---	---	---	---	---	---	5.234
2.51	1,667	354.11	5.27 oc	---	---	---	---	---	---	---	---	---	5.269
2.54	1,682	354.14	5.30 oc	---	---	---	---	---	---	---	---	---	5.304

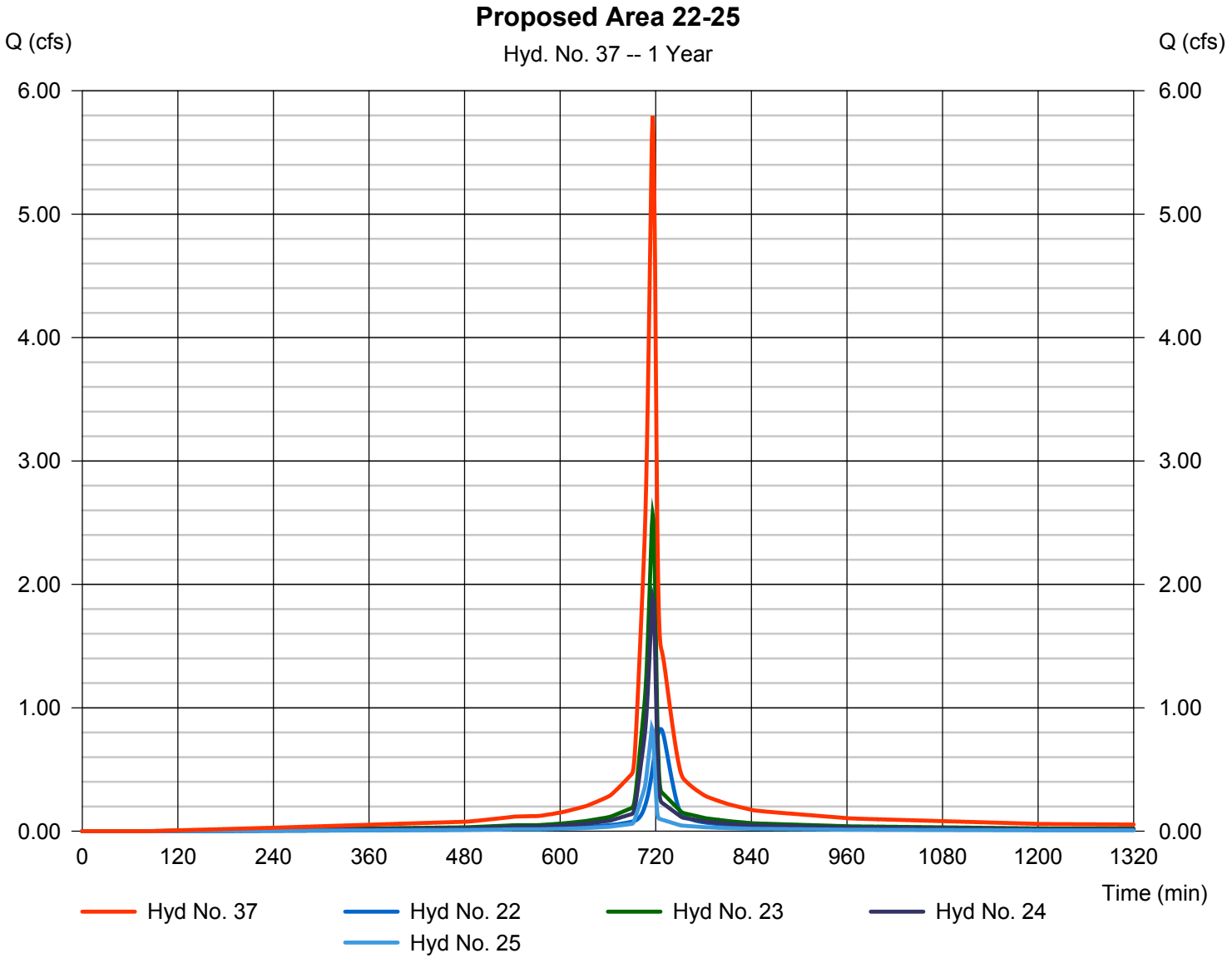
...End

Hydrograph Report

Hyd. No. 37

Proposed Area 22-25

Hydrograph type	= Combine	Peak discharge	= 5.797 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 14,600 cuft
Inflow hyds.	= 22, 23, 24, 25	Contrib. drain. area	= 1.610 ac

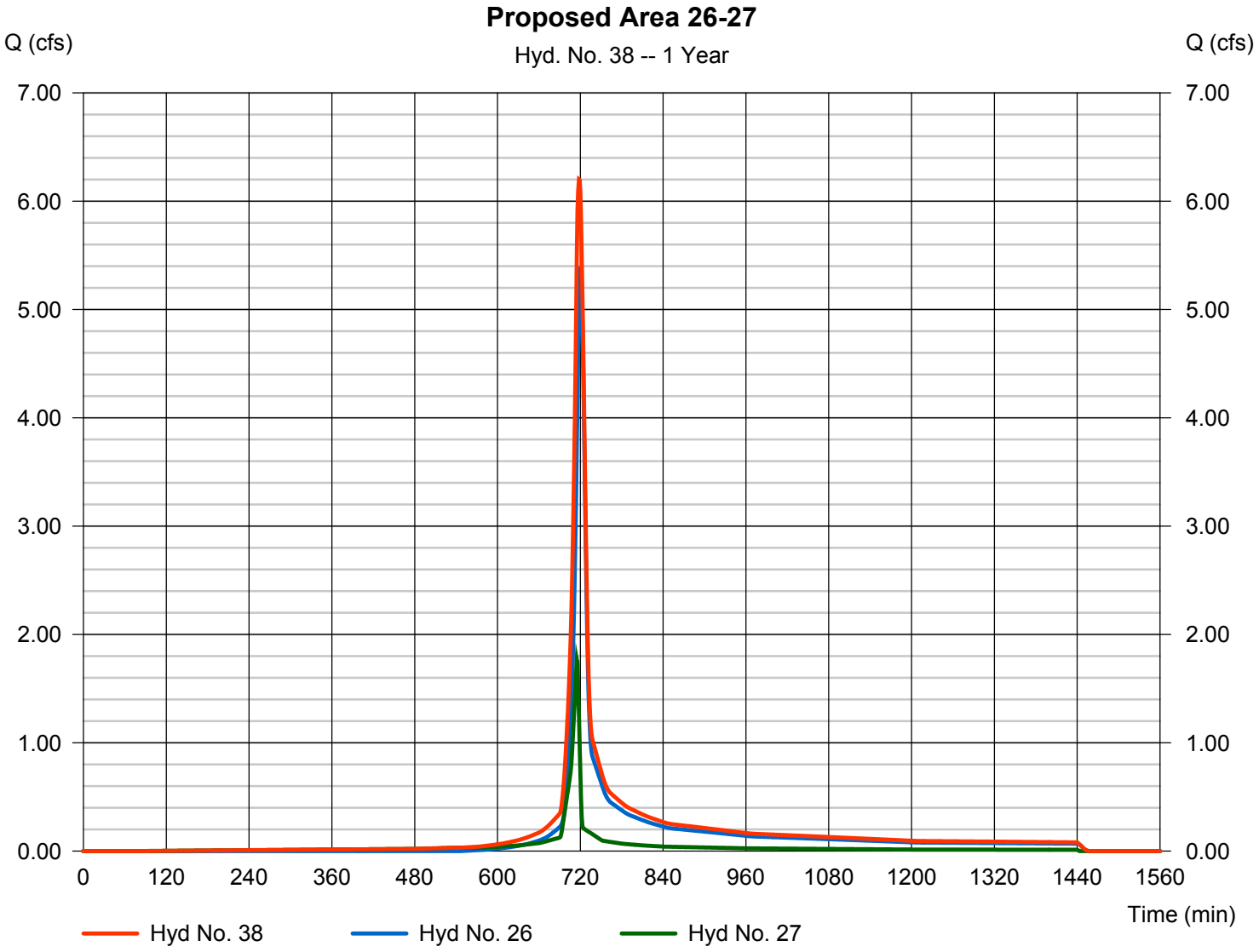


Hydrograph Report

Hyd. No. 38

Proposed Area 26-27

Hydrograph type	=	Combine	Peak discharge	=	6.201 cfs
Storm frequency	=	1 yrs	Time to peak	=	718 min
Time interval	=	1 min	Hyd. volume	=	16,657 cuft
Inflow hyds.	=	26, 27	Contrib. drain. area	=	3.150 ac

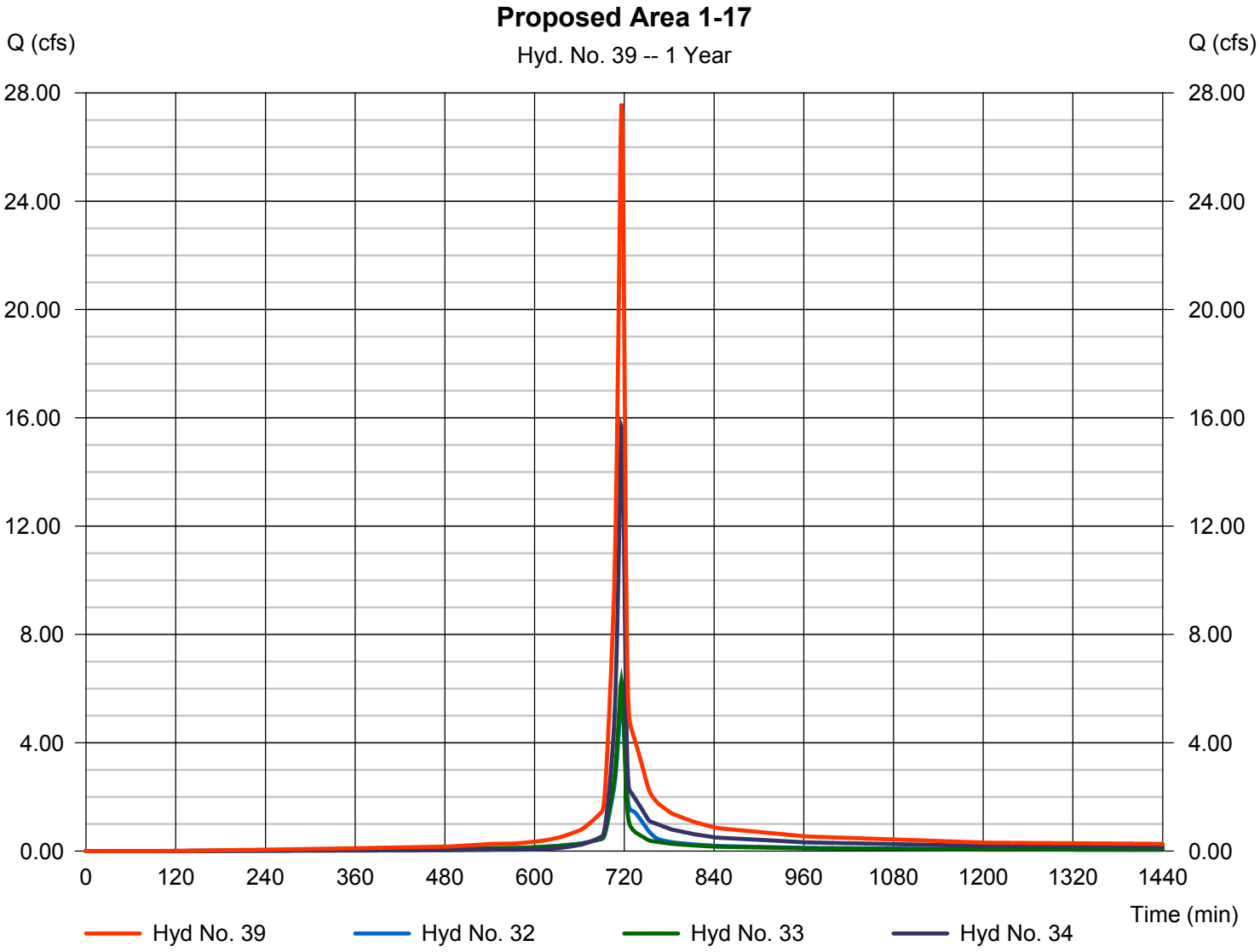


Hydrograph Report

Hyd. No. 39

Proposed Area 1-17

Hydrograph type	= Combine	Peak discharge	= 27.60 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 59,847 cuft
Inflow hyds.	= 32, 33, 34	Contrib. drain. area	= 0.000 ac

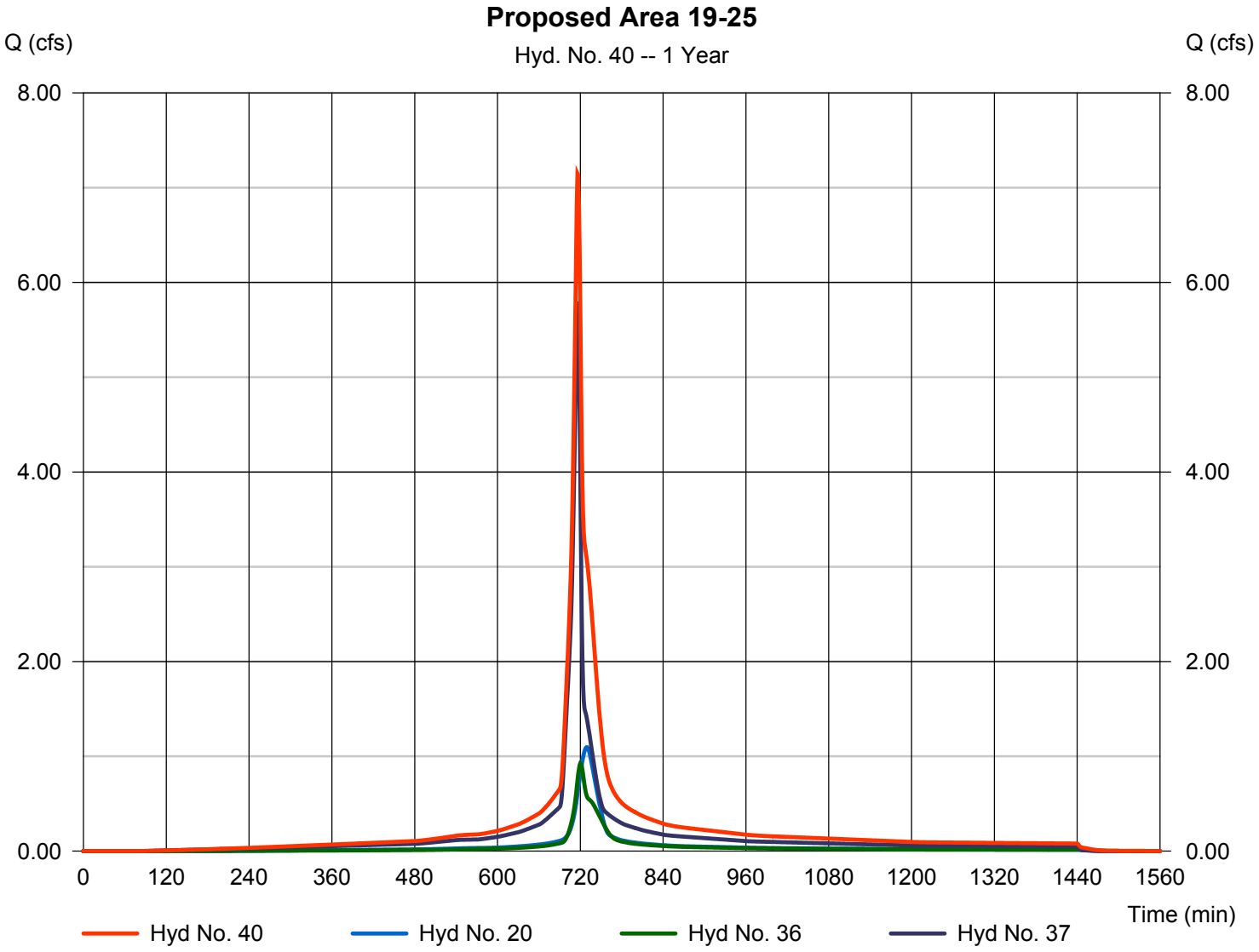


Hydrograph Report

Hyd. No. 40

Proposed Area 19-25

Hydrograph type	= Combine	Peak discharge	= 7.146 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 22,581 cuft
Inflow hyds.	= 20, 36, 37	Contrib. drain. area	= 0.520 ac

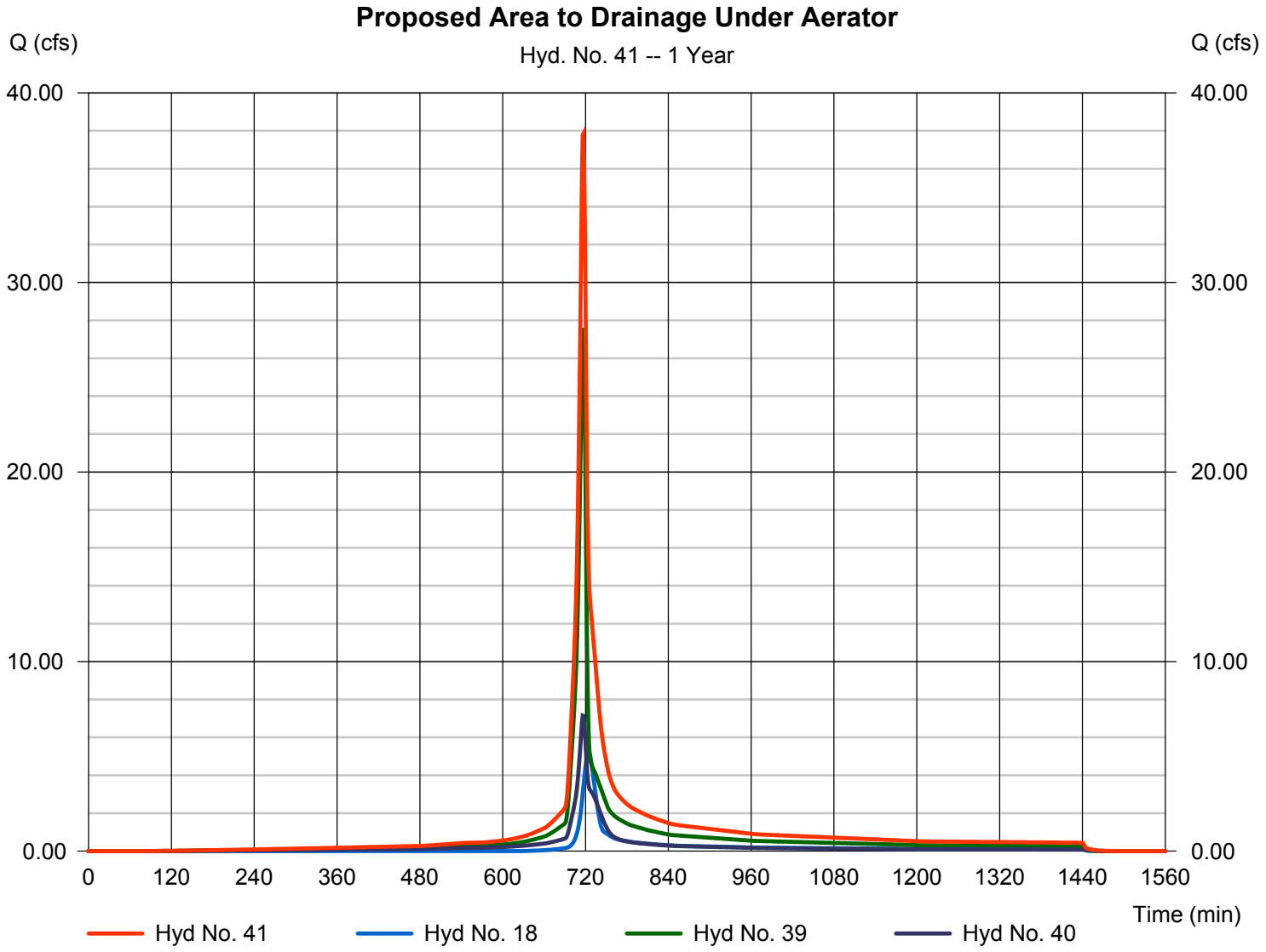


Hydrograph Report

Hyd. No. 41

Proposed Area to Drainage Under Aerator

Hydrograph type	=	Combine	Peak discharge	=	37.85 cfs
Storm frequency	=	1 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	98,321 cuft
Inflow hyds.	=	18, 39, 40	Contrib. drain. area	=	4.240 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1.589	1	715	3,404	------	------	------	Proposed Area 1
2	SCS Runoff	1.076	1	718	2,697	------	------	------	Proposed Area 2
3	SCS Runoff	1.972	1	716	4,495	------	------	------	Proposed Area 3
4	SCS Runoff	2.579	1	716	5,879	------	------	------	Proposed Area 4
5	SCS Runoff	2.477	1	717	5,769	------	------	------	Proposed Area 5
6	SCS Runoff	1.766	1	732	7,566	------	------	------	Proposed Area 6
7	SCS Runoff	2.130	1	717	5,045	------	------	------	Proposed Area 7
8	SCS Runoff	0.757	1	715	1,621	------	------	------	Proposed Area 8
9	SCS Runoff	0.745	1	720	1,913	------	------	------	Proposed Area 9
10	SCS Runoff	2.618	1	716	5,759	------	------	------	Proposed Area 10
11	SCS Runoff	1.589	1	715	3,404	------	------	------	Proposed Area 11
12	SCS Runoff	3.921	1	716	8,772	------	------	------	Proposed Area 12
13	SCS Runoff	2.032	1	715	4,270	------	------	------	Proposed Area 13
14	SCS Runoff	0.908	1	715	1,945	------	------	------	Proposed Area 14
15	SCS Runoff	1.185	1	716	2,567	------	------	------	Proposed Area 15
16	SCS Runoff	1.362	1	715	2,918	------	------	------	Proposed Area 16
17	SCS Runoff	33.98	1	717	65,088	------	------	------	Proposed Area 17
18	SCS Runoff	14.39	1	724	42,631	------	------	------	Proposed Area 18
19	SCS Runoff	1.278	1	718	3,203	------	------	------	Proposed Area 19
20	SCS Runoff	2.040	1	729	8,493	------	------	------	Proposed Area 20
21	SCS Runoff	0.932	1	732	3,966	------	------	------	Proposed Area 21
22	SCS Runoff	1.538	1	726	5,707	------	------	------	Proposed Area 22
23	SCS Runoff	4.628	1	716	10,547	------	------	------	Proposed Area 23
24	SCS Runoff	3.414	1	716	7,781	------	------	------	Proposed Area 24
25	SCS Runoff	1.514	1	715	3,242	------	------	------	Proposed Area 25
26	SCS Runoff	13.08	1	720	32,017	------	------	------	Proposed Area 26
27	SCS Runoff	3.179	1	715	6,808	------	------	------	Proposed Area 27
28	SCS Runoff	3.611	1	723	10,297	------	------	------	Proposed Area 28
29	SCS Runoff	1.204	1	715	2,530	------	------	------	Proposed Area 29
30	SCS Runoff	5.849	1	723	16,681	------	------	------	Proposed Area 30
31	SCS Runoff	39.37	1	716	76,339	------	------	------	Proposed Area 31
32	Combine	10.42	1	716	29,810	1, 2, 3, 4, 5, 6,	------	------	Proposed Area 1-6
33	Combine	11.54	1	716	26,513	7, 8, 9, 10, 11, 12,	------	------	Proposed Area 7-12
34	Combine	39.33	1	716	76,788	13, 14, 15, 16, 17,	------	------	Proposed Area 13-17

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
35	Combine	1.844	1	719	7,169	19, 21,	------	------	Proposed Area 19 & 21
36	Reservoir	1.794	1	720	7,166	35	352.33	250	Proposed Chambers
37	Combine	10.50	1	716	27,277	22, 23, 24,	------	------	Proposed Area 22-25
38	Combine	14.61	1	719	38,825	25, 26, 27,	------	------	Proposed Area 26-27
39	Combine	61.29	1	716	133,111	32, 33, 34,	------	------	Proposed Area 1-17
40	Combine	13.12	1	716	42,935	20, 36, 37,	------	------	Proposed Area 19-25
41	Combine	83.79	1	716	218,677	18, 39, 40	------	------	Proposed Area to Drainage Under Ae

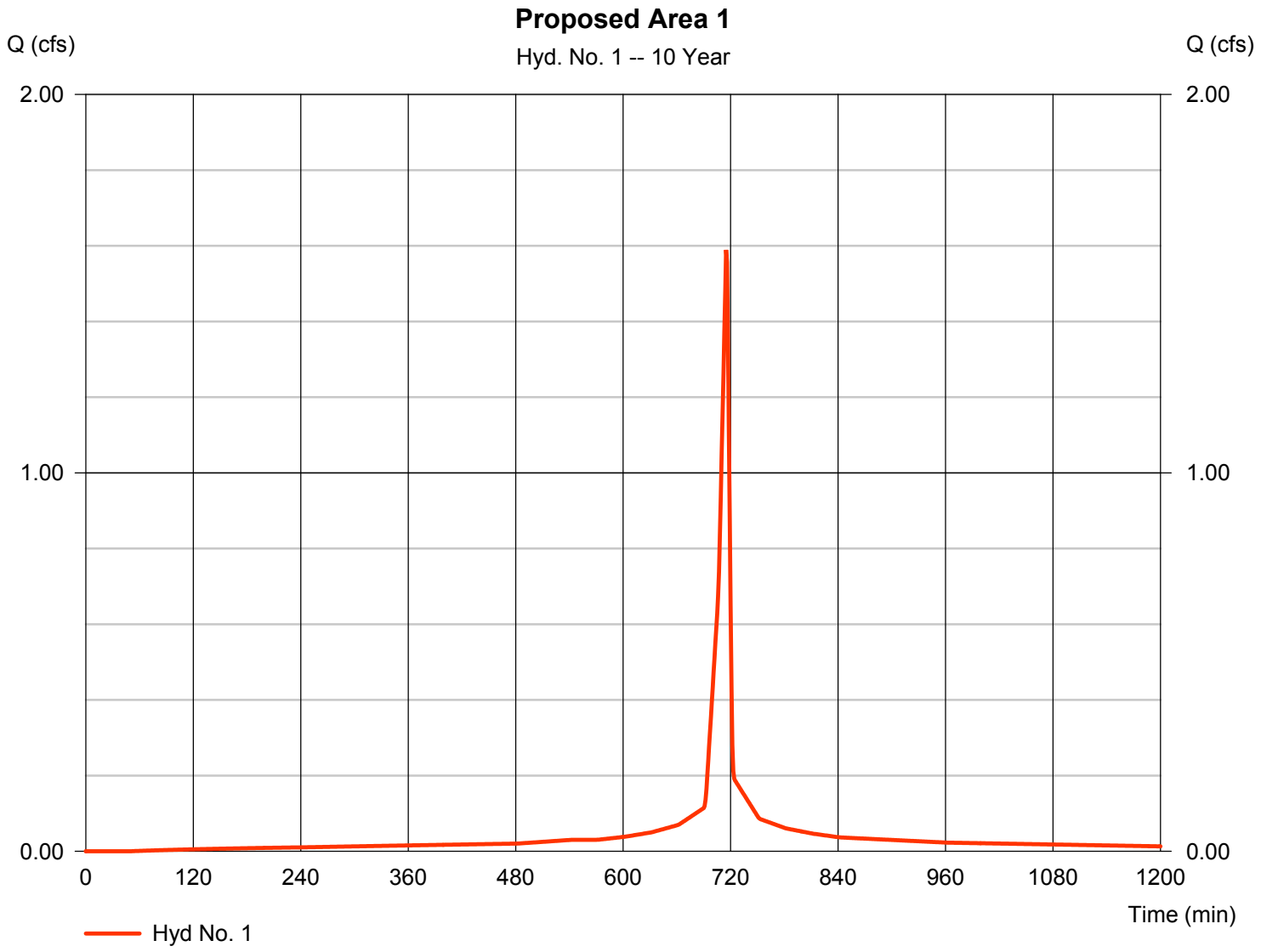
Hydrograph Report

Hyd. No. 1

Proposed Area 1

Hydrograph type	= SCS Runoff	Peak discharge	= 1.589 cfs
Storm frequency	= 10 yrs	Time to peak	= 715 min
Time interval	= 1 min	Hyd. volume	= 3,404 cuft
Drainage area	= 0.210 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.20 min
Total precip.	= 5.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.211 x 98)] / 0.210



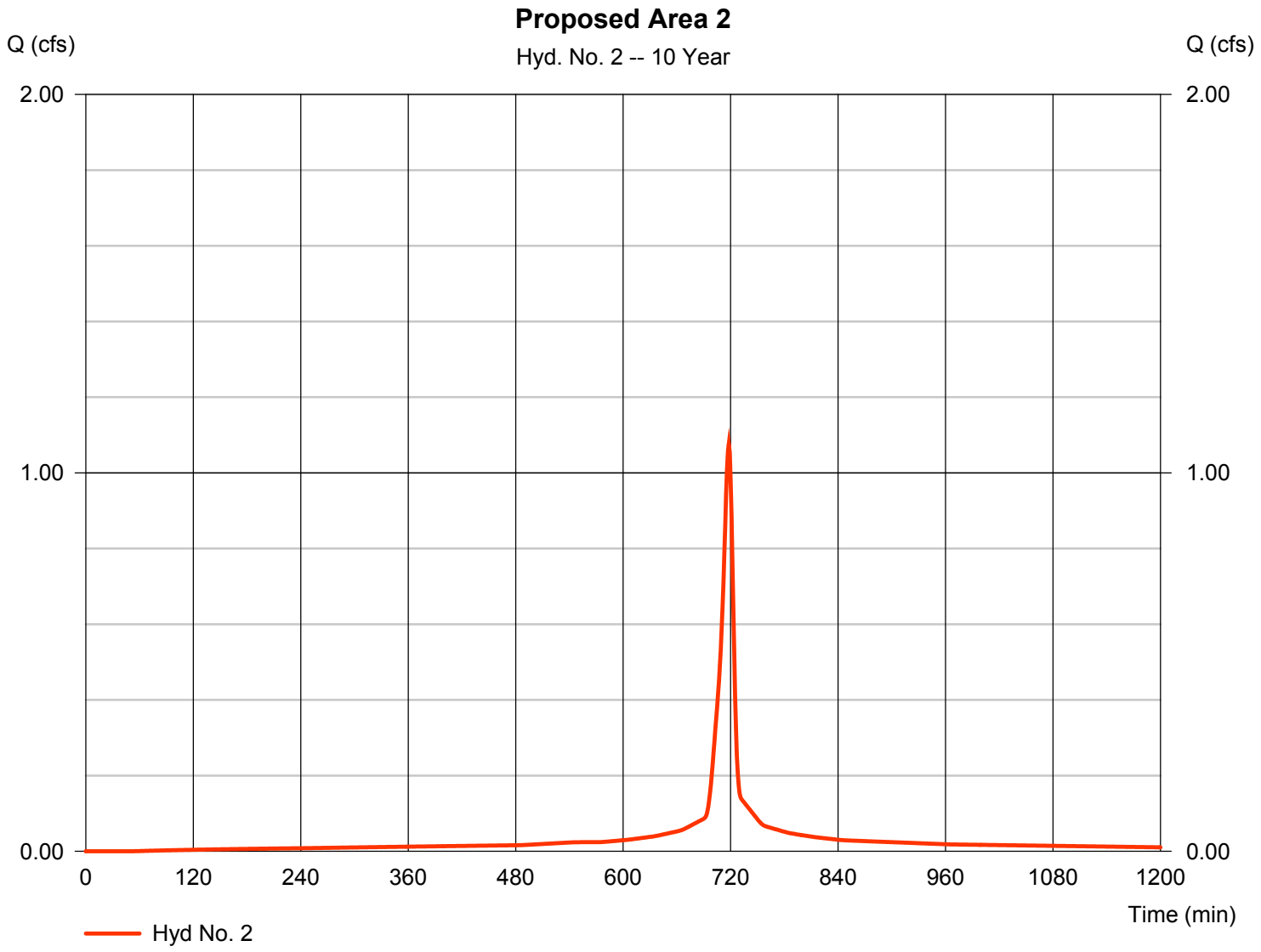
Hydrograph Report

Hyd. No. 2

Proposed Area 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.076 cfs
Storm frequency	=	10 yrs	Time to peak	=	718 min
Time interval	=	1 min	Hyd. volume	=	2,697 cuft
Drainage area	=	0.160 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	6.90 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.152 x 98) + (0.004 x 79)] / 0.160



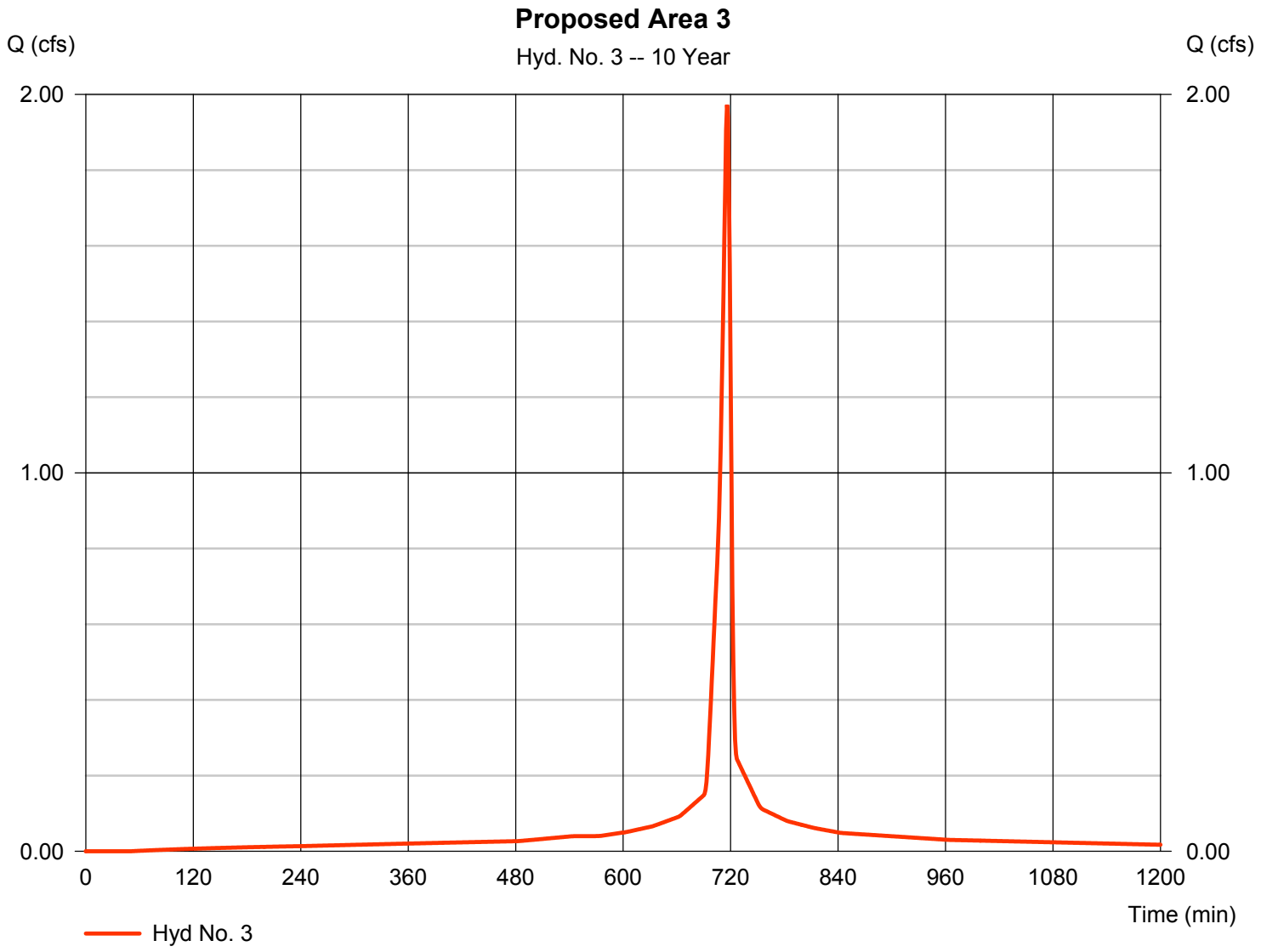
Hydrograph Report

Hyd. No. 3

Proposed Area 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.972 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	4,495 cuft
Drainage area	=	0.260 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	3.70 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.264 x 98)] / 0.260



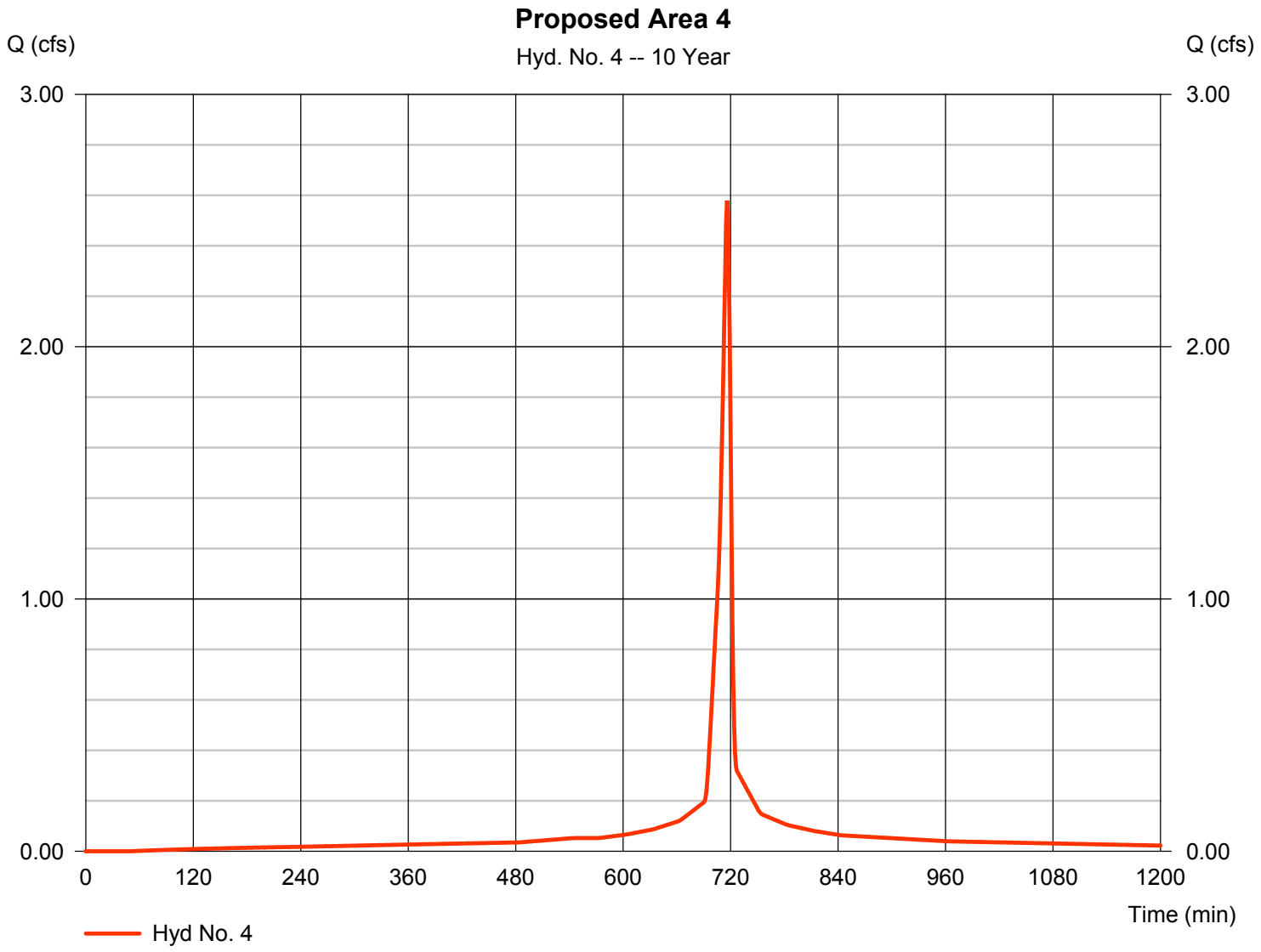
Hydrograph Report

Hyd. No. 4

Proposed Area 4

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.579 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	5,879 cuft
Drainage area	=	0.340 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	3.60 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.335 x 98)] / 0.340



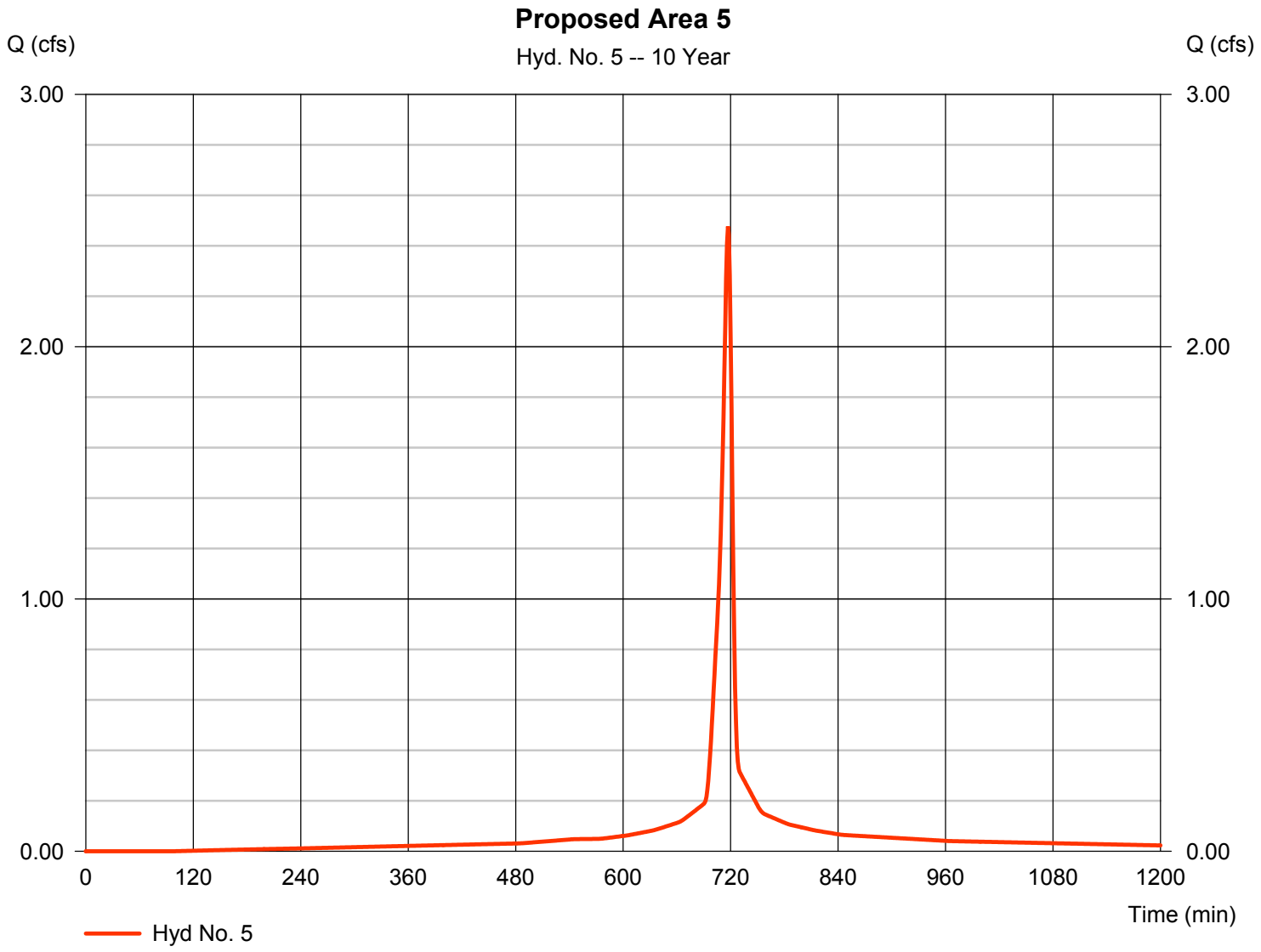
Hydrograph Report

Hyd. No. 5

Proposed Area 5

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.477 cfs
Storm frequency	=	10 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	5,769 cuft
Drainage area	=	0.340 ac	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.50 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.299 x 98) + (0.040 x 79)] / 0.340



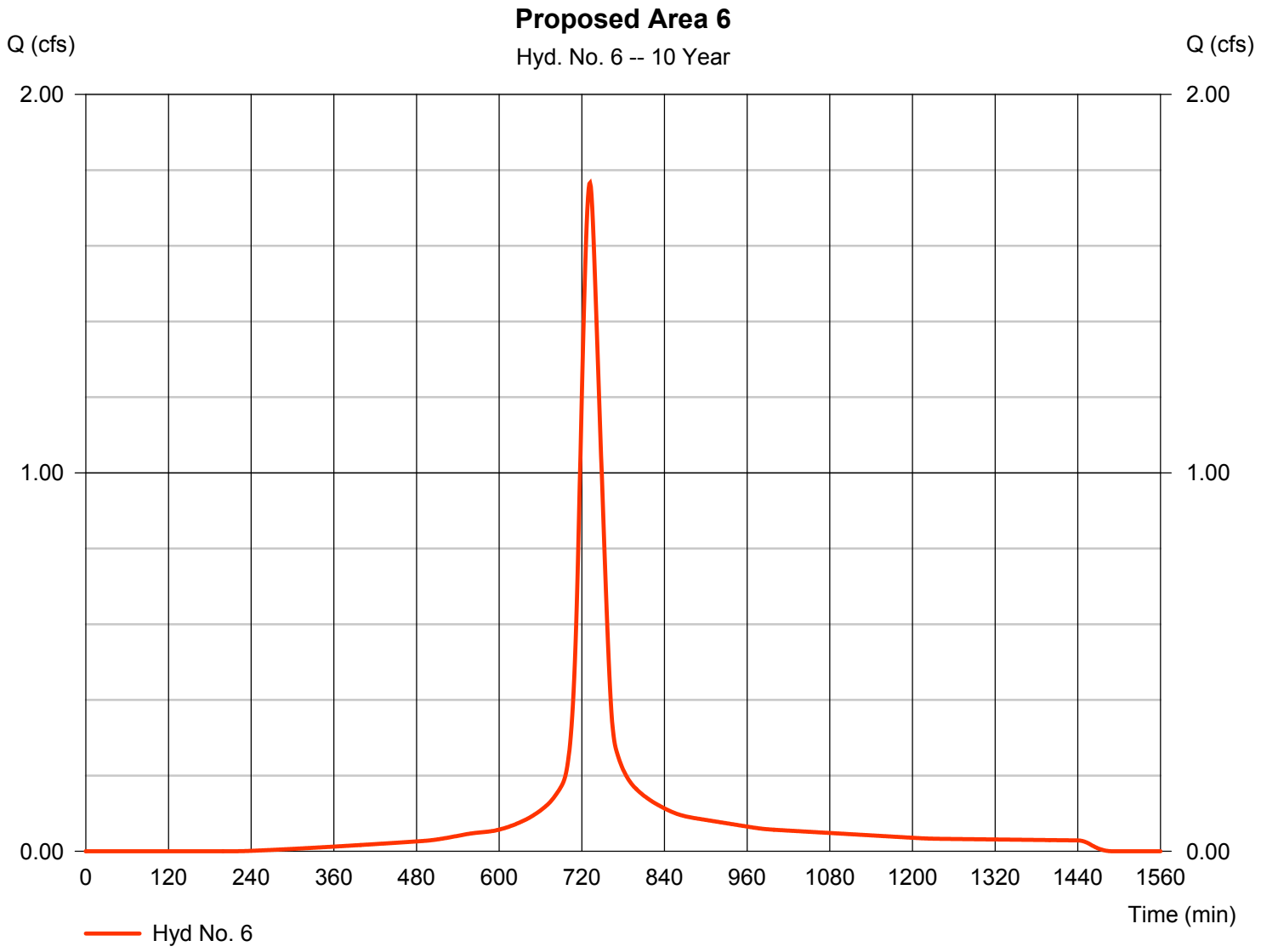
Hydrograph Report

Hyd. No. 6

Proposed Area 6

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.766 cfs
Storm frequency	=	10 yrs	Time to peak	=	732 min
Time interval	=	1 min	Hyd. volume	=	7,566 cuft
Drainage area	=	0.520 ac	Curve number	=	91*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	30.80 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.331 x 98) + (0.191 x 79)] / 0.520



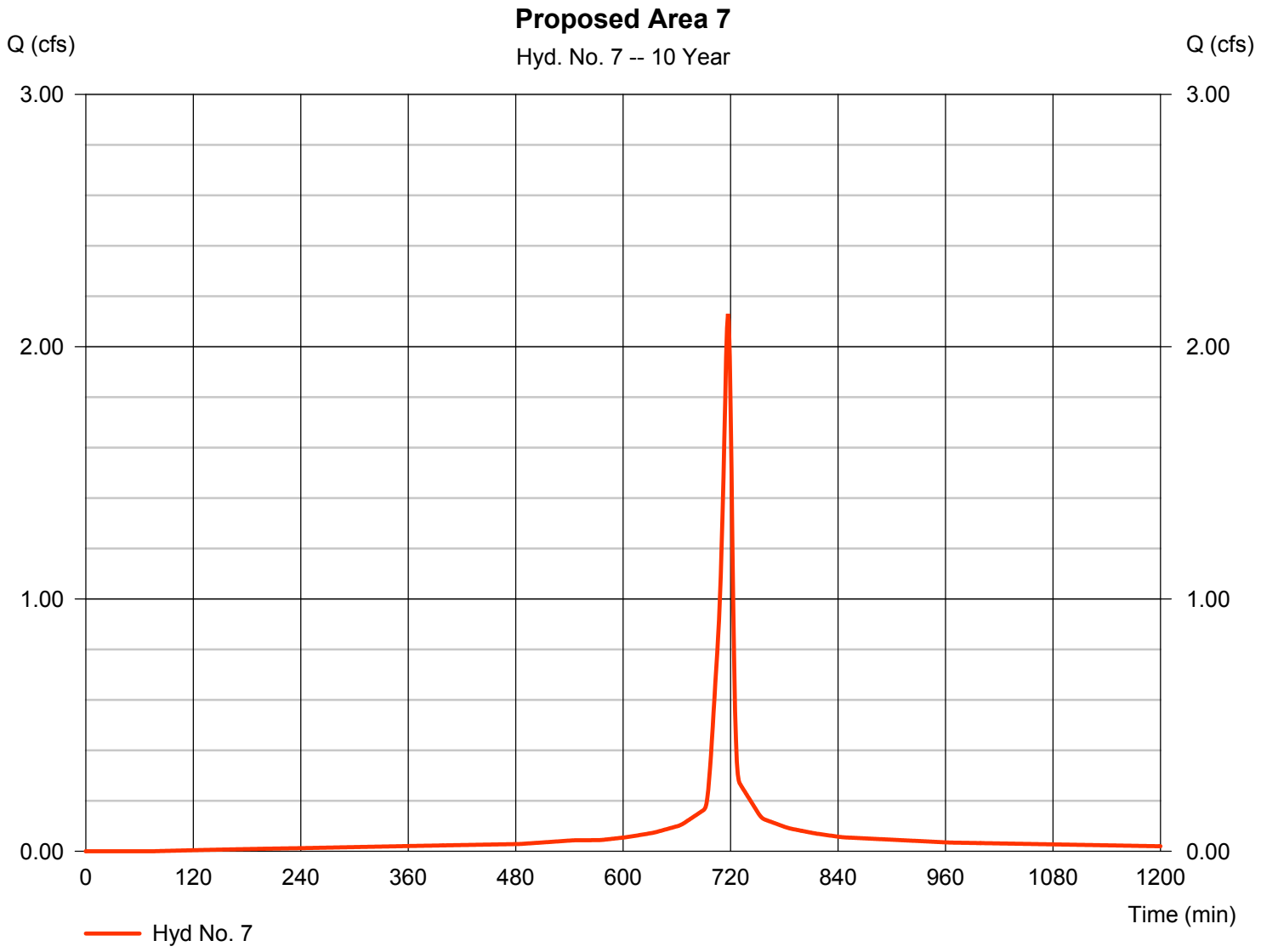
Hydrograph Report

Hyd. No. 7

Proposed Area 7

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.130 cfs
Storm frequency	=	10 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	5,045 cuft
Drainage area	=	0.290 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.272 x 98) + (0.021 x 79)] / 0.290



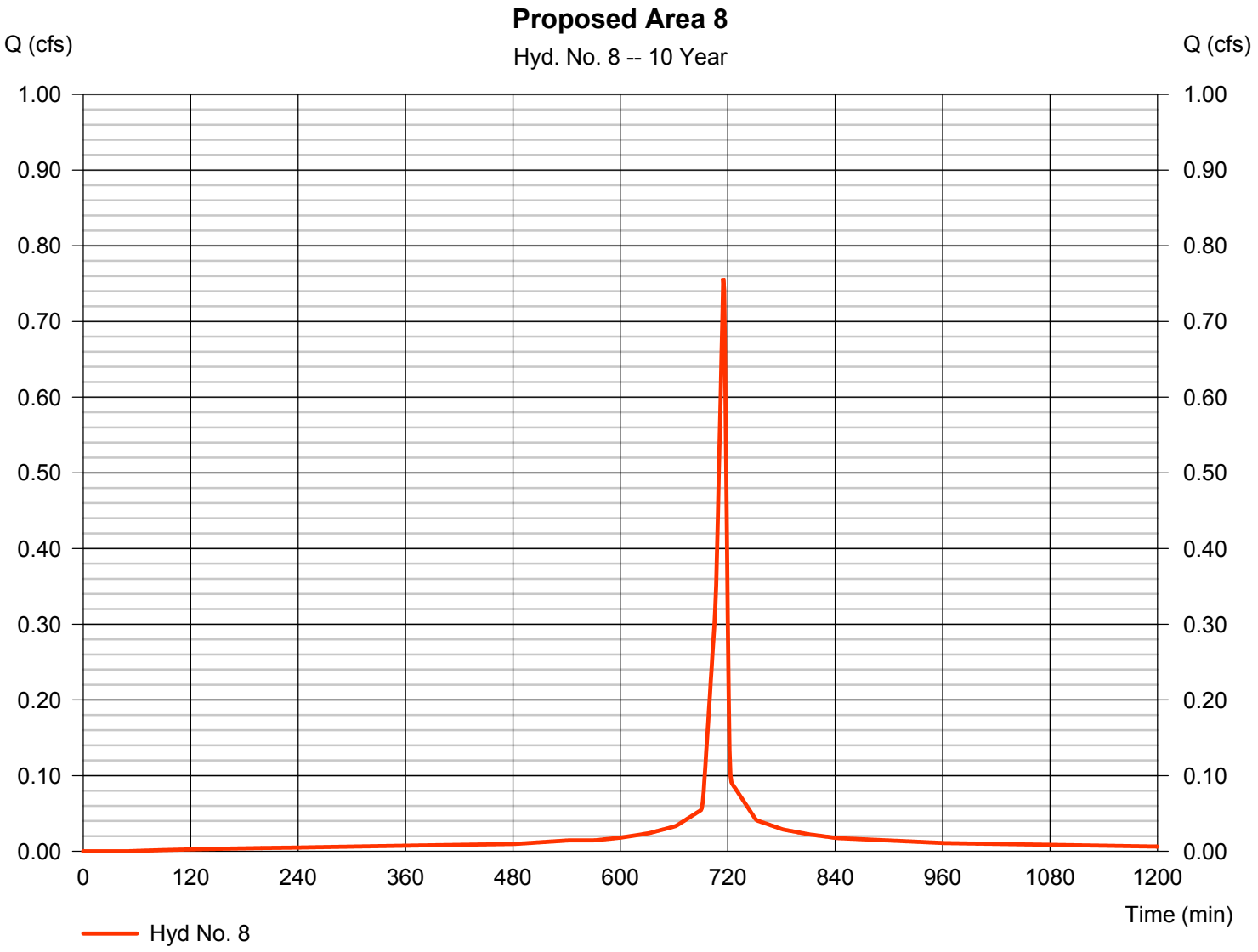
Hydrograph Report

Hyd. No. 8

Proposed Area 8

Hydrograph type	= SCS Runoff	Peak discharge	= 0.757 cfs
Storm frequency	= 10 yrs	Time to peak	= 715 min
Time interval	= 1 min	Hyd. volume	= 1,621 cuft
Drainage area	= 0.100 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.10 min
Total precip.	= 5.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.102 x 98)] / 0.100



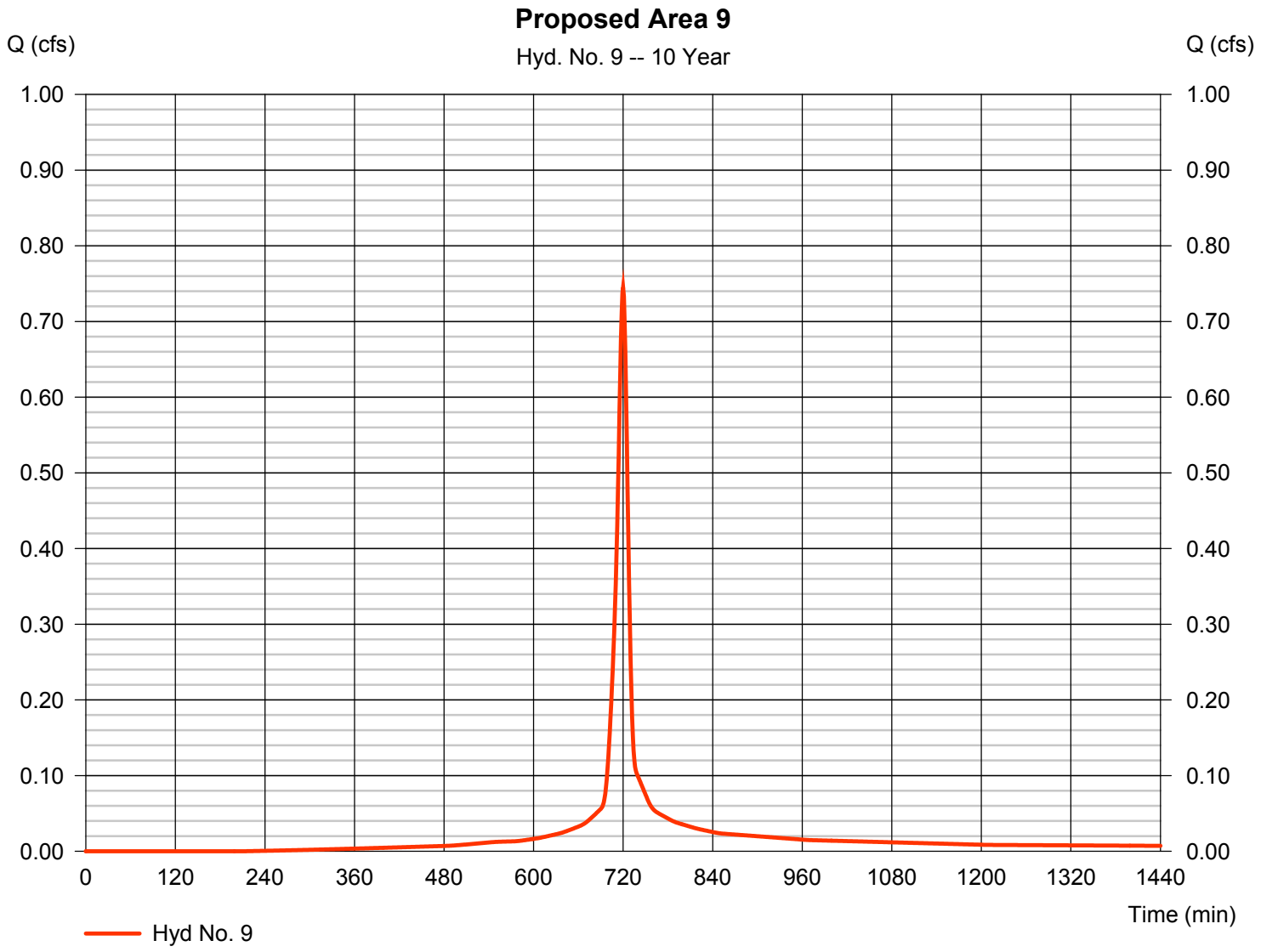
Hydrograph Report

Hyd. No. 9

Proposed Area 9

Hydrograph type	= SCS Runoff	Peak discharge	= 0.745 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 1,913 cuft
Drainage area	= 0.130 ac	Curve number	= 91*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.20 min
Total precip.	= 5.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.081 x 98) + (0.044 x 79)] / 0.130



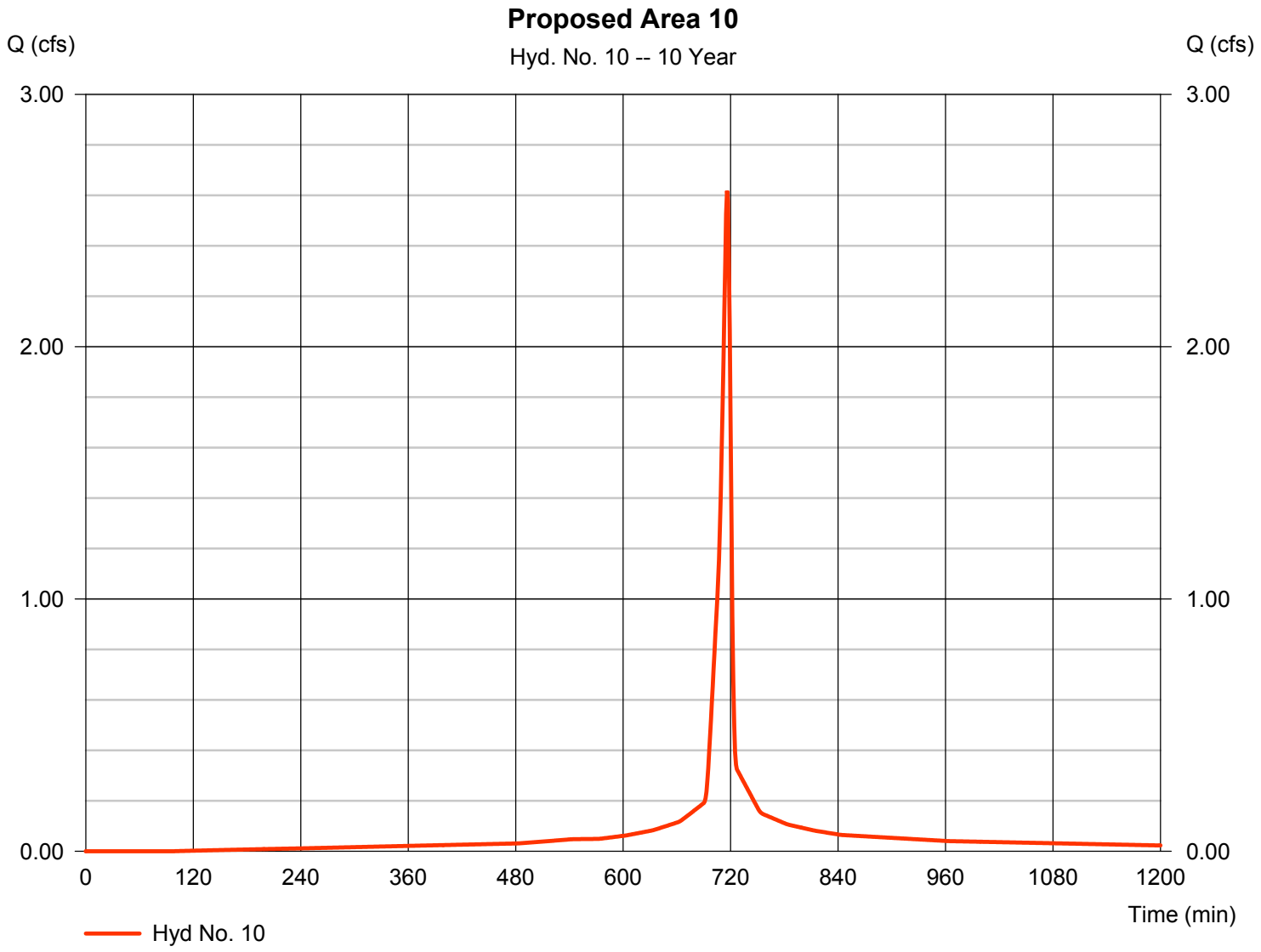
Hydrograph Report

Hyd. No. 10

Proposed Area 10

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.618 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	5,759 cuft
Drainage area	=	0.350 ac	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.50 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.310 x 98) + (0.040 x 79)] / 0.350



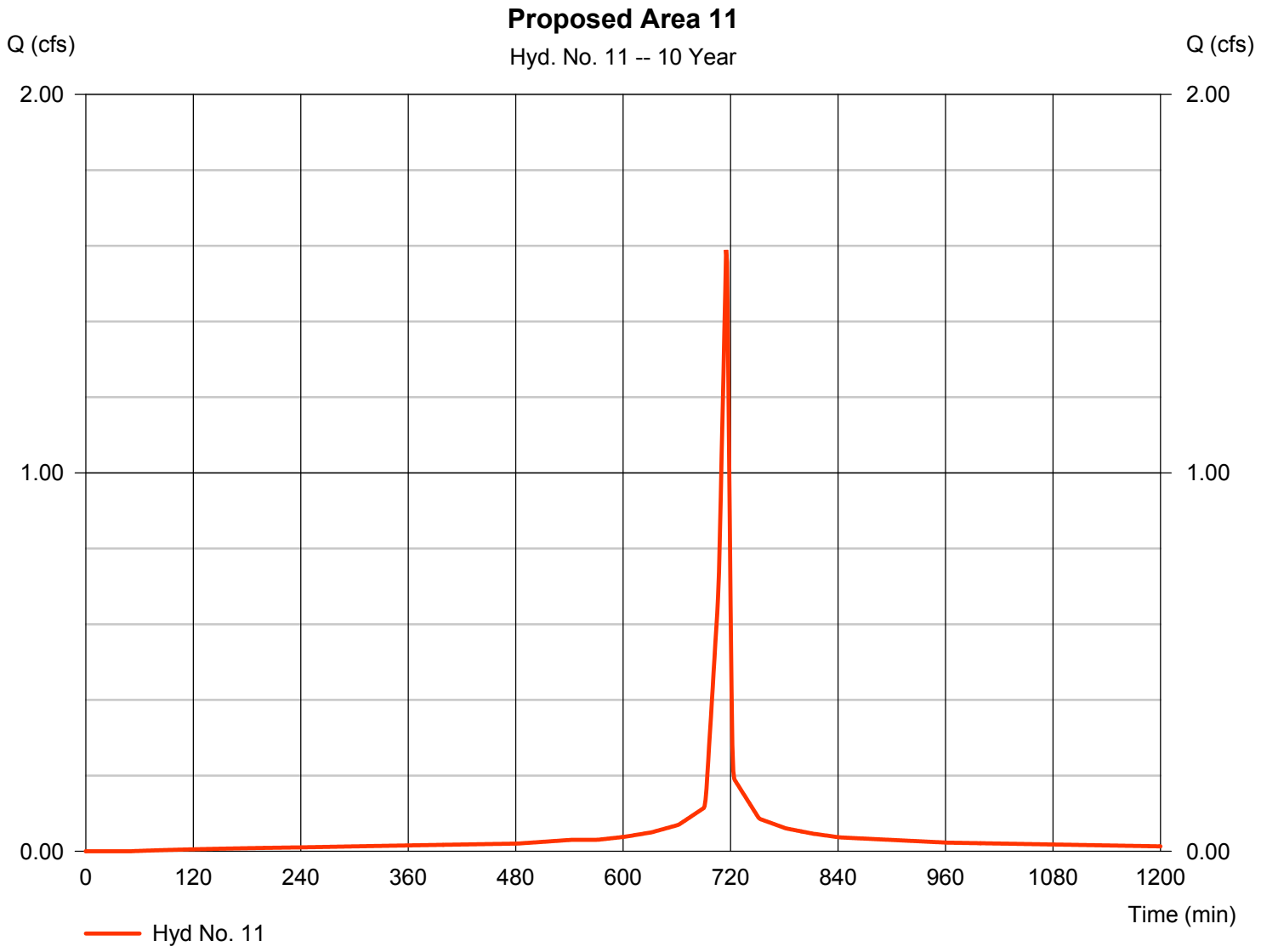
Hydrograph Report

Hyd. No. 11

Proposed Area 11

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.589 cfs
Storm frequency	=	10 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	3,404 cuft
Drainage area	=	0.210 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.50 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.207 x 98)] / 0.210



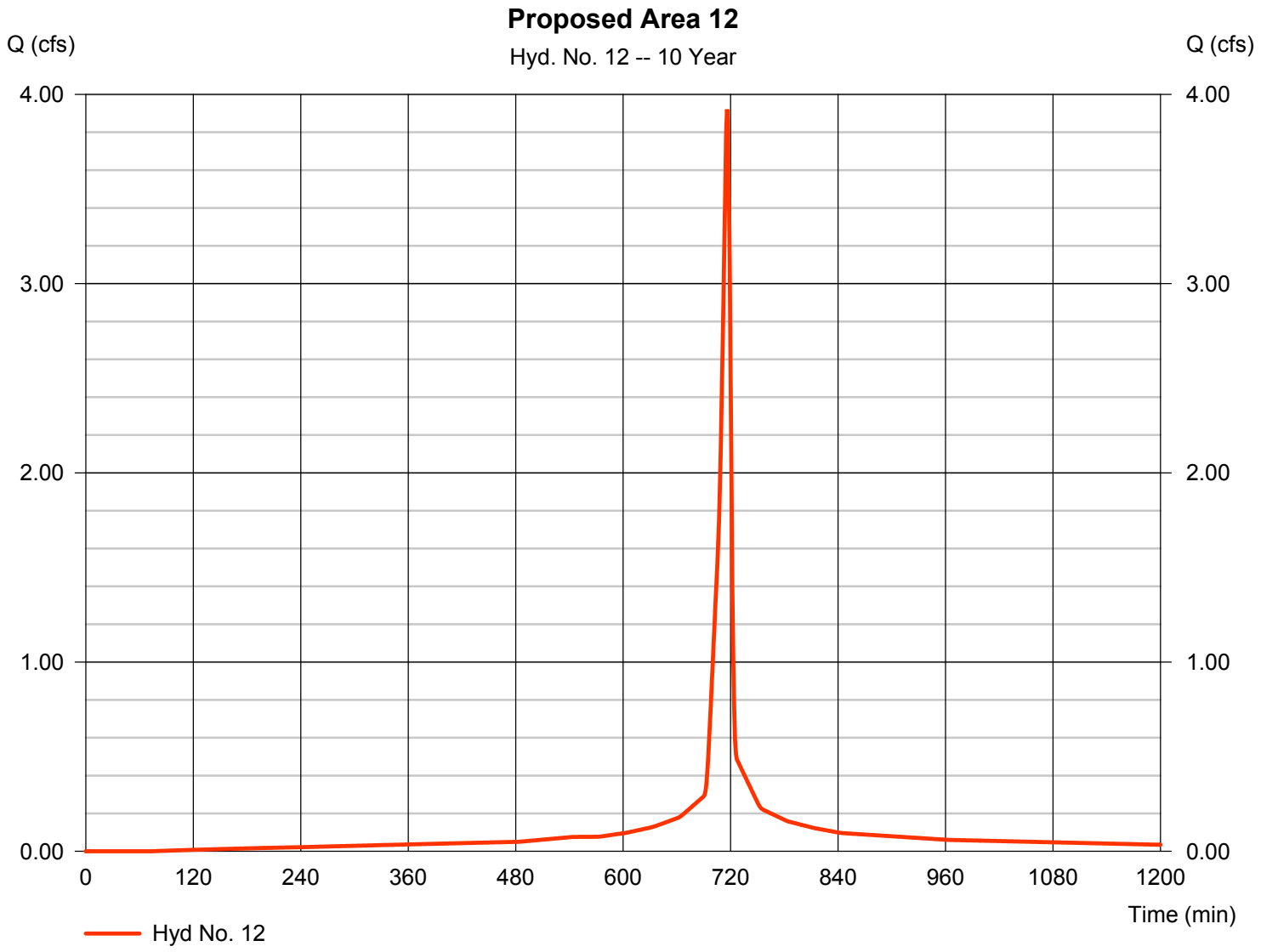
Hydrograph Report

Hyd. No. 12

Proposed Area 12

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.921 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	8,772 cuft
Drainage area	=	0.520 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.10 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.480 x 98) + (0.040 x 79)] / 0.520



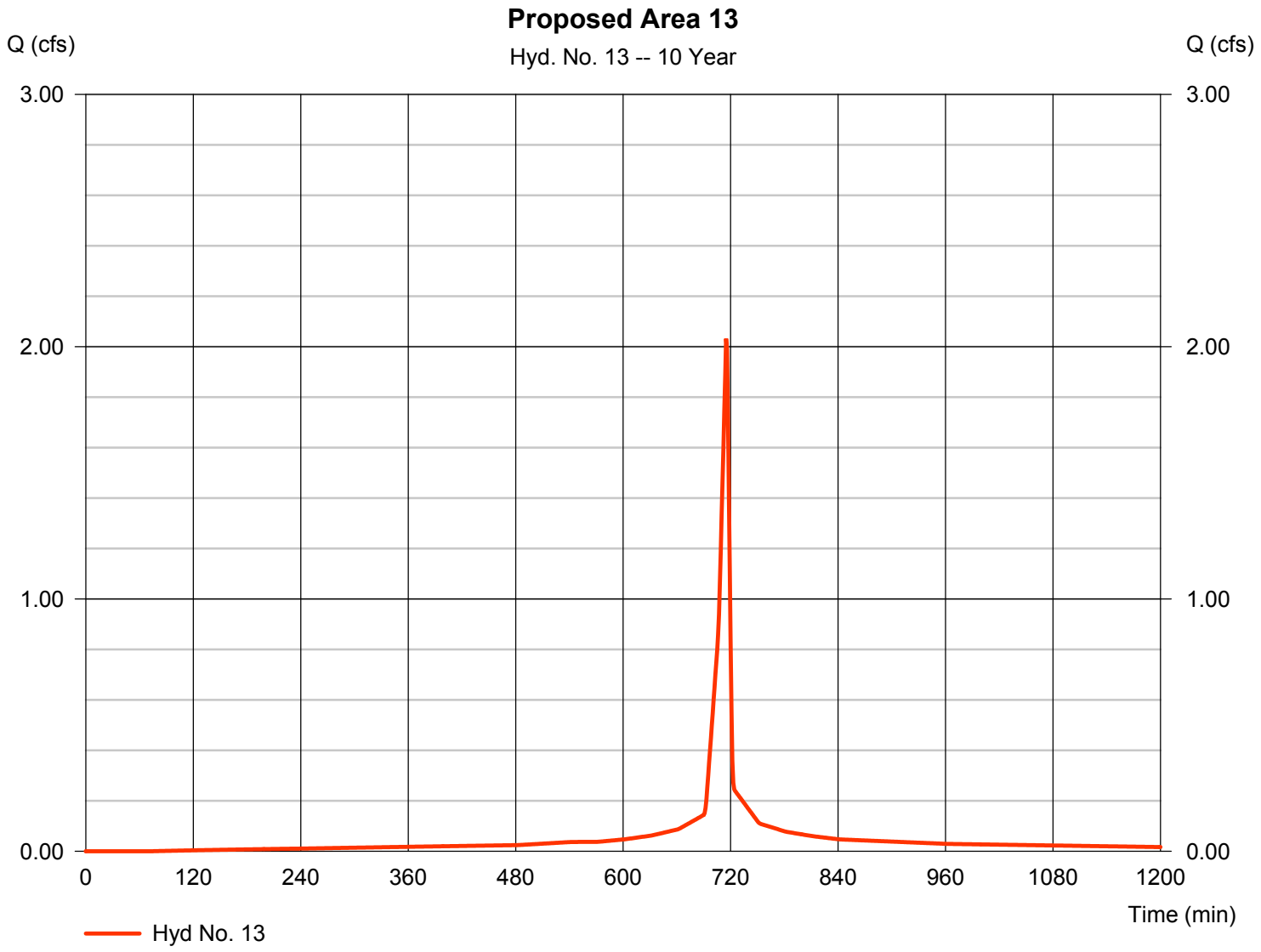
Hydrograph Report

Hyd. No. 13

Proposed Area 13

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.032 cfs
Storm frequency	=	10 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	4,270 cuft
Drainage area	=	0.270 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.50 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.260 x 98) + (0.010 x 79)] / 0.270



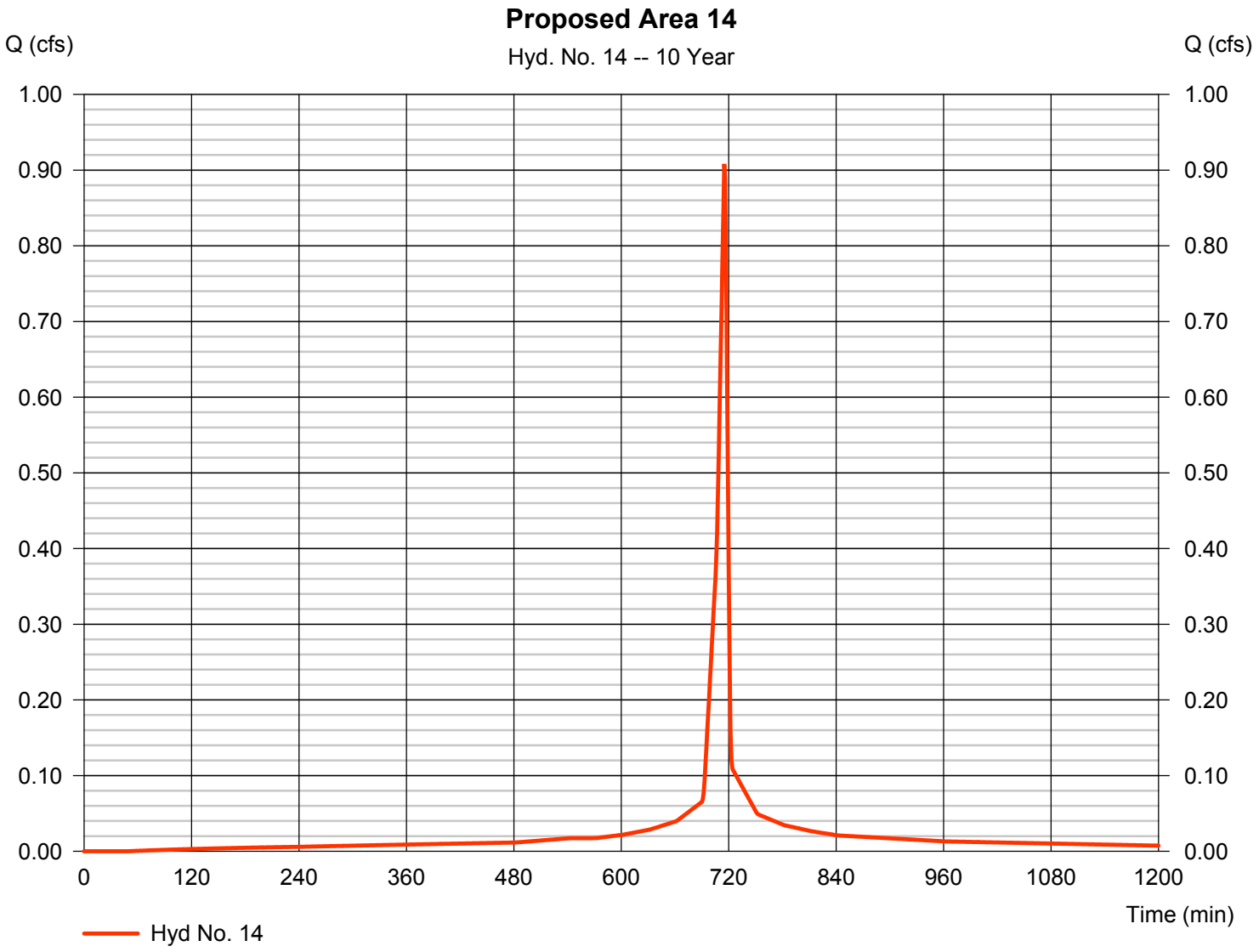
Hydrograph Report

Hyd. No. 14

Proposed Area 14

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.908 cfs
Storm frequency	=	10 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	1,945 cuft
Drainage area	=	0.120 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	1.70 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.123 x 98)] / 0.120



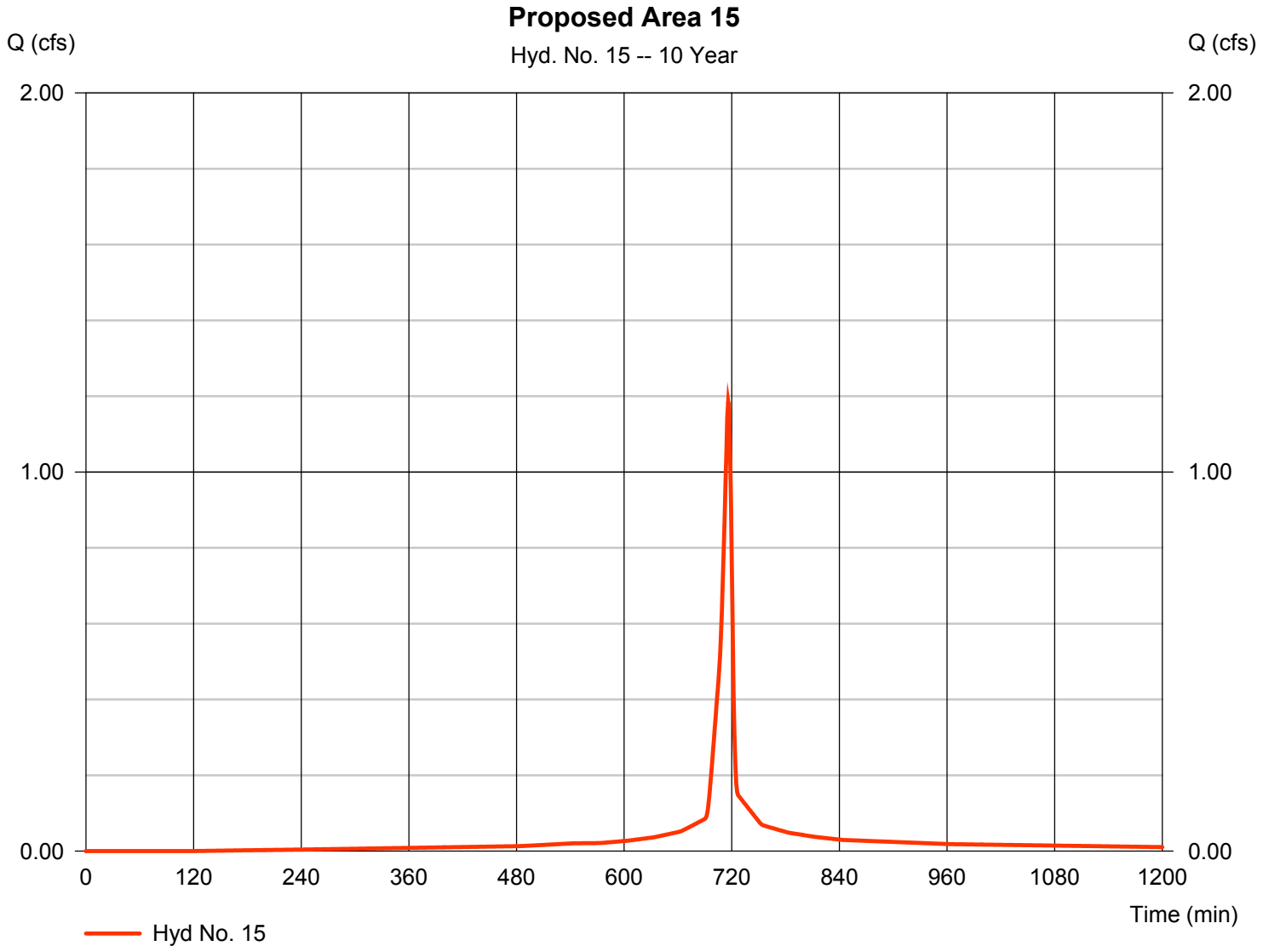
Hydrograph Report

Hyd. No. 15

Proposed Area 15

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.185 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	2,567 cuft
Drainage area	=	0.160 ac	Curve number	=	95*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.90 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.134 x 98) + (0.022 x 79)] / 0.160



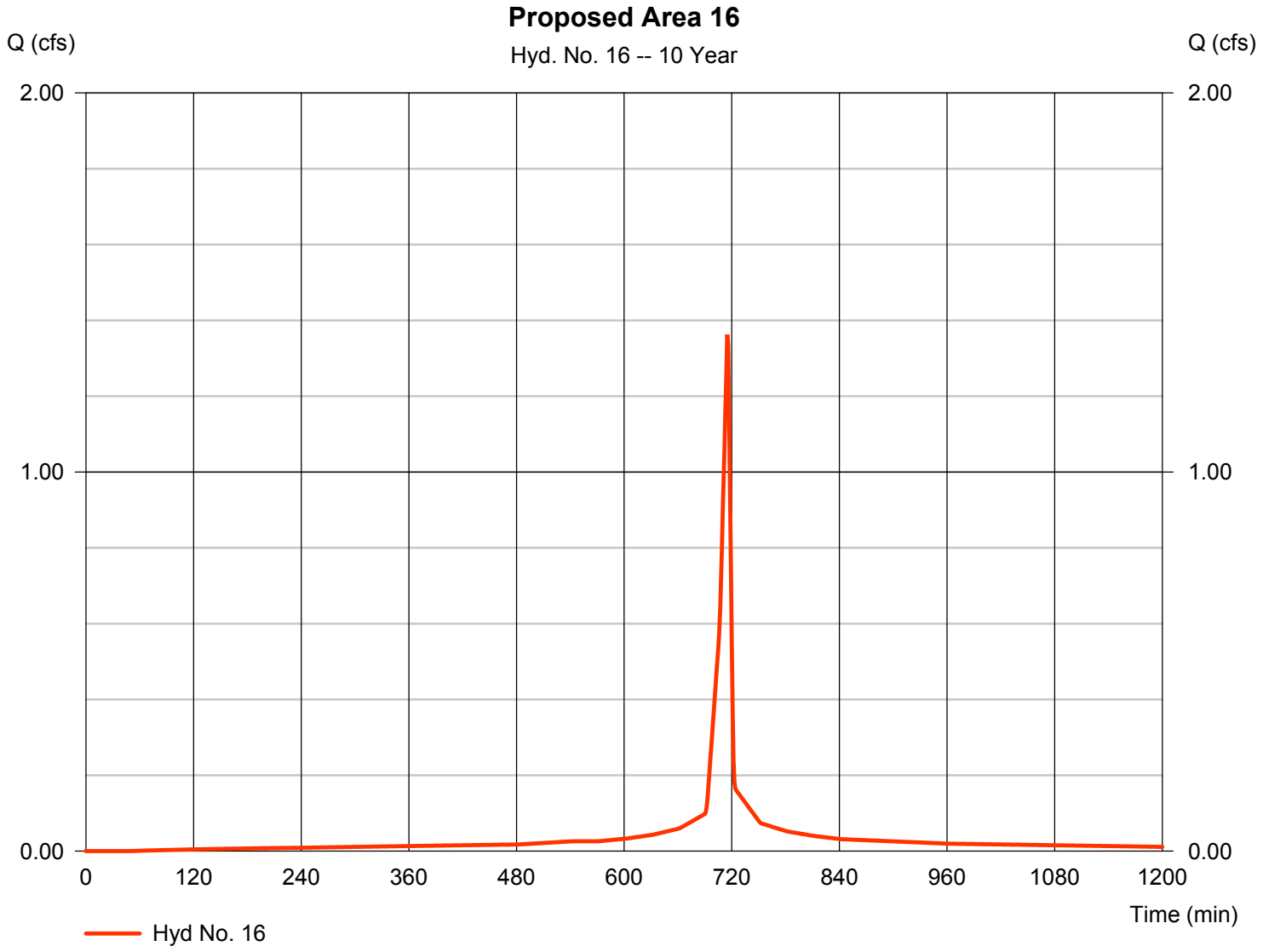
Hydrograph Report

Hyd. No. 16

Proposed Area 16

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.362 cfs
Storm frequency	=	10 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	2,918 cuft
Drainage area	=	0.180 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.40 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.182 x 98)] / 0.180



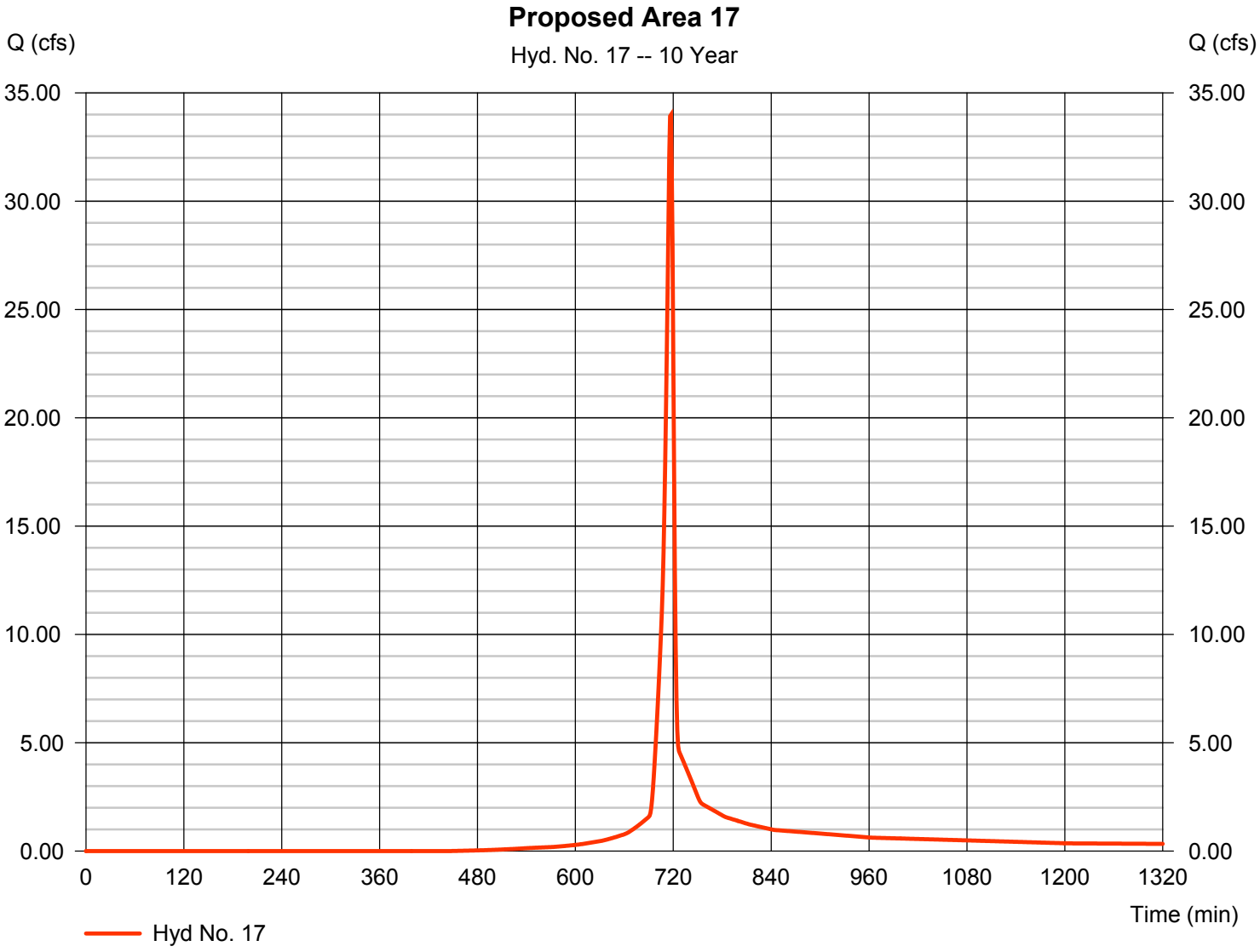
Hydrograph Report

Hyd. No. 17

Proposed Area 17

Hydrograph type	=	SCS Runoff	Peak discharge	=	33.98 cfs
Storm frequency	=	10 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	65,088 cuft
Drainage area	=	6.400 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.90 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.018 x 98) + (6.379 x 79)] / 6.400



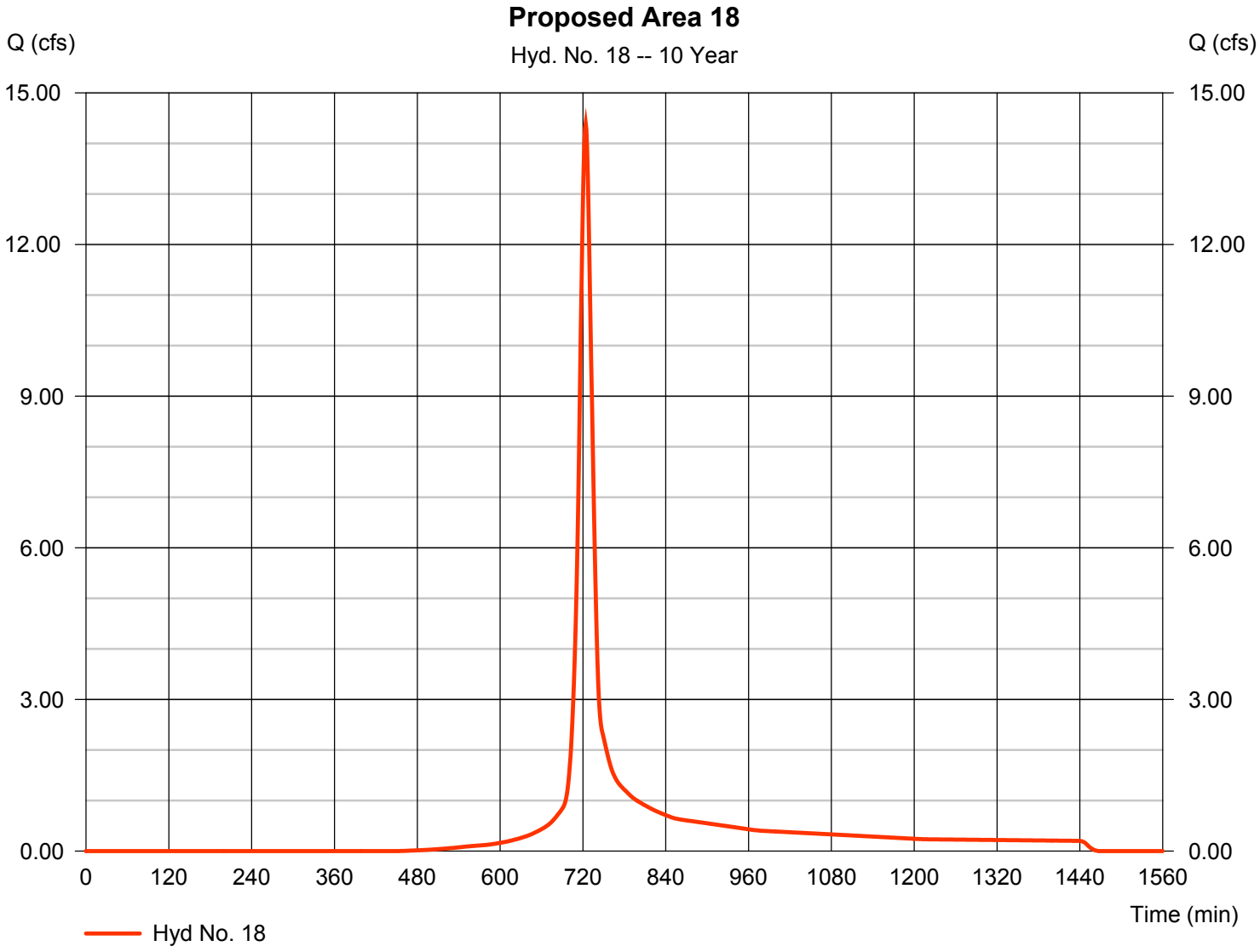
Hydrograph Report

Hyd. No. 18

Proposed Area 18

Hydrograph type	=	SCS Runoff	Peak discharge	=	14.39 cfs
Storm frequency	=	10 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	42,631 cuft
Drainage area	=	4.240 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	17.40 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.036 x 98) + (4.203 x 79)] / 4.240



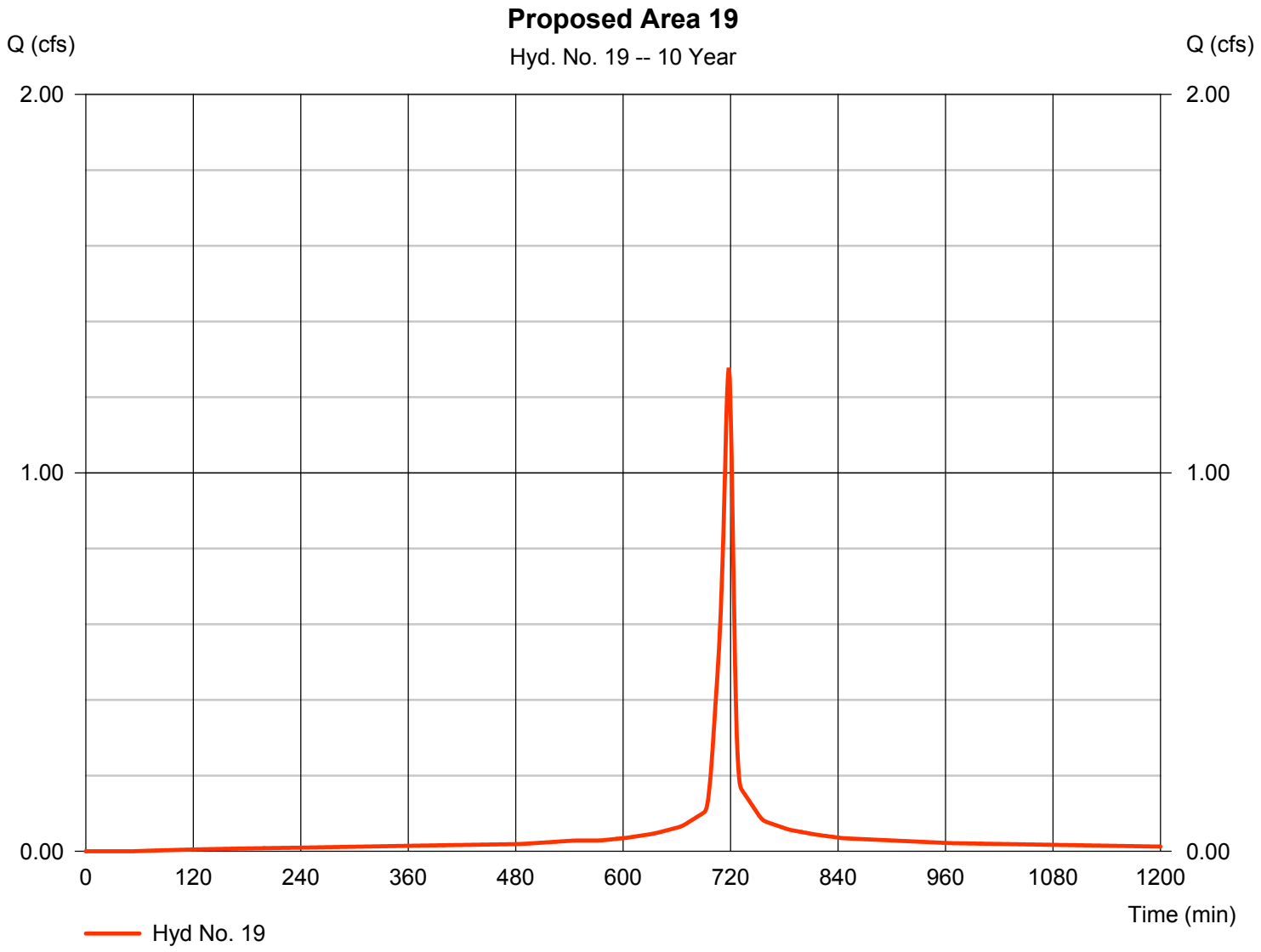
Hydrograph Report

Hyd. No. 19

Proposed Area 19

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.278 cfs
Storm frequency	=	10 yrs	Time to peak	=	718 min
Time interval	=	1 min	Hyd. volume	=	3,203 cuft
Drainage area	=	0.190 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.10 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.188 x 98)] / 0.190



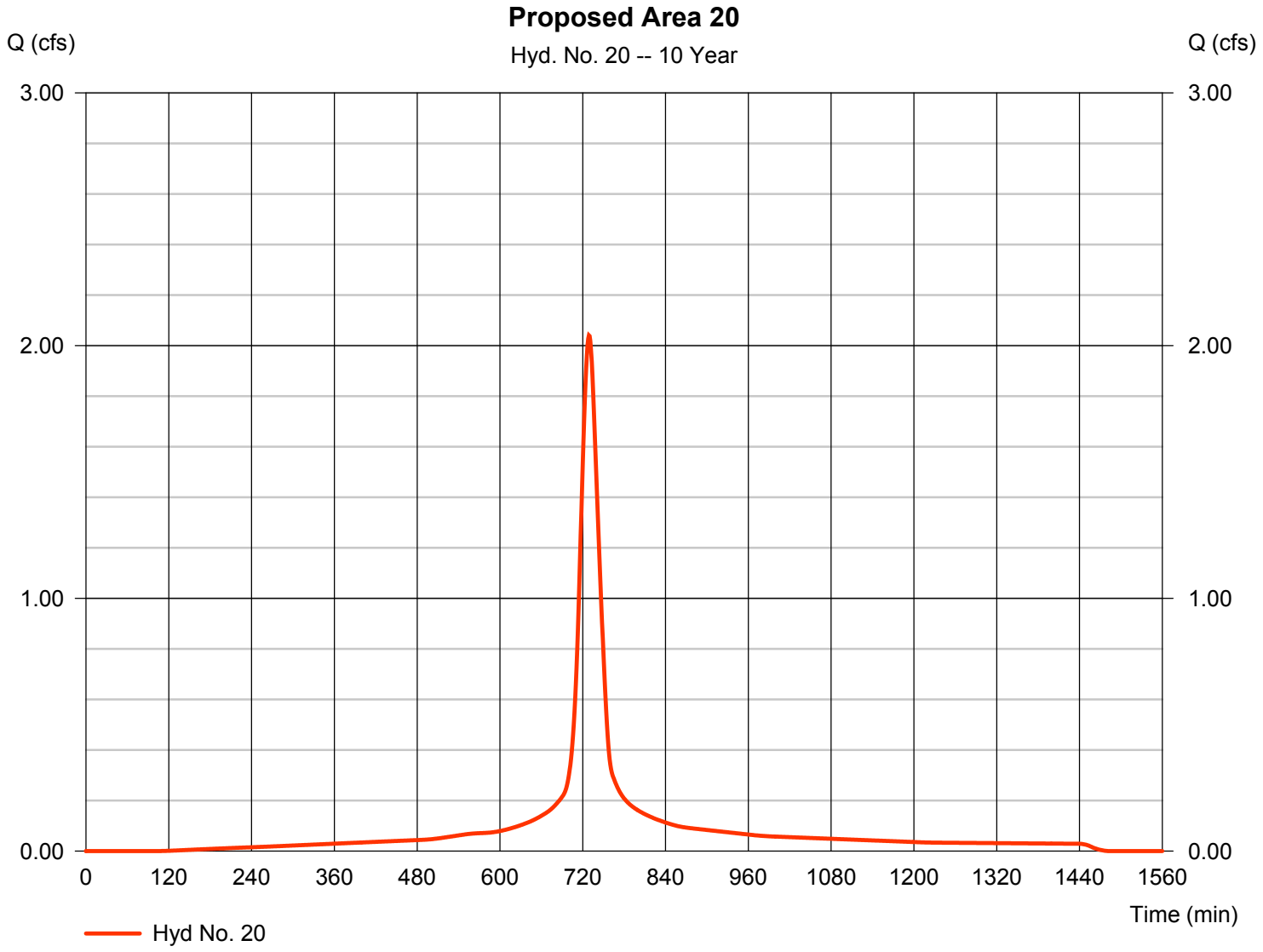
Hydrograph Report

Hyd. No. 20

Proposed Area 20

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.040 cfs
Storm frequency	=	10 yrs	Time to peak	=	729 min
Time interval	=	1 min	Hyd. volume	=	8,493 cuft
Drainage area	=	0.520 ac	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	27.80 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.458 x 98) + (0.060 x 79)] / 0.520



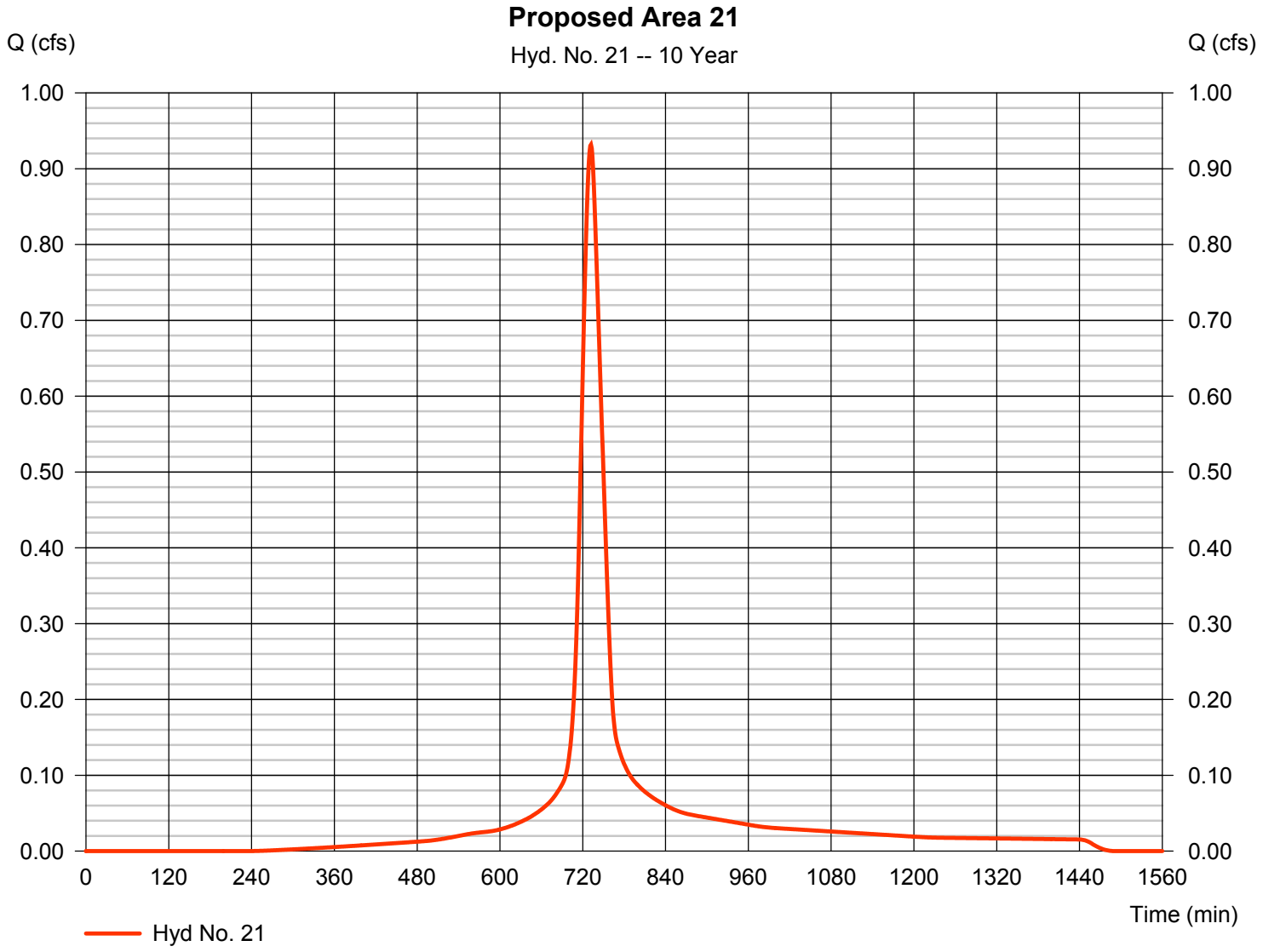
Hydrograph Report

Hyd. No. 21

Proposed Area 21

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.932 cfs
Storm frequency	=	10 yrs	Time to peak	=	732 min
Time interval	=	1 min	Hyd. volume	=	3,966 cuft
Drainage area	=	0.280 ac	Curve number	=	90*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	31.80 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.152 x 98) + (0.123 x 79)] / 0.280



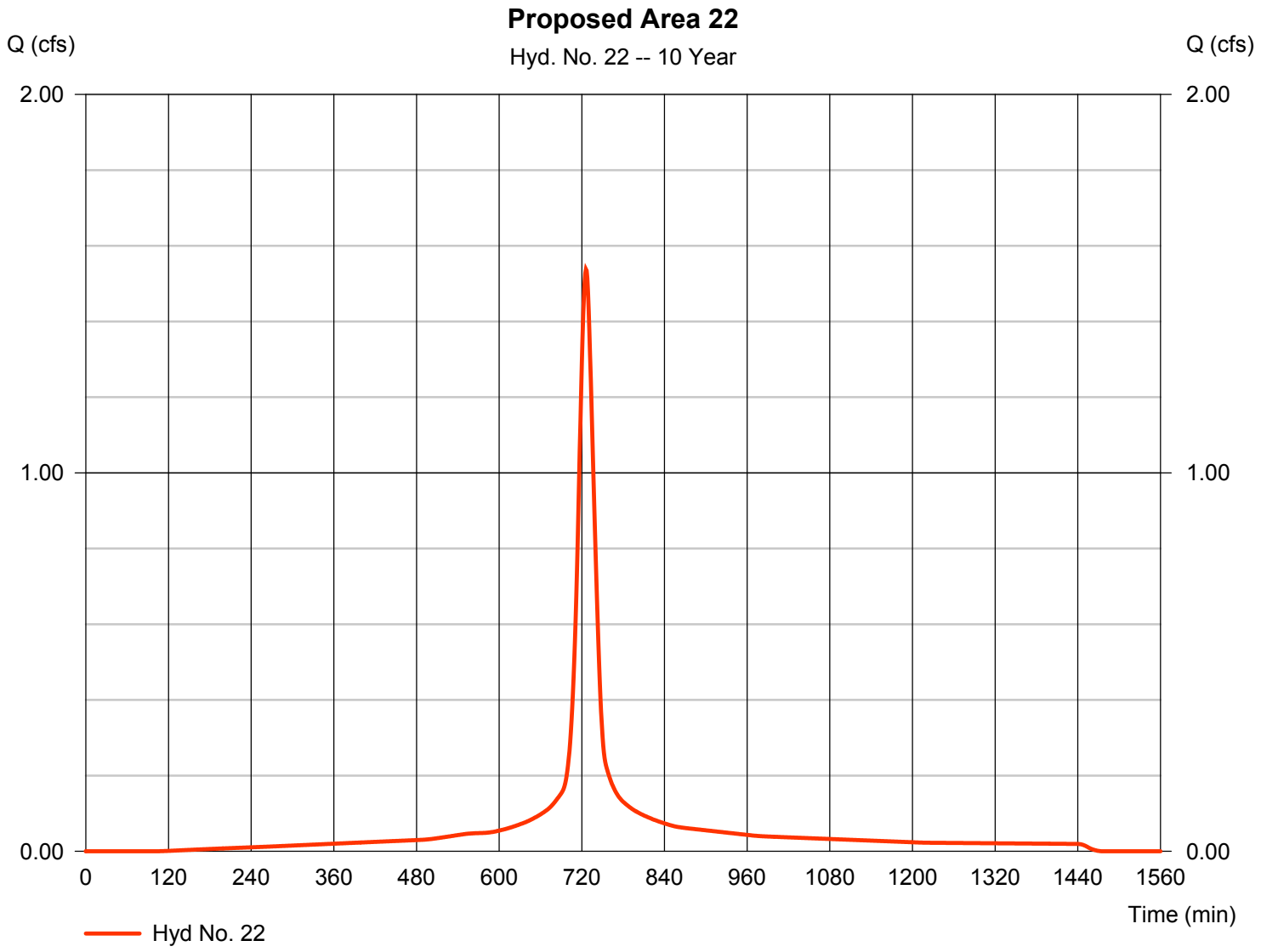
Hydrograph Report

Hyd. No. 22

Proposed Area 22

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.538 cfs
Storm frequency	=	10 yrs	Time to peak	=	726 min
Time interval	=	1 min	Hyd. volume	=	5,707 cuft
Drainage area	=	0.350 ac	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	22.20 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.310 x 98) + (0.040 x 79)] / 0.350



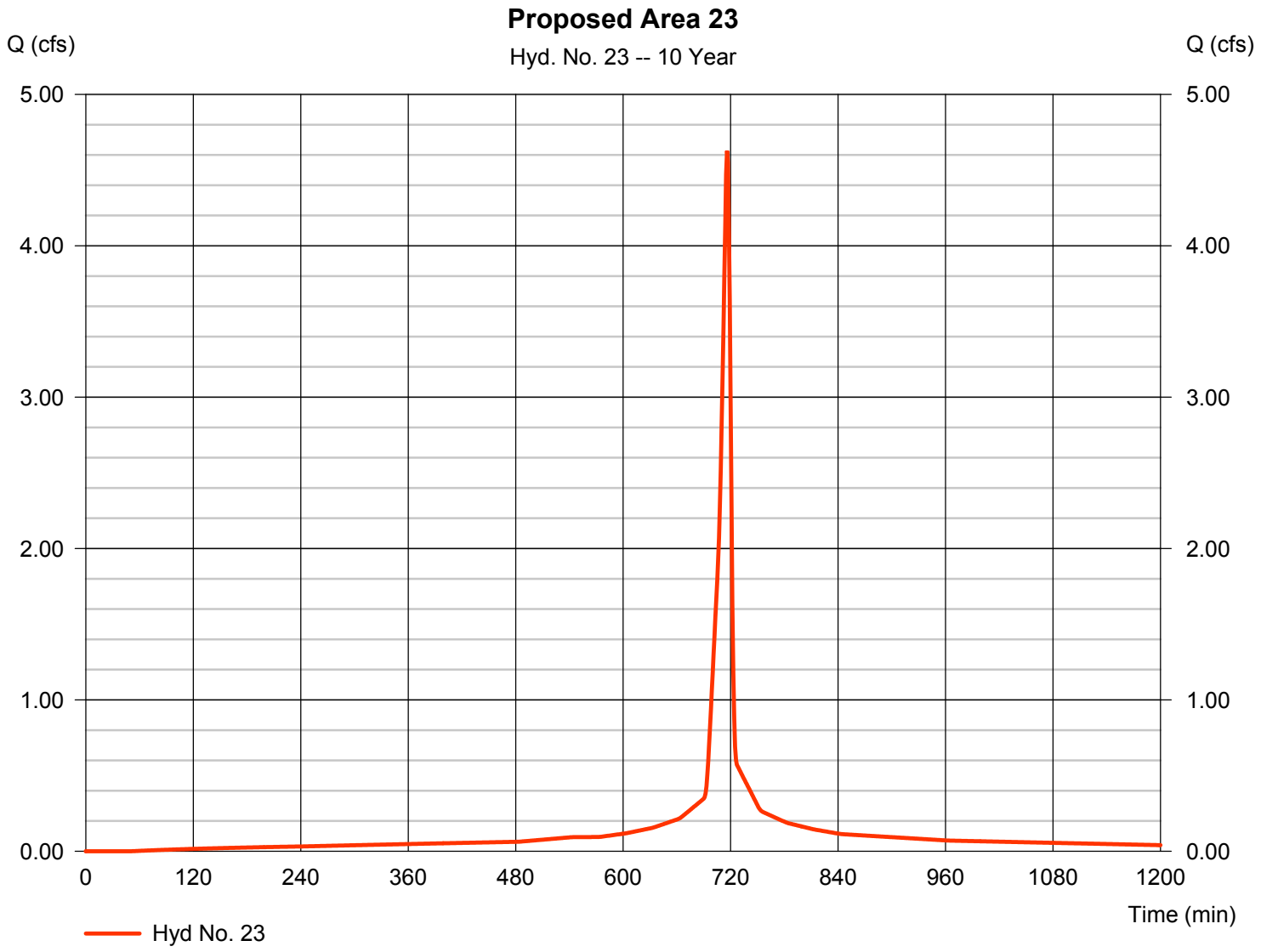
Hydrograph Report

Hyd. No. 23

Proposed Area 23

Hydrograph type	= SCS Runoff	Peak discharge	= 4.628 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 10,547 cuft
Drainage area	= 0.610 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 4.80 min
Total precip.	= 5.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.607 x 98)] / 0.610



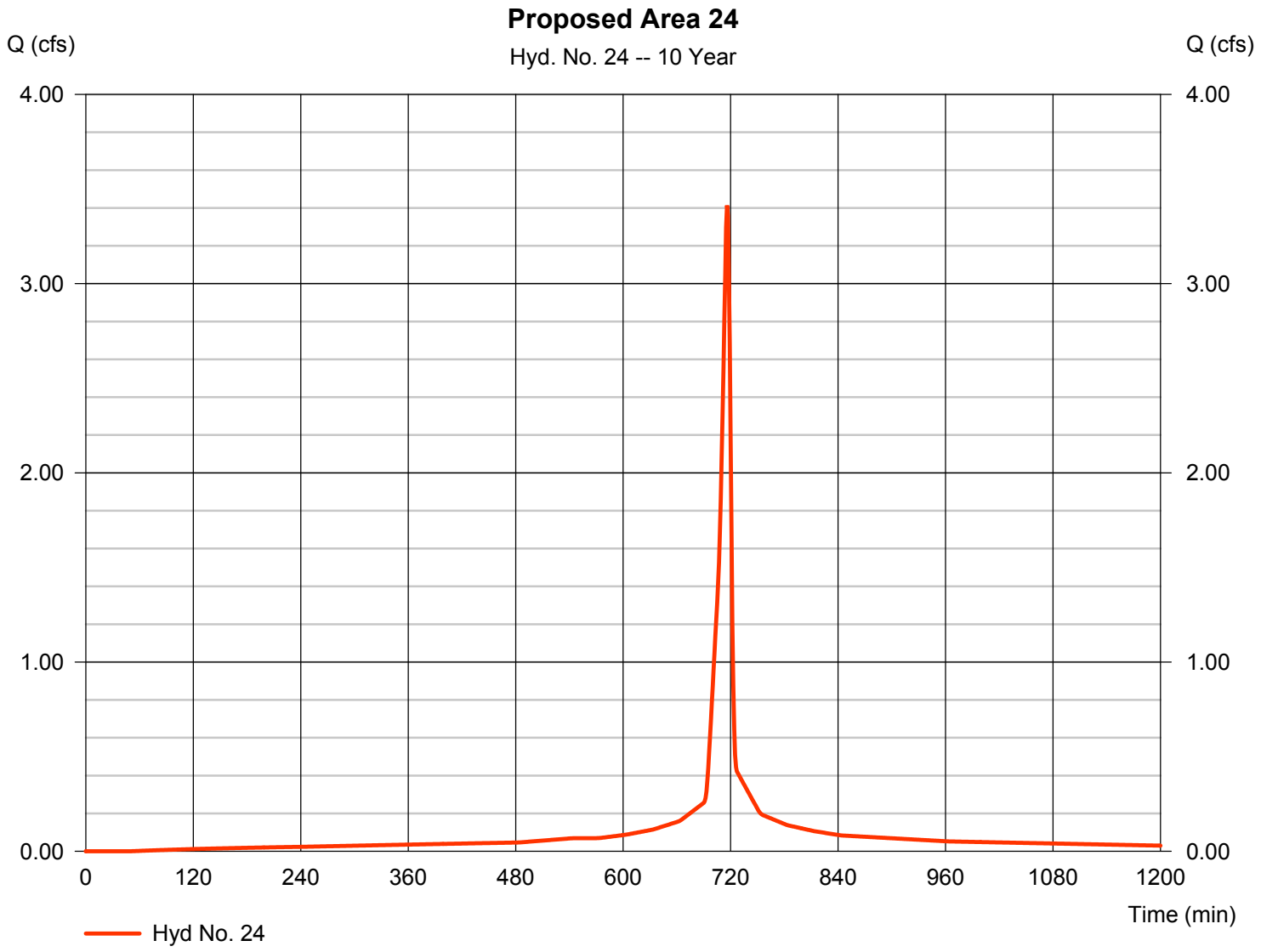
Hydrograph Report

Hyd. No. 24

Proposed Area 24

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.414 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	7,781 cuft
Drainage area	=	0.450 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	3.90 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.447 x 98)] / 0.450



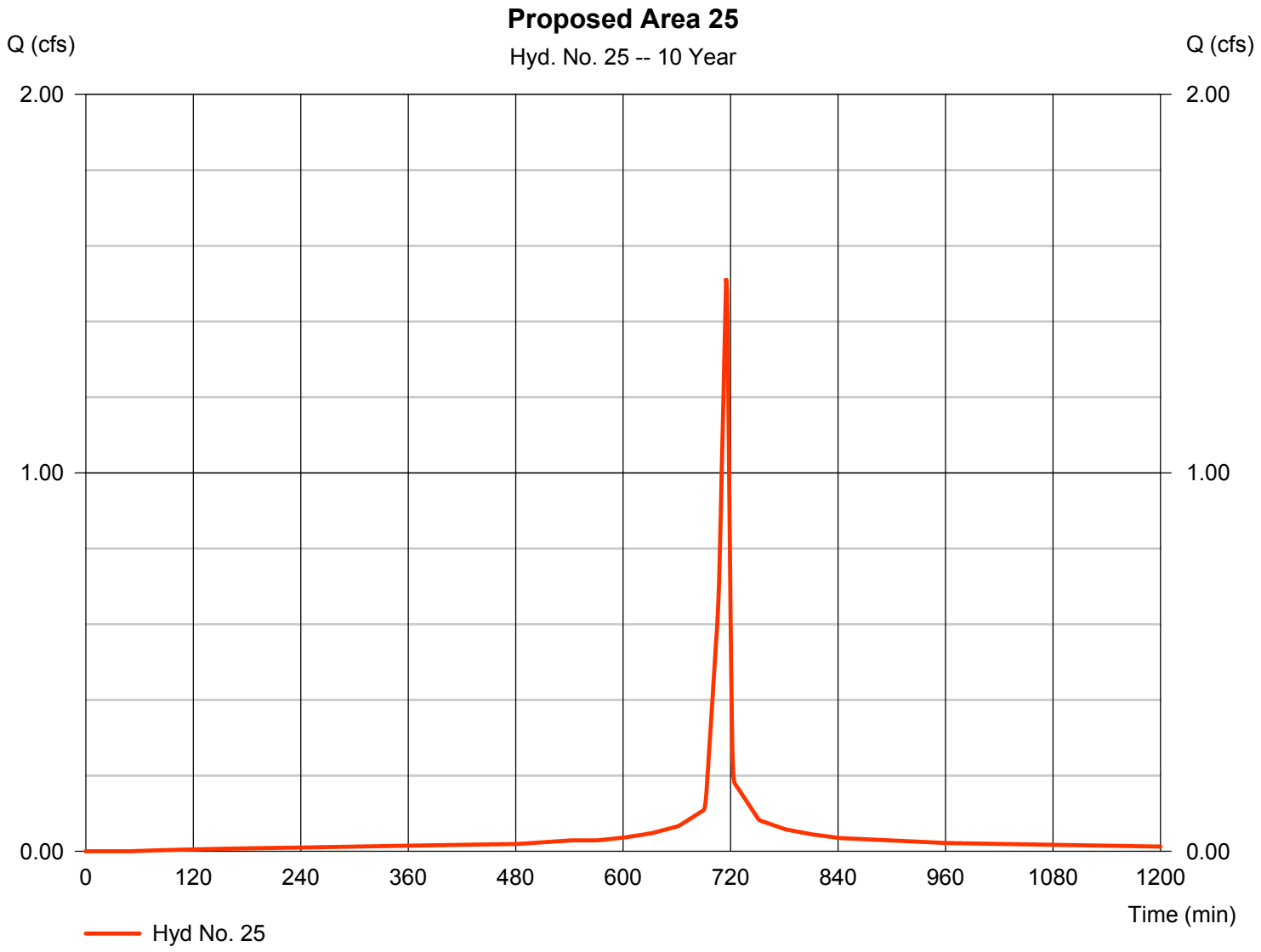
Hydrograph Report

Hyd. No. 25

Proposed Area 25

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.514 cfs
Storm frequency	=	10 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	3,242 cuft
Drainage area	=	0.200 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	1.60 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.203 x 98)] / 0.200



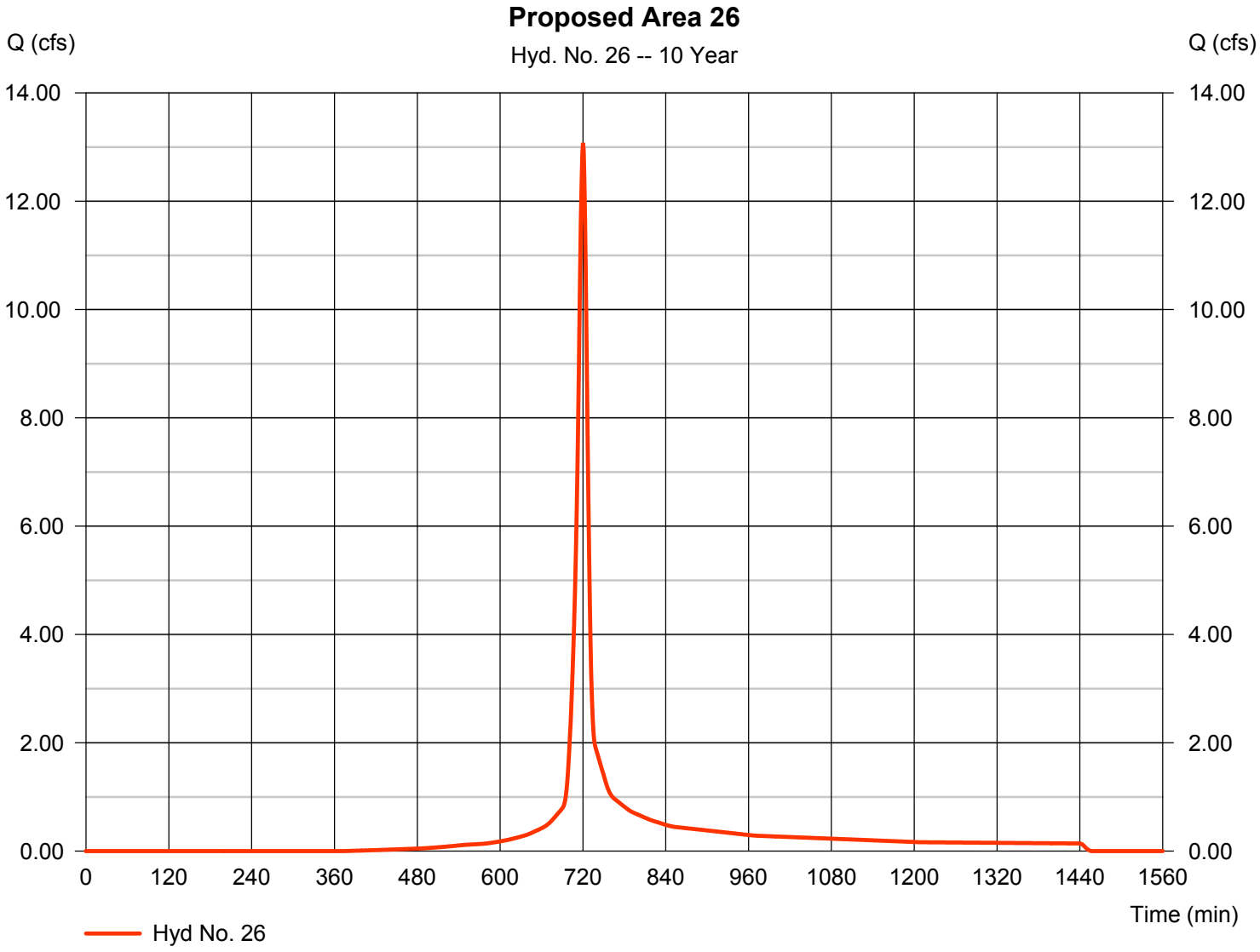
Hydrograph Report

Hyd. No. 26

Proposed Area 26

Hydrograph type	=	SCS Runoff	Peak discharge	=	13.08 cfs
Storm frequency	=	10 yrs	Time to peak	=	720 min
Time interval	=	1 min	Hyd. volume	=	32,017 cuft
Drainage area	=	2.730 ac	Curve number	=	83*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	10.40 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.626 x 98) + (2.102 x 79)] / 2.730



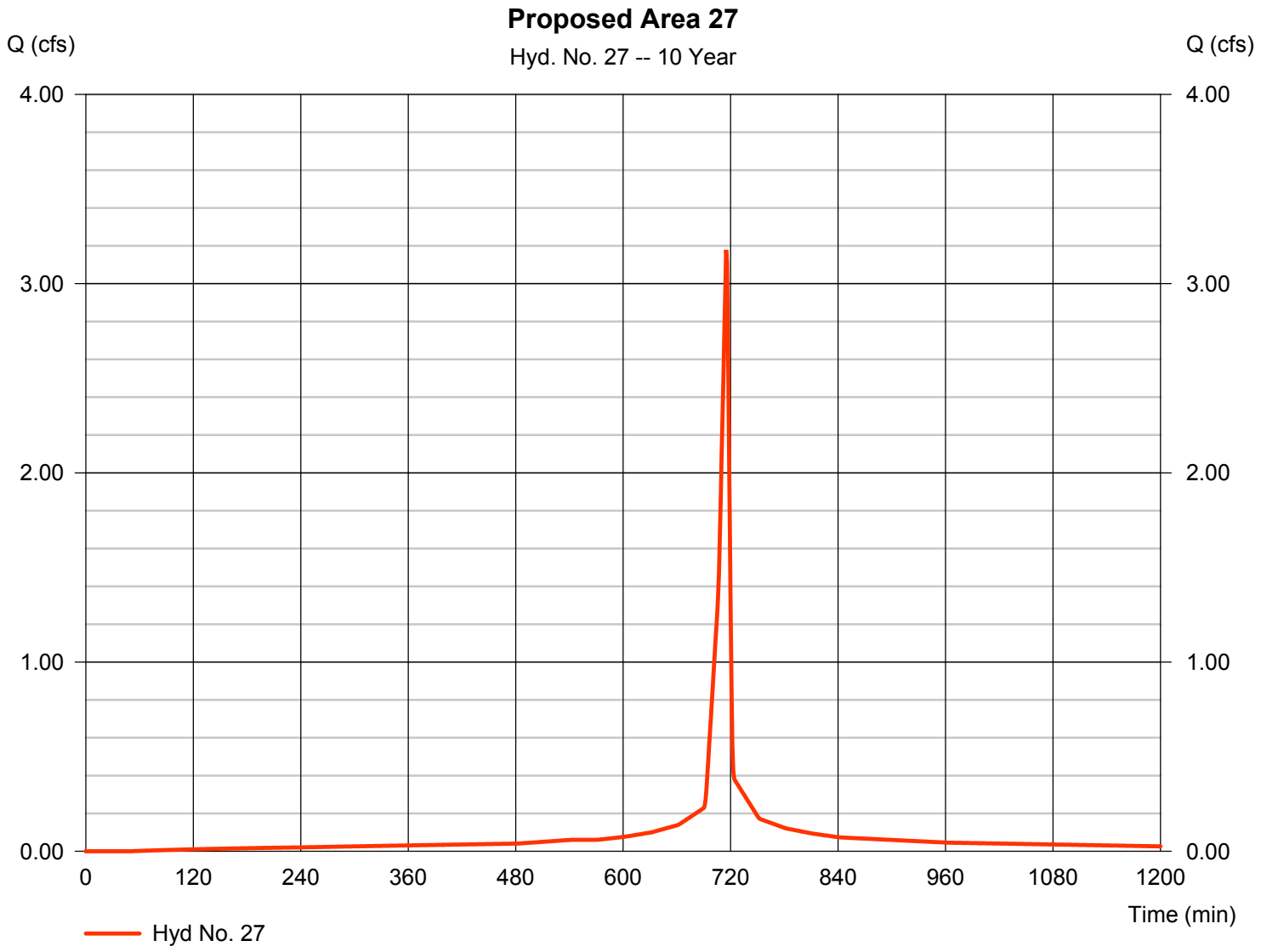
Hydrograph Report

Hyd. No. 27

Proposed Area 27

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.179 cfs
Storm frequency	=	10 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	6,808 cuft
Drainage area	=	0.420 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.00 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.420 x 98)] / 0.420



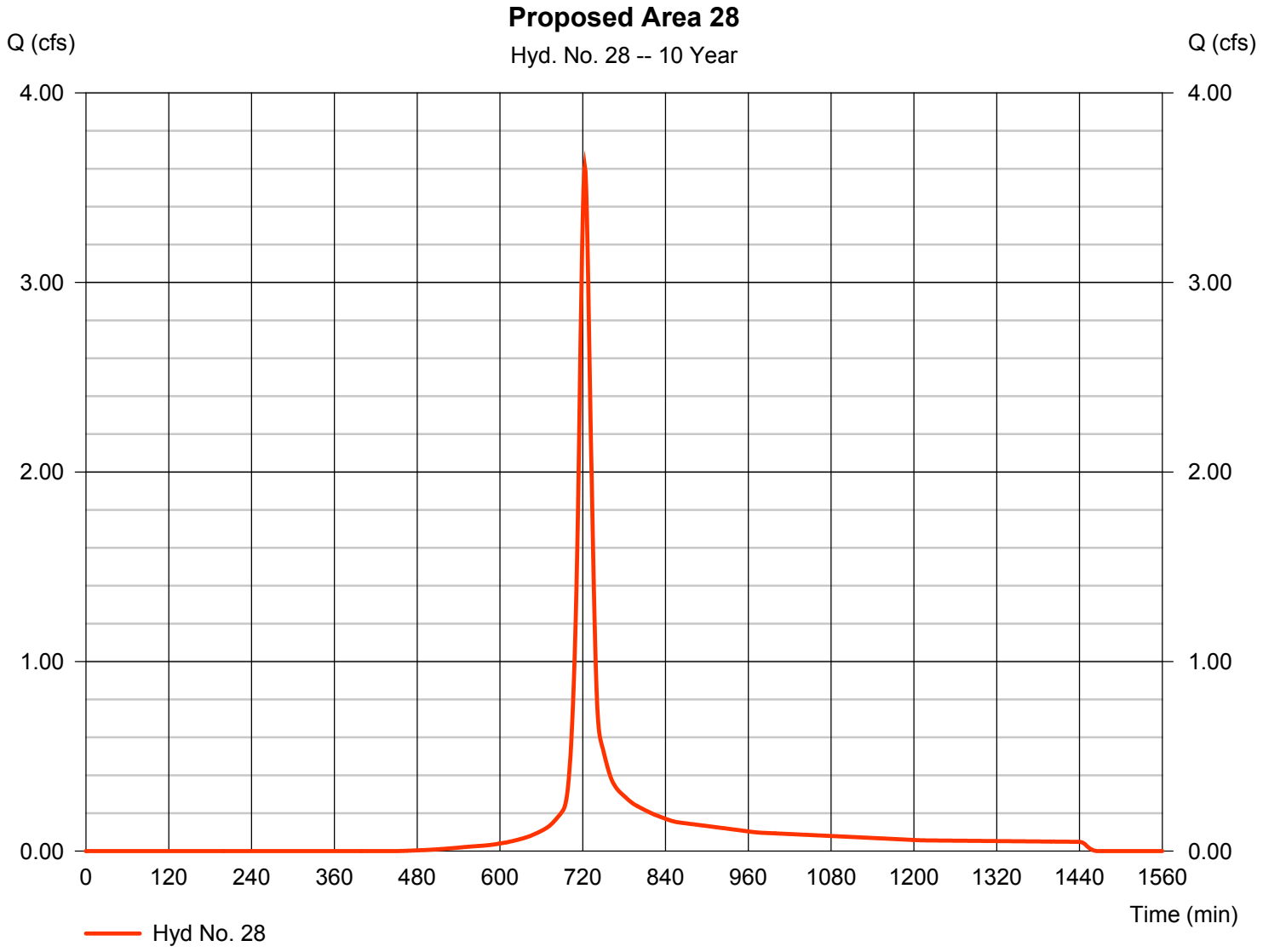
Hydrograph Report

Hyd. No. 28

Proposed Area 28

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.611 cfs
Storm frequency	=	10 yrs	Time to peak	=	723 min
Time interval	=	1 min	Hyd. volume	=	10,297 cuft
Drainage area	=	1.000 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	15.50 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.004 x 98) + (0.999 x 79)] / 1.000



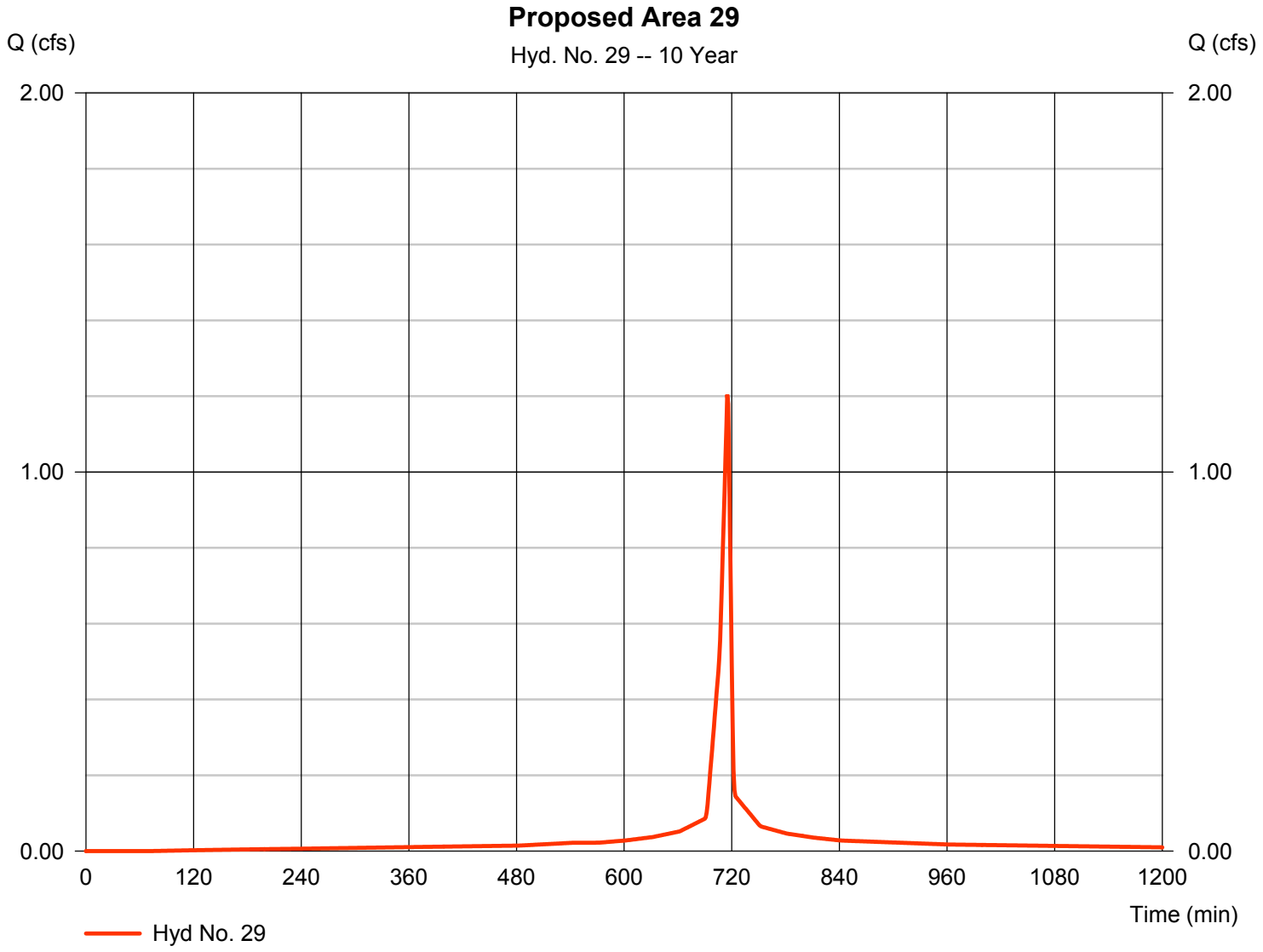
Hydrograph Report

Hyd. No. 29

Proposed Area 29

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.204 cfs
Storm frequency	=	10 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	2,530 cuft
Drainage area	=	0.160 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.20 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.150 x 98) + (0.008 x 79)] / 0.160



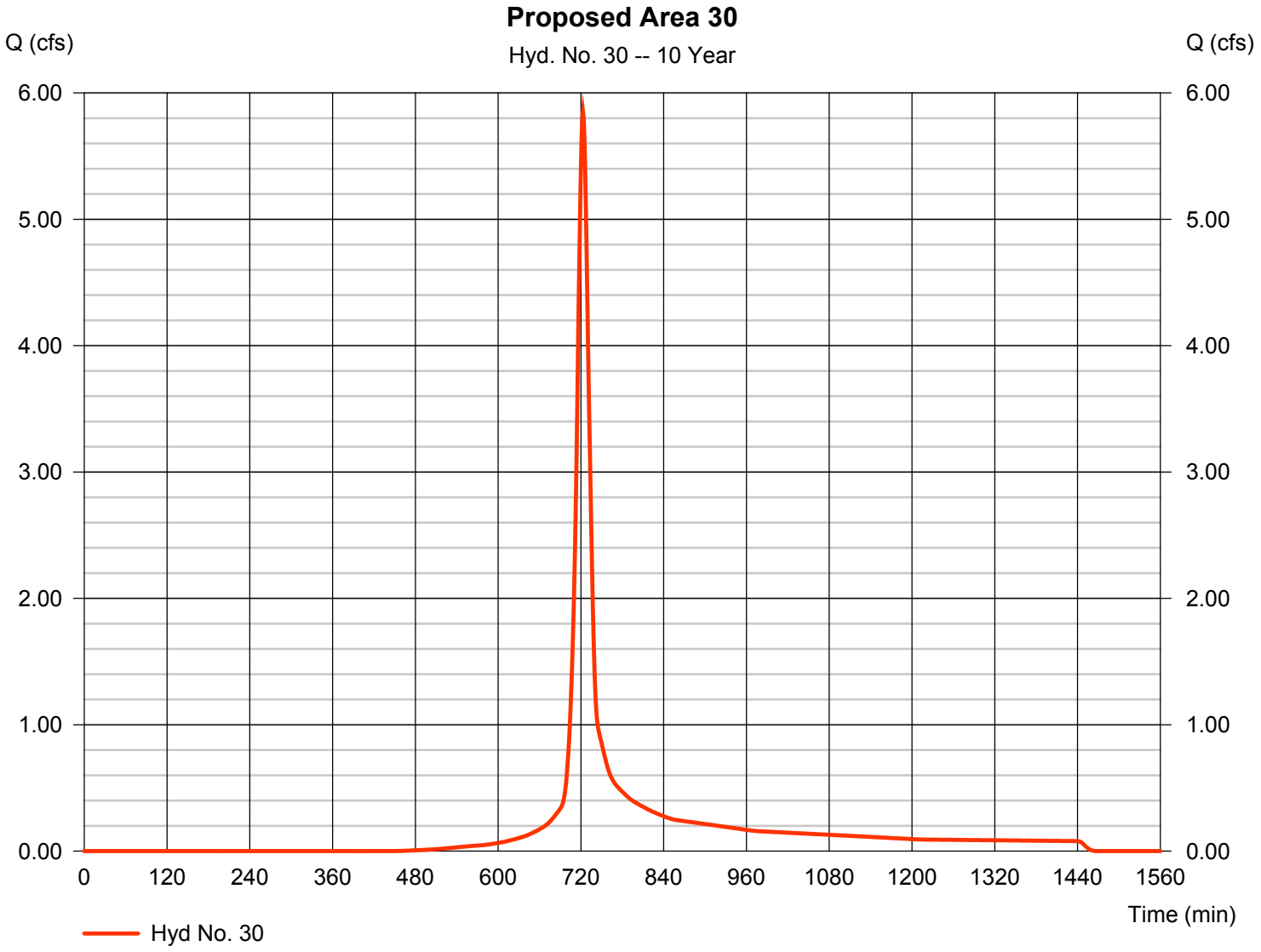
Hydrograph Report

Hyd. No. 30

Proposed Area 30

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.849 cfs
Storm frequency	=	10 yrs	Time to peak	=	723 min
Time interval	=	1 min	Hyd. volume	=	16,681 cuft
Drainage area	=	1.620 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	15.70 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.004 x 98) + (1.620 x 79)] / 1.620



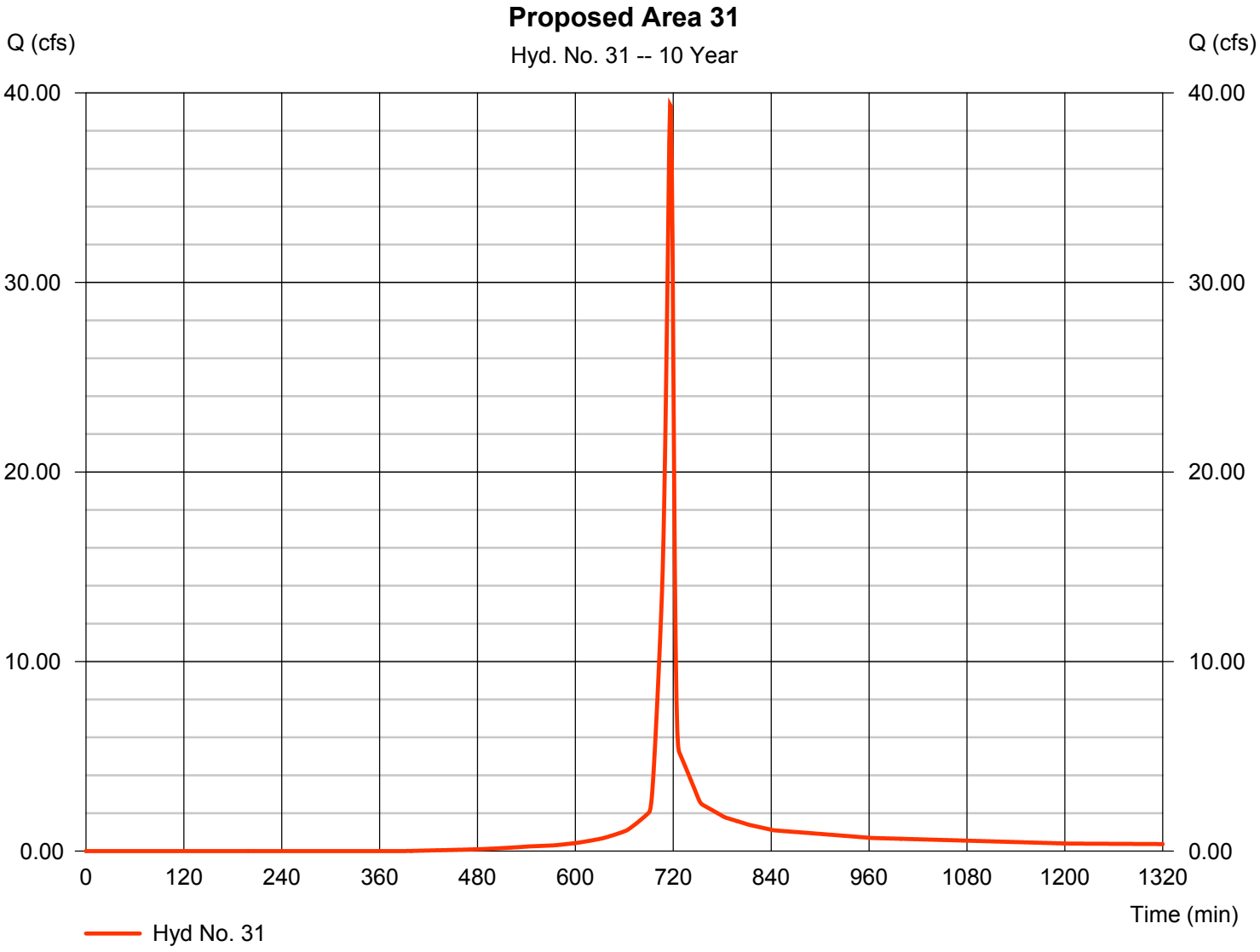
Hydrograph Report

Hyd. No. 31

Proposed Area 31

Hydrograph type	=	SCS Runoff	Peak discharge	=	39.37 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	76,339 cuft
Drainage area	=	6.830 ac	Curve number	=	82*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.80 min
Total precip.	=	5.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.937 x 98) + (5.893 x 79)] / 6.830

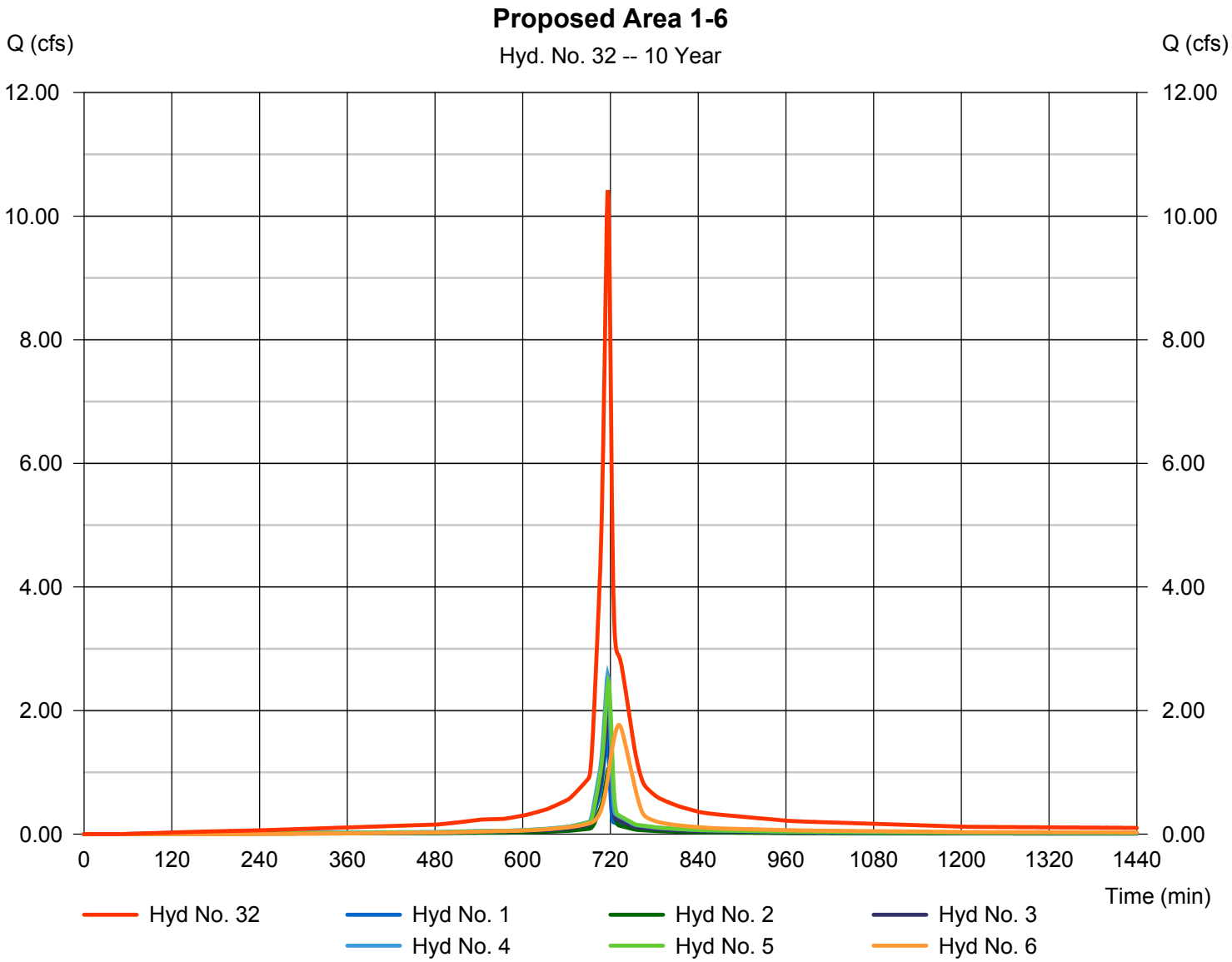


Hydrograph Report

Hyd. No. 32

Proposed Area 1-6

Hydrograph type	= Combine	Peak discharge	= 10.42 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 29,810 cuft
Inflow hyds.	= 1, 2, 3, 4, 5, 6	Contrib. drain. area	= 1.830 ac

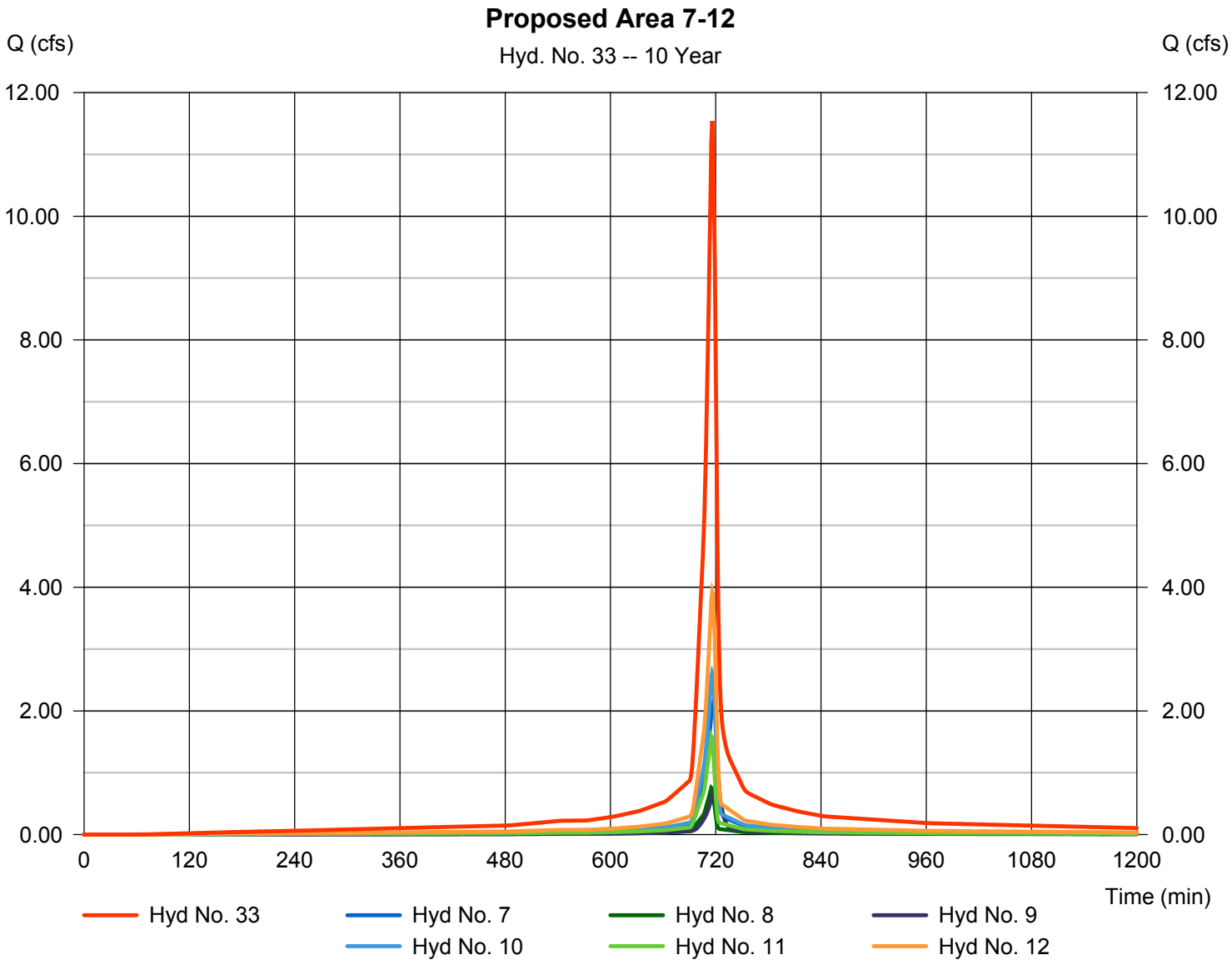


Hydrograph Report

Hyd. No. 33

Proposed Area 7-12

Hydrograph type	= Combine	Peak discharge	= 11.54 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 26,513 cuft
Inflow hyds.	= 7, 8, 9, 10, 11, 12	Contrib. drain. area	= 1.600 ac

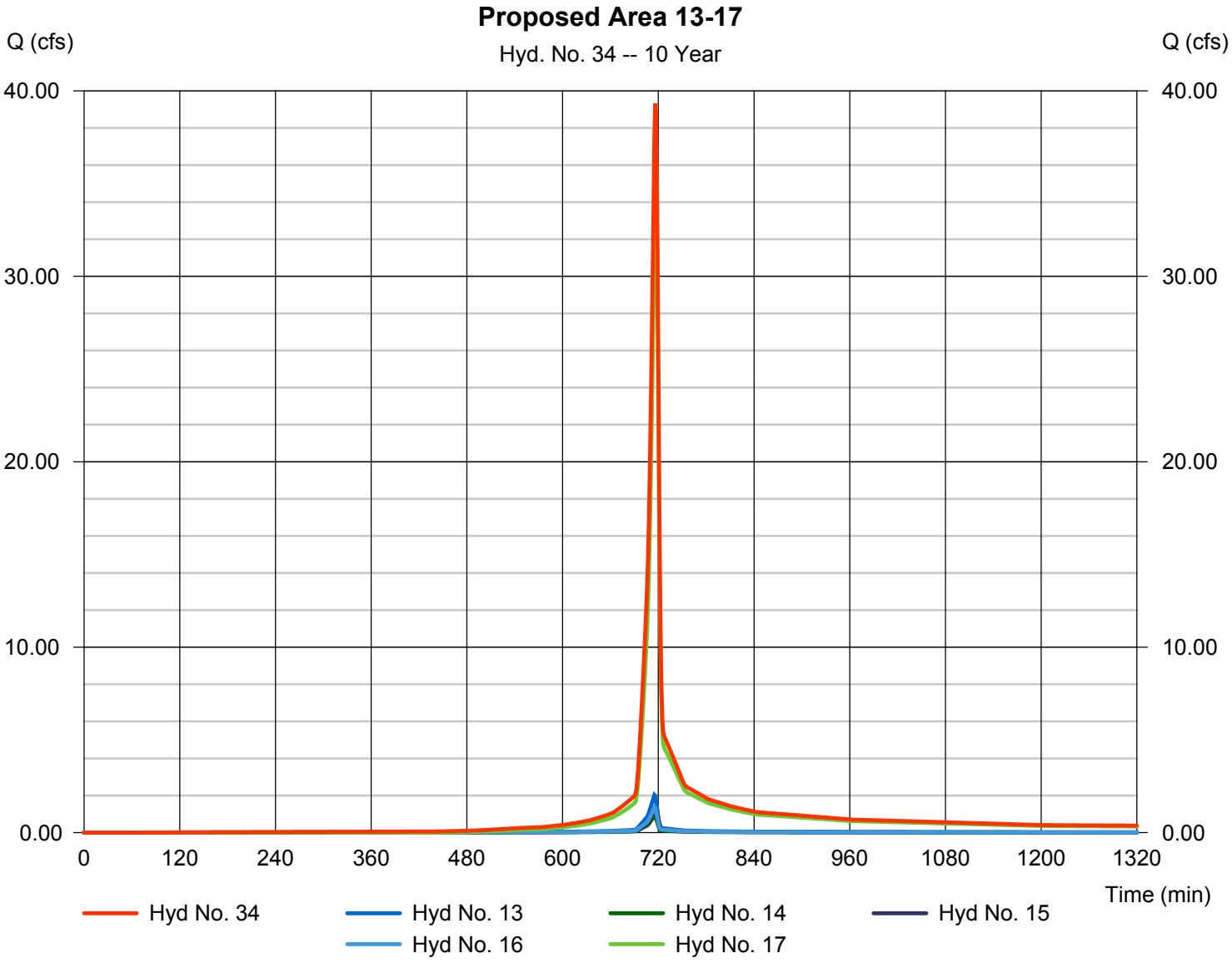


Hydrograph Report

Hyd. No. 34

Proposed Area 13-17

Hydrograph type	= Combine	Peak discharge	= 39.33 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 76,788 cuft
Inflow hyds.	= 13, 14, 15, 16, 17	Contrib. drain. area	= 7.130 ac

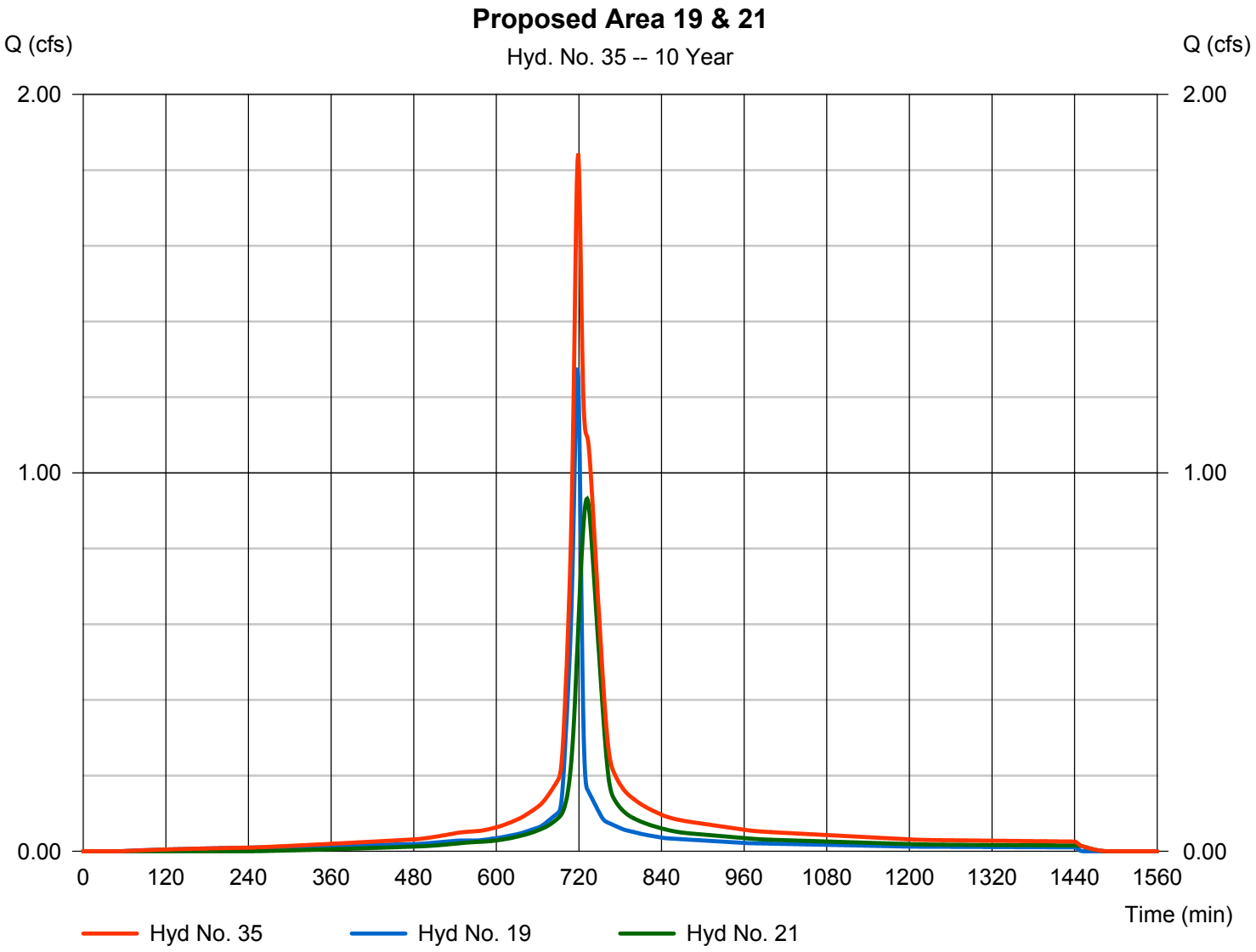


Hydrograph Report

Hyd. No. 35

Proposed Area 19 & 21

Hydrograph type	=	Combine	Peak discharge	=	1.844 cfs
Storm frequency	=	10 yrs	Time to peak	=	719 min
Time interval	=	1 min	Hyd. volume	=	7,169 cuft
Inflow hyds.	=	19, 21	Contrib. drain. area	=	0.470 ac



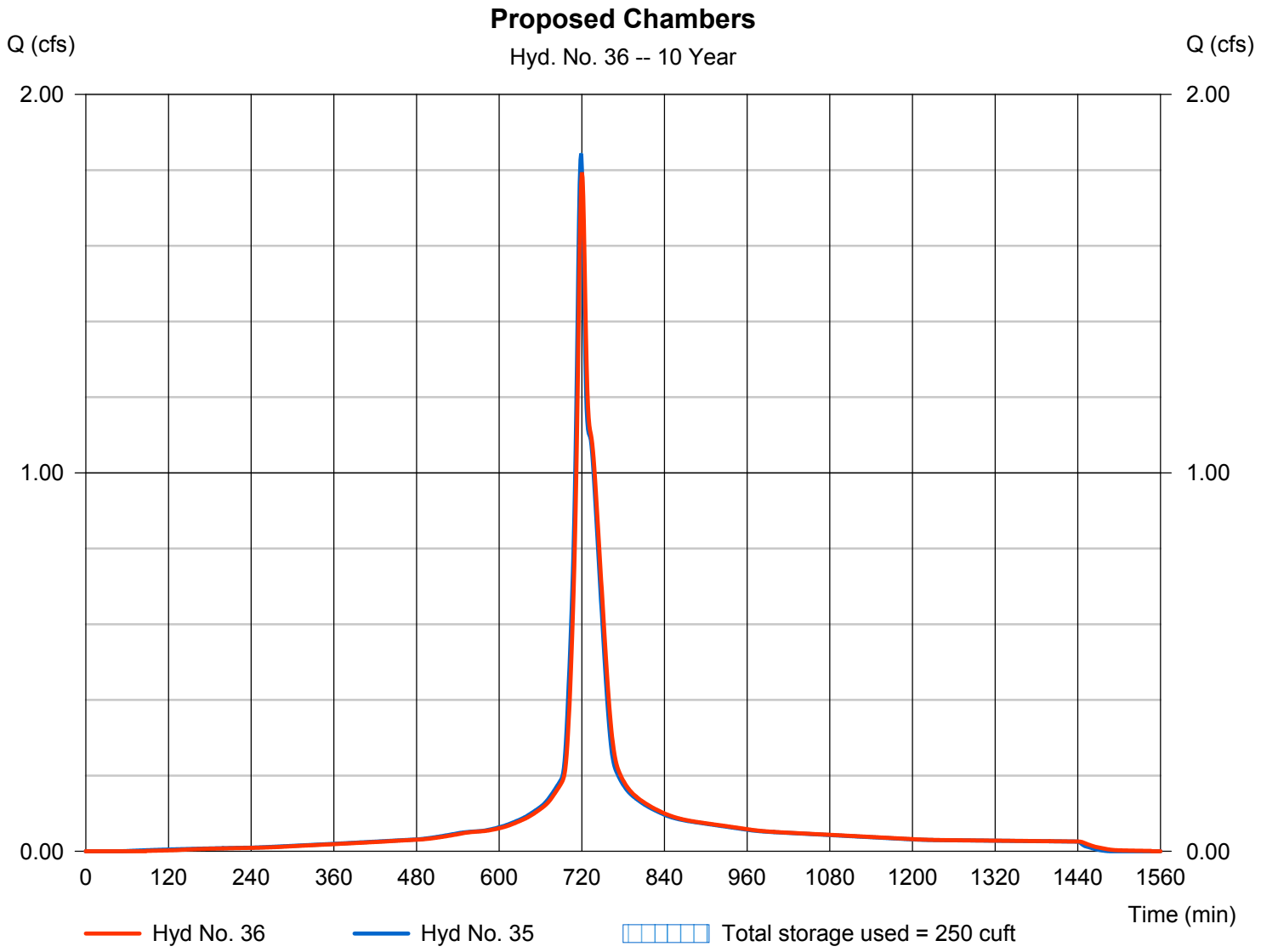
Hydrograph Report

Hyd. No. 36

Proposed Chambers

Hydrograph type	=	Reservoir	Peak discharge	=	1.794 cfs
Storm frequency	=	10 yrs	Time to peak	=	720 min
Time interval	=	1 min	Hyd. volume	=	7,166 cuft
Inflow hyd. No.	=	35 - Proposed Area 19 & 21	Max. Elevation	=	352.33 ft
Reservoir name	=	Proposed Chambers	Max. Storage	=	250 cuft

Storage Indication method used.

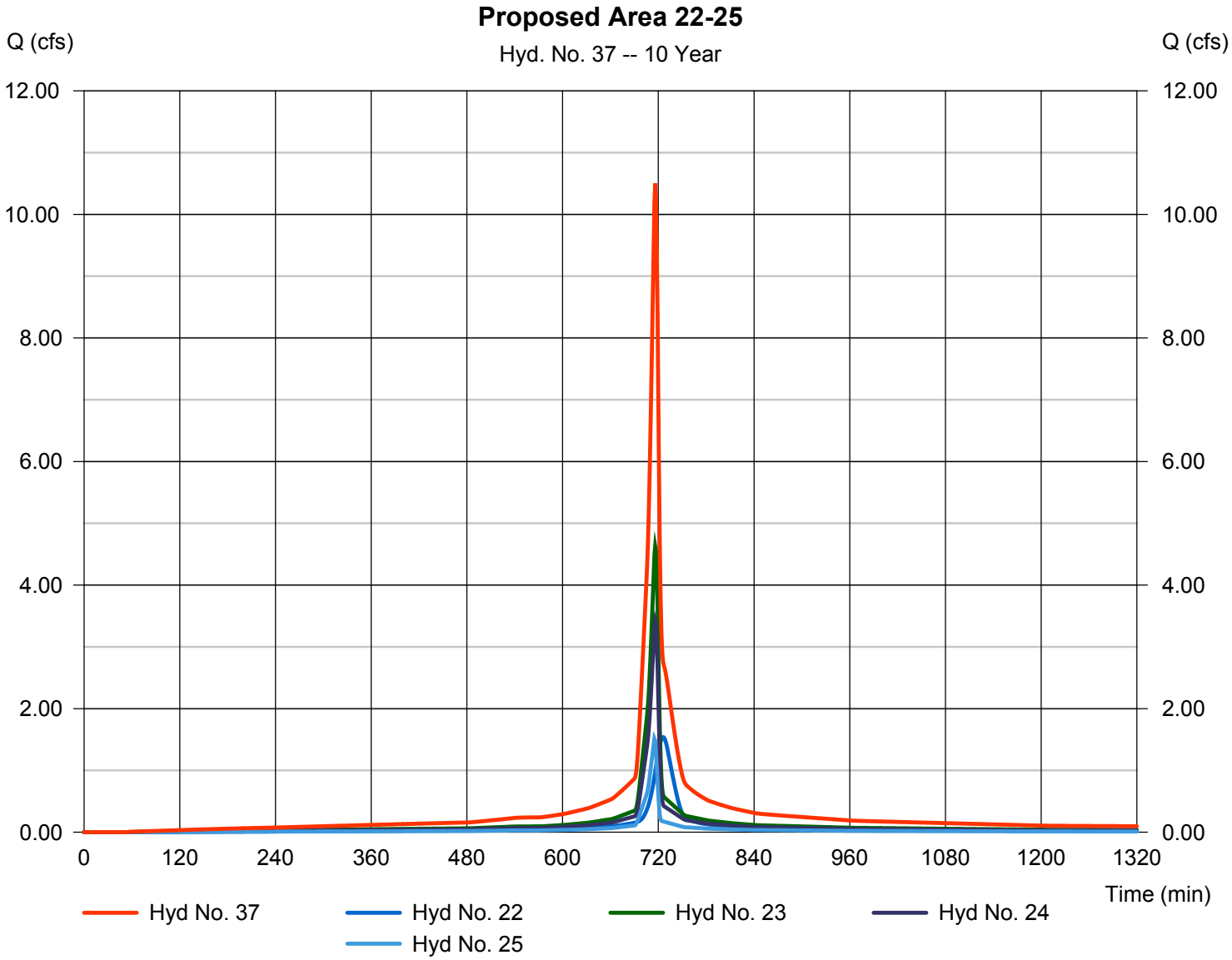


Hydrograph Report

Hyd. No. 37

Proposed Area 22-25

Hydrograph type	= Combine	Peak discharge	= 10.50 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 27,277 cuft
Inflow hyds.	= 22, 23, 24, 25	Contrib. drain. area	= 1.610 ac

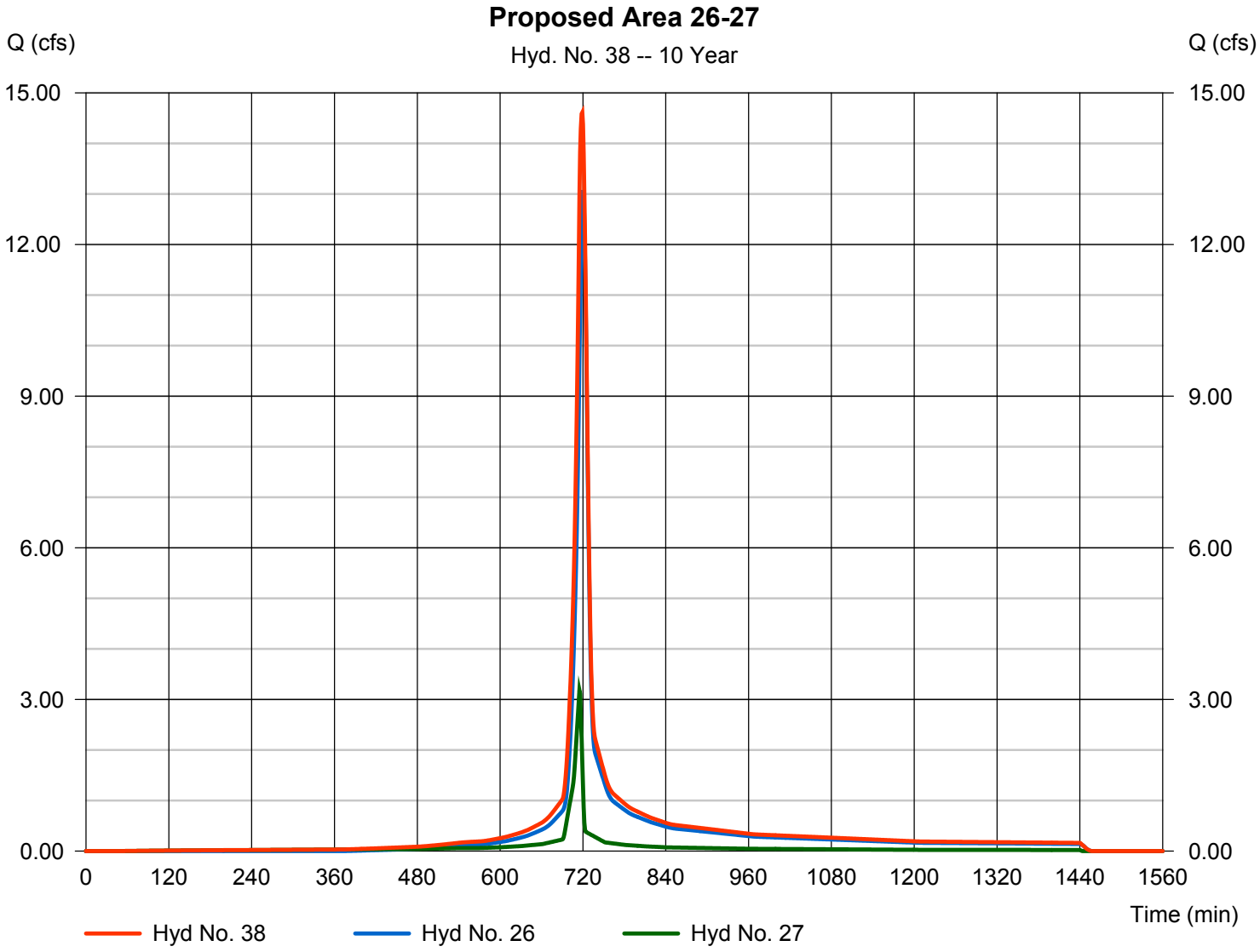


Hydrograph Report

Hyd. No. 38

Proposed Area 26-27

Hydrograph type	=	Combine	Peak discharge	=	14.61 cfs
Storm frequency	=	10 yrs	Time to peak	=	719 min
Time interval	=	1 min	Hyd. volume	=	38,825 cuft
Inflow hyds.	=	26, 27	Contrib. drain. area	=	3.150 ac

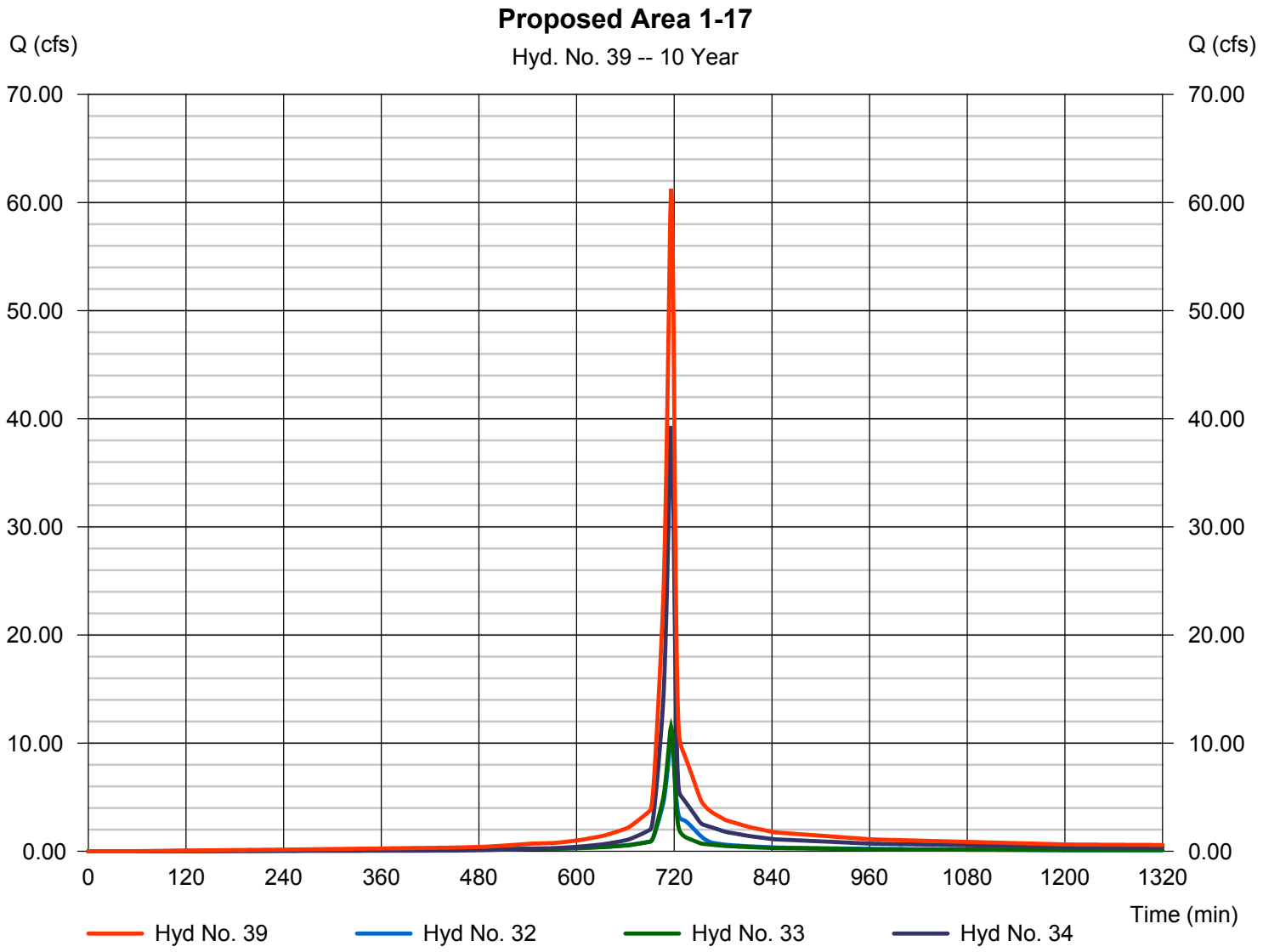


Hydrograph Report

Hyd. No. 39

Proposed Area 1-17

Hydrograph type	=	Combine	Peak discharge	=	61.29 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	133,111 cuft
Inflow hyds.	=	32, 33, 34	Contrib. drain. area	=	0.000 ac

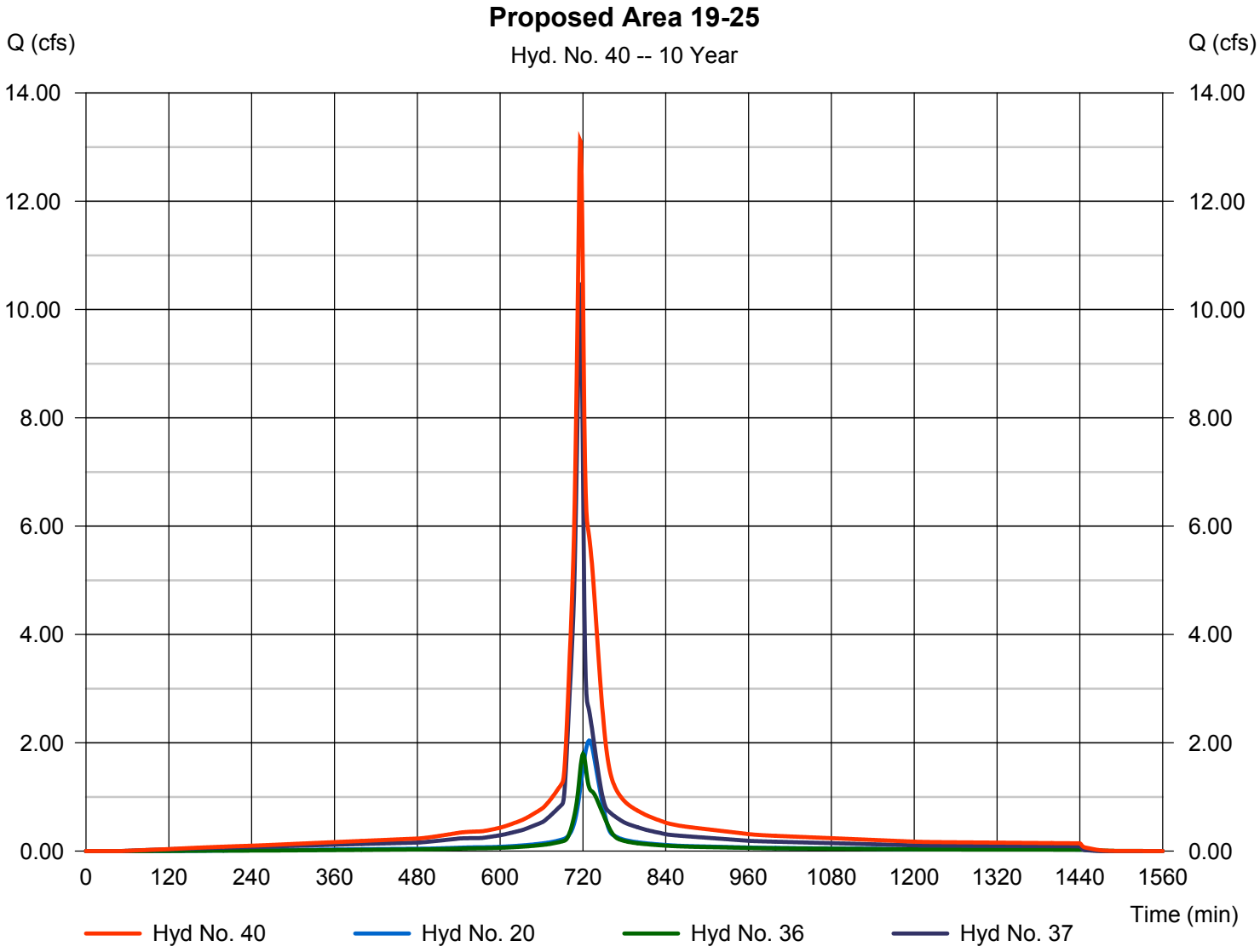


Hydrograph Report

Hyd. No. 40

Proposed Area 19-25

Hydrograph type	= Combine	Peak discharge	= 13.12 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 42,935 cuft
Inflow hyds.	= 20, 36, 37	Contrib. drain. area	= 0.520 ac

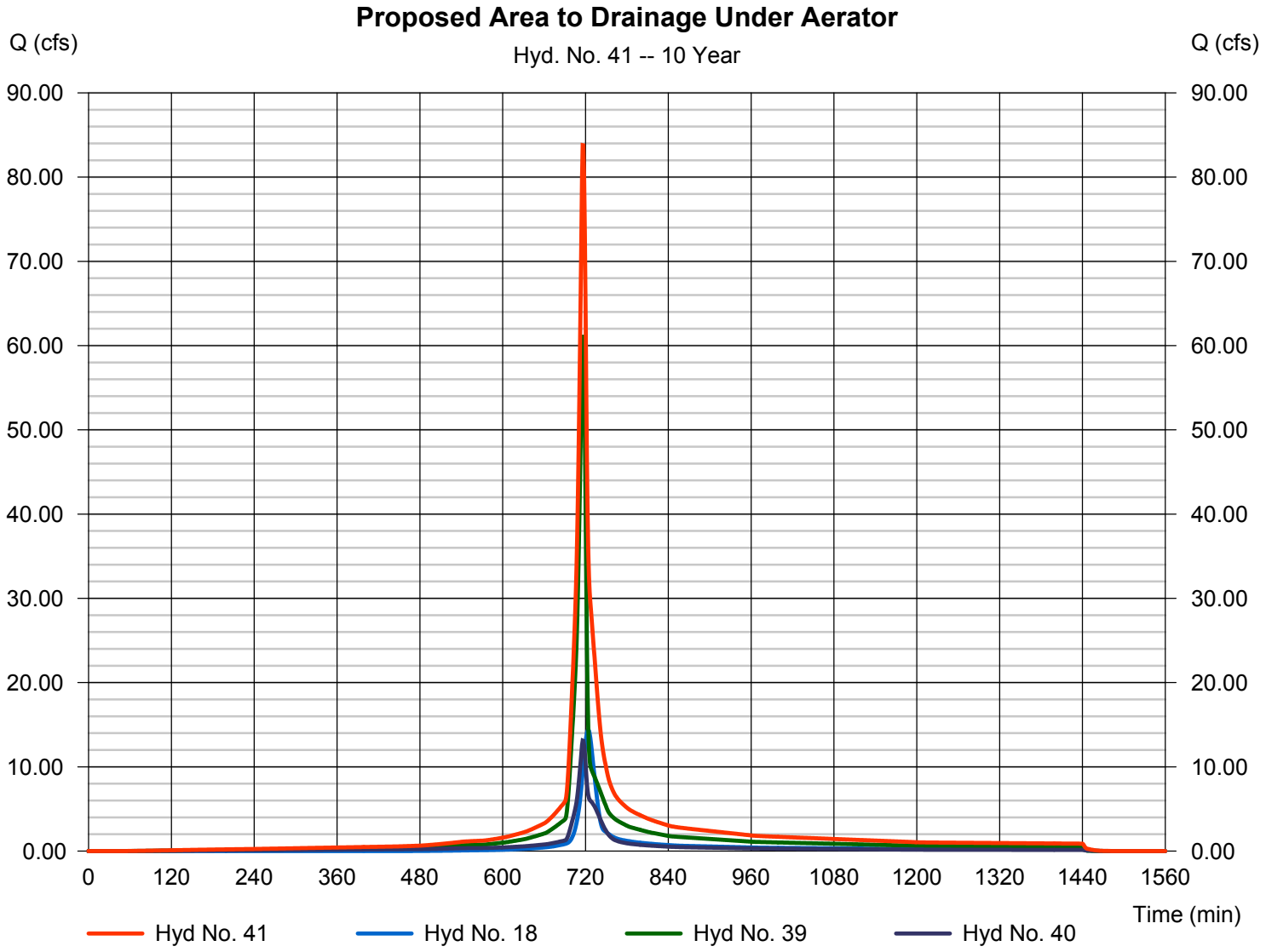


Hydrograph Report

Hyd. No. 41

Proposed Area to Drainage Under Aerator

Hydrograph type	=	Combine	Peak discharge	=	83.79 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	218,677 cuft
Inflow hyds.	=	18, 39, 40	Contrib. drain. area	=	4.240 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1.910	1	715	4,118	------	------	------	Proposed Area 1
2	SCS Runoff	1.293	1	718	3,263	------	------	------	Proposed Area 2
3	SCS Runoff	2.370	1	716	5,438	------	------	------	Proposed Area 3
4	SCS Runoff	3.100	1	716	7,111	------	------	------	Proposed Area 4
5	SCS Runoff	2.989	1	717	7,035	------	------	------	Proposed Area 5
6	SCS Runoff	2.176	1	732	9,419	------	------	------	Proposed Area 6
7	SCS Runoff	2.565	1	717	6,127	------	------	------	Proposed Area 7
8	SCS Runoff	0.910	1	715	1,961	------	------	------	Proposed Area 8
9	SCS Runoff	0.915	1	720	2,381	------	------	------	Proposed Area 9
10	SCS Runoff	3.159	1	716	7,023	------	------	------	Proposed Area 10
11	SCS Runoff	1.910	1	715	4,118	------	------	------	Proposed Area 11
12	SCS Runoff	4.720	1	716	10,654	------	------	------	Proposed Area 12
13	SCS Runoff	2.445	1	715	5,186	------	------	------	Proposed Area 13
14	SCS Runoff	1.091	1	715	2,353	------	------	------	Proposed Area 14
15	SCS Runoff	1.433	1	716	3,143	------	------	------	Proposed Area 15
16	SCS Runoff	1.637	1	715	3,530	------	------	------	Proposed Area 16
17	SCS Runoff	44.11	1	716	85,485	------	------	------	Proposed Area 17
18	SCS Runoff	18.84	1	724	55,991	------	------	------	Proposed Area 18
19	SCS Runoff	1.535	1	718	3,875	------	------	------	Proposed Area 19
20	SCS Runoff	2.465	1	729	10,357	------	------	------	Proposed Area 20
21	SCS Runoff	1.153	1	732	4,958	------	------	------	Proposed Area 21
22	SCS Runoff	1.858	1	726	6,960	------	------	------	Proposed Area 22
23	SCS Runoff	5.561	1	716	12,758	------	------	------	Proposed Area 23
24	SCS Runoff	4.103	1	716	9,412	------	------	------	Proposed Area 24
25	SCS Runoff	1.819	1	715	3,922	------	------	------	Proposed Area 25
26	SCS Runoff	16.69	1	720	41,269	------	------	------	Proposed Area 26
27	SCS Runoff	3.820	1	715	8,235	------	------	------	Proposed Area 27
28	SCS Runoff	4.724	1	723	13,524	------	------	------	Proposed Area 28
29	SCS Runoff	1.449	1	715	3,073	------	------	------	Proposed Area 29
30	SCS Runoff	7.653	1	723	21,909	------	------	------	Proposed Area 30
31	SCS Runoff	50.35	1	716	98,852	------	------	------	Proposed Area 31
32	Combine	12.57	1	716	36,384	1, 2, 3, 4, 5, 6,	------	------	Proposed Area 1-6
33	Combine	13.92	1	716	32,264	7, 8, 9, 10, 11, 12,	------	------	Proposed Area 7-12
34	Combine	50.61	1	716	99,697	13, 14, 15, 16, 17,	------	------	Proposed Area 13-17

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
35	Combine	2.244	1	719	8,832	19, 21,	------	------	Proposed Area 19 & 21
36	Reservoir	2.171	1	720	8,829	35	352.43	287	Proposed Chambers
37	Combine	12.63	1	716	33,052	22, 23, 24,	------	------	Proposed Area 22-25
38	Combine	18.55	1	719	49,505	25, 26, 27,	------	------	Proposed Area 26-27
39	Combine	77.10	1	716	168,344	32, 33, 34,	------	------	Proposed Area 1-17
40	Combine	15.82	1	716	52,238	20, 36, 37,	------	------	Proposed Area 19-25
41	Combine	30.05	1	719	108,229	18, 39, 40	------	------	Proposed Area to Drainage Under Ae

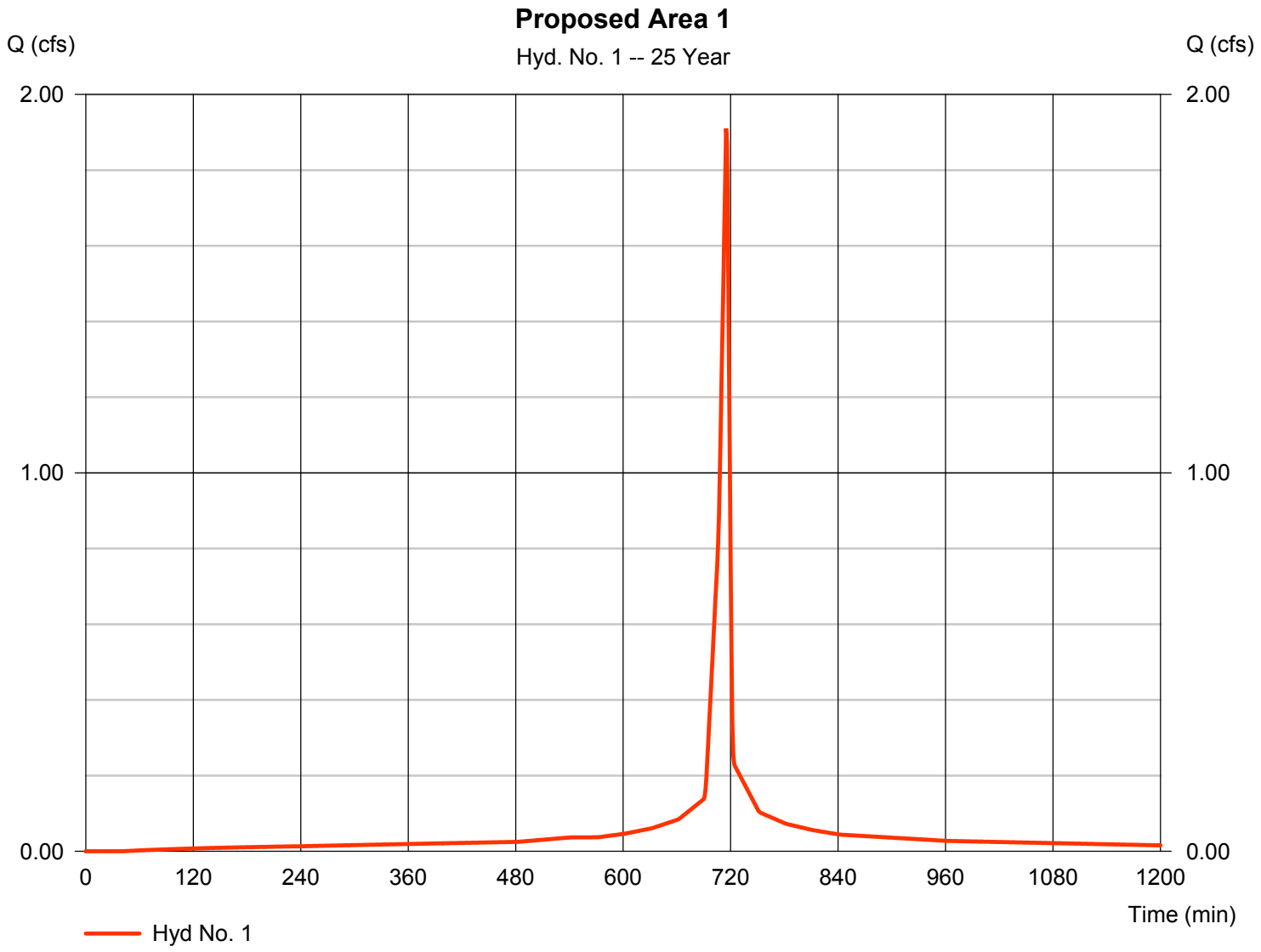
Hydrograph Report

Hyd. No. 1

Proposed Area 1

Hydrograph type	= SCS Runoff	Peak discharge	= 1.910 cfs
Storm frequency	= 25 yrs	Time to peak	= 715 min
Time interval	= 1 min	Hyd. volume	= 4,118 cuft
Drainage area	= 0.210 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.20 min
Total precip.	= 6.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.211 x 98)] / 0.210



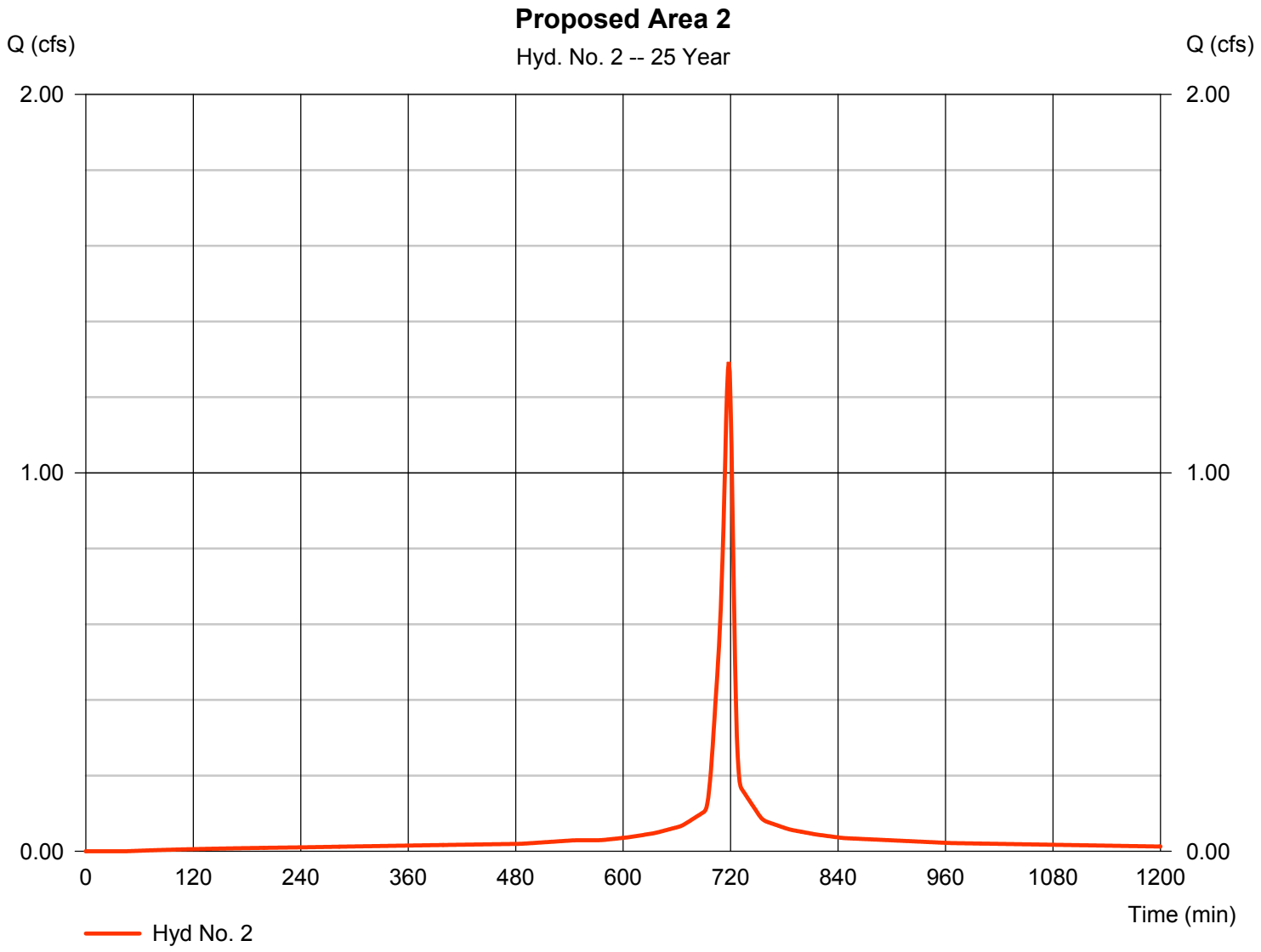
Hydrograph Report

Hyd. No. 2

Proposed Area 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.293 cfs
Storm frequency	=	25 yrs	Time to peak	=	718 min
Time interval	=	1 min	Hyd. volume	=	3,263 cuft
Drainage area	=	0.160 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	6.90 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.152 x 98) + (0.004 x 79)] / 0.160



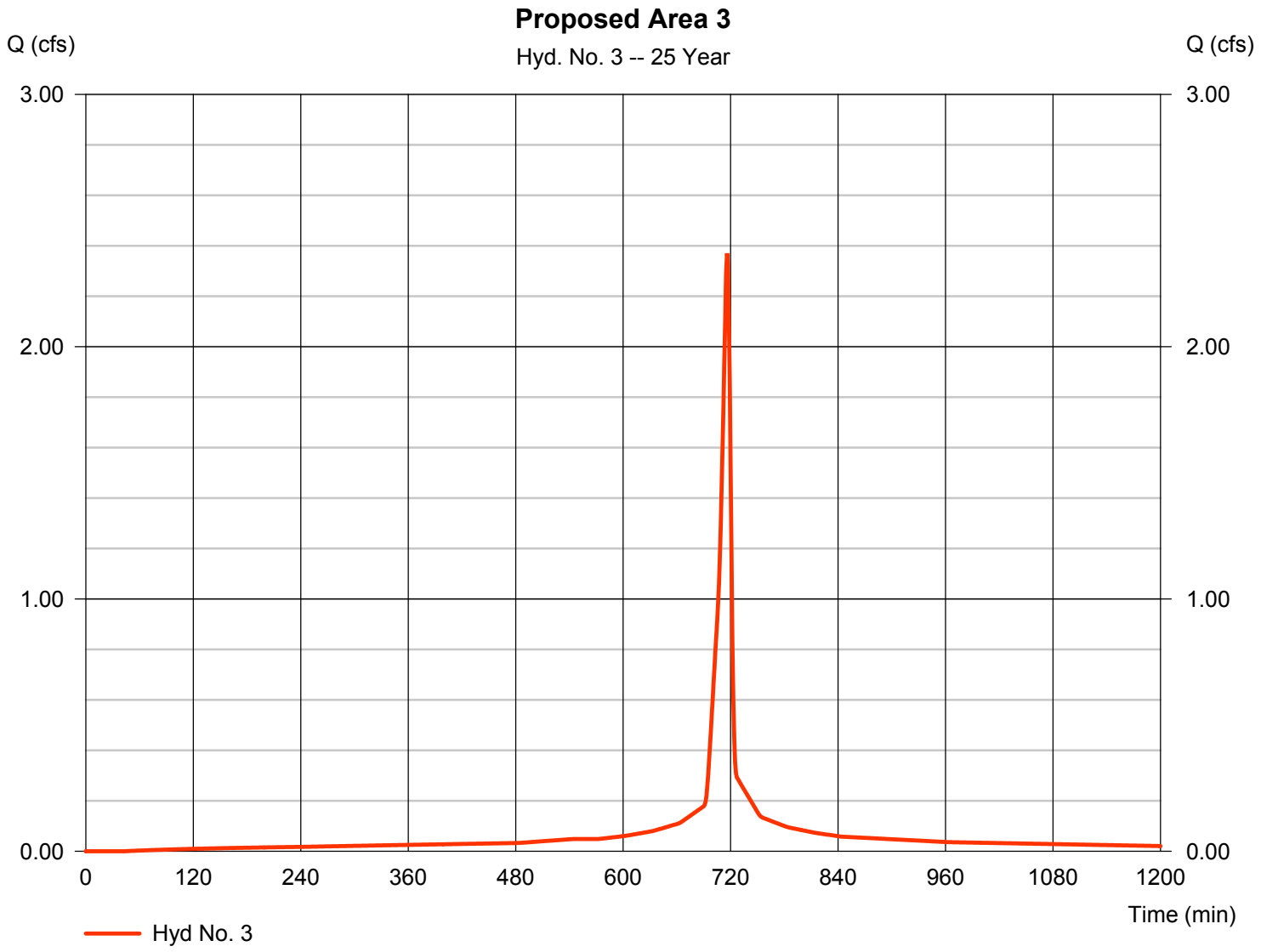
Hydrograph Report

Hyd. No. 3

Proposed Area 3

Hydrograph type	= SCS Runoff	Peak discharge	= 2.370 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 5,438 cuft
Drainage area	= 0.260 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.70 min
Total precip.	= 6.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.264 x 98)] / 0.260



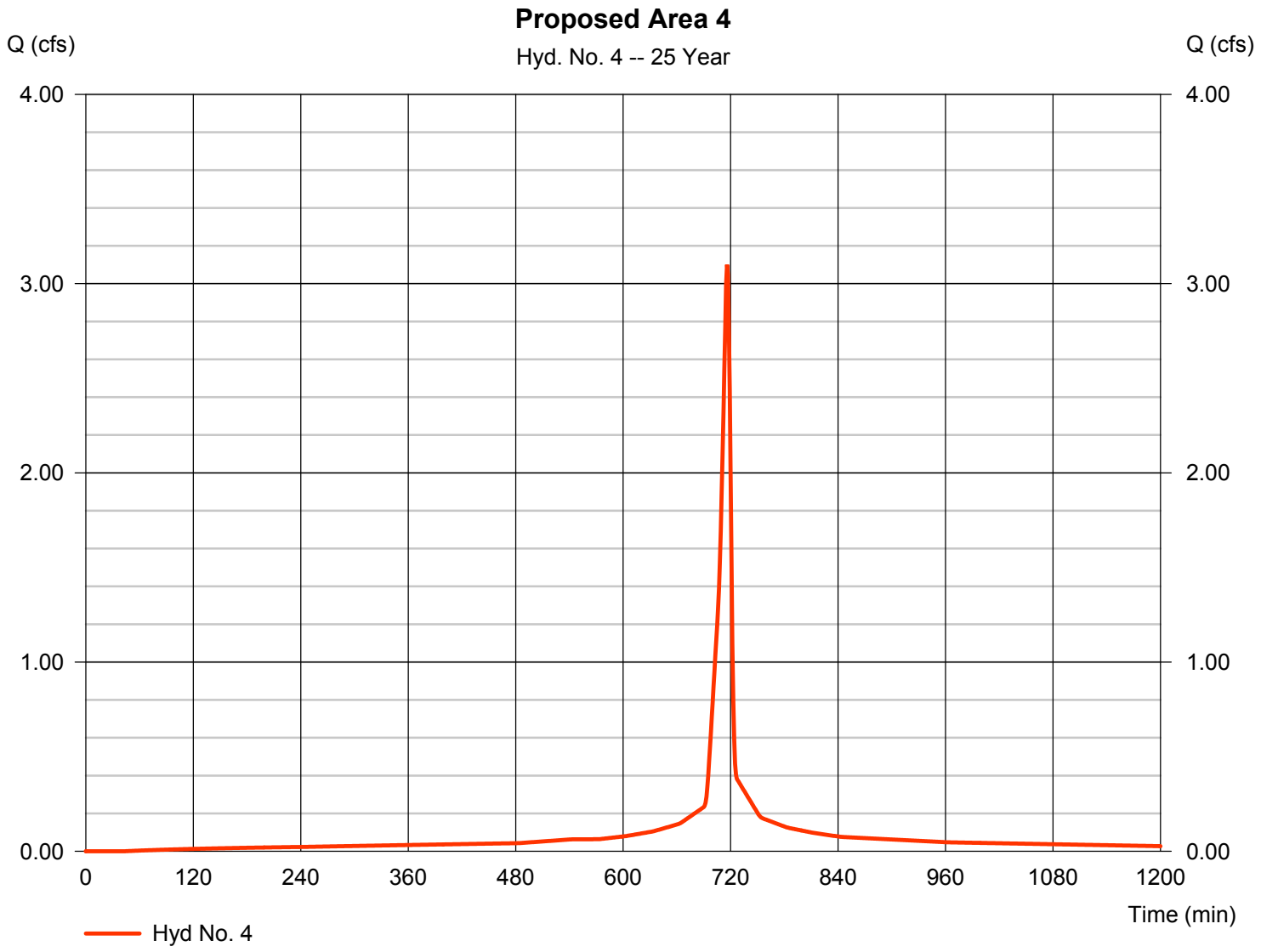
Hydrograph Report

Hyd. No. 4

Proposed Area 4

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.100 cfs
Storm frequency	=	25 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	7,111 cuft
Drainage area	=	0.340 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	3.60 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.335 x 98)] / 0.340



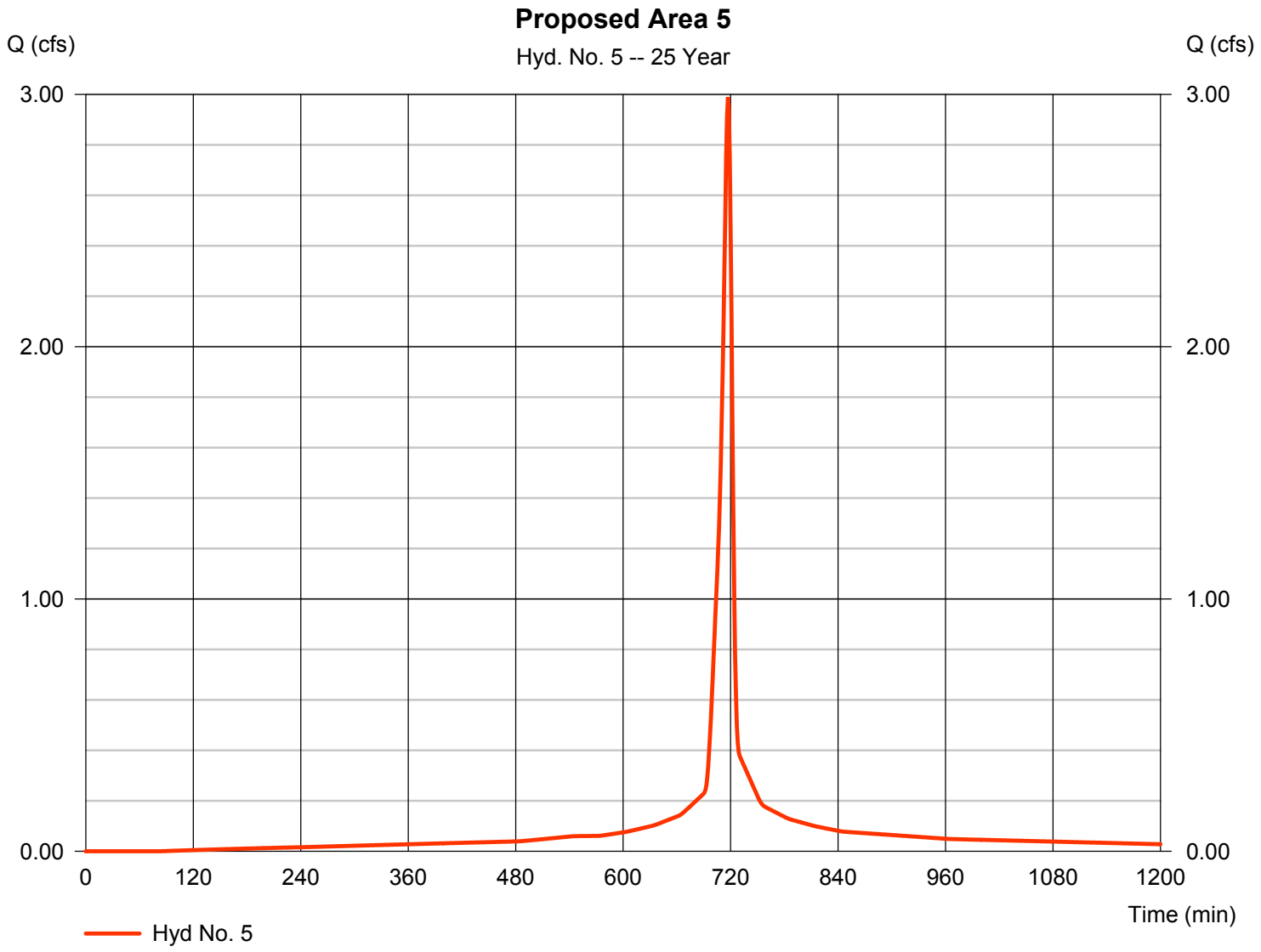
Hydrograph Report

Hyd. No. 5

Proposed Area 5

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.989 cfs
Storm frequency	=	25 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	7,035 cuft
Drainage area	=	0.340 ac	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.50 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.299 x 98) + (0.040 x 79)] / 0.340



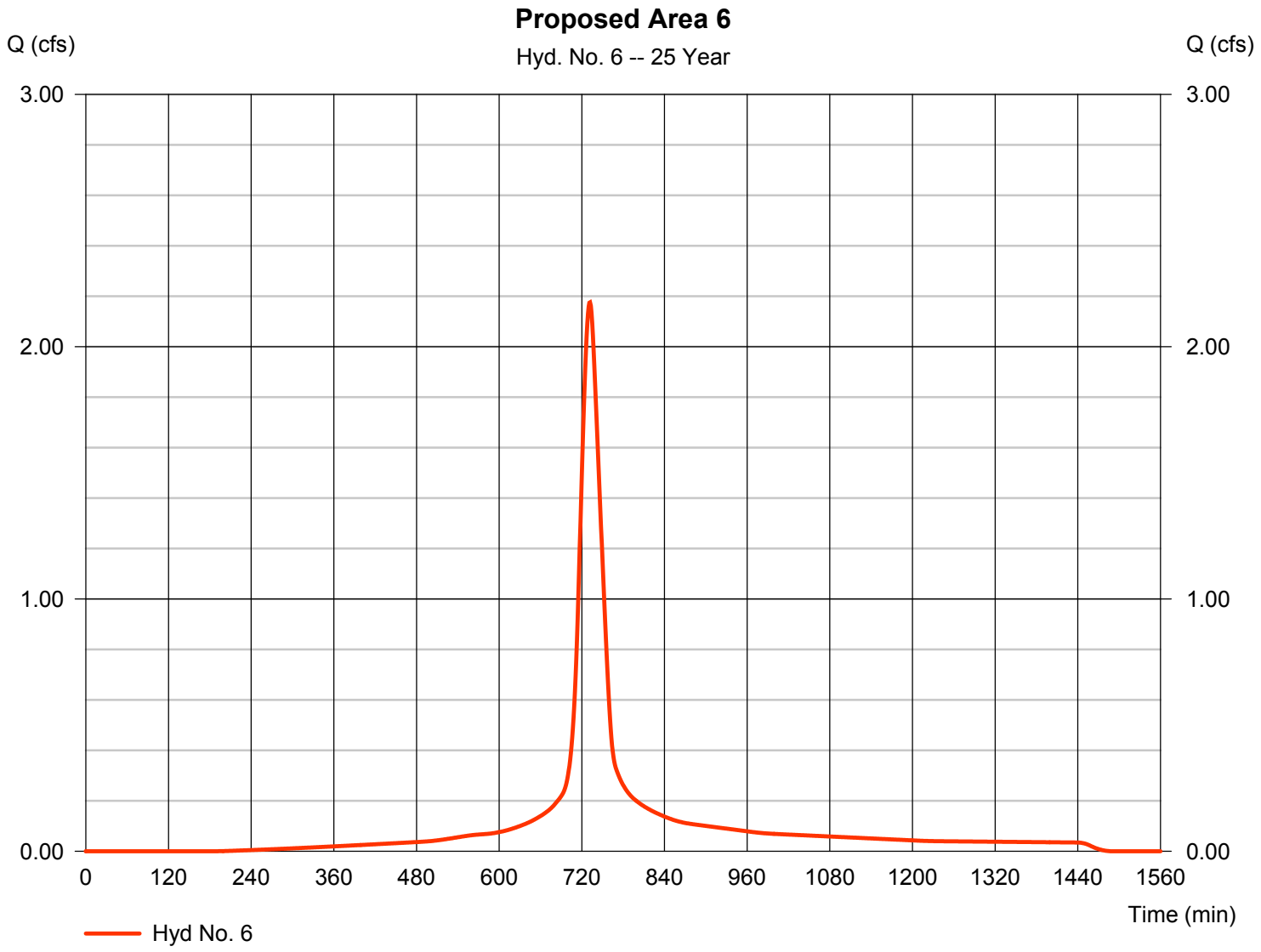
Hydrograph Report

Hyd. No. 6

Proposed Area 6

Hydrograph type	= SCS Runoff	Peak discharge	= 2.176 cfs
Storm frequency	= 25 yrs	Time to peak	= 732 min
Time interval	= 1 min	Hyd. volume	= 9,419 cuft
Drainage area	= 0.520 ac	Curve number	= 91*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 30.80 min
Total precip.	= 6.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.331 x 98) + (0.191 x 79)] / 0.520



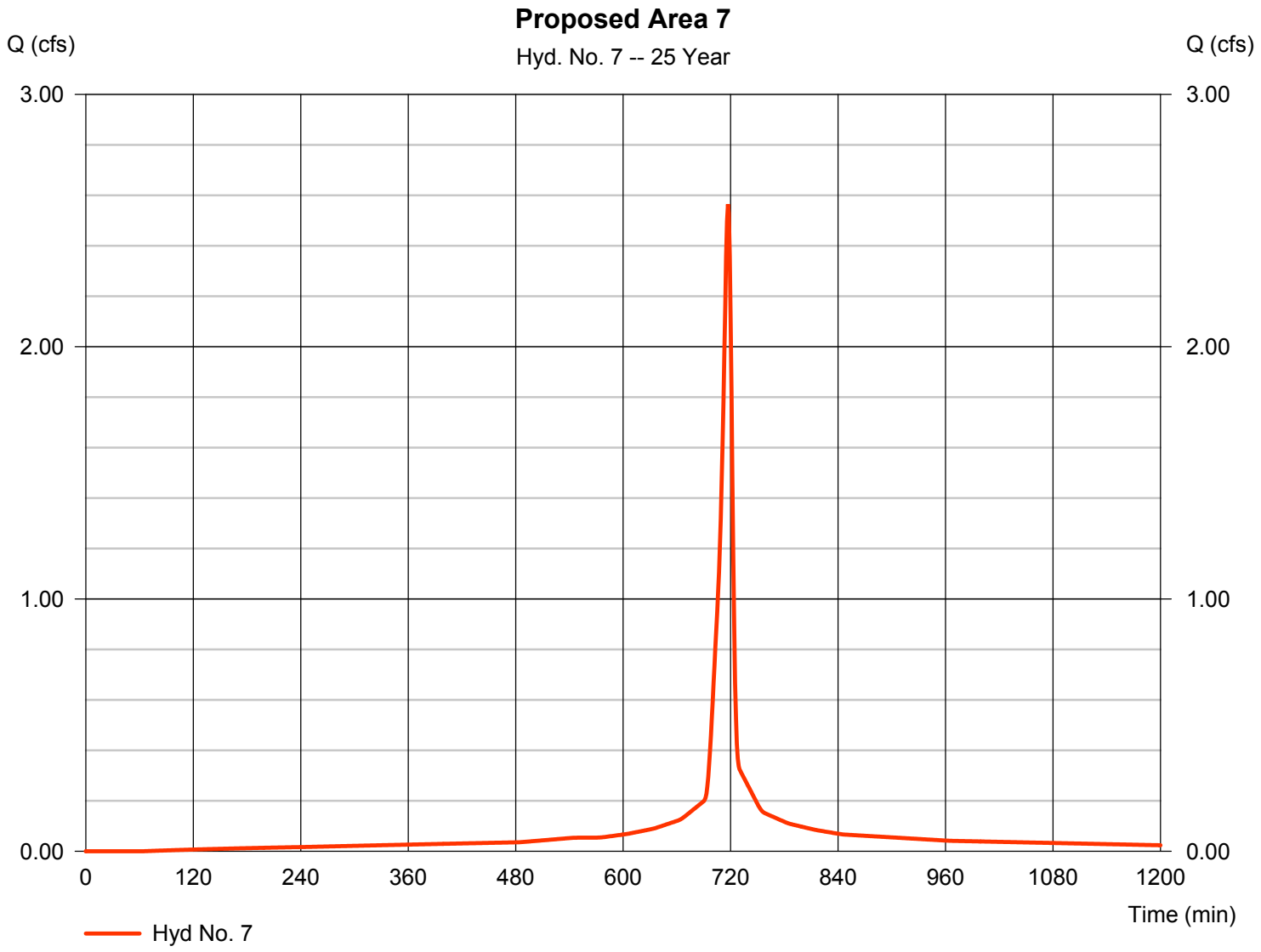
Hydrograph Report

Hyd. No. 7

Proposed Area 7

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.565 cfs
Storm frequency	=	25 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	6,127 cuft
Drainage area	=	0.290 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.272 x 98) + (0.021 x 79)] / 0.290



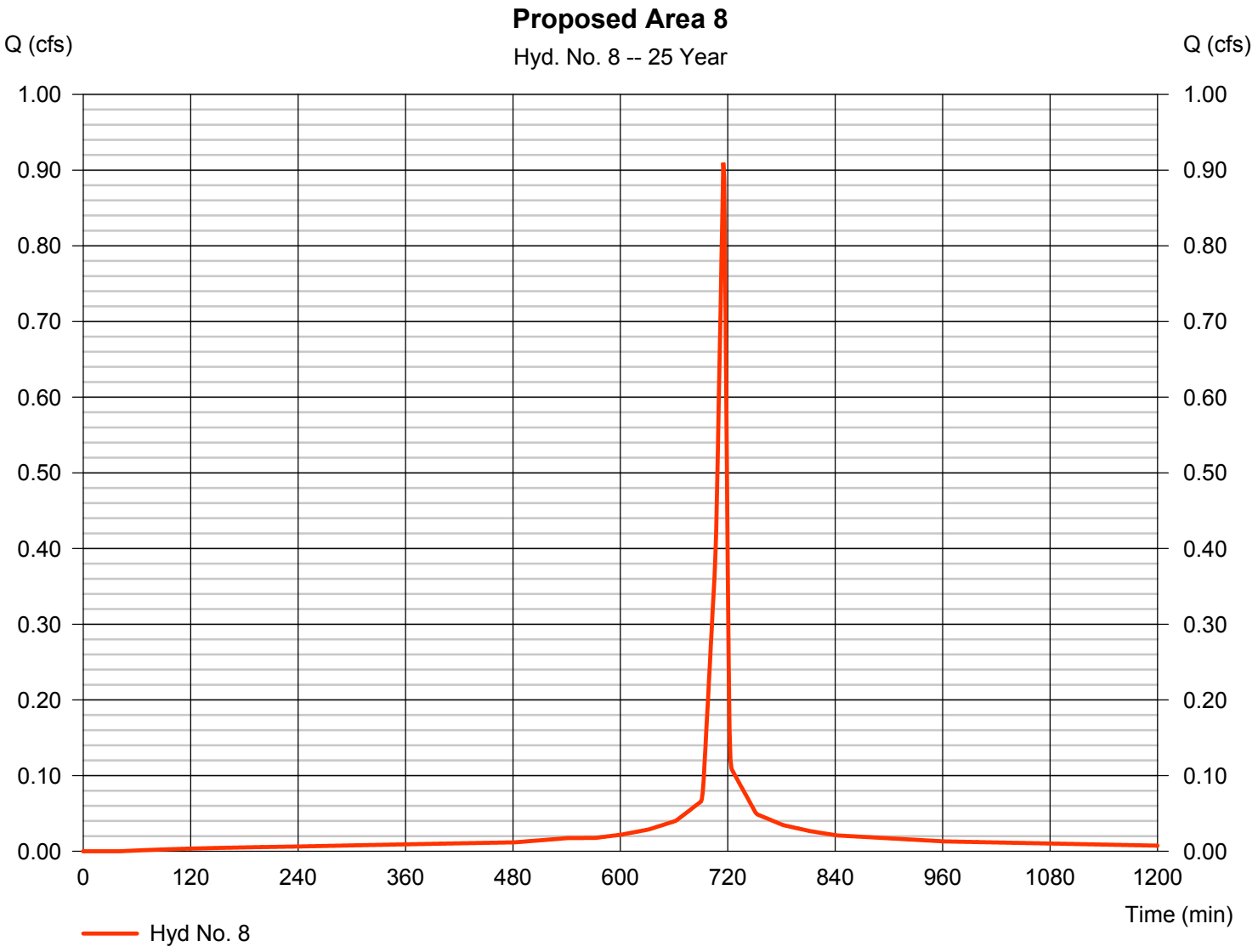
Hydrograph Report

Hyd. No. 8

Proposed Area 8

Hydrograph type	= SCS Runoff	Peak discharge	= 0.910 cfs
Storm frequency	= 25 yrs	Time to peak	= 715 min
Time interval	= 1 min	Hyd. volume	= 1,961 cuft
Drainage area	= 0.100 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.10 min
Total precip.	= 6.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.102 x 98)] / 0.100



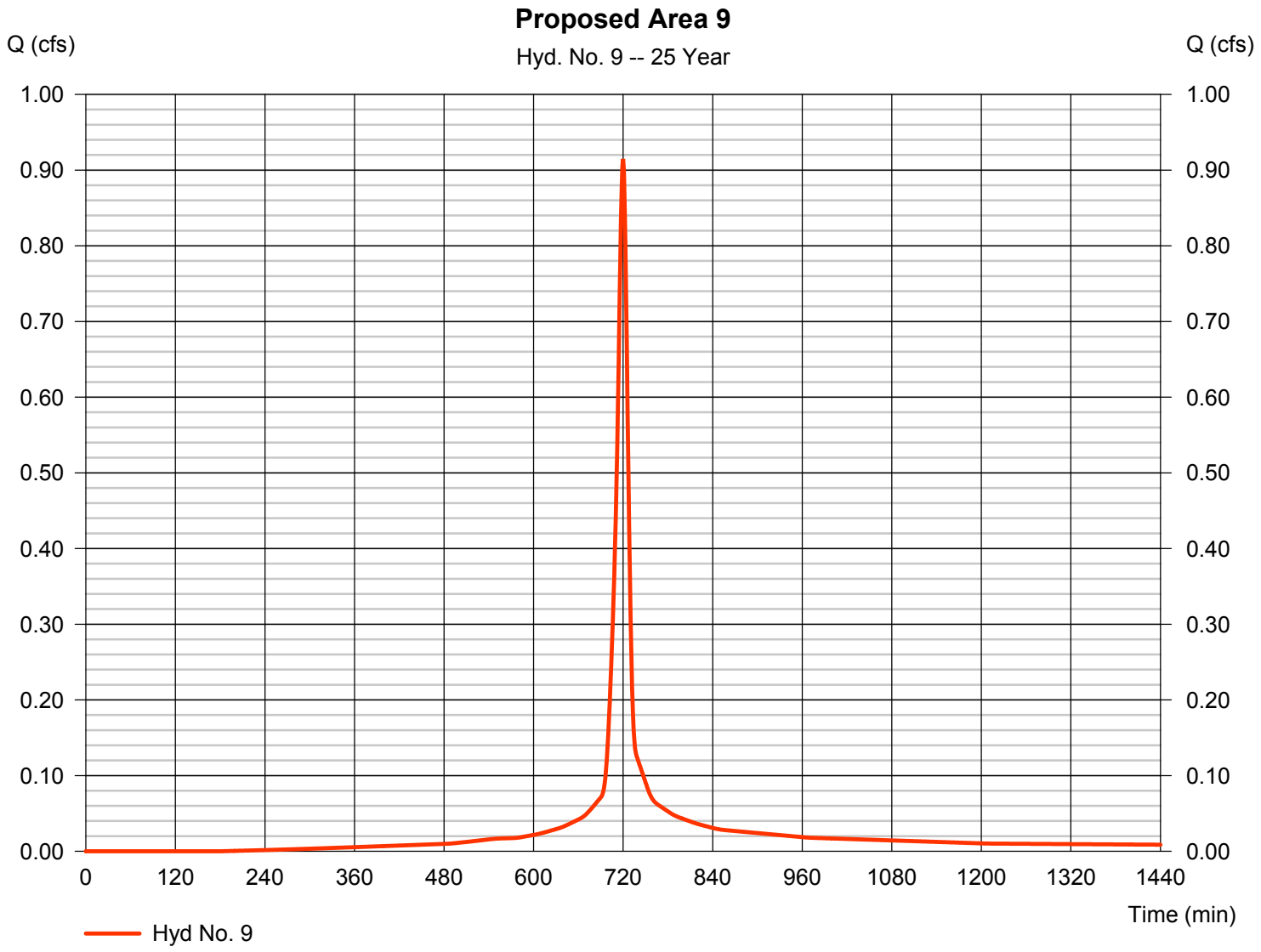
Hydrograph Report

Hyd. No. 9

Proposed Area 9

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.915 cfs
Storm frequency	=	25 yrs	Time to peak	=	720 min
Time interval	=	1 min	Hyd. volume	=	2,381 cuft
Drainage area	=	0.130 ac	Curve number	=	91*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	10.20 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.081 x 98) + (0.044 x 79)] / 0.130



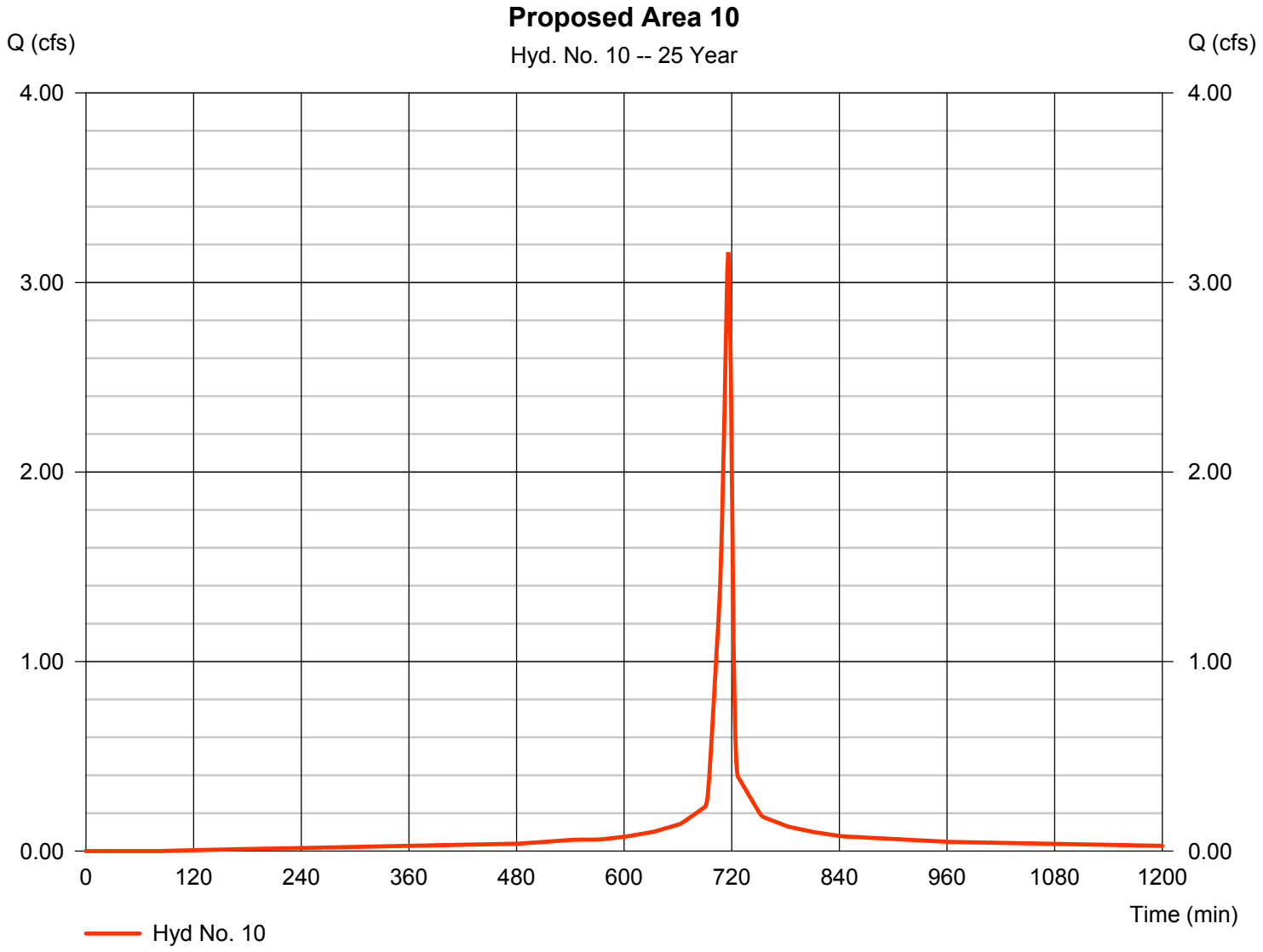
Hydrograph Report

Hyd. No. 10

Proposed Area 10

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.159 cfs
Storm frequency	=	25 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	7,023 cuft
Drainage area	=	0.350 ac	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.50 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.310 x 98) + (0.040 x 79)] / 0.350



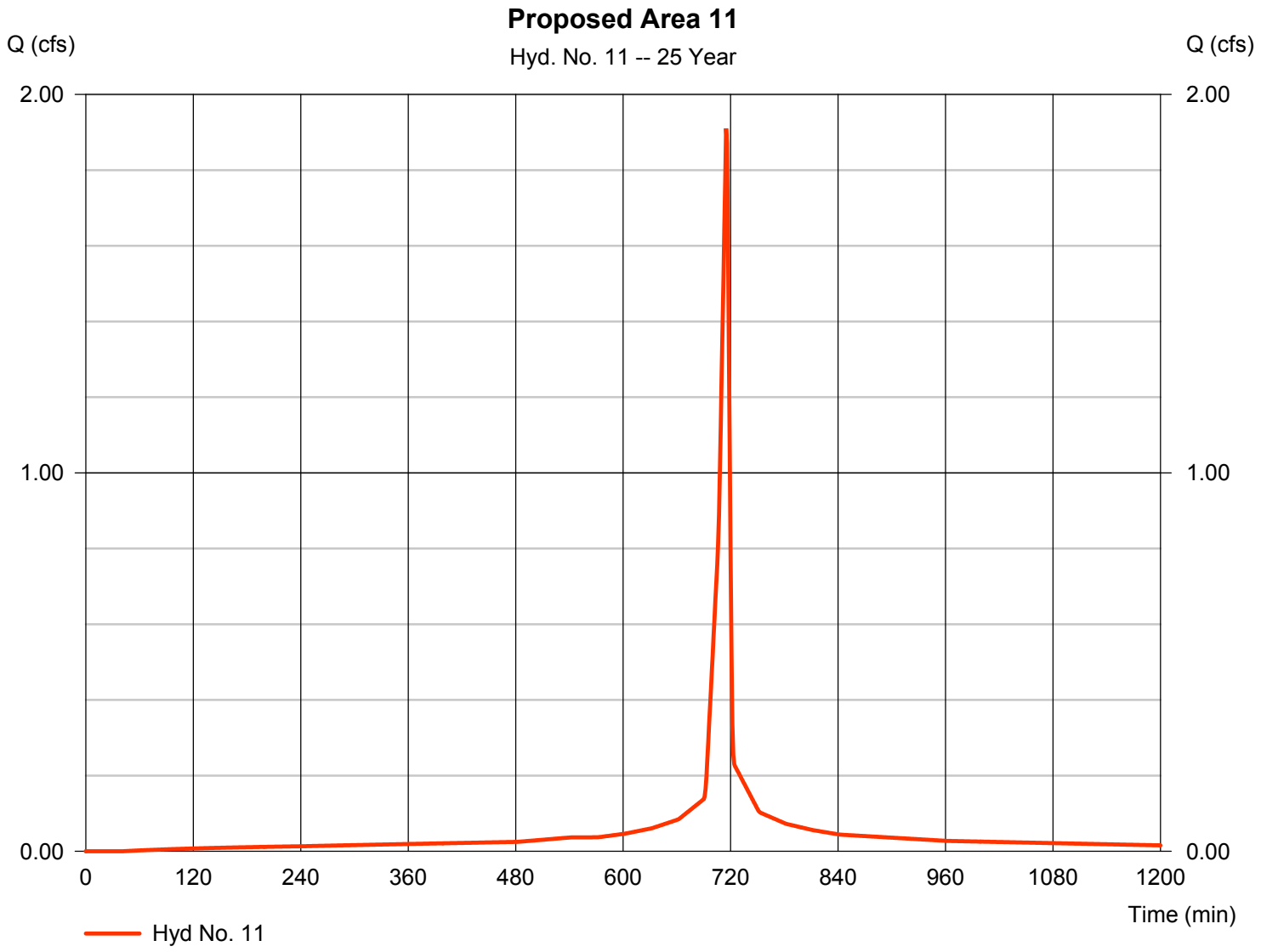
Hydrograph Report

Hyd. No. 11

Proposed Area 11

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.910 cfs
Storm frequency	=	25 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	4,118 cuft
Drainage area	=	0.210 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.50 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.207 x 98)] / 0.210



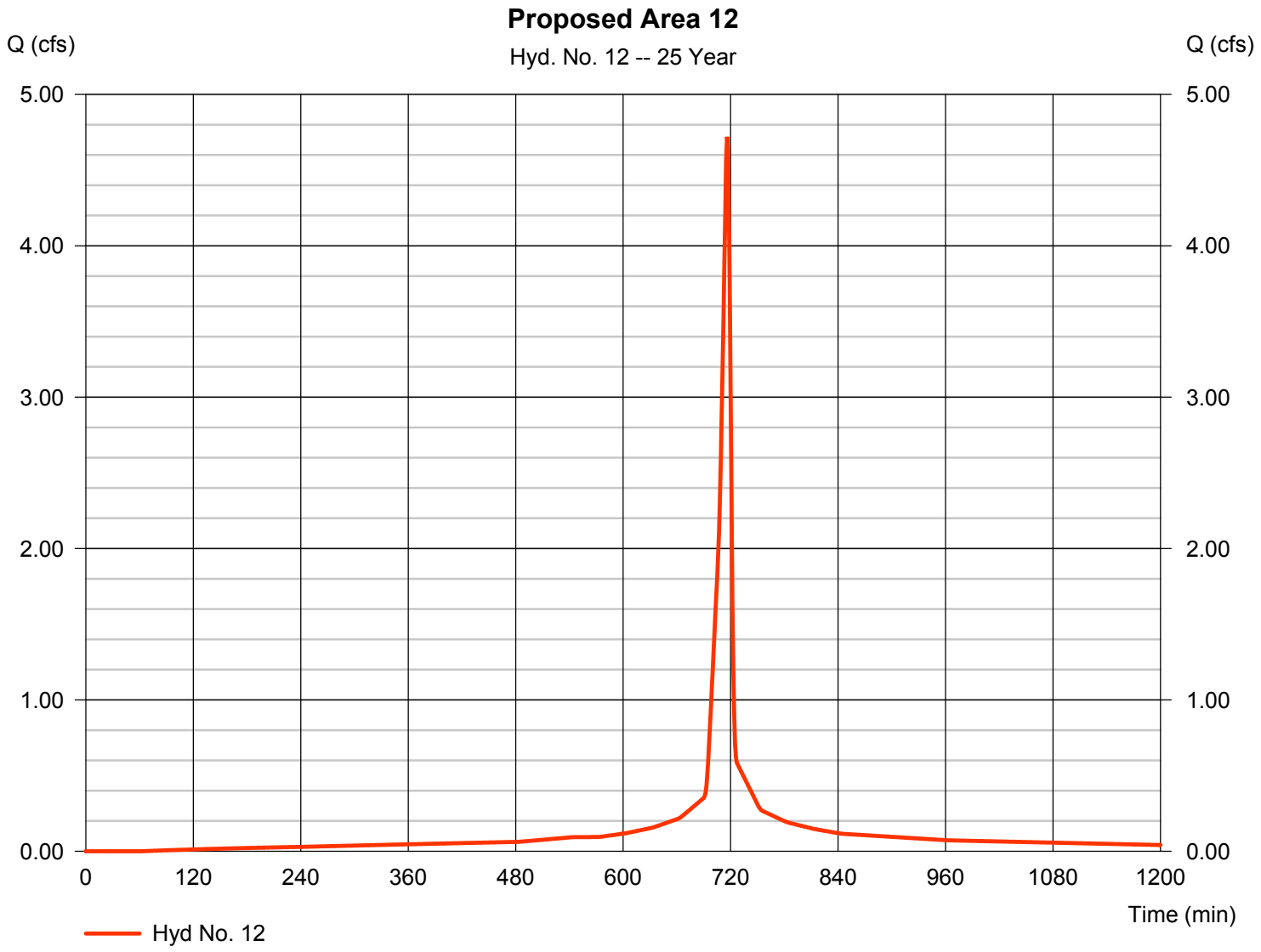
Hydrograph Report

Hyd. No. 12

Proposed Area 12

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.720 cfs
Storm frequency	=	25 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	10,654 cuft
Drainage area	=	0.520 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.10 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.480 x 98) + (0.040 x 79)] / 0.520



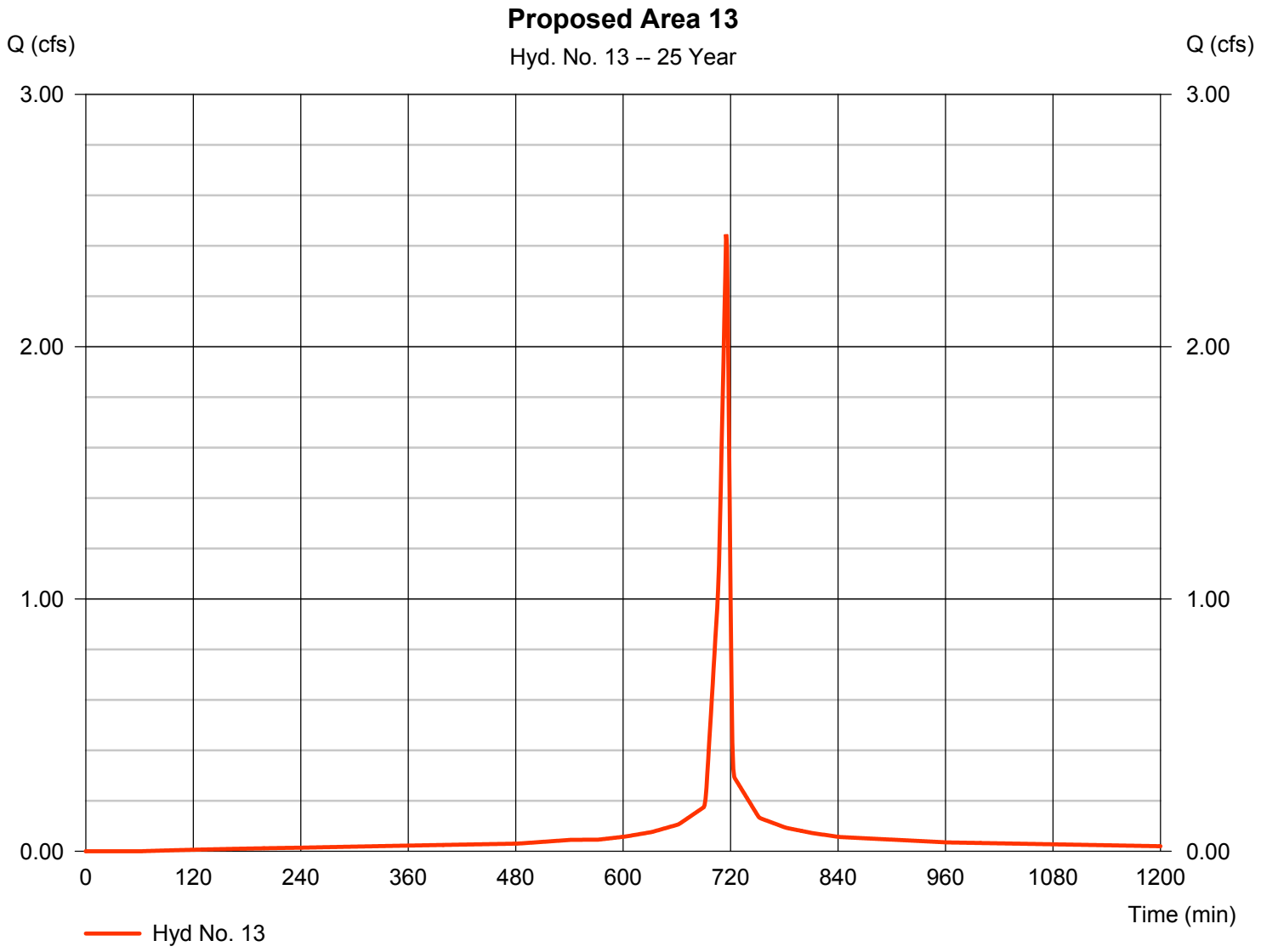
Hydrograph Report

Hyd. No. 13

Proposed Area 13

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.445 cfs
Storm frequency	=	25 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	5,186 cuft
Drainage area	=	0.270 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.50 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.260 x 98) + (0.010 x 79)] / 0.270



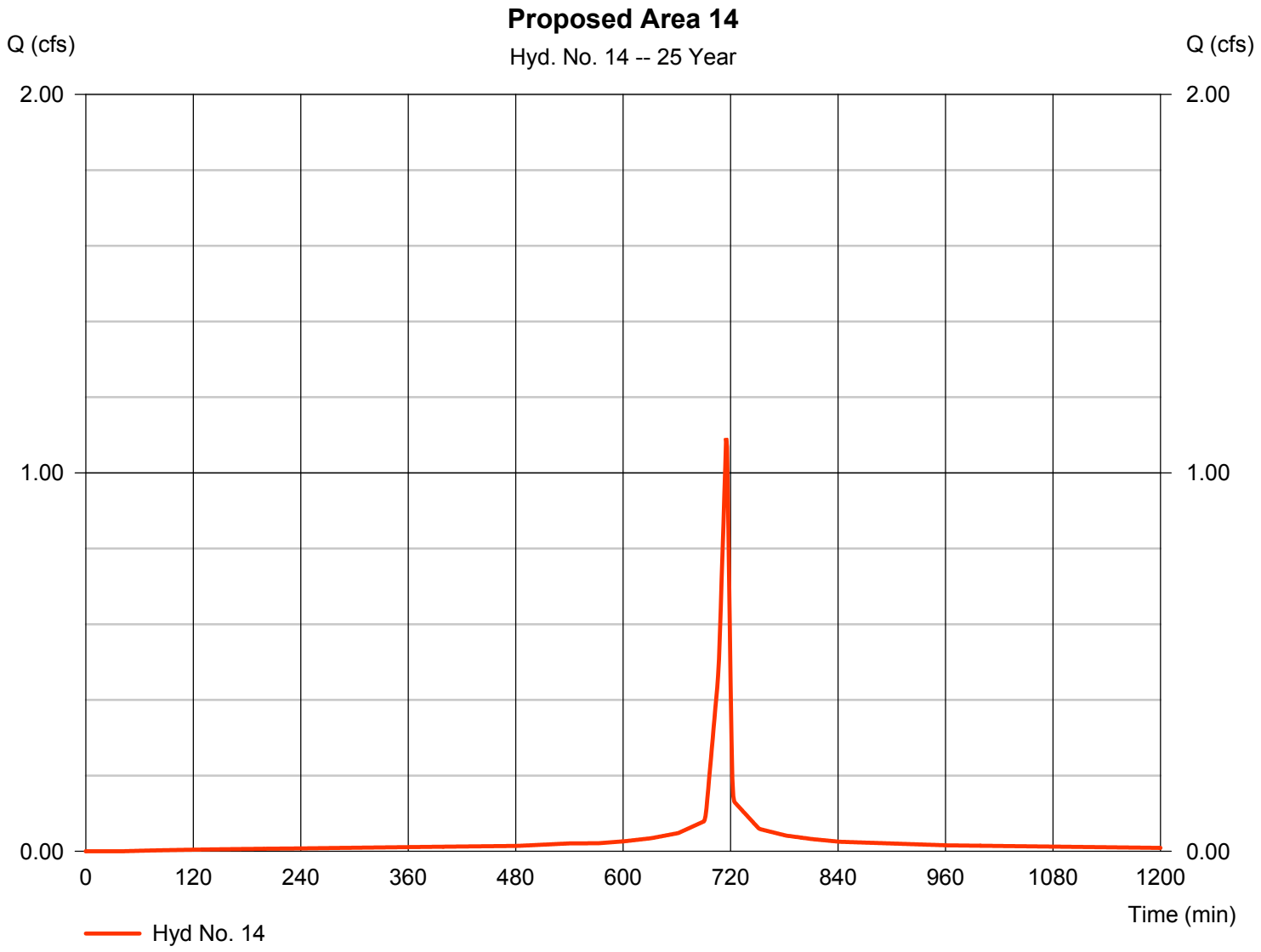
Hydrograph Report

Hyd. No. 14

Proposed Area 14

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.091 cfs
Storm frequency	=	25 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	2,353 cuft
Drainage area	=	0.120 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	1.70 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.123 x 98)] / 0.120



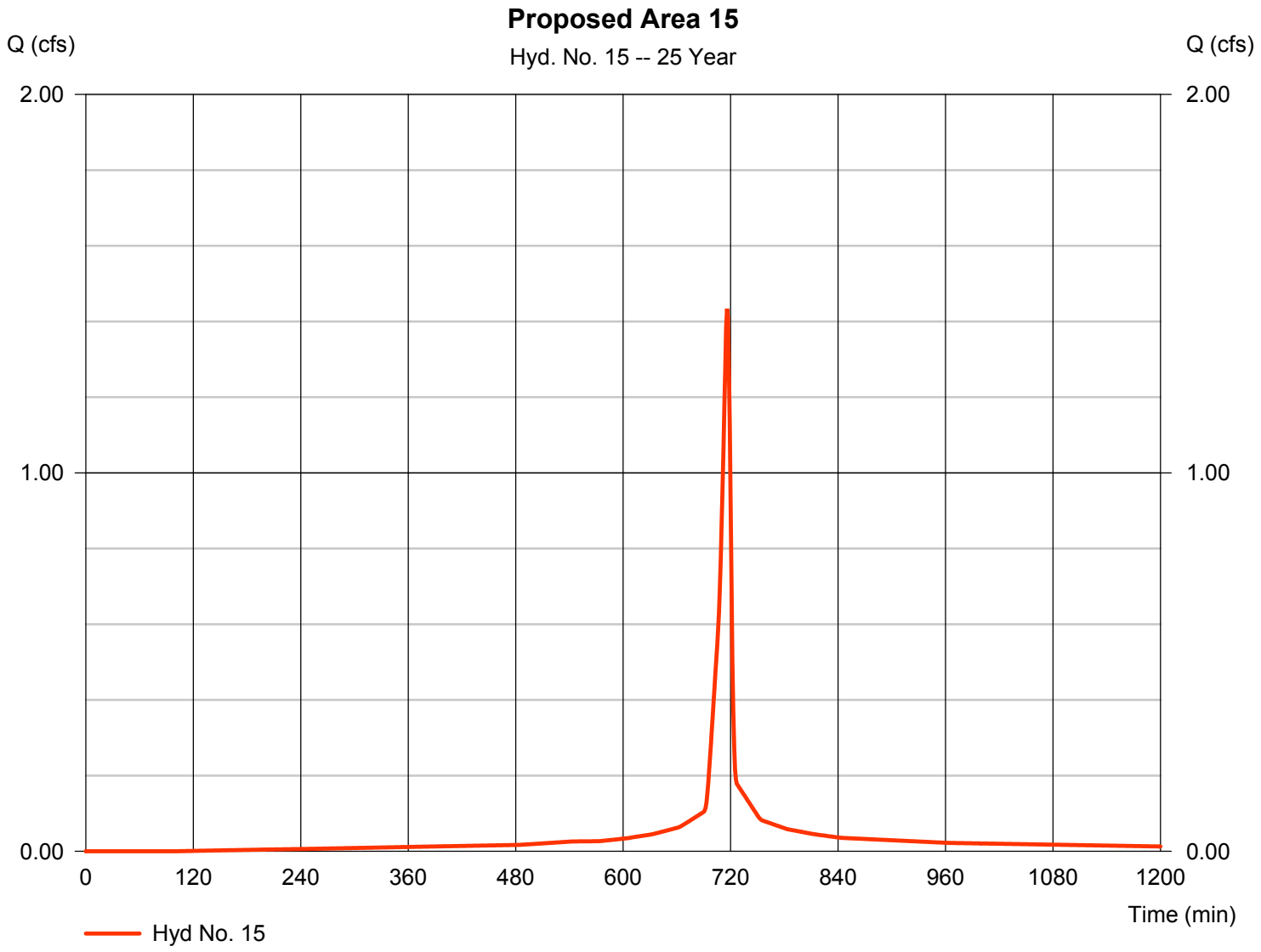
Hydrograph Report

Hyd. No. 15

Proposed Area 15

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.433 cfs
Storm frequency	=	25 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	3,143 cuft
Drainage area	=	0.160 ac	Curve number	=	95*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.90 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.134 x 98) + (0.022 x 79)] / 0.160



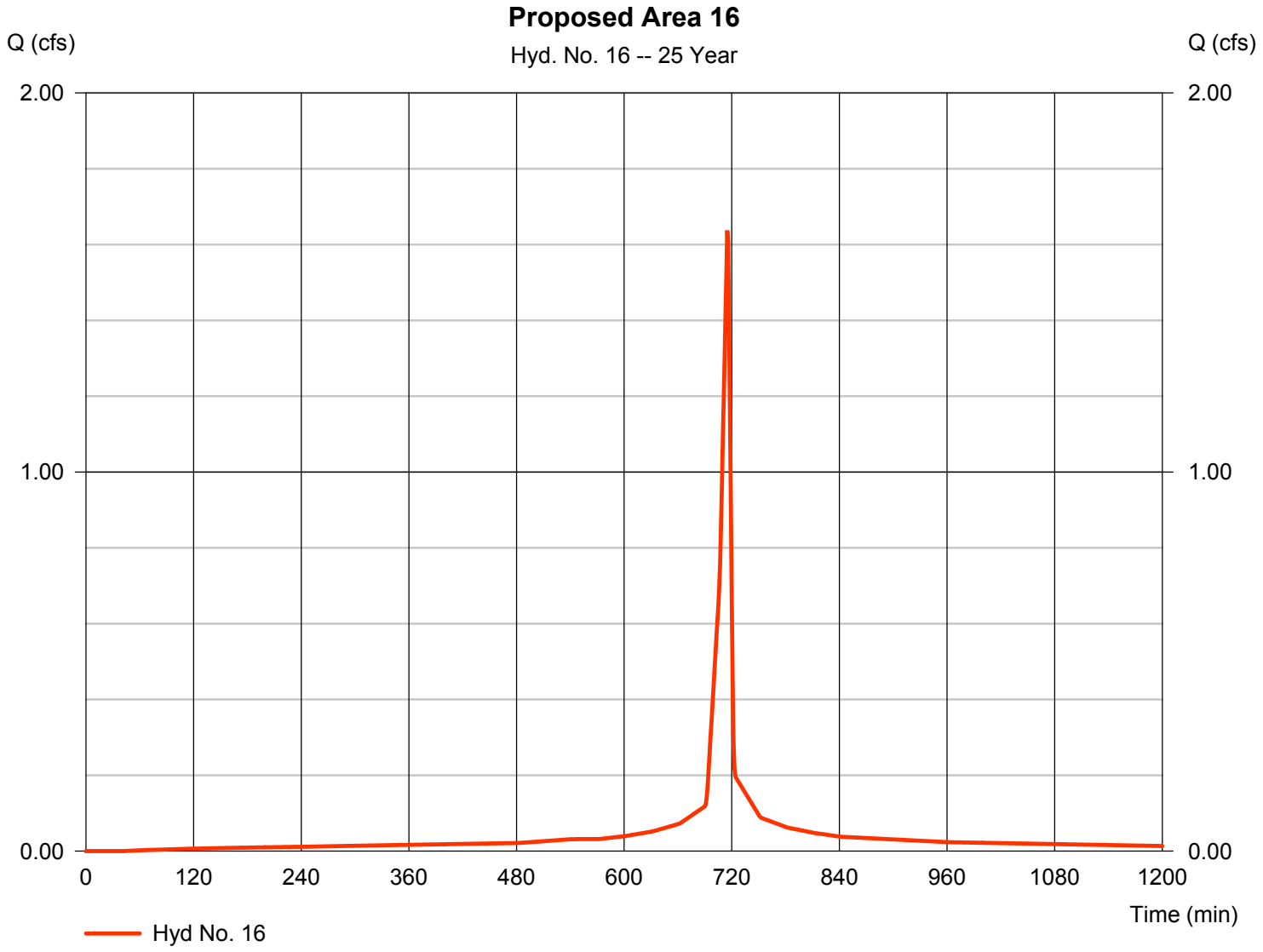
Hydrograph Report

Hyd. No. 16

Proposed Area 16

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.637 cfs
Storm frequency	=	25 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	3,530 cuft
Drainage area	=	0.180 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.40 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.182 x 98)] / 0.180



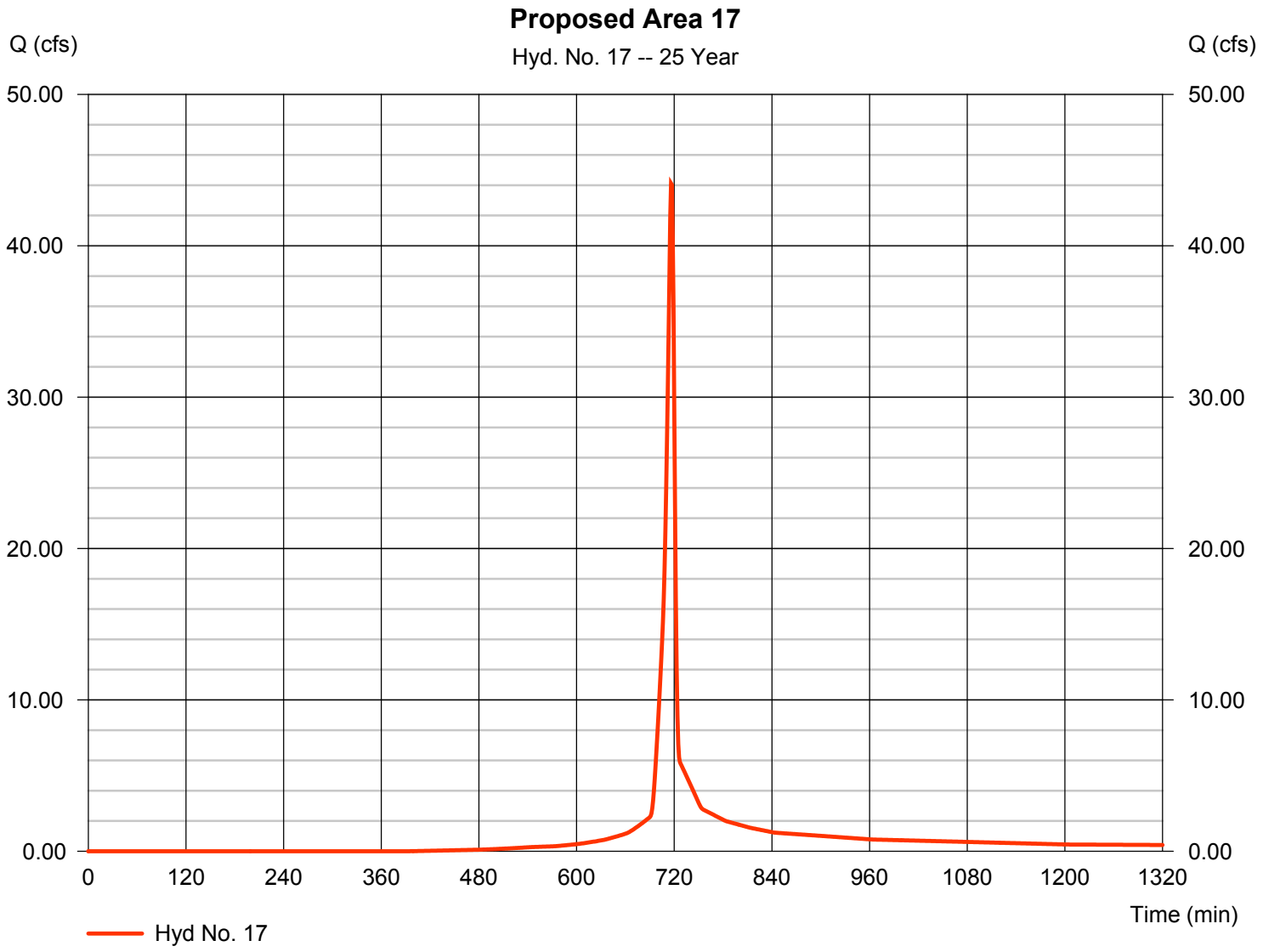
Hydrograph Report

Hyd. No. 17

Proposed Area 17

Hydrograph type	=	SCS Runoff	Peak discharge	=	44.11 cfs
Storm frequency	=	25 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	85,485 cuft
Drainage area	=	6.400 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.90 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.018 x 98) + (6.379 x 79)] / 6.400



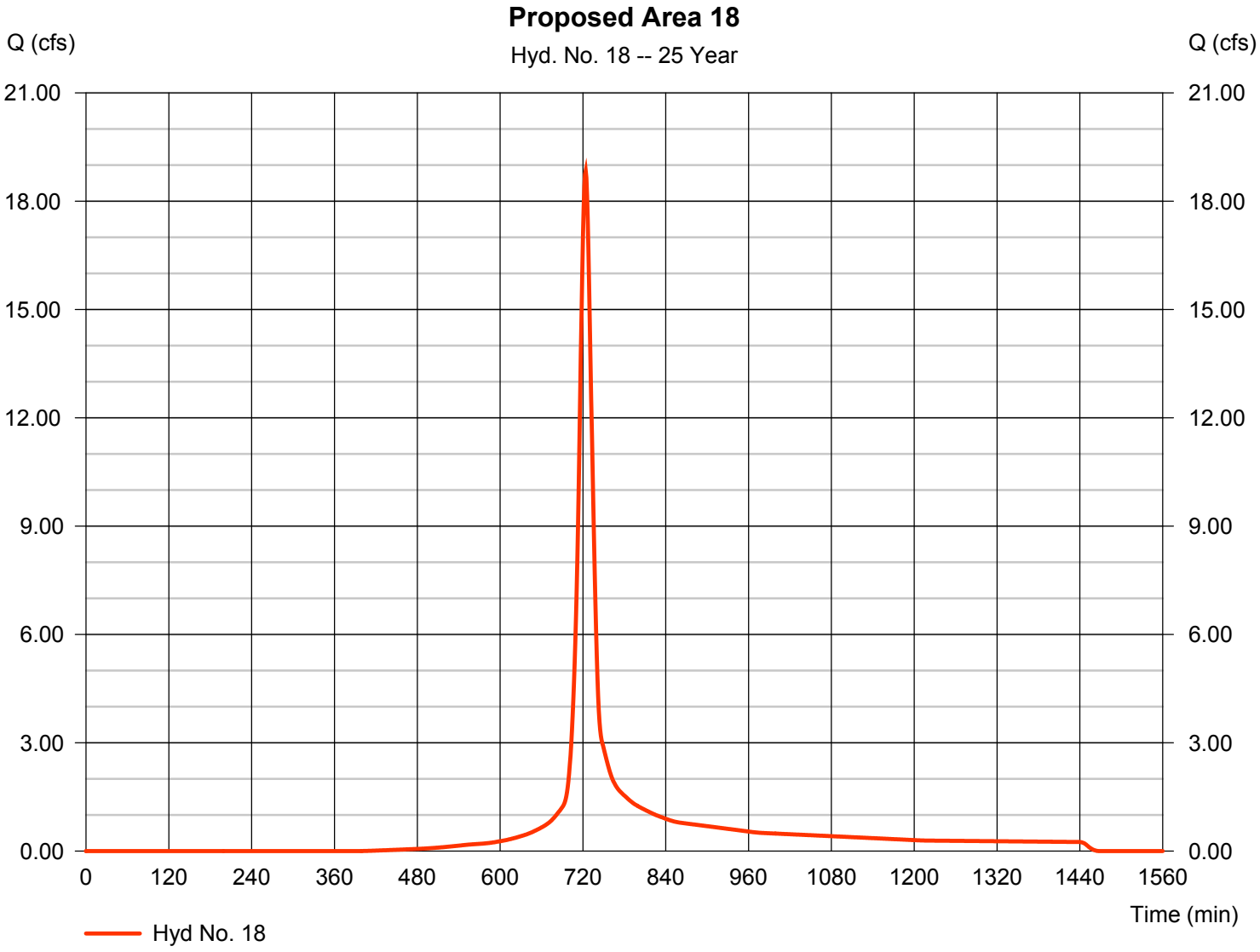
Hydrograph Report

Hyd. No. 18

Proposed Area 18

Hydrograph type	=	SCS Runoff	Peak discharge	=	18.84 cfs
Storm frequency	=	25 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	55,991 cuft
Drainage area	=	4.240 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	17.40 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.036 x 98) + (4.203 x 79)] / 4.240



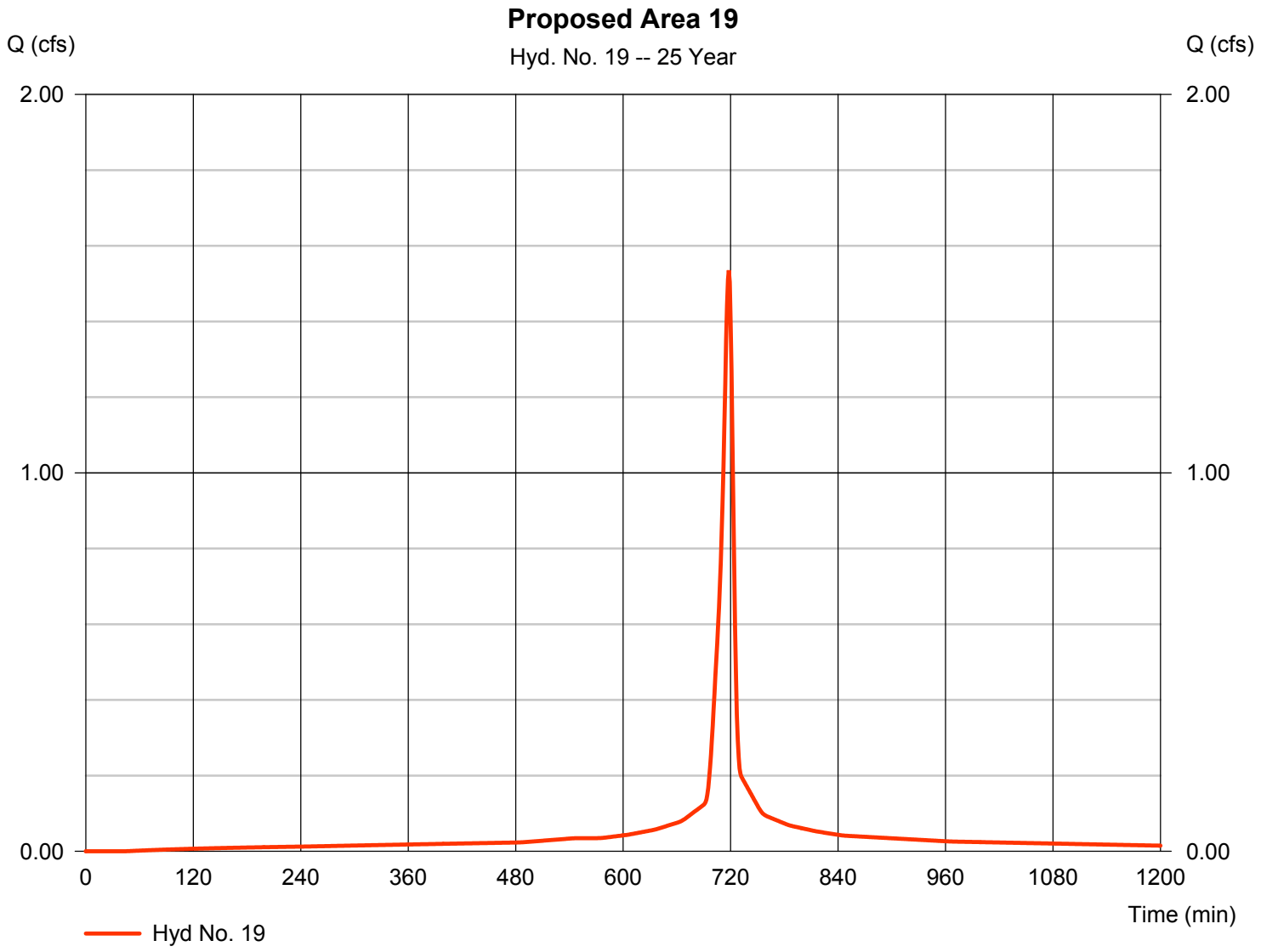
Hydrograph Report

Hyd. No. 19

Proposed Area 19

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.535 cfs
Storm frequency	=	25 yrs	Time to peak	=	718 min
Time interval	=	1 min	Hyd. volume	=	3,875 cuft
Drainage area	=	0.190 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.10 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.188 x 98)] / 0.190



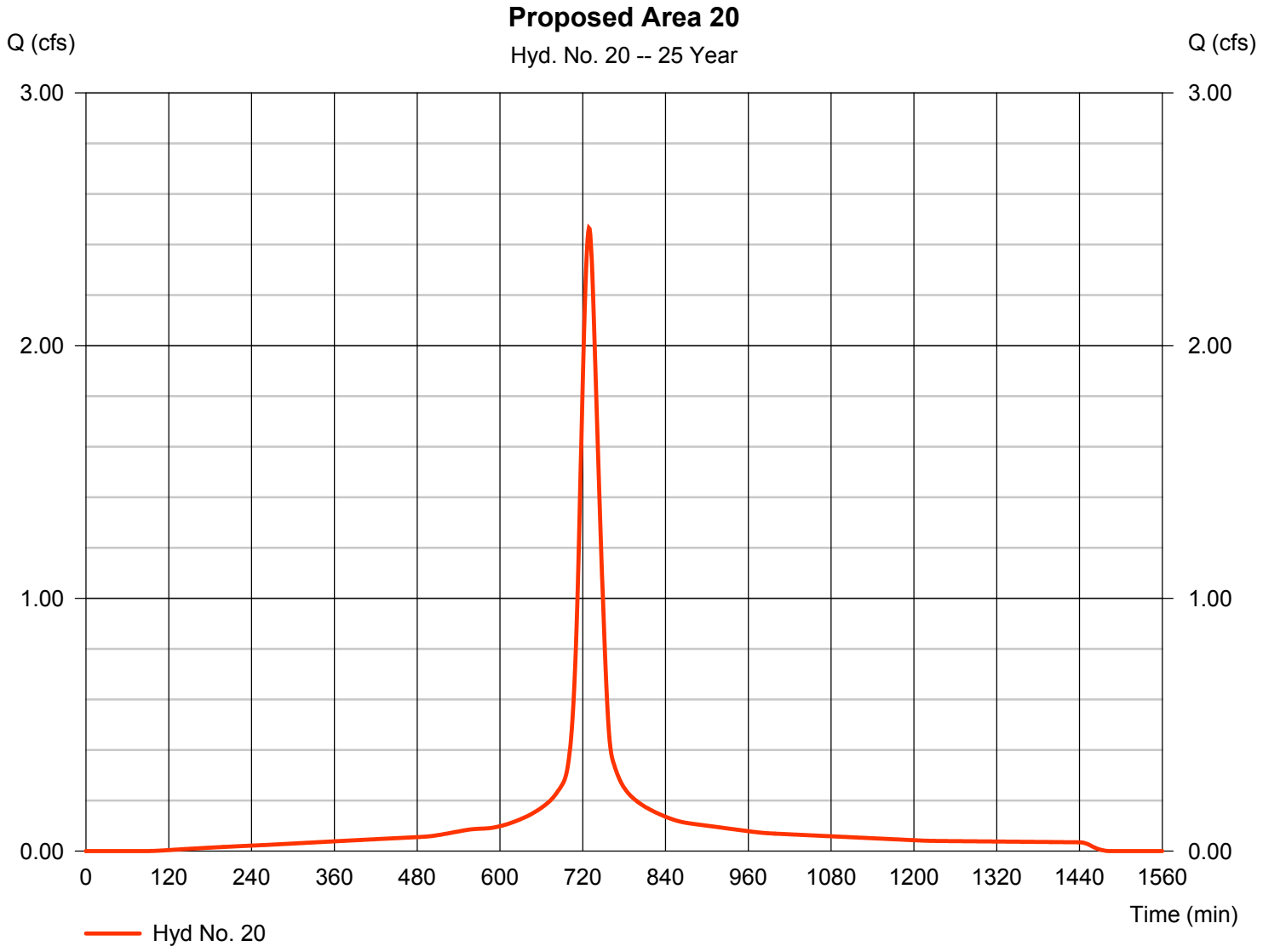
Hydrograph Report

Hyd. No. 20

Proposed Area 20

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.465 cfs
Storm frequency	=	25 yrs	Time to peak	=	729 min
Time interval	=	1 min	Hyd. volume	=	10,357 cuft
Drainage area	=	0.520 ac	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	27.80 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.458 x 98) + (0.060 x 79)] / 0.520



Hydrograph Report

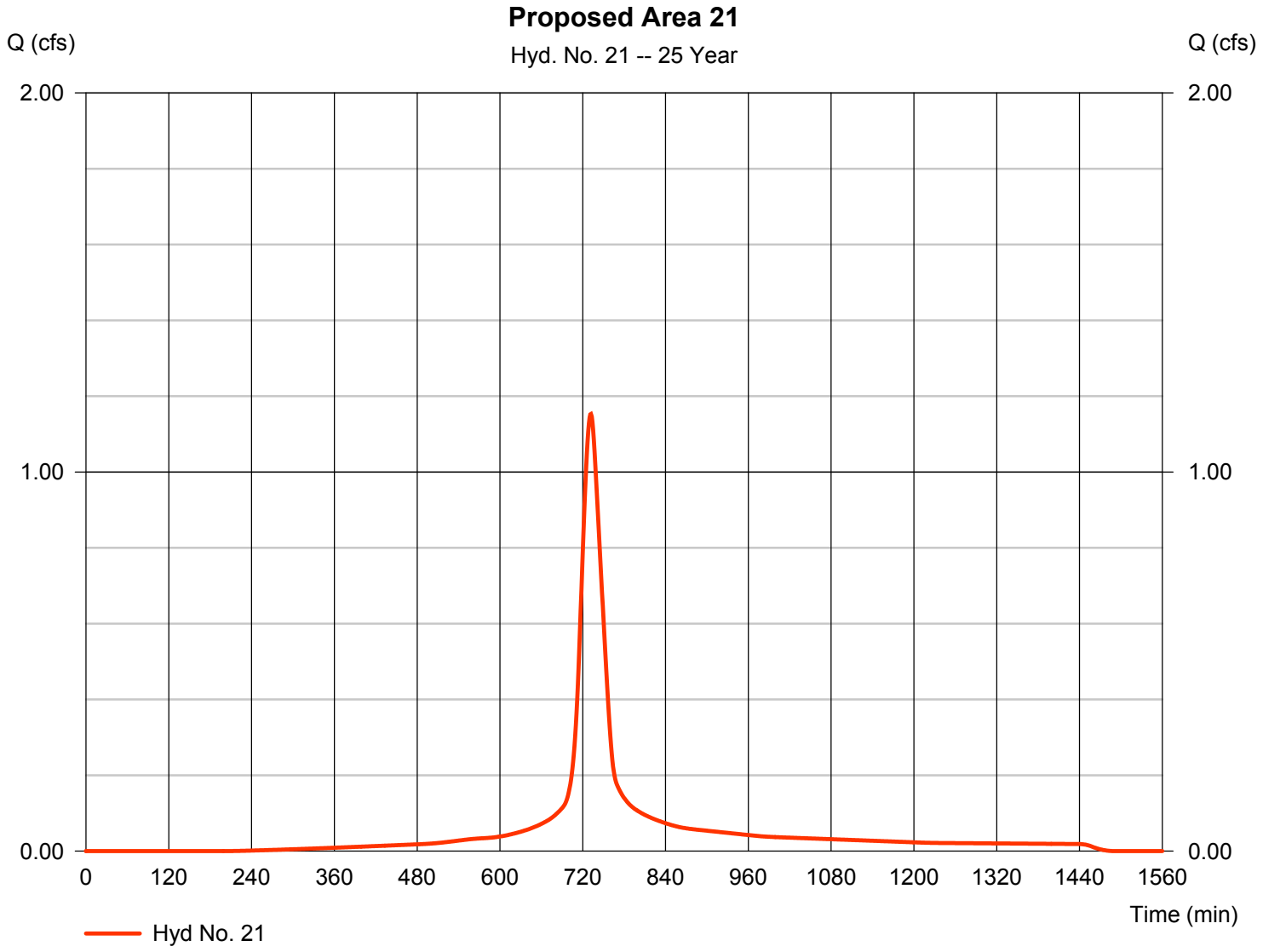
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 21

Proposed Area 21

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.153 cfs
Storm frequency	=	25 yrs	Time to peak	=	732 min
Time interval	=	1 min	Hyd. volume	=	4,958 cuft
Drainage area	=	0.280 ac	Curve number	=	90*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	31.80 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.152 x 98) + (0.123 x 79)] / 0.280



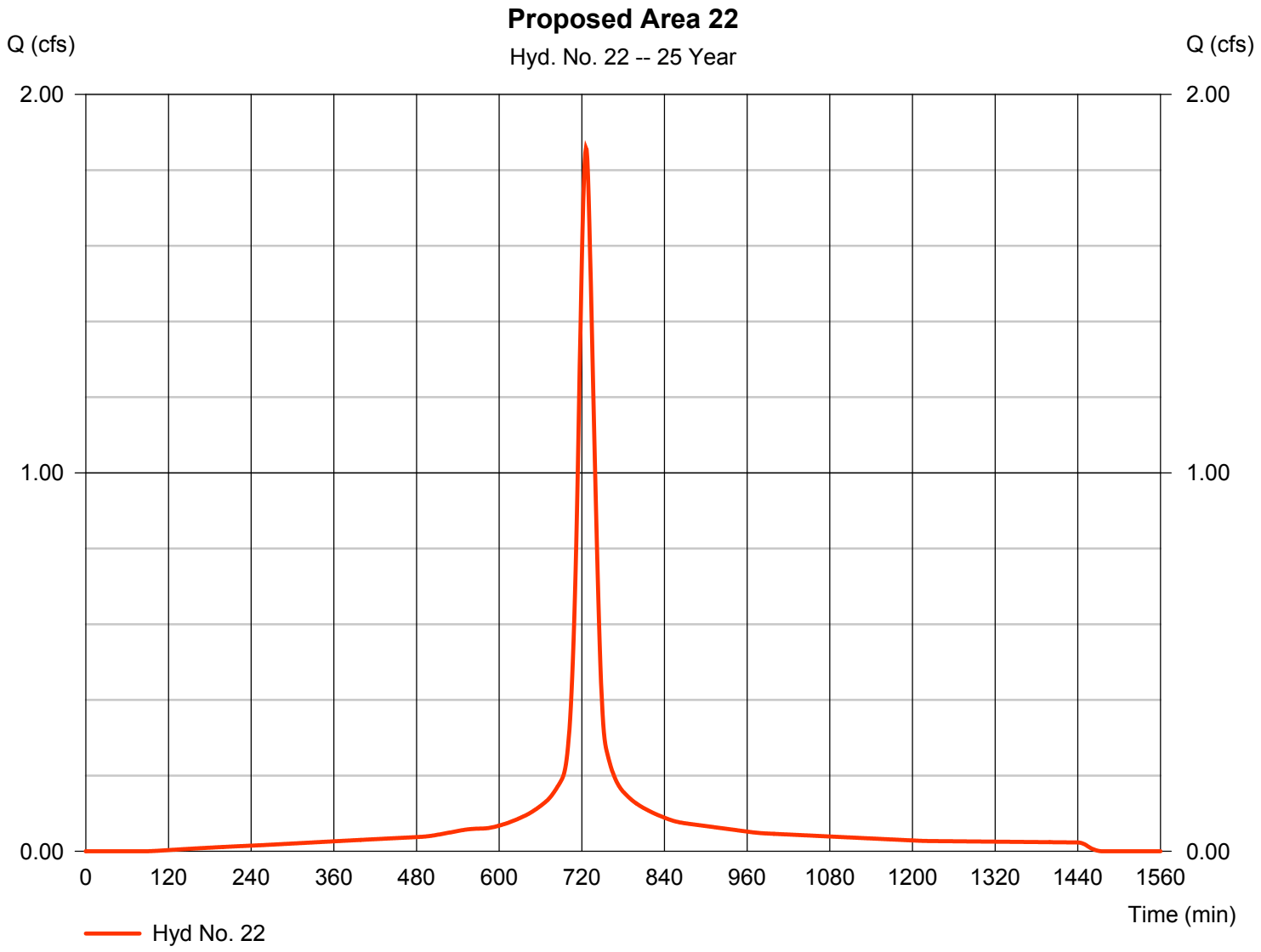
Hydrograph Report

Hyd. No. 22

Proposed Area 22

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.858 cfs
Storm frequency	=	25 yrs	Time to peak	=	726 min
Time interval	=	1 min	Hyd. volume	=	6,960 cuft
Drainage area	=	0.350 ac	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	22.20 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.310 x 98) + (0.040 x 79)] / 0.350



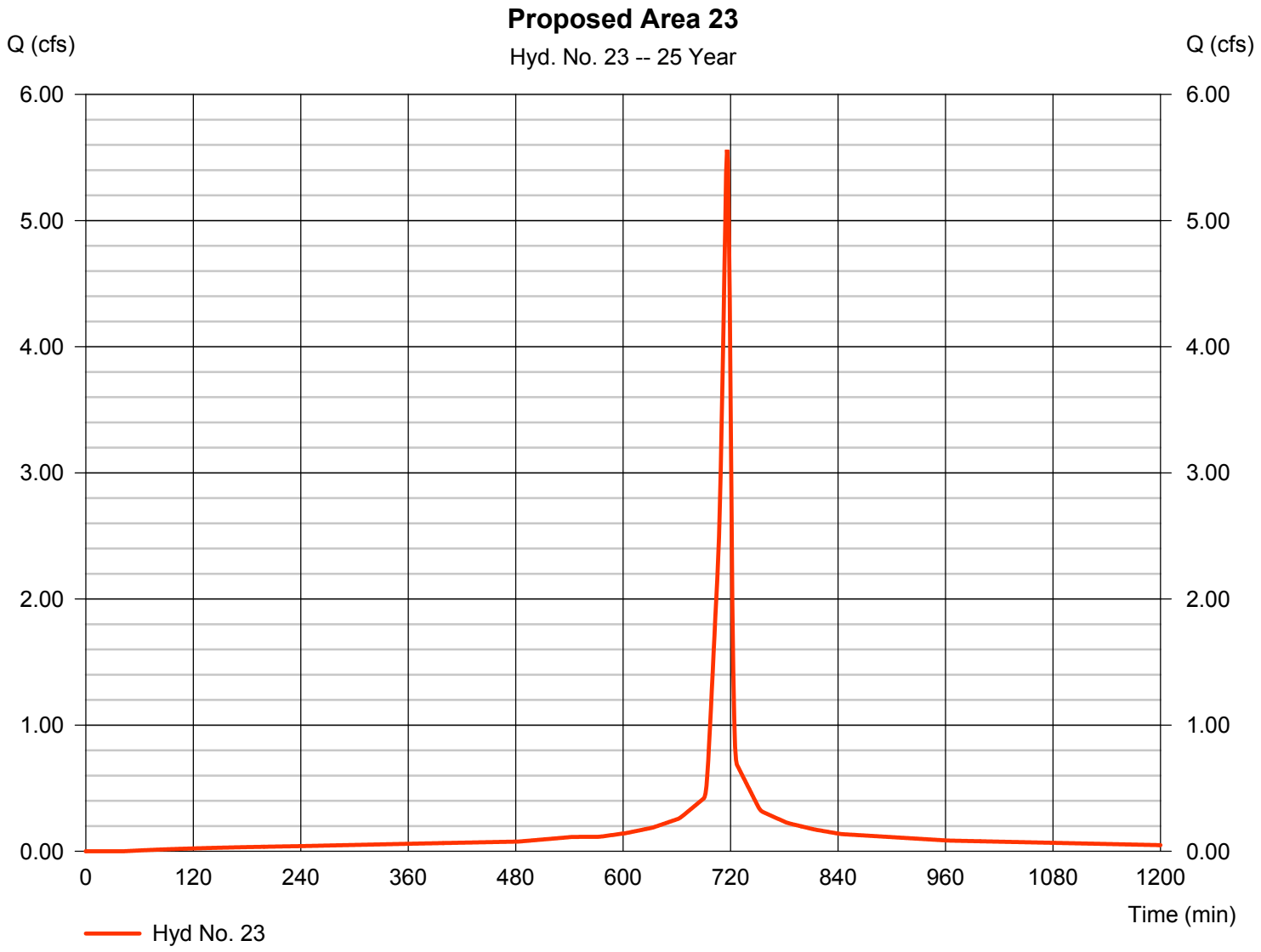
Hydrograph Report

Hyd. No. 23

Proposed Area 23

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.561 cfs
Storm frequency	=	25 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	12,758 cuft
Drainage area	=	0.610 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.80 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.607 x 98)] / 0.610



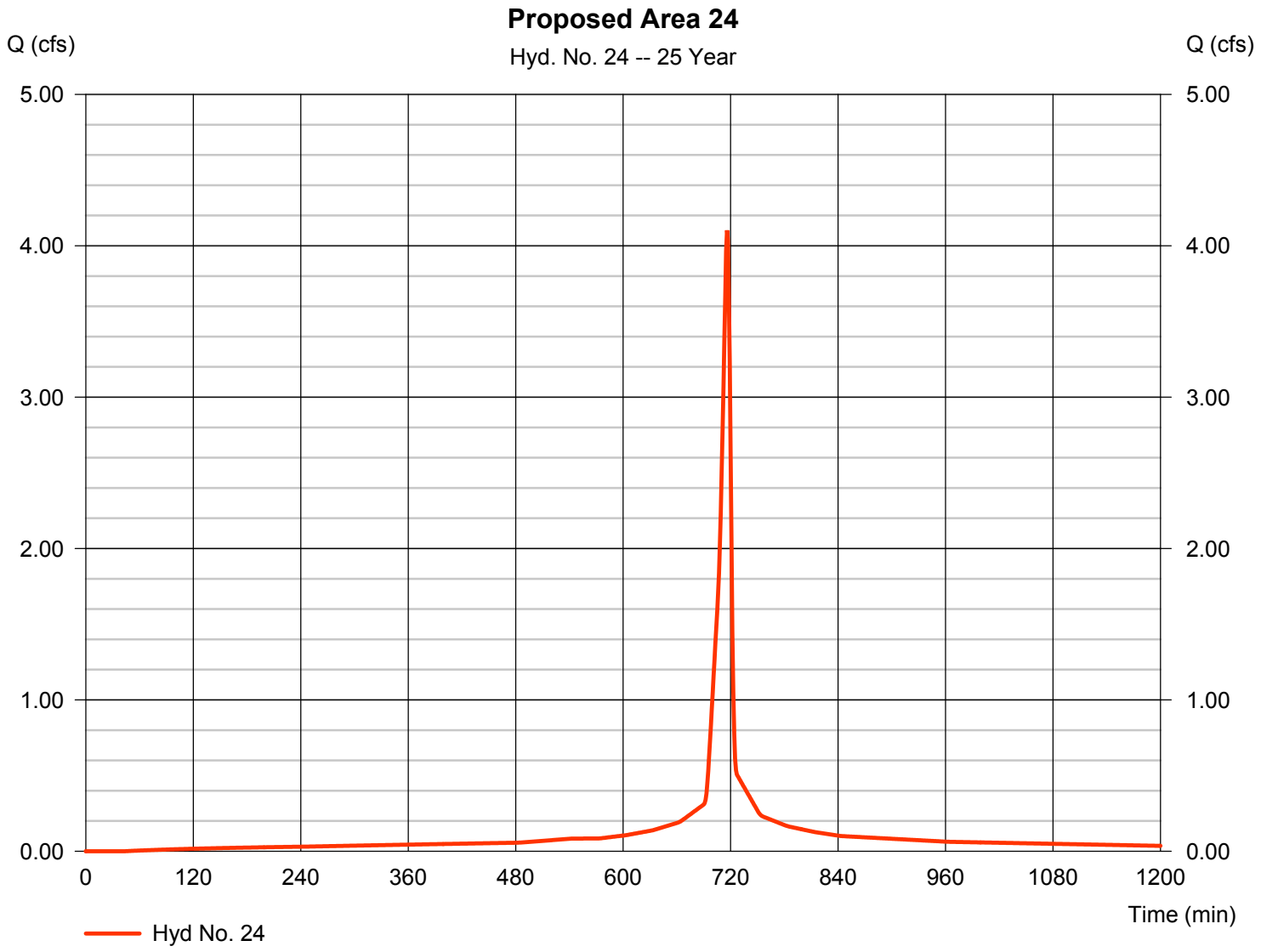
Hydrograph Report

Hyd. No. 24

Proposed Area 24

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.103 cfs
Storm frequency	=	25 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	9,412 cuft
Drainage area	=	0.450 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	3.90 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.447 x 98)] / 0.450



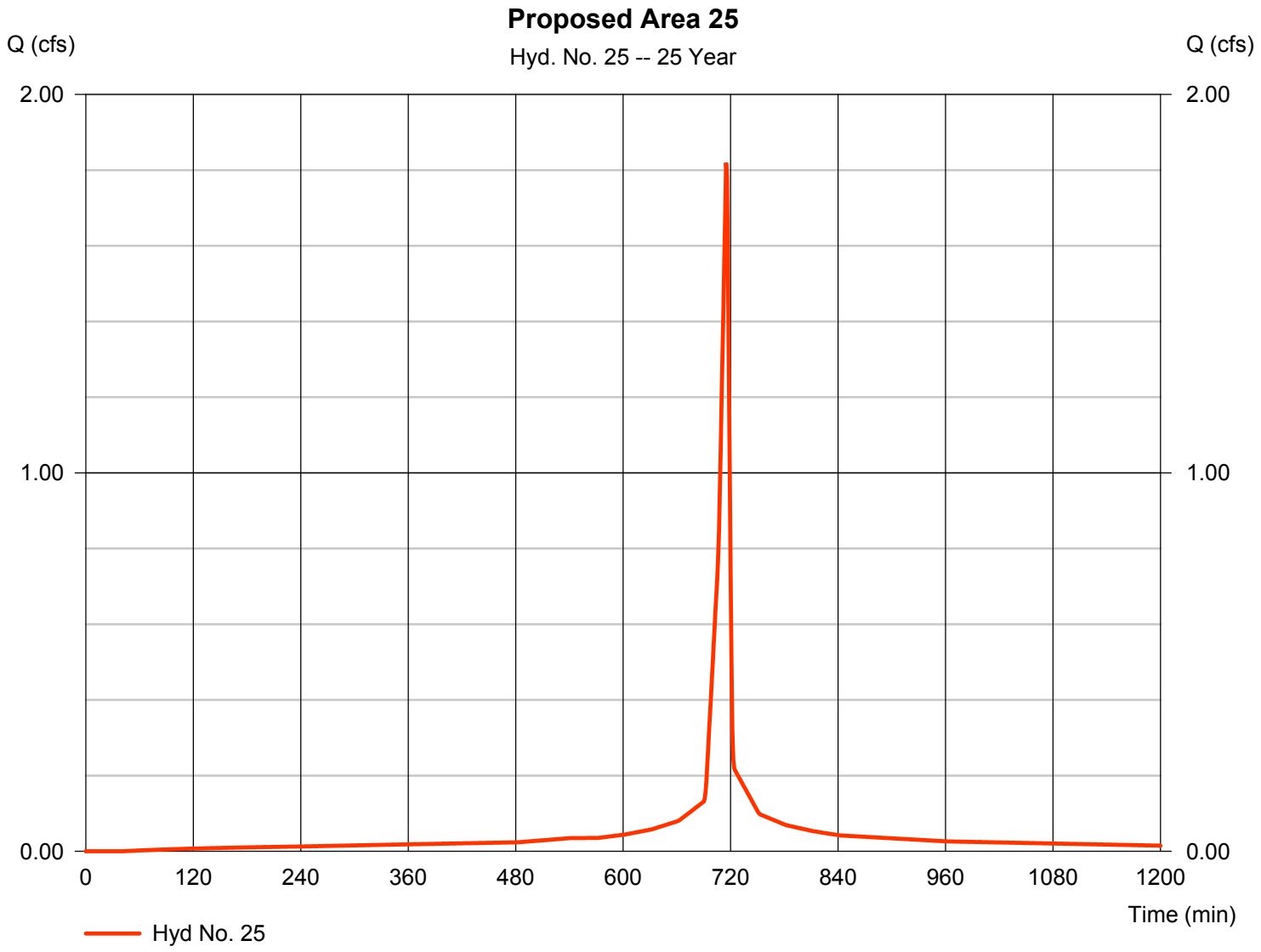
Hydrograph Report

Hyd. No. 25

Proposed Area 25

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.819 cfs
Storm frequency	=	25 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	3,922 cuft
Drainage area	=	0.200 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	1.60 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.203 x 98)] / 0.200



Hydrograph Report

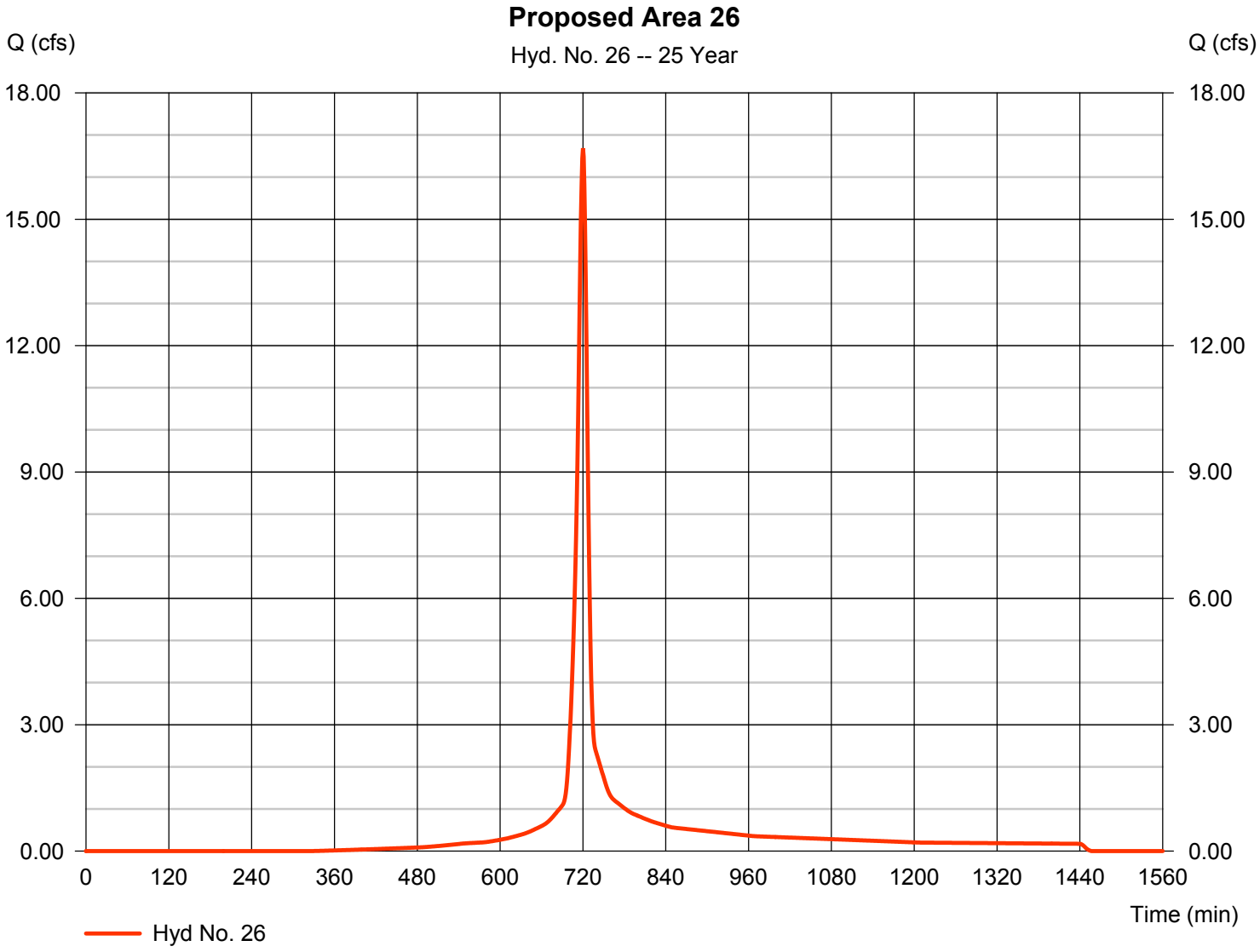
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 26

Proposed Area 26

Hydrograph type	= SCS Runoff	Peak discharge	= 16.69 cfs
Storm frequency	= 25 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 41,269 cuft
Drainage area	= 2.730 ac	Curve number	= 83*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.40 min
Total precip.	= 6.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.626 x 98) + (2.102 x 79)] / 2.730



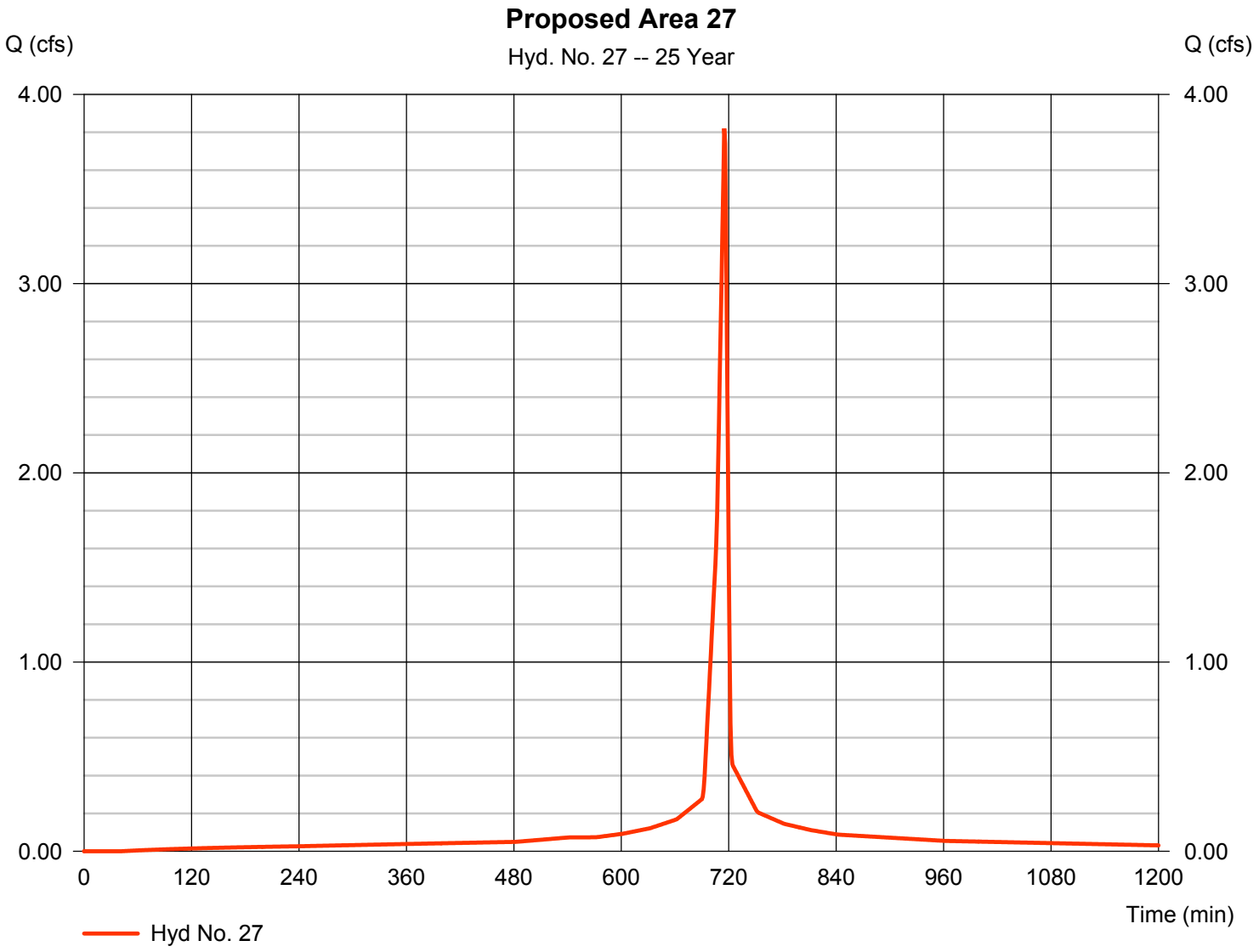
Hydrograph Report

Hyd. No. 27

Proposed Area 27

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.820 cfs
Storm frequency	=	25 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	8,235 cuft
Drainage area	=	0.420 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.00 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.420 x 98)] / 0.420



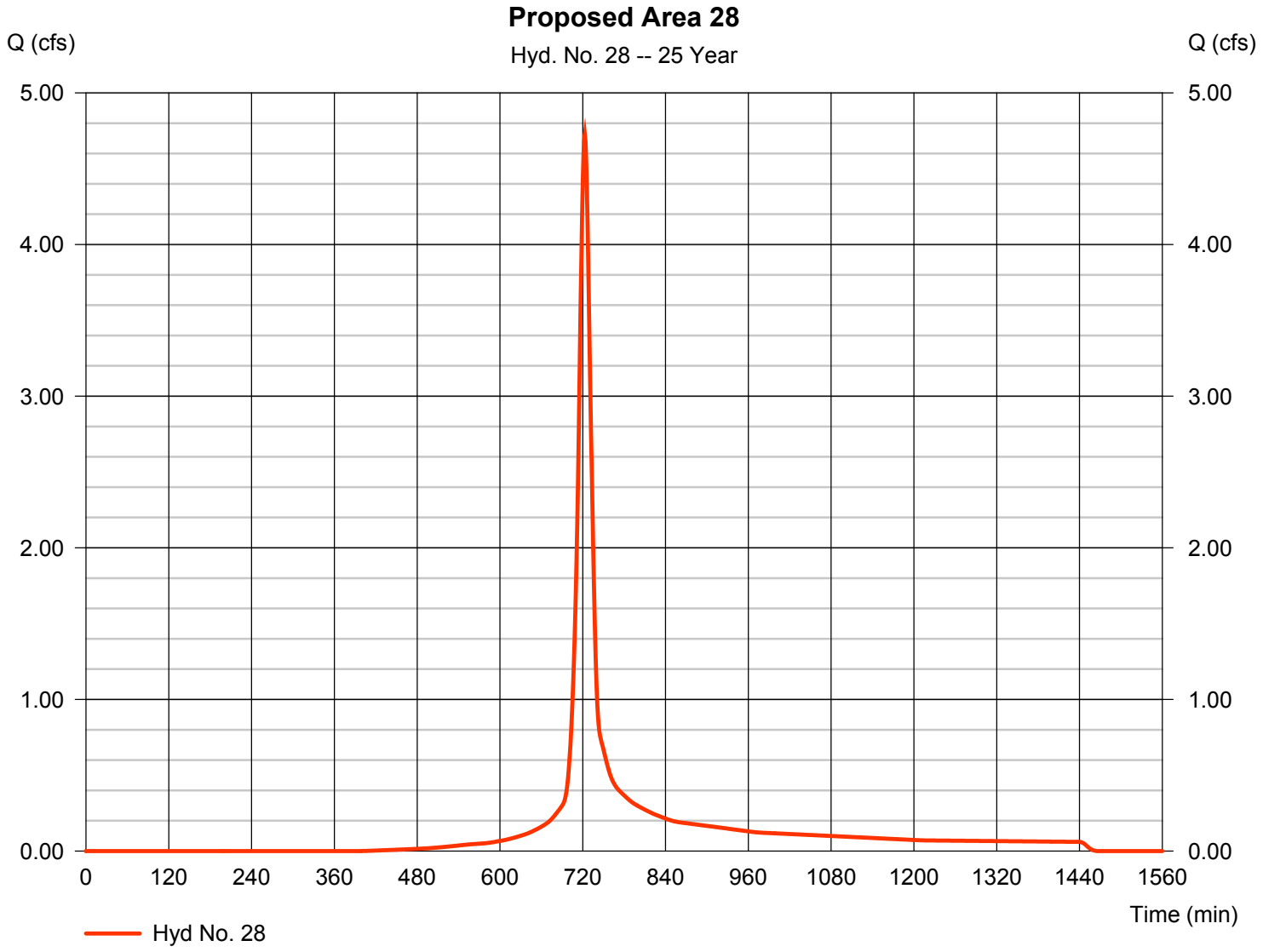
Hydrograph Report

Hyd. No. 28

Proposed Area 28

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.724 cfs
Storm frequency	=	25 yrs	Time to peak	=	723 min
Time interval	=	1 min	Hyd. volume	=	13,524 cuft
Drainage area	=	1.000 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	15.50 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.004 x 98) + (0.999 x 79)] / 1.000



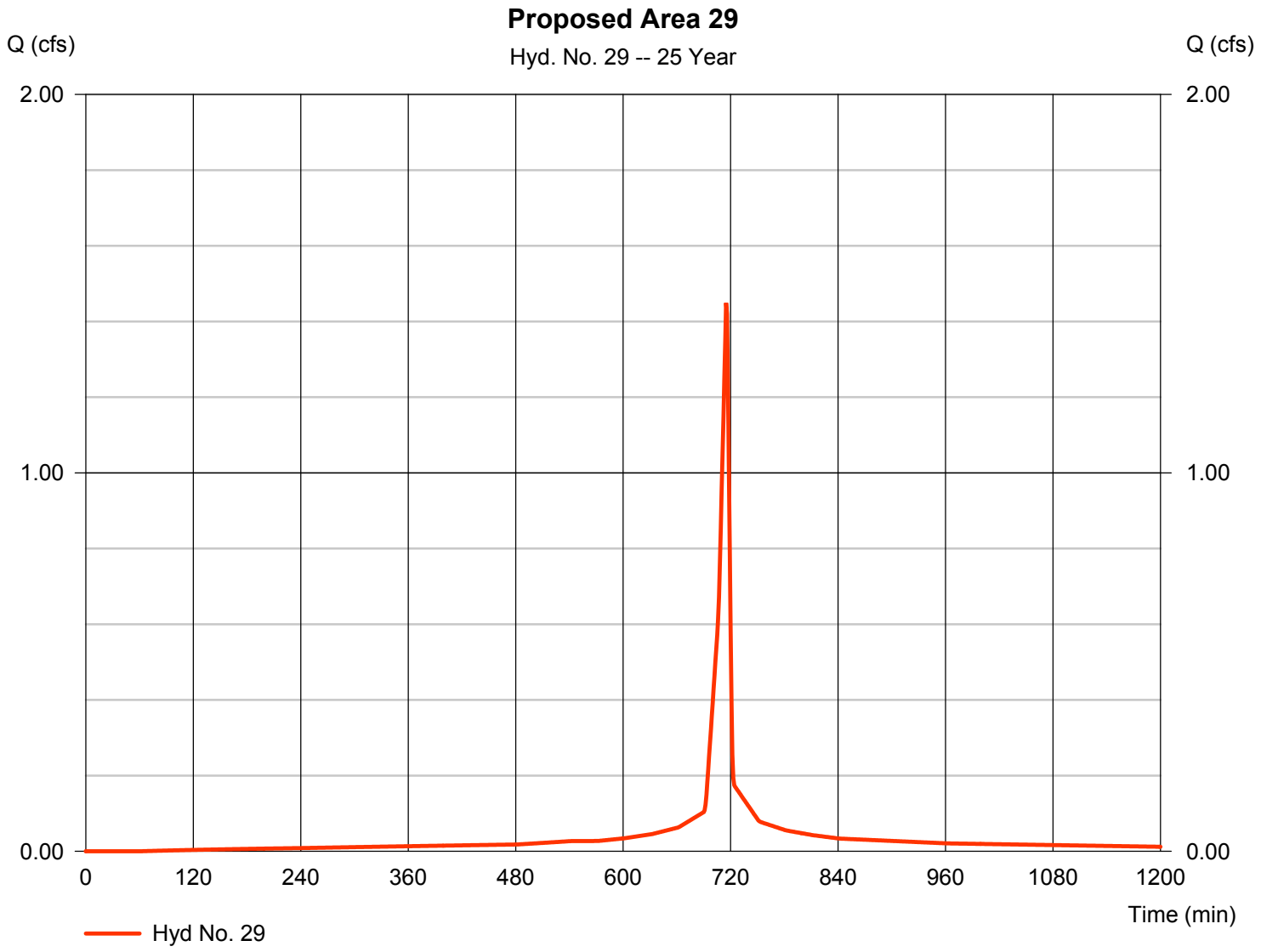
Hydrograph Report

Hyd. No. 29

Proposed Area 29

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.449 cfs
Storm frequency	=	25 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	3,073 cuft
Drainage area	=	0.160 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.20 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.150 x 98) + (0.008 x 79)] / 0.160



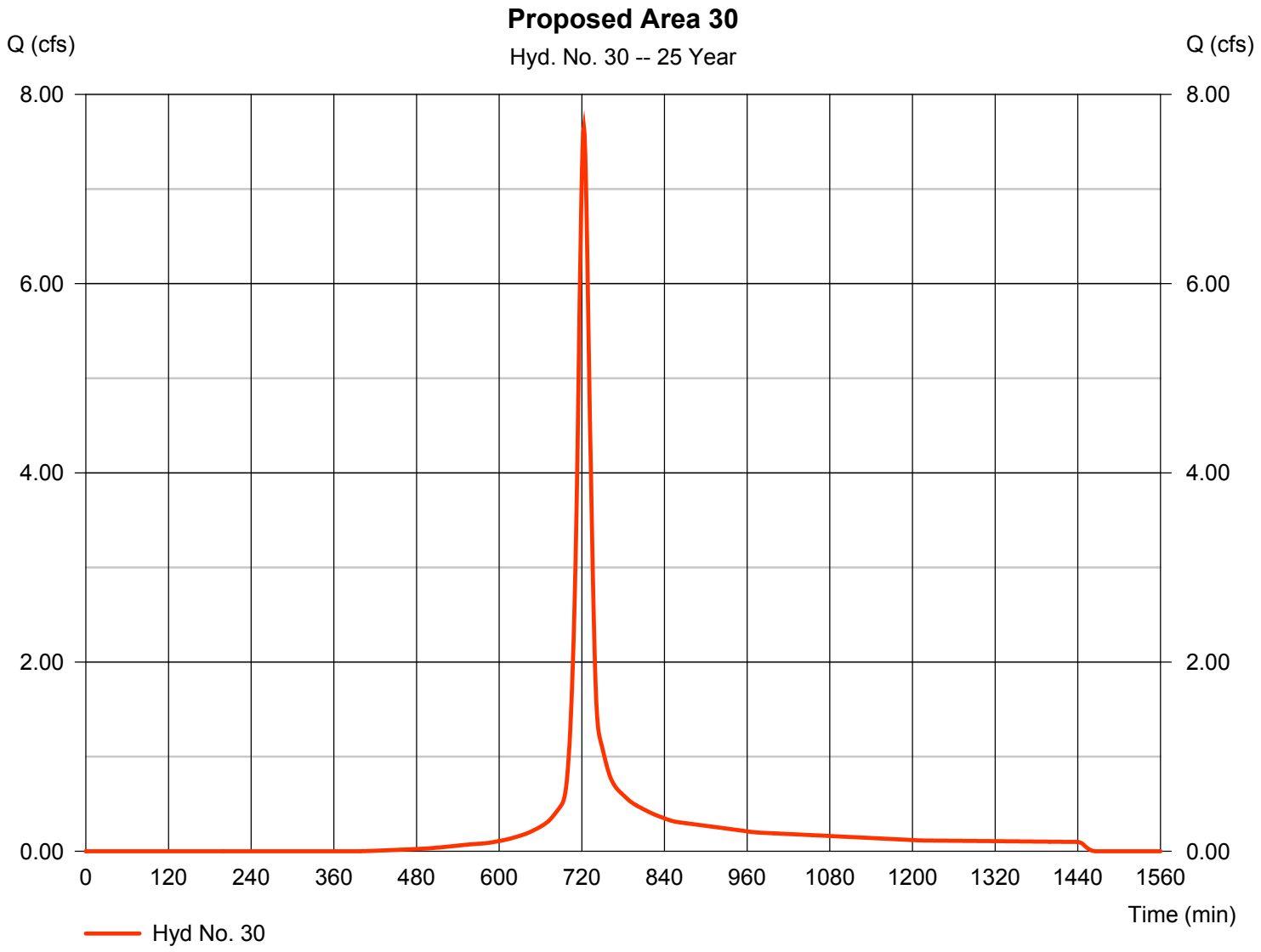
Hydrograph Report

Hyd. No. 30

Proposed Area 30

Hydrograph type	=	SCS Runoff	Peak discharge	=	7.653 cfs
Storm frequency	=	25 yrs	Time to peak	=	723 min
Time interval	=	1 min	Hyd. volume	=	21,909 cuft
Drainage area	=	1.620 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	15.70 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.004 x 98) + (1.620 x 79)] / 1.620



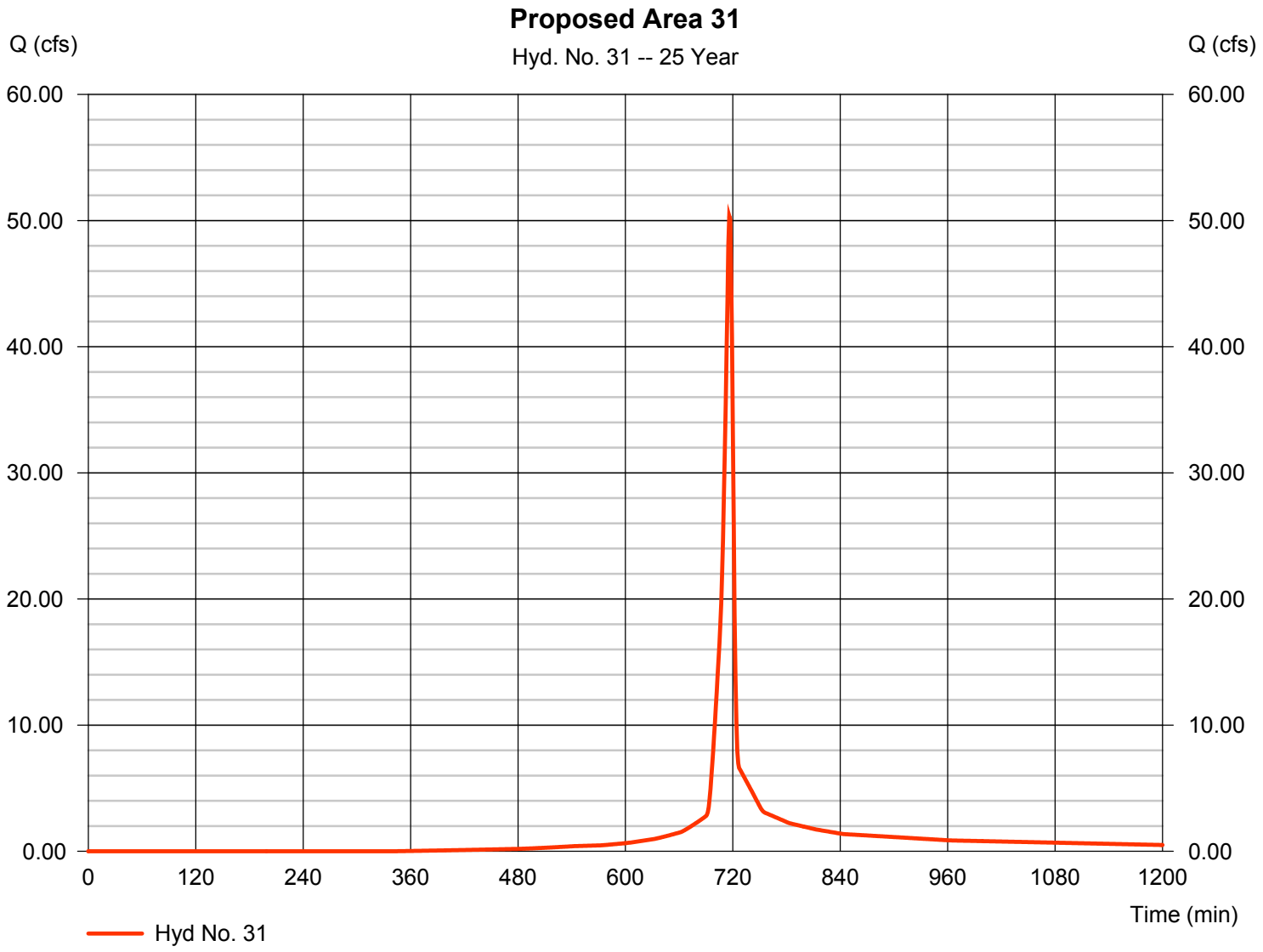
Hydrograph Report

Hyd. No. 31

Proposed Area 31

Hydrograph type	=	SCS Runoff	Peak discharge	=	50.35 cfs
Storm frequency	=	25 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	98,852 cuft
Drainage area	=	6.830 ac	Curve number	=	82*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.80 min
Total precip.	=	6.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.937 x 98) + (5.893 x 79)] / 6.830

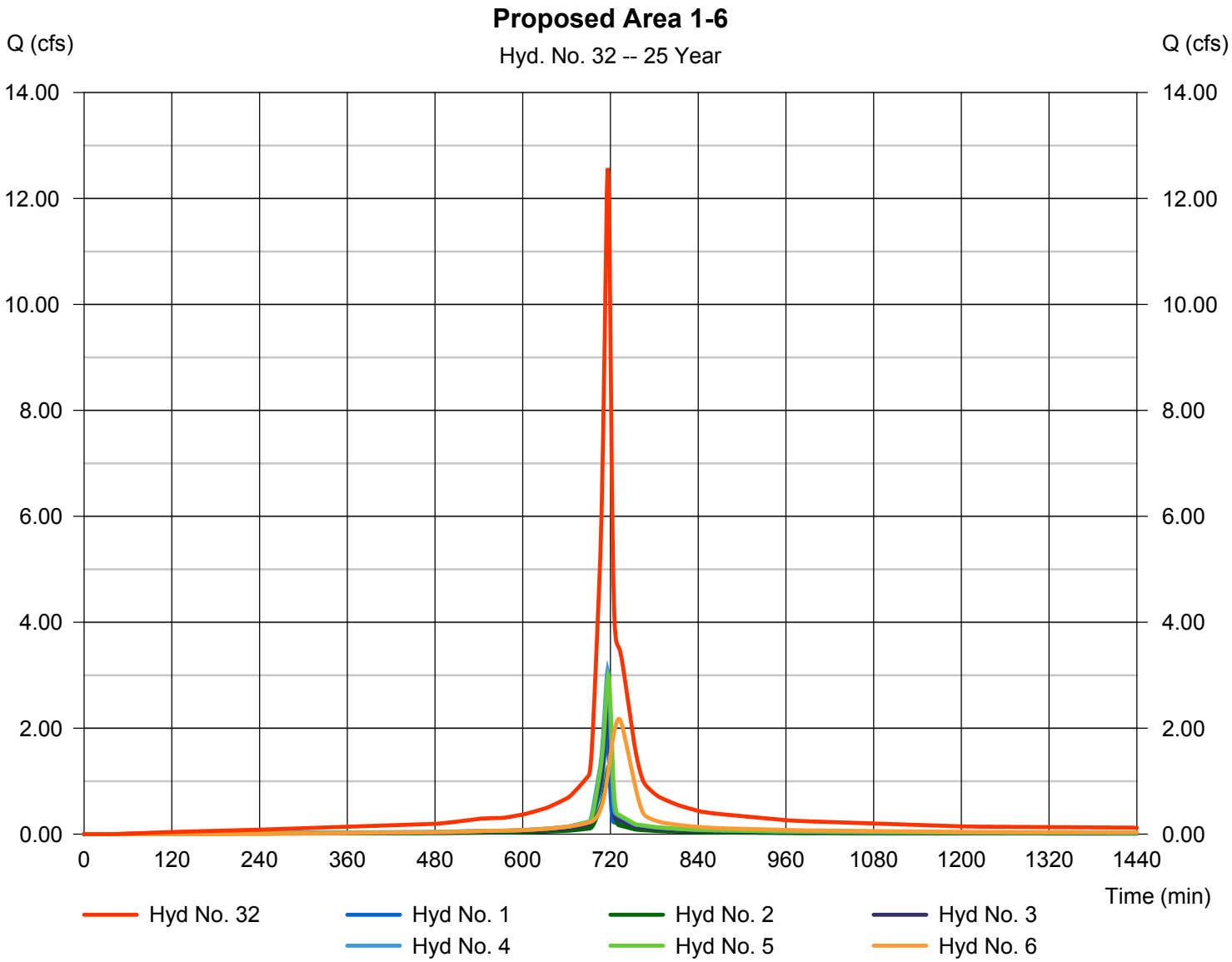


Hydrograph Report

Hyd. No. 32

Proposed Area 1-6

Hydrograph type	= Combine	Peak discharge	= 12.57 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 36,384 cuft
Inflow hyds.	= 1, 2, 3, 4, 5, 6	Contrib. drain. area	= 1.830 ac

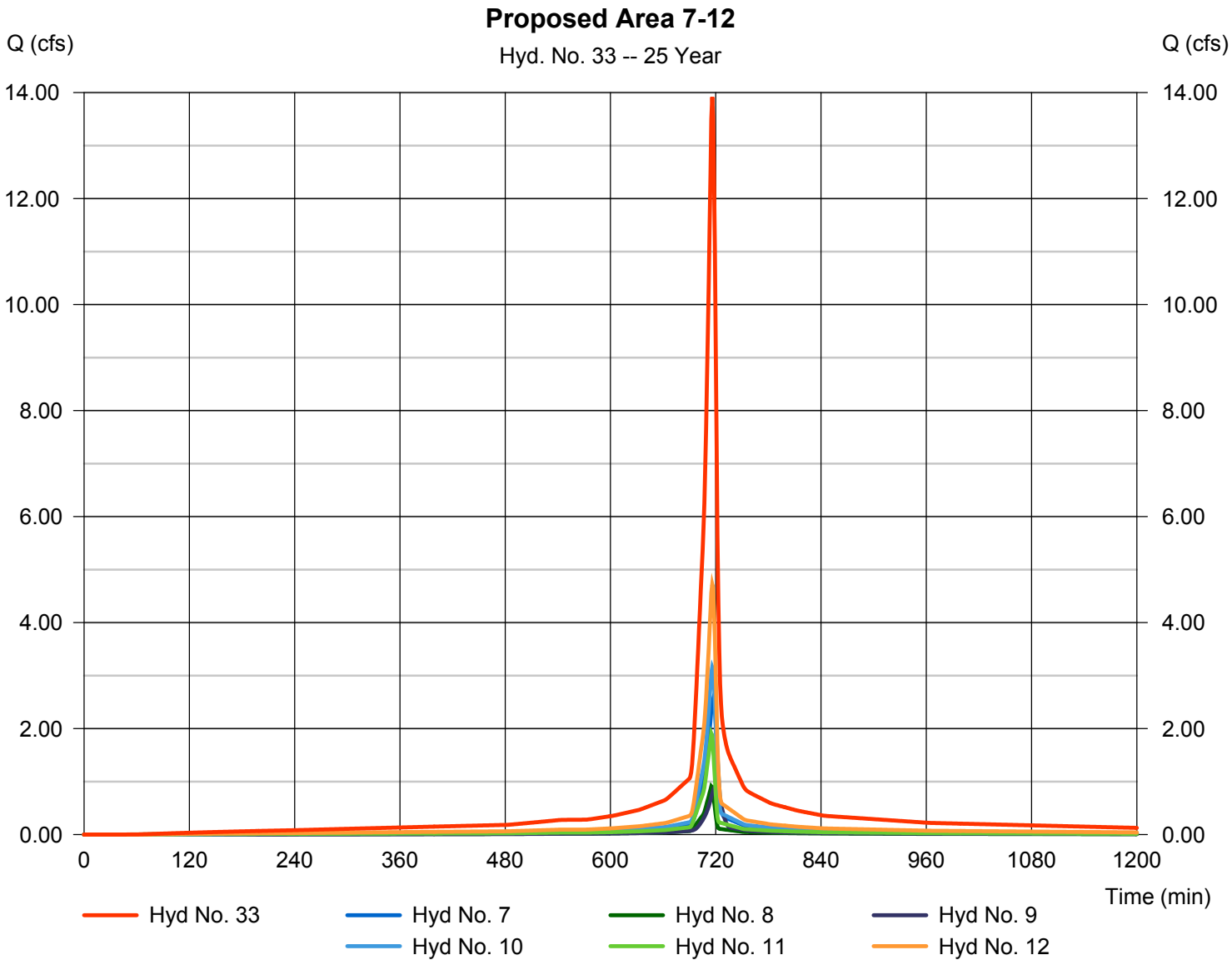


Hydrograph Report

Hyd. No. 33

Proposed Area 7-12

Hydrograph type	= Combine	Peak discharge	= 13.92 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 32,264 cuft
Inflow hyds.	= 7, 8, 9, 10, 11, 12	Contrib. drain. area	= 1.600 ac

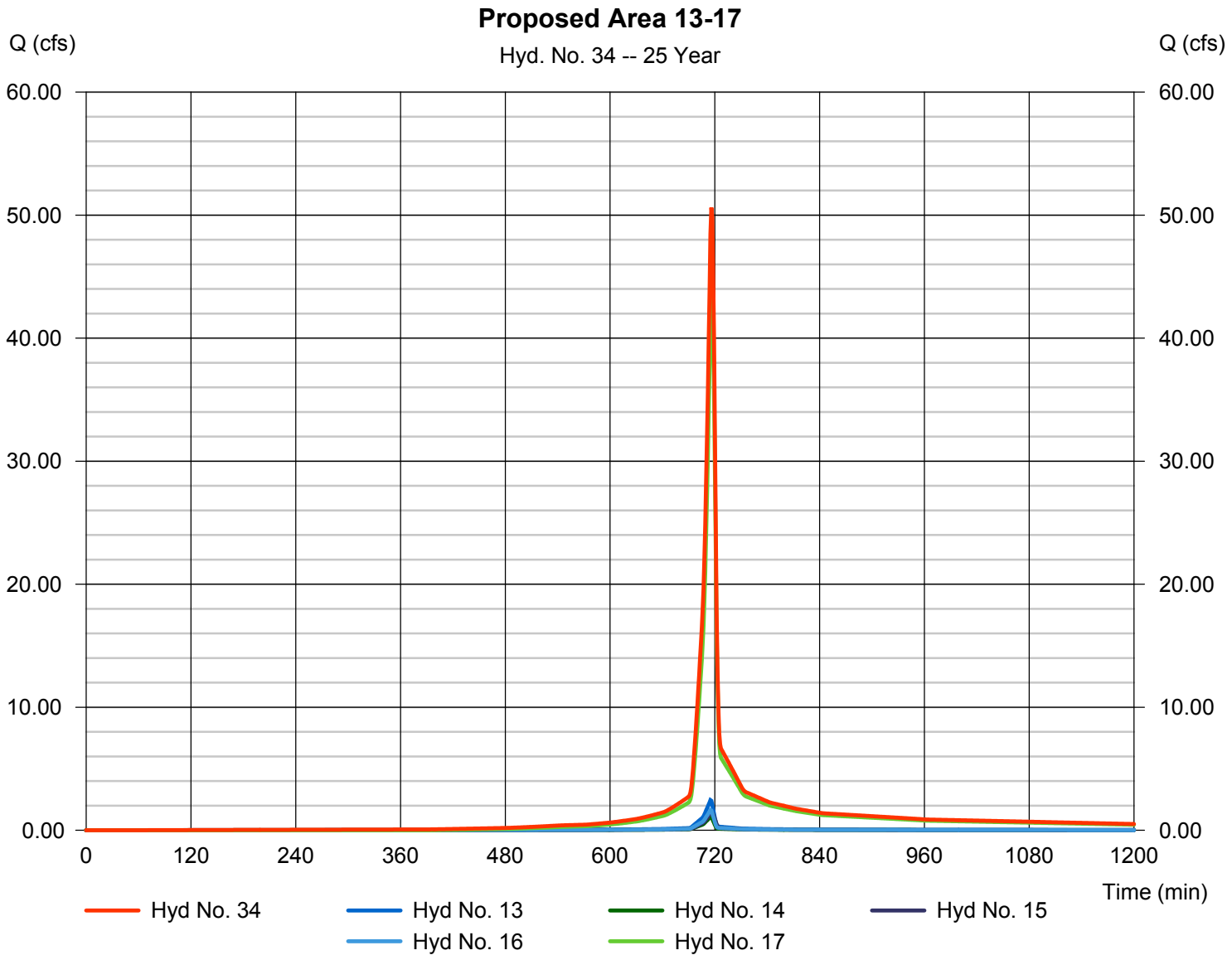


Hydrograph Report

Hyd. No. 34

Proposed Area 13-17

Hydrograph type	=	Combine	Peak discharge	=	50.61 cfs
Storm frequency	=	25 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	99,697 cuft
Inflow hyds.	=	13, 14, 15, 16, 17	Contrib. drain. area	=	7.130 ac

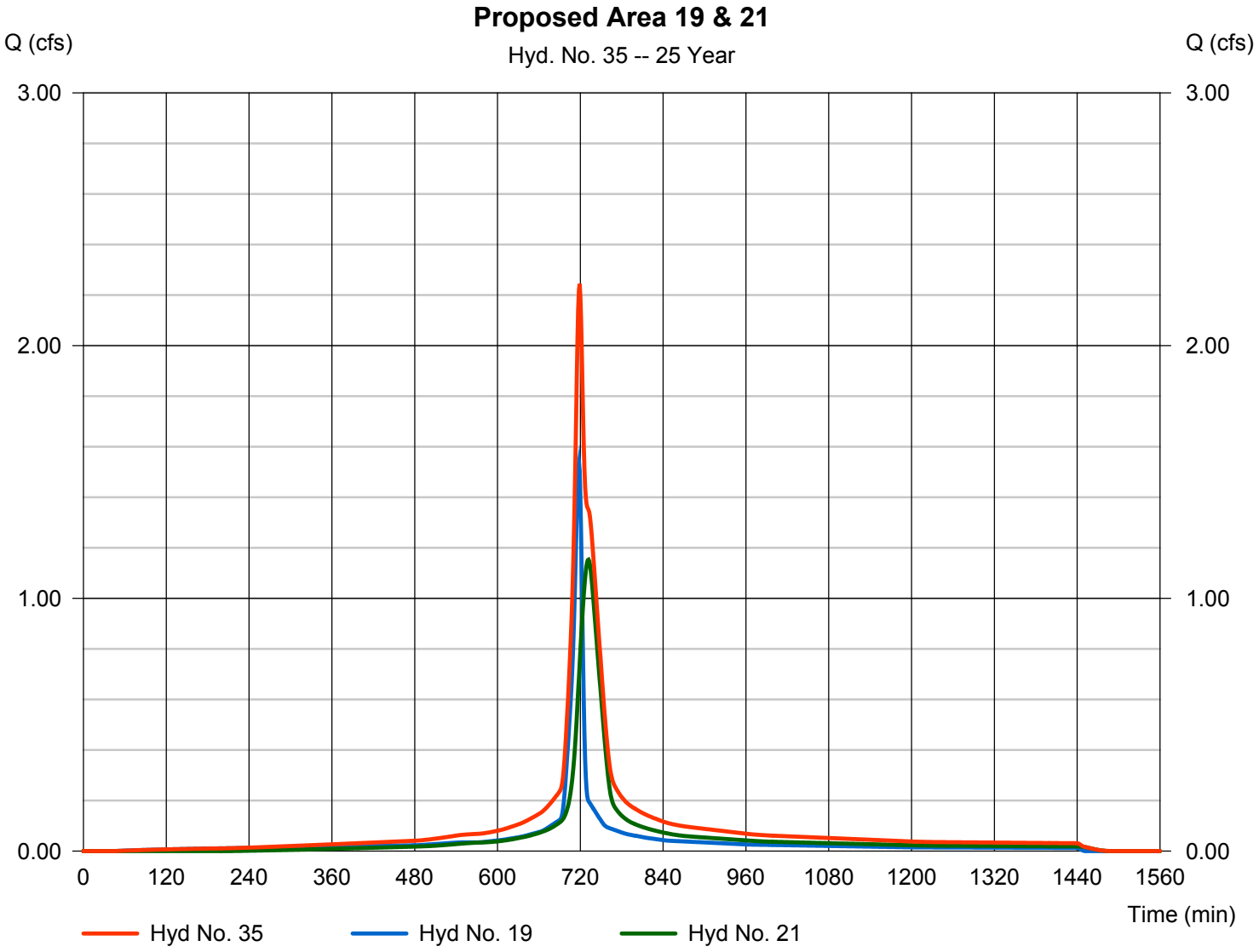


Hydrograph Report

Hyd. No. 35

Proposed Area 19 & 21

Hydrograph type	= Combine	Peak discharge	= 2.244 cfs
Storm frequency	= 25 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 8,832 cuft
Inflow hyds.	= 19, 21	Contrib. drain. area	= 0.470 ac



Hydrograph Report

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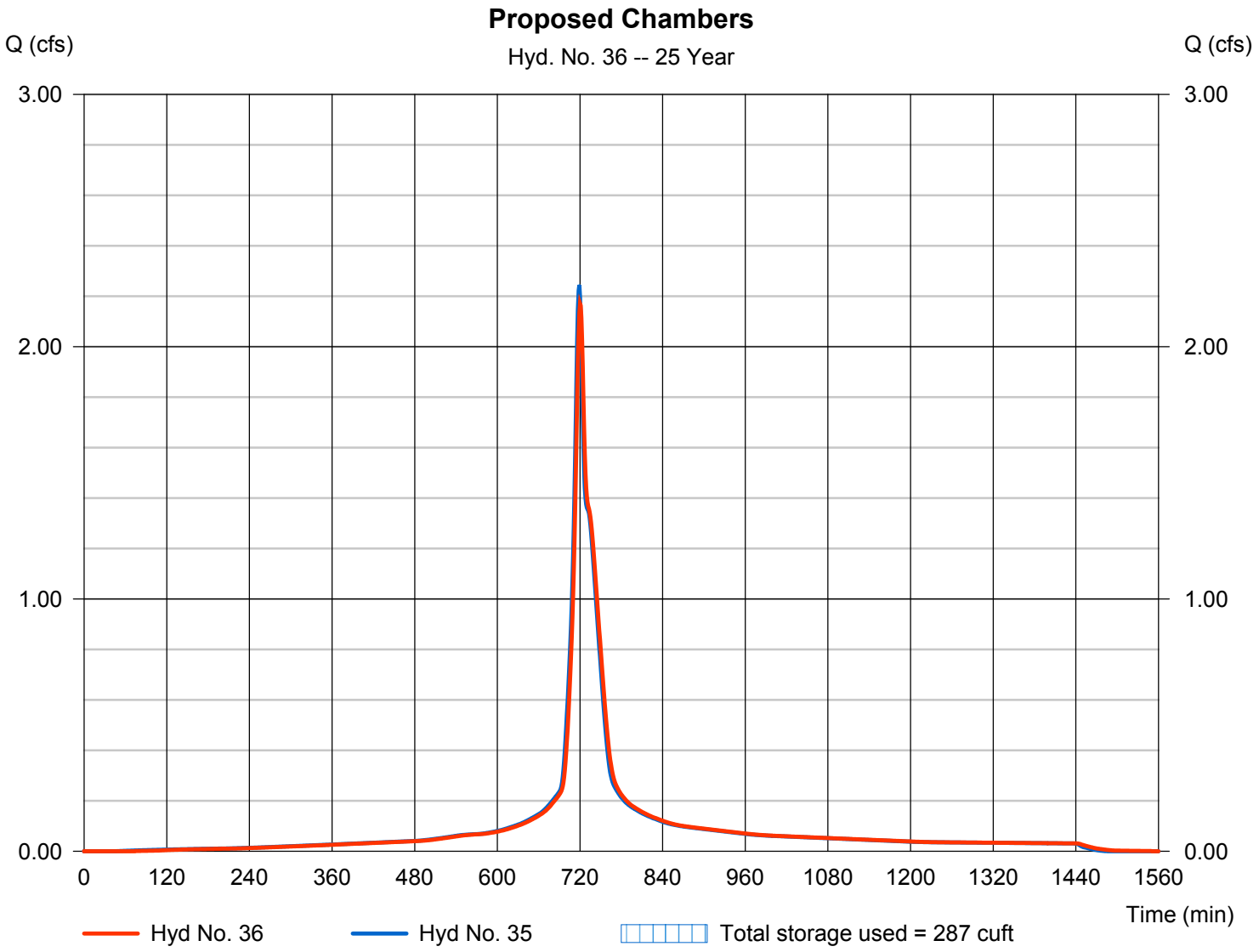
Hyd. No. 36

Proposed Chambers

Hydrograph type	=	Reservoir	Peak discharge	=	2.171 cfs
Storm frequency	=	25 yrs	Time to peak	=	720 min
Time interval	=	1 min	Hyd. volume	=	8,829 cuft
Inflow hyd. No.	=	35 - Proposed Area 19 & 21	Max. Elevation	=	352.43 ft
Reservoir name	=	Proposed Chambers	Max. Storage	=	287 cuft

Storage Indication method used.

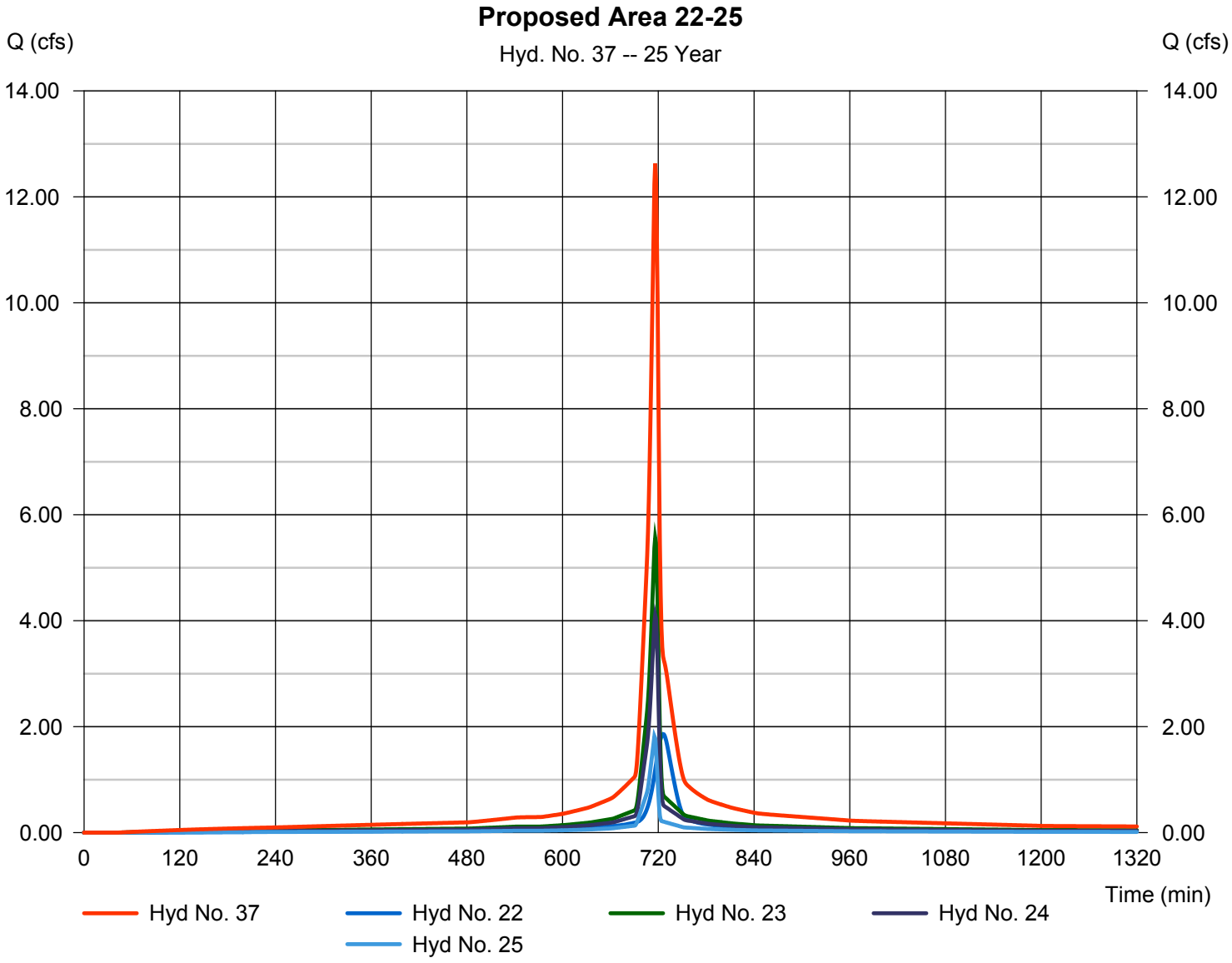


Hydrograph Report

Hyd. No. 37

Proposed Area 22-25

Hydrograph type	=	Combine	Peak discharge	=	12.63 cfs
Storm frequency	=	25 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	33,052 cuft
Inflow hyds.	=	22, 23, 24, 25	Contrib. drain. area	=	1.610 ac

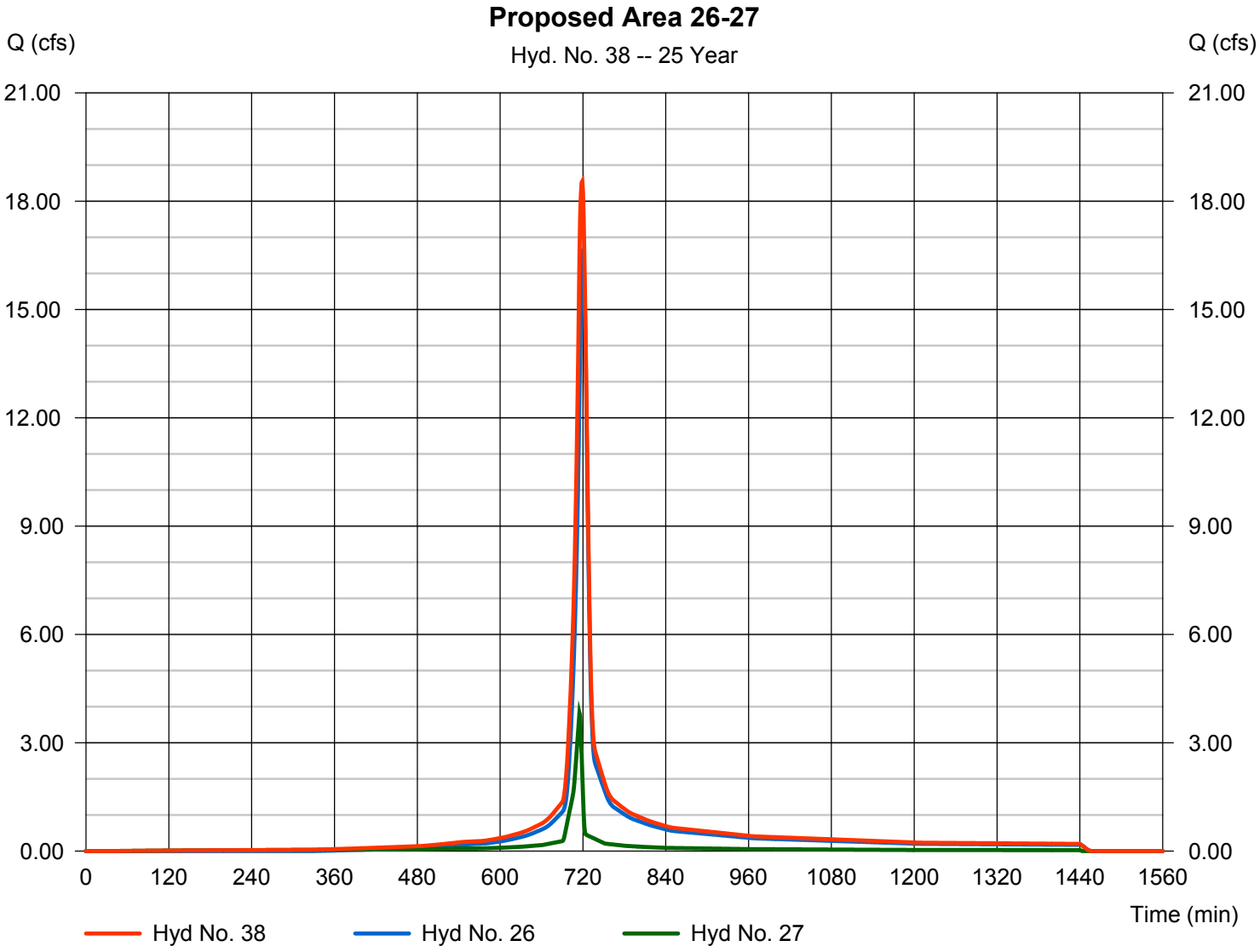


Hydrograph Report

Hyd. No. 38

Proposed Area 26-27

Hydrograph type	= Combine	Peak discharge	= 18.55 cfs
Storm frequency	= 25 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 49,505 cuft
Inflow hyds.	= 26, 27	Contrib. drain. area	= 3.150 ac

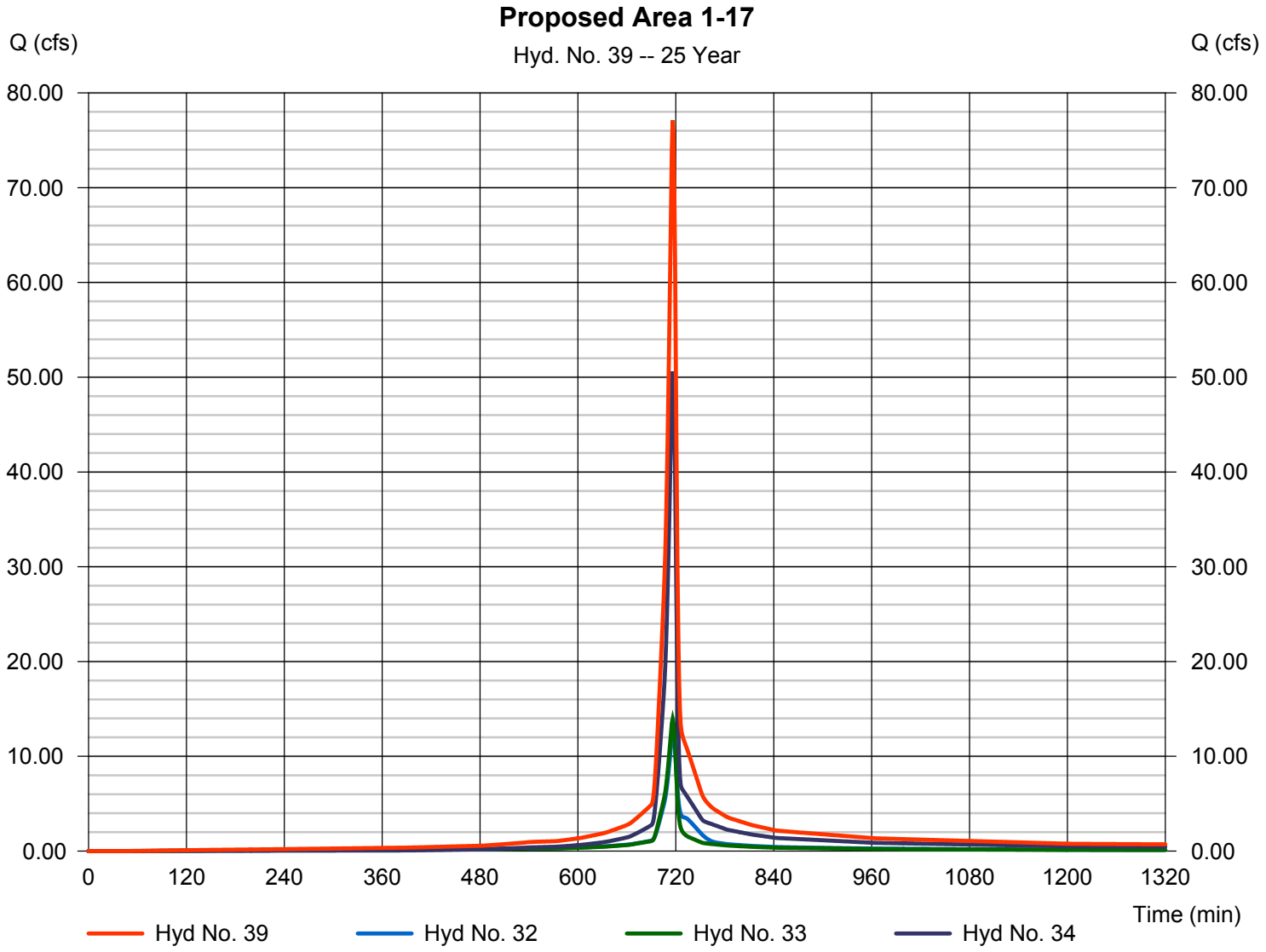


Hydrograph Report

Hyd. No. 39

Proposed Area 1-17

Hydrograph type	=	Combine	Peak discharge	=	77.10 cfs
Storm frequency	=	25 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	168,344 cuft
Inflow hyds.	=	32, 33, 34	Contrib. drain. area	=	0.000 ac

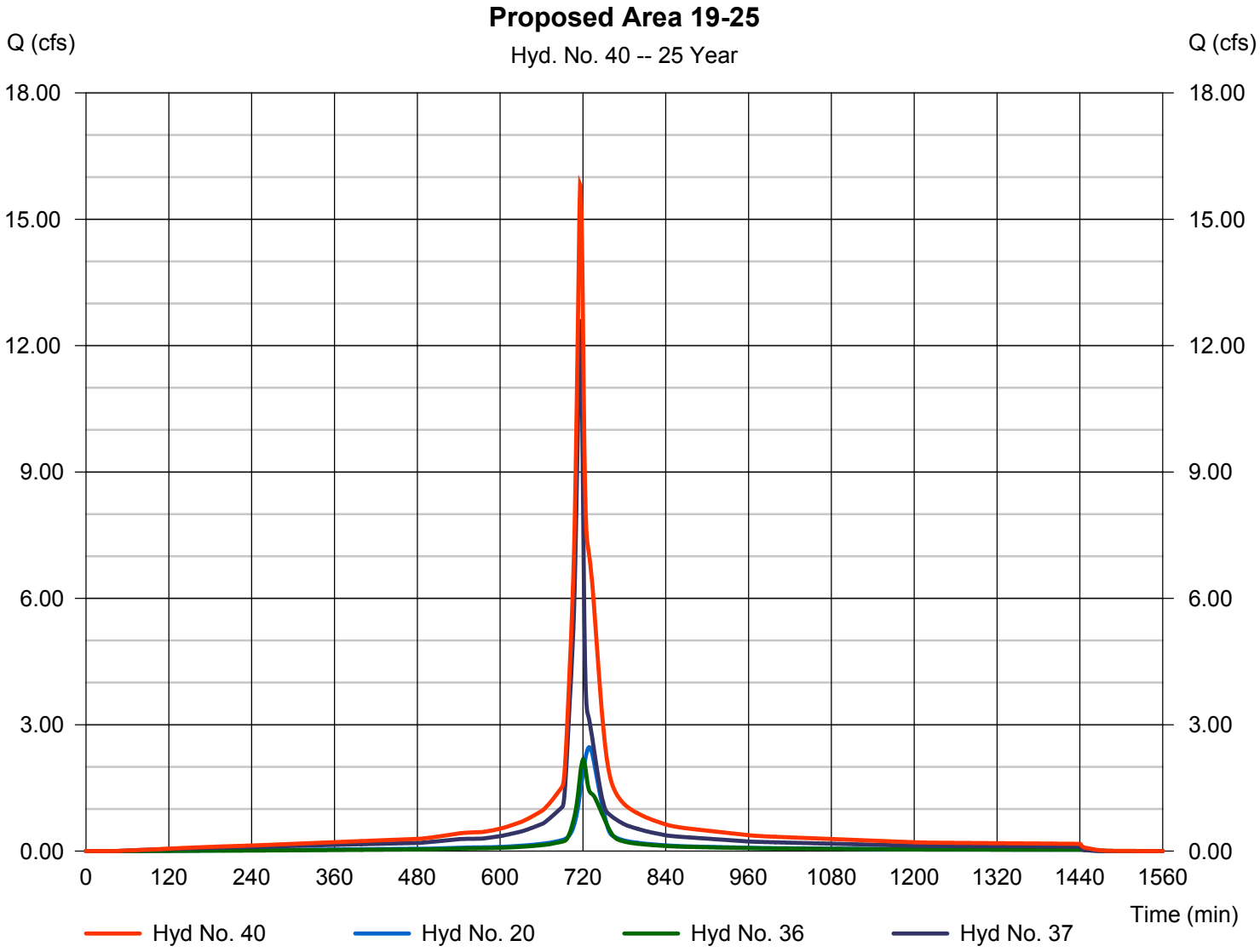


Hydrograph Report

Hyd. No. 40

Proposed Area 19-25

Hydrograph type	= Combine	Peak discharge	= 15.82 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 52,238 cuft
Inflow hyds.	= 20, 36, 37	Contrib. drain. area	= 0.520 ac

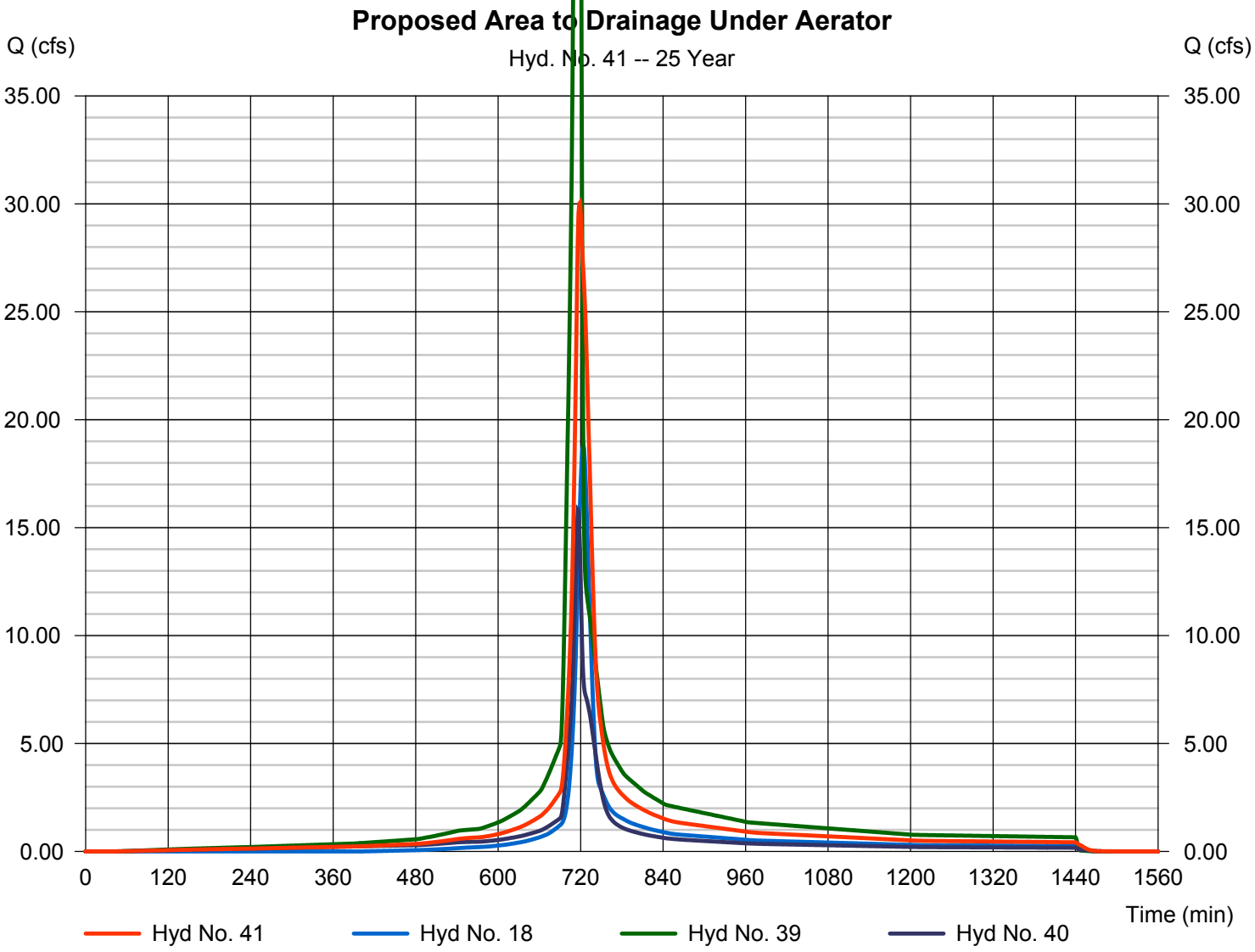


Hydrograph Report

Hyd. No. 41

Proposed Area to Drainage Under Aerator

Hydrograph type	= Combine	Peak discharge	= 30.05 cfs
Storm frequency	= 25 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 108,229 cuft
Inflow hyds.	= 18, 39, 40	Contrib. drain. area	= 4.240 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	2.391	1	715	5,189	------	------	------	Proposed Area 1
2	SCS Runoff	1.618	1	718	4,111	------	------	------	Proposed Area 2
3	SCS Runoff	2.967	1	716	6,852	------	------	------	Proposed Area 3
4	SCS Runoff	3.880	1	716	8,961	------	------	------	Proposed Area 4
5	SCS Runoff	3.754	1	717	8,938	------	------	------	Proposed Area 5
6	SCS Runoff	2.785	1	732	12,219	------	------	------	Proposed Area 6
7	SCS Runoff	3.215	1	717	7,752	------	------	------	Proposed Area 7
8	SCS Runoff	1.138	1	715	2,471	------	------	------	Proposed Area 8
9	SCS Runoff	1.168	1	720	3,089	------	------	------	Proposed Area 9
10	SCS Runoff	3.967	1	716	8,922	------	------	------	Proposed Area 10
11	SCS Runoff	2.391	1	715	5,189	------	------	------	Proposed Area 11
12	SCS Runoff	5.917	1	716	13,480	------	------	------	Proposed Area 12
13	SCS Runoff	3.065	1	715	6,562	------	------	------	Proposed Area 13
14	SCS Runoff	1.366	1	715	2,965	------	------	------	Proposed Area 14
15	SCS Runoff	1.804	1	716	4,009	------	------	------	Proposed Area 15
16	SCS Runoff	2.049	1	715	4,448	------	------	------	Proposed Area 16
17	SCS Runoff	59.55	1	716	117,186	------	------	------	Proposed Area 17
18	SCS Runoff	25.60	1	724	76,753	------	------	------	Proposed Area 18
19	SCS Runoff	1.922	1	718	4,882	------	------	------	Proposed Area 19
20	SCS Runoff	3.100	1	729	13,158	------	------	------	Proposed Area 20
21	SCS Runoff	1.483	1	732	6,460	------	------	------	Proposed Area 21
22	SCS Runoff	2.336	1	726	8,842	------	------	------	Proposed Area 22
23	SCS Runoff	6.961	1	716	16,077	------	------	------	Proposed Area 23
24	SCS Runoff	5.135	1	716	11,860	------	------	------	Proposed Area 24
25	SCS Runoff	2.277	1	715	4,942	------	------	------	Proposed Area 25
26	SCS Runoff	22.12	1	720	55,490	------	------	------	Proposed Area 26
27	SCS Runoff	4.781	1	715	10,378	------	------	------	Proposed Area 27
28	SCS Runoff	6.419	1	723	18,539	------	------	------	Proposed Area 28
29	SCS Runoff	1.816	1	715	3,888	------	------	------	Proposed Area 29
30	SCS Runoff	10.40	1	723	30,033	------	------	------	Proposed Area 30
31	SCS Runoff	66.87	1	716	133,545	------	------	------	Proposed Area 31
32	Combine	15.80	1	716	46,271	1, 2, 3, 4, 5, 6,	------	------	Proposed Area 1-6
33	Combine	17.47	1	716	40,903	7, 8, 9, 10, 11, 12,	------	------	Proposed Area 7-12
34	Combine	67.70	1	716	135,170	13, 14, 15, 16, 17,	------	------	Proposed Area 13-17

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
35	Combine	2.843	1	719	11,342	19, 21,	------	------	Proposed Area 19 & 21
36	Reservoir	2.555	1	722	11,339	35	352.65	392	Proposed Chambers
37	Combine	15.81	1	716	41,721	22, 23, 24,	------	------	Proposed Area 22-25
38	Combine	24.48	1	719	65,868	25, 26, 27,	------	------	Proposed Area 26-27
39	Combine	100.97	1	716	222,343	32, 33, 34,	------	------	Proposed Area 1-17
40	Combine	19.82	1	716	66,217	20, 36, 37,	------	------	Proposed Area 19-25
41	Combine	138.24	1	716	365,314	18, 39, 40	------	------	Proposed Area to Drainage Under Ae

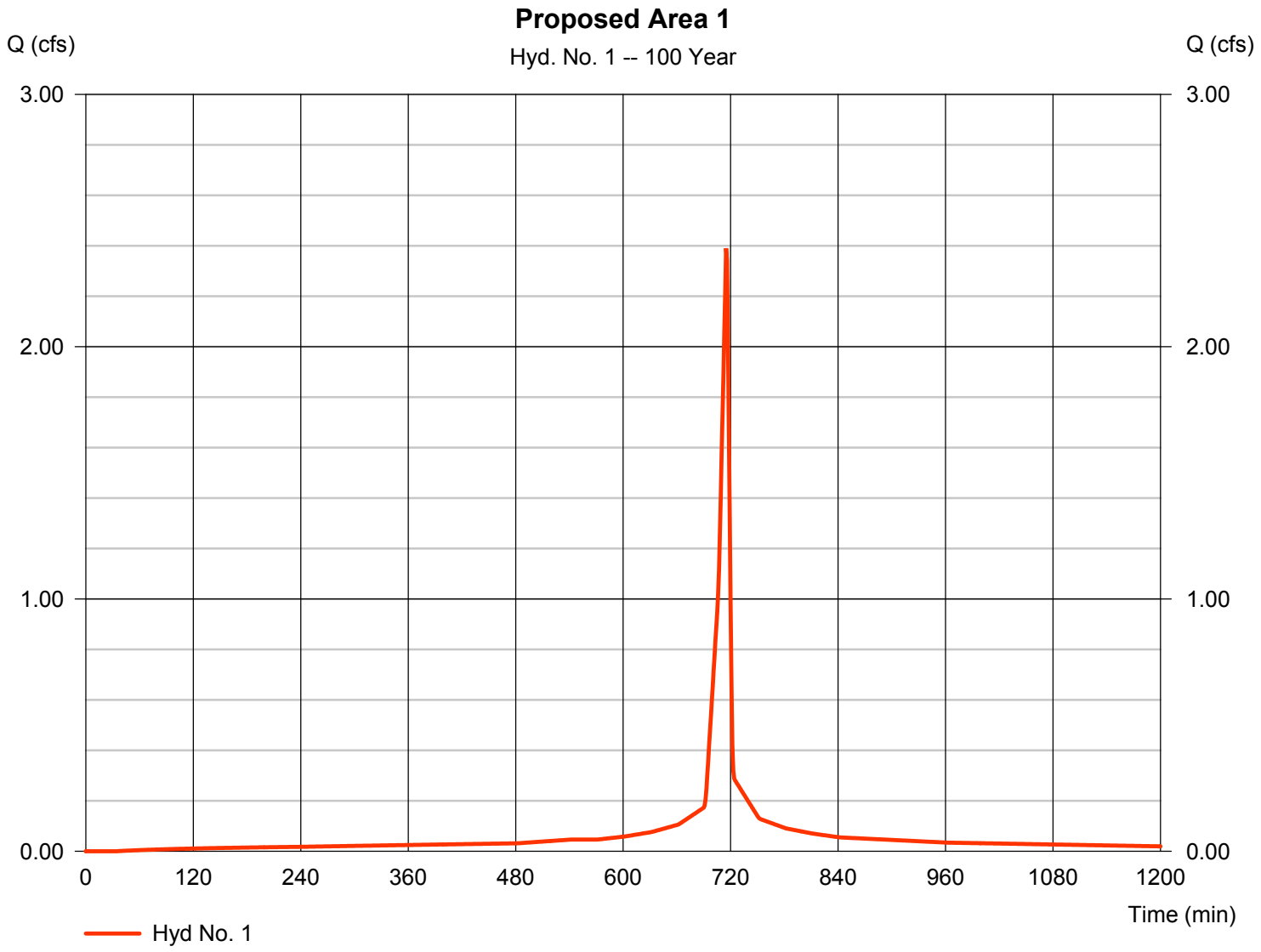
Hydrograph Report

Hyd. No. 1

Proposed Area 1

Hydrograph type	= SCS Runoff	Peak discharge	= 2.391 cfs
Storm frequency	= 100 yrs	Time to peak	= 715 min
Time interval	= 1 min	Hyd. volume	= 5,189 cuft
Drainage area	= 0.210 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.20 min
Total precip.	= 7.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.211 x 98)] / 0.210



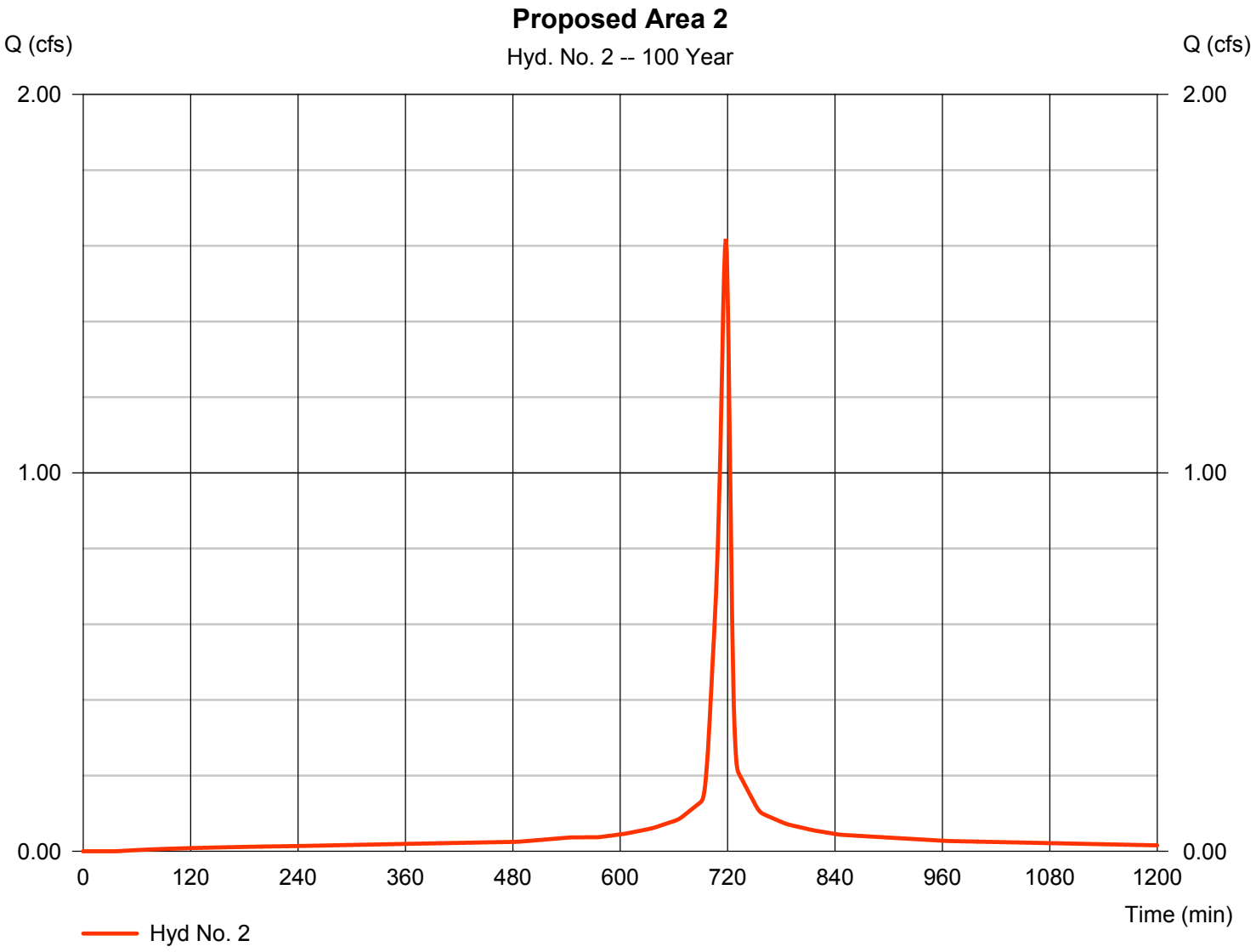
Hydrograph Report

Hyd. No. 2

Proposed Area 2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.618 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 4,111 cuft
Drainage area	= 0.160 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.90 min
Total precip.	= 7.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.152 x 98) + (0.004 x 79)] / 0.160



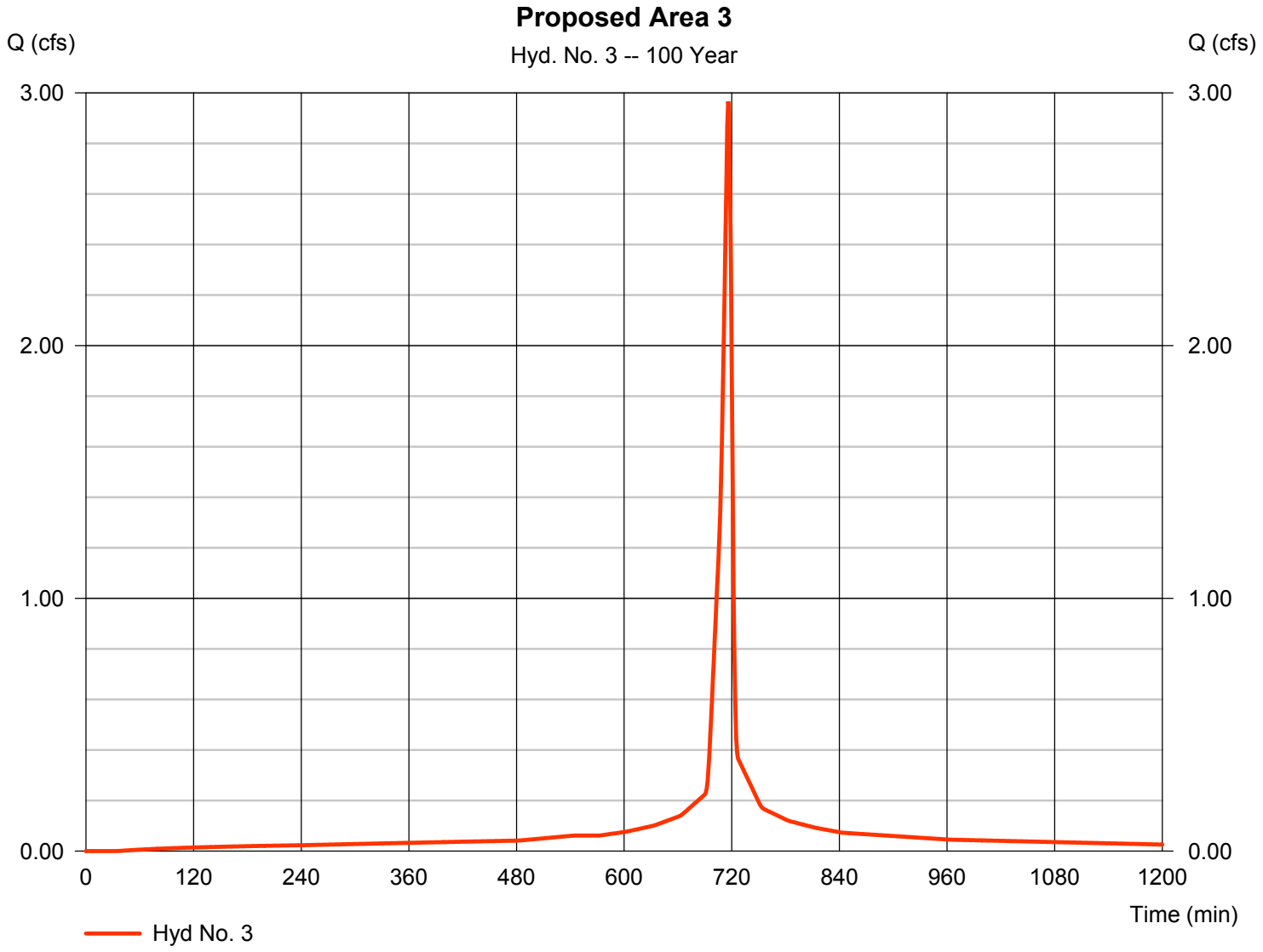
Hydrograph Report

Hyd. No. 3

Proposed Area 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.967 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	6,852 cuft
Drainage area	=	0.260 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	3.70 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.264 x 98)] / 0.260



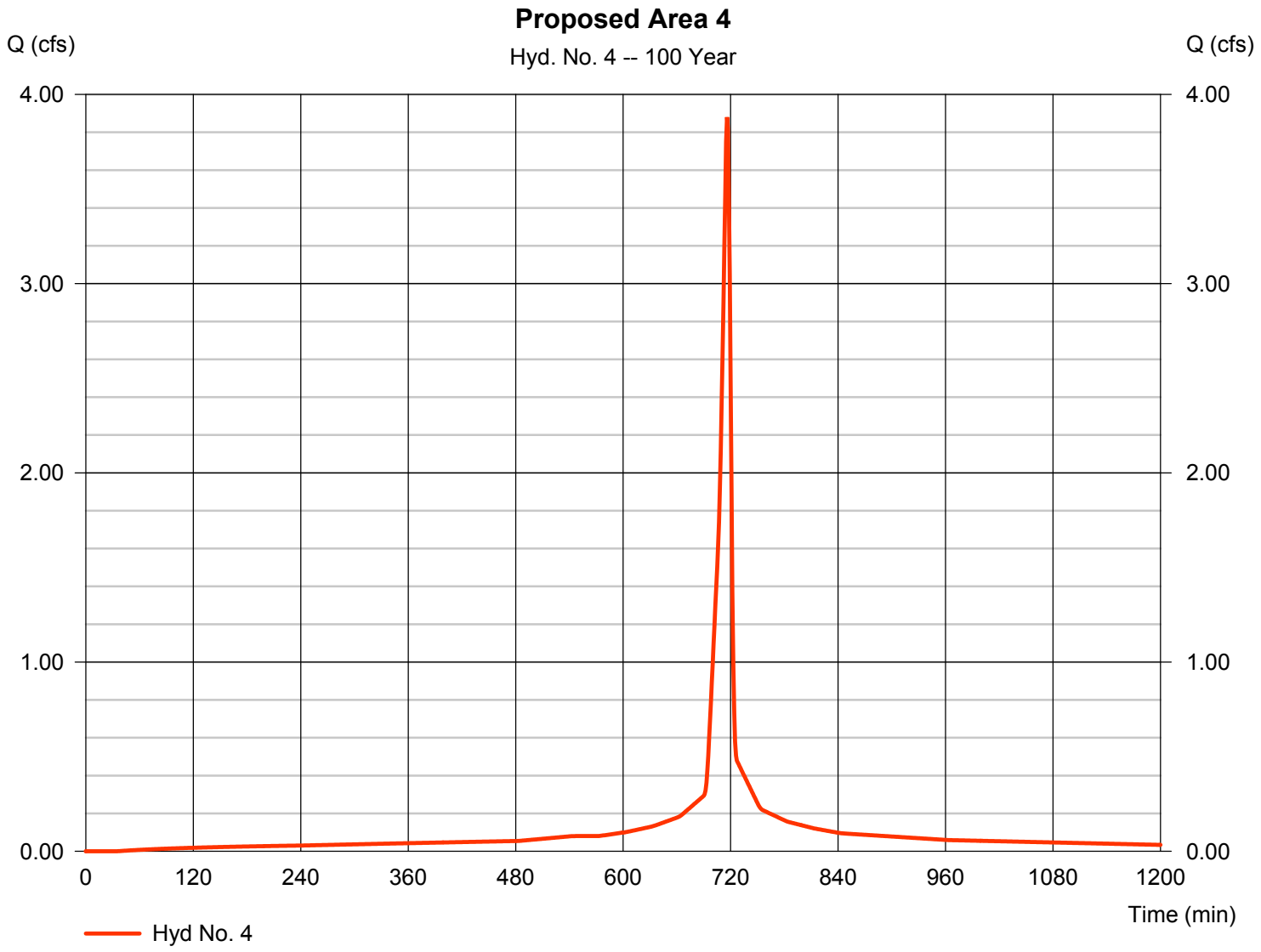
Hydrograph Report

Hyd. No. 4

Proposed Area 4

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.880 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	8,961 cuft
Drainage area	=	0.340 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	3.60 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.335 x 98)] / 0.340



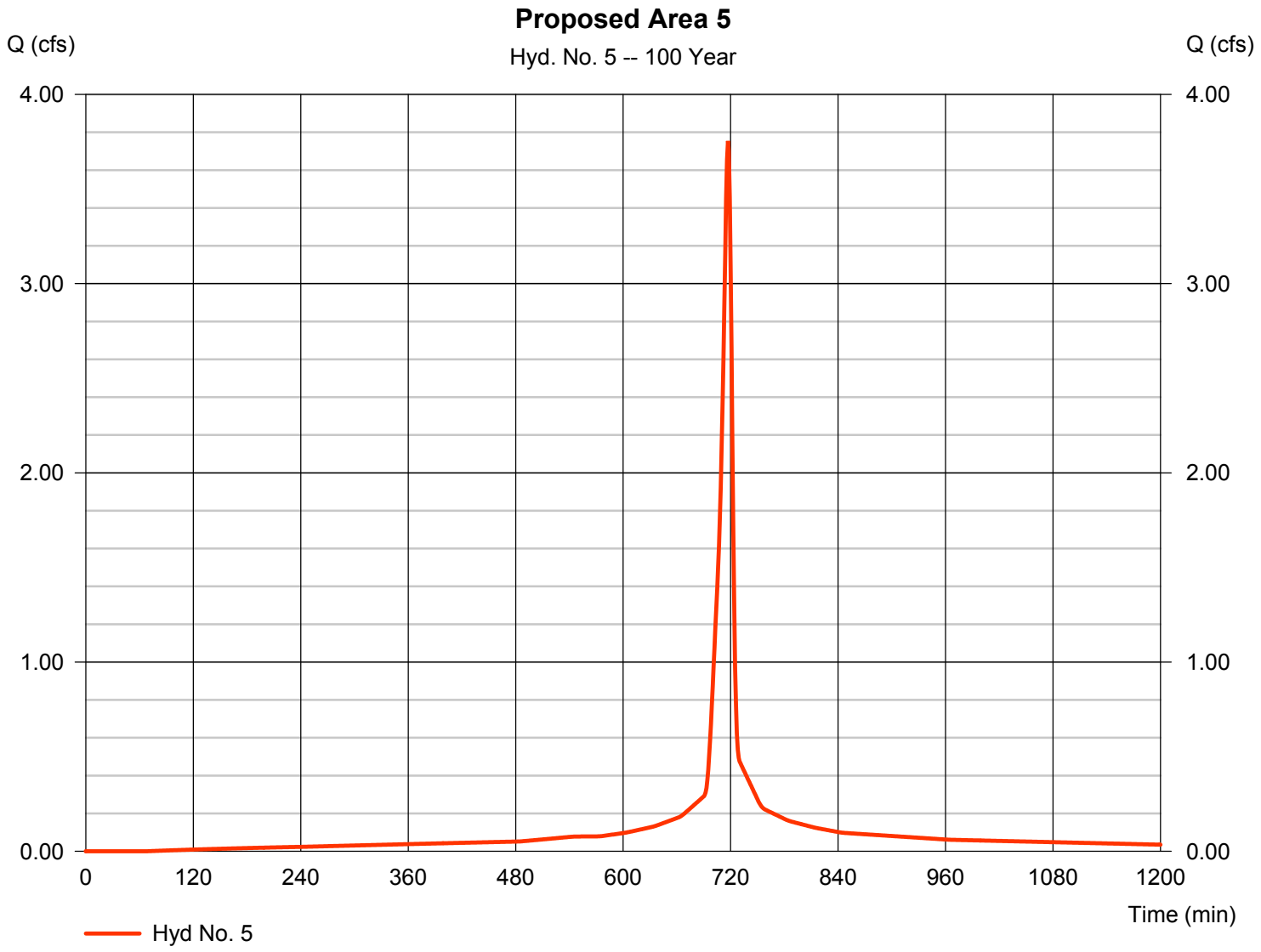
Hydrograph Report

Hyd. No. 5

Proposed Area 5

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.754 cfs
Storm frequency	=	100 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	8,938 cuft
Drainage area	=	0.340 ac	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.50 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.299 x 98) + (0.040 x 79)] / 0.340



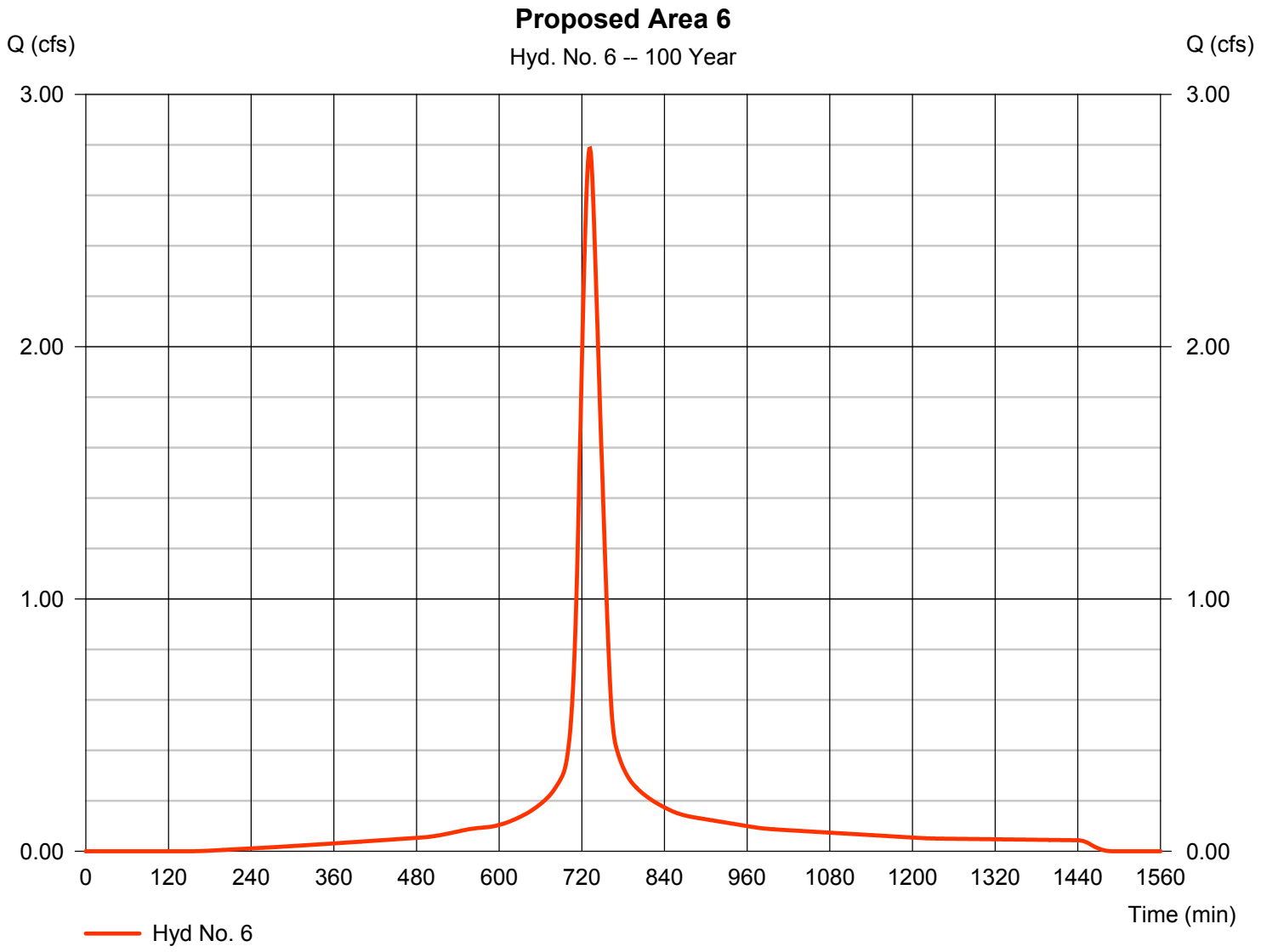
Hydrograph Report

Hyd. No. 6

Proposed Area 6

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.785 cfs
Storm frequency	=	100 yrs	Time to peak	=	732 min
Time interval	=	1 min	Hyd. volume	=	12,219 cuft
Drainage area	=	0.520 ac	Curve number	=	91*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	30.80 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.331 x 98) + (0.191 x 79)] / 0.520



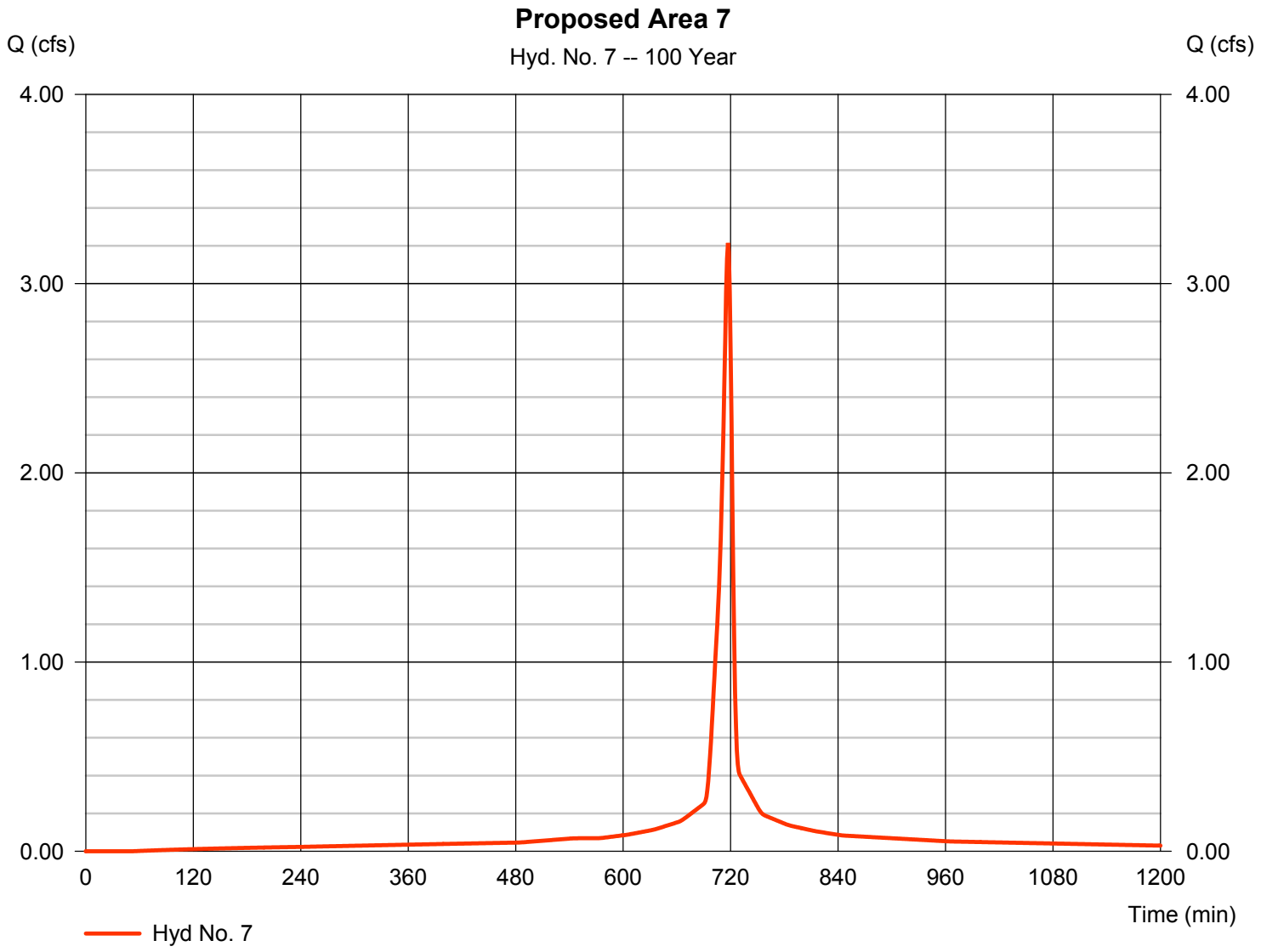
Hydrograph Report

Hyd. No. 7

Proposed Area 7

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.215 cfs
Storm frequency	=	100 yrs	Time to peak	=	717 min
Time interval	=	1 min	Hyd. volume	=	7,752 cuft
Drainage area	=	0.290 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.00 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.272 x 98) + (0.021 x 79)] / 0.290



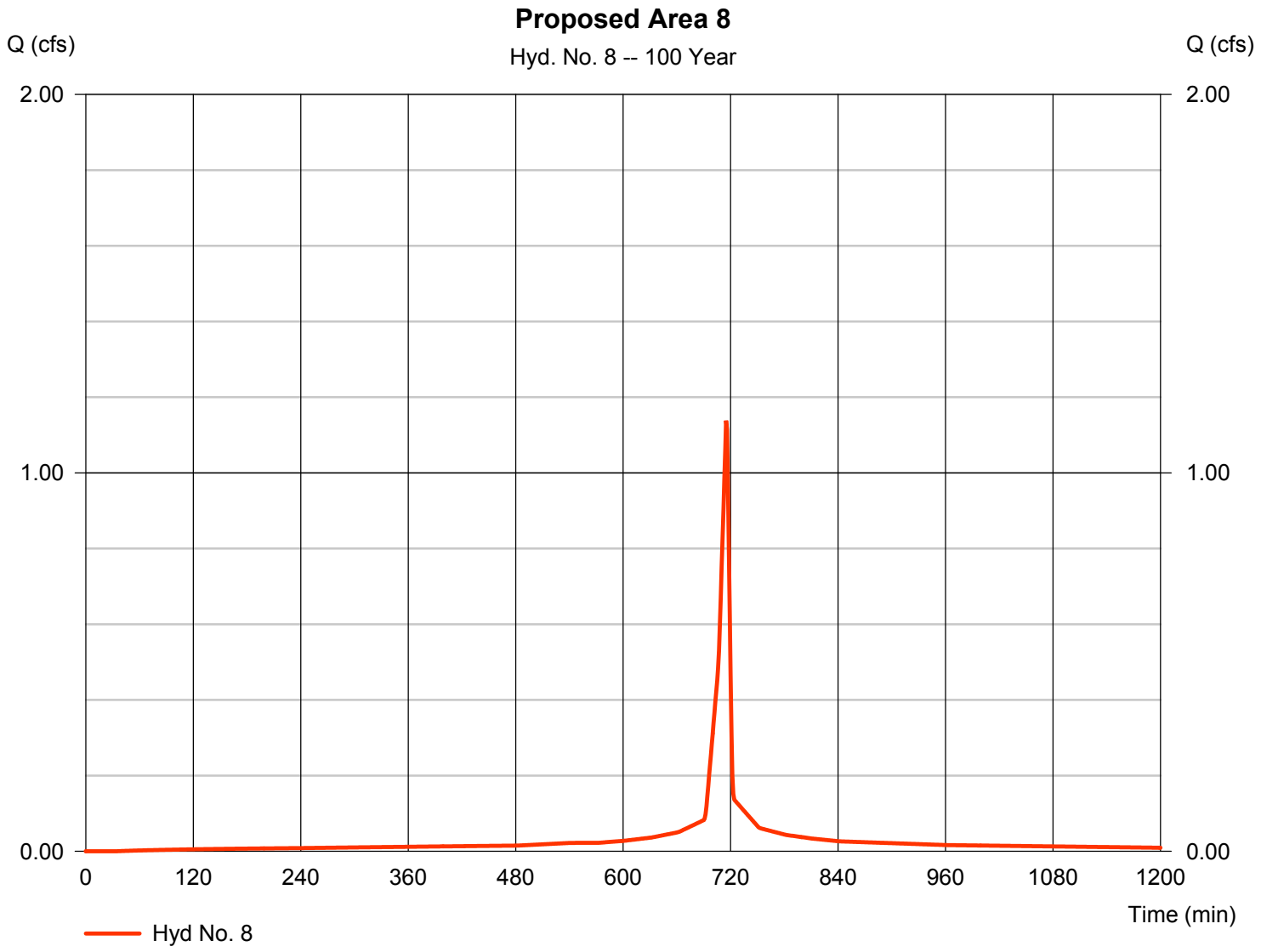
Hydrograph Report

Hyd. No. 8

Proposed Area 8

Hydrograph type	= SCS Runoff	Peak discharge	= 1.138 cfs
Storm frequency	= 100 yrs	Time to peak	= 715 min
Time interval	= 1 min	Hyd. volume	= 2,471 cuft
Drainage area	= 0.100 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.10 min
Total precip.	= 7.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.102 x 98)] / 0.100



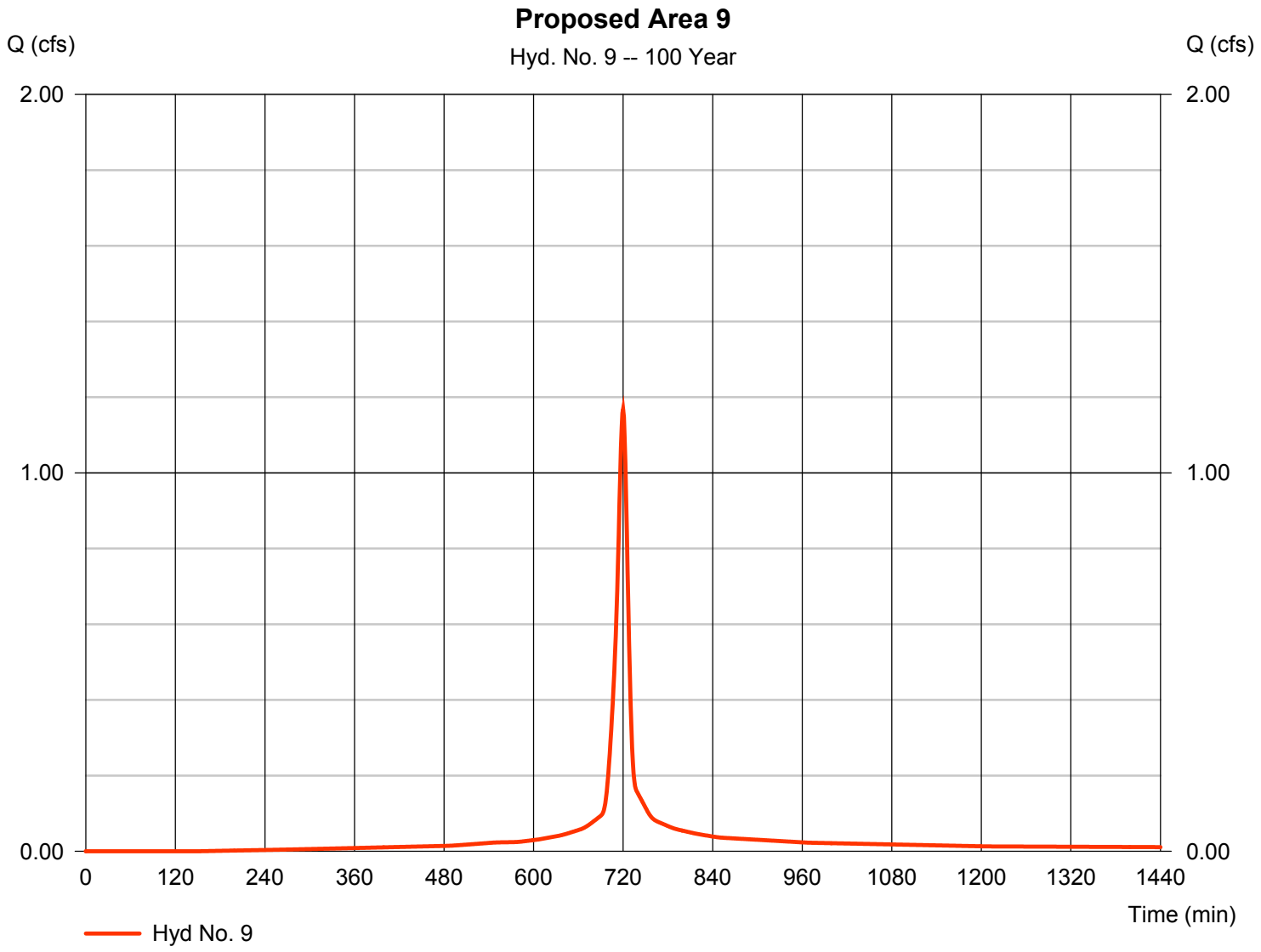
Hydrograph Report

Hyd. No. 9

Proposed Area 9

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.168 cfs
Storm frequency	=	100 yrs	Time to peak	=	720 min
Time interval	=	1 min	Hyd. volume	=	3,089 cuft
Drainage area	=	0.130 ac	Curve number	=	91*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	10.20 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.081 x 98) + (0.044 x 79)] / 0.130



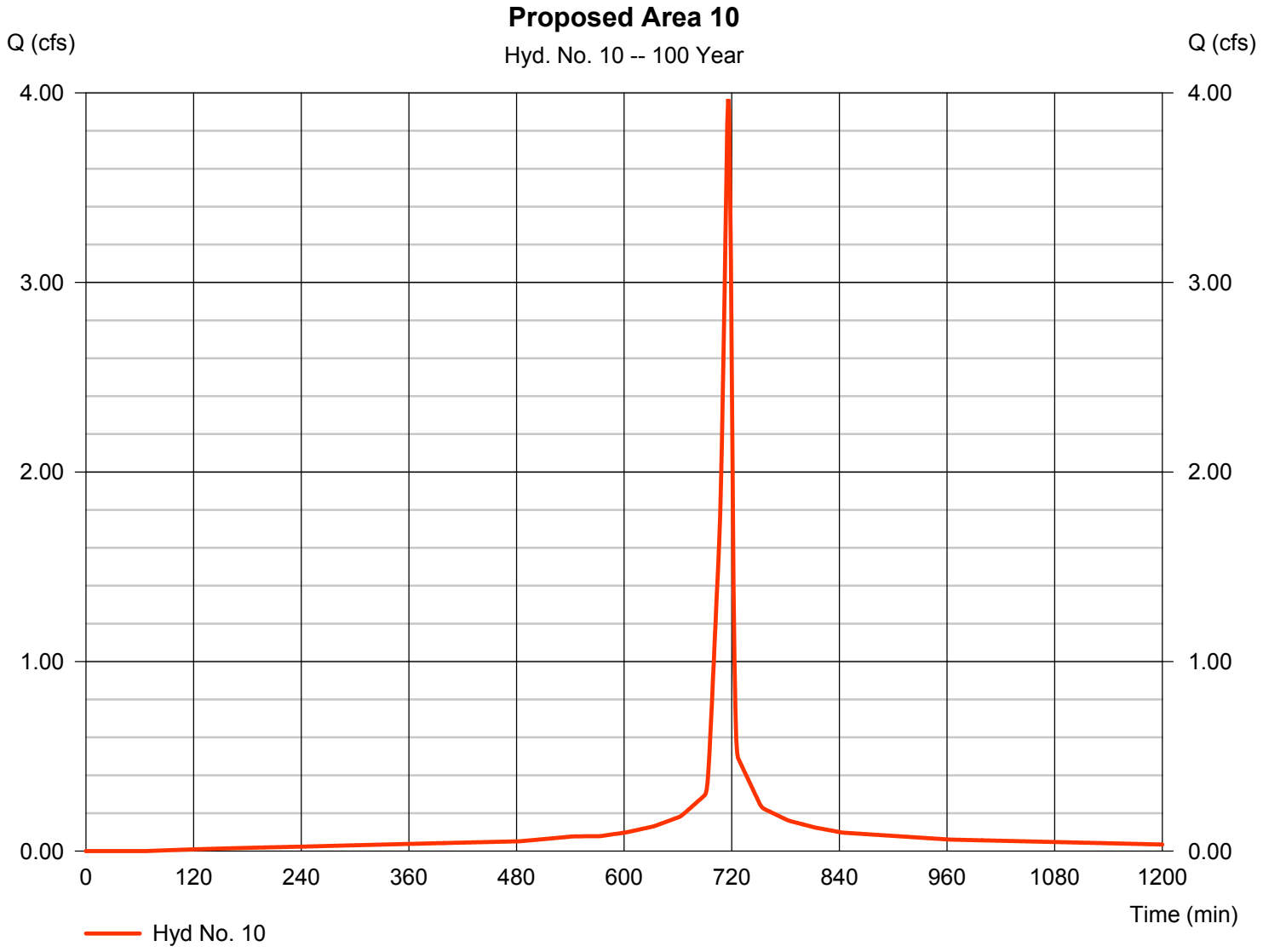
Hydrograph Report

Hyd. No. 10

Proposed Area 10

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.967 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	8,922 cuft
Drainage area	=	0.350 ac	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.50 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.310 x 98) + (0.040 x 79)] / 0.350



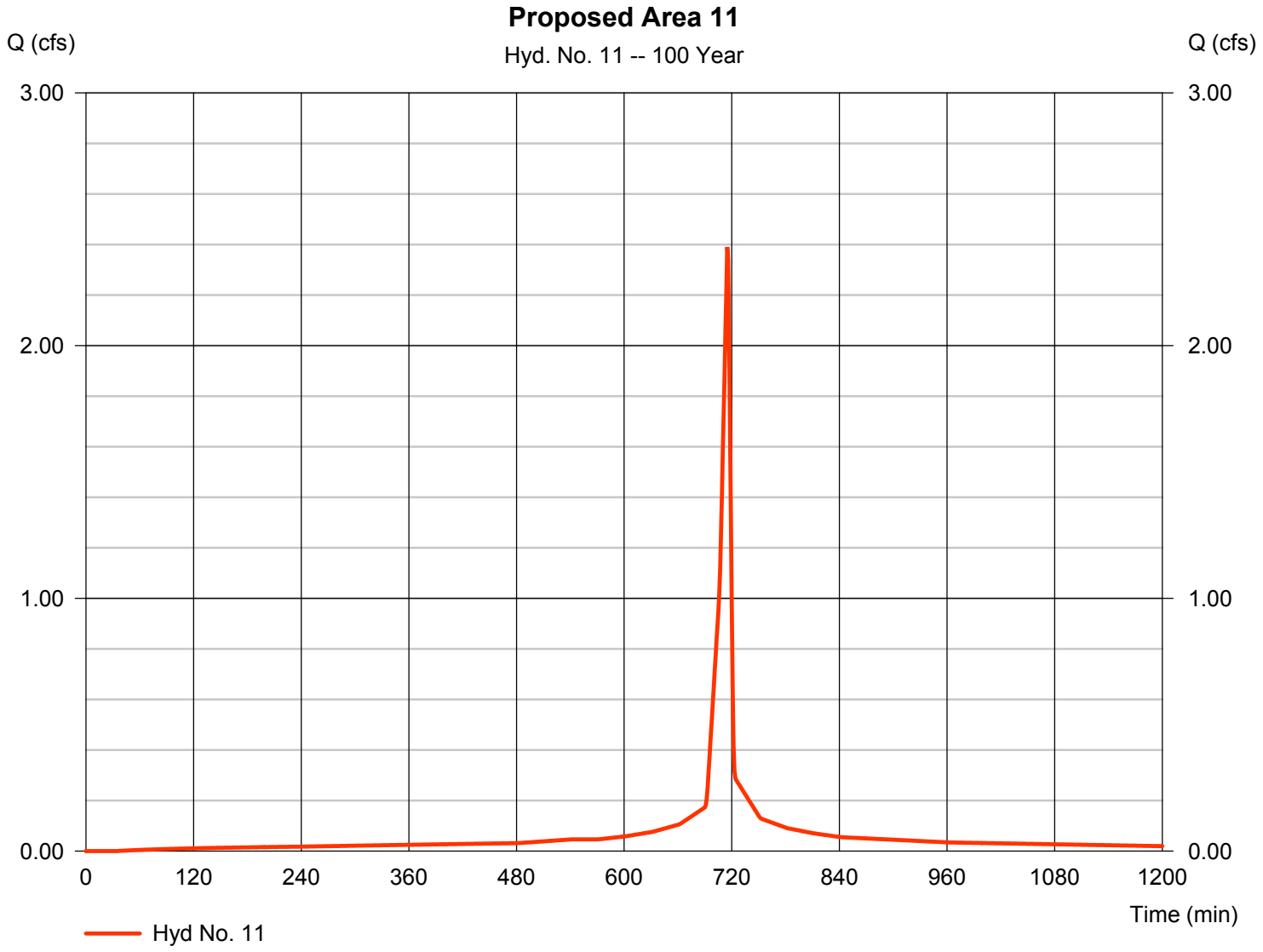
Hydrograph Report

Hyd. No. 11

Proposed Area 11

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.391 cfs
Storm frequency	=	100 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	5,189 cuft
Drainage area	=	0.210 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.50 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.207 x 98)] / 0.210



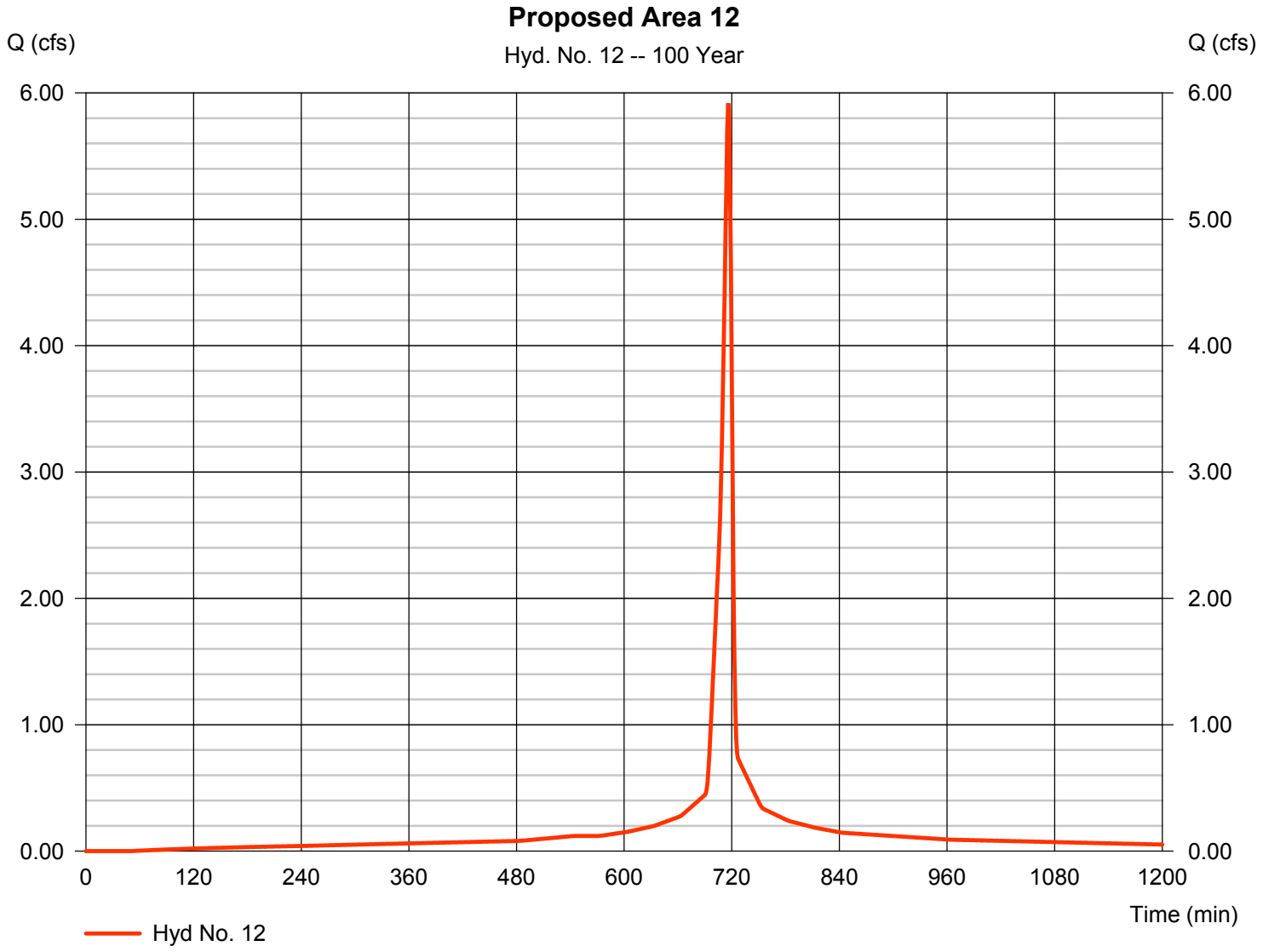
Hydrograph Report

Hyd. No. 12

Proposed Area 12

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.917 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	13,480 cuft
Drainage area	=	0.520 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.10 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.480 x 98) + (0.040 x 79)] / 0.520



Hydrograph Report

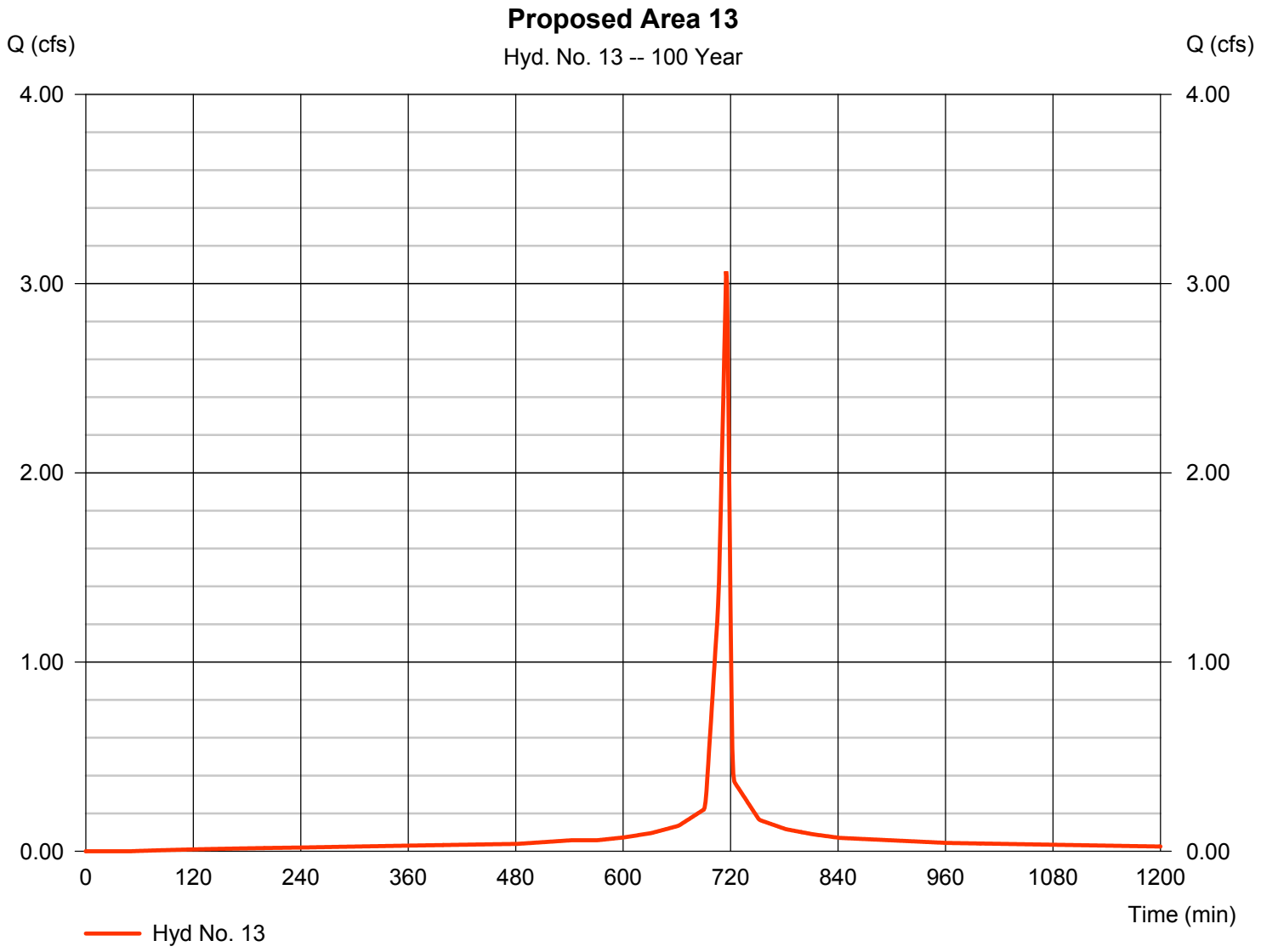
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 13

Proposed Area 13

Hydrograph type	= SCS Runoff	Peak discharge	= 3.065 cfs
Storm frequency	= 100 yrs	Time to peak	= 715 min
Time interval	= 1 min	Hyd. volume	= 6,562 cuft
Drainage area	= 0.270 ac	Curve number	= 97*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.50 min
Total precip.	= 7.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.260 x 98) + (0.010 x 79)] / 0.270



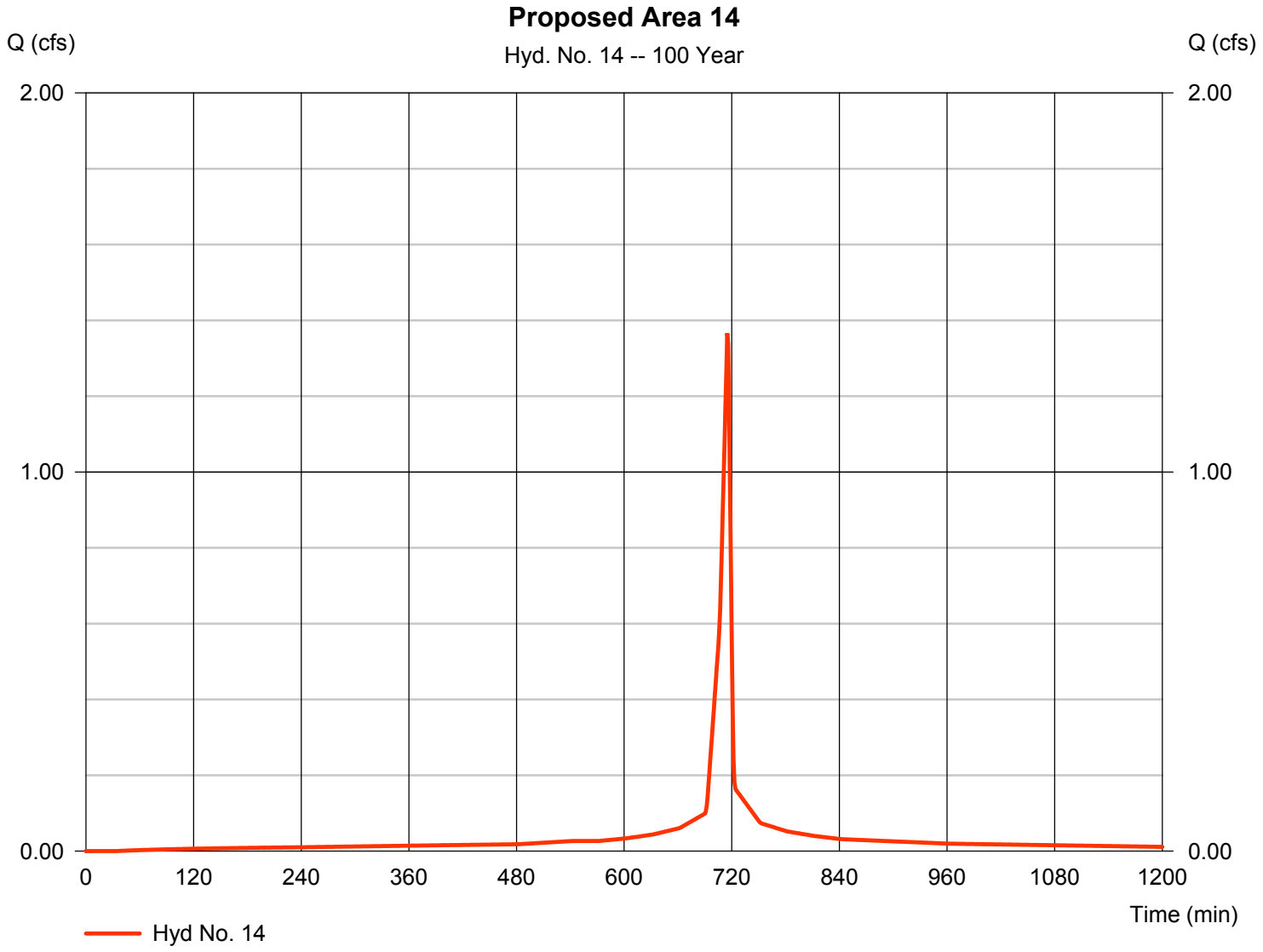
Hydrograph Report

Hyd. No. 14

Proposed Area 14

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.366 cfs
Storm frequency	=	100 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	2,965 cuft
Drainage area	=	0.120 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	1.70 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.123 x 98)] / 0.120



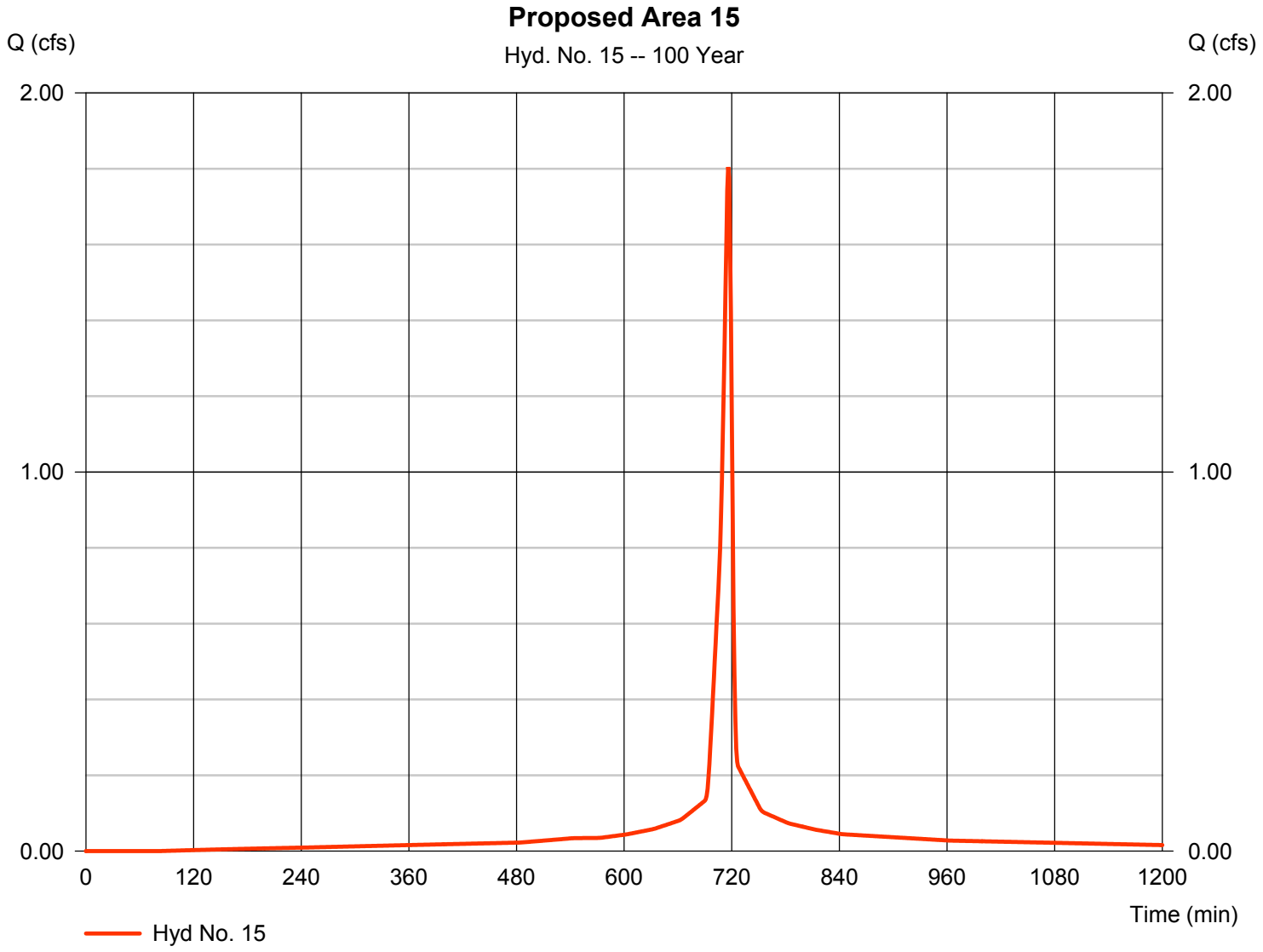
Hydrograph Report

Hyd. No. 15

Proposed Area 15

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.804 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	4,009 cuft
Drainage area	=	0.160 ac	Curve number	=	95*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.90 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.134 x 98) + (0.022 x 79)] / 0.160



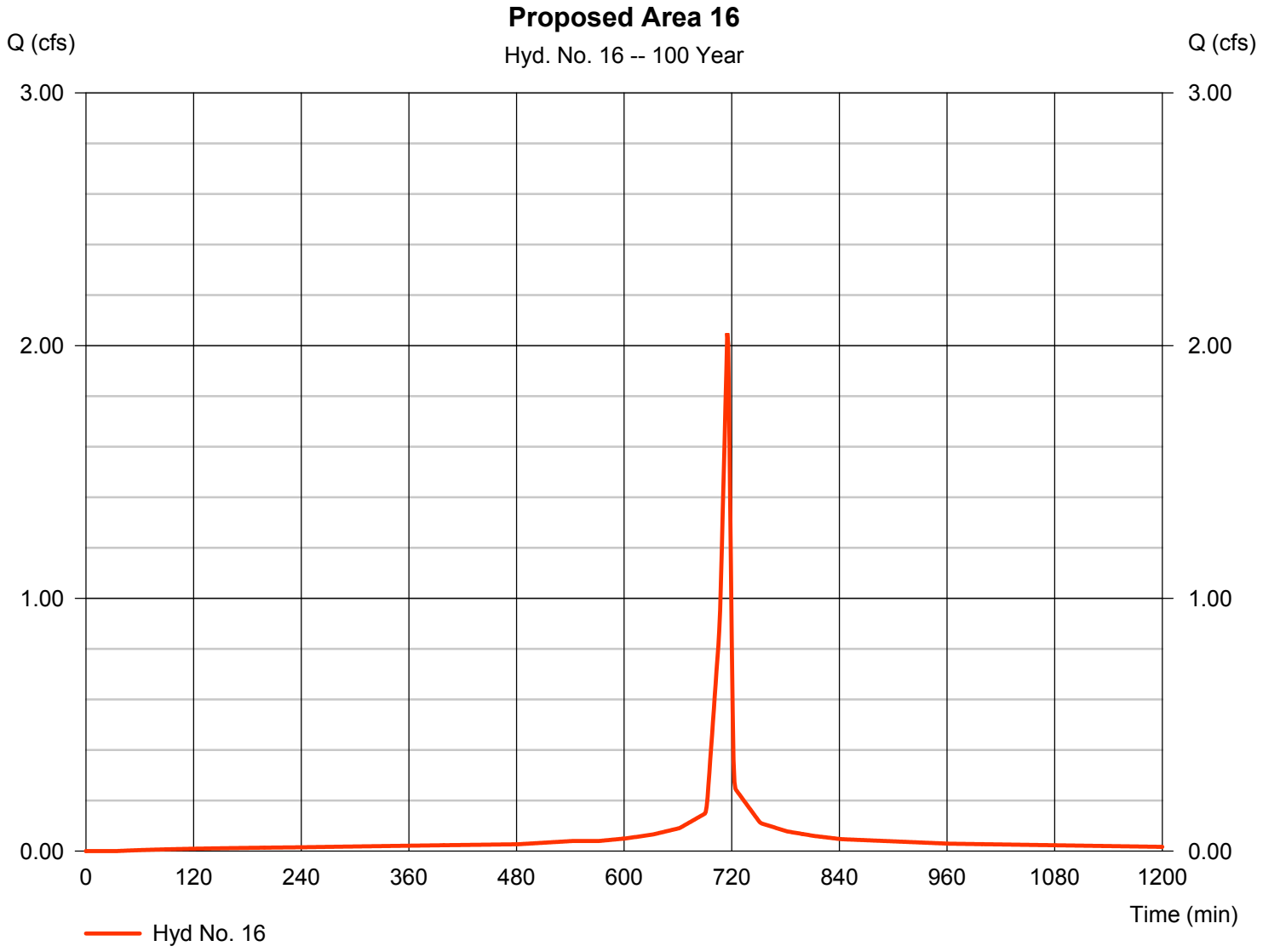
Hydrograph Report

Hyd. No. 16

Proposed Area 16

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.049 cfs
Storm frequency	=	100 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	4,448 cuft
Drainage area	=	0.180 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.40 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.182 x 98)] / 0.180



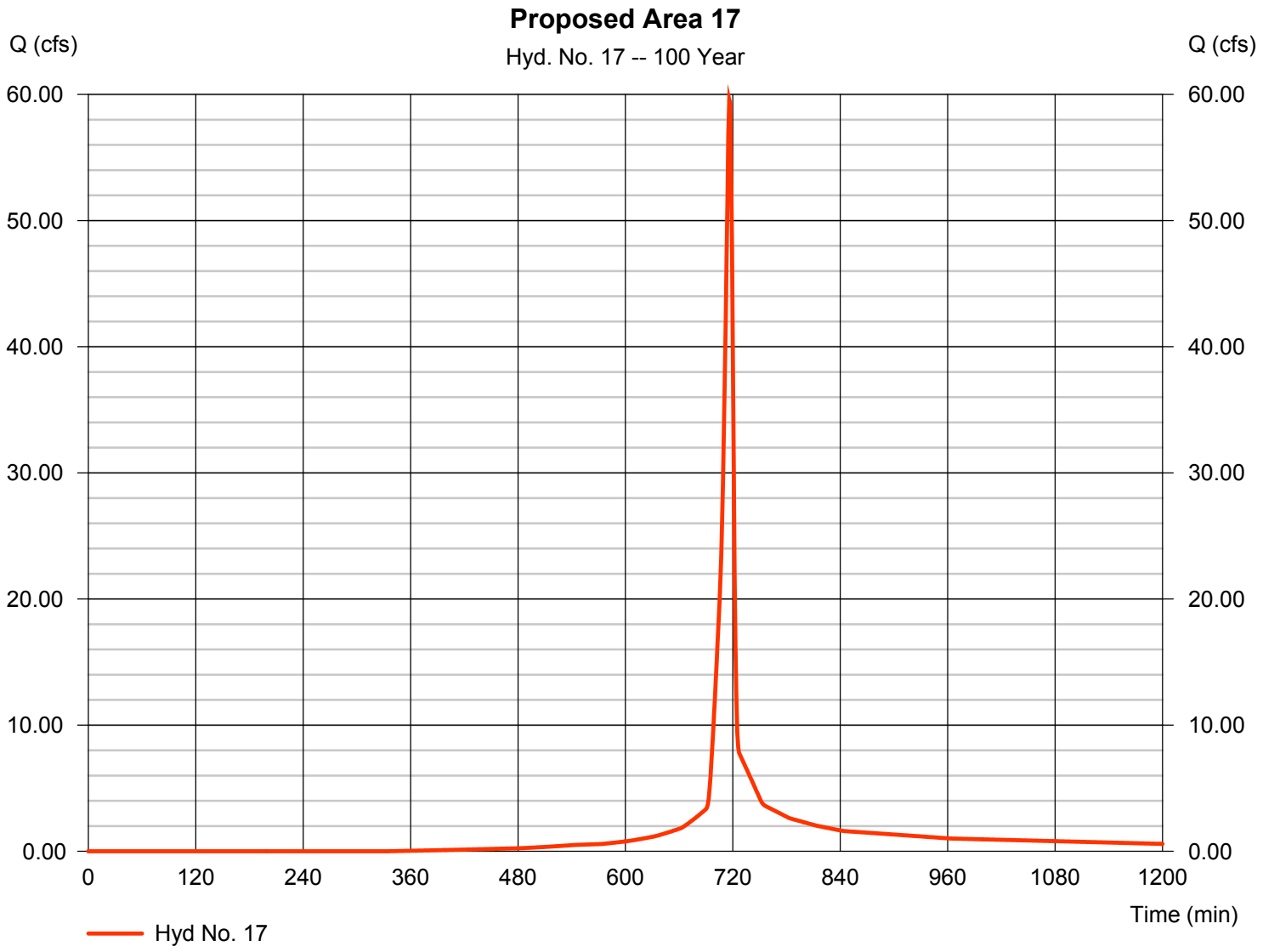
Hydrograph Report

Hyd. No. 17

Proposed Area 17

Hydrograph type	=	SCS Runoff	Peak discharge	=	59.55 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	117,186 cuft
Drainage area	=	6.400 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.90 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.018 x 98) + (6.379 x 79)] / 6.400



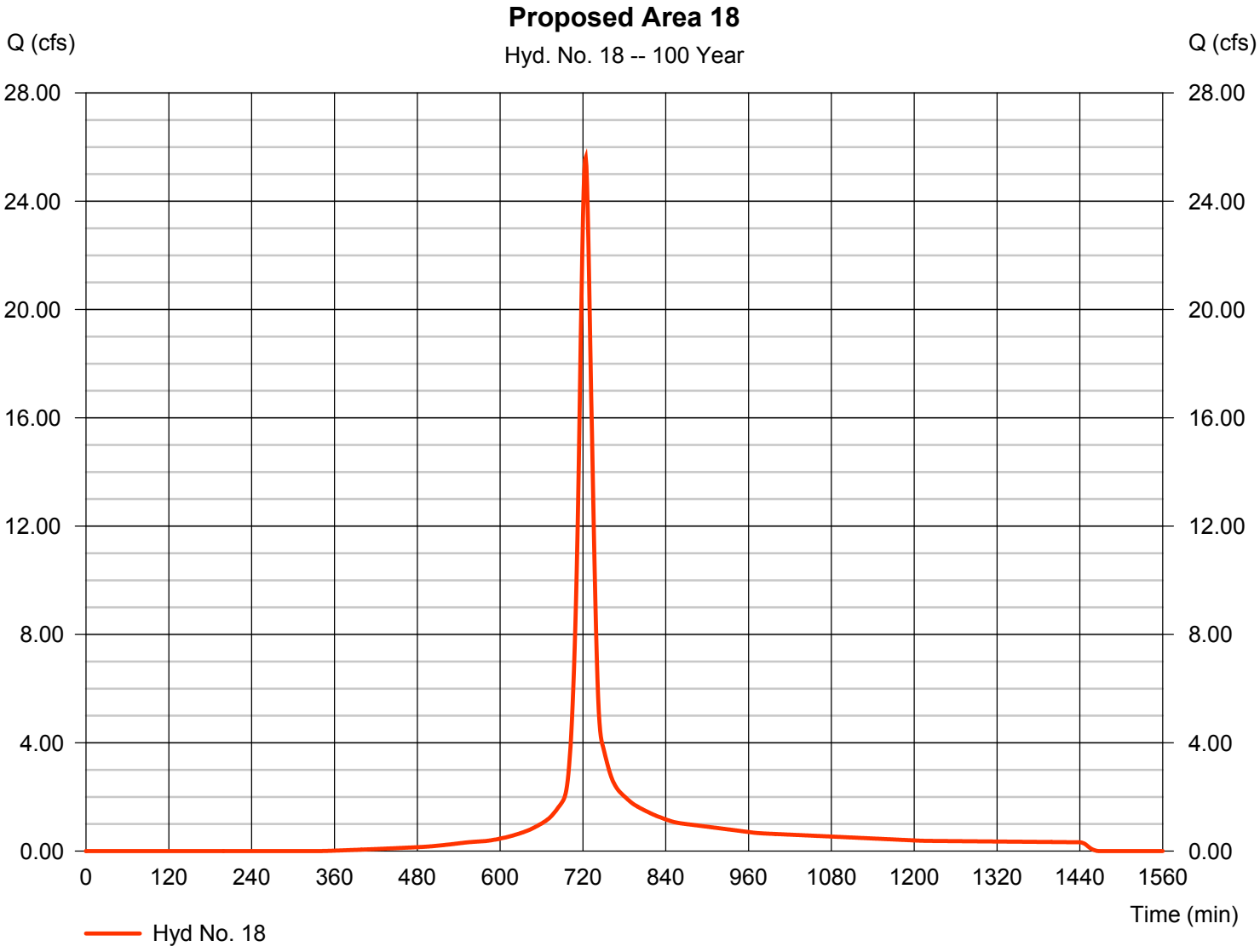
Hydrograph Report

Hyd. No. 18

Proposed Area 18

Hydrograph type	=	SCS Runoff	Peak discharge	=	25.60 cfs
Storm frequency	=	100 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	76,753 cuft
Drainage area	=	4.240 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	17.40 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.036 x 98) + (4.203 x 79)] / 4.240



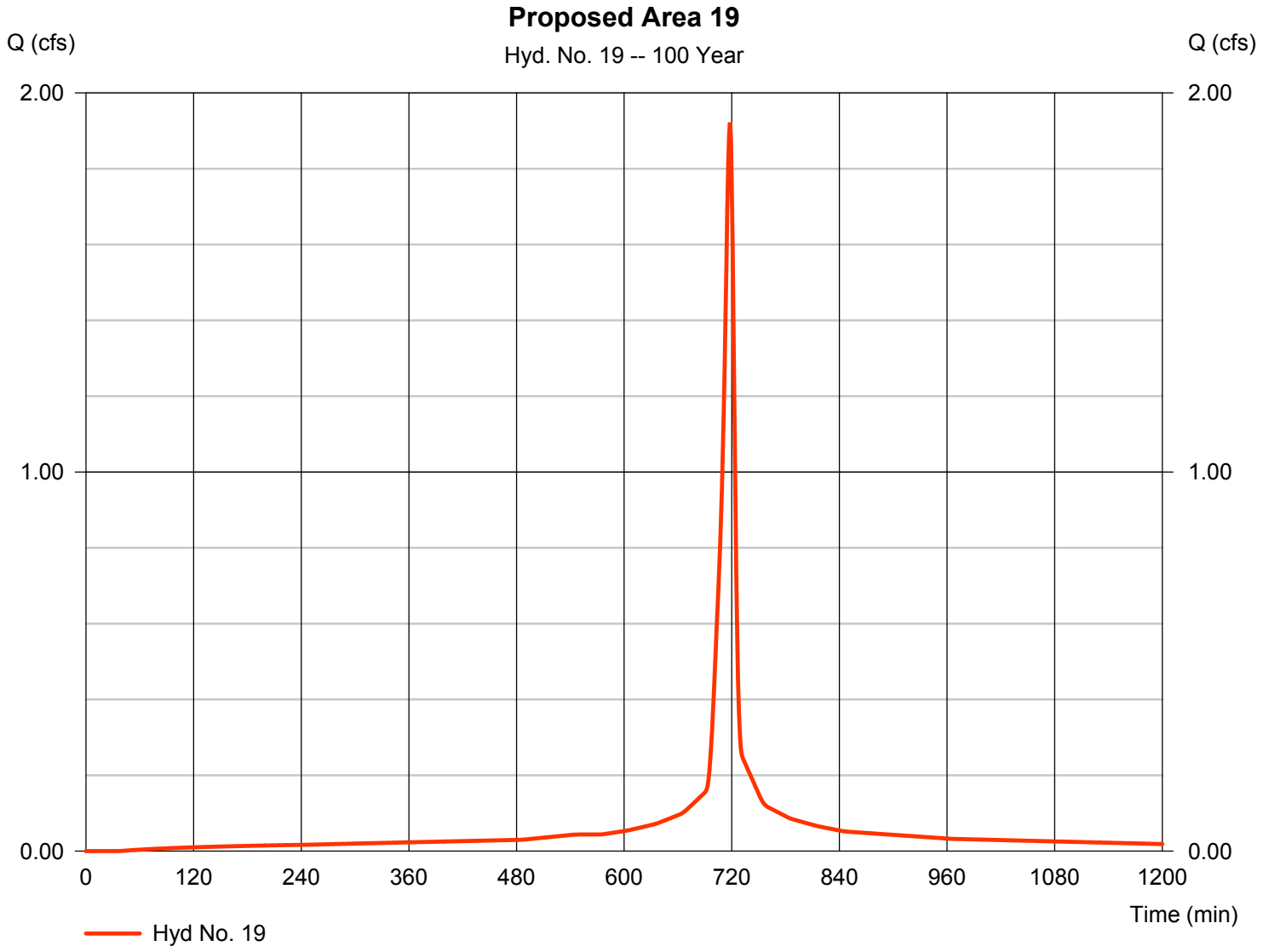
Hydrograph Report

Hyd. No. 19

Proposed Area 19

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.922 cfs
Storm frequency	=	100 yrs	Time to peak	=	718 min
Time interval	=	1 min	Hyd. volume	=	4,882 cuft
Drainage area	=	0.190 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.10 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.188 x 98)] / 0.190



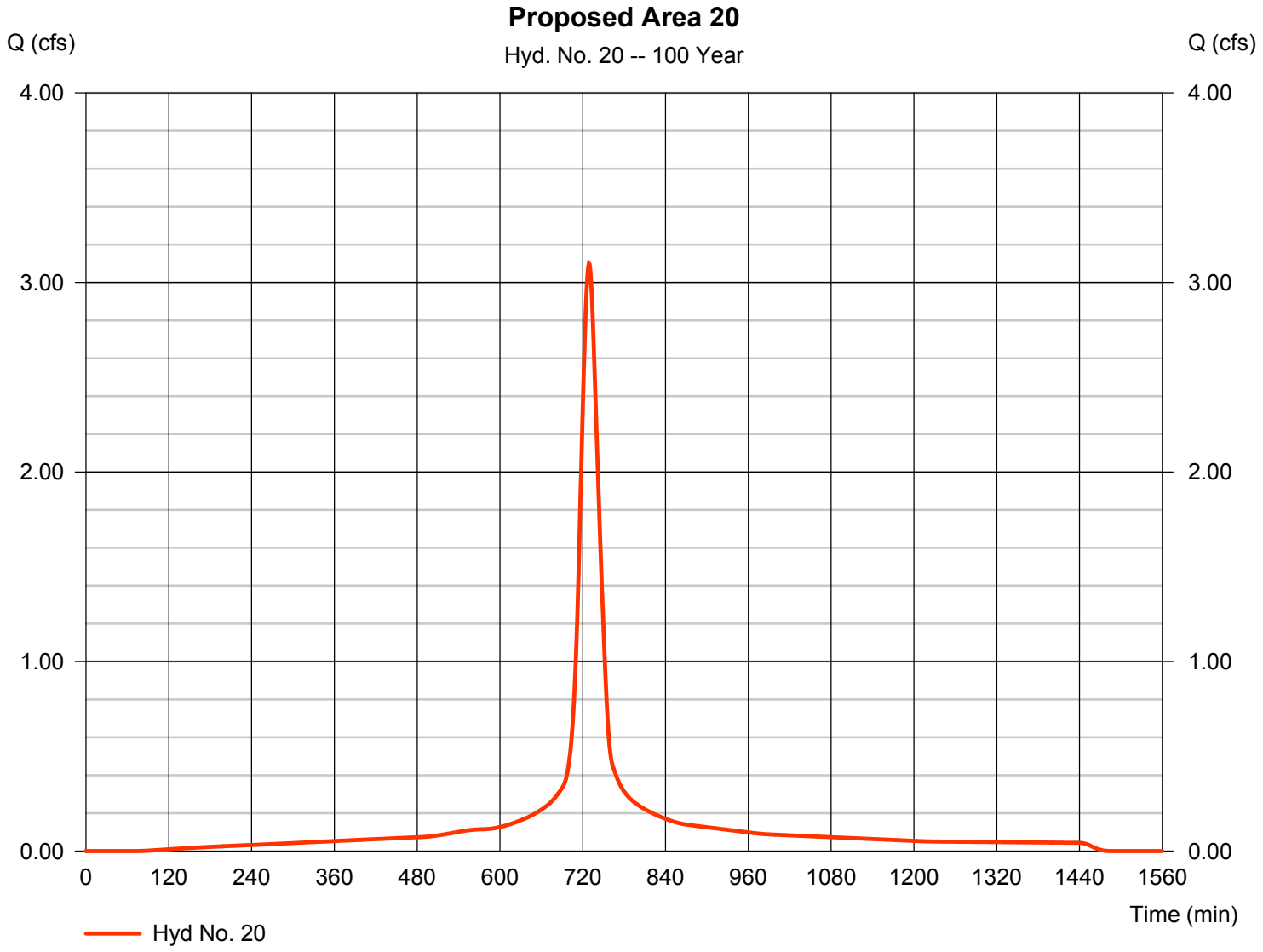
Hydrograph Report

Hyd. No. 20

Proposed Area 20

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.100 cfs
Storm frequency	=	100 yrs	Time to peak	=	729 min
Time interval	=	1 min	Hyd. volume	=	13,158 cuft
Drainage area	=	0.520 ac	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	27.80 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.458 x 98) + (0.060 x 79)] / 0.520



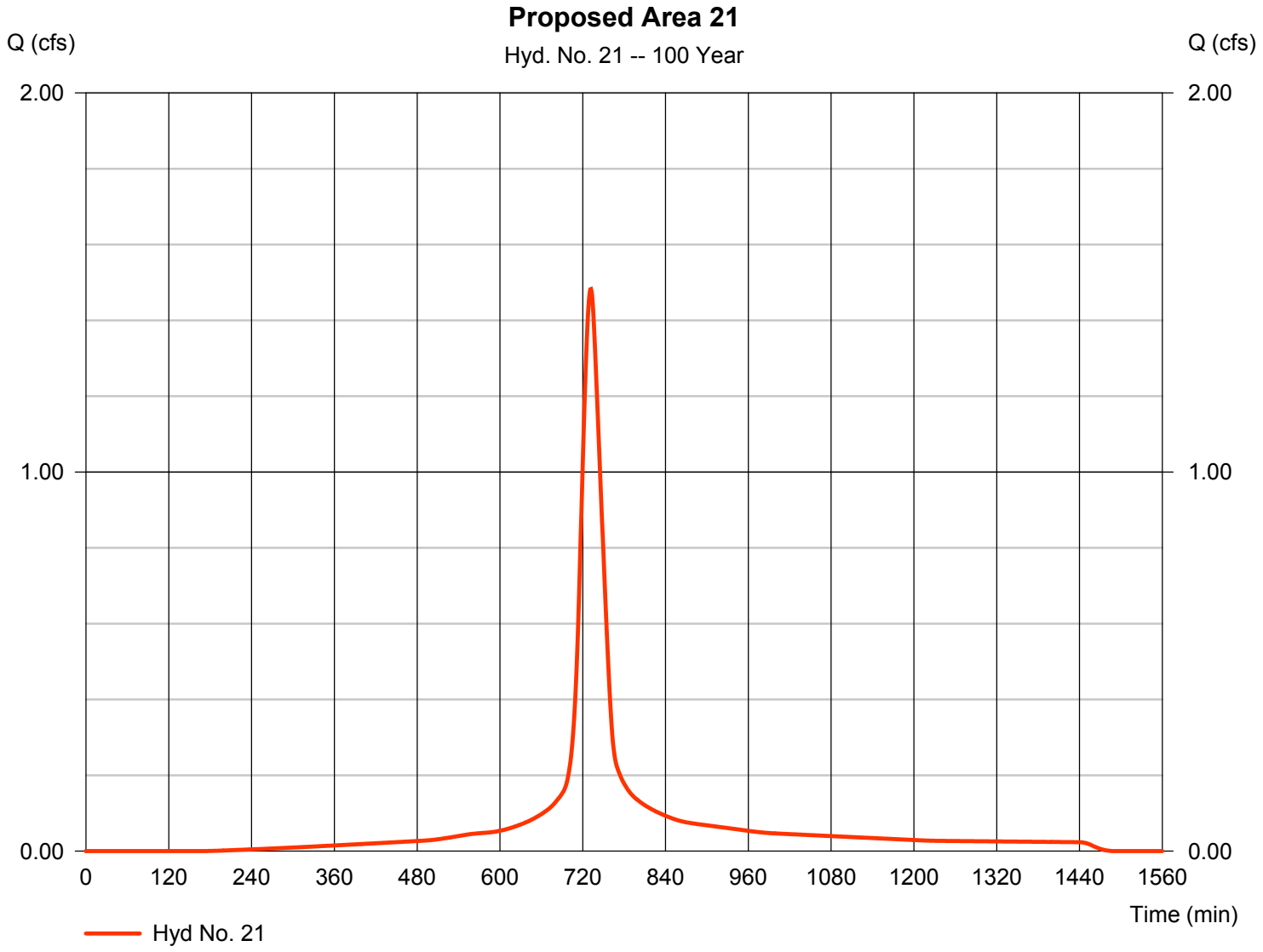
Hydrograph Report

Hyd. No. 21

Proposed Area 21

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.483 cfs
Storm frequency	=	100 yrs	Time to peak	=	732 min
Time interval	=	1 min	Hyd. volume	=	6,460 cuft
Drainage area	=	0.280 ac	Curve number	=	90*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	31.80 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.152 x 98) + (0.123 x 79)] / 0.280



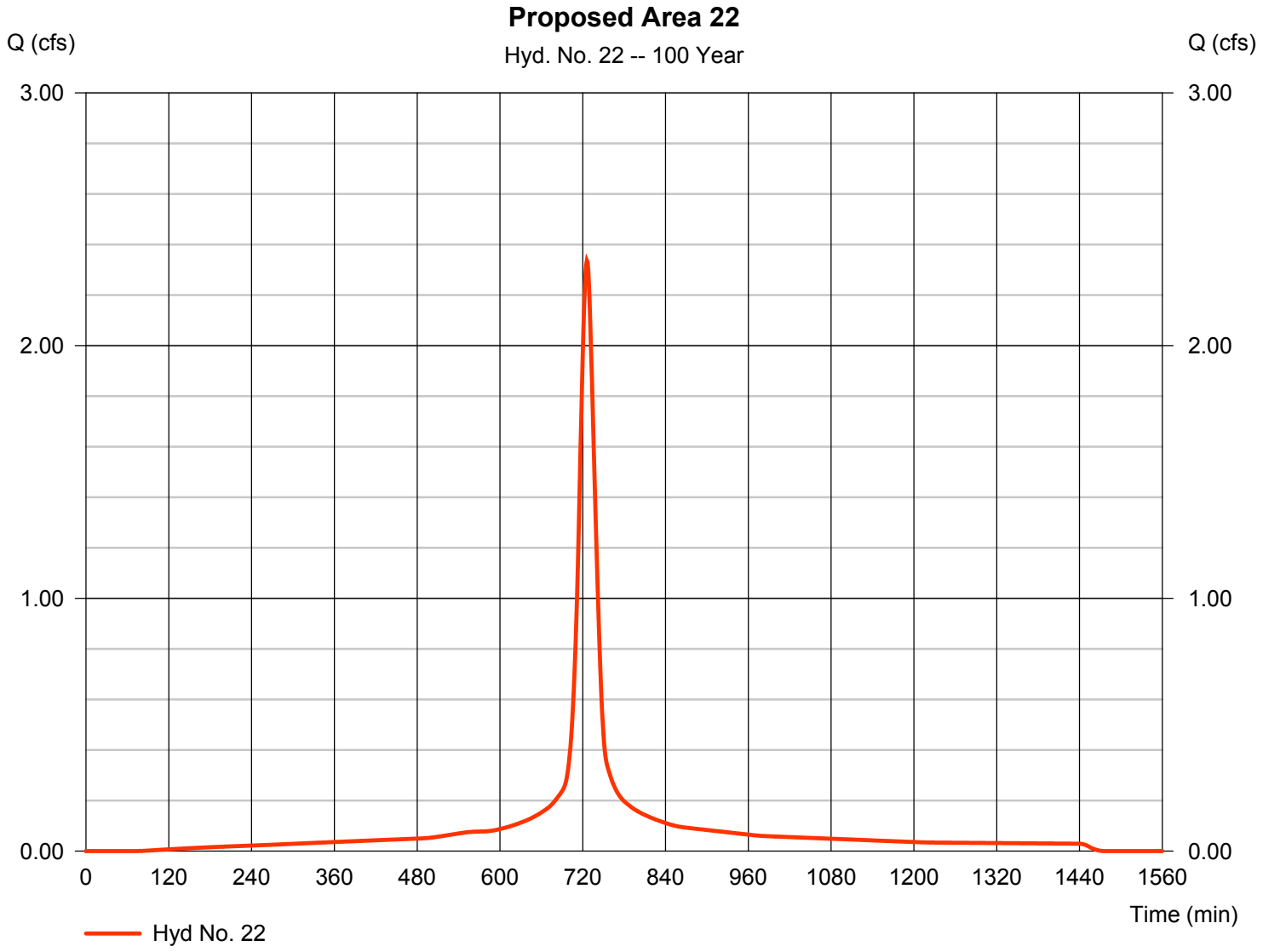
Hydrograph Report

Hyd. No. 22

Proposed Area 22

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.336 cfs
Storm frequency	=	100 yrs	Time to peak	=	726 min
Time interval	=	1 min	Hyd. volume	=	8,842 cuft
Drainage area	=	0.350 ac	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	22.20 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.310 x 98) + (0.040 x 79)] / 0.350



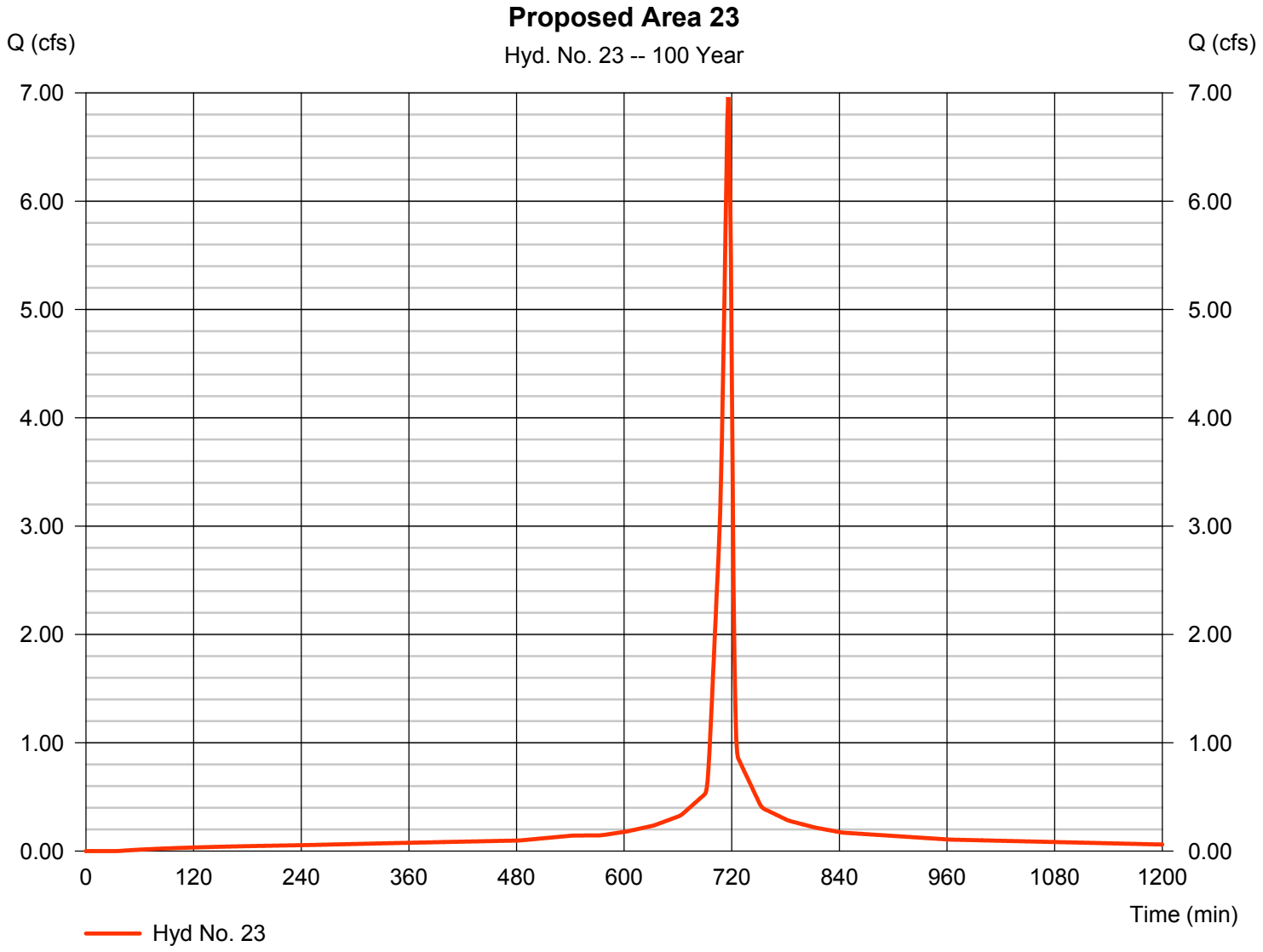
Hydrograph Report

Hyd. No. 23

Proposed Area 23

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.961 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	16,077 cuft
Drainage area	=	0.610 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.80 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.607 x 98)] / 0.610



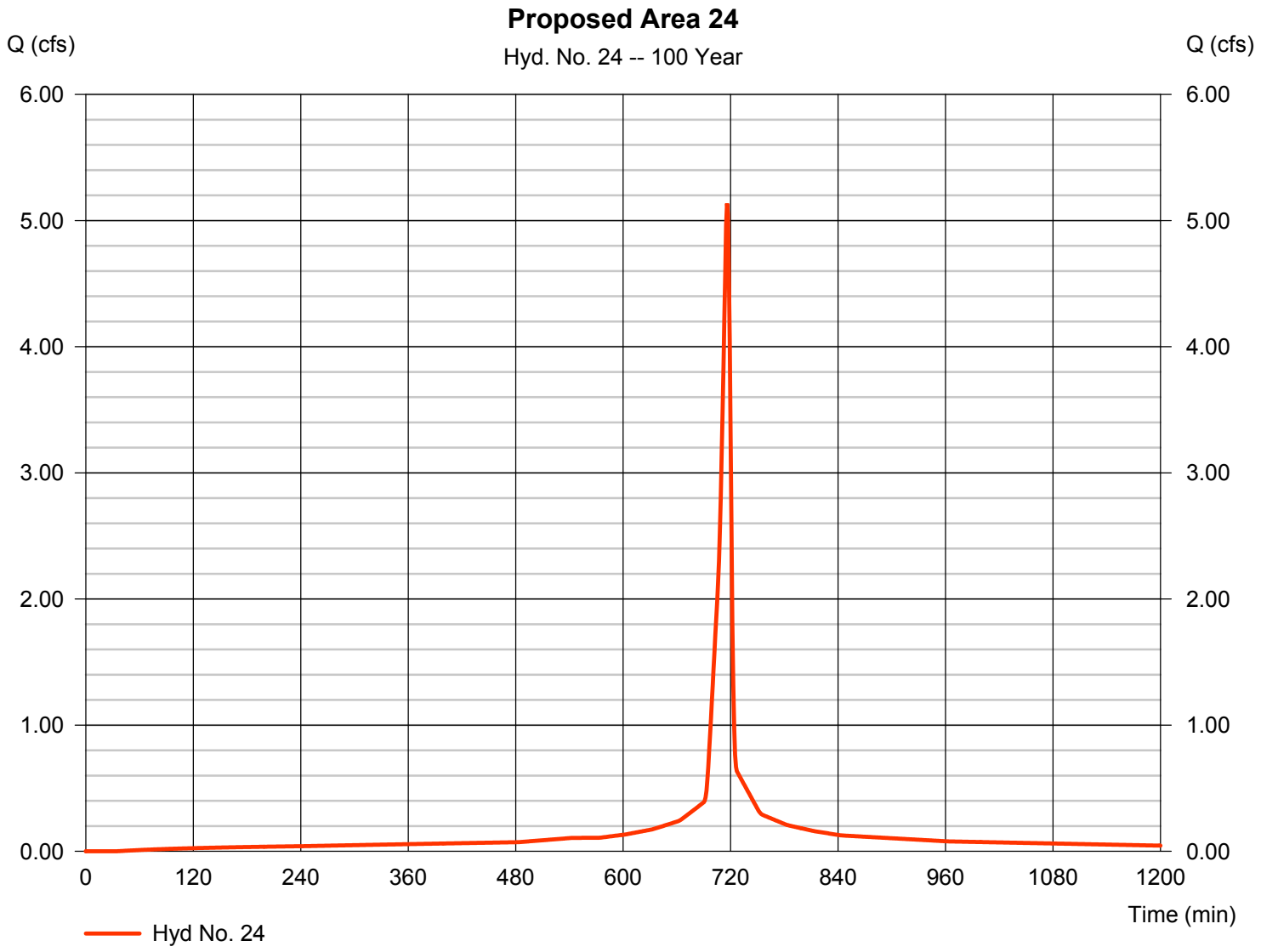
Hydrograph Report

Hyd. No. 24

Proposed Area 24

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.135 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	11,860 cuft
Drainage area	=	0.450 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	3.90 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.447 x 98)] / 0.450



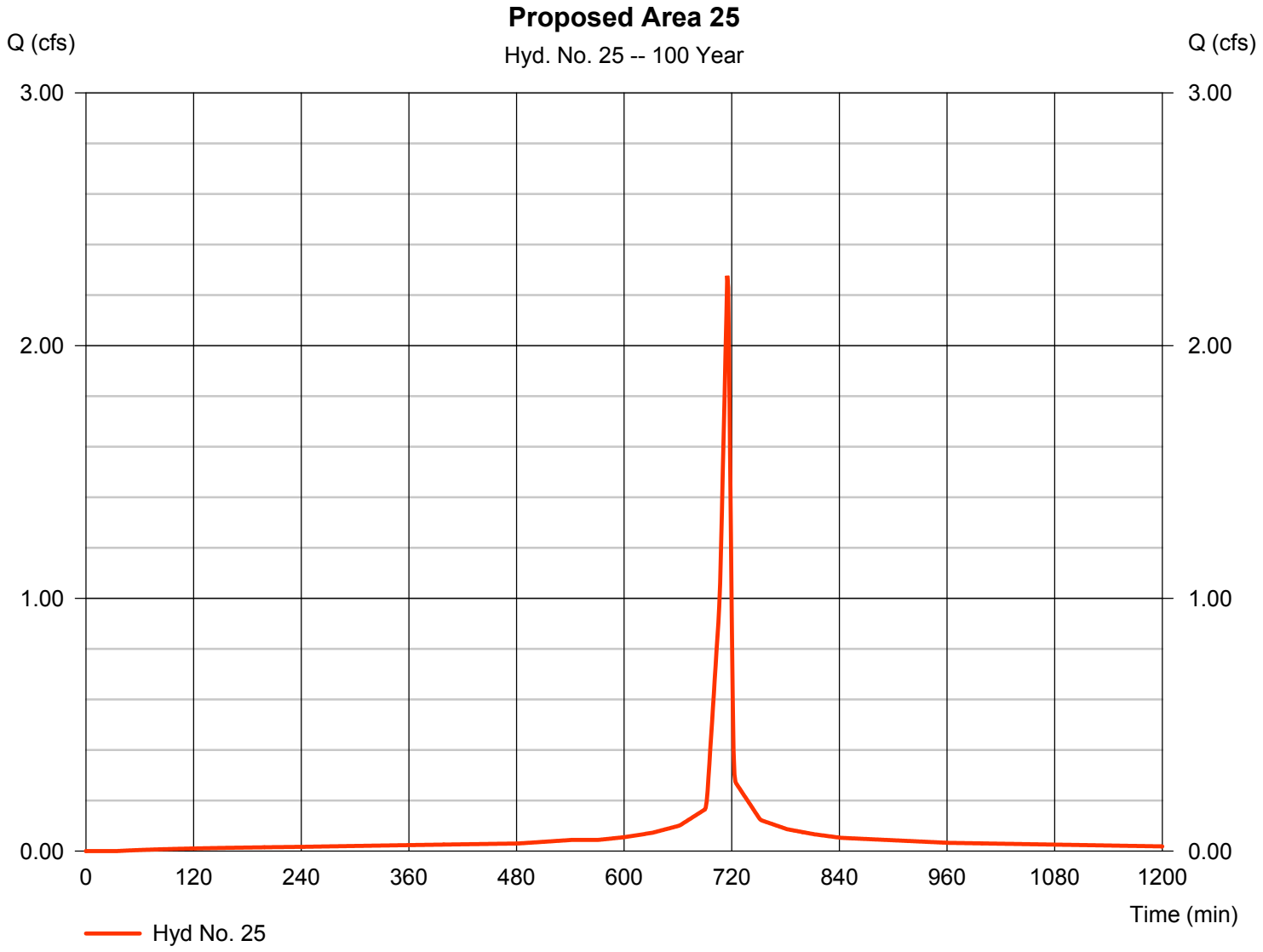
Hydrograph Report

Hyd. No. 25

Proposed Area 25

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.277 cfs
Storm frequency	=	100 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	4,942 cuft
Drainage area	=	0.200 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	1.60 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.203 x 98)] / 0.200



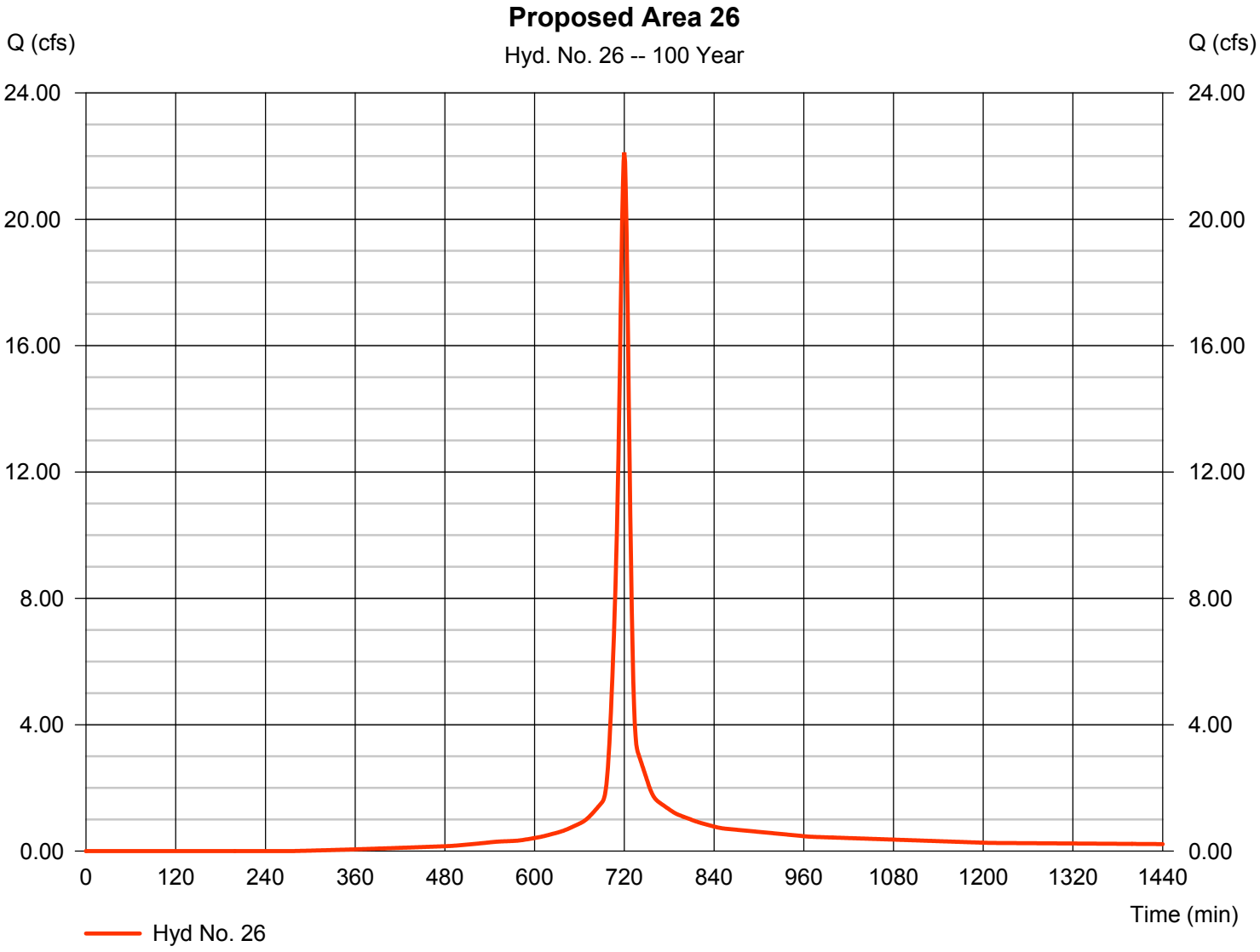
Hydrograph Report

Hyd. No. 26

Proposed Area 26

Hydrograph type	=	SCS Runoff	Peak discharge	=	22.12 cfs
Storm frequency	=	100 yrs	Time to peak	=	720 min
Time interval	=	1 min	Hyd. volume	=	55,490 cuft
Drainage area	=	2.730 ac	Curve number	=	83*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	10.40 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.626 x 98) + (2.102 x 79)] / 2.730



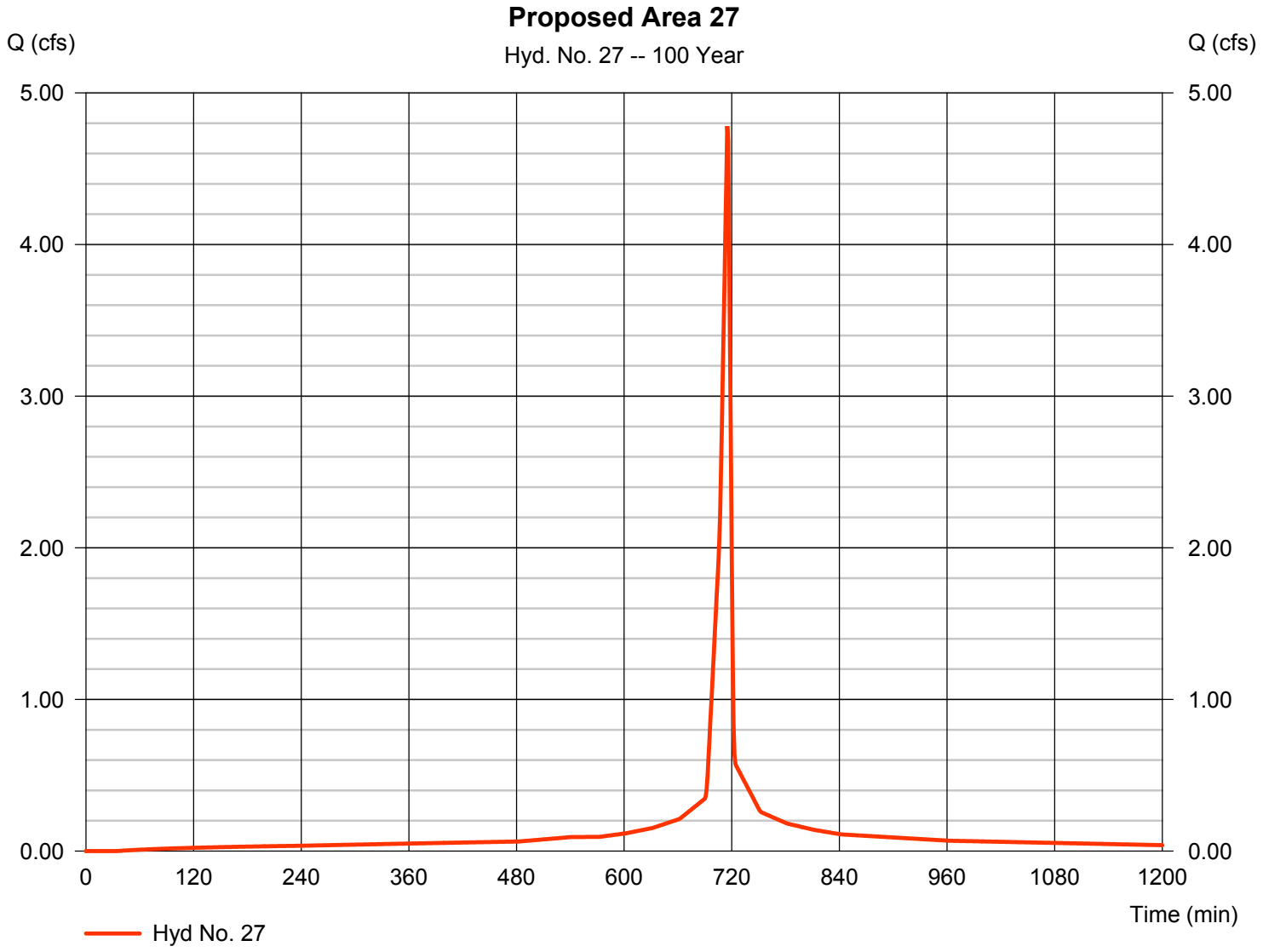
Hydrograph Report

Hyd. No. 27

Proposed Area 27

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.781 cfs
Storm frequency	=	100 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	10,378 cuft
Drainage area	=	0.420 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.00 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.420 x 98)] / 0.420



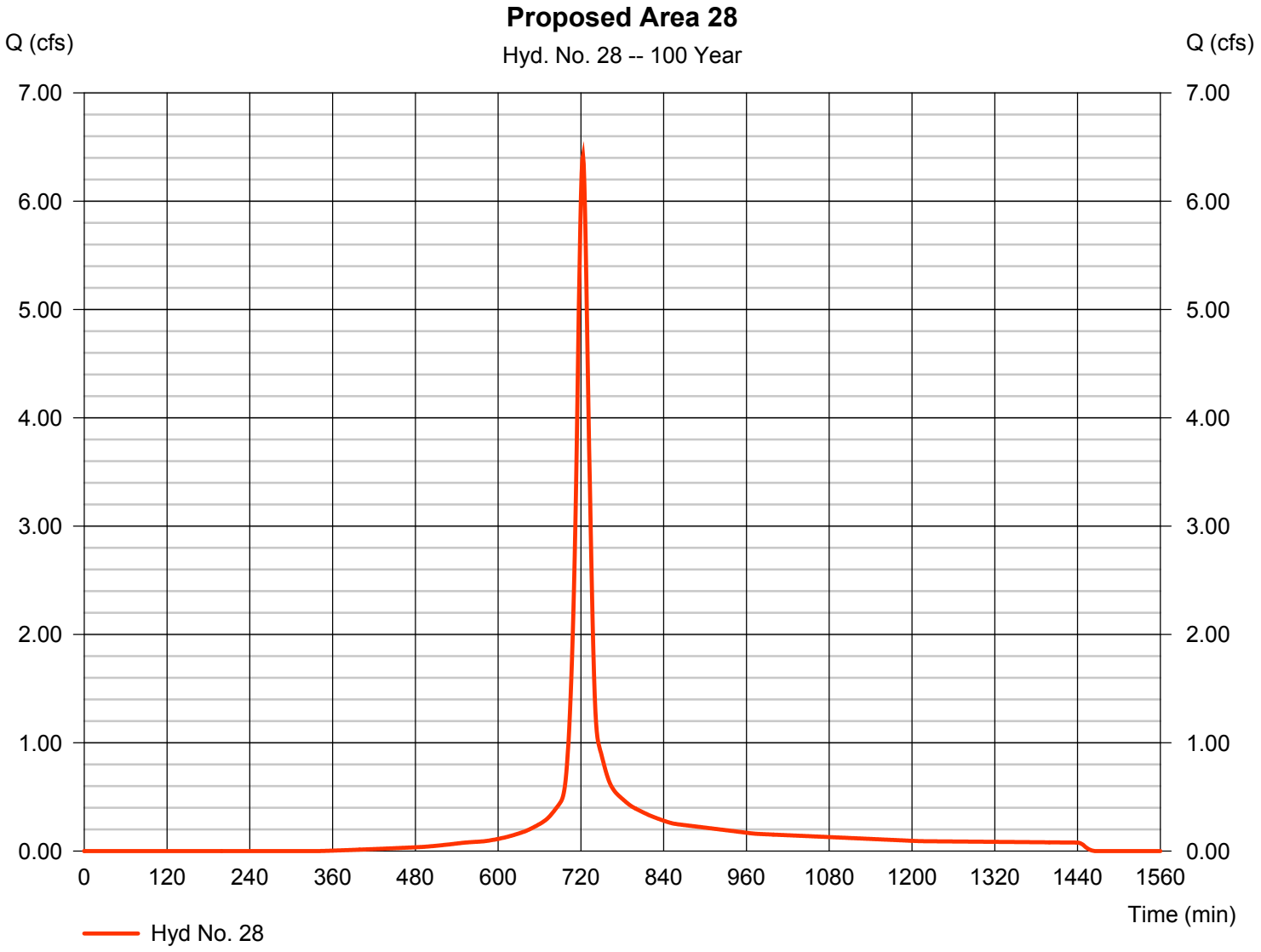
Hydrograph Report

Hyd. No. 28

Proposed Area 28

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.419 cfs
Storm frequency	=	100 yrs	Time to peak	=	723 min
Time interval	=	1 min	Hyd. volume	=	18,539 cuft
Drainage area	=	1.000 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	15.50 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.004 x 98) + (0.999 x 79)] / 1.000



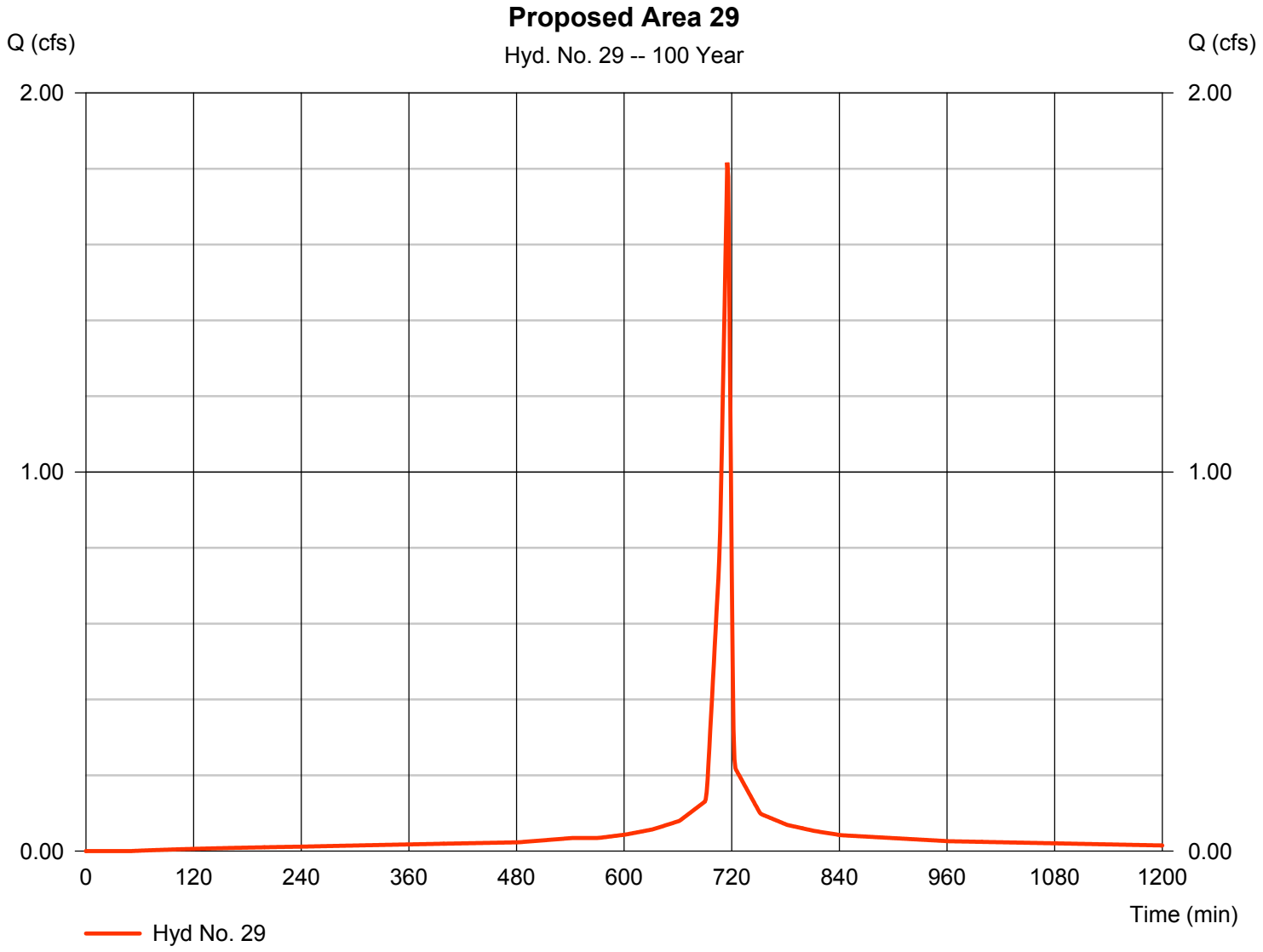
Hydrograph Report

Hyd. No. 29

Proposed Area 29

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.816 cfs
Storm frequency	=	100 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	3,888 cuft
Drainage area	=	0.160 ac	Curve number	=	97*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.20 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.150 x 98) + (0.008 x 79)] / 0.160



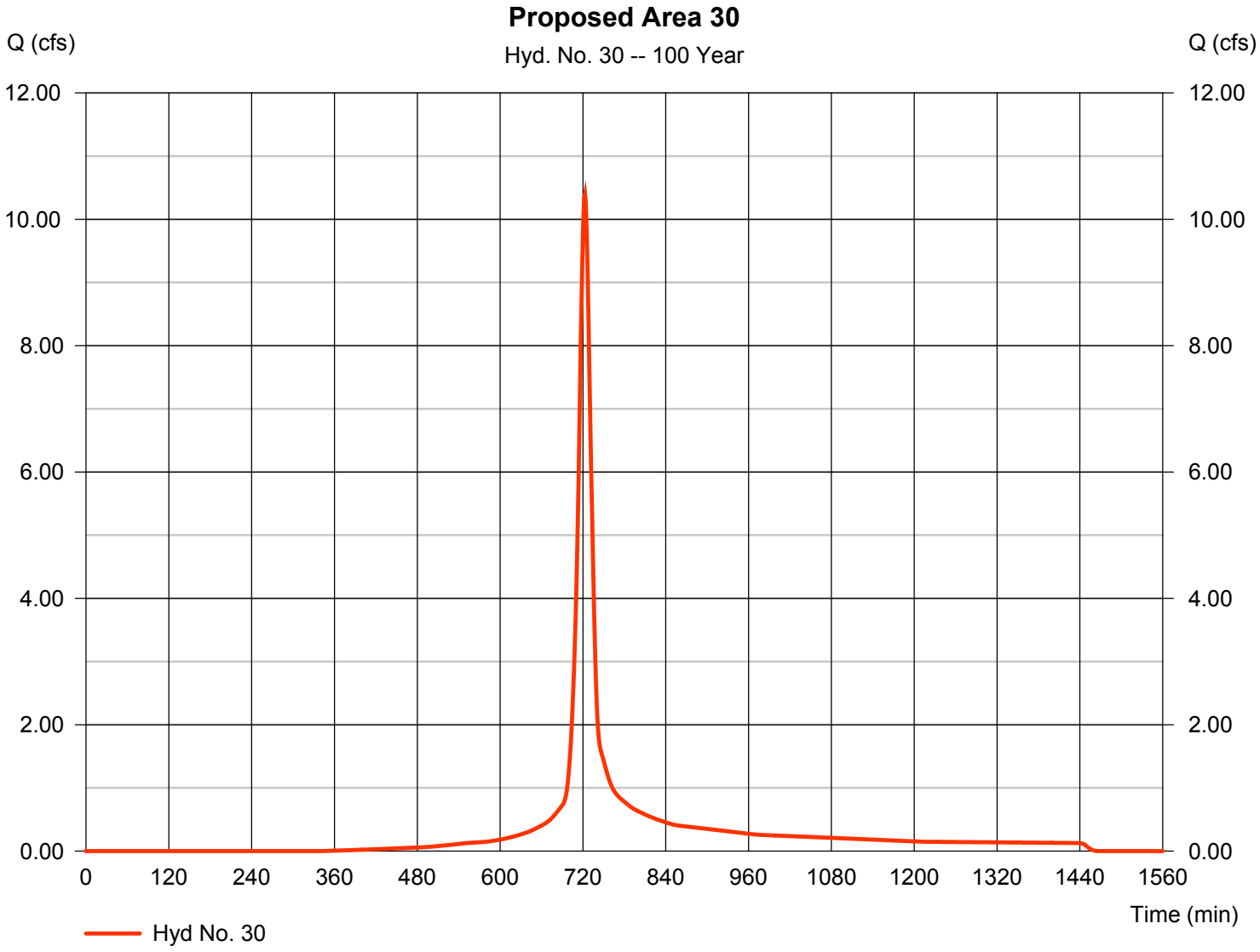
Hydrograph Report

Hyd. No. 30

Proposed Area 30

Hydrograph type	=	SCS Runoff	Peak discharge	=	10.40 cfs
Storm frequency	=	100 yrs	Time to peak	=	723 min
Time interval	=	1 min	Hyd. volume	=	30,033 cuft
Drainage area	=	1.620 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	15.70 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.004 x 98) + (1.620 x 79)] / 1.620



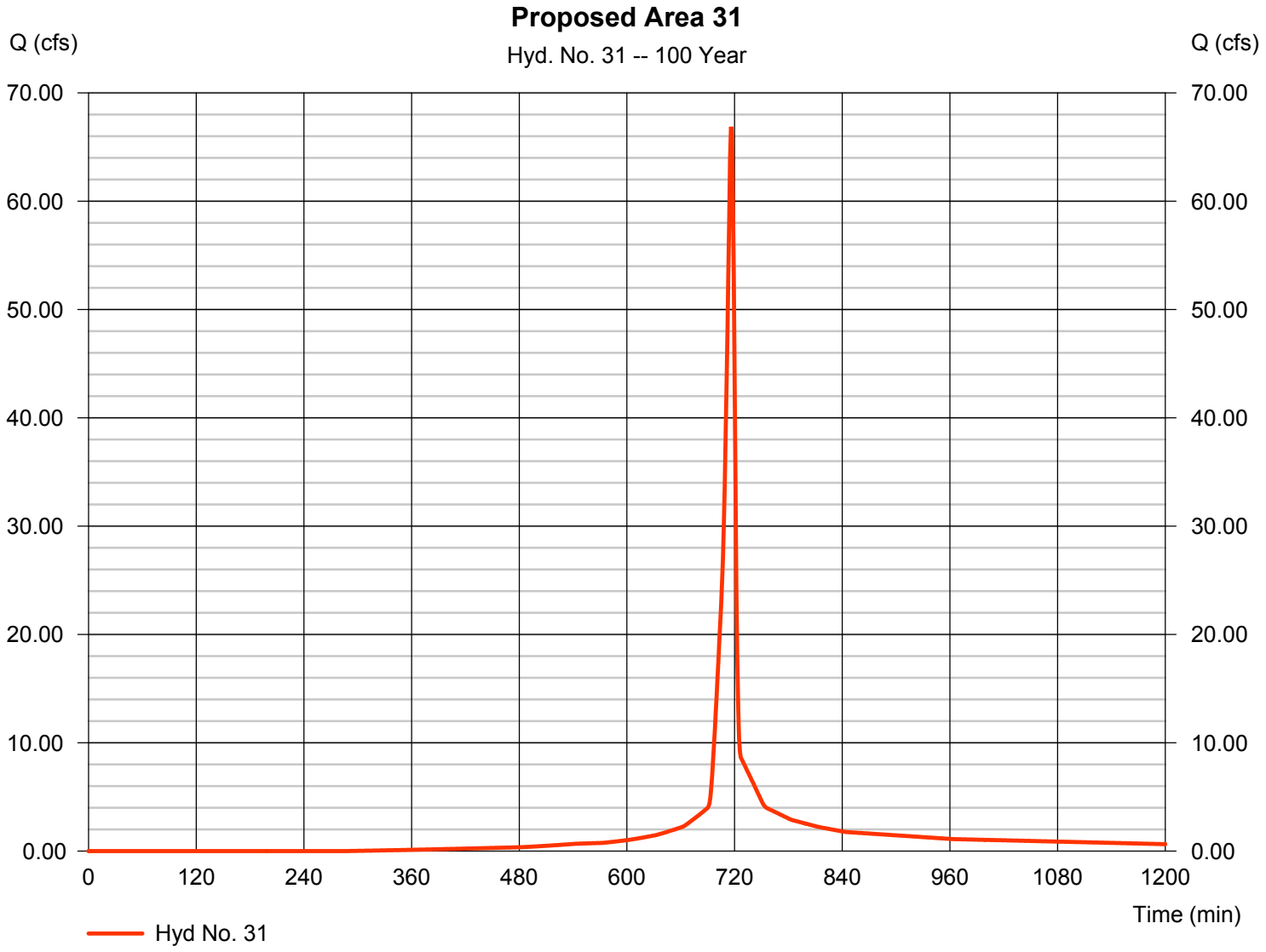
Hydrograph Report

Hyd. No. 31

Proposed Area 31

Hydrograph type	=	SCS Runoff	Peak discharge	=	66.87 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	133,545 cuft
Drainage area	=	6.830 ac	Curve number	=	82*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	4.80 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.937 x 98) + (5.893 x 79)] / 6.830

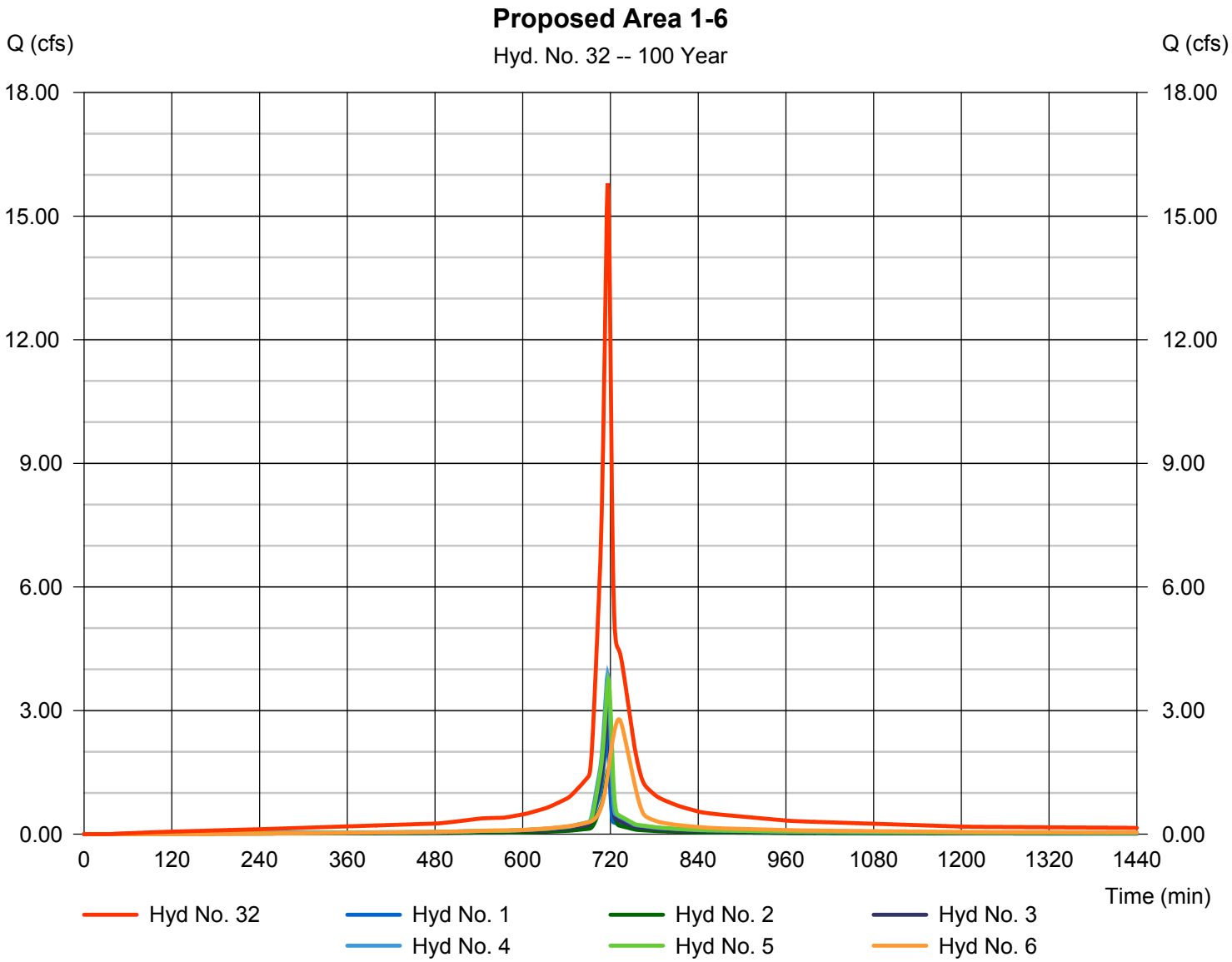


Hydrograph Report

Hyd. No. 32

Proposed Area 1-6

Hydrograph type	= Combine	Peak discharge	= 15.80 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 46,271 cuft
Inflow hyds.	= 1, 2, 3, 4, 5, 6	Contrib. drain. area	= 1.830 ac

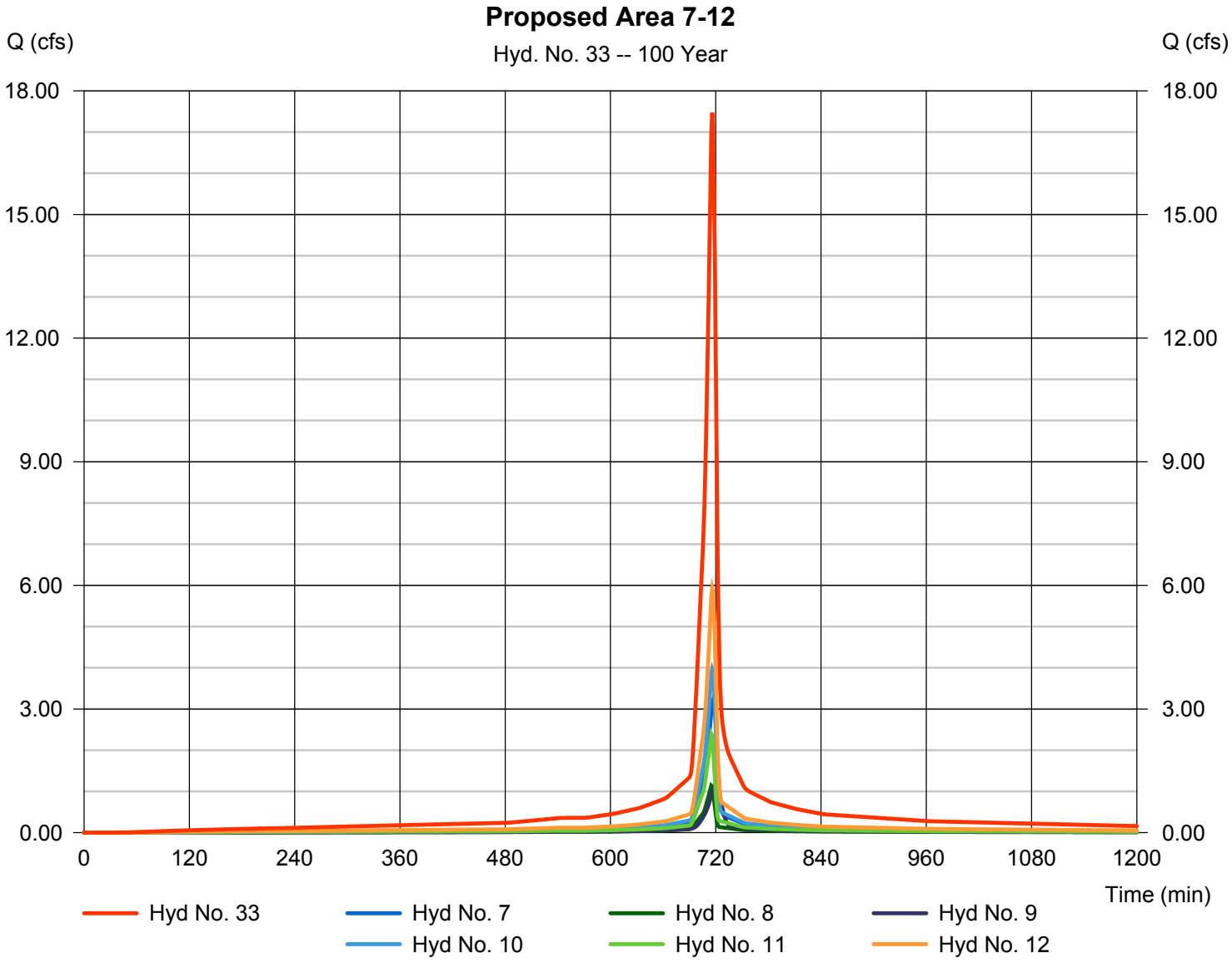


Hydrograph Report

Hyd. No. 33

Proposed Area 7-12

Hydrograph type	= Combine	Peak discharge	= 17.47 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 40,903 cuft
Inflow hyds.	= 7, 8, 9, 10, 11, 12	Contrib. drain. area	= 1.600 ac

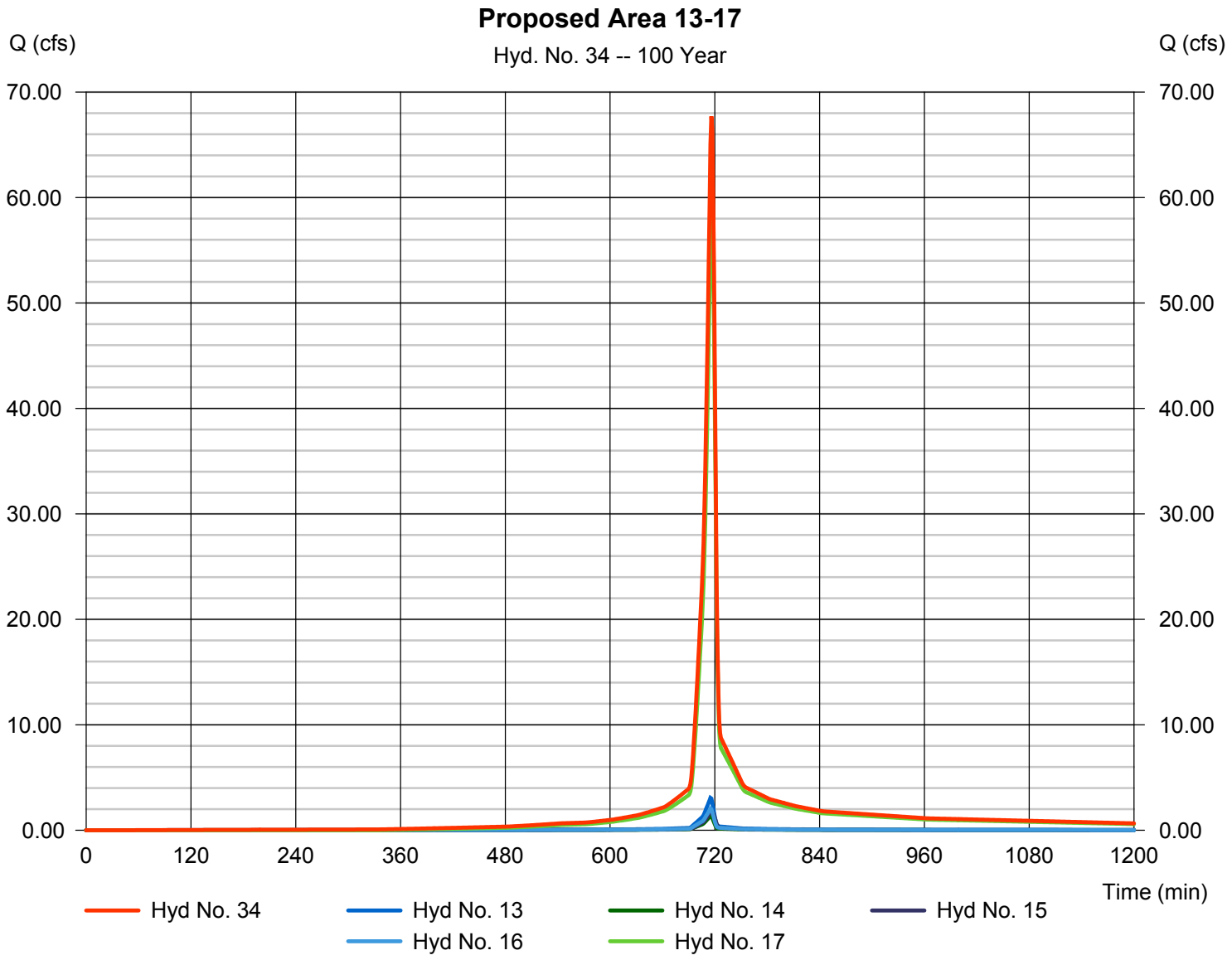


Hydrograph Report

Hyd. No. 34

Proposed Area 13-17

Hydrograph type	=	Combine	Peak discharge	=	67.70 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	135,170 cuft
Inflow hyds.	=	13, 14, 15, 16, 17	Contrib. drain. area	=	7.130 ac

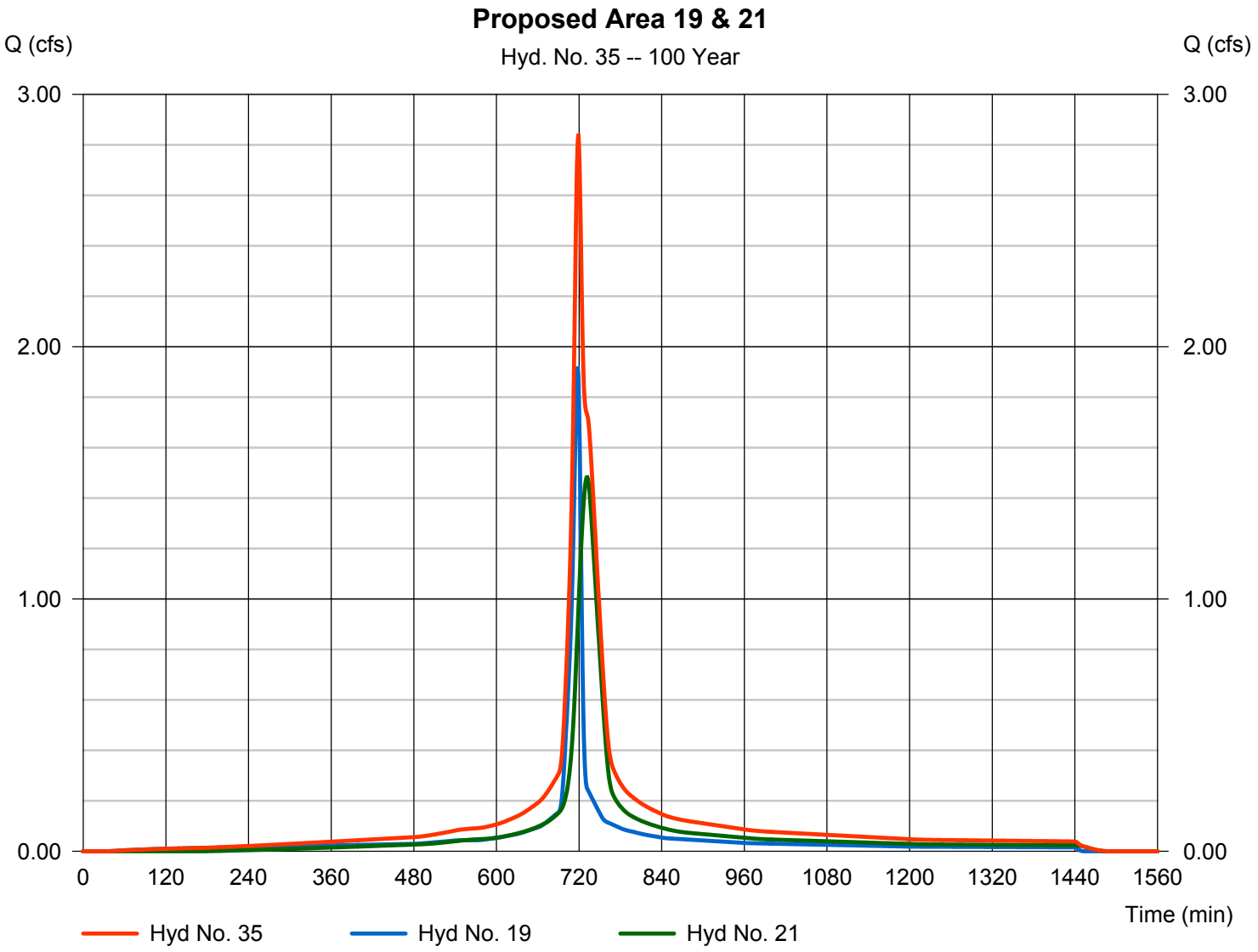


Hydrograph Report

Hyd. No. 35

Proposed Area 19 & 21

Hydrograph type	= Combine	Peak discharge	= 2.843 cfs
Storm frequency	= 100 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 11,342 cuft
Inflow hyds.	= 19, 21	Contrib. drain. area	= 0.470 ac



Hydrograph Report

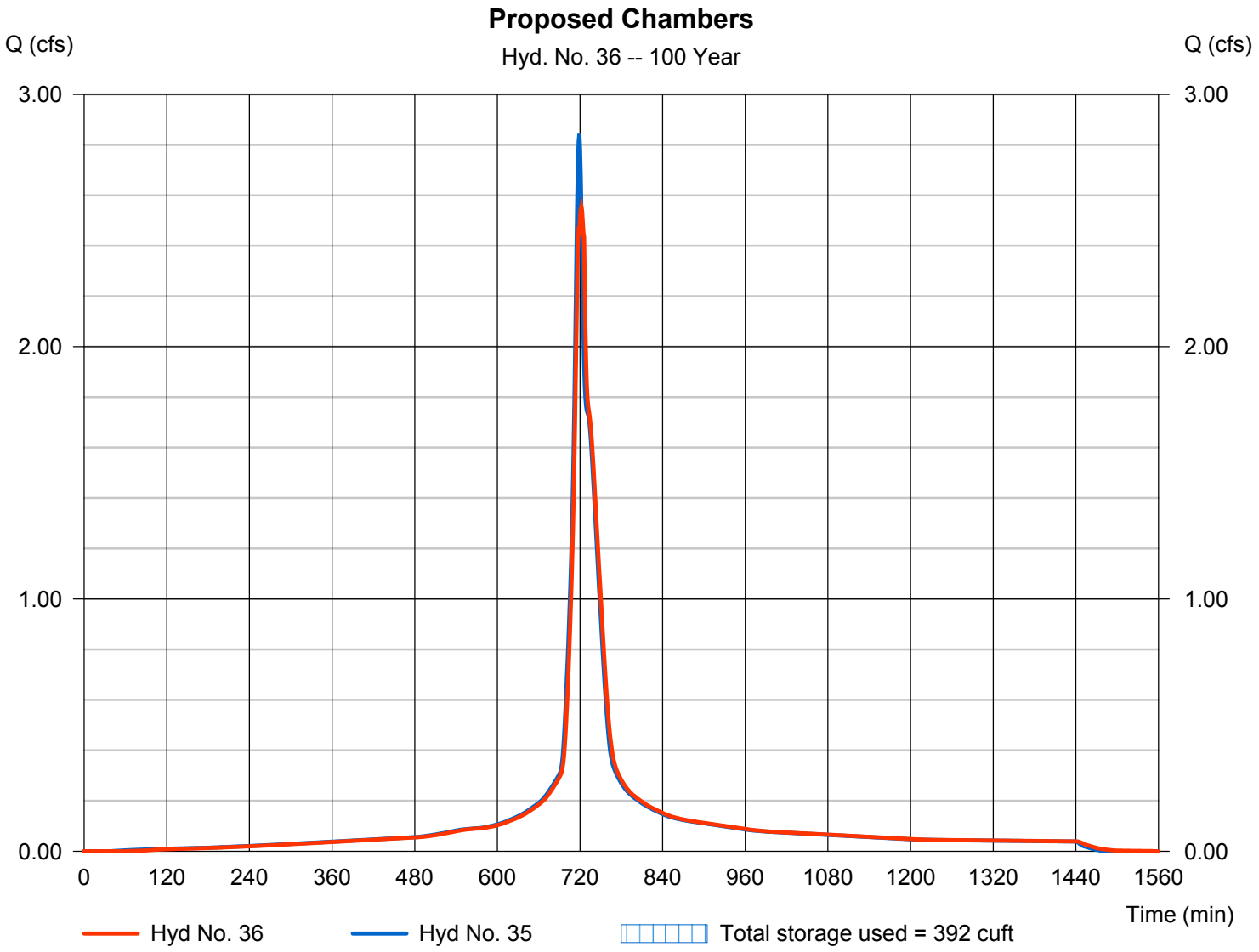
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 36

Proposed Chambers

Hydrograph type	=	Reservoir	Peak discharge	=	2.555 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	1 min	Hyd. volume	=	11,339 cuft
Inflow hyd. No.	=	35 - Proposed Area 19 & 21	Max. Elevation	=	352.65 ft
Reservoir name	=	Proposed Chambers	Max. Storage	=	392 cuft

Storage Indication method used.

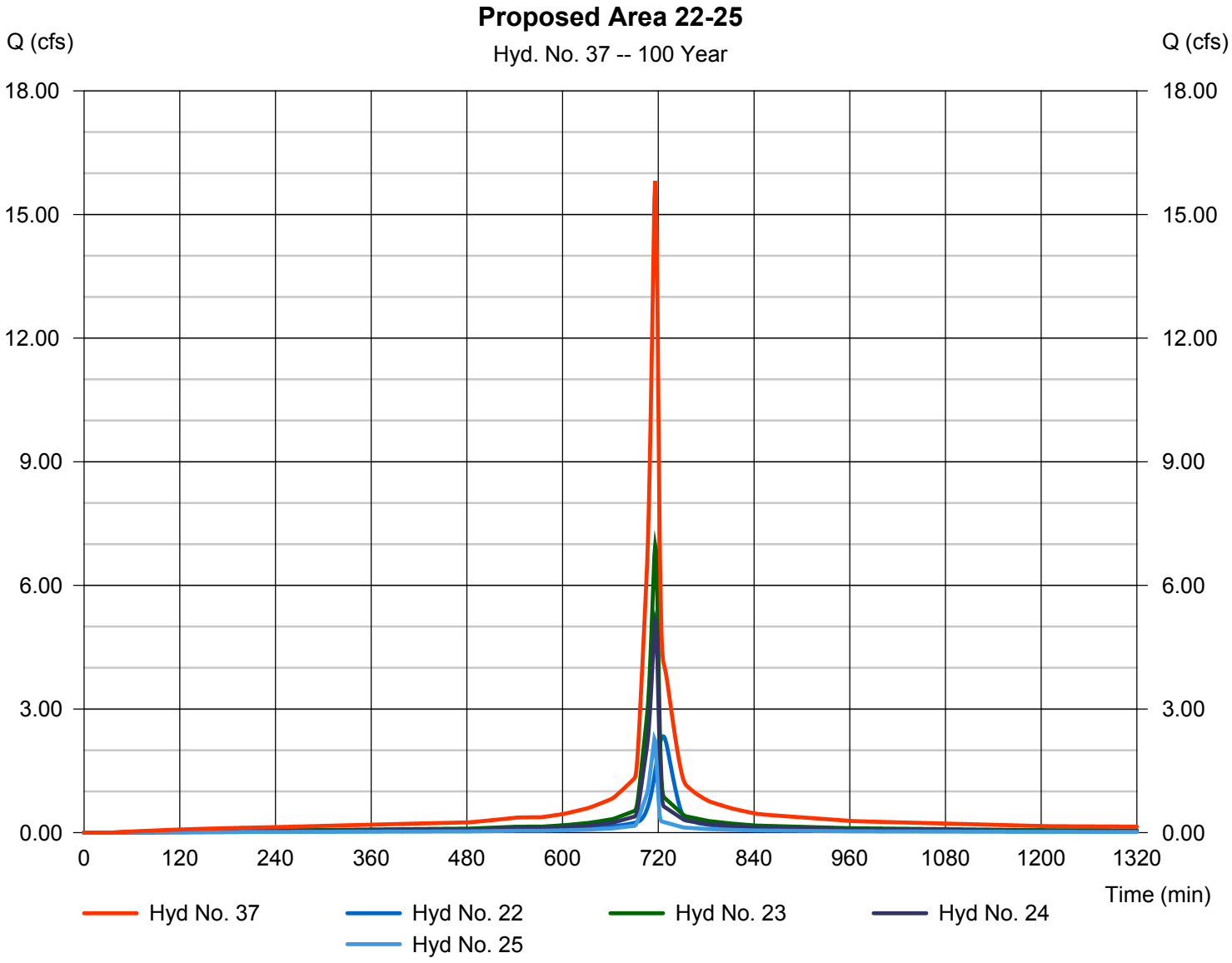


Hydrograph Report

Hyd. No. 37

Proposed Area 22-25

Hydrograph type	= Combine	Peak discharge	= 15.81 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 41,721 cuft
Inflow hyds.	= 22, 23, 24, 25	Contrib. drain. area	= 1.610 ac

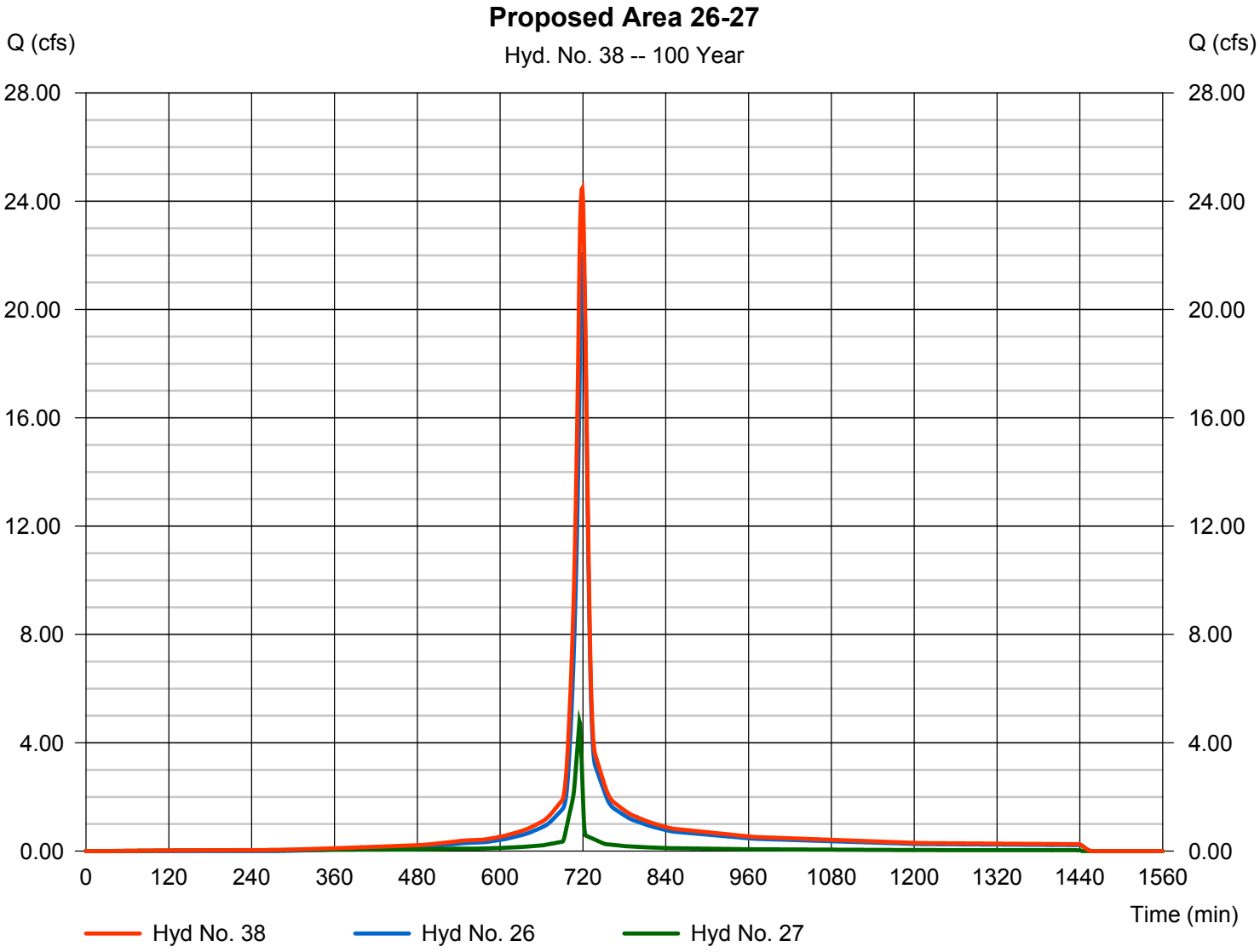


Hydrograph Report

Hyd. No. 38

Proposed Area 26-27

Hydrograph type	= Combine	Peak discharge	= 24.48 cfs
Storm frequency	= 100 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 65,868 cuft
Inflow hyds.	= 26, 27	Contrib. drain. area	= 3.150 ac

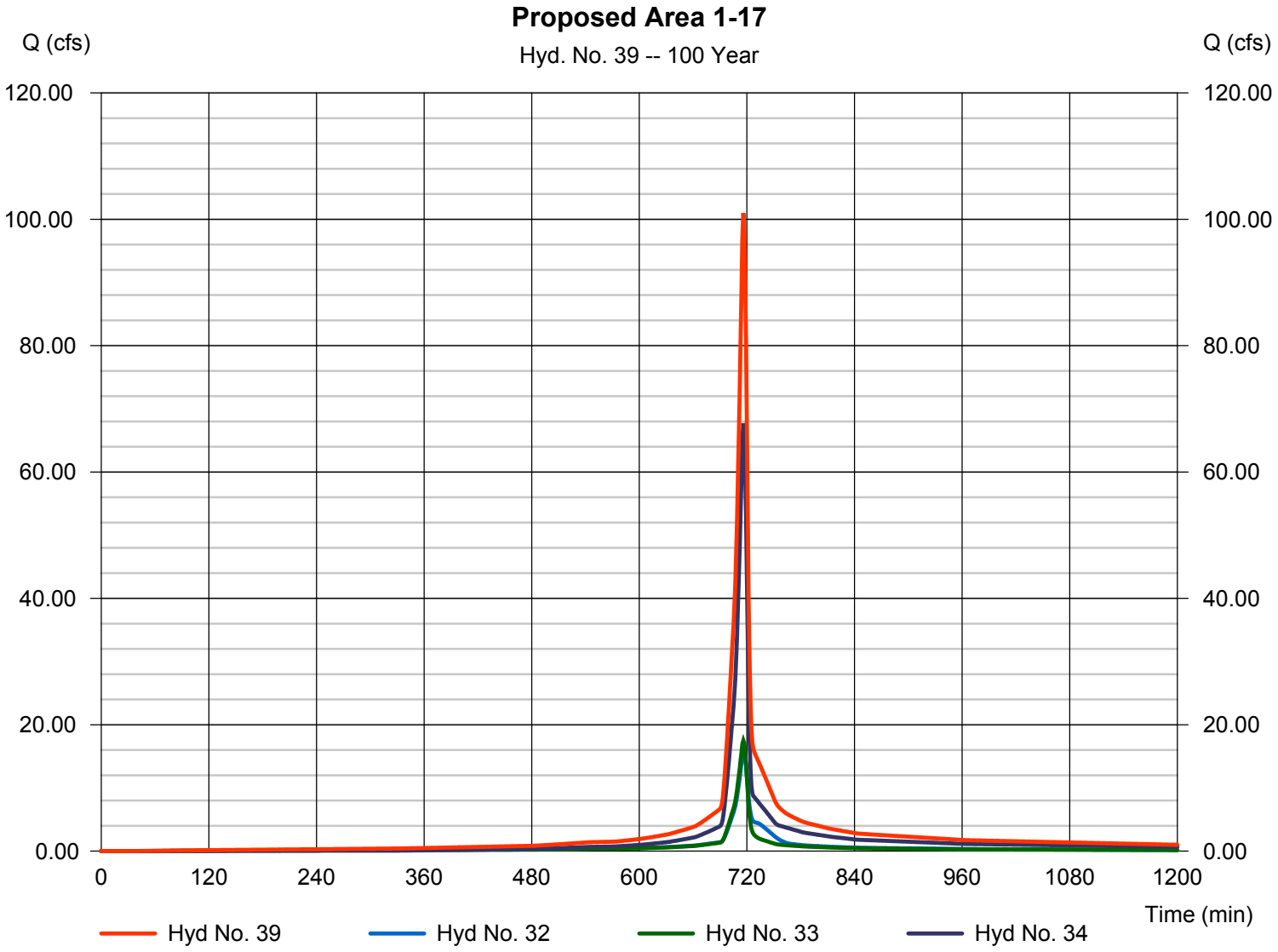


Hydrograph Report

Hyd. No. 39

Proposed Area 1-17

Hydrograph type	=	Combine	Peak discharge	=	100.97 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	222,343 cuft
Inflow hyds.	=	32, 33, 34	Contrib. drain. area	=	0.000 ac

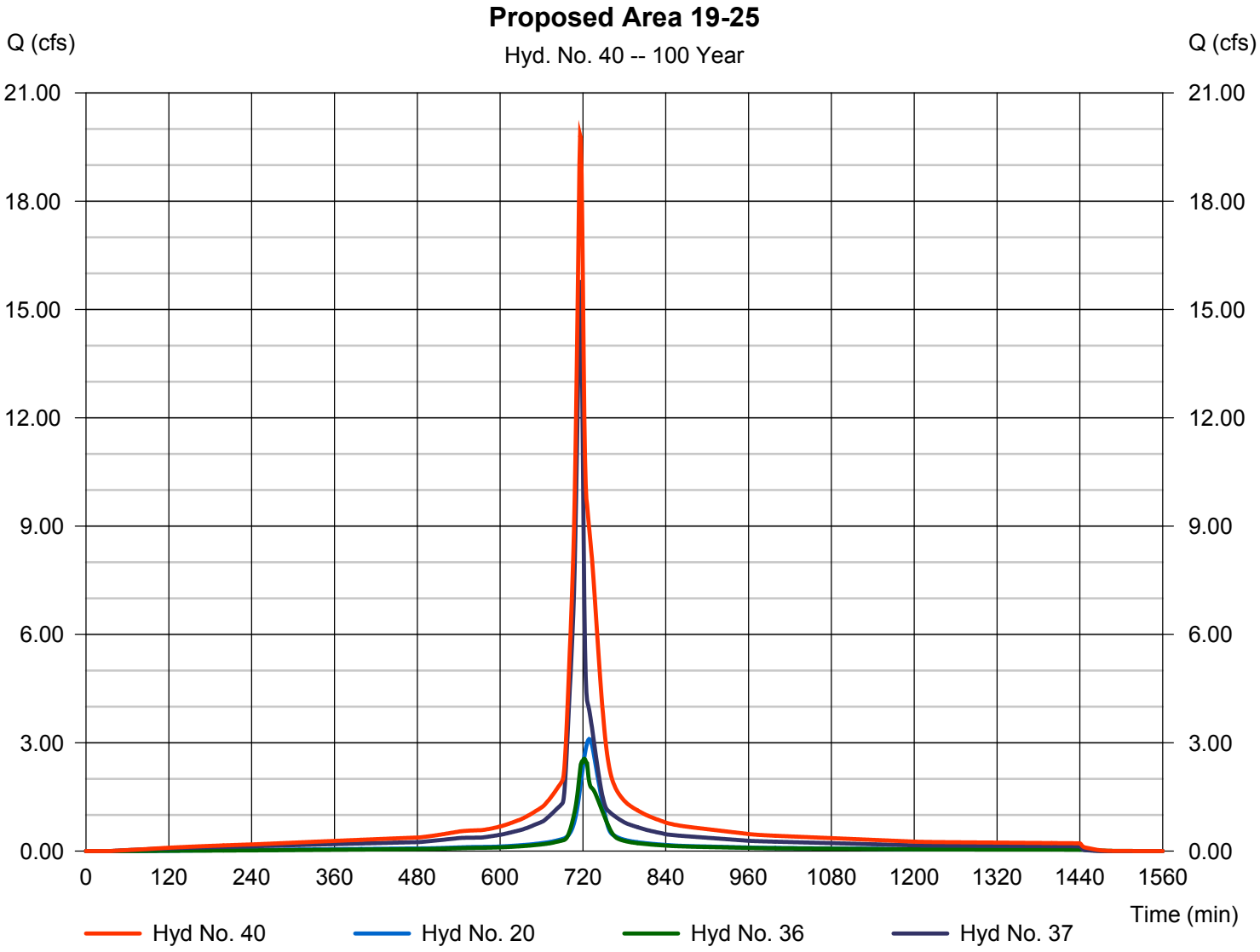


Hydrograph Report

Hyd. No. 40

Proposed Area 19-25

Hydrograph type	= Combine	Peak discharge	= 19.82 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 1 min	Hyd. volume	= 66,217 cuft
Inflow hyds.	= 20, 36, 37	Contrib. drain. area	= 0.520 ac

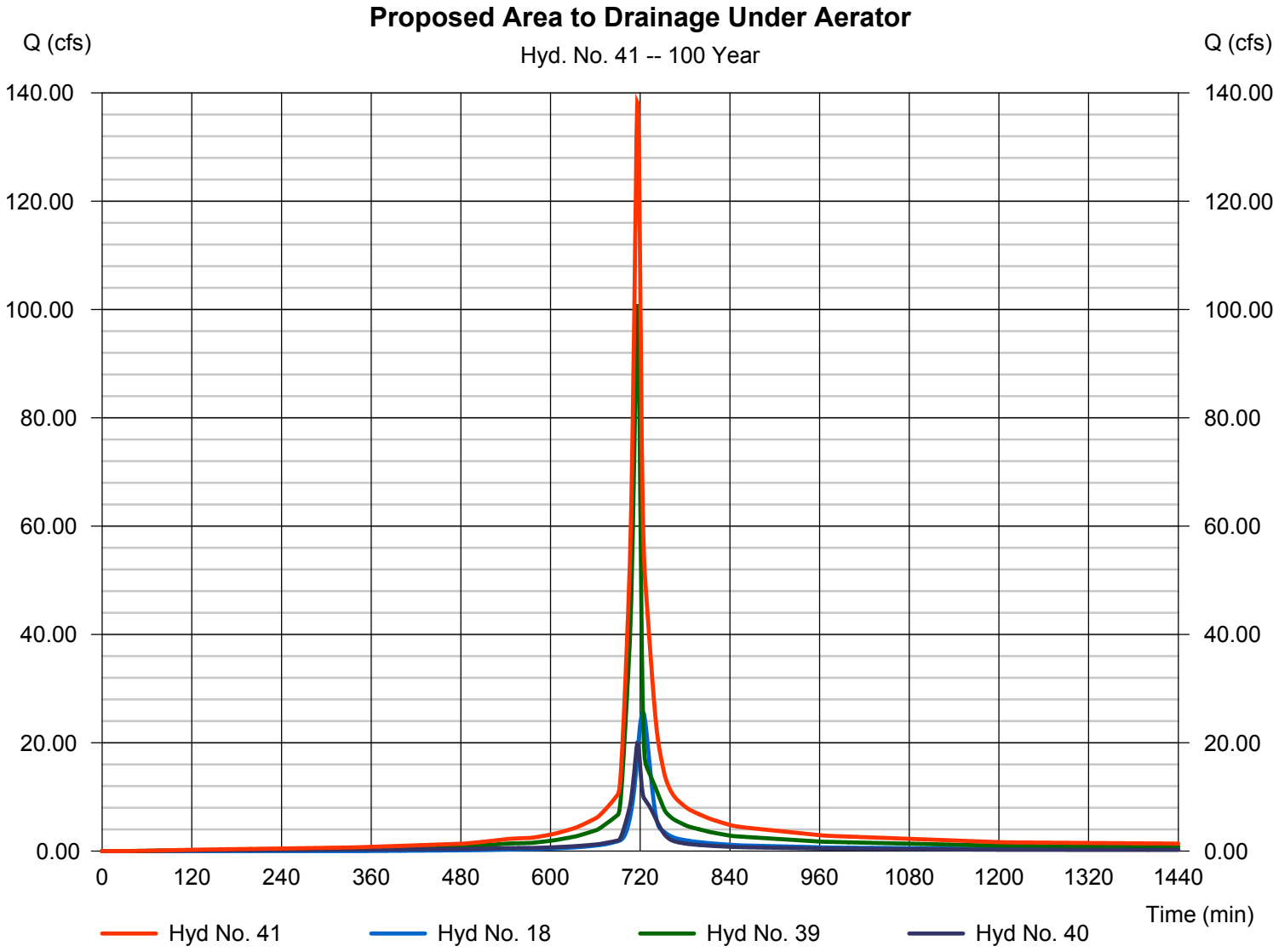


Hydrograph Report

Hyd. No. 41

Proposed Area to Drainage Under Aerator

Hydrograph type	=	Combine	Peak discharge	=	138.24 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	365,314 cuft
Inflow hyds.	=	18, 39, 40	Contrib. drain. area	=	4.240 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	69.8703	13.1000	0.8658	--------
3	0.0000	0.0000	0.0000	--------
5	79.2597	14.6000	0.8369	--------
10	88.2351	15.5000	0.8279	--------
25	102.6072	16.5000	0.8217	--------
50	114.8193	17.2000	0.8199	--------
100	127.1596	17.8000	0.8186	--------

File name: SampleFHA.idf

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.69	4.61	3.89	3.38	2.99	2.69	2.44	2.24	2.07	1.93	1.81	1.70
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.57	5.43	4.65	4.08	3.65	3.30	3.02	2.79	2.59	2.42	2.27	2.15
10	7.24	6.04	5.21	4.59	4.12	3.74	3.43	3.17	2.95	2.77	2.60	2.46
25	8.25	6.95	6.03	5.34	4.80	4.38	4.02	3.73	3.48	3.26	3.07	2.91
50	9.04	7.65	6.66	5.92	5.34	4.87	4.49	4.16	3.88	3.65	3.44	3.25
100	9.83	8.36	7.30	6.50	5.87	5.36	4.94	4.59	4.29	4.03	3.80	3.60

Tc = time in minutes. Values may exceed 60.

Precip. file name: Sample.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	2.80	3.30	0.00	4.50	5.00	6.00	0.00	7.50
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

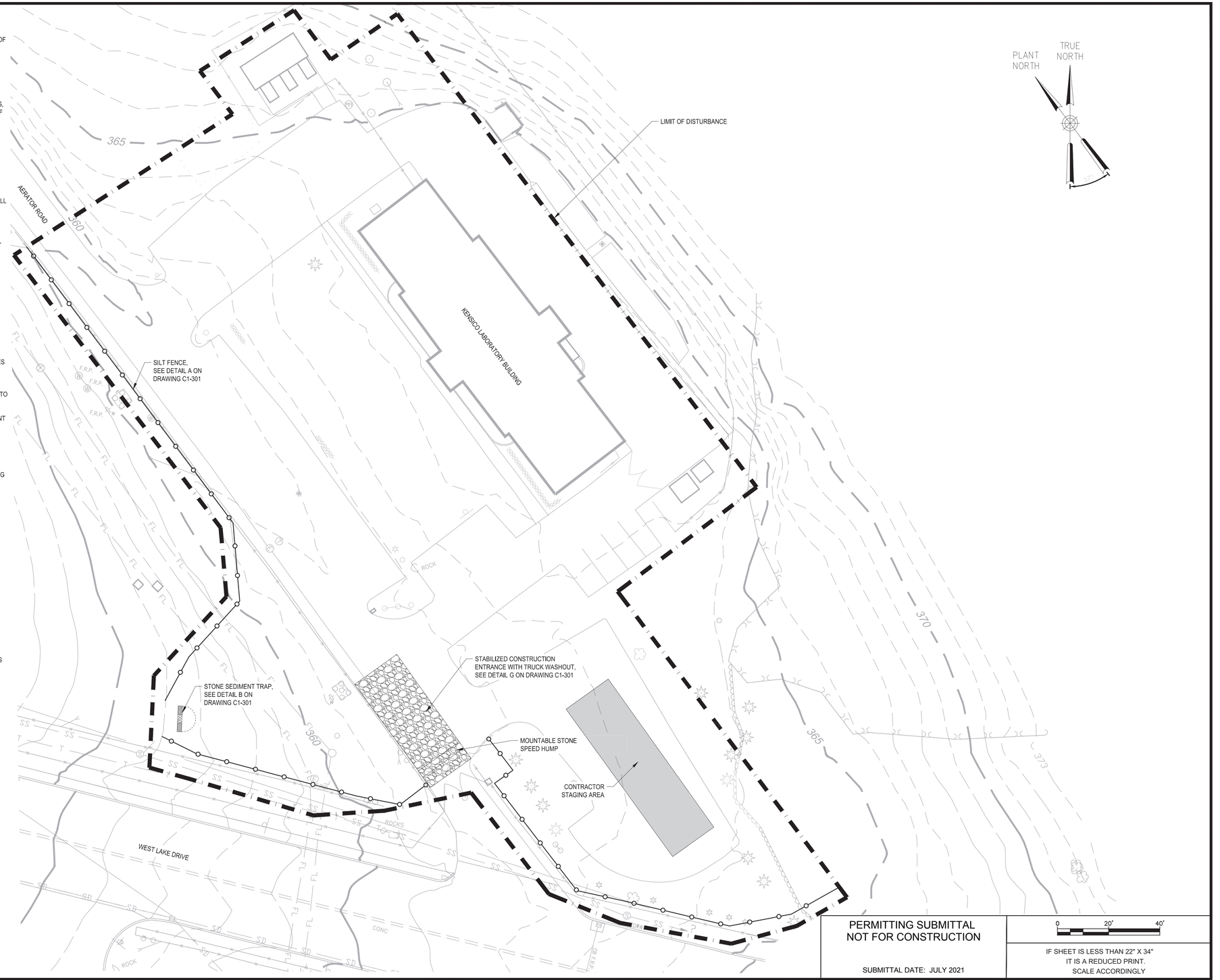
APPENDIX E
Erosion & Sediment Control Drawings

SOIL EROSION & SEDIMENT CONTROL NOTES

1. DUE TO CONSTRUCTION AND DEMOLITION PHASES REQUIRED BY THIS CONTRACT, IT IS ANTICIPATED THAT THE LOCATION AND NATURE OF EROSION AND SEDIMENT CONTROL MEASURES WILL BE ADJUSTED AS REQUIRED TO REFLECT THE CURRENT PHASE OF WORK. THE CONSTRUCTION SCHEDULE ADOPTED BY THE CONTRACTOR WILL IMPACT ON THE PLACEMENT AND NEED FOR SPECIFIC DEVICES REQUIRED FOR THE CONTROL OF EROSION. THE LOCATION AND EXTENT OF EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REVISED AT EACH PHASE OF CONSTRUCTION THAT RESULTS IN A CHANGE OF EITHER THE QUANTITY OR DIRECTION OF THE SURFACE RUNOFF FROM THE CONSTRUCTION AREAS.
2. NO CONSTRUCTION OR LAND DISTURBANCE ACTIVITY MAY BEGIN UNTIL ALL PERIMETER EROSION CONTROL MEASURES HAVE BEEN INSTALLED AS SHOWN ON THE CONTRACT DRAWINGS. MEASURES SHALL INCLUDE BUT NOT LIMITED TO TEMPORARY DIVERSION SWALES, SILT FENCING, CATCH BASIN PROTECTION AND STABILIZED CONSTRUCTION ENTRANCE. IF CLEARING IS REQUIRED FOR INSTALLATION OF A PARTICULAR MEASURE, ALL MEASURES NOT REQUIRING CLEARING SHALL BE INSTALLED FIRST. CLEARING OF THE NECESSARY LAND FOR INSTALLATION OF THE PARTICULAR MEASURE MAY THEN PROCEED.
3. ALL EROSION CONTROL MEASURES SHALL BE IN PLACE BEFORE OR AS SOON AS PRACTICABLE AFTER ANY LAND CLEARING OR CONSTRUCTION ACTIVITY.
4. CLEARING AND PAVEMENT DEMOLITION SHALL BE LIMITED AS MUCH AS POSSIBLE TO AREAS REQUIRED FOR CURRENT CONSTRUCTION ACTIVITIES. MASS CLEARING, GRADING AND PAVEMENT DEMOLITION SHALL BE AVOIDED.
5. ALL POINTS OF CONSTRUCTION INGRESS AND EGRESS SHALL BE PROTECTED TO PREVENT THE DEPOSITION OF MATERIALS ONTO TRAVERSED PUBLIC THOROUGHFARE(S) BY INSTALLING AND MAINTAINING A STABILIZED CONSTRUCTION ENTRANCE AND BY WASHING ALL VEHICLES WHEELS IN A SAFE DISPOSAL AREA. ALL MATERIALS DEPOSITED ONTO PUBLIC THOROUGHFARE(S) SHALL BE REMOVED IMMEDIATELY. PROPER PRECAUTIONS SHALL BE TAKEN TO ENSURE THAT MATERIALS DEPOSITED ONTO PUBLIC THOROUGHFARE(S) ARE REMOVED SO THAT THEY DO NOT ENTER CATCH BASINS, STORM SEWERS, COMBINED SEWERS OR ROADSIDE SWALES.
6. ALL EROSION CONTROL MEASURES SHALL BE INSPECTED FOLLOWING EVERY RAINFALL, BUT IN NO CASE LESS THAN ONCE EVERY WEEK.
7. CONTROL MEASURES SHALL BE REPAIRED OR REPLACED IMMEDIATELY AS REQUIRED TO MAINTAIN PERFORMANCE OF MEASURE. REMOVED SEDIMENTS SHALL BE DISPOSED OF IN SUCH A MANNER AS TO ENSURE FURTHER SEDIMENT TRANSPORT DOES NOT OCCUR.
8. THE CONTRACTOR SHALL INITIATE STABILIZATION MEASURES AS SOON AS PRACTICABLE IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT IN NO CASE MORE THAN 7 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. THIS REQUIREMENT DOES NOT APPLY IN THE FOLLOWING INSTANCES:
   - A. THE INITIATION OF STABILIZATION MEASURES BY THE 7TH DAY AFTER CONSTRUCTION ACTIVITY TEMPORARILY OR PERMANENTLY CEASED IS PRECLUDED BY SNOW COVER OR FROZEN GROUND CONDITIONS, STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS PRACTICABLE.
   - B. WHERE CONSTRUCTION ACTIVITY ON A PORTION OF THE SITE IS TEMPORARILY CEASED, AND EARTH-DISTURBING ACTIVITIES WILL BE RESUMED WITHIN FOURTEEN (14) DAYS, TEMPORARY STABILIZATION MEASURES NEED NOT BE INITIATED ON THAT PORTION OF THE SITE.
9. ALL AREAS SHALL BE FERTILIZED, SEEDED AND MULCHED IN ACCORDANCE WITH THE SPECIFICATIONS, AND RE-SEEDED AS NECESSARY TO ESTABLISH AND MAINTAIN A VIGOROUS DENSE VEGETATIVE COVER.
10. ALL WORK PERFORMED SHALL BE IN ACCORDANCE WITH THE "NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL" 2016, OR LATEST EDITION AND IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
11. THE CONTRACTOR SHALL TEMPORARILY REMOVE AND REPLACE REQUIRED SECTION OF FENCE DURING PROXIMITY EXCAVATION.
12. THE CONTRACTOR SHALL PROVIDE EROSION CONTROL PROTECTION AGAINST SILT ACCUMULATION ON EXISTING DRAINAGE.
13. THE CONTRACTOR SHALL PROVIDE ADJUSTABLE CATCH BASIN DRAIN INSERTS ON THE AFFECTED CATCH BASIN SHOWN ON THE DRAWING AND AS DIRECTED BY THE ENGINEER.
14. ALL GRADED OR DISTURBED AREAS INCLUDING SLOPES SHALL BE PROTECTED DURING CLEARING AND CONSTRUCTION IN ACCORDANCE WITH THE APPROVED EROSION AND SEDIMENT CONTROL PLAN UNTIL THEY ARE PERMANENTLY STABILIZED.
15. ALL SEDIMENT CONTROL PRACTICES AND MEASURES SHALL BE CONSTRUCTED, APPLIED AND MAINTAINED IN ACCORDANCE WITH THE APPROVED EROSION AND SEDIMENT CONTROL PLAN.
16. TOPSOIL REQUIRED FOR THE ESTABLISHMENT OF VEGETATION SHALL BE STOCKPILED IN AMOUNT NECESSARY TO COMPLETE FINISHED GRADING OF ALL EXPOSED AREAS.
17. AREAS TO BE FILLED SHALL BE CLEARED, GRUBBED, AND STRIPPED OF TOPSOIL TO REMOVE TREES, VEGETATION, ROOTS OR OTHER OBJECTIONABLE MATERIAL.
18. AREAS WHICH ARE TO BE TOPSOILED SHALL BE SCARIFIED TO A MINIMUM DEPTH OF FOUR INCHES PRIOR TO PLACEMENT OF TOPSOIL.
19. ALL FILLS SHALL BE COMPACTED AS REQUIRED TO REDUCE EROSION, SLIPPAGE, SETTLEMENT, SUBSIDENCE OR OTHER RELATED PROBLEMS, FILL INTENDED TO SUPPORT BUILDINGS, STRUCTURES AND CONDUITS, ETC. SHALL BE COMPACTED IN ACCORDANCE WITH SPECIFICATIONS, LOCAL REQUIREMENTS OR CODES.
20. ALL FILL SHALL BE PLACED AND COMPACTED IN LAYERS NOT TO EXCEED 9 INCHES IN THICKNESS.
21. FILL MATERIAL SHALL BE FREE OF FROZEN PARTICLES, BRUSH, ROOTS, SOD, OR OTHER FOREIGN OR OTHER OBJECTIONABLE MATERIALS THAT WOULD INTERFERE WITH OR PREVENT CONSTRUCTION OF SATISFACTORY FILLS.
22. FROZEN MATERIALS OR SOFT, MUCKY OR HIGHLY COMPRESSIBLE MATERIALS SHALL NOT BE INCORPORATED IN FILLS.
23. FILL SHALL NOT BE PLACED ON SATURATED OR FROZEN SURFACES.
24. ALL GRADE BENCHES SHALL BE KEPT FREE OF SEDIMENT DURING ALL PHASES OF DEVELOPMENT.
25. SEEPS OR SPRINGS ENCOUNTERED DURING CONSTRUCTION SHALL BE HANDLED IN ACCORDANCE WITH THE STANDARD AND SPECIFICATION FOR SUBSURFACE DRAIN OR OTHER APPROVED METHOD.
26. ALL GRADED AREAS SHALL BE PERMANENTLY STABILIZED IMMEDIATELY FOLLOWING FINISHED GRADING.
27. STOCKPILES, BORROW AREAS AND SPOIL AREAS SHALL BE SHOWN ON THE PLANS AND SHALL BE SUBJECT TO THE PROVISIONS OF NYSDEC STANDARDS AND SPECIFICATIONS.

LEGEND

- SILT FENCE
- LIMIT OF DISTURBANCE
- SEDIMENT TRAP
- STABILIZED CONSTRUCTION ENTRANCE WITH TRUCK WASHOUT
- CONTRACTOR STAGING AREA



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SUBMITTAL DATE: JULY 2021

0 20' 40'

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NO.	DATE	REVISIONS/DESCRIPTION	APPR'D

DESIGNED BY: J. Causarano | DRAWN BY: C. DeBona
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STATE OF NEW YORK · RUDOLF J. GEDEON · 070901 · LICENSED PROFESSIONAL ENGINEER

NYC Environmental Protection

ACCOUNTABLE MANAGER	JOSE NIEVES
PROJECT MANAGER	MARK DELBALZO, P.E.

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REPURPOSING OF THE KENSICO LABORATORY AS THE KENSICO REGIONAL HEADQUARTERS
MOUNT PLEASANT, NEW YORK
CONTRACT CRO-624

CIVIL
SOIL EROSION AND SEDIMENT CONTROL PLAN

DATE: JULY 2021
SCALE: 1" = 20'
SHEET NO: 7 OF 39
DRAWING NO. C-102

SECURITY / CONSTRUCTION FENCE

INLET PROTECTION (TYP.)

EXISTING SPILL RESPONSE STORAGE CONTAINER

SECURITY / CONSTRUCTION FENCE

W. WESTLAKE DRIVE

STABILIZED CONSTRUCTION ENTRANCE

SILT FENCE (TYP.)

LIMITS OF WORK (TYP.)

SHAFT 18 BUILDING

AERATOR

FOR CONTINUATION, SEE DETAIL A ON THIS SHEET

CONSTRUCTION STAGING / CONTRACTOR TRAILER & BATHROOM AREA, PHASE 1

CONSTRUCTION STAGING / CONTRACTOR TRAILER & BATHROOM AREA, PHASE 2

LIMITS OF WORK (TYP.)

SILT FENCE (TYP.)

INLET PROTECTION (TYP.)

SECURITY / CONSTRUCTION FENCE

WESTLAKE DRIVE

STABILIZED CONSTRUCTION ACCESS

12' x 24' CONCRETE WASH OUT STATION

FLUORIDE BUILDING

INLET PROTECTION (TYP.)

SILT FENCE (TYP.)

EXISTING SPILL RESPONSE STORAGE CONTAINER

LIMITS OF WORK (TYP.)

FOR EROSION AND SEDIMENT CONTROL WITHIN THIS AREA, SEE DRAWING NO. C1-105

KENISCO RESERVOIR

W. WESTLAKE DRIVE

WESTLAKE DRIVE

A - CONTINUATION
SCALE: 1" = 50'

LEGEND

- SILT FENCE
- 6' CONSTRUCTION FENCE
- WORK LIMITS
- STABILIZED CONSTRUCTION ENTRANCE
- INLET PROTECTION

PERMITTING SUBMITTAL
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SUBMITTAL DATE: JULY 2021

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6901 JERICHO TURNPIKE, SUITE 216
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Hazen

STATE OF NEW YORK ROBERT J. GEDEON 070904 REGISTERED PROFESSIONAL ENGINEER

NYC Environmental Protection

ACCOUNTABLE MANAGER	JOSE NIEVES
PROJECT MANAGER	MARK DELBALZO, P.E.

NEW YORK CITY ENVIRONMENTAL PROTECTION
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WATERFOWL MANAGEMENT PROGRAM BUILDING AND PAVING
MOUNT PLEASANT, NEW YORK

SOIL EROSION AND SEDIMENT CONTROL PLAN FOR PAVEMENT

DATE:	JULY 2021
SCALE:	1" = 50'
SHEET NO:	6 OF 39
DRAWING NO.	C1-101

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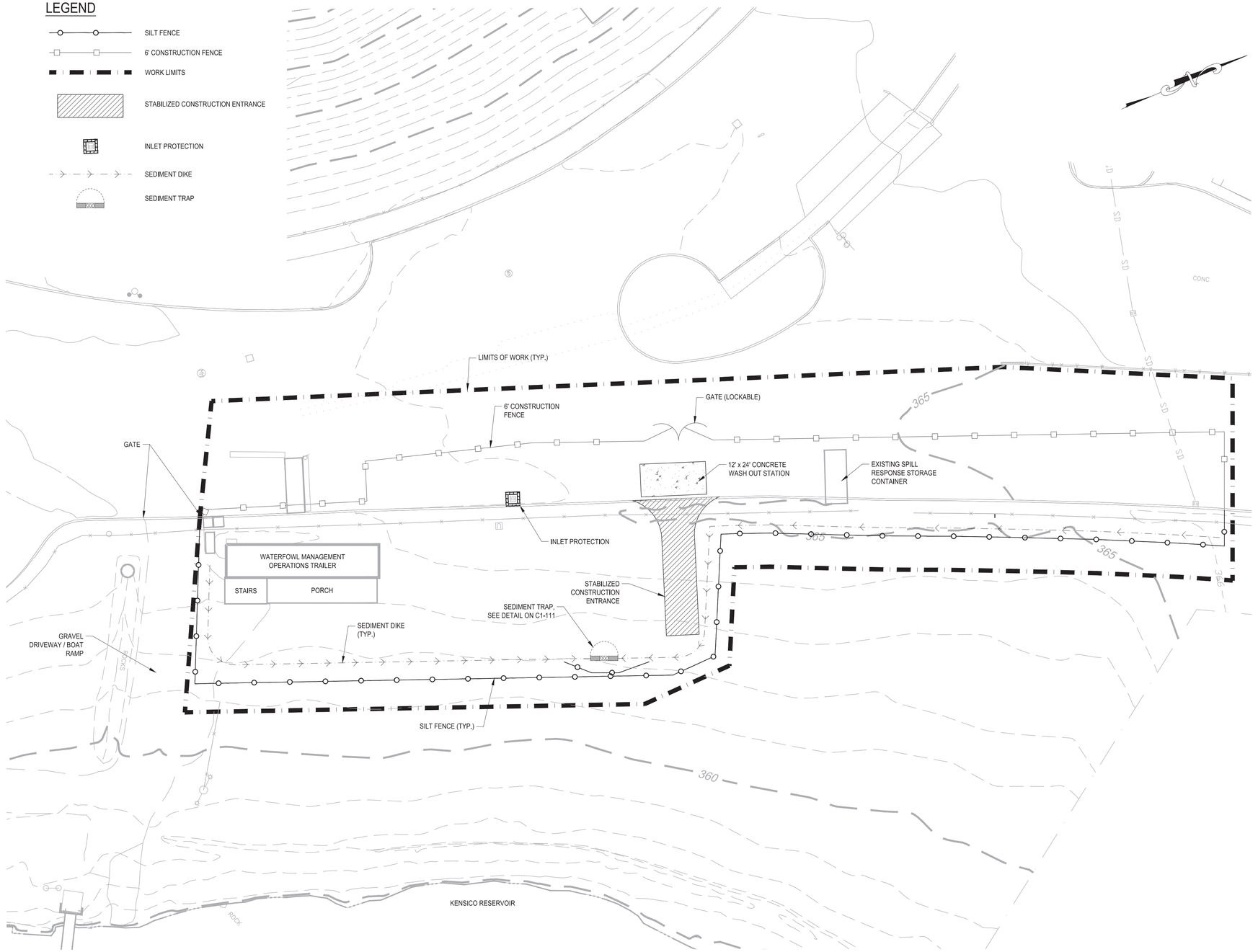
SOIL EROSION & SEDIMENT CONTROL NOTES:

1. DUE TO CONSTRUCTION AND DEMOLITION PHASE REQUIRED BY THIS CONTRACT, IT IS ANTICIPATED THAT THE LOCATION AND NATURE OF EROSION AND SEDIMENT CONTROL MEASURES WILL BE ADJUSTED AS REQUIRED TO REFLECT THE CURRENT PHASE OF WORK. THE CONSTRUCTION SCHEDULE ADOPTED BY THE CONTRACTOR WILL IMPACT ON THE PLACEMENT AND NEED FOR SPECIFIC DEVICES REQUIRED FOR THE CONTROL OF EROSION. THE LOCATION AND EXTENT OF EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REVISED AT EACH PHASE OF CONSTRUCTION THAT RESULTS IN A CHANGE OF EITHER THE QUANTITY OR DIRECTION OF THE SURFACE RUNOFF FROM THE CONSTRUCTION AREAS.
2. NO CONSTRUCTION OR LAND DISTURBANCE ACTIVITY MAY BEGIN UNTIL ALL PERIMETER EROSION CONTROL MEASURES HAVE BEEN INSTALLED AS SHOWN ON THE CONTRACT DRAWINGS. MEASURES SHALL INCLUDE BUT NOT LIMITED TO TEMPORARY DIVERSION SWALES, SILT FENCING, CATCH BASIN PROTECTION AND STABILIZED CONSTRUCTION ENTRANCE. IF CLEARING IS REQUIRED FOR INSTALLATION OF A PARTICULAR MEASURE, ALL MEASURES NOT REQUIRING CLEARING SHALL BE INSTALLED FIRST. CLEARING OF THE NECESSARY LAND FOR INSTALLATION OF THE PARTICULAR MEASURE MAY THEN PROCEED.
3. ALL EROSION CONTROL MEASURES SHALL BE IN PLACE BEFORE ANY LAND CLEARING OR CONSTRUCTION ACTIVITY.
4. CLEARING AND PAVEMENT DEMOLITION SHALL BE LIMITED AS MUCH AS POSSIBLE TO AREAS REQUIRED FOR CURRENT CONSTRUCTION ACTIVITIES. MASS CLEARING, GRADING AND PAVEMENT DEMOLITION SHALL BE AVOIDED.
5. ALL POINTS OF CONSTRUCTION INGRESS AND EGRESS SHALL BE PROTECTED TO PREVENT THE DEPOSITION OF MATERIALS ONTO TRAVERSED PUBLIC THOROUGHFARE(S) BY INSTALLING AND MAINTAINING A STABILIZED CONSTRUCTION ENTRANCE AND BY WASHING ALL VEHICLES WHEELS IN A SAFE DISPOSAL AREA. ALL MATERIALS DEPOSITED ONTO PUBLIC THOROUGHFARE(S) SHALL BE REMOVED IMMEDIATELY. PROPER PRECAUTIONS SHALL BE TAKEN TO ENSURE THAT MATERIALS DEPOSITED ONTO PUBLIC THOROUGHFARE(S) ARE REMOVED SO THAT THEY DO NOT ENTER CATCH BASINS, STORM SEWERS, COMBINED SEWERS OR ROADSIDE SWALES.
6. ALL EROSION CONTROL MEASURES SHALL BE INSPECTED FOLLOWING EVERY RAINFALL, BUT IN NO CASE LESS THAN ONCE EVERY WEEK.
7. CONTROL MEASURES SHALL BE REPAIRED OR REPLACED IMMEDIATELY AS REQUIRED TO MAINTAIN PERFORMANCE OF MEASURE. REMOVED SEDIMENTS SHALL BE DISPOSED OF IN SUCH A MANNER AS TO ENSURE FURTHER SEDIMENT TRANSPORT DOES NOT OCCUR.
8. THE CONTRACTOR SHALL INITIATE STABILIZATION MEASURES AS SOON AS PRACTICABLE IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT IN NO CASE MORE THAN 7 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. THIS REQUIREMENT DOES NOT APPLY IN THE FOLLOWING INSTANCES:
   - A. THE INITIATION OF STABILIZATION MEASURES BY THE 7TH DAY AFTER CONSTRUCTION ACTIVITY TEMPORARILY OR PERMANENTLY CEASED IS PRECLUDED BY SNOW COVER OR FROZEN GROUND CONDITIONS, STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS PRACTICABLE.
   - B. WHERE CONSTRUCTION ACTIVITY ON A PORTION OF THE SITE IS TEMPORARILY CEASED, AND EARTH-DISTURBING ACTIVITIES WILL BE RESUMED WITHIN SEVEN (7) DAYS, TEMPORARY STABILIZATION MEASURES NEED NOT BE INITIATED ON THAT PORTION OF THE SITE.
9. ALL AREAS SHALL BE FERTILIZED, SEEDED AND MULCHED IN ACCORDANCE WITH THE SPECIFICATIONS, AND RE-SEEDED AS NECESSARY TO ESTABLISH AND MAINTAIN A VIGOROUS DENSE VEGETATIVE COVER.
10. ALL WORK PERFORMED SHALL BE IN ACCORDANCE WITH THE "NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL" 2016, OR LATEST EDITION AND IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
11. THE CONTRACTOR SHALL TEMPORARILY REMOVE AND REPLACE REQUIRED SECTION OF FENCE DURING PROXIMITY EXCAVATION.
12. THE CONTRACTOR SHALL PROVIDE EROSION CONTROL PROTECTION AGAINST SILT ACCUMULATION ON EXISTING DRAINAGE.
13. THE CONTRACTOR SHALL PROVIDE ADJUSTABLE CATCH BASIN DRAIN INSERTS ON THE AFFECTED CATCH BASIN SHOWN ON THE DRAWING AND AS DIRECTED BY THE ENGINEER.
14. ALL GRADED OR DISTURBED AREAS INCLUDING SLOPES SHALL BE PROTECTED DURING CLEARING AND CONSTRUCTION IN ACCORDANCE WITH THE APPROVED EROSION AND SEDIMENT CONTROL PLAN UNTIL THEY ARE PERMANENTLY STABILIZED.
15. ALL SEDIMENT CONTROL PRACTICES AND MEASURES SHALL BE CONSTRUCTED, APPLIED AND MAINTAINED IN ACCORDANCE WITH THE APPROVED EROSION AND SEDIMENT CONTROL PLAN.
16. TOPSOIL REQUIRED FOR THE ESTABLISHMENT OF VEGETATION SHALL BE STOCKPILED IN AMOUNT NECESSARY TO COMPLETE FINISHED GRADING OF ALL EXPOSED AREAS.
17. AREAS TO BE FILLED SHALL BE CLEARED, GRUBBED, AND STRIPPED OF TOPSOIL TO REMOVE TREES, VEGETATION, ROOTS OR OTHER OBJECTIONABLE MATERIAL.
18. AREAS WHICH ARE TO BE TOPSOILED SHALL BE SCARIFIED TO A MINIMUM DEPTH OF FOUR INCHES PRIOR TO PLACEMENT OF TOPSOIL.
19. ALL FILLS SHALL BE COMPACTED AS REQUIRED TO REDUCE EROSION, SLIPPAGE, SETTLEMENT, SUBSIDENCE OR OTHER RELATED PROBLEMS. FILL INTENDED TO SUPPORT BUILDINGS, STRUCTURES AND CONDUITS, ETC. SHALL BE COMPACTED IN ACCORDANCE WITH LOCAL REQUIREMENTS OR CODES.
20. ALL FILL SHALL BE PLACED AND COMPACTED IN LAYERS NOT TO EXCEED 9 INCHES IN THICKNESS.
21. FILL MATERIAL SHALL BE FREE OF FROZEN PARTICLES, BRUSH, ROOTS, SOD, OR OTHER FOREIGN OR OTHER OBJECTIONABLE MATERIALS THAT WOULD INTERFERE WITH OR PREVENT CONSTRUCTION OF SATISFACTORY FILLS.
22. FROZEN MATERIALS OR SOFT, MUCKY OR HIGHLY COMPRESSIBLE MATERIALS SHALL NOT BE INCORPORATED IN FILLS.
23. FILL SHALL NOT BE PLACED ON SATURATED OR FROZEN SURFACES.
24. ALL BENCHES SHALL BE KEPT FREE OF SEDIMENT DURING ALL PHASES OF DEVELOPMENT.
25. SEEPS OR SPRINGS ENCOUNTERED DURING CONSTRUCTION SHALL BE HANDLED IN ACCORDANCE WITH THE STANDARD AND SPECIFICATION FOR DEWATERING OR OTHER APPROVED METHOD.
26. ALL GRADED AREAS SHALL BE PERMANENTLY STABILIZED IMMEDIATELY FOLLOWING FINISHED GRADING.
27. STOCKPILES, BORROW AREAS AND SPOIL AREAS SHALL BE SHOWN ON THE PLANS AND SHALL BE SUBJECT TO THE PROVISIONS OF NYSDEC STANDARDS AND SPECIFICATIONS.
28. KENSICO RESERVOIR IS RECOGNIZED AS A REGULATED WATERCOURSE BY THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION AND A REGULATED WETLAND BY THE TOWN OF MOUNT PLEASANT. BOTH ENTITIES REQUIRE A 50 FOOT BUFFER FOR ALL CONSTRUCTION ACTIVITIES NEAR THE MAXIMUM RESERVOIR ELEVATION OF 357 FEET. THE CONTRACTOR SHALL NOT PERFORM ANY CONSTRUCTION ACTIVITIES WITHIN 50 FEET OF THE 357 FOOT CONTOUR WITHOUT EXPLICIT DIRECTION FROM THE ENGINEER.

LEGEND

- SILT FENCE
- 6' CONSTRUCTION FENCE
- WORK LIMITS
- STABILIZED CONSTRUCTION ENTRANCE
- INLET PROTECTION
- SEDIMENT DIKE
- SEDIMENT TRAP



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SUBMITTAL DATE: JULY 2021

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DESIGNED BY: J. CAUSARANO	DRAWN BY: C. DEBONA
CHECKED BY: J. LAPADULA	DESIGN LEAD: R. GEDEON

Hazen

STATE OF NEW YORK · RUDOLF J. GEDEON · 070901 · REGISTERED PROFESSIONAL ENGINEER

NYC Environmental Protection

ACCOUNTABLE MANAGER	JOSE NIEVES
PROJECT MANAGER	MARK DELBALZO, P.E.

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WATERFOWL MANAGEMENT PROGRAM BUILDING AND PAVING
MOUNT PLEASANT, NEW YORK

SOIL EROSION AND SEDIMENT CONTROL PLAN
(WATERFOWL OPERATIONS BUILDING)

DATE:	JULY 2021
SCALE:	1" = 20'
SHEET NO:	7 OF 39
DRAWING NO.	C1-102

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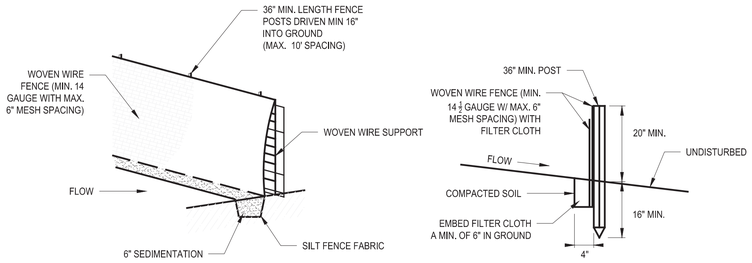
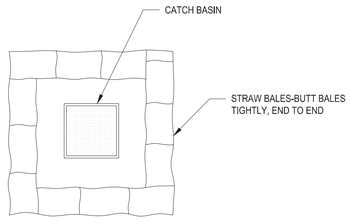


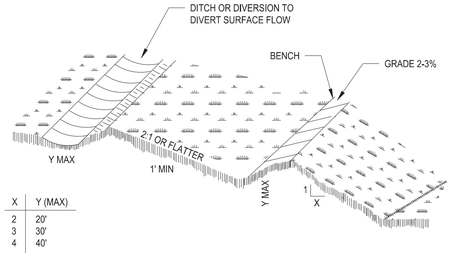
GENERAL NOTES

1. STEEL POSTS WHICH SUPPORT THE SILT FENCE SHALL BE INSTALLED ON A SLIGHT ANGLE TOWARD THE ANTICIPATED RUNOFF SOURCE. THE TOE OF THE SILT FENCE SHALL BE TRENCHED IN WITH A SPADE OR MECHANICAL TRENCHER, SO THAT
2. THE DOWNSLOPE FACE OF THE TRENCH IS FLAT AND PERPENDICULAR TO THE LINE OF FLOW.
3. THE TRENCH SHALL BE A MINIMUM OF 6" DEEP AND 3" - 4" WIDE TO ALLOW FOR THE SILT FENCE TO BE LAID IN THE GROUND AND BACKFILLED.
4. SILT FENCE SHALL BE SECURELY FASTENED TO EACH STEEL SUPPORT POST AND TO WOVEN WIRE, WHICH IS IN TURN ATTACHED TO THE STEEL FENCE POSTS.
5. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED, AS ORDERED BY THE CONSTRUCTION MANAGER.
6. SILT FENCE SHALL BE REMOVED WHEN IT HAS SERVED ITS USEFULNESS, SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
7. SEDIMENT TRAPPED BY THIS PRACTICE SHALL BE LEGALLY DISPOSED OF IN AN APPROVED SITE IN A MANNER THAT WILL NOT CONTRIBUTE TO ADDITIONAL SILTATION.
8. ACCUMULATED SILT SHALL BE REMOVED WHEN IT REACHES A DEPTH OF 6" AND LEGALLY DISPOSED OF IN AN APPROVED SOIL SITE OR AS IN NOTE 7 ABOVE.

A - SILT FENCE
NOT TO SCALE

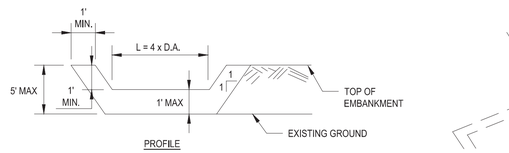


D - INLET PROTECTION
NOT TO SCALE

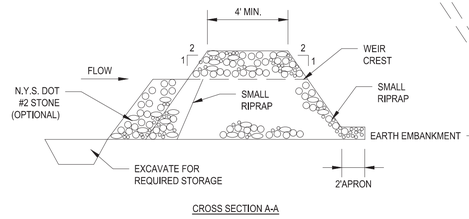


X	Y (MAX)
2	20'
3	30'
4	40'

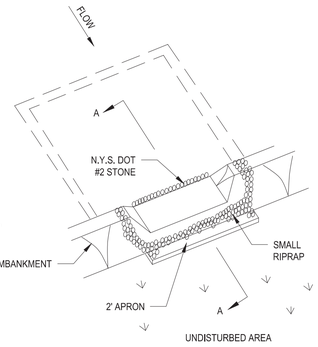
E - LANDGRADING
NOT TO SCALE



PROFILE



CROSS SECTION A-A



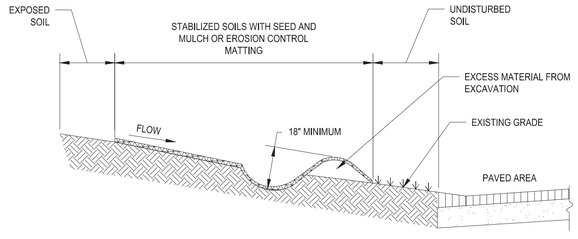
UNDISTURBED AREA

OPTION: A ONE FOOT LAYER OF N.Y.S. DOT #2 STONE MAY BE PLACED ON THE UPSTREAM SIDE OF THE RIPRAP INPLACE OF THE EMBEDDED FILTER CLOTH.

CONSTRUCTION SPECIFICATIONS

1. AREA UNDER EMBANKMENT SHALL BE CLEARED, GRUBBED AND STRIPPED OF ANY VEGETATION AND ROOT MAT. THE POOL AREA SHALL BE CLEARED.
2. THE FILL MATERIAL FOR THE EMBANKMENT SHALL BE FREE OF ROOTS AND OTHER WOODY VEGETATION AS WELL AS OVER-SIZED STONES, ROCKS, ORGANIC MATERIAL OR OTHER OBJECTIONABLE MATERIAL. THE EMBANKMENT SHALL BE COMPACTED BY TRAVERSING WITH EQUIPMENT WHILE IT IS BEING CONSTRUCTED.
3. ALL CUT AND FILL SLOPES SHALL BE 2:1 OR FLATTER.
4. THE STONE USED IN THE OUTLET SHALL BE SMALL RIPRAP 4"-8" ALONG WITH A 1' THICKNESS OF 2" AGGREGATE PLACED ON THE UP-GRADE SIDE ON THE SMALL RIPRAP OR EMBEDDED FILTER CLOTH IN THE RIPRAP.
5. SEDIMENT SHALL BE REMOVED AND TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO 1/2 THE DESIGN DEPTH OF THE TRAP. IT SHALL BE PLACED ON SITE AND STABILIZED.
6. THE STRUCTURE SHALL BE INSPECTED AFTER EACH RAIN AND REPAIRS MADE AS NEEDED.
7. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND SEDIMENT ARE CONTROLLED.
8. THE STRUCTURE SHALL BE REMOVED AND THE AREA STABILIZED WHEN THE DRAINAGE AREA HAS BEEN PROPERLY STABILIZED. MAXIMUM DRAINAGE AREA 5 ACRES

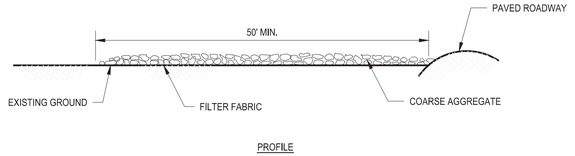
B - STONE OUTLET SEDIMENT TRAP
NOT TO SCALE



CONSTRUCTION NOTES

1. ALL EARTH FILL SHALL BE PLACED ON A STRIPPED FOUNDATION, CONTAIN NO STUMPS OR WOODY MATERIAL, AND BE COMPACTED WITH THE WEIGHT OF THE EXCAVATOR BUCKET.
2. THE SYSTEM SHALL BE USED WITH A MINIMUM 5 FOOT VEGETATED BUFFER ON THE DOWN SLOPE TOE OF THE DIKE OR AN ARTIFICIAL BUFFER OF EROSION CONTROL MATTING.
3. THE ENDS OF THE DIKE SYSTEM SHALL TERMINATE WITH A 90 DEGREE RETURN OF NYS DOT #1A CRUSHED STONE TO FILTER ANY EXCESS FLOW.
4. THE EARTHEN DIKE SHALL BE SEEDED AND MULCHED TO PREVENT EROSION USING AN ANNUAL RYE GRASS MIXTURE AT A RATE OF 1 LB. PER 1,000 SQUARE FEET.

F - SEDIMENT DIKE
NOT TO SCALE

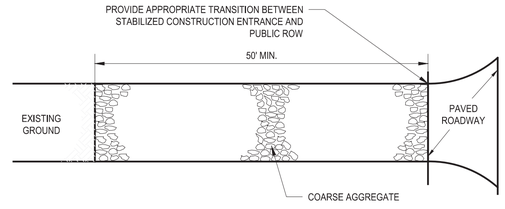


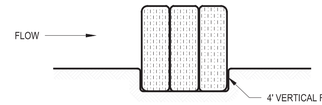
PROFILE

GENERAL NOTES

1. THE STONE SIZE WILL CONSIST OF COARSE AGGREGATE IN ACCORDANCE WITH THE SPECIFICATIONS. THE MATERIAL SHALL BE PLACED WITH A THICKNESS NOT LESS THAN 8", WILL NOT BE LESS THAN THE WIDTH OF THE INGRESS, AND NOT LESS THAN 50' IN LENGTH.
2. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PAVED ROADWAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEAN OUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO THE PUBLIC RIGHT-OF-WAY MUST BE REMOVED BY THE CONTRACTOR IMMEDIATELY.

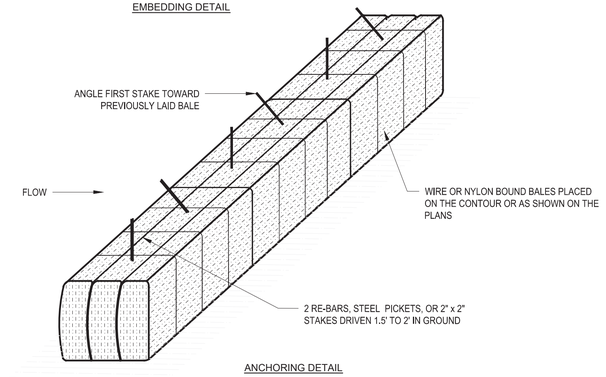
G - STABILIZED CONSTRUCTION ENTRANCE
NOT TO SCALE





EMBEDDING DETAIL

C - EMBEDDING DETAIL
NOT TO SCALE



ANCHORING DETAIL

GENERAL NOTES

1. BALES SHALL BE PLACED IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
2. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF FOUR INCHES.
3. BALES SHALL BE SECURELY ANCHORED IN PLACE BY STAKES OR RE-BARS DRIVEN THROUGH THE BALES. THE FIRST STAKE IN EACH BALE SHALL BE ANGLED TOWARD THE PREVIOUSLY LAID BALE TO FORCE BALES TOGETHER.
4. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
5. BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
6. ACCUMULATED SILT SHALL BE REMOVED AND LEGALLY DISPOSED OF WHEN IT REACHES A DEPTH OF 6 INCHES.
7. CONTRACTOR SHALL REPLACE HAY BALE AND DIKE EVERY THREE (3) MONTHS.

PERMITTING SUBMITTAL
NOT FOR CONSTRUCTION

SUBMITTAL DATE: JULY 2021

IF SHEET IS LESS THAN 22" X 34"
IT IS A REDUCED PRINT.
SCALE ACCORDINGLY

GEDEON GRC CONSULTING
ENGINEERS • PLANNERS • CONSTRUCTION MANAGERS
6901 JERICHO TURNPIKE, SUITE 216
SYOSSET, N.Y. 11791

NO.	DATE	REVISIONS/DESCRIPTION	APPR'D

DESIGNED BY: J. CAUSARANO	DRAWN BY: C. DEBONA
CHECKED BY: J. LAPADULA	DESIGN LEAD: R. GEDEON

Hazen

STATE OF NEW YORK · ROBERT J. GEDEON · 070904 · REGISTERED PROFESSIONAL ENGINEER

Environmental Protection

ACCOUNTABLE MANAGER	JOSE NIEVES
PROJECT MANAGER	MARK DELBALZO, P.E.

NEW YORK CITY ENVIRONMENTAL PROTECTION
BUREAU OF WATER SUPPLY
465 COLUMBUS AVENUE, SUITE 270
VALHALLA, NEW YORK 10595-1336
www.nyc.gov/dep

WATERFOWL MANAGEMENT PROGRAM BUILDING AND PAVING
MOUNT PLEASANT, NEW YORK

DETAILS - 2

DATE:	JULY 2021
SCALE:	N.T.S
SHEET NO:	20 OF 39
DRAWING NO.	C1-115

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APPENDIX F

CONSTRUCTION PHASING

AND SEQUENCE

CONSTRUCTION PHASING AND SEQUENCE

FALL 2022 - WINTER 2024

1. Obtain plan approval and applicable permits.
2. Install stabilized construction entrance, tree protection, inlet protection, and silt fence.
3. Install remaining site protective measures as described in the Sediment and Erosion Control Plans, Tree Protection Plans, and Staging and Access Plans.
4. Complete site clearing as per the removals plan, beginning with Waterfowl Management Program Building Site. No more than 5 acres of the site should be cleared at a given time. 5-acre Phase Areas should be stabilized before continuing to the next Phase Area. Complete the following within each Phase Area:
   a. Move Equipment, trailers and utilities.
   b. Clear and grub.
   c. Rough grade site and stockpile soil with necessary protection.
   d. Construct silt fence between the current and next Phase Area.
   e. Provide temporary seeding for areas left open for more than two weeks within the Phase Area.
5. Repeat Step 5 for paving and Laboratory Renovation Site Work.
6. All erosion and sediment control practices will be inspected weekly and after rainfall events. Needed repairs will be made immediately.
7. Install storm pipes and structures.
8. Install inlet protection for new inlets.
9. After the site is stabilized, remove all temporary measures and install permanent vegetation on the disturbed areas.
10. Complete final grading for walkways and the running track. Stabilize with gravel.
11. Complete final grading of grounds, topsoil critical areas, and permanently vegetate, landscape, and mulch.
12. Complete final grading around building(s).
13. Estimated time before final stabilization— 15 months.

Appendix G

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Stormwater Pond/Wetland Operation, Maintenance and Management Inspection Checklist

Project _____
Location: _____
Site Status: _____

Date: _____
Time: _____

Inspector: _____

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
1. Embankment and emergency spillway (Annual, After Major Storms)		
1. Vegetation and ground cover adequate		
2. Embankment erosion		
3. Animal burrows		
4. Unauthorized planting		
5. Cracking, bulging, or sliding of dam		
a. Upstream face		
b. Downstream face		
c. At or beyond toe		
downstream		
upstream		
d. Emergency spillway		
6.Pond, toe & chimney drains clear and functioning		
7.Seeps/leaks on downstream face		
8.Slope protection or riprap failure		
9. Vertical/horizontal alignment of top of dam “As-Built”		

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
10. Emergency spillway clear of obstructions and debris		
11. Other (specify)		
2. Riser and principal spillway (Annual)		
Type: Reinforced concrete _____ Corrugated pipe _____ Masonry _____ 1. Low flow orifice obstructed		
2. Low flow trash rack. a. Debris removal necessary		
b. Corrosion control		
3. Weir trash rack maintenance a. Debris removal necessary		
b. corrosion control		
4. Excessive sediment accumulation insider riser		
5. Concrete/masonry condition riser and barrels a. cracks or displacement		
b. Minor spalling (<1")		
c. Major spalling (rebars exposed)		
d. Joint failures		
e. Water tightness		
6. Metal pipe condition		
7. Control valve a. Operational/exercised		
b. Chained and locked		
8. Pond drain valve a. Operational/exercised		
b. Chained and locked		
9. Outfall channels functioning		
10. Other (specify)		

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
3. Permanent Pool (Wet Ponds) (monthly)		
1. Undesirable vegetative growth		
2. Floating or floatable debris removal required		
3. Visible pollution		
4. Shoreline problem		
5. Other (specify)		
4. Sediment Forebays		
1.Sedimentation noted		
2. Sediment cleanout when depth < 50% design depth		
5. Dry Pond Areas		
1. Vegetation adequate		
2. Undesirable vegetative growth		
3. Undesirable woody vegetation		
4. Low flow channels clear of obstructions		
5. Standing water or wet spots		
6. Sediment and / or trash accumulation		
7. Other (specify)		
6. Condition of Outfalls (Annual , After Major Storms)		
1. Riprap failures		
2. Slope erosion		
3. Storm drain pipes		
4.Endwalls / Headwalls		
5. Other (specify)		
7. Other (Monthly)		
1. Encroachment on pond, wetland or easement area		

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
2. Complaints from residents		
3.Aesthetics a. Grass growing required		
b. Graffiti removal needed		
c. Other (specify)		
4. Conditions of maintenance access routes.		
5. Signs of hydrocarbon build-up		
6. Any public hazards (specify)		
8. Wetland Vegetation (Annual)		
1. Vegetation healthy and growing Wetland maintaining 50% surface area coverage of wetland plants after the second growing season. (If unsatisfactory, reinforcement plantings needed)		
2. Dominant wetland plants: Survival of desired wetland plant species Distribution according to landscaping plan?		
3. Evidence of invasive species		
4. Maintenance of adequate water depths for desired wetland plant species		
5. Harvesting of emergent plantings needed		
6. Have sediment accumulations reduced pool volume significantly or are plants “choked” with sediment		
7. Eutrophication level of the wetland.		
8. Other (specify)		

Comments:

Actions to be Taken:

Infiltration Trench Operation, Maintenance, and Management Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
1. Debris Cleanout (Monthly)		
Trench surface clear of debris		
Inflow pipes clear of debris		
Overflow spillway clear of debris		
Inlet area clear of debris		
2. Sediment Traps or Forebays (Annual)		
Obviously trapping sediment		
Greater than 50% of storage volume remaining		
3. Dewatering (Monthly)		
Trench dewaters between storms		
4. Sediment Cleanout of Trench (Annual)		
No evidence of sedimentation in trench		
Sediment accumulation doesn't yet require cleanout		
5. Inlets (Annual)		

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
Good condition		
No evidence of erosion		
6. Outlet/Overflow Spillway (Annual)		
Good condition, no need for repair		
No evidence of erosion		
7. Aggregate Repairs (Annual)		
Surface of aggregate clean		
Top layer of stone does not need replacement		
Trench does not need rehabilitation		

Comments:

Actions to be Taken:

Sand/Organic Filter Operation, Maintenance and Management Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
1. Debris Cleanout (Monthly)		
Contributing areas clean of debris		
Filtration facility clean of debris		
Inlet and outlets clear of debris		
2. Oil and Grease (Monthly)		
No evidence of filter surface clogging		
Activities in drainage area minimize oil and grease entry		
3. Vegetation (Monthly)		
Contributing drainage area stabilized		
No evidence of erosion		
Area mowed and clipping removed		
4. Water Retention Where Required (Monthly)		
Water holding chambers at normal pool		
No evidence of leakage		
5. Sediment Deposition (Annual)		

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
Filter chamber free of sediments		
Sedimentation chamber not more than half full of sediments		
6. Structural Components (Annual)		
No evidence of structural deterioration		
Any grates are in good condition		
No evidence of spalling or cracking of structural parts		
7. Outlet/Overflow Spillway (Annual)		
Good condition, no need for repairs		
No evidence of erosion (if draining into a natural channel)		
8. Overall Function of Facility (Annual)		
Evidence of flow bypassing facility		
No noticeable odors outside of facility		

Comments:

Actions to be Taken:

Bioretention Operation, Maintenance and Management Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
1. Debris Cleanout (Monthly)		
Bioretention and contributing areas clean of debris		
No dumping of yard wastes into practice		
Litter (branches, etc.) have been removed		
2. Vegetation (Monthly)		
Plant height not less than design water depth		
Fertilized per specifications		
Plant composition according to approved plans		
No placement of inappropriate plants		
Grass height not greater than 6 inches		
No evidence of erosion		
3. Check Dams/Energy Dissipaters/Sumps (Annual, After Major Storms)		
No evidence of sediment buildup		

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
Sumps should not be more than 50% full of sediment		
No evidence of erosion at downstream toe of drop structure		
4. Dewatering (Monthly)		
Dewaters between storms		
No evidence of standing water		
5. Sediment Deposition (Annual)		
Swale clean of sediments		
Sediments should not be > 20% of swale design depth		
6. Outlet/Overflow Spillway (Annual, After Major Storms)		
Good condition, no need for repair		
No evidence of erosion		
No evidence of any blockages		
7. Integrity of Filter Bed (Annual)		
Filter bed has not been blocked or filled inappropriately		

Comments:

Actions to be Taken:

Open Channel Operation, Maintenance, and Management Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

MAINTENANCE ITEM	SATISFACTORY/ UNSATISFACTORY	COMMENTS
1. Debris Cleanout (Monthly)		
Contributing areas clean of debris		
2. Check Dams or Energy Dissipators (Annual, After Major Storms)		
No evidence of flow going around structures		
No evidence of erosion at downstream toe		
Soil permeability		
Groundwater / bedrock		
3. Vegetation (Monthly)		
Mowing done when needed		
Minimum mowing depth not exceeded		
No evidence of erosion		
Fertilized per specification		
4. Dewatering (Monthly)		
Dewaters between storms		

MAINTENANCE ITEM	SATISFACTORY/ UNSATISFACTORY	COMMENTS
5. Sediment deposition (Annual)		
Clean of sediment		
6. Outlet/Overflow Spillway (Annual)		
Good condition, no need for repairs		
No evidence of erosion		

Comments:

Actions to be Taken:

CONTECH®
ENGINEERED SOLUTIONS

CDS® Inspection and Maintenance Guide

CDS TECHNOLOGIES

Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine weather the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.

CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	yd3	m3
CDS2015-4	4	1.2	3.0	0.9	0.9	0.7
CDS2015	5	1.5	3.0	0.9	1.3	1.0
CDS2020	5	1.5	3.5	1.1	1.3	1.0
CDS2025	5	1.5	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3
CDS5640	10	3.0	6.3	1.9	8.7	6.7
CDS5653	10	3.0	7.7	2.3	8.7	6.7
CDS5668	10	3.0	9.3	2.8	8.7	6.7
CDS5678	10	3.0	10.3	3.1	8.7	6.7

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

Support

- Drawings and specifications are available at www.contechstormwater.com.
- Site-specific design support is available from our engineers.

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater, earth stabilization and wastewater treament products. For information, visit www.ContechES.com or call 800.338.1122

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CDS Inspection & Maintenance Log

CDS Model: _____ Location: _____

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. **Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.**

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

APPENDIX F

CONSTRUCTION PHASING

AND SEQUENCE

CONSTRUCTION PHASING AND SEQUENCE

FALL 2022 - WINTER 2024

1. Obtain plan approval and applicable permits.
2. Install stabilized construction entrance, tree protection, inlet protection, and silt fence.
3. Install remaining site protective measures as described in the Sediment and Erosion Control Plans, Tree Protection Plans, and Staging and Access Plans.
4. Complete site clearing as per the removals plan, beginning with Waterfowl Management Program Building Site. No more than 5 acres of the site should be cleared at a given time. 5-acre Phase Areas should be stabilized before continuing to the next Phase Area. Complete the following within each Phase Area:
   a. Move Equipment, trailers and utilities.
   b. Clear and grub.
   c. Rough grade site and stockpile soil with necessary protection.
   d. Construct silt fence between the current and next Phase Area.
   e. Provide temporary seeding for areas left open for more than two weeks within the Phase Area.
5. Repeat Step 5 for paving and Laboratory Renovation Site Work.
6. All erosion and sediment control practices will be inspected weekly and after rainfall events. Needed repairs will be made immediately.
7. Install storm pipes and structures.
8. Install inlet protection for new inlets.
9. After the site is stabilized, remove all temporary measures and install permanent vegetation on the disturbed areas.
10. Complete final grading for walkways and the running track. Stabilize with gravel.
11. Complete final grading of grounds, topsoil critical areas, and permanently vegetate, landscape, and mulch.
12. Complete final grading around building(s).
13. Estimated time before final stabilization— 15 months.

Appendix H
Drawings

LEGEND

EXISTING

X X	CHAINLINK FENCE
	STOCKADE FENCE
oo oo	SPLIT RAIL FENCE
	BOTTOM OF CURB LINE
	TAX LOT LINE
~	OVERHEAD UTILITY LINES
S	SEWER LINE (OF RECORD)
SD SD SD	STORM DRAIN LINE
W	WATER LINE (OF RECORD)
W	WATER LINE (TONE OUT)
GAS GAS	GAS LINE (TONE OUT)
	BUILDING
	SAW CUT LINE
	LIMIT OF WORK
+ 365.2	ELEVATION
+ 365.2 365.0	TOP OF CURB ELEVATION BOTTOM OF CURB ELEVATION

* SEE INDIVIDUAL SHEETS FOR PROPOSED LEGEND ITEMS.

ABBREVIATIONS

ABANDONED	ABDN.
AHEAD	AH
AMERICAN SOCIETY FOR TESTING AND MATERIALS	ASTM
AS ORDER BY THE ENGINEER	AOBE
ASPHALT	ASPH.
BACK	BK
BASE LINE	B.L.
BITUMINOUS	BIT.
BUILDING	BLDG.
BLOCK	BLK.
BOTTOM OF CURB	BC
BOTTOM OF WALL	BW
BOTTOM OF SIDEWALK ELEVATION	BS
BRICK	BRK.
CATCH BASIN	CB.
CENTER LINE	C.L.
CENTER TO CENTER	C-C
CHAIN LINK FENCE	C.L.F.
CLEARANCE	CL.
CONCRETE	CONC.
CONCRETE SIDEWALK	C.SW.
CONCRETE CURB	C.C.
DIAMETER	DIA.
DRAWING	DWG
DROP CURB	D.C.
DRYWELL	DW.
EAST	E
EDGE OF PAVEMENT	E.O.P.
ELEVATION	ELEV
ELECTRIC PULL BOX	EPB
EXISTING	EXIST.
FEET	FT
FIELD INLET	FI.
FRAME	FR.
GAS VALVE	GV
GROUND ELEVATION	GRD
HIGH-DENSITY POLYETHYLENE	HDPE
HORIZONTAL	HORZ
INCH	IN
INVERT ELEVATION	INV.
LINEAR FEET	LF
LINEAR	LIN
LONG	LG
MANHOLE	MH
MAXIMUM	MAX.
MINIMUM	MIN.
NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION	NYCDEP
NORTH	N
NOT TO SCALE	N.T.S.
ON CENTER	O.C.
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION	OSHA
PAVEMENT	PAVT.
POUNDS	LB
POUNDS PER SQUARE INCH	PSI
RADIUS	R
RECYCLED CONCRETE AGGREGATE	RCA
REINFORCED CONCRETE PIPE	RCP
RIM ELEVATION	RIM.
ROADWAY	RDWY.
STONE UNDERDRAIN	S
SANITARY	SAN
SEWER	SWR.
SPECIFICATIONS	SPECS.
SQUARE	SQ
STANDARD	STD.
STORM WATER	ST.W.
TOP OF CURB	TC
TOP OF WALL	TW
TYPICAL	TYP.
UNKNOWN PULL BOXES	UPB
VACANT	VAC.
VARIES	VAR
VERIFY IN FIELD	VIF
VERTICAL	VERT
WATER VALVE	WV
WELDED WIRE FABRIC	WWF
WELDED WIRE MESH	WWM

GENERAL NOTES

1. DEMOLITION AND REMOVALS / SITE CLEARING INCLUDES BUT IS NOT LIMITED TO THE REMOVAL OF SIDEWALK, CURB, PAVEMENT, DRIVEWAYS, PIPE, MANHOLES, AND OTHER SUBSURFACE STRUCTURES, TREES, BRUSH, ROOTS, DEBRIS, VEGETATION, EXISTING LIGHTS AND POLES AND ALL OTHER ITEMS REQUIRED TO CONSTRUCT THE PROJECT AND/OR AS SHOWN IN THE PLANS, SEE SPECIFICATION SECTION 02222 AND 02230 FOR REQUIREMENTS.
2. DEMOLITION AND REMOVALS AND EXCAVATION INCLUDES BUT IS NOT LIMITED TO EXCAVATION REQUIRED FOR SOIL RESTORATIONS, NEW MANHOLES, INLETS, OR DRAINAGE PIPES. ALL VOIDS CREATED BY THE REMOVAL OF EXISTING STORM DRAINS AND SUBSURFACE STRUCTURES SHALL BE BACKFILLED WITH SUITABLE EXCAVATION MATERIAL AS DIRECTED BY THE ENGINEER. IF NO SUITABLE EXCAVATION IS AVAILABLE IN THE OPINION OF ENGINEER, THE CONTRACTOR SHALL PROVIDE SATISFACTORY SOIL MATERIAL MEETING THE REQUIREMENTS OF THE SPECIFICATIONS FOR USE AS BACKFILL. ALL EXCAVATION SHALL COMPLY WITH OSHA REQUIREMENTS. EXPLOSIVES SHALL NOT BE ALLOWED FOR ROCK EXCAVATION. SEE SPECIFICATIONS SECTION 02222 AND 02316 FOR FULL REQUIREMENTS
3. LOCATIONS OF EXISTING UTILITIES AND SEWERS SHOWN ON THE PLANS WERE DETERMINED BY STANDARD SURVEYING METHODS, AVAILABLE RECORDS AND THROUGH SOLICITATION OF THE RESPECTIVE UTILITY OWNERS. THE INFORMATION FOR THE EXACT LOCATION OF THESE UTILITIES IS NOT GUARANTEED TO BE COMPLETE OR CORRECT. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION OF ALL UTILITIES IN THE FIELD PRIOR TO STARTING CONSTRUCTION.
4. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL FIELD LAYOUT AND VERIFYING ALL EXISTING CONDITIONS IN THE FIELD.
5. EXISTING DIMENSIONS, OFFSETS, INVERTS, RADII, ETC. SHALL BE VERIFIED IN THE FIELD PRIOR TO ANY CONSTRUCTION ACTIVITY. ANY DISCREPANCY SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE ENGINEER FOR RESOLUTION. ALL NOTIFICATIONS SHALL BE IN WRITING.
6. ALL GRADING SHALL BE AS SHOWN ON THE PLANS. THE CONTRACTOR SHALL CAREFULLY DETERMINE ACTUAL GRADING LIMITS BEFORE BEGINNING DEMOLITION AND SITE CLEARING OPERATIONS. CARE SHALL BE TAKEN TO RETAIN EXISTING NATURAL GROWTH AND PREVENT DAMAGE TO TREES OUTSIDE THE PROJECT LIMITS. ANY DAMAGE CAUSED TO THIS NATURAL GROWTH SHALL BE RESTORED AT THE CONTRACTOR'S EXPENSE. ALL AREAS DISTURBED BY THE CONTRACTOR WITHOUT AUTHORIZATION BY THE ENGINEER SHALL BE RESTORED BY THE CONTRACTOR AT HIS EXPENSE.
7. WHERE CONSTRUCTION CROSSES OR IS ADJACENT TO AN EXISTING ELECTRIC, GAS, COMMUNICATIONS, OR OTHER UTILITY LINE, THE CONTRACTOR SHALL CAREFULLY HAND EXCAVATE TO LOCATE, MARK AND PROTECT THE UTILITY LINE AGAINST DISTURBANCE OR DAMAGE BY PROVIDING ADEQUATE SUPPORT AND PROTECTION AS APPROVED BY THE ENGINEER. THE CONTRACTOR SHALL REPAIR ANY ELECTRIC POWER INTERRUPTION IMMEDIATELY, AT NO ADDITIONAL COST TO THE CONTRACT.
8. THE CONTRACTOR SHALL COORDINATE THE LOCATIONS OF TREES AND OTHER PLANTINGS WITH THE DRAINAGE, INCLUDING UNDERGROUND DRAINAGE.
9. THE CONTRACTOR SHALL RESTORE ALL PUBLIC OR PRIVATE PROPERTY DAMAGED OR REMOVED TO AT LEAST AS GOOD A CONDITION AS BEFORE BEING DISTURBED, AS DETERMINED BY THE ENGINEER. ANY DAMAGED TREES, SHRUBS, AND/OR HEDGES SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE. NO WORK SHALL BE PERFORMED ON OTHER PROPERTIES AND BUILDINGS WITHOUT THE PROPER AUTHORIZATION.
10. CONTRACTOR SHALL EXERCISE CARE TO MINIMIZE CLEARING. SPECIFIC TREES AND ITEMS TO BE CLEARED MUST BE APPROVED BY THE ENGINEER PRIOR TO REMOVAL.
11. THE CONTRACTOR SHALL COMPLY WITH ALL REQUIRED PERMITS FROM LOCAL, STATE AND FEDERAL AGENCIES, AS REQUIRED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING AND INCURRING THE COST OF ALL REQUIRED PERMITS, INSPECTIONS, CERTIFICATES, ETC.
12. THE CONTRACTOR SHALL PROTECT EXISTING SURVEYING AND PROPERTY LINE MONUMENTATION. ANY EXISTING SURVEYING AND PROPERTY LINE MONUMENTATION THAT IS DISTURBED OR DESTROYED, AS JUDGED BY THE ENGINEER, SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE UNDER THE SUPERVISION OF A NEW YORK STATE LICENSED LAND SURVEYOR.
13. BEFORE PLANNING OR PROCEEDING WITH ANY EXCAVATION WORK, THE CONTRACTOR SHALL NOTIFY THE "CALL BEFORE YOU DIG" NUMBER AT 811 A MINIMUM OF FIVE WORKING DAYS PRIOR TO ANY EXCAVATION OPERATIONS.
14. ALL TRENCH EXCAVATION AND ANY REQUIRED SHEETING AND SHORING SHALL BE DONE IN ACCORDANCE WITH THE LATEST REVISIONS OF NEW YORK STATE INDUSTRIAL CODE RULE 23 AND OSHA REGULATIONS FOR CONSTRUCTION AND IN ACCORDANCE WITH THE SPECIFICATIONS.
15. CONTRACTOR IS RESPONSIBLE FOR DEWATERING AND THE MAINTENANCE OF SURFACE DRAINAGE DURING THE COURSE OF WORK, IF REQUIRED, IN ACCORDANCE WITH THE SOIL EROSION AND SEDIMENTATION CONTROL PLANS AND DETAILS.
16. CONTRACTOR SHALL GRADE ALL AREAS ON THE SITE TO MAINTAIN POSITIVE DRAINAGE.
17. ALL CONFINED SPACE ENTRIES SHALL BE MADE IN STRICT ACCORDANCE WITH OSHA REGULATIONS REGARDING CONFINED SPACE ENTRY.
18. ALL WORK SHALL BE DONE IN STRICT COMPLIANCE WITH ALL APPLICABLE NYSDOT AND LOCAL SPECIFICATIONS, AS THEY MAY APPLY.
19. CONTRACTOR SHALL MAINTAIN PEDESTRIAN AND VEHICLE ACCESS TO THE SITE AT ALL TIMES IN A MANNER ACCEPTABLE TO THE ENGINEER.
20. CONTRACTOR SHALL TAKE GREAT CARE TO MAINTAIN A SAFE AND SECURE WORK AREA AT ALL TIMES THROUGH THE USE OF BARRICADES AND SAFETY FENCE.
21. THE CONTRACTOR SHALL COMPLY WITH THE CONDITIONS AS SET FORTH IN THE PERMITS ISSUED BY THE REGULATORY AGENCIES, IF ANY.
22. PROVIDE SPECIAL INSPECTIONS AS FOLLOWS AS PER TOWN OF MOUNT PLEASANT BUILDING DEPARTMENT REQUIREMENTS, SPECIFICATIONS AND INSTRUCTIONS:
23. HORIZONTAL DATUM IS NAD-83 NEW YORK EAST ZONE 3101. VERTICAL DATUM IS NAVD 88, EXPRESSED IN US FEET.
24. THE CONTRACTOR SHALL DO TEST PIT FOR UTILITY CONFLICTS PRIOR TO CONSTRICTION ACTIVITIES.
25. KENSICO RESERVOIR IS RECOGNIZED AS A REGULATED WATERCOURSE BY THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION AND A REGULATED WETLAND BY THE TOWN OF MOUNT PLEASANT. BOTH ENTITIES REQUIRE A 50 FOOT BUFFER FOR ALL CONSTRUCTION ACTIVITIES NEAR THE MAXIMUM RESERVOIR ELEVATION OF 357 FEET. THE CONTRACTOR SHALL NOT PERFORM ANY CONSTRUCTION ACTIVITIES WITHIN 50 FEET OF THE 357 FOOT CONTOUR WITHOUT EXPLICIT DIRECTION FROM THE ENGINEER.

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SUBMITTAL DATE: JULY 2021

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NO.	DATE	REVISIONS/DESCRIPTION	APPR'D

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CHECKED BY: J. LAPADULA	DESIGN LEAD: R. GEDEON

Hazen

STATE OF NEW YORK · RUDOLF J. GEDEON · 070901 · LICENSED PROFESSIONAL ENGINEER

NYC Environmental Protection

ACCOUNTABLE MANAGER	JOSE NIEVES
PROJECT MANAGER	MARK DELBALZO, P.E.

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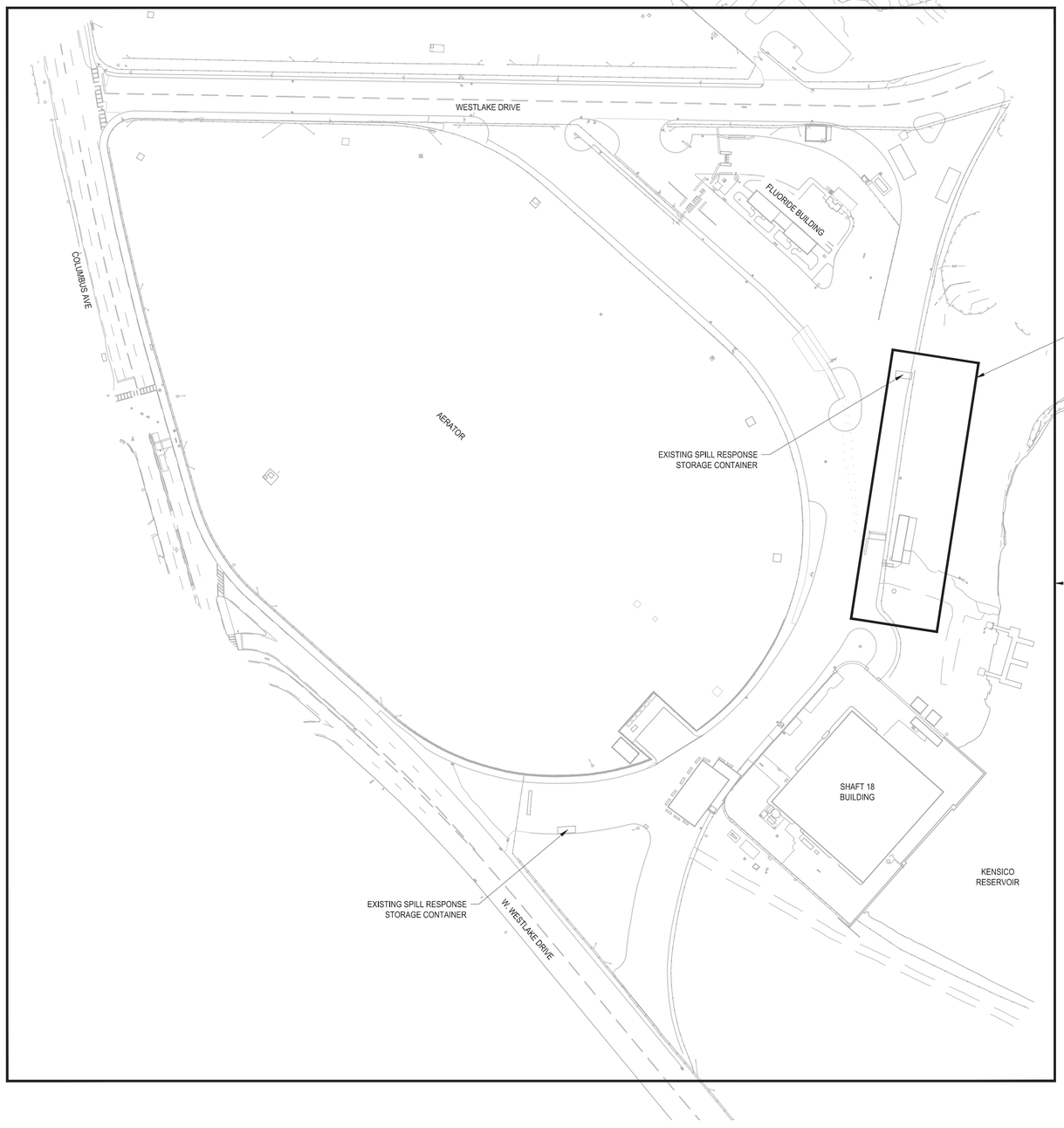
WATERFOWL MANAGEMENT PROGRAM BUILDING AND PAVING
MOUNT PLEASANT, NEW YORK

GENERAL NOTES, LEGENDS, AND ABBREVIATIONS

DATE: JULY 2021
SCALE: NA
SHEET NO: 3 OF 39
DRAWING NO. C0-010



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SUBMITTAL DATE: JULY 2021

0 80' 160'

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CHECKED BY: J. LAPADULA	DESIGN LEAD: R. GEDEON

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WATERFOWL MANAGEMENT PROGRAM BUILDING AND PAVING
MOUNT PLEASANT, NEW YORK

OVERALL EXISTING CONDITIONS PLAN

DATE:	JULY 2021
SCALE:	1" = 80'
SHEET NO:	4 OF 39
DRAWING NO.	C0-011

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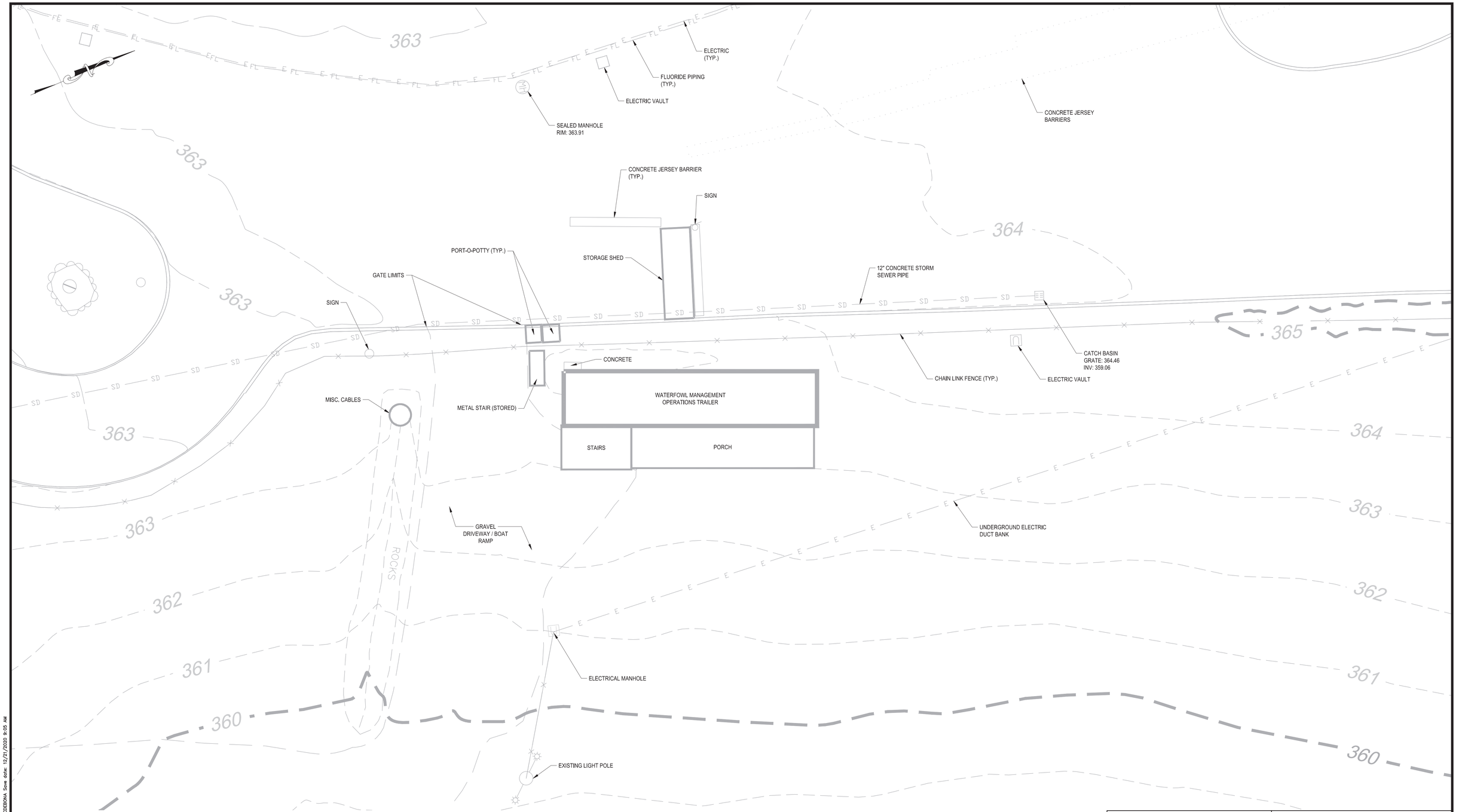

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SUBMITTAL DATE: JULY 2021

0 10' 20'

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STATE OF NEW YORK · RUDOLF J. GEDEON · 070901 · LICENSED PROFESSIONAL ENGINEER

NYC Environmental Protection

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PROJECT MANAGER	MARK DELBALZO, P.E.

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WATERFOWL MANAGEMENT PROGRAM BUILDING AND PAVING
MOUNT PLEASANT, NEW YORK

EXISTING CONDITIONS PLAN

DATE: JULY 2021
SCALE: 1" = 10'
SHEET NO: 5 OF 39
DRAWING NO. C1-100

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SECURITY / CONSTRUCTION FENCE

INLET PROTECTION (TYP.)

EXISTING SPILL RESPONSE STORAGE CONTAINER

SECURITY / CONSTRUCTION FENCE

W. WESTLAKE DRIVE

STABILIZED CONSTRUCTION ENTRANCE

SILT FENCE (TYP.)

LIMITS OF WORK (TYP.)

SHAFT 18 BUILDING

AERATOR

FOR CONTINUATION, SEE DETAIL A ON THIS SHEET

CONSTRUCTION STAGING / CONTRACTOR TRAILER & BATHROOM AREA, PHASE 1

CONSTRUCTION STAGING / CONTRACTOR TRAILER & BATHROOM AREA, PHASE 2

LIMITS OF WORK (TYP.)

SILT FENCE (TYP.)

INLET PROTECTION (TYP.)

SECURITY / CONSTRUCTION FENCE

WESTLAKE DRIVE

STABILIZED CONSTRUCTION ACCESS

12' x 24' CONCRETE WASH OUT STATION

FLUORIDE BUILDING

INLET PROTECTION (TYP.)

SILT FENCE (TYP.)

EXISTING SPILL RESPONSE STORAGE CONTAINER

LIMITS OF WORK (TYP.)

FOR EROSION AND SEDIMENT CONTROL WITHIN THIS AREA, SEE DRAWING NO. C1-105

KENISCO RESERVOIR

W. WESTLAKE DRIVE

WESTLAKE DRIVE

A - CONTINUATION
SCALE: 1" = 50'

LEGEND

- SILT FENCE
- 6' CONSTRUCTION FENCE
- WORK LIMITS
- STABILIZED CONSTRUCTION ENTRANCE
- INLET PROTECTION

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SUBMITTAL DATE: JULY 2021

0 50' 100'

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CHECKED BY: J. LAPADULA	DESIGN LEAD: R. GEDEON

Hazen

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WATERFOWL MANAGEMENT PROGRAM BUILDING AND PAVING
MOUNT PLEASANT, NEW YORK

SOIL EROSION AND SEDIMENT CONTROL PLAN FOR PAVEMENT

DATE:	JULY 2021
SCALE:	1" = 50'
SHEET NO:	6 OF 39
DRAWING NO.	C1-101

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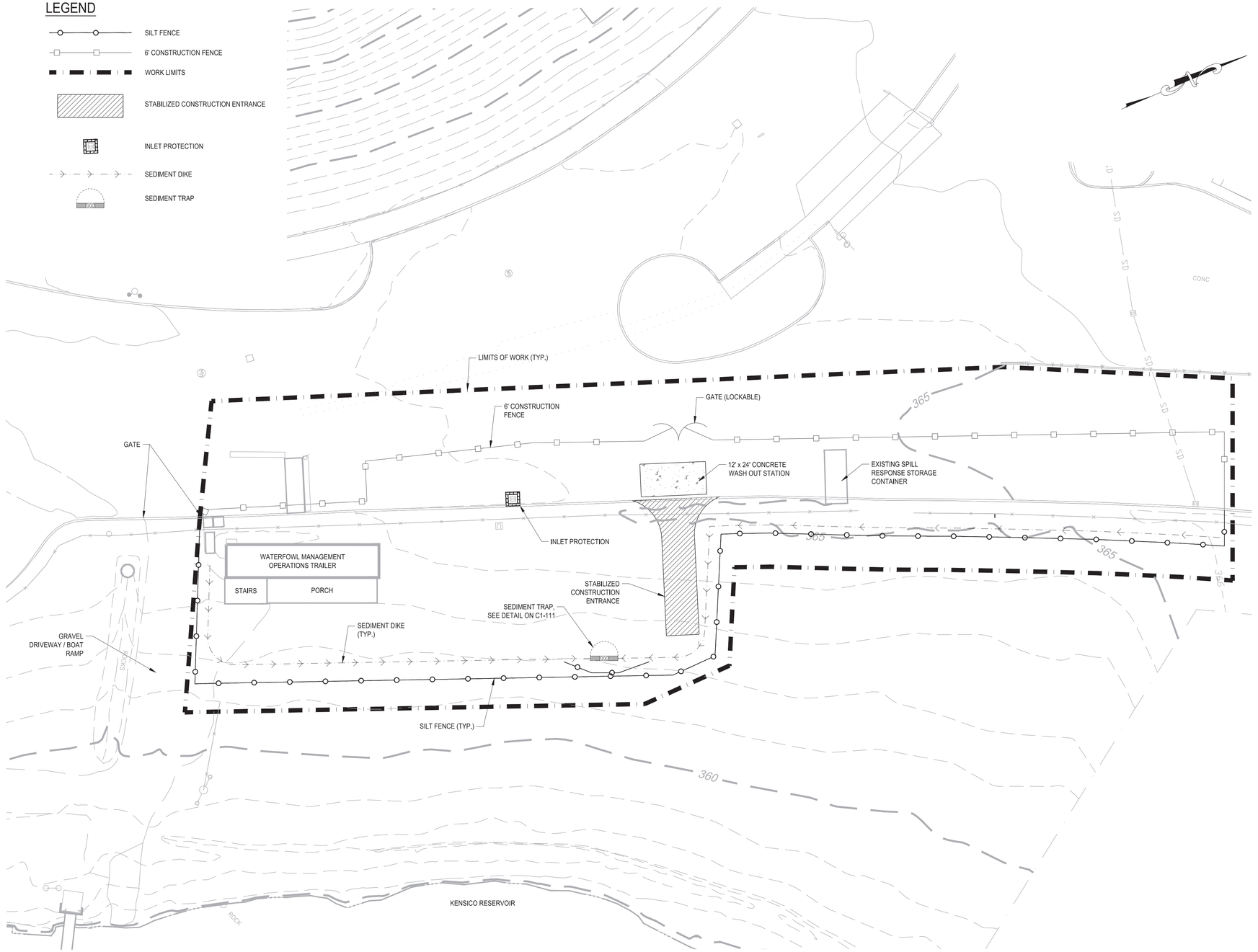
SOIL EROSION & SEDIMENT CONTROL NOTES:

1. DUE TO CONSTRUCTION AND DEMOLITION PHASE REQUIRED BY THIS CONTRACT, IT IS ANTICIPATED THAT THE LOCATION AND NATURE OF EROSION AND SEDIMENT CONTROL MEASURES WILL BE ADJUSTED AS REQUIRED TO REFLECT THE CURRENT PHASE OF WORK. THE CONSTRUCTION SCHEDULE ADOPTED BY THE CONTRACTOR WILL IMPACT ON THE PLACEMENT AND NEED FOR SPECIFIC DEVICES REQUIRED FOR THE CONTROL OF EROSION. THE LOCATION AND EXTENT OF EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REVISED AT EACH PHASE OF CONSTRUCTION THAT RESULTS IN A CHANGE OF EITHER THE QUANTITY OR DIRECTION OF THE SURFACE RUNOFF FROM THE CONSTRUCTION AREAS.
2. NO CONSTRUCTION OR LAND DISTURBANCE ACTIVITY MAY BEGIN UNTIL ALL PERIMETER EROSION CONTROL MEASURES HAVE BEEN INSTALLED AS SHOWN ON THE CONTRACT DRAWINGS. MEASURES SHALL INCLUDE BUT NOT LIMITED TO TEMPORARY DIVERSION SWALES, SILT FENCING, CATCH BASIN PROTECTION AND STABILIZED CONSTRUCTION ENTRANCE. IF CLEARING IS REQUIRED FOR INSTALLATION OF A PARTICULAR MEASURE, ALL MEASURES NOT REQUIRING CLEARING SHALL BE INSTALLED FIRST. CLEARING OF THE NECESSARY LAND FOR INSTALLATION OF THE PARTICULAR MEASURE MAY THEN PROCEED.
3. ALL EROSION CONTROL MEASURES SHALL BE IN PLACE BEFORE ANY LAND CLEARING OR CONSTRUCTION ACTIVITY.
4. CLEARING AND PAVEMENT DEMOLITION SHALL BE LIMITED AS MUCH AS POSSIBLE TO AREAS REQUIRED FOR CURRENT CONSTRUCTION ACTIVITIES. MASS CLEARING, GRADING AND PAVEMENT DEMOLITION SHALL BE AVOIDED.
5. ALL POINTS OF CONSTRUCTION INGRESS AND EGRESS SHALL BE PROTECTED TO PREVENT THE DEPOSITION OF MATERIALS ONTO TRAVERSED PUBLIC THOROUGHFARE(S) BY INSTALLING AND MAINTAINING A STABILIZED CONSTRUCTION ENTRANCE AND BY WASHING ALL VEHICLES WHEELS IN A SAFE DISPOSAL AREA. ALL MATERIALS DEPOSITED ONTO PUBLIC THOROUGHFARE(S) SHALL BE REMOVED IMMEDIATELY. PROPER PRECAUTIONS SHALL BE TAKEN TO ENSURE THAT MATERIALS DEPOSITED ONTO PUBLIC THOROUGHFARE(S) ARE REMOVED SO THAT THEY DO NOT ENTER CATCH BASINS, STORM SEWERS, COMBINED SEWERS OR ROADSIDE SWALES.
6. ALL EROSION CONTROL MEASURES SHALL BE INSPECTED FOLLOWING EVERY RAINFALL, BUT IN NO CASE LESS THAN ONCE EVERY WEEK.
7. CONTROL MEASURES SHALL BE REPAIRED OR REPLACED IMMEDIATELY AS REQUIRED TO MAINTAIN PERFORMANCE OF MEASURE. REMOVED SEDIMENTS SHALL BE DISPOSED OF IN SUCH A MANNER AS TO ENSURE FURTHER SEDIMENT TRANSPORT DOES NOT OCCUR.
8. THE CONTRACTOR SHALL INITIATE STABILIZATION MEASURES AS SOON AS PRACTICABLE IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT IN NO CASE MORE THAN 7 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. THIS REQUIREMENT DOES NOT APPLY IN THE FOLLOWING INSTANCES:
   - A. THE INITIATION OF STABILIZATION MEASURES BY THE 7TH DAY AFTER CONSTRUCTION ACTIVITY TEMPORARILY OR PERMANENTLY CEASED IS PRECLUDED BY SNOW COVER OR FROZEN GROUND CONDITIONS, STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS PRACTICABLE.
   - B. WHERE CONSTRUCTION ACTIVITY ON A PORTION OF THE SITE IS TEMPORARILY CEASED, AND EARTH-DISTURBING ACTIVITIES WILL BE RESUMED WITHIN SEVEN (7) DAYS, TEMPORARY STABILIZATION MEASURES NEED NOT BE INITIATED ON THAT PORTION OF THE SITE.
9. ALL AREAS SHALL BE FERTILIZED, SEEDED AND MULCHED IN ACCORDANCE WITH THE SPECIFICATIONS, AND RE-SEEDED AS NECESSARY TO ESTABLISH AND MAINTAIN A VIGOROUS DENSE VEGETATIVE COVER.
10. ALL WORK PERFORMED SHALL BE IN ACCORDANCE WITH THE "NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL" 2016, OR LATEST EDITION AND IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
11. THE CONTRACTOR SHALL TEMPORARILY REMOVE AND REPLACE REQUIRED SECTION OF FENCE DURING PROXIMITY EXCAVATION.
12. THE CONTRACTOR SHALL PROVIDE EROSION CONTROL PROTECTION AGAINST SILT ACCUMULATION ON EXISTING DRAINAGE.
13. THE CONTRACTOR SHALL PROVIDE ADJUSTABLE CATCH BASIN DRAIN INSERTS ON THE AFFECTED CATCH BASIN SHOWN ON THE DRAWING AND AS DIRECTED BY THE ENGINEER.
14. ALL GRADED OR DISTURBED AREAS INCLUDING SLOPES SHALL BE PROTECTED DURING CLEARING AND CONSTRUCTION IN ACCORDANCE WITH THE APPROVED EROSION AND SEDIMENT CONTROL PLAN UNTIL THEY ARE PERMANENTLY STABILIZED.
15. ALL SEDIMENT CONTROL PRACTICES AND MEASURES SHALL BE CONSTRUCTED, APPLIED AND MAINTAINED IN ACCORDANCE WITH THE APPROVED EROSION AND SEDIMENT CONTROL PLAN.
16. TOPSOIL REQUIRED FOR THE ESTABLISHMENT OF VEGETATION SHALL BE STOCKPILED IN AMOUNT NECESSARY TO COMPLETE FINISHED GRADING OF ALL EXPOSED AREAS.
17. AREAS TO BE FILLED SHALL BE CLEARED, GRUBBED, AND STRIPPED OF TOPSOIL TO REMOVE TREES, VEGETATION, ROOTS OR OTHER OBJECTIONABLE MATERIAL.
18. AREAS WHICH ARE TO BE TOPSOILED SHALL BE SCARIFIED TO A MINIMUM DEPTH OF FOUR INCHES PRIOR TO PLACEMENT OF TOPSOIL.
19. ALL FILLS SHALL BE COMPACTED AS REQUIRED TO REDUCE EROSION, SLIPPAGE, SETTLEMENT, SUBSIDENCE OR OTHER RELATED PROBLEMS. FILL INTENDED TO SUPPORT BUILDINGS, STRUCTURES AND CONDUITS, ETC. SHALL BE COMPACTED IN ACCORDANCE WITH LOCAL REQUIREMENTS OR CODES.
20. ALL FILL SHALL BE PLACED AND COMPACTED IN LAYERS NOT TO EXCEED 9 INCHES IN THICKNESS.
21. FILL MATERIAL SHALL BE FREE OF FROZEN PARTICLES, BRUSH, ROOTS, SOD, OR OTHER FOREIGN OR OTHER OBJECTIONABLE MATERIALS THAT WOULD INTERFERE WITH OR PREVENT CONSTRUCTION OF SATISFACTORY FILLS.
22. FROZEN MATERIALS OR SOFT, MUCKY OR HIGHLY COMPRESSIBLE MATERIALS SHALL NOT BE INCORPORATED IN FILLS.
23. FILL SHALL NOT BE PLACED ON SATURATED OR FROZEN SURFACES.
24. ALL BENCHES SHALL BE KEPT FREE OF SEDIMENT DURING ALL PHASES OF DEVELOPMENT.
25. SEEPS OR SPRINGS ENCOUNTERED DURING CONSTRUCTION SHALL BE HANDLED IN ACCORDANCE WITH THE STANDARD AND SPECIFICATION FOR DEWATERING OR OTHER APPROVED METHOD.
26. ALL GRADED AREAS SHALL BE PERMANENTLY STABILIZED IMMEDIATELY FOLLOWING FINISHED GRADING.
27. STOCKPILES, BORROW AREAS AND SPOIL AREAS SHALL BE SHOWN ON THE PLANS AND SHALL BE SUBJECT TO THE PROVISIONS OF NYSDEC STANDARDS AND SPECIFICATIONS.
28. KENSICO RESERVOIR IS RECOGNIZED AS A REGULATED WATERCOURSE BY THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION AND A REGULATED WETLAND BY THE TOWN OF MOUNT PLEASANT. BOTH ENTITIES REQUIRE A 50 FOOT BUFFER FOR ALL CONSTRUCTION ACTIVITIES NEAR THE MAXIMUM RESERVOIR ELEVATION OF 357 FEET. THE CONTRACTOR SHALL NOT PERFORM ANY CONSTRUCTION ACTIVITIES WITHIN 50 FEET OF THE 357 FOOT CONTOUR WITHOUT EXPLICIT DIRECTION FROM THE ENGINEER.

LEGEND

- SILT FENCE
- 6' CONSTRUCTION FENCE
- WORK LIMITS
- STABILIZED CONSTRUCTION ENTRANCE
- INLET PROTECTION
- SEDIMENT DIKE
- SEDIMENT TRAP



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6901 JERICHO TURNPIKE, SUITE 216
SYOSSET, N.Y. 11791

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SUBMITTAL DATE: JULY 2021

0 20' 40'

IF SHEET IS LESS THAN 22" X 34"
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SCALE ACCORDINGLY

NO.	DATE	REVISIONS/DESCRIPTION	APPR'D

DESIGNED BY: J. CAUSARANO	DRAWN BY: C. DEBONA
CHECKED BY: J. LAPADULA	DESIGN LEAD: R. GEDEON

Hazen

STATE OF NEW YORK · RUDOLF J. GEDEON · 070901 · REGISTERED PROFESSIONAL ENGINEER

NYC Environmental Protection

ACCOUNTABLE MANAGER	JOSE NIEVES
PROJECT MANAGER	MARK DELBALZO, P.E.

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WATERFOWL MANAGEMENT PROGRAM BUILDING AND PAVING
MOUNT PLEASANT, NEW YORK

SOIL EROSION AND SEDIMENT CONTROL PLAN
(WATERFOWL OPERATIONS BUILDING)

DATE:	JULY 2021
SCALE:	1" = 20'
SHEET NO:	7 OF 39
DRAWING NO.	C1-102

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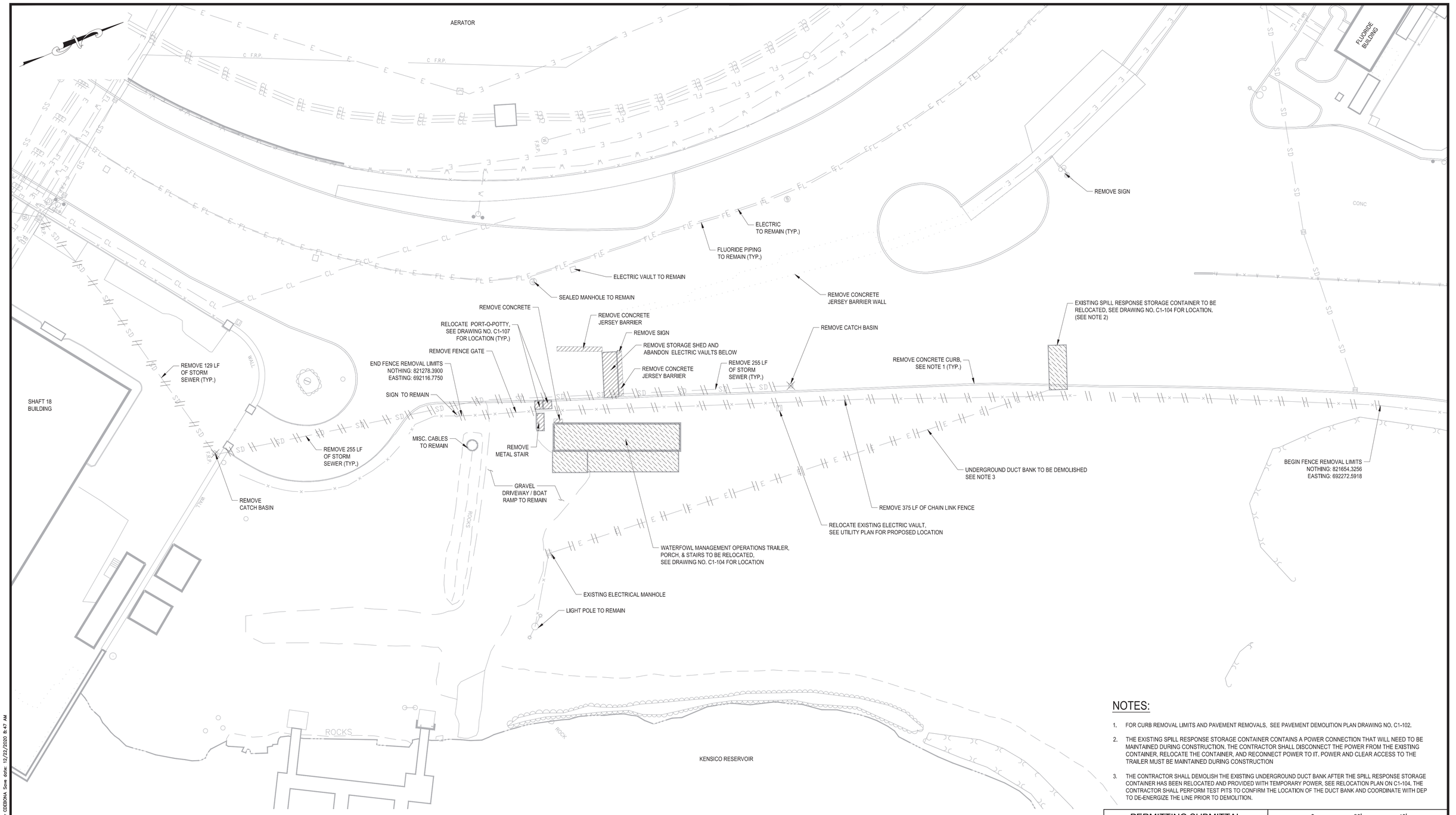
File: C:\BMS WORKING\D0105068\05_C1-102.00 Saved by CDEBONA Save date: 12/17/2020 10:52 AM



NOTES:

1. FOR CURB REMOVAL LIMITS AND PAVEMENT REMOVALS, SEE PAVEMENT DEMOLITION PLAN DRAWING NO. C1-102.
2. THE EXISTING SPILL RESPONSE STORAGE CONTAINER CONTAINS A POWER CONNECTION THAT WILL NEED TO BE MAINTAINED DURING CONSTRUCTION. THE CONTRACTOR SHALL DISCONNECT THE POWER FROM THE EXISTING CONTAINER, RELOCATE THE CONTAINER, AND RECONNECT POWER TO IT. POWER AND CLEAR ACCESS TO THE TRAILER MUST BE MAINTAINED DURING CONSTRUCTION
3. THE CONTRACTOR SHALL DEMOLISH THE EXISTING UNDERGROUND DUCT BANK AFTER THE SPILL RESPONSE STORAGE CONTAINER HAS BEEN RELOCATED AND PROVIDED WITH TEMPORARY POWER. SEE RELOCATION PLAN ON C1-104. THE CONTRACTOR SHALL PERFORM TEST PITS TO CONFIRM THE LOCATION OF THE DUCT BANK AND COORDINATE WITH DEP TO DE-ENERGIZE THE LINE PRIOR TO DEMOLITION.

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SUBMITTAL DATE: JULY 2021

0 20' 40'

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NO.	DATE	REVISIONS/DESCRIPTION	APPR'D

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CHECKED BY: J. LAPADULA	DESIGN LEAD: R. GEDEON

Hazen

STATE OF NEW YORK · REGILLO J. GEDEON · 070904 · LICENSED PROFESSIONAL ENGINEER

NYC Environmental Protection

ACCOUNTABLE MANAGER	JOSE NIEVES
PROJECT MANAGER	MARK DELBALZO, P.E.

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WATERFOWL MANAGEMENT PROGRAM BUILDING AND PAVING
MOUNT PLEASANT, NEW YORK

DEMOLITION & REMOVALS PLAN
(WATERFOWL OPERATIONS BUILDING)

DATE:	JULY 2021
SCALE:	1" = 20'
SHEET NO:	8 OF 39
DRAWING NO.	C1-103

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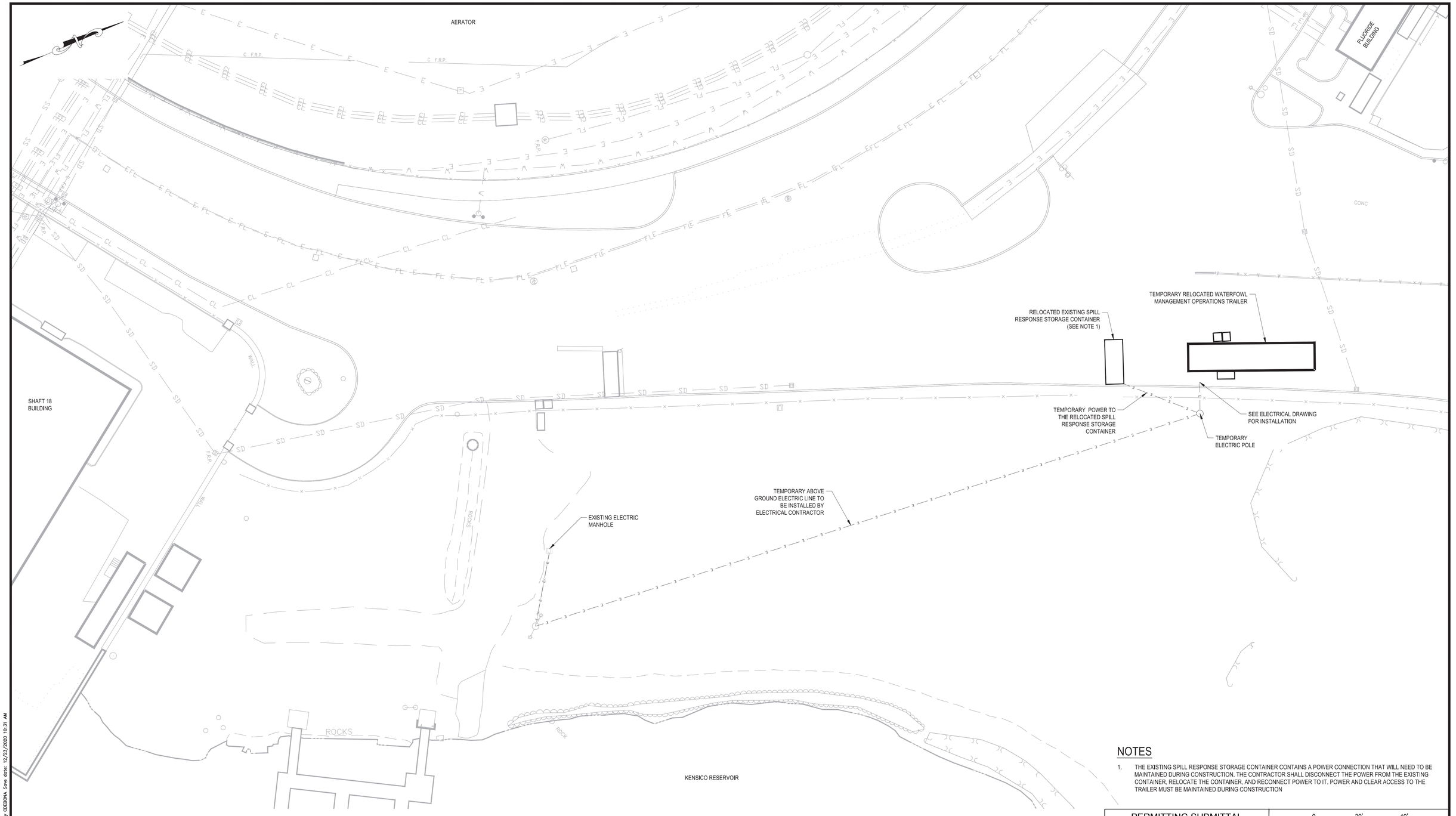

NOTES

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SUBMITTAL DATE: JULY 2021

0 20' 40'

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CHECKED BY: J. LAPADULA	DESIGN LEAD: R. GEDEON

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RUDOLF J. GEDEON 070901 LICENSED PROFESSIONAL ENGINEER STATE OF NEW YORK

Environmental Protection

ACCOUNTABLE MANAGER	JOSE NIEVES
PROJECT MANAGER	MARK DELBALZO, P.E.

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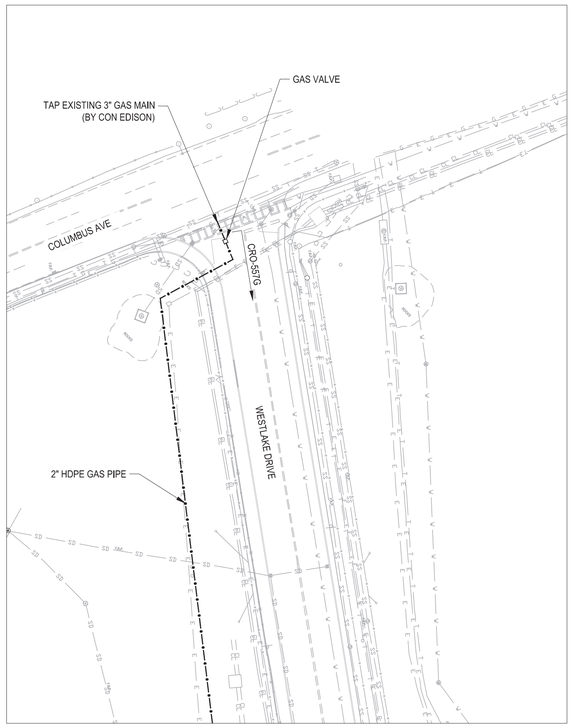
WATERFOWL MANAGEMENT PROGRAM BUILDING AND PAVING
MOUNT PLEASANT, NEW YORK

RELOCATION PLAN
(WATERFOWL OPERATIONS BUILDING)

DATE: JULY 2021
SCALE: 1" = 20'
SHEET NO: 9 OF 39
DRAWING NO. C1-104

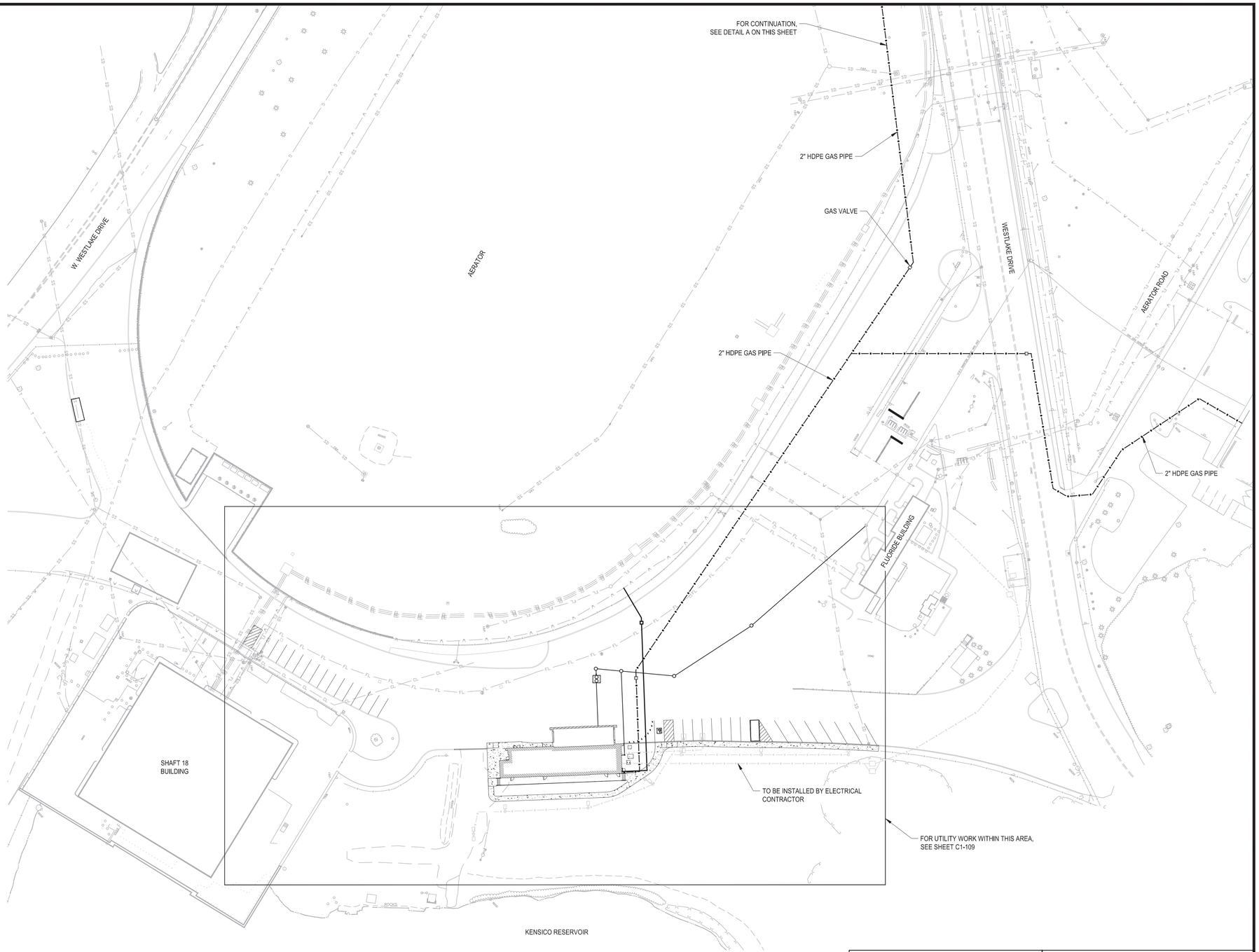
File: C:\BMS WORKING\Q0105808\02_C1-104.00 Saved by OSEBONA Save date: 12/23/2020 10:31 AM



A GAS MAIN CONNECTION
\- SCALE: 1" = 50'

LEGEND

- GAS PIPE
- WATER PIPE
- ELECTRICAL CONDUIT
- SANITARY PIPE
- SANITARY MANHOLE
- ELECTRIC BOX



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CHECKED BY: J. LAPADULA	DESIGN LEAD: R. GEDEON

Hazen

STATE OF NEW YORK · ROBERT J. GEDEON · 070904 · REGISTERED PROFESSIONAL ENGINEER

NYC Environmental Protection

ACCOUNTABLE MANAGER	JOSE NIEVES
PROJECT MANAGER	MARK DELBALZO, P.E.

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WATERFOWL MANAGEMENT PROGRAM BUILDING AND PAVING
MOUNT PLEASANT, NEW YORK

UTILITY PLAN

DATE: JULY 2021
SCALE: 1" = 50'
SHEET NO: 10 OF 39
DRAWING NO. C1-105

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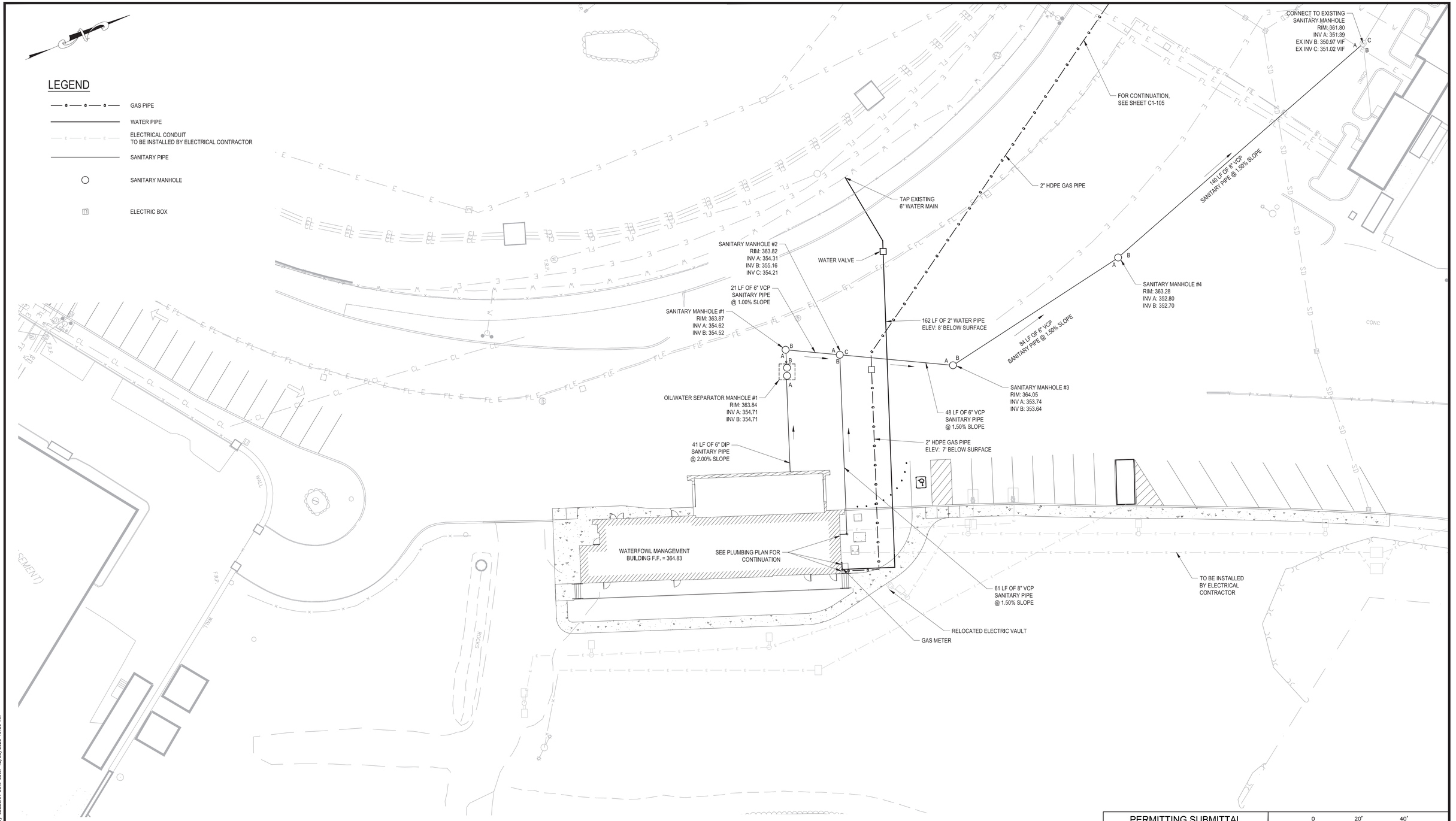
File: C:\BMS WORKING\D0105800\08_C1-105.00 Saved by: CDEBONA Save date: 12/21/2020 2:53 PM

LEGEND

- GAS PIPE
- WATER PIPE
- ELECTRICAL CONDUIT TO BE INSTALLED BY ELECTRICAL CONTRACTOR
- SANITARY PIPE
- SANITARY MANHOLE
- ELECTRIC BOX



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SUBMITTAL DATE: JULY 2021

0 20' 40'

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NO.	DATE	REVISIONS/DESCRIPTION	APPR'D

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CHECKED BY: J. LAPADULA	DESIGN LEAD: R. GEDEON

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Environmental Protection

ACCOUNTABLE MANAGER	JOSE NIEVES
PROJECT MANAGER	MARK DELBALZO, P.E.

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WATERFOWL MANAGEMENT PROGRAM BUILDING AND PAVING
MOUNT PLEASANT, NEW YORK

UTILITY PLAN
(WATERFOWL OPERATIONS BUILDING)

DATE: JULY 2021
SCALE: 1" = 20'
SHEET NO: 11 OF 39
DRAWING NO. C1-106

File: C:\BMS WORKING\V2010\5806\V10. C1-106.00 Saved by: CDEBONA Save date: 12/23/2020 10:30 AM

LEGEND

RCP DRAINAGE PIPE

CATCH BASIN

CONNECT TO EXISTING STRUCTURE INV: 353.35

STORMWATER CHAMBERS VOLUME PROVIDED: 1,000 FT³

INV: 355.64

62 LF OF 12" RCP DRAINAGE PIPE @ 1.00 % SLOPE

DRAINAGE STRUCTURE #2
GRATE: 364.35
INV A: 356.36
INV B: 356.36
INV C: 356.26

100 LF OF 12" RCP DRAINAGE PIPE @ 1.00 % SLOPE

37 LF OF 6" RCP DRAINAGE PIPE @ 1.00% SLOPE

DRAINAGE STRUCTURE #3
GRATE: 364.25
INV A: 357.46
INV B: 357.46
INV C: 357.36

15 LF OF 12" RCP DRAINAGE PIPE @ 1.00% SLOPE

DRAINAGE STRUCTURE #4
GRATE: 364.33
INV A: 357.71
INV B: 357.61

18 LF OF 6" RCP DRAINAGE PIPE @ 1.00% SLOPE

129 LF OF 16" RCP DRAINAGE PIPE @ 1.00% SLOPE

INV: 355.64

40 LF OF 12" RCP DRAINAGE PIPE @ 1.00 % SLOPE

CDS5653-10-C STORMWATER TREATMENT STRUCTURE
GRATE: 363.00
INV A: 355.24
INV B: 355.14

39 LF OF 12" RCP DRAINAGE PIPE @ 1.00% SLOPE

DURING INSTALLATION OF DRAINAGE STRUCTURE #1, RETAINING WALL TO BE SUPPORTED

DRAINAGE STRUCTURE #1
GRATE: 362.19
INV A: 354.75
INV B: 354.65

71 LF OF 8" RCP DRAINAGE PIPE @ 1.00% SLOPE

DRAINAGE STRUCTURE #5
GRATE: 362.09
INV A: 358.42

REPLACE 22 LF OF EXISTING PIPE WITH RCP

CDS4045-8-C STORMWATER TREATMENT STRUCTURE
GRATE: 359.10
INV A: 352.23
INV B: 351.99

REPLACE CURB AS NEEDED, MEET EXISTING GRADES

REPLACE 6 LF OF EXISTING PIPE WITH RCP

A — CDS STORMWATER TREATMENT STRUCTURE AT WESTLAKE DRIVE
- — SCALE: 1" = 20'

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SUBMITTAL DATE: JULY 2021

0 20' 40'

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NO.	DATE	REVISIONS/DESCRIPTION	APPR'D
1	2/23/22	SITE PLAN APPROVALCOMMENTS	JC

DESIGNED BY: J. CAUSARANO
DRAWN BY: C. DEBONA
CHECKED BY: J. LAPADULA
DESIGN LEAD: R. GEDEON

Hazen

STATE OF NEW YORK — RODOLFO J. GEDEON — 070907 — LICENSED PROFESSIONAL ENGINEER

Environmental Protection

ACCOUNTABLE MANAGER: JOSE NIEVES
PROJECT MANAGER: MARK DELBALZO, P.E.

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WATERFOWL MANAGEMENT PROGRAM BUILDING AND PAVING
MOUNT PLEASANT, NEW YORK

FINAL DRAINAGE PLAN
(WATERFOWL OPERATIONS BUILDING)

DATE: JULY 2021
SCALE: 1" = 20'
SHEET NO: 12 OF No. 39
DRAWING NO. C1-107

File: C:\DMS WORKING\20105800\V1. C1-107.00 Saved by: CDEBONA Save date: 2/23/2022 2:33 PM

LEGEND

× 362.85	ELEVATION
× 364.85 364.35	TOP OF CURB ELEVATION BOTTOM OF CURB ELEVATION
— — — —	MEET EXISTING ELEVATION LINE

WATERFOWL MANAGEMENT BUILDING
F.F. = 364.83

BOAT WASH
F.F. = 364.83

MEET EXISTING

MEET EXISTING

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SUBMITTAL DATE: JULY 2021

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NO.	DATE	REVISIONS/DESCRIPTION	APPR'D

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CHECKED BY: J. LAPADULA	DESIGN LEAD: R. GEDEON

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Environmental Protection

ACCOUNTABLE MANAGER	JOSE NIEVES
PROJECT MANAGER	MARK DELBALZO, P.E.

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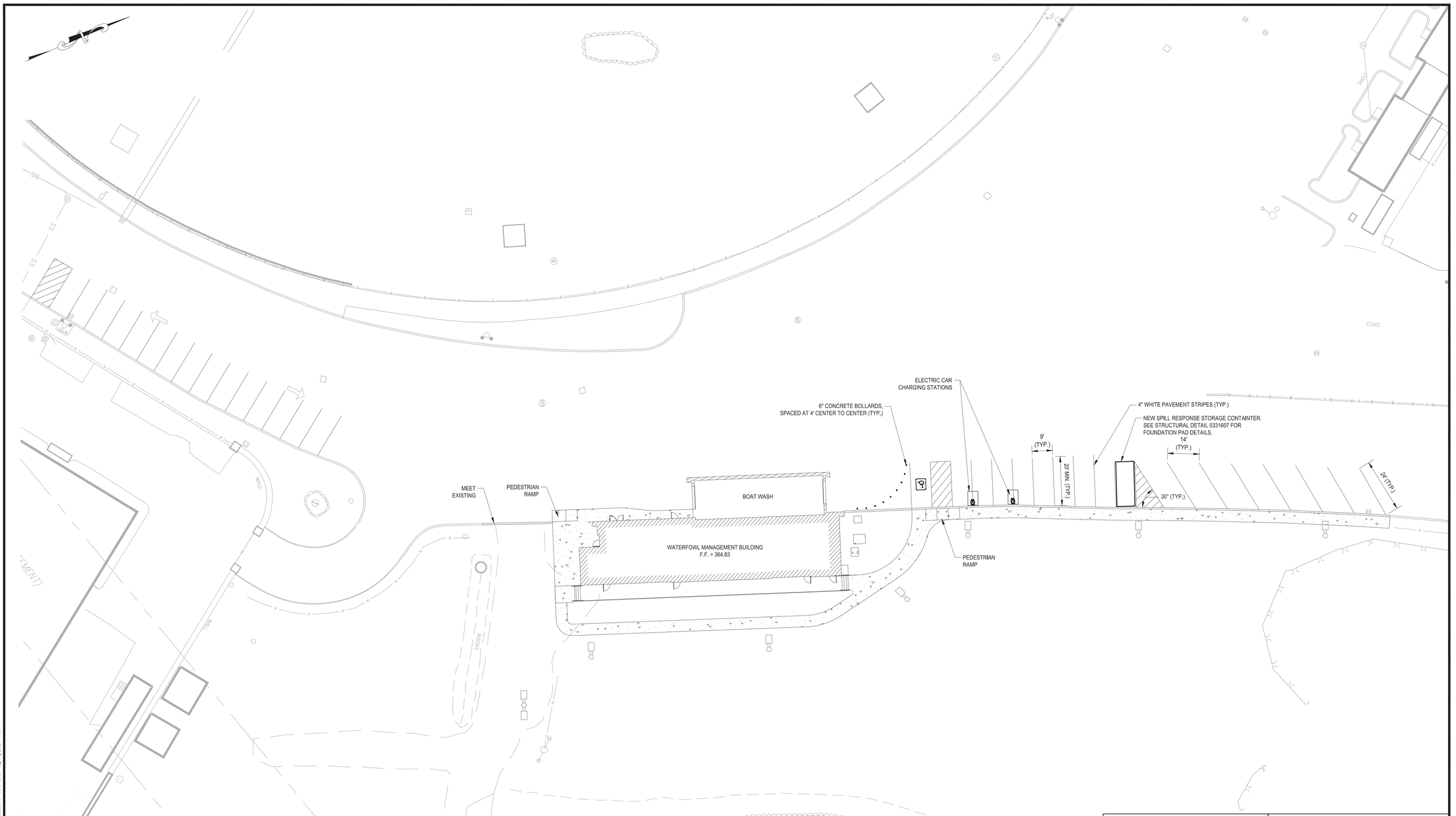
WATERFOWL MANAGEMENT PROGRAM BUILDING AND PAVING
MOUNT PLEASANT, NEW YORK

FINAL GRADING PLAN
(WATERFOWL OPERATIONS BUILDING)

DATE: JULY 2021
SCALE: 1" = 20'
SHEET NO: 13 OF 39
DRAWING NO. C1-108

Plot: C:\BMS WORKING\DO\D0508\12_C1-108.00 Saved by CDEBONA Save date: 12/17/2020 2:23 PM



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SUBMITTAL DATE: JULY 2021

0 20' 40'

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CHECKED BY: J. LAPADULA	DESIGN LEAD: R. GEDEON

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STATE OF NEW YORK · RUDOLF J. GEDEON · 070901 · LICENSED PROFESSIONAL ENGINEER

NYC Environmental Protection

ACCOUNTABLE MANAGER	JOSE NIEVES
PROJECT MANAGER	MARK DELBALZO, P.E.

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WATERFOWL MANAGEMENT PROGRAM BUILDING AND PAVING
MOUNT PLEASANT, NEW YORK

FINAL SITE PLAN
(WATERFOWL OPERATIONS BUILDING)

DATE: JULY 2021	
SCALE: 1" = 20'	
SHEET NO:	14 OF 39
DRAWING NO.	C1-109

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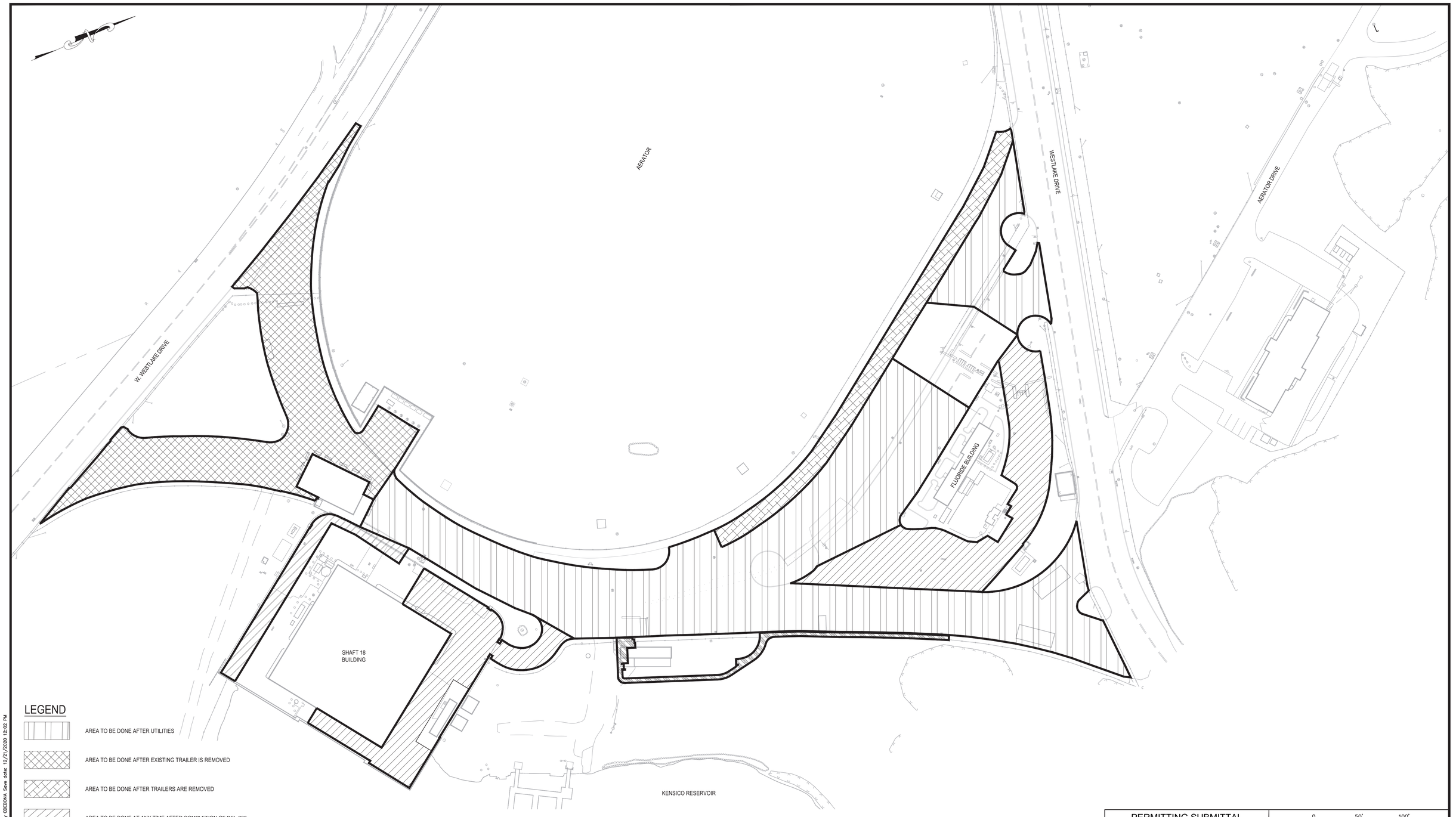

LEGEND

- AREA TO BE DONE AFTER UTILITIES
- AREA TO BE DONE AFTER EXISTING TRAILER IS REMOVED
- AREA TO BE DONE AFTER TRAILERS ARE REMOVED
- AREA TO BE DONE AT ANY TIME AFTER COMPLETION OF DEL-260
- AREA TO BE DONE AT ANY TIME AFTER COMPLETION OF WATERFOWL BUILDING

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SUBMITTAL DATE: JULY 2021

0 50′ 100′

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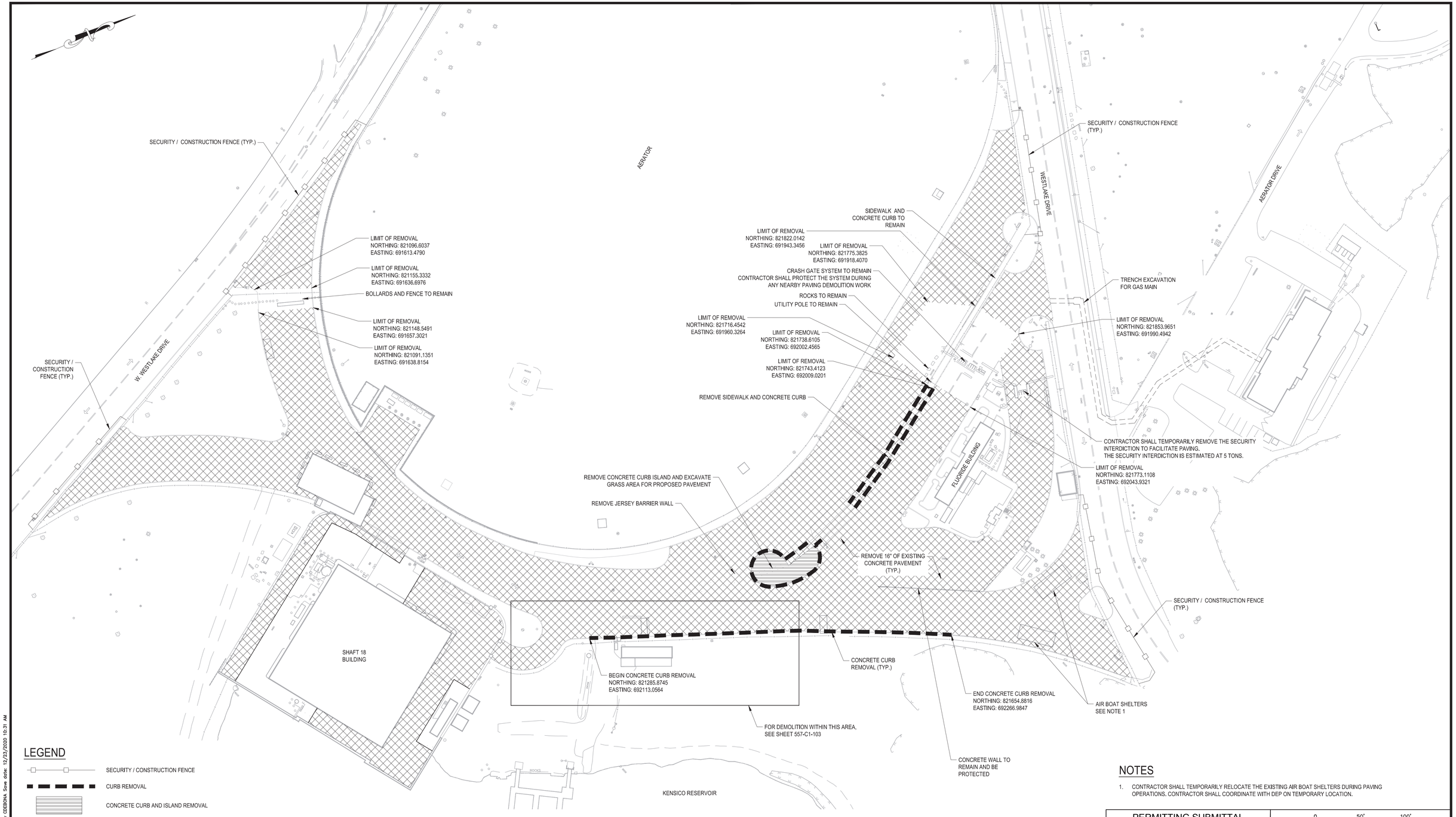
WATERFOWL MANAGEMENT PROGRAM BUILDING AND PAVING
MOUNT PLEASANT, NEW YORK

PAVING STAGING PLAN

DATE: JULY 2021
SCALE: 1" = 50'
SHEET NO: 15 OF 39
DRAWING NO. C1-110

File: C:\BMS WORKING\D0105808\14_C1-110.00 Saved by CDEBONA Save date: 12/21/2020 12:02 PM



LEGEND

- SECURITY / CONSTRUCTION FENCE
- CURB REMOVAL
- CONCRETE CURB AND ISLAND REMOVAL
- PAVEMENT REMOVAL

NOTES

1. CONTRACTOR SHALL TEMPORARILY RELOCATE THE EXISTING AIR BOAT SHELTERS DURING PAVING OPERATIONS. CONTRACTOR SHALL COORDINATE WITH DEP ON TEMPORARY LOCATION.

PERMITTING SUBMITTAL
NOT FOR CONSTRUCTION

SUBMITTAL DATE: JULY 2021

0 50' 100'

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SYOSSET, N.Y. 11791

NO.	DATE	REVISIONS/DESCRIPTION	APPR'D

DESIGNED BY: J. CAUSARANO	DRAWN BY: C. DEBONA
CHECKED BY: J. LAPADULA	DESIGN LEAD: R. GEDEON

Hazen

RUDOLF J. GEDEON 070901 LICENSED PROFESSIONAL ENGINEER STATE OF NEW YORK

Environmental Protection

ACCOUNTABLE MANAGER	JOSE NIEVES
PROJECT MANAGER	MARK DELBALZO, P.E.

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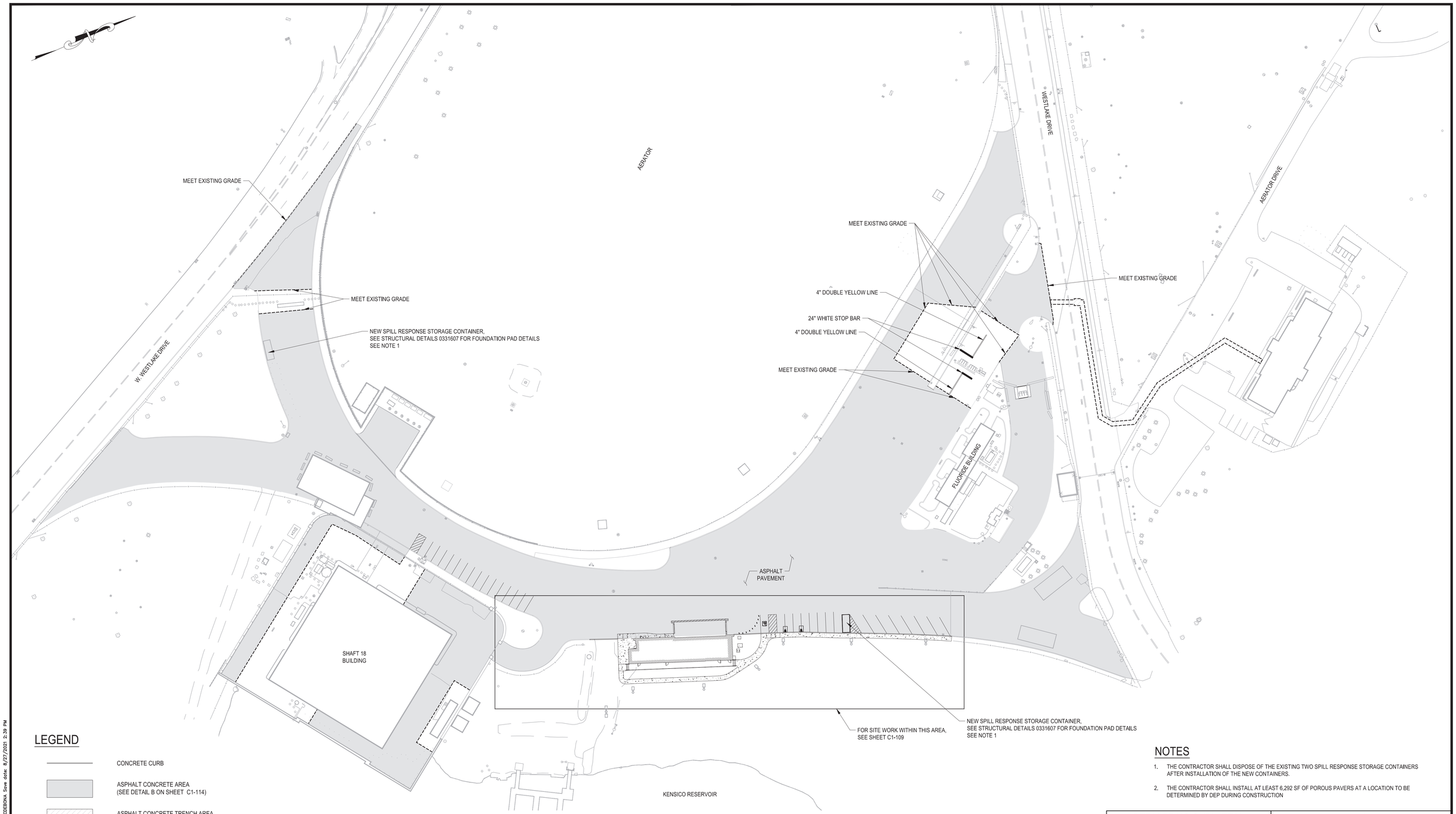
WATERFOWL MANAGEMENT PROGRAM BUILDING AND PAVING
MOUNT PLEASANT, NEW YORK

PAVEMENT DEMOLITION PLAN

DATE:	JULY 2021
SCALE:	1" = 50'
SHEET NO:	16 OF 39
DRAWING NO.	C1-111

File: C:\BMS WORKING\D0100508\15_C1-111.00 Saved by CDEBONA Save date: 12/23/2020 10:31 AM



LEGEND

- CONCRETE CURB
- ASPHALT CONCRETE AREA (SEE DETAIL B ON SHEET C1-114)
- ASPHALT CONCRETE TRENCH AREA (SEE DETAIL F ON SHEET C1-114)
- CONCRETE SIDEWALK

NOTES

1. THE CONTRACTOR SHALL DISPOSE OF THE EXISTING TWO SPILL RESPONSE STORAGE CONTAINERS AFTER INSTALLATION OF THE NEW CONTAINERS.
2. THE CONTRACTOR SHALL INSTALL AT LEAST 6,292 SF OF POROUS PAVERS AT A LOCATION TO BE DETERMINED BY DEP DURING CONSTRUCTION

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SUBMITTAL DATE: JULY 2021

0 50' 100'

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NO.	DATE	REVISIONS/DESCRIPTION	APPR'D

DESIGNED BY: J. CAUSARANO	DRAWN BY: C. DEBONA
CHECKED BY: J. LAPADULA	DESIGN LEAD: R. GEDEON

Hazen

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NYC Environmental Protection

ACCOUNTABLE MANAGER	JOSE NIEVES
PROJECT MANAGER	MARK DELBALZO, P.E.

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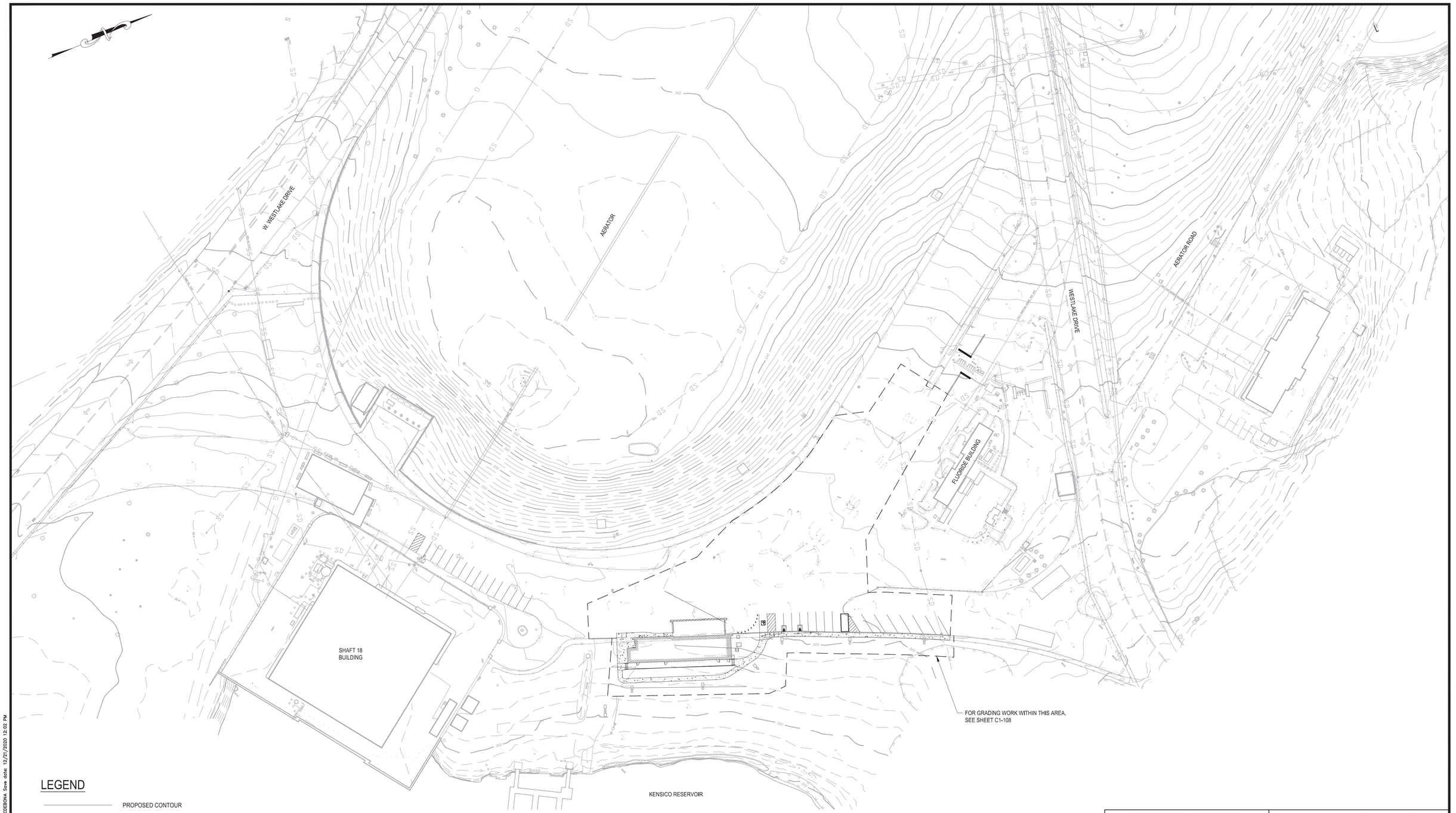
WATERFOWL MANAGEMENT PROGRAM BUILDING AND PAVING
MOUNT PLEASANT, NEW YORK

FINAL PAVEMENT SITE PLAN

DATE: JULY 2021
SCALE: 1" = 50'
SHEET NO: 17 OF 39
DRAWING NO. C1-112

All inquiries regarding this drawing(s) or project should be made to NYC Environmental Protection, Bureau of Engineering Design and Construction.



LEGEND

- PROPOSED CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR

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SUBMITTAL DATE: JULY 2021

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CHECKED BY: J. LAPADULA	DESIGN LEAD: R. GEDEON

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STATE OF NEW YORK · RUDOLF J. GEDEON · 070901 · LICENSED PROFESSIONAL ENGINEER

Environmental Protection

ACCOUNTABLE MANAGER	JOSE NIEVES
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WATERFOWL MANAGEMENT PROGRAM BUILDING AND PAVING
MOUNT PLEASANT, NEW YORK

FINAL GRADING PLAN

DATE: JULY 2021
SCALE: 1" = 50'
SHEET NO: 18 OF 39
DRAWING NO. C1-113

Plot: C:\BMS WORKING\DI105808\17_C1-113.DD Saved by CDEBONA Save date: 12/21/2020 12:02 PM

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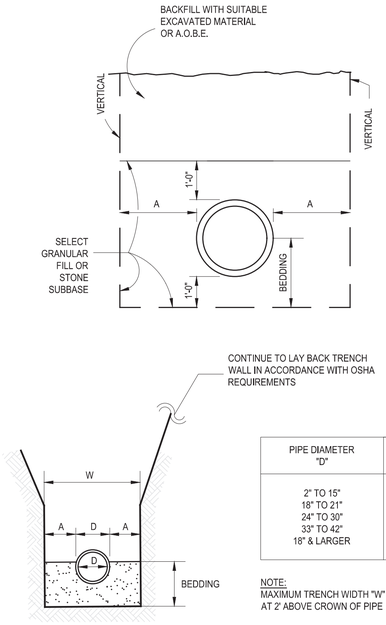
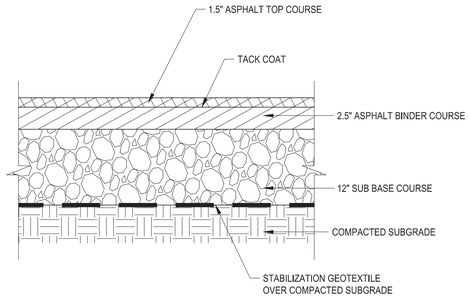


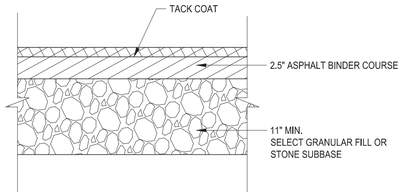
PIPE DIAMETER "D"	MAX "A"
2" TO 15"	8"
18" TO 21"	10"
24" TO 30"	12"
33" TO 42"	15"
18" & LARGER	15"

NOTE:
MAXIMUM TRENCH WIDTH "W" TAKEN AT 2' ABOVE CROWN OF PIPE

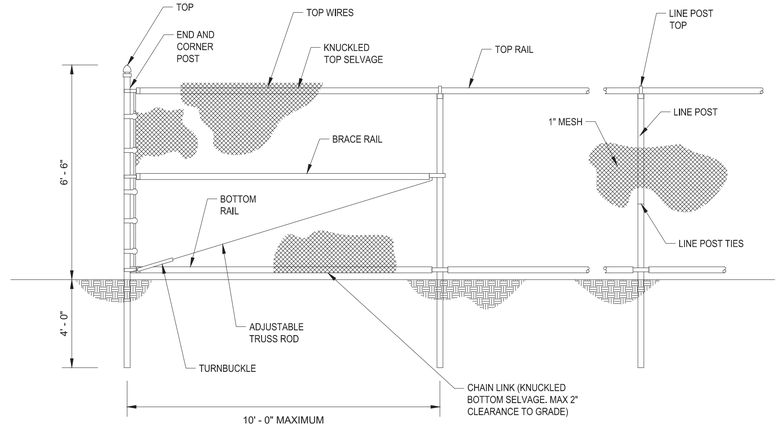
A - NOT TO SCALE — TRENCH DETAIL



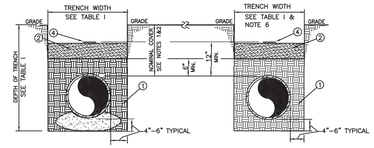
B - NOT TO SCALE — ASPHALT PAVEMENT SECTION



C - NOT TO SCALE — ASPHALT PAVEMENT SECTION FOR TRENCH

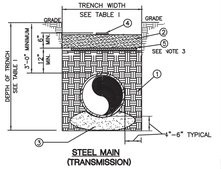


D - NOT TO SCALE — CONSTRUCTION / SECURITY FENCE



STEEL MAIN OR SERVICE (DISTRIBUTION)

PLASTIC MAIN OR SERVICE (DISTRIBUTION)



STEEL MAIN (TRANSMISSION)

TABLE 1

SIZE OF MAIN/ SERVICE	TRENCH WIDTH	TRENCH DEPTH (MAIN)	TRENCH DEPTH (SERVICE)
1"	0'-10"	3'-6"	2'-6"
1 ¼ "	0'-10"	3'-6"	2'-6"
1 ½ "	0'-10"	3'-6"	2'-6"
2"	1'-0"	3'-6"	2'-6"
3"	1'-0"	3'-6"	2'-6"
4"	1'-2"	3'-10"	2'-10"
6"	1'-4"	4'-0"	3'-0"
8"	1'-6"	4'-2"	3'-2"
10"	1'-8"	4'-4"	3'-4"
12"	1'-10"	4'-6"	3'-6"
16"	2'-4"	4'-10"	3'-10"
20"	4'-8"	5'-2"	4'-2"
24"	5'-0"	5'-6"	4'-6"
30"	5'-6"	6'-0"	
36"	6'-0"	6'-6"	

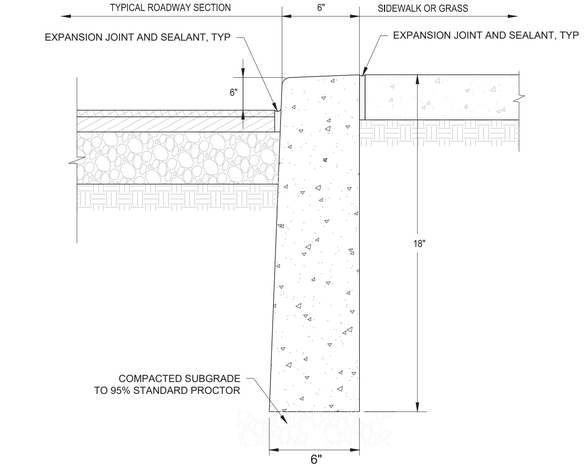
BILL OF MATERIAL

ITEM NO.	DESCRIPTION	SPEC. OR DWG. NO.	CLASS & STOCK NO.
1	3/8" SAND/ CLEAN FILL/ RECYCLED BACKFILL	EO-8065	-
2	SUITABLE BACKFILL	EO-1181	-
3	SANDBAG	ASTM C-33	066-0075
4	"WARNING BURIED GAS LINES BELOW" TAPE	G-8000/ G-8100	024-6660
5	STEEL PROTECTIVE COVER	EO-4799-C	-

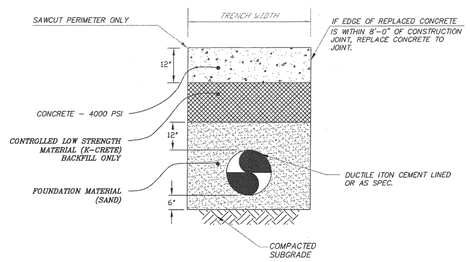
NOTES:

1. DISTRIBUTION MAINS SHOULD BE INSTALLED WITH A MINIMUM 3'-0" COVER SO AS TO ALLOW A MINIMUM COVER OF 2'-0" ON THE SERVICE PIPING.
2. FOR DISTRIBUTION MAINS OR SERVICES, STEEL PROTECTIVE PLATES ARE REQUIRED WHEN THE COVER IS LESS THAN 2'-0". (SEE SPECS. G-8805, G-8100, AND DWG. EO-6793-C).
3. FOR TRANSMISSION MAINS, STEEL PROTECTIVE PLATES ARE REQUIRED FOR ALL NEW INSTALLATIONS REGARDLESS OF COVER AND IF FEASIBLE, WHENEVER AN EXISITING TRANSMISSION MAIN IS EXPOSED. (SEE SPECS. G-8051, G-1193, AND DWG. EO-6798-C).
4. ENSURE PROPER CLEARANCES ARE MAINTAINED BETWEEN GAS FACILITIES AND OTHER FACILITIES OR STRUCTURES. (SEE CI-920-1 AND DWG. EO-5570-C)
5. WHEN SHEETING IS USED, THE "TRENCH WIDTH" DIMENSION IN TABLE 1 SHALL BE MEASURED FROM THE INSIDE OF THE SHEETING.
6. WHEN INSTALLING COILED PLASTIC PIPE, THE TRENCH WIDTH MAY BE LESS THAN SHOWN ON TABLE 1.
7. FOR STEEL MAINS AND SERVICES, INSTALL SANDBAGS AT 10' INTERVALS.
8. ALL REPLACEMENT DIRECT BURIED COPPER TUBING AND PLASTIC TUBING SERVICES IN 1" OR 1 ½" CTS SIZES SHALL HAVE A PROTECTIVE SLEEVE INSTALLED. (SEE G-8100)
9. SEE G-8200 FOR MINIMUM SIZES OF NEW DIRECT BURIED PLASTIC, STEEL, AND COPPER SERVICES OF VARIOUS PRESSURES.

H - NOT TO SCALE — TRENCH EXCAVATION FOR GAS MAINS & SERVICE UP TO 360 PSIG



E - NOT TO SCALE — CONCRETE CURB



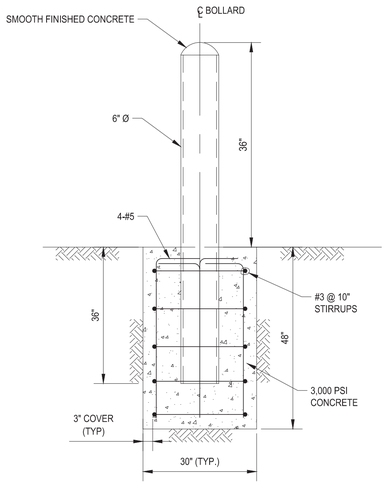
1. TEMPORARY PAVEMENT REPLACEMENT WILL BE ALLOWED ONLY WHEN ASPHALT PLANTS ARE NOT IN OPERATION. WHEN TEMP. PAVEMENT IS USED, CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTENANCE AND UPKEEP OF SAID PATCH UNTIL PERMENANT PATCH IS INSTALLED.

2. UPON THE AVAILABILITY OF ASPHALT, THE CONTRACTOR SHALL EXCAVATE THE "K-KRETE" BACKFILL TO THE ORDERED DEPTH AND REPLACE WITH 4000 PSI CONCRETE AND THE REQUIRED 2" THICK ASPHALT TO THE LIMITS AND SPECIFICATIONS AS SHOWN.

3. STEEL PLATES OF ADEQUATE SIZE SHALL BE PLACED OVER ALL TRENCHES UNTIL THE 4000 PSI CONCRETE PLUG IS DEEMED PASSABLE.

4. STEEL PLATES SHALL BE PINNED AS REQUIRED TO PREVENT MOVEMENT. DURING WINTER ALL STEEL PLATES SHALL BE RECESSED.

F - NOT TO SCALE — PERMANENT CONCRETE PAVEMENT



G - NOT TO SCALE — CONCRETE BOLLARD

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NO.	DATE	REVISIONS/DESCRIPTION	APPR'D

DESIGNED BY: J. CAUSARANO
DRAWN BY: C. DEBONA
CHECKED BY: J. LAPADULA
DESIGN LEAD: R. GEDEON

Hazen

STATE OF NEW YORK — REGILLO J. GEDEON — 070904 — LICENSED PROFESSIONAL ENGINEER

NYC Environmental Protection

ACCOUNTABLE MANAGER: JOSE NIEVES
PROJECT MANAGER: MARK DELBALZO, P.E.

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WATERFOWL MANAGEMENT PROGRAM BUILDING AND PAVING
MOUNT PLEASANT, NEW YORK

DETAILS - 1

DATE: JULY 2021
SCALE: N.T.S
SHEET NO: 19 OF 39
DRAWING NO. C1-114

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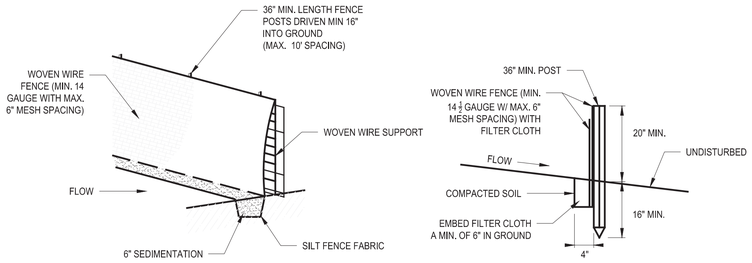
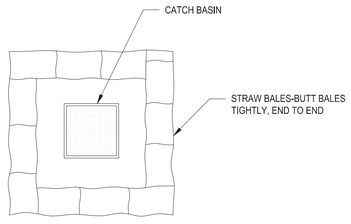


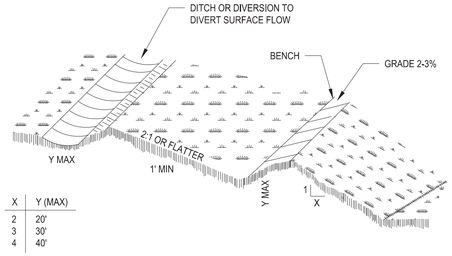
GENERAL NOTES

1. STEEL POSTS WHICH SUPPORT THE SILT FENCE SHALL BE INSTALLED ON A SLIGHT ANGLE TOWARD THE ANTICIPATED RUNOFF SOURCE. THE TOE OF THE SILT FENCE SHALL BE TRENCHED IN WITH A SPADE OR MECHANICAL TRENCHER, SO THAT
2. THE DOWNSLOPE FACE OF THE TRENCH IS FLAT AND PERPENDICULAR TO THE LINE OF FLOW.
3. THE TRENCH SHALL BE A MINIMUM OF 6" DEEP AND 3" - 4" WIDE TO ALLOW FOR THE SILT FENCE TO BE LAID IN THE GROUND AND BACKFILLED.
4. SILT FENCE SHALL BE SECURELY FASTENED TO EACH STEEL SUPPORT POST AND TO WOVEN WIRE, WHICH IS IN TURN ATTACHED TO THE STEEL FENCE POSTS.
5. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED, AS ORDERED BY THE CONSTRUCTION MANAGER.
6. SILT FENCE SHALL BE REMOVED WHEN IT HAS SERVED ITS USEFULNESS, SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
7. SEDIMENT TRAPPED BY THIS PRACTICE SHALL BE LEGALLY DISPOSED OF IN AN APPROVED SITE IN A MANNER THAT WILL NOT CONTRIBUTE TO ADDITIONAL SILTATION.
8. ACCUMULATED SILT SHALL BE REMOVED WHEN IT REACHES A DEPTH OF 6" AND LEGALLY DISPOSED OF IN AN APPROVED SOIL SITE OR AS IN NOTE 7 ABOVE.

A - SILT FENCE
NOT TO SCALE

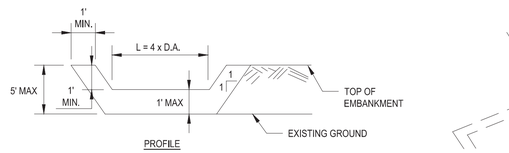


D - INLET PROTECTION
NOT TO SCALE

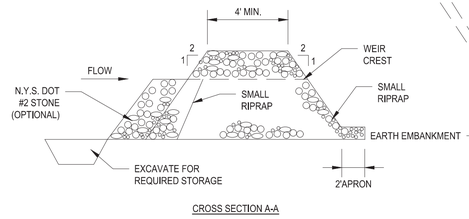


X	Y (MAX)
2	20'
3	30'
4	40'

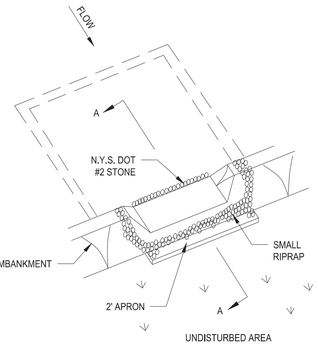
E - LANDGRADING
NOT TO SCALE



PROFILE



CROSS SECTION A-A



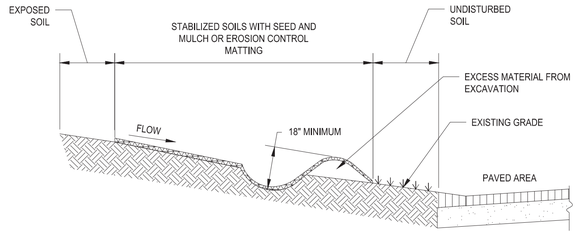
UNDISTURBED AREA

OPTION: A ONE FOOT LAYER OF N.Y.S. DOT #2 STONE MAY BE PLACED ON THE UPSTREAM SIDE OF THE RIPRAP INPLACE OF THE EMBEDDED FILTER CLOTH.

CONSTRUCTION SPECIFICATIONS

1. AREA UNDER EMBANKMENT SHALL BE CLEARED, GRUBBED AND STRIPPED OF ANY VEGETATION AND ROOT MAT. THE POOL AREA SHALL BE CLEARED.
2. THE FILL MATERIAL FOR THE EMBANKMENT SHALL BE FREE OF ROOTS AND OTHER WOODY VEGETATION AS WELL AS OVER-SIZED STONES, ROCKS, ORGANIC MATERIAL OR OTHER OBJECTIONABLE MATERIAL. THE EMBANKMENT SHALL BE COMPACTED BY TRAVERSING WITH EQUIPMENT WHILE IT IS BEING CONSTRUCTED.
3. ALL CUT AND FILL SLOPES SHALL BE 2:1 OR FLATTER.
4. THE STONE USED IN THE OUTLET SHALL BE SMALL RIPRAP 4"-8" ALONG WITH A 1' THICKNESS OF 2" AGGREGATE PLACED ON THE UP-GRADE SIDE ON THE SMALL RIPRAP OR EMBEDDED FILTER CLOTH IN THE RIPRAP.
5. SEDIMENT SHALL BE REMOVED AND TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO 1/2 THE DESIGN DEPTH OF THE TRAP. IT SHALL BE PLACED ON SITE AND STABILIZED.
6. THE STRUCTURE SHALL BE INSPECTED AFTER EACH RAIN AND REPAIRS MADE AS NEEDED.
7. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND SEDIMENT ARE CONTROLLED.
8. THE STRUCTURE SHALL BE REMOVED AND THE AREA STABILIZED WHEN THE DRAINAGE AREA HAS BEEN PROPERLY STABILIZED. MAXIMUM DRAINAGE AREA 5 ACRES

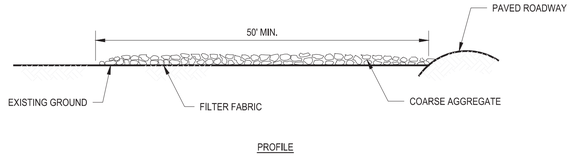
B - STONE OUTLET SEDIMENT TRAP
NOT TO SCALE



CONSTRUCTION NOTES

1. ALL EARTH FILL SHALL BE PLACED ON A STRIPPED FOUNDATION, CONTAIN NO STUMPS OR WOODY MATERIAL, AND BE COMPACTED WITH THE WEIGHT OF THE EXCAVATOR BUCKET.
2. THE SYSTEM SHALL BE USED WITH A MINIMUM 5 FOOT VEGETATED BUFFER ON THE DOWN SLOPE TOE OF THE DIKE OR AN ARTIFICIAL BUFFER OF EROSION CONTROL MATTING.
3. THE ENDS OF THE DIKE SYSTEM SHALL TERMINATE WITH A 90 DEGREE RETURN OF NYS DOT #1A CRUSHED STONE TO FILTER ANY EXCESS FLOW.
4. THE EARTHEN DIKE SHALL BE SEEDED AND MULCHED TO PREVENT EROSION USING AN ANNUAL RYE GRASS MIXTURE AT A RATE OF 1 LB. PER 1,000 SQUARE FEET.

F - SEDIMENT DIKE
NOT TO SCALE

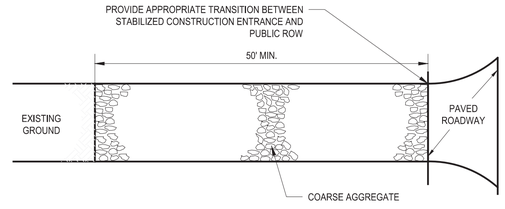


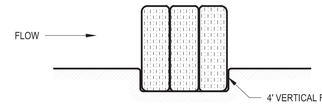
PROFILE

GENERAL NOTES

1. THE STONE SIZE WILL CONSIST OF COARSE AGGREGATE IN ACCORDANCE WITH THE SPECIFICATIONS. THE MATERIAL SHALL BE PLACED WITH A THICKNESS NOT LESS THAN 8", WILL NOT BE LESS THAN THE WIDTH OF THE INGRESS, AND NOT LESS THAN 50' IN LENGTH.
2. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PAVED ROADWAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEAN OUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO THE PUBLIC RIGHT-OF-WAY MUST BE REMOVED BY THE CONTRACTOR IMMEDIATELY.

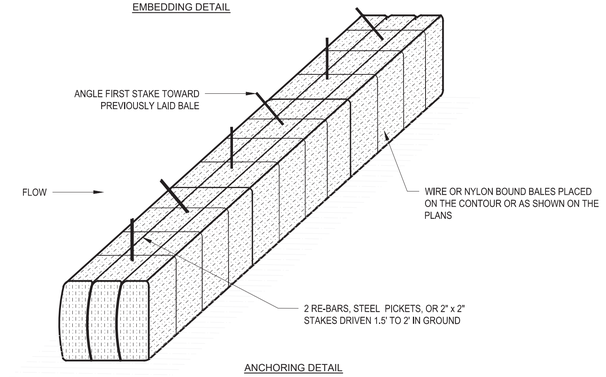
G - STABILIZED CONSTRUCTION ENTRANCE
NOT TO SCALE





EMBEDDING DETAIL

C - EMBEDDING DETAIL
NOT TO SCALE



ANCHORING DETAIL

GENERAL NOTES

1. BALES SHALL BE PLACED IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
2. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF FOUR INCHES.
3. BALES SHALL BE SECURELY ANCHORED IN PLACE BY STAKES OR RE-BARS DRIVEN THROUGH THE BALES. THE FIRST STAKE IN EACH BALE SHALL BE ANGLED TOWARD THE PREVIOUSLY LAID BALE TO FORCE BALES TOGETHER.
4. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
5. BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
6. ACCUMULATED SILT SHALL BE REMOVED AND LEGALLY DISPOSED OF WHEN IT REACHES A DEPTH OF 6 INCHES.
7. CONTRACTOR SHALL REPLACE HAY BALE AND DIKE EVERY THREE (3) MONTHS.

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NOT FOR CONSTRUCTION

SUBMITTAL DATE: JULY 2021

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SYOSSET, N.Y. 11791

NO.	DATE	REVISIONS/DESCRIPTION	APPR'D

DESIGNED BY: J. CAUSARANO	DRAWN BY: C. DEBONA
CHECKED BY: J. LAPADULA	DESIGN LEAD: R. GEDEON

Hazen

STATE OF NEW YORK · ROBERT J. GEDEON · 070904 · REGISTERED PROFESSIONAL ENGINEER

Environmental Protection

ACCOUNTABLE MANAGER	JOSE NIEVES
PROJECT MANAGER	MARK DELBALZO, P.E.

NEW YORK CITY ENVIRONMENTAL PROTECTION
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VALHALLA, NEW YORK 10595-1336
www.nyc.gov/dep

WATERFOWL MANAGEMENT PROGRAM BUILDING AND PAVING
MOUNT PLEASANT, NEW YORK

DETAILS - 2

DATE:	JULY 2021
SCALE:	N.T.S
SHEET NO:	20 OF 39
DRAWING NO.	C1-115

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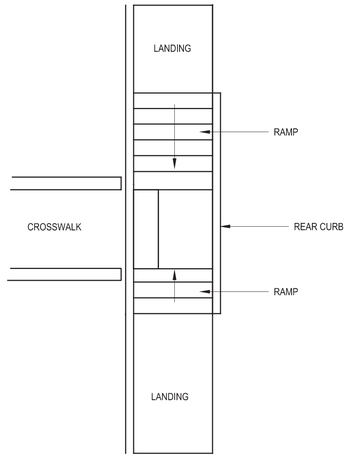
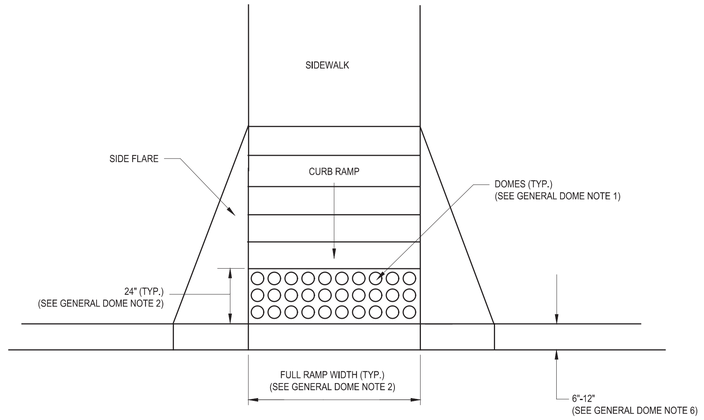


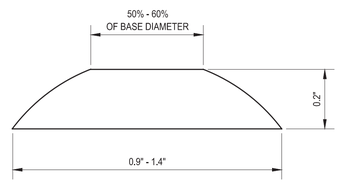
GENERAL NOTES

SEE NYSDOT DETAIL CURB RAMP CONFIGURATION: TYPE 9 MID BLOCK CROSSING

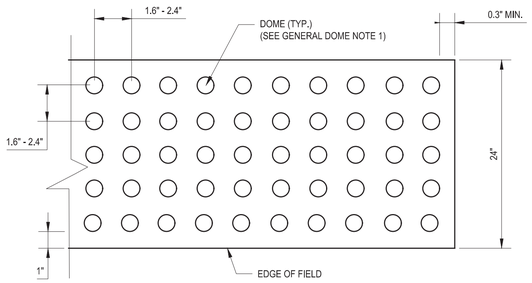
A
-
CURB RAMP
NOT TO SCALE



B
-
DETECTABLE WARNING AT CURB RAMP
NOT TO SCALE



C
-
DOME SECTION
NOT TO SCALE



D
-
DOME SPACING
NOT TO SCALE

GENERAL DOME NOTES

1. THE DETAILS PROVIDED ARE NOT DRAWN TO SCALE. THE QUANTITY OF DOMES DEPICTED ON THE DETECTABLE WARNING FIELD (THE DOMES AND THE ENTIRE 24"LEVEL SURFACE) IS FOR ILLUSTRATION ONLY.

DETECTABLE WARNING FIELD DIMENSIONS

2. THE SIZE OF THE DETECTABLE WARNING FIELD SHALL BE 24" IN THE DIRECTION OF TRAVEL AND SHALL EXTEND THE FULL WIDTH OF THE CURB RAMP OR FLUSH SURFACE, EXCLUSIVE OF SIDE FLARES.

DOME ALIGNMENT

3. THE ROWS OF DOMES SHALL BE ALIGNED TO BE PERPENDICULAR OR RADIAL TO THE GRADE BREAK BETWEEN THE RAMP LANDING OR CURB RAMP AND THE STREET.

4. WHERE DOMES ARE ARRAYED RADIALLY THEY MAY DIFFER IN DOME DIAMETER AND CENTER-TO-CENTER SPACING WITHIN THE RANGES SPECIFIED ON THIS SHEET.

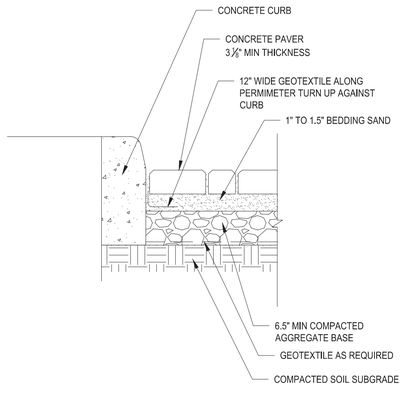
COLOR REQUIREMENTS

5. THE DETECTABLE WARNING FIELD SHALL BE THE COLOR SPECIFIED IN THE CONTRACT DOCUMENTS OR MEET THE REQUIREMENTS OF THE STANDARD SPECIFICATIONS.

DETECTABLE WARNINGS LOCATIONS

6. DETECTABLE WARNINGS SHALL BE LOCATED SO THAT THE EDGE OR ON CURB RAMP TYPE 1 AT LEAST ONE CORNER OF THE WARNING FIELD NEAREST TO THE ROADWAY IS 6" TO 8.9" FROM THE FRONT OF THE CURB OR THE EDGE (12" WHERE TRAVERSABLE CURB IS USED).

7. THE EDGE OF THE DETECTABLE WARNING FIELD NEAREST TO A RAILROAD CROSSING SHALL BE 5.9' MINIMUM AND 15' MAXIMUM FROM THE CENTERLINE OF THE NEAREST RAIL.



E
-
CONCRETE PAVER
NOT TO SCALE

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SUBMITTAL DATE: JULY 2021

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SCALE ACCORDINGLY

NO.	DATE	REVISIONS/DESCRIPTION	APPR'D

DESIGNED BY: J. CAUSARANO | DRAWN BY: C. DEBONA
CHECKED BY: J. LAPADULA | DESIGN LEAD: R. GEDEON

Hazen

STATE OF NEW YORK · RUDOLF J. GEDEON · 070901 · REGISTERED PROFESSIONAL ENGINEER

NYC Environmental Protection

ACCOUNTABLE MANAGER
JOSE NIEVES
PROJECT MANAGER
MARK DELBALZO, P.E.

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VALHALLA, NEW YORK 10595-1336
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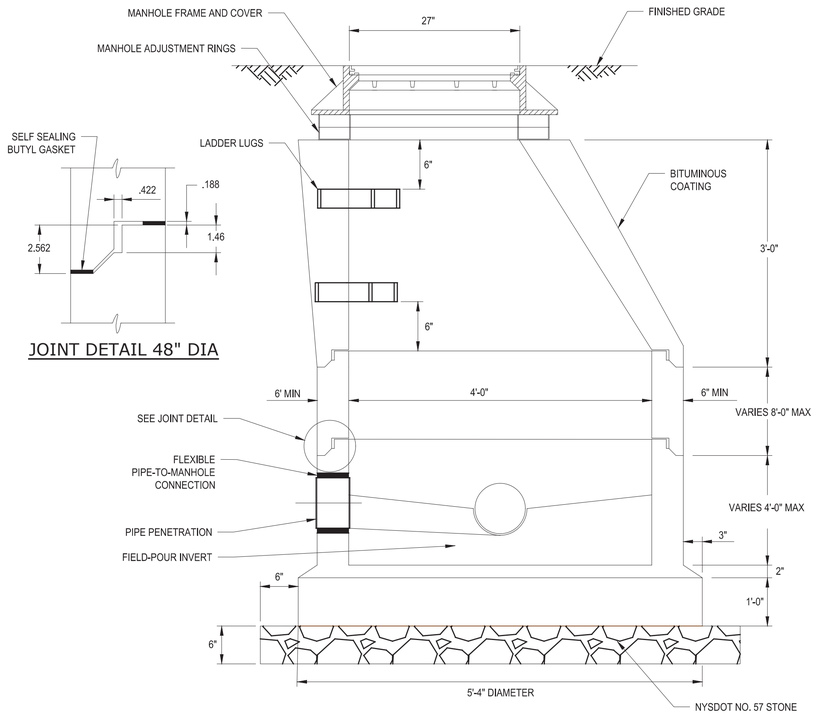
WATERFOWL MANAGEMENT PROGRAM BUILDING AND PAVING
MOUNT PLEASANT, NEW YORK

DETAILS - 3

DATE: JULY 2021
SCALE: N.T.S
SHEET NO: 21 OF 39
DRAWING NO. C1-116

File: C:\BMS WORKING\D010506\20_C1-116.00 Saved by CDEBONA Save date: 8/20/2021 10:20 AM

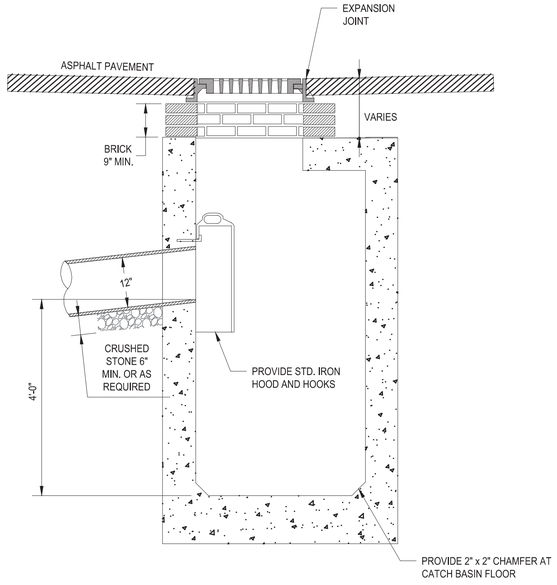


JOINT DETAIL 48" DIA

NOTES

1. REINFORCING SHALL COMPLY WITH DEP SEWER DESIGN STANDARDS SE28A, STANDARD FOR 4'0" DIAMETER PRECAST MANHOLE.
2. RISER SECTIONS SHALL COMPLY WITH ASTM C478-12, STANDARD SPECIFICATION FOR PRECAST REINFORCED CONCRETE MANHOLE SECTIONS.
3. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI.
4. PRECAST CONCRETE MANHOLES GREATER THAN 4'-0" IN DIAMETER SHALL COMPLY WITH DRAWINGS SE29 AND/OR SE30 OF THE NYCDEP SEWER DESIGN STANDARDS, JANUARY 2009 OR LATEST EDITION.

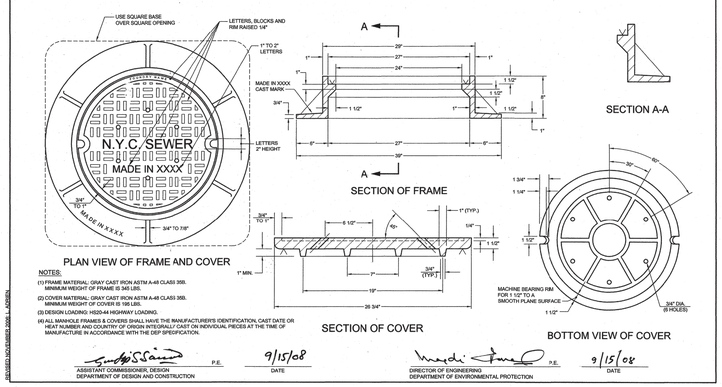
A
STANDARD NYCDEP SEWER MANHOLE
NOT TO SCALE



B
MODIFIED NYCDEP TYPE 2 CATCH BASIN WITHOUT CURB PIECE
NOT TO SCALE

SE39 — CITY OF NEW YORK — DEPARTMENT OF ENVIRONMENTAL PROTECTION — SE39

STANDARD FOR 27" DIAMETER CAST IRON MANHOLE FRAME AND COVER
(FOR ACCESS OR CLEANOUT)



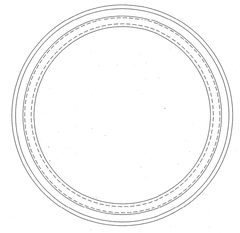
NOTES:
(1) FRAME MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B. MINIMUM WEIGHT OF FRAME IS 345 LBS.
(2) COVER MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B. MINIMUM WEIGHT OF COVER IS 195 LBS.
(3) DESIGN LOADING: HS20-44 HIGHWAY LOADING.
(4) ALL MANHOLE FRAMES & COVERS SHALL HAVE THE MANUFACTURER'S IDENTIFICATION, CAST DATE OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST ON INDIVIDUAL PIECES AT THE TIME OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.

ASSISTANT COMMISSIONER, DESIGN, DEPARTMENT OF DESIGN AND CONSTRUCTION — P.E. — 9/15/08 DATE
DIRECTOR OF ENGINEERING, DEPARTMENT OF ENVIRONMENTAL PROTECTION — P.E. — 9/15/08 DATE

C
27" DIAMETER CAST IRON MANHOLE FRAME AND COVER
NOT TO SCALE

SE40 — CITY OF NEW YORK — DEPARTMENT OF ENVIRONMENTAL PROTECTION — SE40

STANDARD FOR 27" DIAMETER CAST IRON EXTENSION RING
FOR 27" DIAMETER MANHOLE FRAME AND COVER


PLAN

SECTION

E = 2" for 2" raise
E = 3" for 3" raise
E = 4" for 4" raise
Minimum Raise: 2"
Maximum Raise: 4"

NOTES:
(1) MATERIAL: GRAY CAST IRON ASTM A-48, CLASS 35B. MINIMUM WEIGHT OF EXTENSION RINGS:
2" = 120 LBS., 3" = 180 LBS., 4" = 170 LBS.
(2) DESIGN LOADING: HS20-44 HIGHWAY LOADING
(3) ALL MANHOLE FRAMES & COVERS SHALL HAVE THE MANUFACTURER'S IDENTIFICATION, CAST DATE OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST ON INDIVIDUAL PIECES AT THE TIME OF MANUFACTURE IN ACCORDANCE WITH THEDEP SPECIFICATION.

ASSISTANT COMMISSIONER, DESIGN, DEPARTMENT OF DESIGN AND CONSTRUCTION — P.E. — 7/9/07 DATE
DIRECTOR OF ENGINEERING, DEPARTMENT OF ENVIRONMENTAL PROTECTION — P.E. — 8/10/07 DATE

D
27" DIAMETER CAST IRON EXTENSION RING FOR 27" DIAMETER FRAME AND COVER
NOT TO SCALE

PERMITTING SUBMITTAL
NOT FOR CONSTRUCTION

SUBMITTAL DATE: JULY 2021

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SYOSSET, N.Y. 11791

NO.	DATE	REVISIONS/DESCRIPTION	APPR'D

DESIGNED BY:	DRAWN BY:
J. CAUSARANO	C. DEBONA
CHECKED BY:	DESIGN LEAD:
J. LAPADULA	R. GEDEON

Hazen

STATE OF NEW YORK — ROBERT J. GEDEON — 070904 — REGISTERED PROFESSIONAL ENGINEER

Environmental Protection

ACCOUNTABLE MANAGER	JOSE NIEVES
PROJECT MANAGER	MARK DELBALZO, P.E.

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WATERFOWL MANAGEMENT PROGRAM BUILDING AND PAVING
MOUNT PLEASANT, NEW YORK

DETAILS - 4

DATE:	JULY 2021
SCALE:	N.T.S
SHEET NO:	22 OF 39
DRAWING NO.	C1-117

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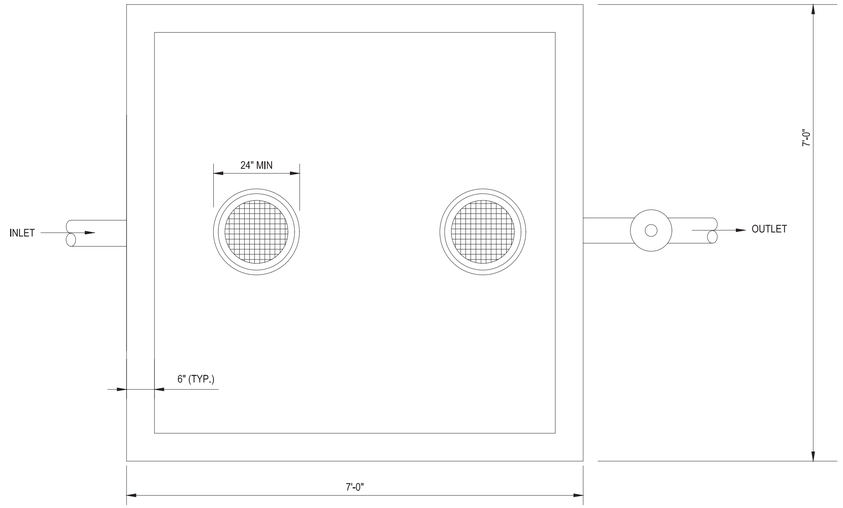
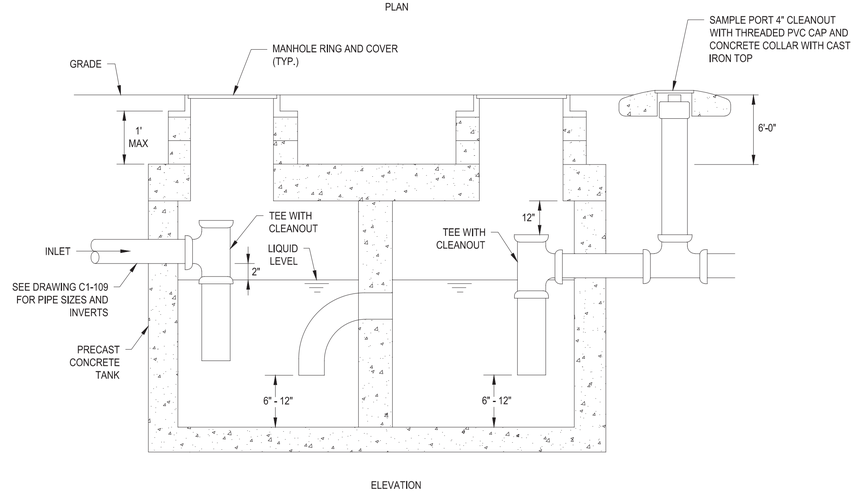


PLAN



ELEVATION

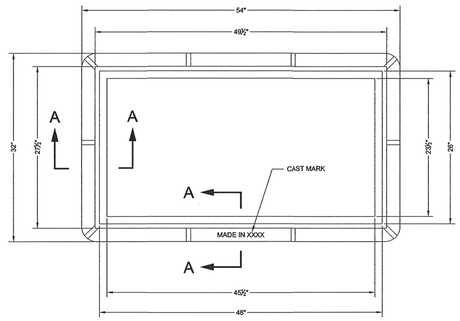
A - NOT TO SCALE — OIL AND WATER SEPARATOR

SE58A

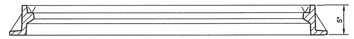
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR CAST IRON FRAME FOR CATCH BASINS
(WITHOUT CURB PIECE)

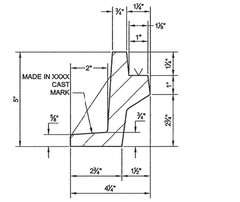
SE58A



PLAN



SECTION



SECTION A-A

NOTES:

(1) MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B. MINIMUM WEIGHT OF FRAME IS 275 LBS.

(2) DESIGN LOADING: HS20-44 HIGHWAY LOADING.

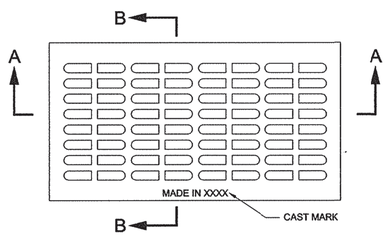
(3) ALL FRAMES SHALL HAVE THE MANUFACTURER'S IDENTIFICATION, CAST DATE OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST ON INDIVIDUAL PIECES AT THE TIME OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.

Gourdji S. Sarini P.E. — ASSOCIATE COMMISSIONER, DESIGN, DEPARTMENT OF DESIGN AND CONSTRUCTION — 8/14/18 DATE

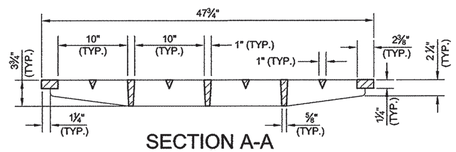
Thomas Wynne P.E. — EXECUTIVE DIRECTOR OF ENGINEERING, DEPARTMENT OF ENVIRONMENTAL PROTECTION — 8/14/18 DATE

REVISED DECEMBER 2017 P. LEUNG
W. PATALANOP, MDY

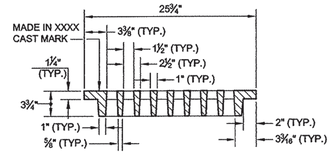
B - NOT TO SCALE — DEP STANDARD FRAME FOR CATCH BASIN



PLAN OF GRATING (TYPE R)



SECTION A-A



SECTION B-B

C - NOT TO SCALE — DEP STANDARD GRATE

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SUBMITTAL DATE: JULY 2021

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6901 JERICHO TURNPIKE, SUITE 216
SYOSSET, N.Y. 11791

DESIGNED BY: J. CAUSARANO	DRAWN BY: C. DEBONA
CHECKED BY: J. LAPADULA	DESIGN LEAD: R. GEDEON

Hazen

STATE OF NEW YORK · BURTON J. GEDEON · 070901 · LICENSED PROFESSIONAL ENGINEER

NYC Environmental Protection

ACCOUNTABLE MANAGER	JOSE NIEVES
PROJECT MANAGER	MARK DELBALZO, P.E.

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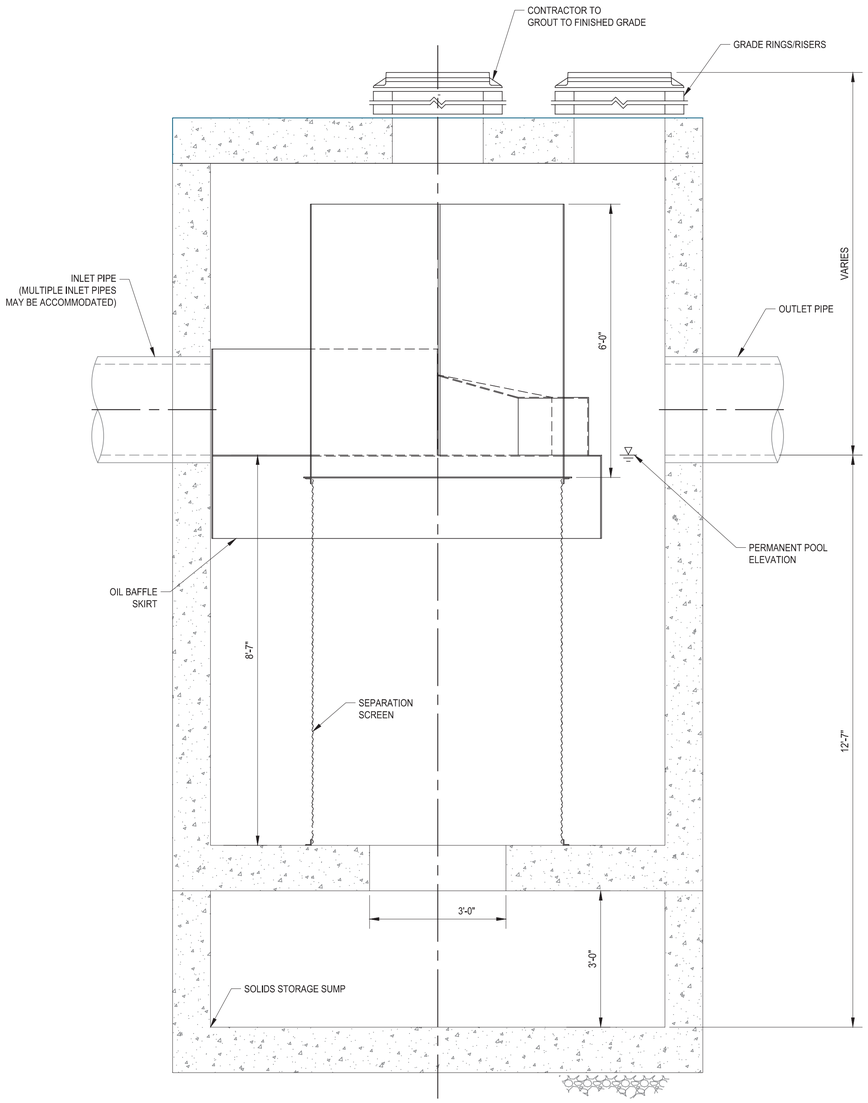
WATERFOWL MANAGEMENT PROGRAM BUILDING AND PAVING
MOUNT PLEASANT, NEW YORK

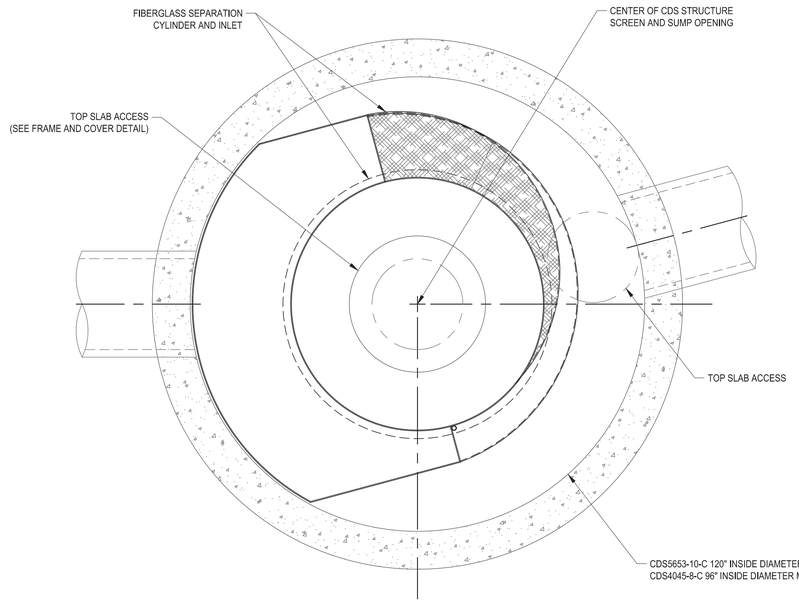
DETAILS - 5

DATE: JULY 2021
SCALE: N.T.S
SHEET NO: 23 OF 39
DRAWING NO. C1-118

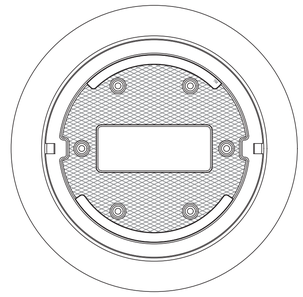
Plot: C:\BMS WORKING\DO\D0508\R\22_C1-118.DO Saved by CDEBONA Save date: 1/27/2021 8:01 PM



ELEVATION



PLAN



FRAME AND COVER

A - CDS STORMWATER TREATMENT MANHOLE
NOT TO SCALE

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PERMITTING SUBMITTAL
NOT FOR CONSTRUCTION

SUBMITTAL DATE: JULY 2021

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SCALE ACCORDINGLY

NO.	DATE	REVISIONS/DESCRIPTION	APPR'D
1	2/23/22	SITE PLAN APPROVALCOMMENTS	JC

DESIGNED BY: J. CAUSARANO	DRAWN BY: C. DEBONA
CHECKED BY: J. LAPADULA	DESIGN LEAD: R. GEDEON

Hazen

STATE OF NEW YORK ★ ROBERT J. GEDEON ★ 027090 ★ LICENSED PROFESSIONAL ENGINEER

Environmental Protection

ACCOUNTABLE MANAGER	JOSE NIEVES
PROJECT MANAGER	MARK DELBALZO, P.E.

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WATERFOWL MANAGEMENT PROGRAM BUILDING AND PAVING
MOUNT PLEASANT, NEW YORK

DETAILS - 6

DATE: JULY 2021
SCALE: N.T.S
SHEET NO: 24 OF No. 39
DRAWING NO. C1-119

All inquiries regarding this drawing(s) or project should be made to NYC Environmental Protection, Bureau of Engineering Design and Construction.

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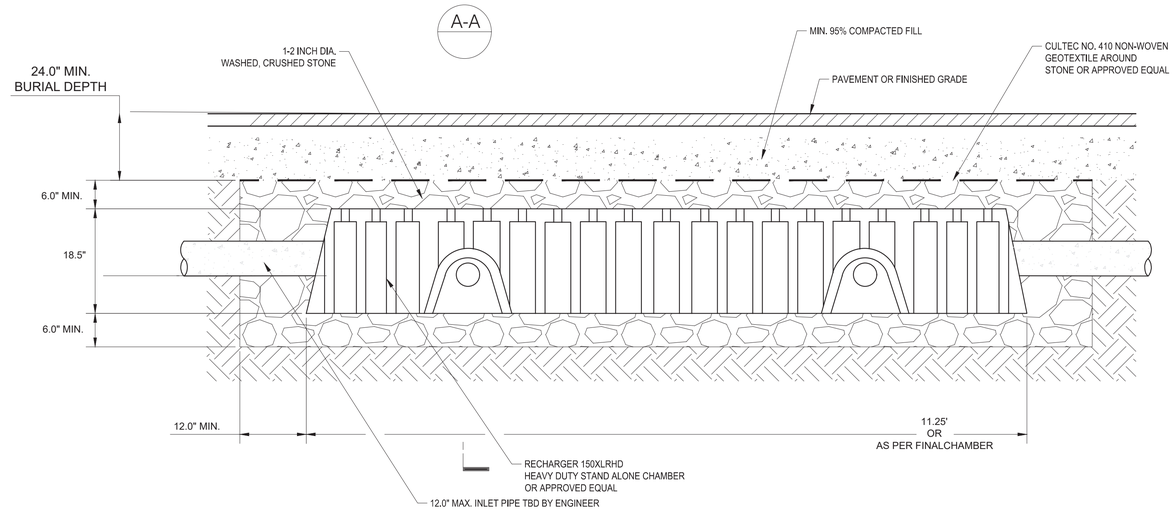

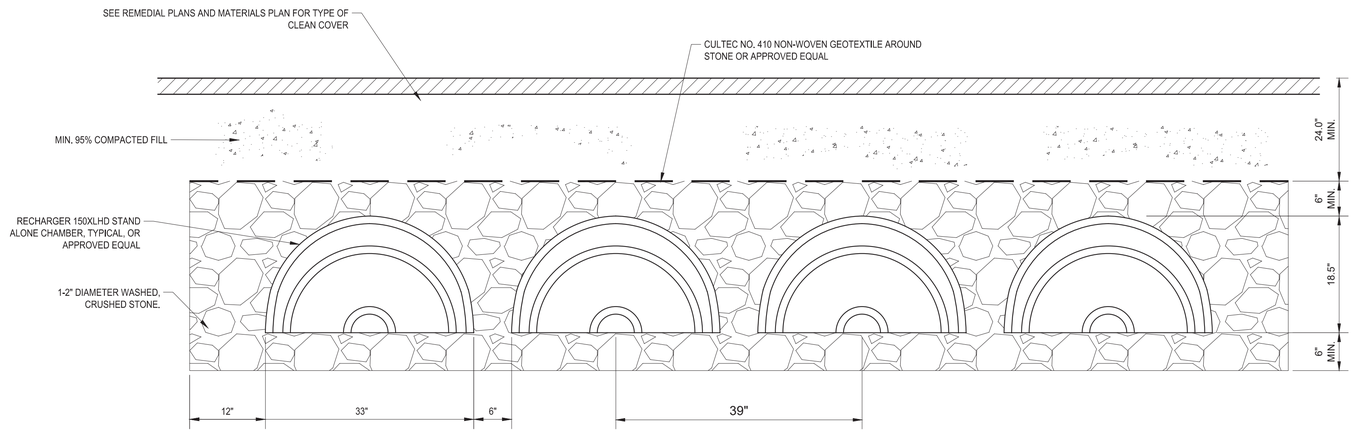

SECTION A-A

A STORMWATER CHAMBERS
\- NOT TO SCALE

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SUBMITTAL DATE: JULY 2021

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NO.	DATE	REVISIONS/DESCRIPTION	APPR'D

DESIGNED BY: J. CAUSARANO	DRAWN BY: C. DEBONA
CHECKED BY: J. LAPADULA	DESIGN LEAD: R. GEDEON

Hazen

STATE OF NEW YORK · RUDOLF J. GEDEON · 070901 · LICENSED PROFESSIONAL ENGINEER

Environmental Protection

ACCOUNTABLE MANAGER	JOSE NIEVES
PROJECT MANAGER	MARK DELBALZO, P.E.

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WATERFOWL MANAGEMENT PROGRAM BUILDING AND PAVING
MOUNT PLEASANT, NEW YORK

DETAILS - 7

DATE:	JULY 2021
SCALE:	N.T.S
SHEET NO:	25 OF 39
DRAWING NO.	C1-120

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LEGEND

EXISTING

X X	CHAINLINK FENCE
	STOCKADE FENCE
oo oo	SPLIT RAIL FENCE
	BOTTOM OF CURB LINE
	TAX LOT LINE
~	OVERHEAD UTILITY LINES
S	SEWER LINE (OF RECORD)
SD SD SD	STORM DRAIN LINE
W	WATER LINE (OF RECORD)
W	WATER LINE (TONE OUT)
GAS GAS	GAS LINE (TONE OUT)
	BUILDING
	SAW CUT LINE
	LIMIT OF WORK
+ 365.2	ELEVATION
+ 365.2 365.0	TOP OF CURB ELEVATION BOTTOM OF CURB ELEVATION

* SEE INDIVIDUAL SHEETS FOR PROPOSED LEGEND ITEMS.

ABBREVIATIONS

ABANDONED	ABDN.
AHEAD	AH
AMERICAN SOCIETY FOR TESTING AND MATERIALS	ASTM
AS ORDER BY THE ENGINEER	AOBE
ASPHALT	ASPH.
BACK	BK
BASE LINE	B.L.
BITUMINOUS	BIT.
BUILDING	BLDG.
BLOCK	BLK.
BOTTOM OF CURB	BC
BOTTOM OF WALL	BW
BOTTOM OF SIDEWALK ELEVATION	BS
BRICK	BRK.
CATCH BASIN	CB.
CENTER LINE	C.L.
CENTER TO CENTER	C-C
CHAIN LINK FENCE	C.L.F.
CLEARANCE	CL.
CONCRETE	CONC.
CONCRETE SIDEWALK	C.SW.
CONCRETE CURB	C.C.
DIAMETER	DIA.
DRAWING	DWG
DROP CURB	D.C.
DRYWELL	DW.
EAST	E
EDGE OF PAVEMENT	E.O.P.
ELEVATION	ELEV
ELECTRIC PULL BOX	EPB
EXISTING	EXIST.
FEET	FT
FIELD INLET	FI.
FRAME	FR.
GAS VALVE	GV
GROUND ELEVATION	GRD
HANDICAP	H.C.
HIGH-DENSITY POLYETHYLENE	HDPE
HORIZONTAL	HORZ
INCH	IN
INVERT ELEVATION	INV.
LINEAR FEET	LF
LINEAR	LIN
LONG	LG
MANHOLE	MH
MAXIMUM	MAX.
MINIMUM	MIN.
NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION	NYCDEP
NORTH	N
NOT TO SCALE	N.T.S.
ON CENTER	O.C.
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION	OSHA
PAVEMENT	PAVT.
POUNDS	LB
POUNDS PER SQUARE INCH	PSI
RADIUS	R
RECYCLED CONCRETE AGGREGATE	RCA
REINFORCED CONCRETE PIPE	RCP
RIM ELEVATION	RIM.
ROADWAY	RDWY.
STONE UNDERDRAIN	S
SANITARY	SAN
SEWER	SWR.
SPECIFICATIONS	SPECS.
SQUARE	SQ
STANDARD	STD.
STORM WATER	ST.W.
TOP OF CURB	TC
TOP OF WALL	TW
TYPICAL	TYP.
UNKNOWN PULL BOXES	UPB
VACANT	VAC.
VARIES	VAR
VERIFY IN FIELD	VIF
VERTICAL	VERT
WATER VALVE	WV
WELDED WIRE FABRIC	WWF
WELDED WIRE MESH	WWM

GENERAL NOTES

1. SELECT DEMOLITION AND SITE CLEARING INCLUDES BUT IS NOT LIMITED TO THE REMOVAL OF SIDEWALK, CURB, PAVEMENT, DRIVEWAYS, PIPE, MANHOLES, AND OTHER SUBSURFACE STRUCTURES, TREES, BRUSH, ROOTS, DEBRIS, VEGETATION, POLES AND ALL OTHER ITEMS REQUIRED TO CONSTRUCT THE PROJECT AND/OR AS SHOWN IN THE PLANS.
2. UNCLASSIFIED EXCAVATION INCLUDES BUT IS NOT LIMITED TO EXCAVATION REQUIRED FOR SOIL RESTORATIONS, NEW MANHOLES, INLETS, OR DRAINAGE PIPES. ALL VOIDS CREATED BY THE REMOVAL OF EXISTING STORM DRAINS AND SUBSURFACE STRUCTURES SHALL BE BACKFILLED WITH SUITABLE UNCLASSIFIED EXCAVATION MATERIAL AS DIRECTED BY THE CLIENT. ALL EXCAVATION SHALL COMPLY WITH OSHA REQUIREMENTS. EXPLOSIVES SHALL NOT BE ALLOWED FOR ROCK EXCAVATION. SEE SPECIFICATIONS.
3. LOCATIONS OF EXISTING UTILITIES AND SEWERS SHOWN ON THE PLANS WERE DETERMINED BY STANDARD SURVEYING METHODS, AVAILABLE RECORDS AND THROUGH SOLICITATION OF THE RESPECTIVE UTILITY OWNERS. THE INFORMATION FOR THE EXACT LOCATION OF THESE UTILITIES IS NOT GUARANTEED TO BE COMPLETE OR CORRECT. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION OF ALL UTILITIES IN THE FIELD PRIOR TO STARTING CONSTRUCTION.
4. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL FIELD LAYOUT AND VERIFYING ALL EXISTING CONDITIONS IN THE FIELD.
5. EXISTING DIMENSIONS, OFFSETS, INVERTS, RADII, ETC. SHALL BE VERIFIED IN THE FIELD PRIOR TO ANY CONSTRUCTION ACTIVITY. ANY DISCREPANCY SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE CLIENT FOR RESOLUTION. ALL NOTIFICATIONS SHALL BE IN WRITING.
6. ALL GRADING SHALL BE AS SHOWN ON THE PLANS. THE CONTRACTOR SHALL CAREFULLY DETERMINE ACTUAL GRADING LIMITS BEFORE BEGINNING DEMOLITION AND SITE CLEARING OPERATIONS. CARE SHALL BE TAKEN TO RETAIN EXISTING NATURAL GROWTH AND PREVENT DAMAGE TO TREES OUTSIDE THE PROJECT LIMITS. ANY DAMAGE CAUSED TO THIS NATURAL GROWTH SHALL BE RESTORED AT THE CONTRACTOR'S EXPENSE. ALL AREAS DISTURBED BY THE CONTRACTOR WITHOUT AUTHORIZATION BY THE CLIENT SHALL BE RESTORED BY THE CONTRACTOR AT HIS EXPENSE.
7. WHERE CONSTRUCTION CROSSES OR IS ADJACENT TO AN EXISTING ELECTRIC, GAS, COMMUNICATIONS, OR OTHER UTILITY LINE, THE CONTRACTOR SHALL CAREFULLY HAND EXCAVATE TO LOCATE, MARK AND PROTECT THE UTILITY LINE AGAINST DISTURBANCE OR DAMAGE BY PROVIDING ADEQUATE SUPPORT AND PROTECTION AS APPROVED BY THE CLIENT. THE CONTRACTOR SHALL REPAIR ANY ELECTRIC POWER INTERRUPTION IMMEDIATELY, AT NO ADDITIONAL COST TO NYCDEP.
8. THE CONTRACTOR SHALL COORDINATE THE LOCATIONS OF TREES AND OTHER PLANTINGS AS TO NOT CONFLICT WITH DRAINAGE, INCLUDING UNDERGROUND DRAINAGE.
9. THE CONTRACTOR SHALL RESTORE ALL PUBLIC OR PRIVATE PROPERTY DAMAGED OR REMOVED TO AT LEAST AS GOOD A CONDITION AS BEFORE BEING DISTURBED, AS DETERMINED BY THE CLIENT. ANY DAMAGED TREES, SHRUBS, AND/OR HEDGES SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE. NO WORK SHALL BE PERFORMED ON OTHER PROPERTIES AND BUILDINGS WITHOUT THE PROPER AUTHORIZATION.
10. CONTRACTOR SHALL EXERCISE CARE TO MINIMIZE CLEARING. SPECIFIC TREES AND ITEMS TO BE CLEARED MUST BE APPROVED BY THE CLIENT PRIOR TO REMOVAL.
11. THE CONTRACTOR SHALL COMPLY WITH ALL REQUIRED PERMITS FROM LOCAL, STATE AND FEDERAL AGENCIES, AS REQUIRED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING AND INCURRING THE COST OF ALL REQUIRED PERMITS, INSPECTIONS, CERTIFICATES, ETC.
12. THE CONTRACTOR SHALL PROTECT EXISTING SURVEYING AND PROPERTY LINE MONUMENTATION. ANY EXISTING SURVEYING AND PROPERTY LINE MONUMENTATION THAT IS DISTURBED OR DESTROYED, AS JUDGED BY THE NYCDEP, SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE UNDER THE SUPERVISION OF A NEW YORK STATE LICENSED LAND SURVEYOR.
13. BEFORE PLANNING OR PROCEEDING WITH ANY EXCAVATION WORK, THE CONTRACTOR SHALL NOTIFY THE "CALL BEFORE YOU DIG" NUMBER AT 1-800-962-7962 A MINIMUM OF FIVE WORKING DAYS PRIOR TO ANY EXCAVATION OPERATIONS.
14. ALL TRENCH EXCAVATION AND ANY REQUIRED SHEETING AND SHORING SHALL BE DONE IN ACCORDANCE WITH THE LATEST REVISIONS OF NEW YORK STATE INDUSTRIAL CODE RULE 23 AND OSHA REGULATIONS FOR CONSTRUCTION AND IN ACCORDANCE WITH THE SPECIFICATIONS.
15. CONTRACTOR IS RESPONSIBLE FOR DEWATERING AND THE MAINTENANCE OF SURFACE DRAINAGE DURING THE COURSE OF WORK, IF REQUIRED, IN ACCORDANCE WITH THE SOIL EROSION AND SEDIMENTATION CONTROL PLANS AND DETAILS.
16. CONTRACTOR SHALL GRADE ALL AREAS ON THE SITE TO MAINTAIN POSITIVE DRAINAGE.
17. ALL CONFINED SPACE ENTRIES SHALL BE MADE IN STRICT ACCORDANCE WITH OSHA REGULATIONS REGARDING CONFINED SPACE ENTRY.
18. ALL WORK SHALL BE DONE IN STRICT COMPLIANCE WITH ALL APPLICABLE NYSDOT AND NYCDOT SPECIFICATIONS, AS THEY MAY APPLY.
19. CONTRACTOR SHALL MAINTAIN PEDESTRIAN AND VEHICLE ACCESS TO THE SITE AT ALL TIMES IN A MANNER ACCEPTABLE TO THE CLIENT.
20. CONTRACTOR SHALL TAKE GREAT CARE TO MAINTAIN A SAFE AND SECURE WORK AREA AT ALL TIMES THROUGH THE USE OF BARRICADES AND SAFETY FENCE.
21. THE CONTRACTOR SHALL COMPLY WITH THE CONDITIONS AS SET FORTH IN THE PERMITS ISSUED BY THE REGULATORY AGENCIES, IF ANY.
22. PROVIDE SPECIAL INSPECTIONS AS FOLLOWS AS PER TOWN OF MOUNT PLEASANT BUILDING DEPARTMENT REQUIREMENTS, SPECIFICATIONS AND INSTRUCTIONS:
23. IT IS THE CONTRACTOR'S RESPONSIBILITY TO SUBMIT AND OBTAIN THE NECESSARY PERMITS FROM ALL APPLICABLE AGENCIES, EXCEPT FOR NYSDEC, SITE PLAN, & SPECIAL USE PERMIT. ALL COMMENTS RESULTING FROM A REVIEW BY SAID AGENCIES SHALL BE ADDRESSED BY THE CONTRACTOR AND NOT THE ENGINEER/DESIGNER.
24. HORIZONTAL DATUM IS NAD-83 NEW YORK EAST ZONE 3101. VERTICAL DATUM IS NAVD 88, EXPRESSED IN US FEET.
25. THE CONTRACTOR SHALL DO TEST PIT FOR UTILITY CONFLICTS PRIOR TO CONSTRICTION ACTIVITIES.

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SUBMITTAL DATE: JULY 2021

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NO.	DATE	REVISIONS/DESCRIPTION	APPR'D

DESIGNED BY: J. Causarano | DRAWN BY: C. DeBona
CHECKED BY: B. Mawhirter | DESIGN LEAD: EDWARD BARBOE, P.E.

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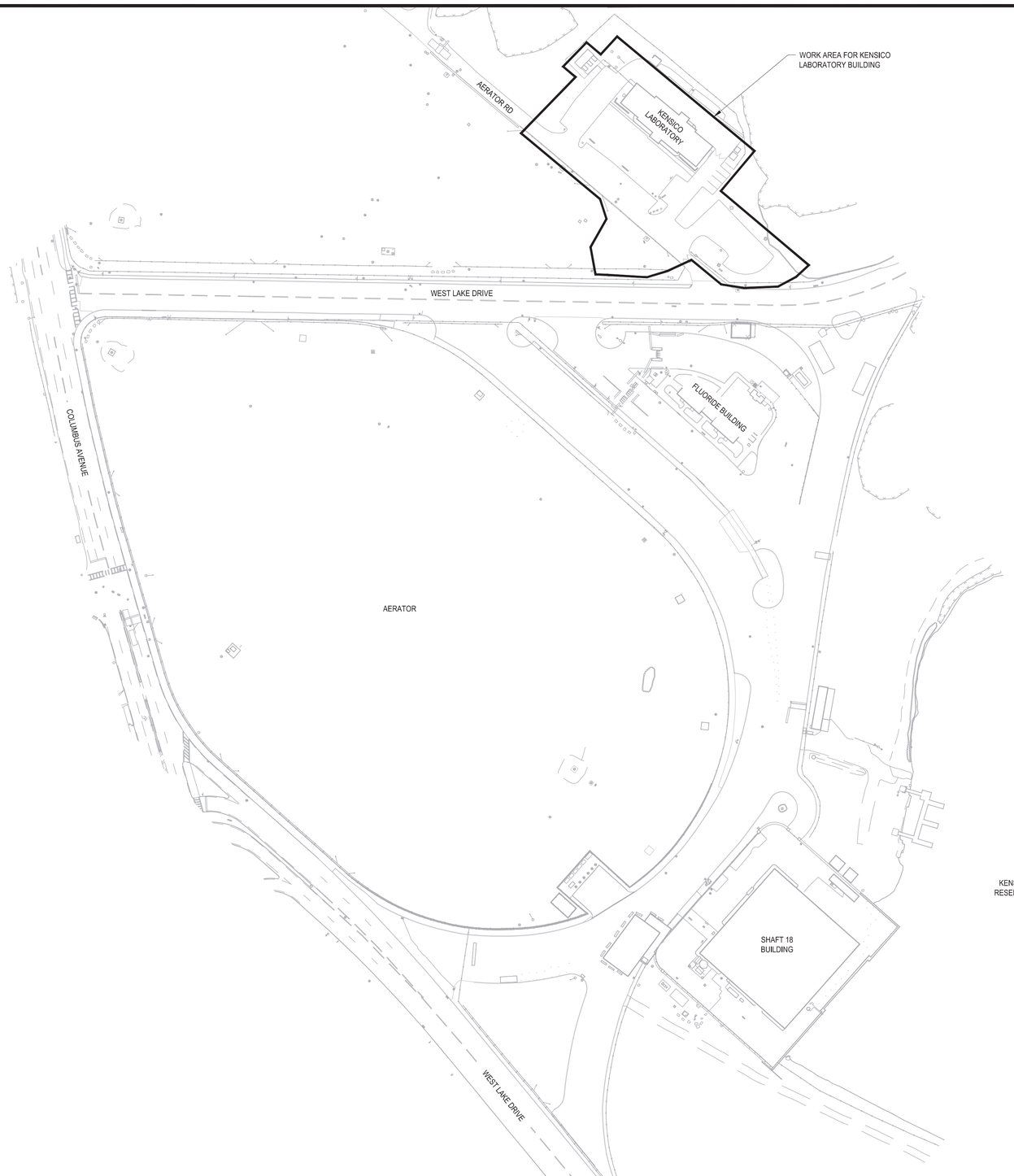
REPURPOSING OF THE KENSICO LABORATORY AS
THE KENSICO REGIONAL HEADQUARTERS
MOUNT PLEASANT, NEW YORK
CONTRACT CRO-624

CIVIL
GENERAL NOTES, LEGEND, AND ABBREVIATIONS

DATE: JULY 2021
SCALE: NA
SHEET NO: 3 OF 39
DRAWING NO. GC-100



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SUBMITTAL DATE: JULY 2021

0 80' 160'

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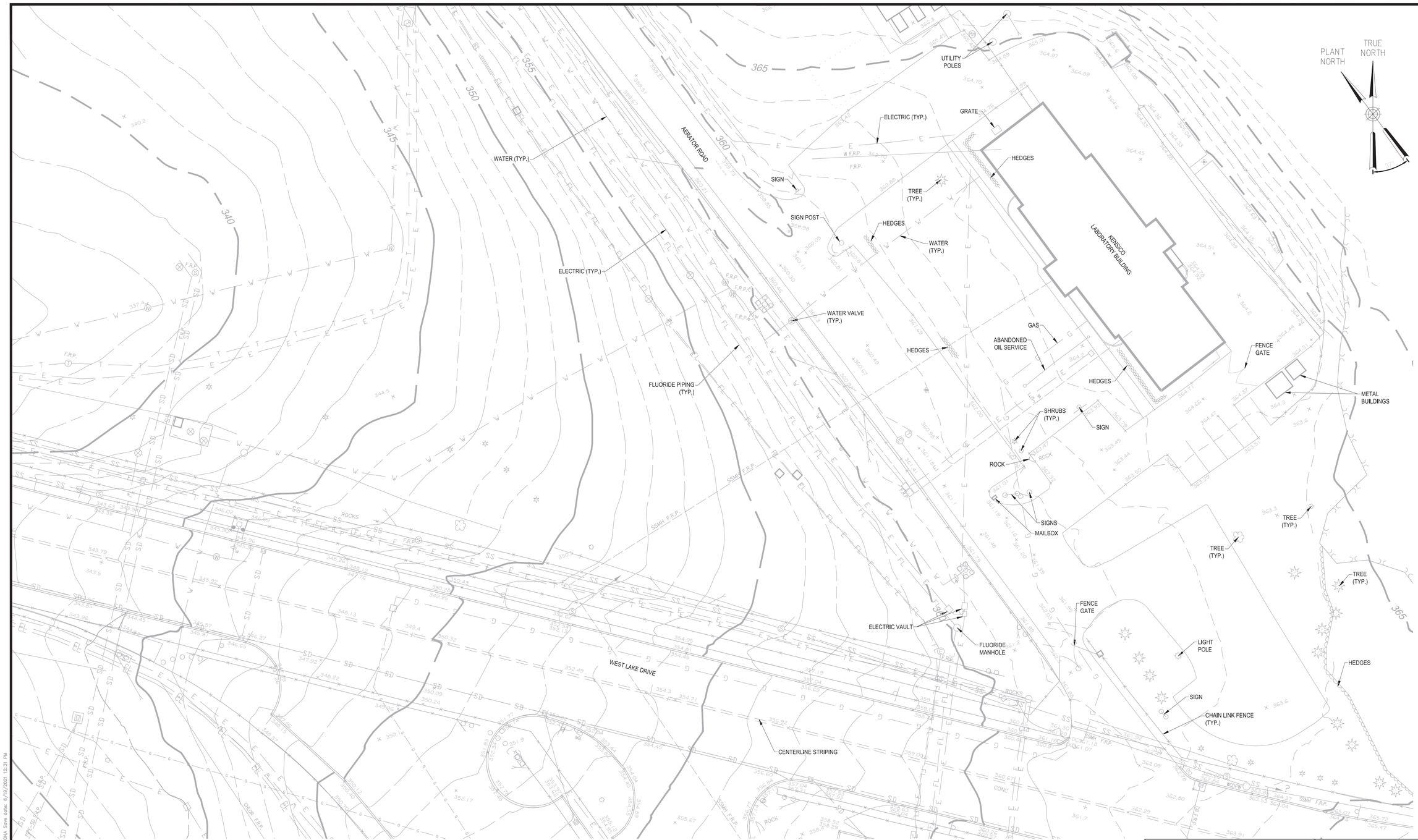
REPURPOSING OF THE KENSICO LABORATORY AS THE KENSICO REGIONAL HEADQUARTERS MOUNT PLEASANT, NEW YORK CONTRACT CRO-624

CIVIL
LOCATION PLAN

DATE: JULY 2021
SCALE: 1" = 80'
SHEET NO: 4 OF 39
DRAWING NO. C-100



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SUBMITTAL DATE: JULY 2021

0 20' 40'

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DESIGNED BY: J. Causarano
DRAWN BY: C. DeBona
CHECKED BY: B. Mawhirter
DESIGN LEAD: EDWARD BARBOE, P.E.

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REPURPOSING OF THE KENSICO LABORATORY AS THE KENSICO REGIONAL HEADQUARTERS MOUNT PLEASANT, NEW YORK CONTRACT CRO-624

CIVIL
EXISTING CONDITIONS PLAN

DATE: JULY 2021
SCALE: 1" = 20'
SHEET NO: 5 OF 39
DRAWING NO. C-101

All inquiries regarding this drawing(s) or project should be made to NYC Environmental Protection, Bureau of Engineering Design and Construction.

LEGEND

- FULL DEPTH REMOVAL
- MILL TOP 2" OF ASPHALT PAVEMENT
- REMOVAL FOR SIDEWALKS
- PAVEMENT/BUILDING REMOVALS
- FULL DEPTH REMOVAL FOR DRAINAGE INSTALLATION
- TREE PROTECTION

PLANT NORTH
TRUE NORTH

END FENCE REMOVAL
NORTHING: 822246.9854
EASTING: 692046.2447

REMOVE TRAILER

BEGIN FENCE REMOVAL
NORTHING: 822221.2860
EASTING: 692068.0080

UTILITY POLES TO REMAIN

REMOVE 100 LF OF FENCE

AERATOR ROAD

DEMOLISH ASPHALT PAVEMENT

RELOCATE SIGN, SEE DRAWING C1-103 FOR LOCATION

REMOVE HEDGES

DEMOLISH CONCRETE SIDEWALK

REMOVE SIGN POST

TREE TO REMAIN

DEMOLISH SIDEWALK

KENSICO LABORATORY BUILDING

REMOVE HEDGES

DEMOLISH LANDING

REMOVE HEDGES

REMOVE GATE

REMOVE HEDGES

REMOVE SIGN

REMOVE SHRUB

METAL BUILDINGS TO REMAIN

REMOVE ROCK

RELOCATE TRAFFIC SIGN, SEE DRAWING C1-103 FOR LOCATION

BEGIN FENCE REMOVAL
NORTHING: 822044.0010
EASTING: 692200.8730

REMOVE FENCE TO BUILDING

END FENCE REMOVAL
NORTHING: 822018.1807
EASTING: 692050.1443

REMOVE TREE

TREES TO REMAIN

RELOCATE MAILBOX, SEE DRAWING C1-103 FOR LOCATION

REMOVE BUILDING SIGN

REMOVE 103 LF OF FENCE

TREE TO REMAIN

REMOVE TREE

TREES TO REMAIN

REMOVE HEDGES

LITE POLE TO REMAIN

WEST LAKE DRIVE

BEGIN FENCE REMOVAL
NORTHING: 821934.8500
EASTING: 692110.6780

PROVIDE TREE PROTECTION (TYP.)
SEE LANDSCAPE DETAILS ON DRAWING LS1-300

REMOVE TREE

SIGN TO REMAIN

PERMITTING SUBMITTAL
NOT FOR CONSTRUCTION

SUBMITTAL DATE: JULY 2021

0 20' 40'

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REPURPOSING OF THE KENSICO LABORATORY AS THE KENSICO REGIONAL HEADQUARTERS MOUNT PLEASANT, NEW YORK CONTRACT CRO-624

CIVIL
DEMOLITION PLAN

DATE: JULY 2021
SCALE: 1" = 20'
SHEET NO: 6 OF 39
DRAWING NO. DC-100

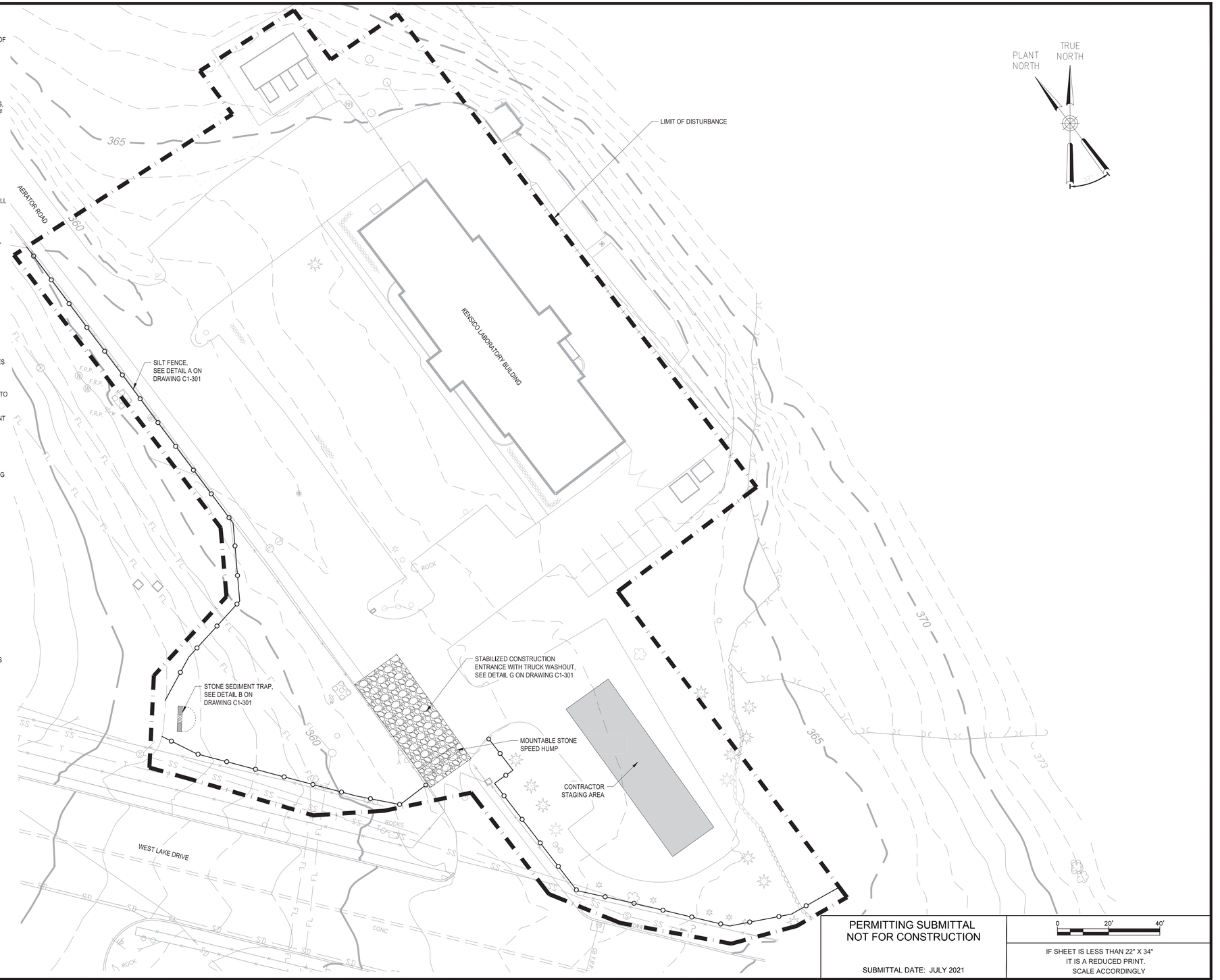
File: C:\SAVE WORKING\D010585\Ct-101.00 Saved by CDEBONA Save date: 6/19/2021 12:32 PM

SOIL EROSION & SEDIMENT CONTROL NOTES

1. DUE TO CONSTRUCTION AND DEMOLITION PHASES REQUIRED BY THIS CONTRACT, IT IS ANTICIPATED THAT THE LOCATION AND NATURE OF EROSION AND SEDIMENT CONTROL MEASURES WILL BE ADJUSTED AS REQUIRED TO REFLECT THE CURRENT PHASE OF WORK. THE CONSTRUCTION SCHEDULE ADOPTED BY THE CONTRACTOR WILL IMPACT ON THE PLACEMENT AND NEED FOR SPECIFIC DEVICES REQUIRED FOR THE CONTROL OF EROSION. THE LOCATION AND EXTENT OF EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REVISED AT EACH PHASE OF CONSTRUCTION THAT RESULTS IN A CHANGE OF EITHER THE QUANTITY OR DIRECTION OF THE SURFACE RUNOFF FROM THE CONSTRUCTION AREAS.
2. NO CONSTRUCTION OR LAND DISTURBANCE ACTIVITY MAY BEGIN UNTIL ALL PERIMETER EROSION CONTROL MEASURES HAVE BEEN INSTALLED AS SHOWN ON THE CONTRACT DRAWINGS. MEASURES SHALL INCLUDE BUT NOT LIMITED TO TEMPORARY DIVERSION SWALES, SILT FENCING, CATCH BASIN PROTECTION AND STABILIZED CONSTRUCTION ENTRANCE. IF CLEARING IS REQUIRED FOR INSTALLATION OF A PARTICULAR MEASURE, ALL MEASURES NOT REQUIRING CLEARING SHALL BE INSTALLED FIRST. CLEARING OF THE NECESSARY LAND FOR INSTALLATION OF THE PARTICULAR MEASURE MAY THEN PROCEED.
3. ALL EROSION CONTROL MEASURES SHALL BE IN PLACE BEFORE OR AS SOON AS PRACTICABLE AFTER ANY LAND CLEARING OR CONSTRUCTION ACTIVITY.
4. CLEARING AND PAVEMENT DEMOLITION SHALL BE LIMITED AS MUCH AS POSSIBLE TO AREAS REQUIRED FOR CURRENT CONSTRUCTION ACTIVITIES. MASS CLEARING, GRADING AND PAVEMENT DEMOLITION SHALL BE AVOIDED.
5. ALL POINTS OF CONSTRUCTION INGRESS AND EGRESS SHALL BE PROTECTED TO PREVENT THE DEPOSITION OF MATERIALS ONTO TRAVERSED PUBLIC THOROUGHFARE(S) BY INSTALLING AND MAINTAINING A STABILIZED CONSTRUCTION ENTRANCE AND BY WASHING ALL VEHICLES WHEELS IN A SAFE DISPOSAL AREA. ALL MATERIALS DEPOSITED ONTO PUBLIC THOROUGHFARE(S) SHALL BE REMOVED IMMEDIATELY. PROPER PRECAUTIONS SHALL BE TAKEN TO ENSURE THAT MATERIALS DEPOSITED ONTO PUBLIC THOROUGHFARE(S) ARE REMOVED SO THAT THEY DO NOT ENTER CATCH BASINS, STORM SEWERS, COMBINED SEWERS OR ROADSIDE SWALES.
6. ALL EROSION CONTROL MEASURES SHALL BE INSPECTED FOLLOWING EVERY RAINFALL, BUT IN NO CASE LESS THAN ONCE EVERY WEEK.
7. CONTROL MEASURES SHALL BE REPAIRED OR REPLACED IMMEDIATELY AS REQUIRED TO MAINTAIN PERFORMANCE OF MEASURE. REMOVED SEDIMENTS SHALL BE DISPOSED OF IN SUCH A MANNER AS TO ENSURE FURTHER SEDIMENT TRANSPORT DOES NOT OCCUR.
8. THE CONTRACTOR SHALL INITIATE STABILIZATION MEASURES AS SOON AS PRACTICABLE IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT IN NO CASE MORE THAN 7 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. THIS REQUIREMENT DOES NOT APPLY IN THE FOLLOWING INSTANCES:
   - A. THE INITIATION OF STABILIZATION MEASURES BY THE 7TH DAY AFTER CONSTRUCTION ACTIVITY TEMPORARILY OR PERMANENTLY CEASED IS PRECLUDED BY SNOW COVER OR FROZEN GROUND CONDITIONS, STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS PRACTICABLE.
   - B. WHERE CONSTRUCTION ACTIVITY ON A PORTION OF THE SITE IS TEMPORARILY CEASED, AND EARTH-DISTURBING ACTIVITIES WILL BE RESUMED WITHIN FOURTEEN (14) DAYS, TEMPORARY STABILIZATION MEASURES NEED NOT BE INITIATED ON THAT PORTION OF THE SITE.
9. ALL AREAS SHALL BE FERTILIZED, SEEDED AND MULCHED IN ACCORDANCE WITH THE SPECIFICATIONS, AND RE-SEEDED AS NECESSARY TO ESTABLISH AND MAINTAIN A VIGOROUS DENSE VEGETATIVE COVER.
10. ALL WORK PERFORMED SHALL BE IN ACCORDANCE WITH THE "NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL" 2016, OR LATEST EDITION AND IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
11. THE CONTRACTOR SHALL TEMPORARILY REMOVE AND REPLACE REQUIRED SECTION OF FENCE DURING PROXIMITY EXCAVATION.
12. THE CONTRACTOR SHALL PROVIDE EROSION CONTROL PROTECTION AGAINST SILT ACCUMULATION ON EXISTING DRAINAGE.
13. THE CONTRACTOR SHALL PROVIDE ADJUSTABLE CATCH BASIN DRAIN INSERTS ON THE AFFECTED CATCH BASIN SHOWN ON THE DRAWING AND AS DIRECTED BY THE ENGINEER.
14. ALL GRADED OR DISTURBED AREAS INCLUDING SLOPES SHALL BE PROTECTED DURING CLEARING AND CONSTRUCTION IN ACCORDANCE WITH THE APPROVED EROSION AND SEDIMENT CONTROL PLAN UNTIL THEY ARE PERMANENTLY STABILIZED.
15. ALL SEDIMENT CONTROL PRACTICES AND MEASURES SHALL BE CONSTRUCTED, APPLIED AND MAINTAINED IN ACCORDANCE WITH THE APPROVED EROSION AND SEDIMENT CONTROL PLAN.
16. TOPSOIL REQUIRED FOR THE ESTABLISHMENT OF VEGETATION SHALL BE STOCKPILED IN AMOUNT NECESSARY TO COMPLETE FINISHED GRADING OF ALL EXPOSED AREAS.
17. AREAS TO BE FILLED SHALL BE CLEARED, GRUBBED, AND STRIPPED OF TOPSOIL TO REMOVE TREES, VEGETATION, ROOTS OR OTHER OBJECTIONABLE MATERIAL.
18. AREAS WHICH ARE TO BE TOPSOILED SHALL BE SCARIFIED TO A MINIMUM DEPTH OF FOUR INCHES PRIOR TO PLACEMENT OF TOPSOIL.
19. ALL FILLS SHALL BE COMPACTED AS REQUIRED TO REDUCE EROSION, SLIPPAGE, SETTLEMENT, SUBSIDENCE OR OTHER RELATED PROBLEMS, FILL INTENDED TO SUPPORT BUILDINGS, STRUCTURES AND CONDUITS, ETC. SHALL BE COMPACTED IN ACCORDANCE WITH SPECIFICATIONS, LOCAL REQUIREMENTS OR CODES.
20. ALL FILL SHALL BE PLACED AND COMPACTED IN LAYERS NOT TO EXCEED 9 INCHES IN THICKNESS.
21. FILL MATERIAL SHALL BE FREE OF FROZEN PARTICLES, BRUSH, ROOTS, SOD, OR OTHER FOREIGN OR OTHER OBJECTIONABLE MATERIALS THAT WOULD INTERFERE WITH OR PREVENT CONSTRUCTION OF SATISFACTORY FILLS.
22. FROZEN MATERIALS OR SOFT, MUCKY OR HIGHLY COMPRESSIBLE MATERIALS SHALL NOT BE INCORPORATED IN FILLS.
23. FILL SHALL NOT BE PLACED ON SATURATED OR FROZEN SURFACES.
24. ALL GRADE BENCHES SHALL BE KEPT FREE OF SEDIMENT DURING ALL PHASES OF DEVELOPMENT.
25. SEEPS OR SPRINGS ENCOUNTERED DURING CONSTRUCTION SHALL BE HANDLED IN ACCORDANCE WITH THE STANDARD AND SPECIFICATION FOR SUBSURFACE DRAIN OR OTHER APPROVED METHOD.
26. ALL GRADED AREAS SHALL BE PERMANENTLY STABILIZED IMMEDIATELY FOLLOWING FINISHED GRADING.
27. STOCKPILES, BORROW AREAS AND SPOIL AREAS SHALL BE SHOWN ON THE PLANS AND SHALL BE SUBJECT TO THE PROVISIONS OF NYSDEC STANDARDS AND SPECIFICATIONS.

LEGEND

- SILT FENCE
- LIMIT OF DISTURBANCE
- SEDIMENT TRAP
- STABILIZED CONSTRUCTION ENTRANCE WITH TRUCK WASHOUT
- CONTRACTOR STAGING AREA



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SUBMITTAL DATE: JULY 2021

0 20' 40'

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SCALE ACCORDINGLY

NO.	DATE	REVISIONS/DESCRIPTION	APPR'D

DESIGNED BY: J. Causarano | DRAWN BY: C. DeBona
CHECKED BY: B. Mawhirter | DESIGN LEAD: EDWARD BARBOE, P.E.

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ENGINEERS • PLANNERS • CONSTRUCTION MANAGERS
6901 JERICHO TURNPIKE, SUITE 216
SYOSSET, N.Y. 11791

STATE OF NEW YORK · RUDOLF J. GEDEON · 070901 · LICENSED PROFESSIONAL ENGINEER

NYC Environmental Protection

ACCOUNTABLE MANAGER	JOSE NIEVES
PROJECT MANAGER	MARK DELBALZO, P.E.

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REPURPOSING OF THE KENSICO LABORATORY AS THE KENSICO REGIONAL HEADQUARTERS
MOUNT PLEASANT, NEW YORK
CONTRACT CRO-624

CIVIL
SOIL EROSION AND SEDIMENT CONTROL PLAN

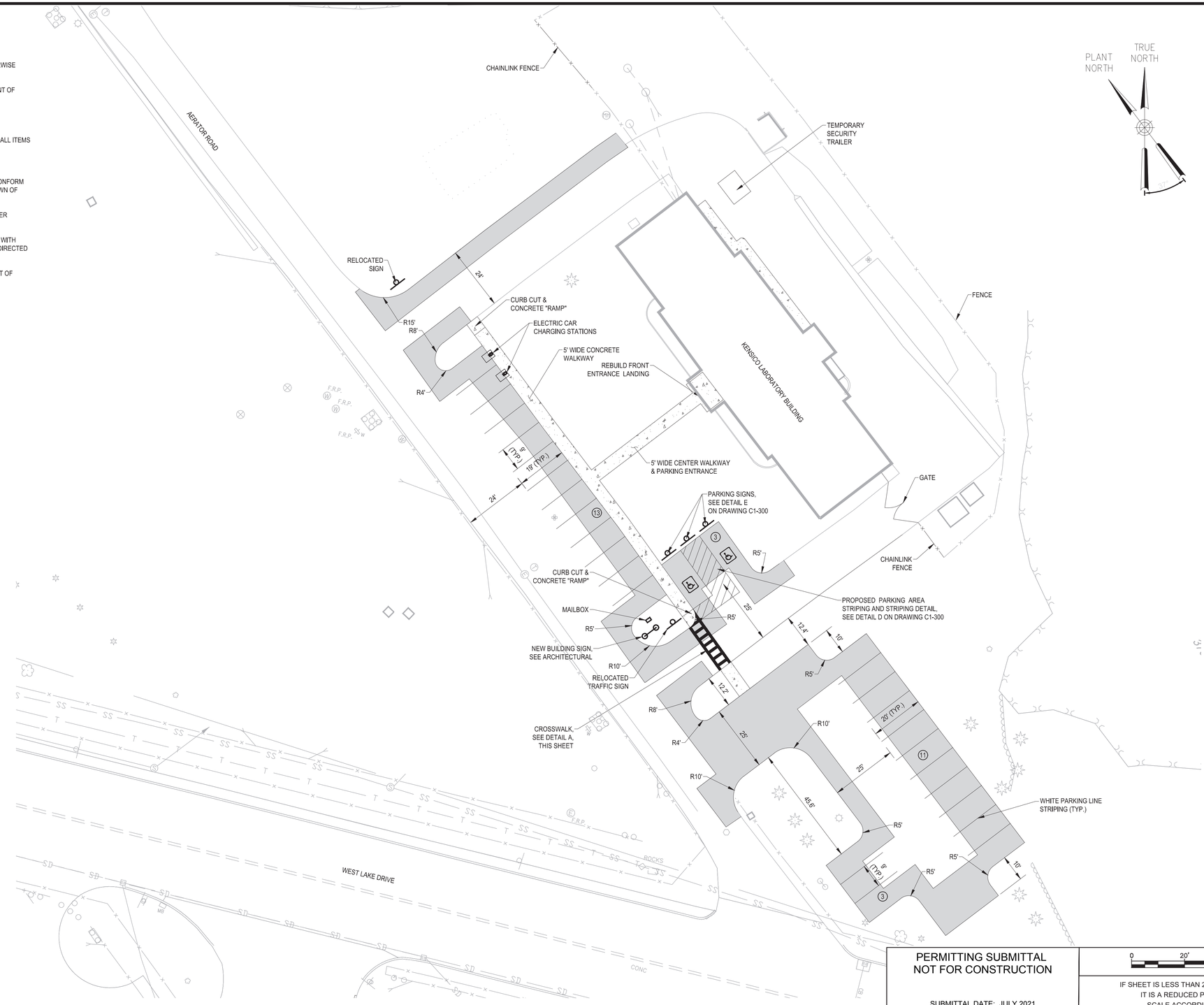
DATE: JULY 2021
SCALE: 1" = 20'
SHEET NO: 7 OF 39
DRAWING NO. C-102

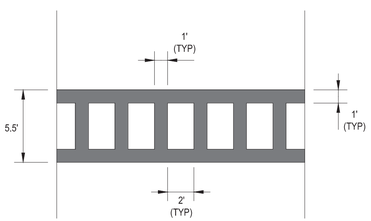
NOTES

1. CONTRACTOR TO VERIFY ALL UNDERGROUND UTILITIES.
2. CONTRACTOR TO SUBMIT WORK SCHEDULE TO NYCDEP (15) DAYS PRIOR TO COMMENCEMENT OF WORK, UNLESS OTHERWISE STATED BY NYCDEP IN WRITING.
3. CONTRACTOR IS RESPONSIBLE FOR PROTECTION OF SITE FOR SAFETY AND SECURITY ISSUES PRIOR TO COMMENCEMENT OF WORK.
4. ALL WORK PERFORMED TO BE IN ACCORDANCE WITH FEDERAL, STATE, COUNTY, AND LOCAL GOVERNING AUTHORITY REGULATIONS AND TO THE SATISFACTION OF NYCDEP.
5. CONTRACTORS TO VERIFY WITH NYCDEP ALL ITEMS TO BE REMOVED PRIOR TO COMMENCEMENT OF WORK, AS WELL AS ALL ITEMS TO BE STOCKPILED FOR NYCDEP.
6. ALL EXPANSION JOINTS FOR CONCRETE TO MEET NYCDEP SPECIFICATIONS.
7. ALL WORK IN THE PUBLIC ROW, INCLUDING ALL CONCRETE CURBING, SIDEWALKS AND DRAINAGE STRUCTURES SHALL CONFORM TO TOWN OF MOUNT PLEASANT PLANNING BOARD AND ENGINEERING STANDARD DETAILS AND SPECIFICATIONS. THE TOWN OF MOUNT PLEASANT DEPARTMENT OF BUILDING SHALL BE NOTIFIED 48 HOURS IN ADVANCE OF ALL CONSTRUCTION.
8. LOCATION AND GRADES FOR CURBS AND WALKS TO BE VERIFIED WITH THE TOWN OF MOUNT PLEASANT OR WESTCHESTER COUNTY PRIOR TO CONSTRUCTION.
9. ALL TRAFFIC CONTROL DEVICES, i.e. SIGNALS, SIGNS AND PAVEMENT MARKINGS SHALL BE INSTALLED IN CONFORMANCE WITH GUIDELINES OF THE FEDERAL MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES AND N.Y.S.D.O.T. SUPPLEMENT AND AS DIRECTED BY THE N.Y.S.D.O.T., DIVISION OF TRAFFIC SAFETY.
10. PRIOR TO STARTING ANY WORK AT THIS LOCATION THE CONTRACTOR SHALL NOTIFY THE NEW YORK STATE DEPARTMENT OF TRANSPORTATION THAT A TONE-OUT OF SIGNAL EQUIPMENT IS NEEDED.

LEGEND

- SIDEWALK
- RAMP
- RELOCATED SIGNS
- PROPOSED H.C. SIGS
- (10) PARKING COUNT NO.
- NEW ELECTRIC CAR CHARGING STATION
- EDGE OF PAVEMENT
- RELOCATED MAILBOX
- PAVING LIMITS





A - CROSSWALK DETAIL
NOT TO SCALE

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PROJECT MANAGER: MARK DELBALZO, P.E.

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REPURPOSING OF THE KENSICO LABORATORY AS THE KENSICO REGIONAL HEADQUARTERS
MOUNT PLEASANT, NEW YORK
CONTRACT CRO-624

CIVIL
SITE PLAN

DATE: JULY 2021
SCALE: 1" = 20'
SHEET NO: 8 OF 39
DRAWING NO. C-103

LEGEND

- PROPOSED CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- CATCH BASIN / DRAINAGE STRUCTURE
- HEADWALL W/ RIP/RAP SPILLWAY
- STORM MANHOLE

PLANT NORTH / TRUE NORTH

AERATOR ROAD

WEST LAKE DRIVE

KENSICO LABORATORY BUILDING

SEE STRUCTURAL DRAWINGS FOR DETAILS OF FOUNDATION DRAIN

DRAINAGE STRUCTURE #3
GRATE: 359.98
INV A: 354.98

129 LF OF 18" RCP DRAINAGE PIPE @ 2.00% SLOPE

50 LF OF 2" PVC DRAINAGE PIPE @ 1.00% SLOPE

DRAINAGE STRUCTURE #1
GRATE: 364.23
INV A: 359.23

22 LF OF 16" RCP DRAINAGE PIPE @ 2.00% SLOPE

STORM MANHOLE #1
RIM: 364.35
INV A: 358.79
INV B: 360.95
INV C: 358.70

49 LF OF 18" RCP DRAINAGE PIPE @ 1.00% SLOPE

DRAINAGE STRUCTURE #2
GRATE: 364.10
INV A: 358.21
INV B: 357.02

71 LF OF 18" RCP DRAINAGE PIPE @ 1.00% SLOPE

DRAINAGE STRUCTURE #4
GRATE: 361.02
INV A: 352.40
INV B: 352.30

FLOW SPREADER
SEE DETAIL G, SHEET C1-302

32 LF OF 24" RCP DRAINAGE PIPE @ 1.00% SLOPE

HEADWALL W/ RIP/RAP SPILLWAY
SEE DETAIL B, SHEET C1-301
ELEV: 349.25

STORM MANHOLE #2
RIM: 361.31
INV A: 356.31
INV B: 351.98
INV C: 351.88

20 LF OF 27" RCP DRAINAGE PIPE @ 1.75% SLOPE

72 LF OF 27" RCP DRAINAGE PIPE @ 1.5% SLOPE

CDS STORMWATER PRETREATMENT
RIM: 361.24
INV A: 351.08
INV B: 350.98

73 LF OF 18" RCP DRAINAGE PIPE @ 1.00% SLOPE

DRAINAGE STRUCTURE #6
GRATE: 363.13
INV A: 353.83
INV B: 353.73

40 LF OF 12" RCP DRAINAGE PIPE @ 1.00% SLOPE

STORM MANHOLE #3
RIM: 363.19
INV A: 354.33
INV B: 354.23

DRAINAGE STRUCTURE #5
GRATE: 361.80
INV A: 351.53
INV B: 353.00
INV C: 351.43

23 LF OF 27" RCP DRAINAGE PIPE @ 1.00% SLOPE

33 LF OF 12" RCP DRAINAGE PIPE @ 1.00% SLOPE

DRAINAGE STRUCTURE #7
GRATE: 362.78
INV A: 354.66

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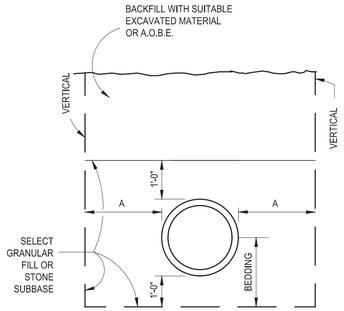
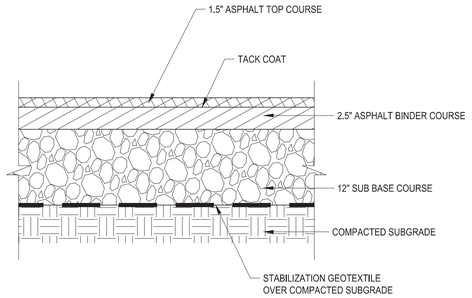
REPURPOSING OF THE KENSICO LABORATORY AS THE KENSICO REGIONAL HEADQUARTERS MOUNT PLEASANT, NEW YORK CONTRACT CRO-624

CIVIL
GRADING AND DRAINAGE PLAN

DATE: JULY 2021
SCALE: 1" = 20'
SHEET NO: 9 OF 39
DRAWING NO. C-104

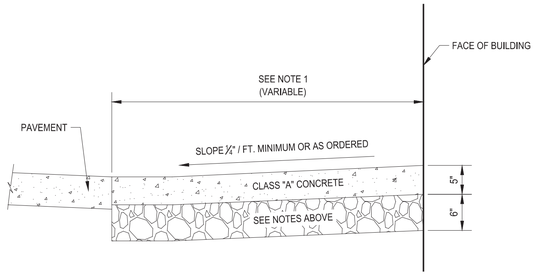
All inquiries regarding this drawing(s) or project should be made to NYC Environmental Protection, Bureau of Engineering Design and Construction.



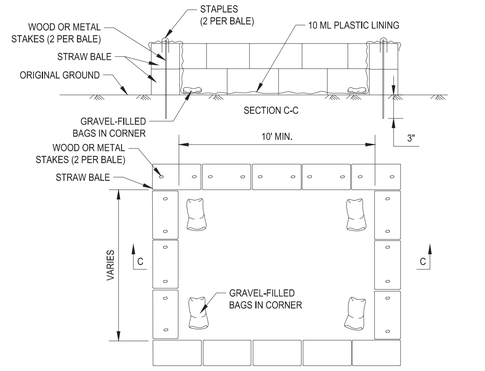


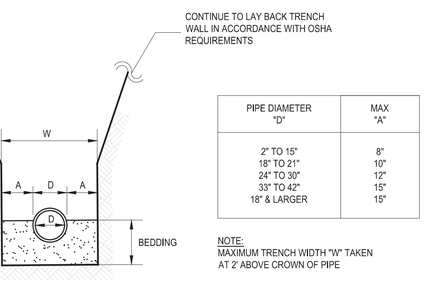
NOTES

1. SIDEWALKS WIDER THAN 4'-0" OR AS DIRECTED SHALL BE REINFORCED WITH EPOXY COATED WELDED WIRE FABRIC 10 GA. 6" x 6" W1.4.
2. ALL CONCRETE SIDEWALKS SHALL HAVE A BROOM FINISH WITH SCORES AT 5'-0".
3. IMMEDIATELY AFTER FINISHING THE CONCRETE, THE CONTRACTOR SHALL APPLY AN APPROVED CURING MATERIAL. THE CONTRACTOR SHALL SPRAY TWO (2) COATS AT COMBINED COVERAGE OF 250 SQUARE FEET PER GALLON, OR ROLL ONE (1) COAST AT THE RATE 250 SQUARE FEET PER GALLON AND IN A MANNER ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
4. THE BASE COURSE SHALL CONSIST OF COMPACTED ¾" CRUSHED STONE.



½" PREMOLDED EXPANSION JOINT TO BE SET ½" BELOW SURFACE OF WALK AND 10'-0" ON CENTER TRANSVERSE EXPANSION JOINT 10'-0" ON CENTER AS DIRECTED.





PIPE DIAMETER "D"	MAX "A"
2" TO 15"	8"
18" TO 21"	10"
24" TO 30"	12"
33" TO 42"	15"
18" & LARGER	15"

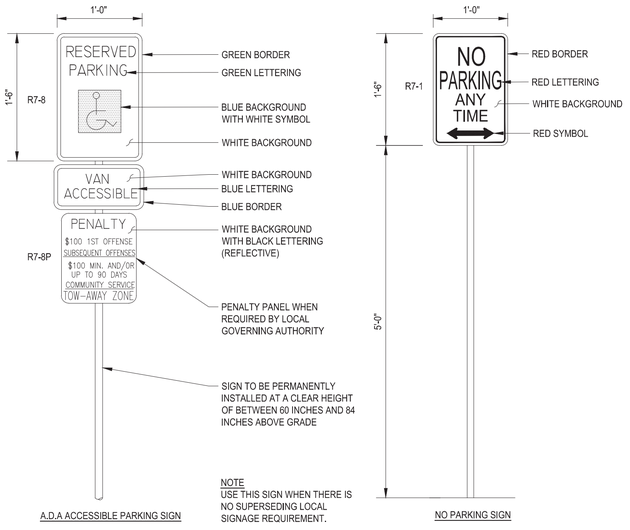
NOTE:
MAXIMUM TRENCH WIDTH "W" TAKEN AT 2' ABOVE CROWN OF PIPE

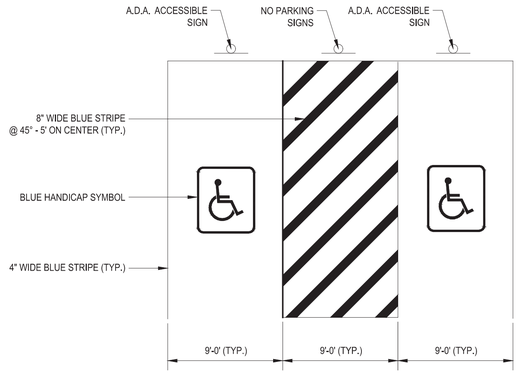
A — TRENCH DETAIL
- — NOT TO SCALE

B — ASPHALT PAVEMENT SECTION
- — NOT TO SCALE

H — CONCRETE SIDEWALK
- — NOT TO SCALE

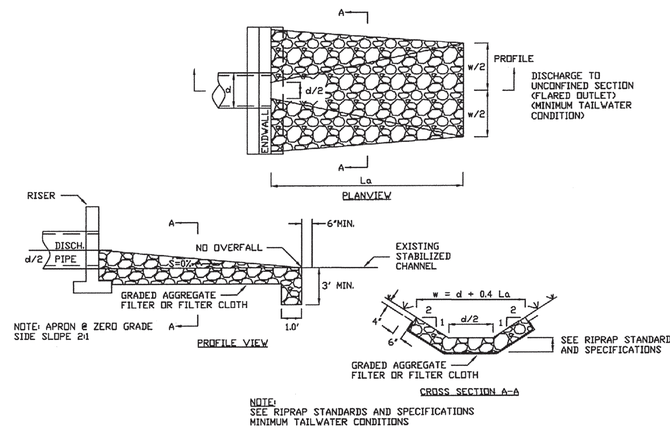
H — CONCRETE WASHOUT
- — NOT TO SCALE





NOTE

1. HANDICAP PARKING STALLS AND LOADING AREA SHALL BE IN FULL COMPLIANCE WITH THE "AMERICANS WITH DISABILITIES ACT" PUBLIC LAW 101-336, EFFECTIVE JAN. 26, 1992 OR LATEST VERSION OF GUIDANCE.



J — RIPRAP OUTLET PROTECTION
- — NOT TO SCALE

E — PARKING AREA STRIPING AND ALIGNMENT DETAIL
- — NOT TO SCALE

D — PARKING AREA STRIPING AND ALIGNMENT DETAIL
- — NOT TO SCALE

PERMITTING SUBMITTAL
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SUBMITTAL DATE: JULY 2021

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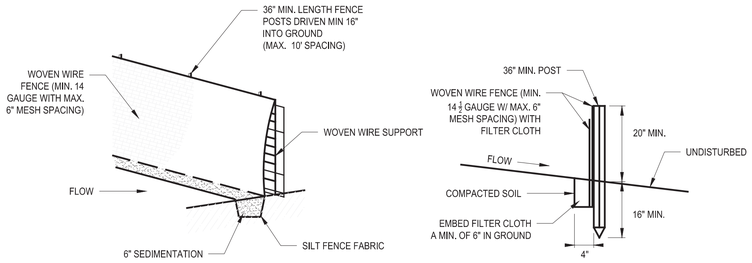
REPURPOSING OF THE KENSICO LABORATORY AS THE KENSICO REGIONAL HEADQUARTERS
MOUNT PLEASANT, NEW YORK
CONTRACT CRO-624

CIVIL
DETAILS - 1

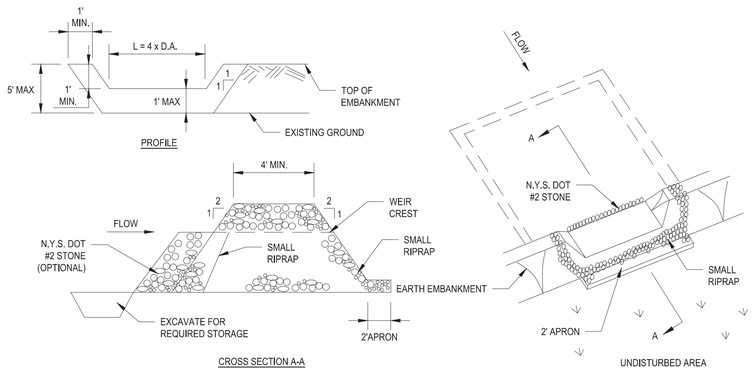
DATE: JULY 2021
SCALE: N.T.S
SHEET NO: 10 OF 39
DRAWING NO. C-105



GENERAL NOTES

1. STEEL POSTS WHICH SUPPORT THE SILT FENCE SHALL BE INSTALLED ON A SLIGHT ANGLE TOWARD THE ANTICIPATED RUNOFF SOURCE. THE TOE OF THE SILT FENCE SHALL BE TRENCHED IN WITH A SPADE OR MECHANICAL TRENCHER, SO THAT
2. THE DOWNSLOPE FACE OF THE TRENCH IS FLAT AND PERPENDICULAR TO THE LINE OF FLOW.
3. THE TRENCH SHALL BE A MINIMUM OF 6" DEEP AND 3" - 4" WIDE TO ALLOW FOR THE SILT FENCE TO BE LAID IN THE GROUND AND BACKFILLED.
4. SILT FENCE SHALL BE SECURELY FASTENED TO EACH STEEL SUPPORT POST AND TO WOVEN WIRE, WHICH IS IN TURN ATTACHED TO THE STEEL FENCE POSTS.
5. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED, AS ORDERED BY THE CONSTRUCTION MANAGER.
6. SILT FENCE SHALL BE REMOVED WHEN IT HAS SERVED ITS USEFULNESS, SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
7. SEDIMENT TRAPPED BY THIS PRACTICE SHALL BE LEGALLY DISPOSED OF IN AN APPROVED SITE IN A MANNER THAT SHALL NOT CONTRIBUTE TO ADDITIONAL SILTATION.
8. ACCUMULATED SILT SHALL BE REMOVED WHEN IT REACHES A DEPTH OF 6" AND LEGALLY DISPOSED OF IN AN APPROVED SOIL SITE OR AS IN NOTE 7 ABOVE.

A SILT FENCE
\- NOT TO SCALE

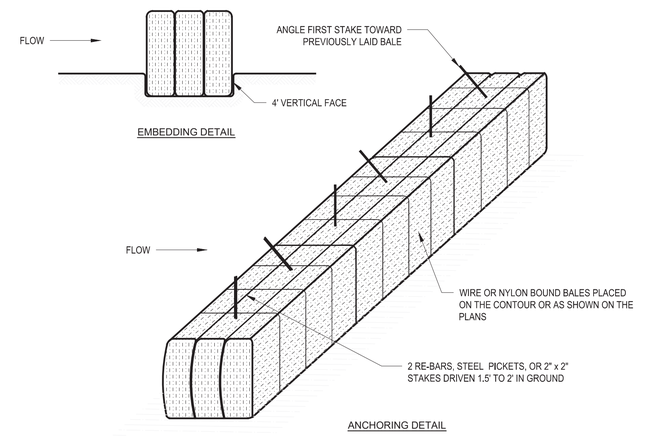


OPTION: A ONE FOOT LAYER OF N.Y.S. DOT #2 STONE MAY BE PLACED ON THE UPSTREAM SIDE OF THE RIPRAP INPLACE OF THE EMBEDDED FILTER CLOTH.

CONSTRUCTION SPECIFICATIONS

1. AREA UNDER EMBANKMENT SHALL BE CLEARED, GRUBBED AND STRIPPED OF AND VEGETATION AND ROOT MAT. THE POOL AREA SHALL BE CLEARED.
2. THE FILL MATERIAL FOR THE EMBANKMENT SHALL BE FREE OF ROOTS AND OTHER WOODY VEGETATION AS WELL AS OVER-SIZED STONES, ROCKS, ORGANIC MATERIAL OR OTHER OBJECTIONABLE MATERIAL. THE EMBANKMENT SHALL BE COMPACTED BY TRAVERSING WITH EQUIPMENT WHILE IT IS BEING CONSTRUCTED.
3. ALL CUT AND FILL SLOPES SHALL BE 2:1 OR FLATTER.
4. THE STONE USED IN THE OUTLET SHALL BE SMALL RIPRAP 4"-8" ALONG WITH A 1' THICKNESS OF 2" AGGREGATE PLACED ON THE UP-GRADE SIDE ON THE SMALL RIPRAP OR EMBEDDED FILTER CLOTH IN THE RIPRAP.
5. SEDIMENT SHALL BE REMOVED AND TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO 1/2 THE DESIGN DEPTH OF THE TRAP. IT SHALL BE PLACED ON SITE AND STABILIZED.
6. THE STRUCTURE SHALL BE INSPECTED AFTER EACH RAIN AND REPAIRS MADE AS NEEDED.
7. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND SEDIMENT ARE CONTROLLED.
8. THE STRUCTURE SHALL BE REMOVED AND THE AREA STABILIZED WHEN THE DRAINAGE AREA HAS BEEN PROPERLY STABILIZED. MAXIMUM DRAINAGE AREA 5 ACRES

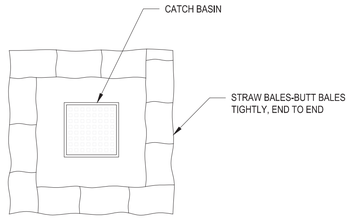
B STONE OUTLET SEDIMENT TRAP
\- NOT TO SCALE



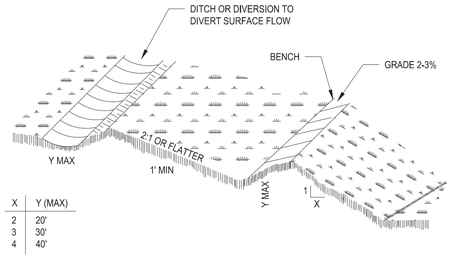
GENERAL NOTES

1. BALES SHALL BE PLACED IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
2. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF FOUR INCHES.
3. BALES SHALL BE SECURELY ANCHORED IN PLACE BY STAKES OR RE-BARS DRIVEN THROUGH THE BALES. THE FIRST STAKE IN EACH BALE SHALL BE ANGLED TOWARD THE PREVIOUSLY LAID BALE TO FORCE BALES TOGETHER.
4. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
5. BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
6. ACCUMULATED SILT SHALL BE REMOVED AND LEGALLY DISPOSED OF WHEN IT REACHES A DEPTH OF 6 INCHES.
7. CONTRACTOR SHALL REPLACE HAY BALE AND DIKE EVERY THREE (3) MONTHS.

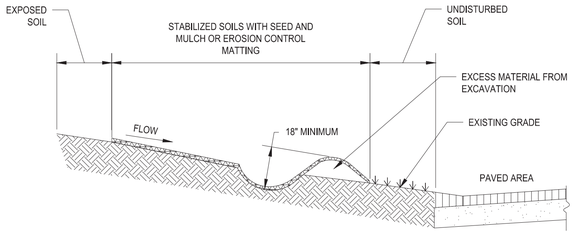
C EMBEDDING DETAIL
\- NOT TO SCALE



D INLET PROTECTION
\- NOT TO SCALE



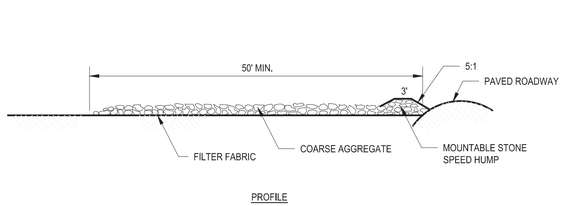
E LANDGRADING
\- NOT TO SCALE



CONSTRUCTION NOTES

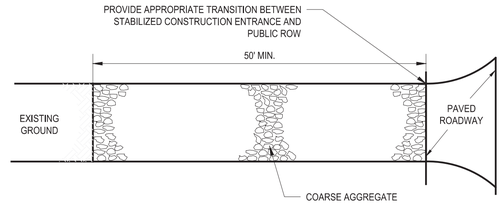
1. ALL EARTH FILL SHALL BE PLACED ON A STRIPPED FOUNDATION, CONTAIN NO STUMPS OR WOODY MATERIAL, AND BE COMPACTED WITH THE WEIGHT OF THE EXCAVATOR BUCKET.
2. THE SYSTEM SHALL BE USED WITH A MINIMUM 5 FOOT VEGETATED BUFFER ON THE DOWN SLOPE TOE OF THE DIKE OR AN ARTIFICIAL BUFFER OF EROSION CONTROL MATTING.
3. THE ENDS OF THE DIKE SYSTEM SHALL TERMINATE WITH A 90 DEGREE RETURN OF NYS DOT #1A CRUSHED STONE TO FILTER ANY EXCESS FLOW.
4. THE EARTHEN DIKE SHALL BE SEEDED AND MULCHED TO PREVENT EROSION USING AN ANNUAL RYE GRASS MIXTURE AT A RATE OF 1 LB. PER 1,000 SQUARE FEET.

F SEDIMENT DIKE
\- NOT TO SCALE



GENERAL NOTES

1. STONE SIZE - USE 1"- 4" STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH - NOT LESS THAN 50 FEET (EXCEPT ON A SINGLE RESIDENCE LOT WHERE A 30 FOOT MINIMUM LENGTH WOULD APPLY).
3. THICKNESS - NOT LESS THAN SIX (6) INCHES.
4. WIDTH - TWELVE (12) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. TWENTY-FOUR (24) FOOT IF,SINGLE, ENTRANCE TO SITE.
5. FILTER CLOTH - WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
8. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON A AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.



G STABILIZED CONSTRUCTION ENTRANCE
\- NOT TO SCALE

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CHECKED BY: B. Mawhirter | DESIGN LEAD: EDWARD BARBOE, P.E.

GEDEON GRC CONSULTING
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SYOSSET, N.Y. 11791

STATE OF NEW YORK · RUDOLF J. GEDEON · 070901 · LICENSED PROFESSIONAL ENGINEER

Environmental Protection

ACCOUNTABLE MANAGER: JOSE NIEVES
PROJECT MANAGER: MARK DELBALZO, P.E.

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REPURPOSING OF THE KENSICO LABORATORY AS THE KENSICO REGIONAL HEADQUARTERS
MOUNT PLEASANT, NEW YORK
CONTRACT CRO-624

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DETAILS - 2

DATE: JULY 2021
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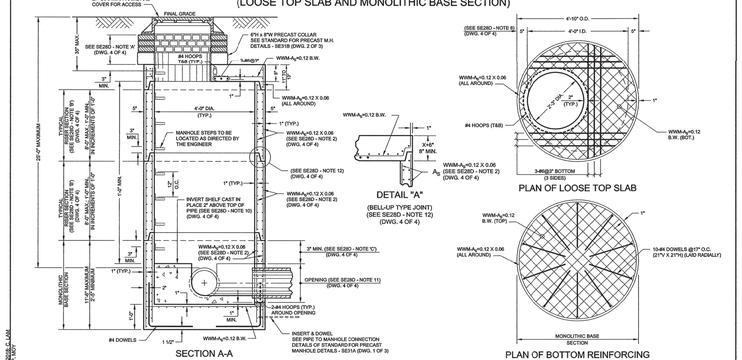
SHEET NO: 11 OF 39
DRAWING NO. C-106

SE28A

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR 4'-0" DIAMETER PRECAST MANHOLE (DWG. 1 OF 4)

(LOOSE TOP SLAB AND MONOLITHIC BASE SECTION)



Sandip S. Saini P.E. 8/14/18
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION
DATE

Thomas Wynne P.E. 8/14/18
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DATE

REVISED JULY 2018 - I-AM
REVISED JULY 2019 - KY, WARLOW, HDO

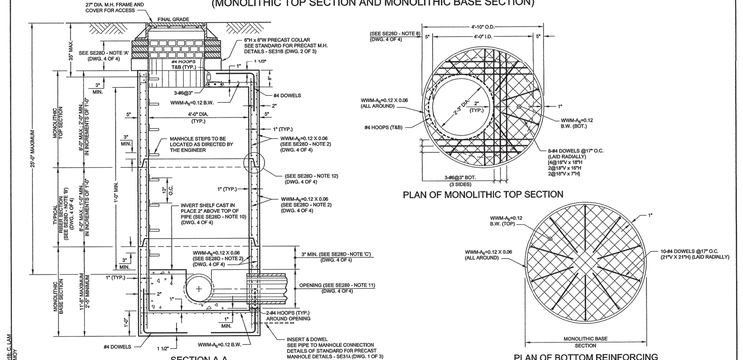
A - STANDARD NYCDEP MANHOLE 1 OF 4
- NOT TO SCALE

SE28B

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR 4'-0" DIAMETER PRECAST MANHOLE (DWG. 2 OF 4)

(MONOLITHIC TOP SECTION AND MONOLITHIC BASE SECTION)



Sandip S. Saini P.E. 8/14/18
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION
DATE

Thomas Wynne P.E. 8/14/18
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DATE

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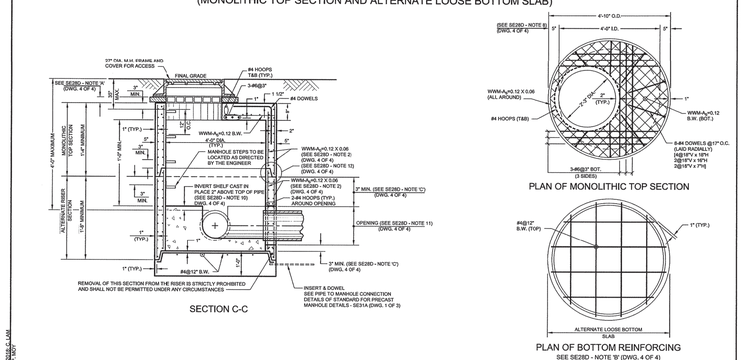
B - STANDARD NYCDEP MANHOLE 2 OF 4
- NOT TO SCALE

SE28C

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR 4'-0" DIAMETER PRECAST MANHOLE (DWG. 3 OF 4)

(MONOLITHIC TOP SECTION AND ALTERNATE LOOSE BOTTOM SLAB)



SEE SE28D - NOTE 'B' (DWG. 4 OF 4)

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ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION
DATE

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EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DATE

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REVISED JULY 2019 - KY, WARLOW, HDO

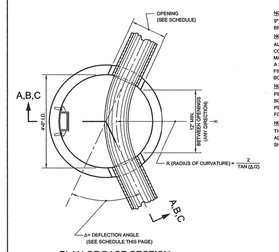
C - STANDARD NYCDEP MANHOLE 3 OF 4
- NOT TO SCALE

SE28D

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR 4'-0" DIAMETER PRECAST MANHOLE (DWG. 4 OF 4)

(MISCELLANEOUS DETAIL, NOTES AND SCHEDULE)



NOTE 'A':
9" MIN. TO 20" MAX.; 9" BRICK MIN. LAID RADIALLY, USE 1 OR 2 PRECAST COLLARS OR BRICK AS REQUIRED. (4" BRICK MIN. ONLY FOR SHALLOW MANHOLE CONSTRUCTION.)

NOTE 'B':
ALTERNATE LOOSE BOTTOM SLAB TO BE USED ONLY IN SHALLOW MANHOLE CONSTRUCTION.
MANHOLE RISER MAY NOT BE REQUIRED IN SHALLOW MANHOLE CONSTRUCTION.
A SHALLOW MANHOLE IS A MANHOLE ON A SEWER WHICH HAS A COVER FROM FINAL GRADE TO THE OUTER TOP OF THE PIPE OF LESS THAN 4'-0". USE OF LOOSE BOTTOM SLAB IN CONJUNCTION WITH LOOSE TOP SLAB WILL NOT BE PERMITTED.

NOTE 'C':
PIPE OPENINGS WILL NOT BE PERMITTED THROUGH JOINTS. DISTANCE FROM TOP OR BOTTOM OF ANY SECTION SHALL BE A MINIMUM OF 3" PLUS THE JOINT DEPTH FOR CAST PIPE OPENINGS AND A MINIMUM OF 12" PLUS THE JOINT DEPTH FOR CORED OPENINGS FOR BASIN CONNECTIONS.

NOTE 'D':
THE MANUFACTURER SHALL ENSURE THAT ALL PRECAST MANHOLE SECTIONS ARE ADDITIONALLY REINFORCED WHERE REQUIRED TO RESIST DAMAGE FROM HANDLING, SHIPPING AND INSTALLATION STRESSES.

SCHEDULE		
PIPE DIA.	OPENING*	ΔMAX.
6"	14"	113°
10"	16"	112°
12"	18"	104°
15"	22"	93°
16"	24"	83°
24"	34"	60°

* SEE NOTE 11

GENERAL NOTES:
(1) THIS 4'-0" DIA. PRECAST MANHOLE MAY BE SUBSTITUTED FOR STANDARD MANHOLE TYPES A-1, A-2, B-1 AND B-2 ON SEWERS 24" IN DIAMETER AND LESS ONLY.
(2) MANHOLE RISER REINFORCING COMPLIES WITH AREA REQUIREMENTS OF ASTM DATE, EXCEPT THAT ALL WALL SECTIONS SHALL BE REINFORCED WITH WWM, A$_s$=0.12 CIR. X 0.06 LONG. - E.F. WITH 2-#4 HOOPS AROUND OPENINGS. (THE ADDITIONAL 2-#4 HOOPS AROUND OPENINGS ARE REQUIRED AT CORED OPENINGS FOR BASIN CONNECTIONS.) (ALL VALUES OF AREA OF STEEL (A$_s$) ARE IN SQUARE INCHES AND ARE A MINIMUM.)
(3) CORED OPENINGS WILL BE PERMITTED FOR 12" DIA. BASIN CONNECTIONS ONLY. FOR BELL-UP CORED OPENING (DWG. 4 OF 4) FOR THESE BASIN CONNECTIONS, CORED OPENING WILL NOT BE PERMITTED FOR SHALLOW MANHOLES.
(4) FOR DETAILS OF STEPS, JOINTS, GASKETS, PRECAST COLLARS, PIPE TO MANHOLE CONNECTIONS, (PLE & DP SIZE FLARED #3 PLACE ALTERNATE), MANHOLE CONNECTIONS, SEE STANDARD FOR PRECAST MANHOLE DETAILS, STANDARD FOR MANHOLE STEPS AND STANDARD FOR ALTERNATE MONOLITHIC BASE SECTIONS FOR PRECAST MANHOLES (POURED IN PLACE).
(5) THE MAXIMUM DEPTH OF COVER OF THE 4'-0" DIA. PRECAST MANHOLE, FROM FINAL GRADE TO THE OUTER TOP OF THE PIPE, SHALL BE TWENTY-FIVE (25) FEET.
(6) ALL COVER DISTANCES SHOWN FOR REINFORCEMENT ARE CLEAR DISTANCES.
(7) LIFTING HOLES SHALL BE LOCATED IN THE SECTIONS AS PER MANUFACTURER'S RECOMMENDATIONS AND GROUTED PRIOR TO BACKFILLING.
(8) THE VALUES OF THE WALL AND SLAB THICKNESSES ARE A MINIMUM.
(9) CONCRETE DESIGN MIX = 5,000 PSI (MIN. 28 DAY STRENGTH) = 4,000 PSI; MAX. W/C = 0.47), REBARS = F$_y$ = 60,000 PSI. WWM - F$_y$ = 65,000 PSI.
(10) INVERT SHELVES SHALL HAVE A 1/2" PER LINEAR FOOT PITCH TOWARDS THE SEWER.
(11) THE OPENING DIAMETERS SHOWN IN THE SCHEDULE ARE MAXIMUM VALUES. MINIMUM CORED OPENING DIAMETERS SHALL BE AS FOLLOWS: 8" TO 24" DIA. PIPES = O.D.+2"
(12) BELL-UP TYPE JOINTS SHALL BE ALLOWED FOR 4'-0" DIA. PRECAST MANHOLE, WITH THE FOLLOWING MODIFICATION TO THE LOOSE TOP SLAB: THE BELL-UP TYPE JOINT SHALL BE LOCATED AT 1'-0" FROM THE TOP (JOINT DEPTH), BUT IN NO CASE SHALL IT BE LESS THAN 9" THICK AND (B) THE EMBEDMENT LENGTH SHALL BE 1-1" (WHERE Y IS THE THICKNESS OF RISER WALL) SEE DETAL "A" ON DWG. 1 OF 4.

Sandip S. Saini P.E. 8/14/18
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION
DATE

Thomas Wynne P.E. 8/14/18
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DATE

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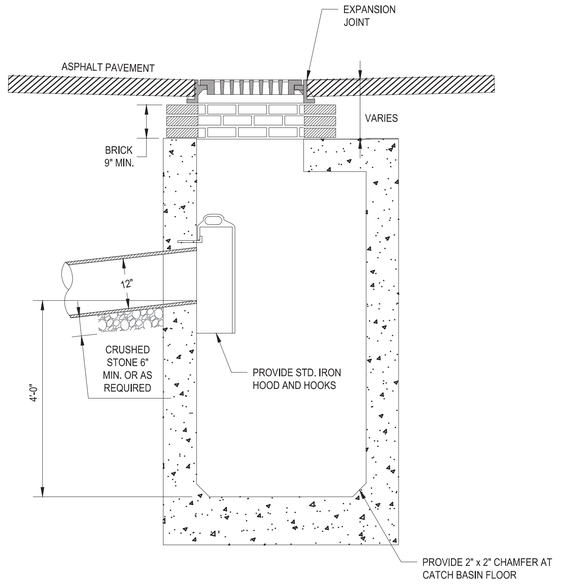
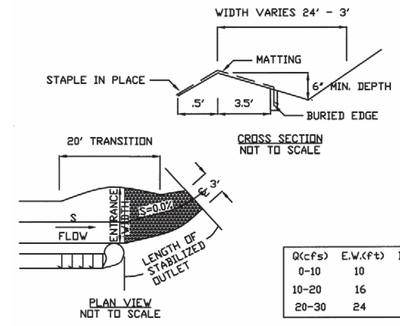
REVISED JULY 2019 - KY, WARLOW, HDO

E - STANDARD NYCDEP MANHOLE 4 OF 4
- NOT TO SCALE



F - MODIFIED NYCDEP TYPE 2 CATCH BASIN WITHOUT CURB PIECE
- NOT TO SCALE



Q(cfs)	E.W.(ft)	D(ft)	LENGTH(ft)
0-10	10	0.5	10
10-20	16	0.6	20
20-30	24	0.7	30

CONSTRUCTION SPECIFICATIONS

1. THE MATTING SHOULD BE A MINIMUM OF 4FT. WIDE EXTENDING 6 INCHES OVER THE LIP AND BURIED 6 INCHES DEEP IN A VERTICAL TRENCH ON THE LOWER EDGE. THE UPPER EDGE SHOULD BUTT AGAINST SMOOTHLY CUT SOD AND BE SECURELY HELD IN PLACE WITH CLOSELY SPACED HEAVY DUTY WIRE STAPLES AT LEAST 12 INCHES IN LENGTH.
2. ENSURE THAT THE LIP IS LEVEL TO UNIFORMLY SPREAD DISCHARGE.
3. THE LIP SHALL BE CONSTRUCTED ON UNDISTURBED SOIL NOT FILL.
4. A 20 FOOT TRANSITION SECTION WILL BE CONSTRUCTED FROM THE DIVERSION CHANNEL TO THE SPREADER TO SMOOTHLY BLEND THE DIFFERENT DIMENSION AND GRADES.
5. THE RUNOFF DISCHARGE WILL BE OUTLETED ONTO A STABILIZED VEGETATED SLOPE NOT EXCEEDING 10%.
6. SEED AND MULCH THE DISTURBED AREA IMMEDIATELY AFTER CONSTRUCTION.

G - FLOW SPREADER
- NOT TO SCALE

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SUBMITTAL DATE: JULY 2021

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NO.	DATE	REVISIONS/DESCRIPTION	APPR'D

DESIGNED BY: J. Causarano
DRAWN BY: C. DeBona
CHECKED BY: B. Mawhirter
DESIGN LEAD: EDWARD BARBOE, P.E.

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Environmental Protection

ACCOUNTABLE MANAGER
JOSE NIEVES

PROJECT MANAGER
MARK DELBALZO, P.E.

NEW YORK CITY ENVIRONMENTAL PROTECTION
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VALHALLA, NEW YORK 10595-1336
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REPURPOSING OF THE KENSICO LABORATORY AS THE KENSICO REGIONAL HEADQUARTERS
MOUNT PLEASANT, NEW YORK
CONTRACT CRO-624

CIVIL
DETAILS - 3

DATE: JULY 2021
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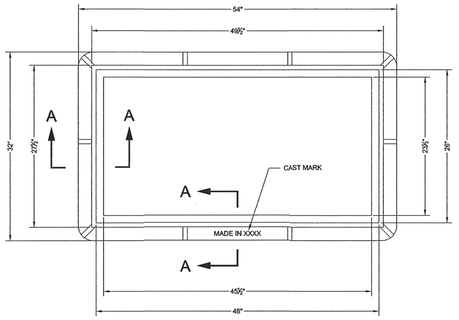
SHEET NO: 12 OF 39
DRAWING NO. C-107

SE58A

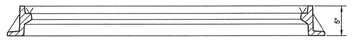
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR CAST IRON FRAME FOR CATCH BASINS
(WITHOUT CURB PIECE)

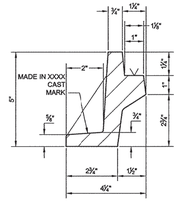
SE58A



PLAN



SECTION



SECTION A-A

NOTES:

(1) MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B. MINIMUM WEIGHT OF FRAME IS 275 LBS.

(2) DESIGN LOADING: HS20-44 HIGHWAY LOADING.

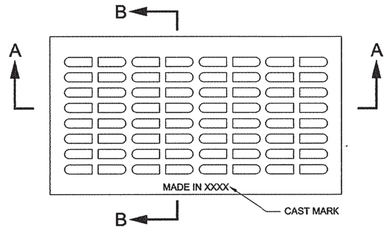
(3) ALL FRAMES SHALL HAVE THE MANUFACTURER'S IDENTIFICATION, CAST DATE OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST ON INDIVIDUAL PIECES AT THE TIME OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.

Gurdeep S. Saini — P.E. — 8/14/18
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION
DATE

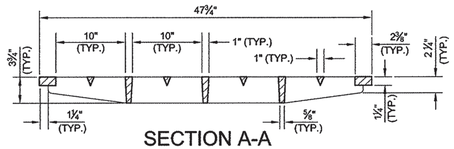
Thomas Wynne — P.E. — 8/14/18
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DATE

REVISED DECEMBER 2017- P. LEUNG
W: \STANDARDS \ MOD

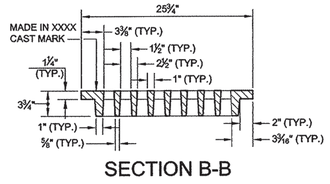
A — DEP STANDARD FRAME FOR CATCH BASIN
\- — NOT TO SCALE



PLAN OF GRATING (TYPE R)



SECTION A-A



SECTION B-B

B — DEP STANDARD GRATE
\- — NOT TO SCALE

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CHECKED BY: B. Mawhirter | DESIGN LEAD: EDWARD BARBOE, P.E.

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Environmental Protection

ACCOUNTABLE MANAGER: JOSE NIEVES
PROJECT MANAGER: MARK DELBALZO, P.E.

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CONTRACT CRO-624

CIVIL
DETAILS - 4

DATE: JULY 2021
SCALE: N.T.S
SHEET NO: 13 OF 39
DRAWING NO. C-108

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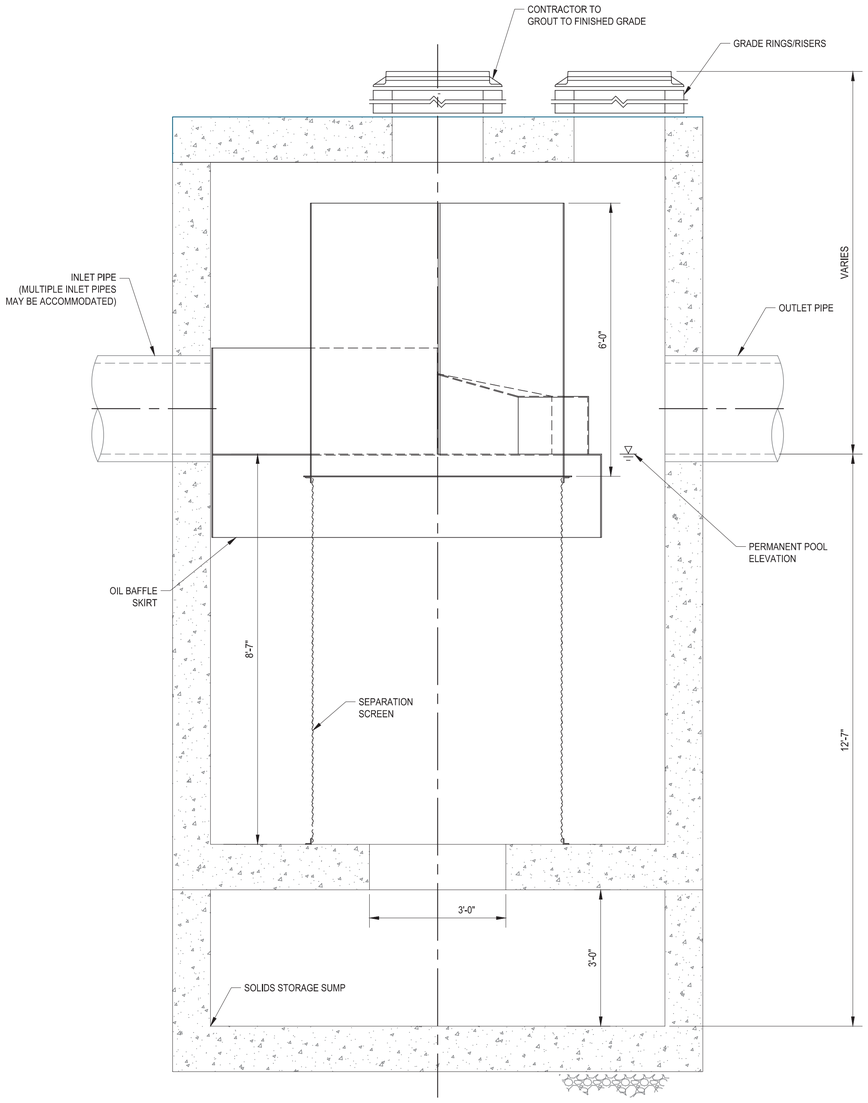
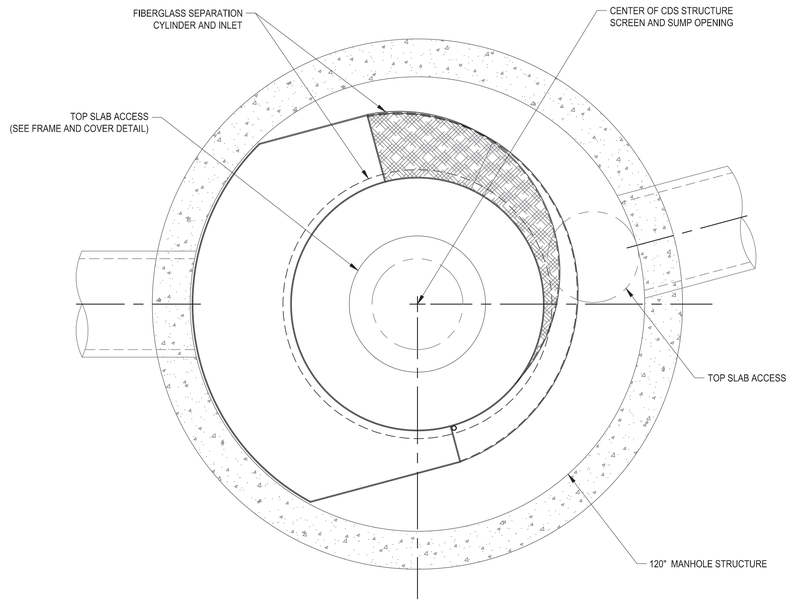
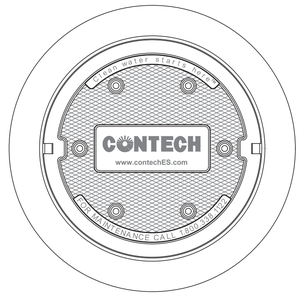


ELEVATION



PLAN



FRAME AND COVER

A - CDS STORMWATER TREATMENT MANHOLE
NOT TO SCALE

PERMITTING SUBMITTAL
NOT FOR CONSTRUCTION

SUBMITTAL DATE: JULY 2021

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ACCOUNTABLE MANAGER
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PROJECT MANAGER
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CONTRACT CRO-624

CIVIL
DETAILS - 5

DATE: JULY 2021
SCALE: N.T.S
SHEET NO: 14 OF 39
DRAWING NO. C-109

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Appendix I
Specifications

SECTION 02105
Soil Sampling and Analysis

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall provide all labor, materials, tools, and equipment to perform all operations necessary to characterize, classify and determine the requirements for handling, reuse and disposal of all materials to be excavated.

B. The primary method of characterizing soils shall be through in-situ sampling. No stockpiling of excavated material on-site or ex-situ sampling will be allowed without written approval from the Engineer.

C. The following index of this Section is included for convenience:

1.02 PAYMENT

A. Unless otherwise provided in the Detailed Specifications, no separate payment will be made for performing any Work required under this Section and the Contractor shall include all costs thereof in its lump sum price bid for the Contract.

1.03 RELATED SECTIONS

A. General Specification 02240 - Dewatering

B. General Specification 02316 - Excavation

C. General Specification 02317 - Backfilling

D. General Specification 02371 - Dust, Soil Erosion and Sedimentation Control

1.04 REFERENCES

A. EPA QA/G-4, Guidance on Systematic Planning Using the Data Quality Objectives Process, February 2006 or latest revision

B. USEPA Office of Solid Waste, Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods (SW-846), Third Edition, December 1996 with updates or latest revision

C. NYSDEC regulations, 6 NYCRR Subpart 360-1, General Provisions, Solid Waste Management Facilities

D. NYSDEC regulations, 6 NYCRR Part 371, Identification and Listing of Hazardous Wastes (40 CFR Part 261)

E. NYSDEC regulations, 6 NYCRR Subpart 375, Environmental Remediation Programs

F. American Society for Testing and Materials (ASTM) Standards:

1. D422 - Method for Particle-Size Analysis of Soils.

2. D1556 - Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

3. D1557 - Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3))

4. D6938 - Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

G. DER-10, Technical Guidance for Site Investigation and Remediation, NYSDEC Division of Environmental Remediation

H. Commissioner Policy CP-51 Soil Cleanup Guidance Policy, Issued 10/21/2010; Effective 12/03/2010, NYSDEC Division of Environmental Remediation

1.05 DEFINITIONS

A. Analyte-free Water: Water containing less than the detection limits for volatile organics, pesticides, PCBs and inorganics. Compliance shall be verified either by the supplier or by an analytical laboratory.

B. Backfill: Material to be excavated and proposed for reuse as backfill must meet the solid waste cessation requirements of 6NYCRR 360-1.15(b) for a Pre-

Determined BUD or 6 NYCRR 360.1.15(d) for a Case-Specific BUD. Backfill shall be non-hazardous and shall meet the requirements of General Specification 02317 – Backfilling.

C. Composite Sample: Composite sampling is comprised of grab samples which are initially collected from within a grid area and then combined into a single sample. This sample is representative of the entire grid area from which the grab samples were collected.

D. Excavated Material: All material regardless of its nature, except rock or boulders that have been excavated. Refer to General Specification 02316 – Excavation.

E. Ex-situ Soil Sampling: Sampling of soil that has been excavated and stockpiled.

F. Grab Sample: A single sample is collected at a particular time and place that represents the composition of the soil only at that time and place.

G. In-situ Soil Sampling: Sampling of soil prior to excavation and most representative of undisturbed conditions.

H. Pre-Determined Beneficial Use Determination (BUD) – NYSDEC allows soil to be reused on-site under a Pre-Determined BUD under the following conditions: 360-1.15(b)(7) uncontaminated soil which has been excavated as part of a construction project, and which is being used as a fill material, in place of soil native to the site of disposition; 360-1.15(b)(8) non-hazardous, contaminated soil which has been excavated as part of a construction project, other than a NYSDEC-approved or undertaken inactive hazardous waste disposal site remediation program, and which is used as backfill for the same excavation or excavations containing similar contaminants at the same site. Excess materials on these projects are subject to the requirements of Part 360. No *de minimus* quantity of solid waste or historic fill is allowed when reusing soils under both 360-1.15(b)(7) and 360-1.15(b)(8), with the exception of reuse in the same excavation. Refer to Article 1.06 for sampling requirements for uncontaminated soil and non-hazardous, contaminated soil, and Article 3.01 for a list of parameters to be analyzed for soils to be reused on-site, or soils to be reused or disposed off-site.

I. Case-Specific Beneficial Use Determination (BUD): Under 6 NYCRR 360-1.15 (d), NYSDEC sets forth the requirements for petitioning NYSDEC to obtain a Case-Specific BUD, and the criteria for reviewing, granting, or denying of the BUD. For reuse of a solid waste to be determined a beneficial use, the petition must demonstrate the following:

1. The use will not adversely affect human health and safety, the environment, or natural resources.
2. The solid waste is an effective substitute for a commercial product or can be used beneficially in the manufacture of a commercial product.

3. The essential nature of the use constitutes a legitimate reuse and not disposal.

J. Waste Classification:

1. Regulated Solid Waste:

a. Hazardous Solid Waste: Material shall be considered a characteristic hazardous solid waste when it exhibits any of the following: ignitability, corrosivity, reactivity, or toxicity for Volatile Organic Compounds (VOCs), semi-VOCs (SVOCs), metals, pesticides, or herbicides, as defined in 6 NYCRR Part 371 or 40 CFR Section 261. Under New York State (NYS) regulations, a material that contains greater than 50 ppm of PCBs is considered a hazardous waste. The Environmental Protection Agency (EPA) considers greater than 50 ppm of PCB to be a PCB-contaminated waste under Toxic Substances Control Act (TSCA). All hazardous waste shall be considered unsuitable for reuse, and shall be disposed of at an approved permitted hazardous waste landfill.

b. Non-Hazardous Contaminated Waste:

1) Industrial Waste: Non-hazardous contaminated waste includes industrial waste (i.e., solid waste generated by manufacturing or industrial processes). Such processes may include, but are not limited to the following: electric power generation; fertilizer/agricultural chemicals; inorganic chemicals; iron and steel manufacturing; organic chemicals; and all other materials as defined in 6 NYCRR Part 360. The forms of such wastes are exemplified by but not limited to: liquids such as acids, alkalis, caustics, leachate, petroleum (and its derivatives), and processes or treatment wastewaters; sludges which are semi-solid substances resulting from process or treatment operations or residues from storage or use of liquids; solidified chemicals, paints or pigments; and dredge spoil generated by manufacturing or industrial processes, foundry sand, and the end or by-products of incineration or other forms of combustion. Physical evidence that a soil contains industrial waste shall include visual identification of waste, chemical odors, vapor emission, and chemical staining. Evidence that soil is contaminated shall also include contaminant concentrations exceeding 6 NYCRR Part 375-6 Lower of Groundwater Protection and Residential Soil Cleanup Objectives (SCOs).

2) Historic Fill: Non-hazardous contaminated waste also includes historic fill as defined in 6 NYCRR Part 375. Historic fill material means non-indigenous or non-native material, historically deposited or disposed in the general area of, or on a site to create usable land by filling water bodies, wetlands or topographic depressions, which is in no way connected with the subsequent operations at the location of the emplacement, and which was contaminated prior to emplacement. Historic fill may be solid waste including, but not limited to, coal ash, wood ash, municipal solid waste incinerator ash, construction and demolition debris, dredged sediments, railroad ballast, refuse and land clearing debris, which was used prior to October 10, 1962. Any soil or soil-like wastes from any area which was operated by a municipality or other person as a landfill is not considered historic fill.

c. Construction and Demolition (C&D) Debris: Uncontaminated solid waste resulting from the construction, remodeling, repair and demolition of utilities, structures and roads; and uncontaminated solid waste resulting from land clearing. Such waste includes, but is not limited to bricks, concrete, and other masonry materials, rock, and uncontaminated soil. Uncontaminated solid waste means C&D debris that is not mixed or comingled with other solid waste at the point of generation, processing or disposal, and that is not contaminated with spills of a petroleum product, hazardous waste, or industrial waste. Contamination from spills of a petroleum product does not include asphalt or concrete pavement that has come in contact with petroleum through normal vehicle use of the roadway.

d. Non-hazardous Petroleum-contaminated Waste: Exhibits a discernible petroleum-type odor, contains visible petroleum product, or may be associated with a reported spill.

2. Non-regulated Solid Waste: This applies to materials that, before being beneficially used (as determined by the NYSDEC or applicable Out-of-State Regulatory Agency) were solid waste. Material is no longer considered solid waste when used as described below:

a. uncontaminated soil which has been excavated as part of a construction project, and which is being used as a fill material, in place of soil native to the site of disposition;

b. non-hazardous contaminated soil which has been excavated as part of a construction project, other than a NYSDEC-approved or undertaken inactive waste disposal site remediation program, and which is used as backfill for the same excavation or excavations containing similar contaminants at the same site (excess materials on these projects are subject to the requirements of 6 NYCRR Part 360);

c. recognizable, uncontaminated concrete and concrete products, asphalt pavement, brick, glass, soil and rock placed in commerce for service as a substitute for conventional aggregate;

d. non-hazardous petroleum-contaminated soil when incorporated into asphalt pavement products by a producer authorized by the NYSDEC;

e. and all other uses as described in 6 NYCRR Part 360, Section 360-1.15, Beneficial Use. Note the NYSDEC will no longer consider asphalt millings to be recognizable if millings are combined with soil.

1.06 SAMPLING REQUIREMENTS

A. Uncontaminated Soil:

1. Under 360-1.15(b)(7), soil may be determined to be uncontaminated, without sampling, if two or more of the following criteria can be satisfied:

a. When environmental due diligence performed under a recognized protocol (such as those included in DER-10 Chapter 3) determines that soil or fill is uncontaminated (i.e., that there is no history of spills or releases, or mixture with other solid wastes, including cinders or ash).

b. When it is determined to be native and uncontaminated based on observation of the site vegetation in conjunction with other indicators such as soil morphology as determined by a qualified soil scientist, geologist, environmental scientist, or professional engineer.

c. When existing data indicate that non-native soil such as common fill is uncontaminated.

2. Sampling is required when information cited above is not available or when environmental due diligence indicates a potential for an existing or historical impact (e.g., spill or release) in soil to be excavated, but the extent and magnitude have not yet been defined.

3. Sampling is performed within the planned excavation boundaries and receiving areas to define contamination boundaries and to allow a comparison to confirm similarity of contaminants.

4. Analytical data is used to determine whether soil may be reused at any site without restriction (meets soil cleanup objectives [SCOs] in 6 NYCRR Part 375-6.8(a), parameters of CP-51, and most recent supplemental SCOs, as applicable).

B. Non-Hazardous Contaminated Soil:

1. Under 6 NYCRR 360-1.15(b)(8), non-hazardous, contaminated soil may be reused within the same site, without sampling, provided the type of contaminants and origin are understood; and the receiving area is known to be affected similarly (e.g., same types of contaminants, same general concentrations, same site history).

2. Sampling is required when the information cited above is not available; or when known historical impacts are not well understood; or to define contamination boundaries. Same numbers of composite and discrete samples from excavation and receiving areas shall be analyzed and results compared by ranges in concentration for individual parameters.

3. Analytical data is used to determine whether soil may be reused at any site, with the exception of ecologically sensitive and agricultural locations, as fill and cover (meets the lower of 6 NYCRR Part 375-6.8(b) Protection of Public Health Residential and Protection of Groundwater SCOs, as applicable); or soil may be reused on the same site provided environmental due diligence and testing show that the material being excavated is non-hazardous and will be used as backfill in an area containing similar contaminants.

C. It shall be noted that when relocating soils on the same site, hazardous soils, non-soil wastes, or hot spots, as evidenced by visual observation, hand-held instruments or analytical results, must not be incorporated. All such material shall be removed off-site for disposal.

1.07 SUBMITTALS

A. The Contractor shall submit Shop Drawings and other materials for the approval of the Engineer. Submittals shall include, but not be limited to:

1. DEP Environmental, Health, and Safety (EH&S) Drilling and Boring Checklist: A completed EH&S Drilling and Boring Checklist shall be submitted to the Engineer a minimum of 60 days prior to the proposed commencement of the drilling/boring work. No drilling/boring work shall be performed at the site without obtaining written approval of the EH&S Drilling and Boring Checklist from the Engineer. An updated checklist shall be submitted whenever there is a change of the drilling

subcontractor or scope of drilling/boring work; or new EH&S hazards have to be considered in performing the work. The EH&S Drilling and Boring Checklist is located in the Detailed Specifications.

2. Field Sampling Plan (FSP): A FSP shall be submitted to the Engineer for approval 30 days following notice to proceed. The Engineer will approve the FSP only if it clearly provides a means to collect the information necessary to allow for classification of all material proposed for excavation and if it will ultimately generate data necessary to gain approval from the Contractor's chosen reuse or disposal sites. No sampling shall be conducted until the Engineer has reviewed and formally approved the FSP in writing. The FSP shall include the following at a minimum:

   a. Protocols for the collection and analysis of samples that represent all soils to be excavated.

      1) Each composite sample will be comprised of multiple (3-5) discrete samples that are representative of the horizontal and vertical extent of the excavation footprint.

      2) Two discrete (biased worst case) VOC samples will be collected for every one composite sample.

      3) When soils are visibly heterogenous, composite samples will be obtained to represent each visually different stratum or section of the excavation site, regardless of the overall excavation volume.

   b. A detailed outline of the BUD or disposal facility requirements for sampling, testing and analysis including specific number and types of samples per unit volume of soil to be excavated.

   c. Parameters analyzed for soils to be reused on-site, and reused or disposed off-site shall be as described in Article 3.01.

   d. A scaled site map showing:

      1) existing fixed landmarks;

      2) proposed excavation limits or area to be excavated divided into distinct vertical and horizontal grids, identifying the volume of soil or fill that each sample will represent;

      3) specific sampling locations that are representative of the entire depth of excavation and that will conform to the applicable sampling frequency requirement;

4) identification numbers of the sample grids, relative depth, sampling intervals, and volumes reflective of the Contractor's excavation method.

a) Sampling intervals shall account for existing subsurface data, historic sampling information, including descriptions, depths, orientation, and location of material of potentially different classifications, and shall minimize undue mixing of excavated soils.

e. Proposed sampling, handling, preservation, and storage of equipment and procedures, including transfer procedures, and sampling equipment decontamination procedures.

f. Proposed analytical methods, in accordance with SW-846, latest edition, for the analyses to be performed.

g. Procedures for assessing precision, accuracy, degree of representation, comparability and completeness of samples and data, including performance audits and proposed protocols for corrective measures where problems are identified in accordance with Article 1.09 -- Quality Assurance.

h. Schedule of field inspections.

i. A statement that the sampling program is in accordance with the Contract requirements.

j. Manufacturer, catalog data and calibration records of all analytical equipment to be used on-site.

k. Name and address of analytical laboratory, copy of laboratory certification, and Quality Assurance Manual.

l. Description of QA/QC samples and any additional requirements of the reuse or disposal facilities.

m. The organizational structure of the Contractor's and all subcontractors' quality management (QM) personnel, including their:

1) names, titles and contact information;

2) resumes;

3) responsibilities;

4) authorities; and

5) qualifications.

3. Field Sampling Summary Report (FSSR): Hard copies of the FSSR shall be submitted to the Engineer for review in a timeframe, dependent on the extent of the data collection effort, determined by the Engineer at the time. The FSSR shall contain all laboratory analytical results obtained from the field sampling event and shall allow the Engineer to determine if the soil is acceptable for beneficial use or requires disposal at a permitted solid waste disposal facility. At minimum, the FSSR shall include the following information:

    a. A detailed account of any field procedures used which deviated from those established in the FSP.

    b. A summary table listing the analytical results (with individual ID for each sample) with highlighted exceedances of RCRA Characteristics, BUD, and all disposal facility limits, including any alternate acceptance criteria.

        1) Data shall also be compared to the NYSDEC Subpart 375-6.8(a) and (b) SCOs, and CP-51 SSCOs, as applicable.

    c. Location of each sampling point (using individual ID from analytical results summary table) on the scaled site map created in the FSP.

    d. A complete set of field notes collected and maintained by the Contractor during sampling. The field notes shall be made available to the Engineer during the sampling program.

    e. Boring or probe logs from each sampling location containing a continuous stratigraphic description of all material encountered. Descriptions of material shall include, but not be limited to, color, odor, staining, field screening measurement, relative grain size distribution, material composition, moisture content, and cohesive properties.

    f. Depth intervals for each sample, whether a grab or composite, and any special notes, which are included on the laboratory chain-of-custody forms.

    g. Copies of all laboratory chain-of-custody forms for samples that are collected for analysis.

4. Analytical Results: The Contractor shall submit analytical results for sampled soil material to the Engineer within three (3) business days of receiving such data from the laboratory. Analytical results data shall be managed by utilizing a computer spreadsheet or database program as approved by the Engineer. Data shall be organized in such a way that all samples may be tracked from collection through analysis.

a. The analytical results generated for a ten (10) business day turnaround time deliverable shall include a Form I (or equivalent) showing compounds analyzed for, and concentrations detected, and associated chain-of-custody reports to the Engineer.

b. The final data package generated by the laboratory shall include the following information:

1) A Form I showing pertinent physical data presented in concise, easy to follow formats (i.e., sample number, laboratory ID, client, date of sample preparation, date analyzed, percent moisture, dilution factor, sample matrix, units, undetected and detected compounds, etc.).

2) Reference to analytical methodology used.

3) General discussion including a description of sample types, tests performed, any problems encountered, and any general comments (case narrative).

4) Data from each discrete sample reported using cross-referencing between site samples and quality control samples and including all pertinent dates, information and reporting limits.

5) Associated quality control samples such as blanks, spikes and spike duplicates, laboratory duplicates, laboratory control samples, field duplicates and appropriate check standards.

6) Copies of chain-of-custody sheets.

7) Analytical results in tabular Microsoft Excel format with highlighted exceedances of the RCRA Characteristics, BUD, or applicable parameters of 6NYCRR Part 375 SCOs and CP-51 Supplemental SCOs, as applicable, and all disposal facility limits, including any alternate acceptance criteria as part of the FSSR and disposal facility application packages submitted to the Engineer for review and approval.

8) The information must be delivered on CD or via electronic mail to the Engineer. All electronic data must be certified to be virus-free.

1.08 OFF-SITE REUSE/DISPOSAL FACILITY

A. The Contractor shall submit the name(s) of the selected off-site soil reuse and disposal facilities and their location(s) to the Engineer for approval.

B. Reuse of excavation spoils off-site must be prioritized over disposal. Disposal facilities shall only be approved where reuse options are not available.

C. Note that some companies may have multiple reuse or disposal facilities, each possessing differing requirements regarding the types of materials accepted, the specific analytical testing parameters that must be performed for each material, and the frequency of sampling required for each material. It is the Contractor's responsibility to determine the specific waste acceptance criteria and testing requirements for each of its proposed facilities.

D. The Contractor shall confirm the location(s) and permit status, as well as check for outstanding violations and enforcement actions at each selected reuse or disposal facility. The Engineer shall verify the information provided by the Contractor for each facility prior to approval.

E. The Contractor shall verify types of materials accepted, the specific analytical testing parameters that must be performed for each material, and the frequency of sampling required for each material, at each of the chosen facilities.

F. If an approved facility is not available during construction, the Contractor shall be fully responsible for procuring alternate approved facilities at no additional cost to the City. Any additional sampling and analysis required and labor involved in selecting new facilities after the initial reuse or disposal facilities are accepted shall be the responsibility of the Contractor.

1.09 QUALITY ASSURANCE

A. Laboratory Requirements:

1. The Contractor shall provide the services of a laboratory certified by the New York State Department of Health Environmental Laboratory Approval Program (NYSDOH-ELAP) to perform applicable testing and chemical analyses for the duration of the Work.

2. The laboratory shall also meet the certification requirements of the reuse or disposal facility that will be utilized by the Contractor for the duration of the Work.

B. Permits and Regulations:

1. The Contractor shall obtain all necessary permits and perform all work in compliance with applicable requirements of OSHA, and other governing authorities having jurisdiction.

C. Field QA/QC Samples:

1. Shall be collected and analyzed in accordance with the protocol for site samples.

2. The number of QA/QC samples required for a quantity of soil shall meet all reuse or disposal facility requirements, and the approval of the Engineer.

3. Field duplicate samples shall be collected for a minimum of 5 percent of the samples spaced throughout the sample program.

D. Sample Turn-Around: The Contractor shall provide for prompt sampling and turn-around of analysis so as not to delay the project. If a turn-around time of less than ten (10) business days is required due to delays in construction scheduling or other constraints, Contractor shall provide for such at no additional cost to the City.

1.10 DELIVERY, STORAGE AND HANDLING

A. Sample Identification:

1. All samples shall be identified with a sample label in addition to an entry on a chain-of-custody record. The label shall be identified upon receipt by the laboratory and cross-referenced to the chain-of-custody record.

2. Any inconsistencies shall be noted on the custody record. Laboratory personnel shall notify the Sampling and Analysis Manager immediately if any inconsistencies exist in the paper work associated with the samples, and Contractor shall collect new samples to replace those with inconsistencies which cannot be rectified.

B. Sample Labels: The field team shall complete the following information on a sample label for each sample bottle:

1. Site Name

2. Job Number

3. Sample Number

4. Sample Description

5. Company Name

6. Parameters to be Analyzed

7. Date

8. Time

9. Preservation Technique Employed

10. Sample labels shall be attached to the sample bottles

C. Completion of Chain-of-Custody Record:

1. Maintain a chain-of-custody record on all samples. A chain-of-custody record is a printed multi-part form that accompanies a sample or group

of samples as custody is transferred from person to person. A chain-of-custody record is a controlled document.

2. As soon as is practical after sample collection, preferably after decontamination, the following information shall be entered on the chain-of-custody form. All information shall be recorded in ink.

   a. Project number: Enter the alphanumeric designation assigned by the field team that uniquely identifies the project site.

   b. Project name: Enter the site name.

   c. Samplers: Sign the name(s) of the sampler(s).

   d. Station number: Enter the sample number for each sample in the shipment. This number appears on the sample identification label.

   e. Date: Enter a six-digit number indicating the year, month, and day of sample collection.

   f. Time: Enter a four-digit number indicating the time of collection in 24-hour time, for example, 13:54.

   g. Matrix/Type: Indicate the type of sample; composite or grab.

   h. Station location: Describe the location where the sample was collected.

   i. Number of containers: For each sample number, enter the number of sample bottles that are contained in the shipment.

   j. Remarks: Enter any appropriate remarks.

D. Sample Shipment:

1. Custody of samples shall be maintained throughout the shipment of samples to the selected laboratory (ies). All samples shall be packaged and shipped daily to ensure that no sample is held at the site more than 24 hours. Samples shall be delivered directly to the laboratory using the following procedures:

   a. Use waterproof high-strength plastic ice chests or coolers only.

   b. After filling out the pertinent information on the sample label and tag, put the sample in the bottle or vial and screw on the lid. For bottles other than VOC sample bottles, secure the lid with tape (tape on VOC bottles may cause contamination).

   c. Place inert cushioning material such as vermiculite or "bubble-wrap" in the bottom of the cooler.

d. Enclose the bottles in clear plastic bags through which sample labels are visible, and seal the bag. Place bottles upright in the cooler in such a way that they do not touch and will not touch during shipment.

e. Put in additional inert packing material to partially cover sample bottles (more than half-way). Place double-bagged crushed ice around, among, and on top of the sample bottles.

f. Fill cooler with cushioning material.

g. Put paperwork (chain-of-custody record) in a waterproof plastic bag and tape it with packing tape to the inside lid of the cooler.

h. Tape the drain shut.

i. Secure lid by taping. Wrap the cooler completely with strapping tape at a minimum of two locations. Do not cover any labels.

j. Attach completed shipping label to top of the cooler.

k. Put "This Side Up" labels on all four sides and "Fragile" labels on at least two sides of coolers containing glass containers.

l. Ship the cooler overnight by commercial carrier (e.g., Federal Express, UPS), laboratory carrier or field personnel to the respective laboratory.

2. Custody forms for the samples shall be signed by the Contractor's designated representative who is relinquishing custody. The custody form shall include the air bill number, method of shipment, and time and date of the transfer of custody.

3. Custody seals shall be applied to the front and back of the sample coolers. A shipping label with return address shall be applied as well as the air express bill and any Department of Transportation (DOT) required labels or markings.

E. Transferring Custody of Samples to Shipper, if applicable: Contractor shall transfer custody of samples to a shipper as follows:

1. Sign, date, and enter time on the chain-of-custody report under "Relinquished by."

2. Make certain that shipper signs the "Received by" entry.

3. Enter name of the carrier under next "Relinquished by" category. Receiving laboratory shall sign "Received for Laboratory by" on lower line and enter date and time.

F. Transferring Custody from Sampler or Shipper to Common Carrier:

1. The shipper or Contractor shall transfer custody of samples to a common carrier as follows:
    a. Sign, date, and enter time under "Relinquished by" entry.
    b. Enter name of carrier (e.g., UPS, Federal Express) under "Received by."
    c. Enter bill-of-lading or Federal Express airbill number under "Remarks."
    d. Place the original of the chain-of-custody form in the appropriate sample shipping package. Retain a copy with field records.
    e. Sign and date the custody seal. The custody seal is part of the chain-of-custody process and is used to prevent tampering with samples after they have been collected in the field.
    f. Wrap the seal across filament tape which has been wrapped around the hinges of the shipping package at least twice.
    g. Fold the custody seal over on itself so that it sticks together.
    h. Complete other carrier-required shipping papers.
2. In instances when the Common Carrier will not accept responsibility for handling chain-of-custody forms, the Contractor shall ensure that the record is packed within the sample package.

G. Laboratory Custody Procedures: Once the samples arrive at the laboratory, the Contractor shall ensure that custody of the samples is maintained by laboratory personnel. The laboratory shall, at a minimum, document the chain of custody through each stage of analysis from receipt to final reporting.

1.11 PROJECT CONDITIONS

A. Stockpiling: There may be circumstances that prevent in-situ sampling. In these cases, stockpiling of excavated soils on site or ex-situ sampling shall require written approval from the Engineer.

1. If stockpiling is considered necessary, and approved by the Engineer, sampling shall be conducted by collecting representative grab samples throughout the soil stockpile. Surface soil shall not be used as sampling material. The Contractor is also required to satisfy the specific sampling requirements of the reuse or disposal facility.
2. During stockpiling activities, the Engineer may identify quantities within each 500 cubic yard portion that differ in appearance from the bulk of the material. In this case, the Engineer will direct the Contractor to segregate these variable materials for stockpiling on-site.

3. All stockpiles of excavated materials shall be handled on site as required in General Specification 02371 – Dust, Soil Erosion and Sedimentation Control.

B. Decontamination of Sampling Equipment: All sampling equipment shall be certified clean or precleaned, prior to collection of each sample, by the following method:

1. Wash all sampling equipment, secondary containers (e.g., mixing bowls for composite sampling) and aluminum foil with non-phosphate laboratory grade detergent and distilled water.

2. Triple rinse with distilled water.

3. Rinse with isopropyl alcohol, or if samples are visibly contaminated with petroleum use a solvent, such as hexane or other alternate approved by the Engineer.

4. Triple rinse with analyte-free water.

C. Disposal of Decontamination Solutions: Collect all decontamination solution and dispose of it through a licensed chemical waste disposal service if it is unsuitable for treatment on-site by incorporation into existing on-site treatment processes as defined in General Specification 02240 – Dewatering.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 TESTING

A. Parameters analyzed for soils to be reused on-site shall be at a minimum EPA 6010 and EPA 7471 for the RCRA-14 list of metals (i.e., antimony, arsenic, barium, beryllium, cadmium, total chromium, copper, lead, mercury, nickel, selenium, silver, vanadium and zinc), unless knowledge of the material or results of prior sampling and analysis justify analysis for fewer metals; EPA 8270D SVOCs (entire Target Compound List); if there is concern about potential impact from historic fill, C&D debris or site history, the parameter list will be expanded to include the following, as applicable:

1. EPA 8082 PCB’s

2. EPA 8081 Pesticides

3. EPA 8260 VOCs

4. Additional constituents from Commissioner Policy CP-51 and the most recent Supplemental Soil Cleanup Objectives (SSCOs)

5. RCRA Characteristics including ignitability, corrosivity, reactivity, and Toxicity Characteristic Leaching Procedure (TCLP) for metals and

SVOCs. Additionally, TCLP VOCs, pesticides and herbicides, shall be analyzed as applicable.

B. Parameters analyzed for soils to be reused or disposed off-site shall be the RCRA Characteristics identified above at a minimum, in addition to any other parameters required by the reuse or disposal facility.

C. Unless otherwise specified in the Detailed Specification or required by the reuse or disposal facility, the sampling frequency, based on anticipated soil excavation volumes in cubic yards (CY) shall be as follows:

1. 0-500 CY: 1 composite sample, 2 discrete (VOC) samples
2. 501-1000 CY: 2 composite samples, 2 discrete (VOC) samples
3. 1001-10,000 CY: Add 1 composite sample, 2 discrete (VOC) samples for each additional 1000 CY
4. Greater than 10,001 CY: Add 1 composite sample, 2 discrete (VOC) samples for each additional 2,500 CY

D. Classification of soils for reuse or disposal shall be carried out by the Engineer.

E. Conduct testing in accordance with the Detailed Specifications and the approved FSP.

F. Field sampling shall be completed in ample time to prevent delay of the excavation work or the work of any other contractor.

END OF SECTION

SECTION 02222
Demolition and Removals

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to complete the demolition, removal, disposal and relocation Work.

B. Included, but not limited to, are demolition and removals of existing materials, structures, equipment, or work necessary to install the new Work, as shown and specified and to connect same with existing work in an approved manner. Demolition includes structural concrete, foundations, walls, doors, windows, structural steel, metals, roofs, masonry, attachments, appurtenances, piping, electrical and mechanical equipment, paving, curbs, walks, fencing, and similar existing facilities.

C. Demolitions and removals which may be specified under other Sections shall conform to requirements of this Section.

D. The Contractor shall obtain all required permits from the City and other agencies having jurisdiction.

E. The following index of this Section is presented for convenience:

1.02 PAYMENT

A. Unless otherwise provided in the Detailed Specifications, no separate payment will be made for performing any work required under this Section and the Contractor shall include all costs thereof in its lump sum price for the Contract.

1.03 RELATED SECTIONS

A. Section 02105 - Soil Sampling and Analysis

B. Section 02316 - Excavation

C. Section 02371 - Dust, Soil Erosion and Sedimentation Control.

1.04 REFERENCES

A. 29 CFR 1926 - Safety and Health Regulations for Construction (Subpart T - Demolition)

B. 29 CFR 1910 - Occupational Safety and Health Standards

C. ANSI/ASSE A10 - Construction and Demolition Safety Standards

D. AWS D12.1 - Reinforcing Steel Welding Code

E. New York City Department of Environmental Protection (NYCDEP)

1. Environmental Health and Safety Policies and Procedures – Vol. III. Control of Hazardous Energy Lock-Out/Tag-Out, or latest version

1.05 DESCRIPTION

A. Protection:

1. Demolition and removal Work shall be performed by competent workers experienced in the various types of demolition and removal Work required. The Work shall be carried through to completion with the prevention of damage to structures and the adjacent property and with due regard to the safety of City employees, work persons on the site, and the public. The Work will be performed so as not to interfere with the use of, and free and safe passage to and from, adjacent structures.

2. The Contractor shall provide, erect and maintain catch platforms, lights, barriers, weather protection, warning signs and other items as required for proper protection of the public, occupants of the building, work persons engaged in demolition operations, and adjacent construction.

3. The Contractor shall provide and maintain weather protection at exterior openings so as to fully protect the interior premises against damage from the elements until such openings are closed by new construction.

4. The Contractor shall provide and maintain temporary protection of the existing structure designated to remain where demolition, removal and construction work is being done, connections made, materials handled or equipment moved. The Contractor shall be responsible for any damage to the existing structure or contents by reason of providing insufficient protection.

5. The Contractor shall take necessary precautions to control dust as required by Section 31 25 10 – Dust, Soil Erosion and Sediment Control. Dust shall be prevented from rising by wetting demolished masonry, concrete, plaster and similar debris. All portions of the existing buildings affected by the operations under this Section shall be protected by dustproof partitions and other adequate means.

6. The Contractor shall monitor the atmosphere inside the aeration tanks, in particular for the presence of hazardous gases, in accordance with the requirements of this Contract and all applicable laws and regulations.

7. The Contractor shall provide adequate fire protection in accordance with local Fire Department requirements.

8. The Contractor shall carry out all operations so as to avoid interference with operations and work in the existing facilities and the work under other contracts.

9. The Contractor shall be solely responsible for making all necessary arrangements and for performing all necessary work involving the discontinuance or interruption of all utilities or services.

10. Any equipment, piping and appurtenances removed without proper authorization, and that are necessary for the operations of the existing or expanded facilities, shall immediately be replaced to the satisfaction of the Engineer at no cost to the City.

11. Closing or obstructing of roadways, sidewalks, and passageways adjacent to the work by the placement or storage of materials will not be permitted, and all operations shall be conducted with minimum interference to traffic.

12. The Contractor shall repair damage caused by its operations to existing structures and equipment to remain, or to any property belonging to the City or its employees.

13. The Work shall comply with 29 CFR Part 1926 -- Safety and Health Regulations for Construction, applicable provisions and recommendations of ANSI/ASSE A10 -- Construction and Demolition Safety Standards, New York City Construction Code, New York City Electrical Code, all other governing codes and rules, and as specified herein or shown in the Contract Documents.

14. The Contractor shall make such investigations, explorations and probes as are necessary to ascertain any required protective measures before proceeding with demolition and removal.

15. Demolition and removal of hazardous materials shall be in accordance with applicable federal, State and Local regulations.

B. Permits: Obtain all permits from all appropriate regulatory agencies required for closing or obstructing streets and sidewalks. Obtain all air permits as required for demolition of any building or structure located in New York City including a Demolition Permit from the Department of Buildings and a DEP Registration for Demolition from the Department of Environmental Protection, Bureau of Environmental Compliance.

C. Condition of Buildings, Structures and Equipment:

1. The City does not assume responsibility for the actual condition of buildings, structures and equipment to be demolished and removed.

2. Conditions existing at the time of inspection for bidding purposes will be maintained by the City so far as practicable. However, there is no guarantee by the City that the number of fixtures, amount of equipment or any other material of value existing at bidding time in the buildings and structures to be demolished will be present in the structures when they are demolished. The Contractor shall have no claim against the City because of the absence of such fixtures and materials.

3. The conditions of existing structures and equipment shown on the Contract Documents is based on visual inspection and a walk-through survey only. Neither the Engineer nor the City will be responsible for interpretations or conclusions drawn therefrom by Contractor.

D. Scheduling: The Contractor shall carry out operations so as to avoid interference with City's operations and work in the existing facilities.

E. Notification: At least 48 hours prior to commencement of a demolition or removal, Contractor shall notify the Engineer in writing of his proposed schedule. City will inspect the existing equipment or facilities and review with the Contractor those items which are to remain the property of the City. No removals shall be started without the permission of the Engineer.

F. Coordination: The Contractor shall coordinate all electrical shutdowns with the Engineer and the Plant’s Responsible Individual as defined in the DEP Policies and Procedures. The Contractor shall confirm all equipment is de-energized, and install required lock-out and tag-out devices on electrical equipment to prevent accidental re-energizing of the equipment.

G. PRE-DEMOLITION MEETING

1. The Contractor shall have a pre-demolition meeting with the Engineer and representatives of other related construction contracts, if any, in the presence of the Resident Engineer, to review all of the work areas that will be affected by the removal of materials from demolition.

1.06 QUALITY ASSURANCE

A. Not Used

1.07 SUBMITTALS

A. Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited to proposed methods, equipment and operating sequences to be used in performance of the demolition and removals work and handling of hazardous materials.

B. The Contractor shall demonstrate how coordination of operations and sequence for shut-off, capping, temporary services, continuation of utility services, and other applicable items will be provided to ensure no interruption of City's operations.

C. Sequence and Schedule: The Contractor shall submit a detailed schedule showing the sequence and duration of demolition activities.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Not Used

1.09 SPARE PARTS, SPECIAL TOOLS, AND SUPPLIES

A. Not Used

1.10 SPECIAL WARRANTY PROVISIONS / GUARANTEE PERIODS

A. Not Used

PART 2 PRODUCTS (NOT USED)

2.01 MANUFACTURERS

A. Not Used

2.02 MATERIALS / EQUIPMENT

A. Not Used

2.03 FABRICATION / ASSEMBLING / FINISHES

A. Not Used

2.04 SOURCE QUALITY CONTROL / SHOP TESTS

A. Not Used

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Not Used

3.02 IMPLEMENTATION

A. GENERAL

1. The Work required shall be done with care, and shall include all necessary shoring, bracing, and support to prevent movement, settlement, or collapse of existing structures or facilities. The Contractor shall be responsible for any damage caused by demolition and removal Work to any part or parts of existing structures or equipment designated for reuse or to remain. The Contractor shall perform patching, restoration and new work in accordance with applicable technical sections of the Specifications and in accordance with the details shown on the Contract Drawings.

2. Surfaces of walls, floors, ceilings, or other areas which are exposed by any of the removals specified herein, and which will remain as architecturally finished surfaces, which have holes, scars, chipped or other damaged surfaces revealed by the removal, shall be repaired by the Contractor with the same or matching materials as the existing surface or as may be otherwise approved by the Engineer.

3. Pollution Controls: Use water sprinkling, temporary enclosures, and other suitable methods to limit the amount of dust and dirt rising and scattering in the air to the lowest practical level. Comply with General Specification 02371 – Dust, Soil Erosion and Sedimentation Control and all governing regulations pertaining to environmental protection.

   a. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

   b. Clean adjacent structures, facilities, and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to conditions existing prior to the start of the work.

   c. The use of calcium chloride for dust control will not be allowed.

4. All supports, pedestals and anchors shall be removed with the equipment and piping unless otherwise specified or required. Concrete bases, anchor bolts and other supports shall be removed to approximately one inch below the surrounding finished area, and the recesses shall be patched to match the adjacent areas. Superstructure wall and roof openings shall be closed, and damaged surfaces shall be patched to match the adjacent areas, as specified under applicable sections of the Specifications, , as shown on the Contract Drawings, or as directed by the

Engineer. Wall sleeves and castings shall be plugged or blanked off, all openings in concrete shall be closed in a manner meeting the requirements of the appropriate sections of the Specifications, as shown on the Contract Drawings and as directed and approved by the Engineer.

5. Any materials or items designated to remain the property of the City shall be removed with care and stored at locations designated by the City.

6. Where equipment is shown or specified to be removed and relocated, the Contractor shall not proceed with removal of this equipment without the prior approval of the Engineer. Upon approval, and prior to commencing removal operations, the equipment shall be operated in the presence of representatives of the Contractor, the City and the Engineer. Such items shall be removed with care, under the supervision of the trade responsible for reinstallation, and shall be protected and stored until required. Material or equipment damaged during removal shall be replaced with similar new material or equipment. Any equipment that is removed without proper authorization and is required for plant operation shall be replaced at no cost to the City.

7. Wherever piping is to be removed for disposal, the Contractor shall drain the piping and adjacent pipe and headers that are to remain in service shall be blanked off or plugged and then anchored in an approved manner.

8. Where alterations occur, or new and old work join, the Contractor shall cut, remove, patch, repair or refinish the adjacent surfaces to the extent required by the construction conditions, so as to leave the altered work in as good a condition as existed prior to the start of the work. The materials and workmanship employed in the alterations shall be of the same quality as required for new work of the same type.

9. The Contractor shall confine cutting of existing roof areas designated to remain to the limits required for the proper installation of the Work. The Contractor shall cut and remove insulation and weather protection, and provide temporary weathertight protection as required until new roofing and flashings are installed.

10. The Contractor shall remove enclosures, signs, guards, and the like when no longer required or when directed by the Engineer at the completion of the Work.

11. The Contractor shall dispose of all demolition materials, equipment debris, and all other items not marked or specified by the City or the Engineer to remain as property of the City, off site and in conformance with the requirements of the Contract and all existing applicable laws and regulations.

12. Building Demolition:

    a. Unless otherwise approved by the Engineer, proceed with demolition from the top of the structure to the ground. Complete demolition work above each floor or tier before disturbing supporting members of lower levels.

    b. Demolish concrete and masonry in small sections.

    c. Remove structural framing members and lower to ground by means of hoists, derricks, or other suitable methods.

    d. Break up and remove foundations and slabs-on-grade, unless otherwise shown to remain.

    e. Locate equipment used for demolition work, and remove demolished materials, so as not to impose excessive loads on supporting walls, floors or framing.

    f. Regrade in accordance with General Specification 02316 - Excavation.

13. The Contractor shall de-energize and disconnect electrical service to all structures and equipment prior to demolition or relocation. No demolition activity shall commence prior to electrical disconnection.

14. All construction and demolition debris that has come in contact with regulated solid waste shall be cleaned to the satisfaction of the Engineer before leaving the site.

15. The use of explosives is not permitted.

16. Dust Control: The Contractor is responsible for controlling visible dust caused by demolition activities. Dust control shall be provided as described in General Specifications 02371 – Dust, Soil Erosion and Sedimentation Control.

B. STRUCTURAL REMOVALS

1. The Contractor shall remove concrete, structures and sub-structures to the lines and grades shown unless otherwise directed by the Engineer. The removal of masonry beyond these limits shall be at the Contractor's expense and these excess removals shall be reconstructed to the satisfaction of the Engineer with no additional compensation to the Contractor.

2. Determine the thickness of existing concrete to be removed and the extent to which it is reinforced. No additional compensation will be made because of variations from the thickness shown or for variations in the amount of reinforcement.

3. All concrete, stone, masonry, roofing materials, reinforcement, structural or miscellaneous metals, plaster, wire mesh and other items contained in or upon the structure shall be removed and taken from the site and disposed of at a permitted facility. Demolished items shall not be used in backfill.

4. After removal of parts or all of masonry walls, slabs and like work which tie into new work or existing work, the point of junction shall be neatly repaired so as to leave only finished edges and finished surfaces exposed.

C. MECHANICAL REMOVALS

1. Mechanical removals shall consist of dismantling and removing existing pipes, pumps, motors and other facilities as specified, shown, or required for the completion of the work. It shall include cutting, capping, draining, and plugging as required, except that the cutting of existing piping for the purpose of making connections thereto will be included under Division 15 of the Detailed Specifications.

2. Existing process, water, chemical, and other piping shall be removed where shown on the Contract Drawings. All removed piping shall be removed to the nearest solid support, capped and left in place. Piping shall be purged and made safe by the Contractor prior to removal or capping. Disposal of any chemicals or other purged material in accordance with the requirements of Detailed Specification 01355 -- Hazardous Materials Control and other applicable environmental, health, and safety (EHS) requirements of the Contract shall be the responsibility of the Contractor. Where piping that is to be removed passes through existing walls, it shall be cut off and properly capped on each side of the wall.

3. When underground piping is to be altered or removed, the remaining piping shall be properly capped. Abandoned underground piping may be left in place unless it interferes with new work or is shown or specified to be removed.

4. Any required demolition or changes to potable water piping and other plumbing system work shall be made in conformance with all applicable codes. Portions of the potable water system that may have been altered or opened shall be pressure tested and disinfected in accordance with the Detailed Specifications for Division 15 and local codes. Other plumbing piping and heating piping shall be pressure tested only.

5. Provide all caps, plugs, blind flanges, shut-off valves and other work and materials required to remove from service existing piping and necessary to keep existing piping in service where shown or required.

D. PAVEMENT, CURB AND SIDEWALK REMOVALS

1. Remove existing pavement, including base and surface courses, stabilized sub-bases, curbs, and gutters as required to construct new facilities or as shown. Before removing, saw a straight joint at least 1-1/2-inches deep between sidewalk and pavement designated for removal and that left in place. Curbs and gutters shall be removed to the nearest construction joint beyond the limit of demolition shown on the Drawings.

2. Provide for satisfactory transition between replaced pavement and sidewalks and the portions remaining in place.

E. ELECTRICAL REMOVALS

1. Electrical removals shall consist of the removal of existing generators, transformers, distribution switchboards, control panels, motors, conduits and wires, and miscellaneous electrical equipment all as shown, specified, or required to perform the work.

2. All existing electrical equipment and fixtures to be removed shall be removed with such care as may be required to prevent unnecessary damage to keep existing systems in operation and maintain the integrity of the grounding systems.

3. Distribution switchboards shall be removed or modified as shown. Switchboards to be removed shall be disconnected and dismantled, and all components shall be disposed of off the site. Circuit breakers and other control equipment on modified switchboards that will no longer be used shall be removed unless otherwise shown or specified. All new openings cut into the modified switchboard panels shall be cut square and dressed smooth to the dimensions required for the installation of the new equipment.

4. Motors shall be disconnected and removed where shown or specified. Motors not marked or designated by the City or the Engineer to be salvaged shall be removed from the site. Motors or other electrical gear designated for reuse shall be stored in enclosed, heated storage.

5. Conduits and wires shall be abandoned or removed where shown. All wires in abandoned conduits shall be removed, salvaged, turned over to the City and stored where directed by the Engineer. Abandoned conduits concealed in floor or ceiling slabs, or in walls, shall be cut flush with the slab or wall at the point of entrance. The conduits shall be suitably plugged and the area repaired in a flush, smooth, approved manner. Exposed conduits and their supports shall be disassembled and removed from the site. Repair all areas of work to prevent rust spots on exposed surfaces.

6. The Contractor shall coordinate all electrical shutdowns with the Engineer and the facility's Responsible Individual as defined in the DEP Policies and Procedures. The Contractor shall confirm all equipment is de-energized, and install required lock-out and tag-out devices on electrical equipment to prevent accidental re-energizing of the equipment.

F. MISCELLANEOUS REMOVALS

1. Contractor shall remove miscellaneous items where shown on the Drawings or where necessary for the construction of new structures or modification of existing structures. Anchor bolts shall be cut back one inch below the concrete surface and the hole patched.

G. MODIFICATIONS AND CLOSURES

1. Modifications shall conform to all applicable Specifications, the Drawings, and the directions and approvals of the Engineer.

2. Where alterations require cutting or drilling into existing floors, walls, and roofs, the holes shall be repaired in an approved manner. Contractor shall repair such openings with the same or matching materials as the existing floor, wall, or roof, or as otherwise approved by the Engineer. All repairs shall be smoothly finished unless otherwise approved by the Engineer.

3. Openings in existing concrete slabs, ceilings, roofs, masonry walls, floors and partitions which are not to be used in the new work shall be closed and sealed as shown or otherwise directed by the Engineer.

4. Where parts of existing structures are to remain in service, demolish the portions to be removed, repair damage, and leave the structure in proper condition for the intended use. Remove concrete and masonry to the lines designated by drilling, chipping, and other suitable methods. Leave the resulting surfaces true and even, with sharp straight corners that will result in neat joints with new construction or be satisfactory for the purpose intended. Where existing reinforcing rods are to extend into new construction, remove the concrete so that the reinforcing is clean and undamaged. Cut off other reinforcing flush with the surface.

5. New work shall be keyed into the existing in an acceptable manner. New reinforcing steel shall be welded to the existing reinforcing. Welding shall conform to AWS D12.1, Reinforcing Steel Welding Code. In general, the same or matching materials as the existing adjacent surface shall be used. The finished closure shall be a smooth, tight, sealed, permanent closure with all exposed surfaces smooth finished and acceptable to the Engineer.

H. MAINTENANCE AND CLEAN UP

1. Contractor shall maintain the buildings, structures, and other City properties free from accumulations of waste, debris, and rubbish caused by the demolition and removal operations.
2. Contractor shall provide on-site dump containers for collection of waste materials, debris and rubbish, and shall wet down dry materials to prevent blowing dust.
3. At reasonable intervals during the progress of the demolition and removal work or as directed by the Engineer, the Contractor shall clean the Site and properties and dispose of all waste materials in accordance with the applicable regulations and requirements of this Contract.

3.03 FIELD TESTING / QUALITY CONTROL

A. Not Used

3.04 STARTUP / DEMONSTRATION

A. Not Used

3.05 ADJUSTING / PROTECTION / CLEANUP

A. Not Used

END OF SECTION

SECTION 02230
Site Clearing

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall provide all labor, tools, equipment, materials and incidental items required to perform site clearing of all designated areas within the Contract limits and as shown on the Contract Drawings, including work specified in permits and other agreements, in accordance with the requirements of the Contract Documents

B. The Contractor shall develop and implement an Emerald Ash Borer (EAB) Management Plan that provides for compliance with the latest EAB Quarantine Order(s), as applicable to the location of work. Work includes, but is not limited to, the performance of a site survey by an appropriately qualified professional when the site is located in an EAB Quarantine Zone, and written protocol for the management of EAB Regulated Articles.

C. The Contractor shall develop and implement an Asian Longhorned Beetle (ALB) Management Plan that provides for compliance with 7 CFR 301.51 and NYCRR Title 1 Part 139, as applicable to the location of work. Work includes, but is not limited to, the performance of a site survey by an appropriately qualified professional when the site is located in an ALB Quarantine Zone, and written protocol for the management of ALB Regulated Articles.

D. The following index of this Section is included for convenience:

1.02 PAYMENT

A. Unless otherwise provided in the Detailed Specifications, no separate payment will be made for performing any work required under this Section and the Contractor shall include all costs thereof in its lump sum price bid for the Contract.

1.03 RELATED SECTIONS

A.	General Specification 02316	--	Excavation
B.	General Specification 02317	--	Backfilling
C.	General Specification 02371	--	Dust, Soil Erosion and Sedimentation Control
D.	General Specification 02910	--	Planting
E.	General Specification 02920	--	Soil Mixes

1.04 REFERENCES

A. Federal regulations, 7 CFR 301.51- Asian Longhorned Beetle

B. NYCRR Title 1 Part 139 – Control of the Asian Long Horned Beetle

C. NYCRR Title 1 Part 141 – Control of the Emerald Ash Borer

D. Federal regulations, 7 CFR 301.53 – Emerald Ash Borer

1.05 DEFINITIONS & EXPLANATIONS

A. Asian Longhorned Beetle (ALB): The insect known as the Asian Longhorned Beetle (Anoplophora glabripennis) in any stage of development.

B. ALB Compliance Agreement: A written agreement between United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) and a person engaged in growing, handling, or moving regulated articles that are moved within an ALB Quarantine Zone, in which the person agrees to comply with the provisions of 7 CFR 301.51.

C. ALB Limited Permit: A document in which a USDA APHIS inspector affirms that the ALB Regulated Article is eligible for movement only to a specified destination and in accordance with conditions specified on the permit.

D. ALB Regulated Article: The term applies to: (1) Firewood (all hardwood species), and green lumber and other material living, dead, cut or fallen, inclusive of nursery stock, logs, stumps, roots, branches, and

debris of half an inch or more in diameter of the following genera: Acer (maple), Aesculus (horse chestnut), Albizia (mimosa), Betula (birch), Celtis (hackberry), Cercidiphyllum (katsura), Fraxinus (ash), Platanus (sycamore), Populus (poplar), Salix (willow), Sorbus (mountain ash), and Ulmus (elm); (2) Any other article, product, or means of conveyance not covered in (1) of this definition if a USDA APHIS inspector determines that it presents a risk of spreading Asian Longhorned Beetle and notifies the person in possession of the article, product, or means of conveyance that it is subject to the restrictions of 7 CFR 301.51. This definition is subject to change and should be verified by consulting 7 CFR 301.51 prior to the start of work.

E. Caliper: An instrument used to measure the diameter of a tree.

F. Clearing: Clearing is the removal from the ground surface within the designated areas and disposal of trees, brush, shrubs, down timber, decayed wood, other vegetation, rubbish, trash, scrap metal, debris and miscellaneous other structures not covered under other Sections as shown on the Contract Drawings, specified or otherwise required to permit construction of the new Work.

G. Emerald Ash Borer (EAB): The insect known as the Emerald Ash Borer in any stage of development.

H. EAB Compliance Agreement: An approved document, executed by persons or firms, covering the restricted movement, processing, handling or utilization of regulated articles not eligible for certification for intrastate movement. USDA APHIS controls the issuance of EAB Compliance Agreements for movement of regulated articles interstate. For movement of regulated articles intrastate, New York State Department of Agriculture and Markets (NYSDAM) controls the issuance of EAB Compliance Agreements.

I. EAB Regulated Article: The term applies to: (1) entire ash trees of any size, inclusive of nursery stock; (2) any part of ash trees, including leaves, bark, stumps, limbs, branches, and roots (i.e., living, dead, cut or fallen); (3) ash lumber or ash logs of any length; (4) any item made from or containing ash wood; (5) any article, product or means of conveyance determined by the USDA APHIS, NYSDAM or New York State Department of Environmental Conservation (NYSDEC) to present risk of spreading the EAB infestation; (6) firewood from any tree species; and, (7) wood chips and bark mulch from any tree species, larger than 1 inch in two dimensions, whether composted or uncomposted. This definition is subject to change. The relevant EAB Quarantine Order should be consulted for the current definition.

J. Grubbing: Grubbing is the removal and disposal of all stumps, buried logs, roots larger than 2 inches, matted roots and organic materials.

1.06 QUALITY ASSURANCE

A. Codes and Standards: State and local laws and code requirements shall govern the hauling and disposal of trees, shrubs, stumps, roots, rubbish, debris and other matter.

B. The Contractor or subcontractor responsible for work of any kind affecting EAB Regulated Articles within the Emerald Ash Borer Quarantine Zone must have EAB First Detectors training as certified by Cornell Cooperative Extension, or an approved equal. Work includes, but is not limited to planting trees, transplanting trees, pruning trees, fertilizing trees, removing trees and stumps, and clearing and grubbing trees or roots.

C. The Contractor or subcontractor responsible for work of any kind affecting ALB Regulated Articles within the Asian Longhorned Beetle Quarantine Zone must have an ALB Compliance Agreement. Work includes, but is not limited to planting trees, transplanting trees, pruning trees, fertilizing trees, removing trees and stumps, and clearing and grubbing trees or roots.

1.07 PROJECT/SITE CONDITIONS

A. Streets, roads, adjacent property and other works and structures shall be protected throughout the entire project. Contractor shall return to original condition, satisfactory to the Engineer, facilities damaged by the Contractor's operations.

B. If the project site is in an Emerald Ash Borer Quarantine Zone established by the NYSDEC and NYSDAM, New York State prohibits the movement of regulated articles beyond the quarantined counties without an EAB Compliance Agreement.

C. If the project site is in an Asian Longhorned Beetle Quarantine Zone, USDA APHIS prohibits the movement of regulated articles beyond the quarantine zone without an ALB Compliance Agreement.

1.08 GUARANTEE

A. The Contractor shall guarantee that work performed under this Section will not permanently damage trees, shrubs, turf or plants designated to remain, or other adjacent work or facilities. If damage resulting from Contractor's operations appears during the period up to 12 months after completion of the project, he shall replace damaged items as directed by DEP at no expense to the City to the satisfaction of the DEP.

1.09 SUBMITTALS

A. Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Shop Drawings shall identify all trees designated for removal and those that shall remain and require protection, as directed by the Engineer.

B. Tree Protection Plan

1. The Contractor shall submit a Tree Protection Plan to the Engineer for approval prior to performing any work on trees or shrubs to be saved or in the vicinity of such trees and shrubs. The Plan must be approved prior to any such work being performed.

   a. The Plan shall be prepared in consultation with the Engineer.

      1) The Plan should include, but not necessarily be limited to, the location of temporary wooden tree guards, construction fence, temporary snow fence boundary, range fencing, micro tunneling, soil erosion and sediment control, hand and/or pneumatic excavation, soil compaction prevention and mitigation requirements, impact of trenching and/or cut and fill operations and pruning and fertilization schedule. Soil testing and fertilization schedule, as well as other applicable methods of tree protection shall be as required by General Specification 02920 - Soil Mixes and the Detailed Specifications.

      2) In addition, the Plan should address the Contractor's operations, including designated staging areas, site access and stockpiling of materials.

      3) Mandatory provisions of the Plan always include, but are not limited to, the following provisions:

         a) The Contractor shall not be permitted to park vehicles or equipment or to stockpile materials of any nature under the drip line of trees and shrubs in order to minimize surface and subsurface root damage and soil compaction. This directive shall apply to all areas within or outside the contract limit line.

C. Emerald Ash Borer Management Plan

1. Each Contractor responsible for site clearing and grubbing shall submit an EAB Management Plan to the Engineer for approval prior to removal of any trees or vegetation from the construction site. The Plan shall identify each work site and all transportation routes, haulers, processing and disposal facilities including full contact information. The Plan shall confirm whether any debris will be generated, transported, processed or disposed in an EAB Quarantine Zone. If the construction site, transportation routes, processing and disposal facilities are not within an EAB Quarantine Zone, no further details are required in the Plan.

2. If EAB Regulated Articles are generated at a site that is not located within an EAB Quarantine Zone, but the materials will be transported into or through a Quarantine Zone for processing or disposal, the Plan shall also include:

    a. A copy of the EAB Compliance Agreement for the transportation of EAB Regulated Articles into or through an EAB Quarantine Zone.

3. If the site is located within an EAB Quarantine Zone, the Plan shall also include the following:

    a. A description of the survey methods to identify any EAB infestation and EAB Regulated Articles. The survey shall be performed by a professional in possession of a Cornell Cooperative Extension EAB First Detectors Certificate, or an approved equal, and shall be performed after felling trees and prior to removing any EAB Regulated Articles from the site. Evidence of certification shall be provided in the Plan. The results of the survey shall be summarized in an EAB survey report and provided to the Engineer prior to removing any EAB Regulated Articles from the site.

    b. Provisions for notifying the Engineer and a NYSDAM horticultural inspector immediately upon the discovery of an EAB infestation. If an EAB infestation is confirmed by NYSDAM, the Contractor will be required to enter into an EAB Compliance Agreement. The EAB Compliance Agreement will dictate how the EAB and Regulated Articles must be managed and treated prior to removal from the site.

4. Unless the survey report specifically confirms the absence of ash trees (*Fraxinus* spp.), the Plan shall also include the following:

    a. Schedule for conducting activities affected by EAB Regulated Articles

    b. Identification and anticipated quantity of EAB Regulated Articles and proposed handling methods.

        1) If the EAB Regulated Articles are destined for a processing facility, the facility shall identify whether the materials will be recycled for resale or disposed

        2) If the EAB Regulated Articles are to be processed for resale by the Contractor, Subcontractor or processing facility, the Plan shall include a copy of the facility's EAB Compliance Agreement for handling Regulated Articles.

3) If the EAB Regulated Articles are to be transported out of the EAB Quarantine Zone, a copy of the Contractor's EAB Compliance Agreement for transporting Regulated Articles out of an EAB Quarantine Zone shall be included in the Plan.

c. Storage location for EAB Regulated Articles

d. Treatment methods if the Contractor elects to treat EAB Regulated Articles onsite such that they are no longer regulated. Onsite treatment requires that the responsible party be in possession of a Cornell Cooperative Extension EAB First Detectors Certificate, or an approved equal, and requires coordination with NYSDAM for inspection and verification. Evidence of the responsible party's certification shall be provided in the Plan.

e. Protocol for tracking the shipment of EAB Regulated Articles using a bill of lading or manifest that identifies the site, transporter, truck identification number and provides for signature upon receipt at the Processing or Disposal Facility. Payment of the removal of EAB Regulated Articles will not be made until signed copies of the bill of lading or manifest are provided to the Engineer.

D. EAB Survey Report

1. Each Contractor responsible for site clearing and grubbing within an EAB Quarantine Zone is required to have the site surveyed for the presence of EAB by a professional in possession of a Cornell Cooperative Extension EAB First Detectors Certificate, or an approved equal. The Contractor shall submit an EAB Survey Report to the Engineer within two weeks of survey completion. Regulated Articles may not be moved offsite without Engineer approval of the EAB Survey Report. The EAB Survey Report shall be signed by the certified professional and shall include documentation of the surveyor's credentials.

E. Asian Longhorned Beetle Management Plan

1. Each Contractor responsible for site clearing and grubbing shall submit an ALB Management Plan to the Engineer for approval prior to removal of any trees or vegetation from the construction site. The Plan shall identify each work site and all transportation routes, haulers, processing and disposal facilities including full contact information. The Plan shall confirm whether any debris will be generated, transported, processed or disposed in an ALB Quarantine Zone. If the construction site,

transportation routes, processing and disposal facilities are not within an ALB Quarantine Zone, no further details are required in the Plan.

2. If ALB Regulated Articles are generated at a site that is not located within an ALB Quarantine Zone, but the materials will be transported into or through a quarantine zone for processing or disposal, the Plan shall also include:

   a. For Interstate Movement - A copy of the ALB Limited Permit authorizing such movement or specific procedures for ensuring compliance with 7 CFR 301.51-4 which regulates the movement of Regulated Articles.

   b. For Intrastate Movement - Identification of the origin and destination of the regulated article in accordance with NYCRR Title 1 Part 139.

   c. A copy of the processing or disposal facility's ALB Compliance Agreement.

3. If the site is located within an ALB Quarantine Zone, the Plan shall also include the following:

   a. A copy of the Contractor's ALB Compliance Agreement with USDA APHIS.

   b. A description of the survey methods to identify any ALB infestation and ALB Regulated Articles. The survey shall be performed by a professional in possession of an ALB Compliance Agreement, and shall be performed prior to felling trees and removing any ALB Regulated Articles from the site. Evidence of the professional's ALB Compliance Agreement shall be provided in the Plan. The results of the survey shall be summarized in an ALB survey report and provided to the Engineer prior to removing any ALB Regulated Articles from the site.

   c. Provisions for notifying the Engineer and a USDA APHIS inspector immediately upon the discovery of an ALB infestation. If an ALB infestation is discovered, the Contractor shall stop all site clearing and grubbing until permission to resume work has been given in writing by a USDA APHIS Inspector. A copy of the permission to resume work shall be provided to the Engineer.

4. Unless the survey report specifically confirms the absence of Regulated Articles, the Plan shall also include the following:

   a. Schedule for conducting activities affected by ALB Regulated Articles

b. Identification and anticipated quantity of ALB Regulated Articles and proposed handling methods.

1) If the ALB Regulated Articles are destined for a processing facility, the facility shall be in possession of an ALB Compliance Agreement. The Plan shall include a copy of the facility's ALB Compliance Agreement for handling Regulated Articles.

2) If the ALB Regulated Articles are to be transported out of the ALB Quarantine Zone, a copy of the Contractor's ALB Compliance Agreement for transporting Regulated Articles out of an ALB Quarantine Zone shall be included in the Plan.

c. Storage location for ALB Regulated Articles

d. Treatment methods if the Contractor elects to treat ALB Regulated Articles onsite such that they are no longer regulated. Onsite treatment requires that the responsible party be in possession of an ALB Compliance Agreement and requires coordination with USDA APHIS or a professional in possession of an ALB Compliance Agreement with USDA APHIS for inspection and verification. A copy of the responsible party's ALB Compliance Agreement shall be provided in the Plan.

e. Protocol for tracking the shipment of ALB Regulated Articles using a bill of lading or manifest that identifies the site, transporter, truck identification number and provides for signature upon receipt at the processing or disposal facility. Payment of the removal of ALB Regulated Articles will not be made until signed copies of the bill of lading or manifest are provided to the Engineer.

F. ALB Survey Report

1. Each Contractor responsible for site clearing and grubbing within an ALB Quarantine Zone is required to have the site surveyed for the presence of ALB by a professional in possession of an ALB Compliance Agreement. The Contractor shall submit an ALB Survey Report to the Engineer within two weeks of survey completion. Regulated Articles may not be moved offsite without Engineer approval of the ALB Survey Report. The ALB Survey Report shall be signed by the professional and shall include a copy of the surveyor's ALB Compliance Agreement.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 TREES AND SHRUBS TO BE SAVED

A. Protection: The Contractor shall protect from defacement, injury and destruction all trees and shrubs within the construction site that are so delineated or are marked in the field to be saved. Trees, shrubs and grassed areas which are to remain shall be protected by fences, barricades, wrapping or other methods as shown on the Contract Drawings, specified or approved by the Engineer.

1. Within the limits of the area from the tree trunk up to 3 to 4 feet outside of the tree drip line, work shall be performed with extreme care using either hand tools or equipment that will not cause damage to trees.

   a. Do not disturb or cut roots unnecessarily. Do not cut roots 2 inches and larger unless approved.

   b. Immediately backfill around tree roots after completion of construction in the vicinity of trees.

   c. Do not operate any wheeled or tracked equipment within drip line.

2. Vegetation shall be protected from damage caused by emissions from engine-powered equipment.

3. During working operations, the trunk, foliage and root system of all trees to be saved shall be protected with boards or other guards placed as shown on the Contract Drawings and as required to prevent damage, injury and defacement.

   a. Excavated materials shall not be piled within the drip line or adjacent to the trunks of trees. Equipment, stockpiles, etc. shall not be permitted within the drip line.

   b. Do not allow runoff to accumulate around trunks of trees.

   c. Ropes, cables, or guy wires shall not be fastened or attached to trees without permission. When such permission is granted, protect the tree before making fastening or attachments by providing burlap wrapping and softwood cleats.

   d. The use of axes or climbing spurs for trimming will not be permitted.

   e. Provide climbing ropes during trimming.

4. When directed by the Engineer, shrubs to be saved shall be removed by taking a sufficient earth ball with the roots to maintain the shrub.

a. Temporarily replant, if required, and replace at the completion of construction in a condition equaling that which existed prior to removal.

b. Replace in kind if the transplant fails. Provide transplanting, planting, and watering and guarantee as specified in General Specification 02910 - Planting.

5. When directed by the Engineer, emergency repair to damaged trees and to trees which pose an imminent danger shall be performed within 24 hours.

6. Damage Assessment

a. Tree damage. For trees that are damaged during the course of construction, a monetary credit shall be taken. The monetary assessment shall be the difference between the tree's condition rating, as per the International Society of Arboriculture appraisal method, before and after the damage. The damage assessment shall be determined by the Engineer.

b. Tree Destruction. Any trees irreparably damaged during the course of construction, as determined by the Engineer shall be removed at the Contractor's sole expense. Restitution shall be made according to the Caliper Area Replacement formula, as determined by the Engineer. Restitution can be met by the Contractor through the following options:

1) Direct planting by the Contractor or its subcontractor of the required equivalent number of replacement trees at locations determined by the Engineer; or

2) A monetary credit for the value of the tree destroyed; or

3) A combination of (1) and (2) above, as determined by the Engineer. If the Contractor plants some replacement trees, a monetary credit shall be taken for the difference between the full value of the destroyed tree and the value of the number of replacement trees planted.

c. Tree Removal. Restitution for any prohibited tree removals shall be made according to the Caliper Area Replacement formula, with adjustments for tree condition as per the International Society of Arboriculture appraisal method, as determined by the Engineer.

3.02 REMOVAL OF TREES AND SHRUBS

A. Tree Removal within Property Limits:

1. Only those trees designated on the Contract Drawings for removal shall be removed.

2. Tree and shrub removal shall be conducted in a manner so as to avoid damage to those trees and shrubs which will remain.

3. Do not cut or damage trees or shrubs outside of the Contract limit lines. Damage outside the Contract limit lines caused by the Contractor's operations shall be corrected at the Contractor's expense.

4. The removal of trees with calipers 6 inches or less shall be included in the costs for the work of this Section. Payment for removal of trees greater than 6 inches shall be paid under individual unit price items specified in the Detailed Specifications using the following parameters:

   a. Over 6” to 12”

   b. Over 12” to 18”

   c. Over 18” to 24”

   d. Over 24”

5. All trees shall be calipered at four and one-half feet above existing grade prior to removal. All trees shall be "topped" and "limbed" previous to felling unless otherwise directed by the Engineer.

6. In areas of major construction, the stumps and roots of all trees designated for removal shall be grubbed and excavated to a depth of three (3) feet below the ground surface except in areas of fill greater than three (3) feet, where such trees may be cut flush with the ground surface.

3.03 CERTIFIED ARBORIST

A. All tree pruning, tree repair, and tree removal is to be performed by competent workers only, under the supervision of an arborist holding certification from the International Society of Arboriculture (ISA), or registered with the American Society of Consulting Arborists or equivalent education and experience.

3.04 EMERALD ASH BORER QUARANTINE ZONE

A. The EAB is a destructive wood boring insect that solely infests ash (*Fraxinus* spp.) trees and has killed tens of millions of trees across the US. EAB feed upon the cambium and phloem and kill a tree within two years. From a seedling to full grown trees, all parts of an ash tree are subject to infestation. In an effort to control the spread of EAB to other areas, quarantine orders have been imposed on a number of counties within New York State. A current

map of the geographic area included in the quarantine zones within New York State is available at the following website: http://www.dec.ny.gov/animals/47761.html.

B. Any Contractor and Subcontractor performing tree work of any kind within the EAB Quarantine Zone shall be in compliance with the relevant NYSDEC Quarantine Order. Tree work includes, but is not limited to planting trees, transplanting trees, pruning and fertilizing trees, removing trees and stumps, and clearing and grubbing trees or roots.

3.05 ASIAN LONGHORNED BEETLE QUARANTINE ZONE

A. The Asian Longhorned Beetle (ALB) is a destructive wood boring insect. It can cause serious damage to healthy trees by boring into their heartwood and eventually killing them. Nursery stock, logs, green lumber, firewood, stumps, roots, branches and debris of one-half (½") inch or more in diameter are subject to infestation. In an effort to control the spread of the beetle to other areas, a quarantine has been imposed by USDA APHIS on large portions of the City of New York as per Part 139 of Title 1 NYCRR.

B. Any Contractor or subcontractor performing tree work of any kind within the ALB Quarantine Zone must have an ALB Compliance Agreement, and will be held responsible for compliance with USDA APHIS. Tree work includes, but is not limited to planting trees, transplanting trees, pruning and fertilizing trees, removing trees and stumps, and clearing and grubbing trees or roots.

1. A current map of the geographic area included in the ALB Quarantine Zone within New York City is available at the following website: https://www.aphis.usda.gov/aphis/ourfocus/planthealth/plant-pest-and-disease-programs/pests-and-diseases/asian-longhorned-beetle/ct_alb_maps

2. Additional information is available at the following website: http://www.agriculture.ny.gov/PI/alb.html

3.06 CLEARING AND GRUBBING

A. Clearing: The Contractor shall clear all items specified to the Contract limit lines shown on the Contract Drawings and shall remove cleared and grubbed materials from the site to an authorized disposal site.

1. Do not start earthwork operations in areas where clearing and grubbing is not complete, except that stumps and large roots may be removed concurrent with excavation.

2. Comply with erosion, sediment control and storm management measures as specified in General Specification 02371 - Dust, Soil Erosion and Sedimentation Control.

B. Grubbing: The Contractor shall clear and grub areas to be excavated, areas receiving less than 3 feet of fill and areas upon which structures are to be constructed.

1. Stumps and root mats in these areas shall be removed to a depth of not less than 1 foot below the subgrade of sloped surfaces.

2. All depressions made by the removal of stumps or roots shall be filled with material suitable for backfill as specified in General Specification 02317 - Backfilling.

C. Limited Clearing: The Contractor shall clear areas receiving more than 3 feet of fill by cutting trees and shrubs as close as practical to the existing ground. Grubbing will not be required.

D. Disposal:

1. All disposals off-site shall be in complete accordance with rules and regulations of the authorities having jurisdiction.

2. Burning of cleared and grubbed materials is not allowed within the property limits.

E. Explosives shall not be used.

F. No cleared or grubbed material may be used in backfills or structural embankments.

G. Cleared and grubbed items shall be removed from the site and disposed of in accordance with the applicable regulations and requirements of this Contract.

H. Air pollution caused by dust and dirt shall be controlled, complying with governing regulations. Dust control shall be as specified in General Specification 02371 – Dust, Soil Erosion and Sedimentation Control.

3.07 STRIPPING TOPSOIL

A. The Contractor shall strip existing topsoil as described in General Specification 02316 - Excavation. Heavy growths of grass shall be removed from areas before stripping the topsoil.

END OF SECTION

SECTION 02240
Dewatering

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall furnish, install, operate and maintain dewatering equipment and systems as specified, shown on the Contract Drawings, or required during the Contract.

B. The Contractor shall provide standby equipment and power supply for maintaining uninterrupted construction dewatering.

C. The Contractor shall install groundwater monitoring wells/piezometers and measure, record and report the levels/hydraulic head of groundwater as required during the project.

D. The Contractor shall obtain and comply with all necessary permits from State and local agencies required for operation of the dewatering system, monitoring groundwater, and disposal of dewatering effluent.

E. The Contractor shall collect samples of the dewatering effluent as required by the applicable State and local permits and provide the services of a laboratory certified under the New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) for the analyses of the samples collected to determine the quality of dewatering effluent prior to disposal.

F. The following index of this Section is included for convenience:

1.02 PAYMENT

A. Unless otherwise provided in the Detailed Specifications, no separate payment will be made for performing any Work required under this Section and the Contractor shall include all costs thereof in its lump sum price bid for the Contract.

1.03 RELATED SECTIONS

A. General Specification 02105 - Soil Sampling and Analysis

B. General Specification 02316 - Excavation

C. General Specification 02371 - Dust, Soil Erosion and Sedimentation Control

1.04 REFERENCES

A. 6 NYCRR Part 750, State Pollutant Discharge Elimination System (SPDES) Permits

B. 6 NYCRR Part 601, Water Withdrawal Permitting, Reporting and Registration (Exclusive of Long Island Wells Regulated Under Part 602 of This Title)

C. 6 NYCRR Part 602, Applications for Long Island Wells

D. 6 NYCRR Part 621, Uniform Procedures

E. Water and Sewer Forms, New York City Department of Environmental Protection; (http://www.nyc.gov/html/dep/html/forms_and_permits/wsforms.shtml)

F. New York City Construction Code

G. ASTM standards applicable to piping, equipment and other items required for a complete dewatering system

1.05 DEFINITIONS

A. Construction Dewatering: Controlling groundwater levels, hydrostatic pressures and controlling surface water, such that excavation required on the Contract Drawings can be performed to required depths in substantially dry and stable conditions.

B. Dewatering System: System of wells, well points, sumps, ejectors, pumps, piping, power supply, effluent treatment equipment and other equipment

designed by the Contractor, submitted to and approved by the Engineer prior to dewatering, that will effectively dewater the site as required herein and as specified in the Detailed Specifications. Adequate monitoring wells/piezometers shall be included in the dewatering system to verify drawdown levels inside the excavation area and monitor groundwater levels outside the limits of the excavation near adjacent structures.

1.06 SUBMITTALS

A. The Contractor shall submit Shop Drawings and the following for the approval of the Engineer:

1. Pre-construction Submittals: A Dewatering Plan shall be submitted to the Engineer for approval, at least 30 calendar days prior to the scheduled date for commencement of the dewatering Work, and to the NYSDEC, as applicable. Approval of the Dewatering Plan by the Engineer or City shall not in any way relieve the Contractor from full responsibility for the complete and adequate design and performance of the dewatering system to provide the necessary construction dewatering. At a minimum, the Dewatering Plan shall include the following:

a. Design calculations confirming the adequacy of the proposed dewatering system, including depths to groundwater within the excavation limits.

b. Calculations and requisite technical data on well screens and filter materials and gradations to demonstrate the adequacy of proposed systems to prevent the pumping of fines.

c. Shop drawings showing the proposed types and planned locations of surface water control and the dewatering system to be used.

d. Shop drawings shall include the arrangements, locations and depths of the dewatering system, a complete description of equipment and materials to be used and the procedures to be followed in installation, operation and maintenance in relation to the proposed sequence of excavation, foundation construction and backfilling.

e. The standby equipment and standby power supply details.

f. The proposed locations and sizes of effluent treatment equipment, effluent flow equalization tanks and discharge of water.

g. Location and size of sumps, ditches and water discharge lines, including their relation to water disposal points.

h. Submittals shall also include discharge details, metering, and monitoring schedules and the details of the settling tank and oil/water separator.

i. Methods and equipment to be used for drilling, construction, and development of wells and piezometers.

j. Protocols to be followed for the sampling and analysis of dewatering effluent, and the name and qualifications of the laboratory that will be testing the quality of dewatering effluent prior to disposal.

k. Protocols to be followed for treatment of effluent in conformance with the requirements of the applicable permits.

2. As required in Section 02105 -- Soil Sampling and Analysis, the Contractor shall submit a completed EH&S Drilling and Boring Checklist for approval to the Engineer

3. As-built Submittals: Prior to the start of construction dewatering, submit as-built conditions of the dewatering system. As-built data are to include but are not limited to:

   a. Plans and sections showing as-built locations, and surveyed elevations of the dewatering system and its components.

   b. Drawings to indicate changes made to the original shop drawings to accommodate field conditions and to comply with design standards.

   c. Details of installation including dimensions and materials used, description and drawings of all installations, all procedures, soil strata encountered and logs with descriptions of soil samples and stratification.

   d. Details of each sump, well, well point, observation well, and piezometer installed, including, but not limited to, the diameters of the borehole and the components, screen type, screen opening size, screen top and bottom elevations, details of filter, seal and grout, pump type, and capacity if installed within. These details should be provided to the Engineer within a week of installation of each entity. The details shall be re-submitted if any part of the entity changes during construction.

   e. Details of abandoning each sump, well, well point, observation well, and piezometer after its use has been completed.

4. Regulatory Compliance: Prior to the start of construction dewatering, submit a report comparing site groundwater quality data with the water quality standards to be complied with under permit(s) as applicable to

the project or required in the Detailed Specifications. The permitting requirements to be considered under the Work of this section include, but may not be limited to:

a. NYCDEP Dewatering Permit for temporary groundwater discharge into the public sewers of the City.

1) Wastewater Quality Control Application and Letter of Approval, if applicable, from the Inspection & Permitting Section, Industrial Pollution Prevention (IPP) Program, Division of Pollution Control and Monitoring, Bureau of Wastewater Treatment (BWT).

2) Letter of Approval from the Division of Connection and Permitting, Bureau of Water & Sewer Operations (BWSO), if applicable.

3) NYC DEP Bureau of Customer Service Permit

b. NYSDEC SPDES Discharge Permit(s) - General or Individual Permits - for dewatering effluent or storm water discharges from construction activities at the project site.

c. Water Supply and Long Island Well Permits, if applicable, in association with construction dewatering.

d. The Contractor shall be responsible for compliance with all dewatering permit requirements including renewals once construction dewatering begins.

1.07 QUALITY ASSURANCE

A. The dewatering Work shall be performed by an entity specializing in and having experience installing and operating dewatering systems in similar subsurface conditions for at least 5 years.

B. Dewatering system shall be designed by a Professional Engineer registered in the State of New York having experience in designing a system in similar site conditions.

C. Well drillers shall be licensed in the State of New York.

1.08 DESIGN REQUIREMENTS

A. The Contractor shall design, install, operate, maintain and remove the dewatering system as necessary to:

1. Lower and maintain groundwater levels and hydrostatic pressures to 2 feet below the prevailing excavation level or to a point no higher than 2 feet above the top of an impermeable stratum, if the subgrade is in the impermeable stratum. Groundwater levels shall be lowered for a time

period as deemed necessary by the Engineer to ensure adequate factor of safety for the constructed structure.

2. Maintain stable slopes and subgrade.

3. Control and remove seepage and surface water into excavations.

4. Allow subsequent work to be safely performed and not result in damage to adjacent properties, buildings, structures, utilities and other work.

5. The Contractor shall provide primary and standby power, including all costs for installation, energy and fuel.

6. The Engineer will perform inspections and witnessing of:

   a. Testing of sand and silt from dewatering wells.

   b. Drawdown and performance testing of Dewatering System.

   c. Performance testing of standby power source and backup Dewatering System.

B. The method of dewatering and control of water both inside and outside the excavation shall be selected by the Contractor who shall be solely responsible for the location, arrangement and depth of any system(s) selected to accomplish the Work. The Contractor shall construct protective works as necessary to dewater, cut off porous zones of fill and direct the flow of water from whatever source away from the excavations and adjacent areas. Protective works shall include slurry methods, grouting, clay seepage plugs, toe drains with appropriate filters, deep wells, well points, sumps, dikes, ditches and all supporting features as required, but not specifically shown on the Contract Drawings.

1. The dewatering system shall be designed and implemented so as to maintain a minimum factor of safety against the uplift groundwater pressures in any soil strata. The factor of safety shall be calculated by considering the stabilizing pressure to consist of overburden soil weight alone. The dewatering system shall be maintained operational until the dead weight of the overburden soil plus any completed portion of the structure is able to provide the required factor of safety at static (normal) groundwater level / pressure.

1.09 REGULATORY REQUIREMENTS

A. The Contractor shall manage and dispose of all groundwater removed during dewatering activities in accordance with either New York State Pollutant Discharge Elimination System (SPDES) standards set by the New York State DEC for discharge to surface water, or New York City DEP Sewer Discharge Criteria for discharge to the City wastewater collection system. The Contractor shall acquire all necessary permits and/or applications for disposal of dewatering effluent.

B. For discharge to the City wastewater collection system, a comparison of the site groundwater quality data (before and after any treatment proposed by the Contractor) with the NYCDEP Limitations for Effluent to Sanitary or Combined Sewers (latest version issued by the Division of Pollution Control and Monitoring, Bureau of Wastewater Treatment) shall be required prior to and during effluent discharge.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment used in the dewatering system shall adhere to accepted industry standards and be in good operating condition and able to perform satisfactorily over the required duration of construction dewatering.

B. Back up equipment for the dewatering system shall be identical to the primary equipment and shall be available in operating condition at all times.

C. Pipes and well screens shall consist of Schedule 40 PVC or stronger.

D. Sand shall consist of clean, single-size filter sand of adequate gradation.

E. Grout shall consist of cement-bentonite grout of adequate mix proportion and consistency. Seals shall consist of bentonite pellets.

F. Pumps, meters, hoses and controls shall be suitable for the intended purpose and application.

G. Power supply and effluent discharge are included in this Work.

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. Construction dewatering is required to protect foundation subgrades and to maintain dry and stable conditions for construction. The Contractor shall maintain a continuous and completely effective Dewatering System for the required time as specified in General Specification 02316 -- Excavation.

B. The Contractor shall contact the NYSDEC to obtain SPDES permit(s), if necessary, sufficiently in advance of dewatering system startup. The Contractor shall also keep the SPDES permits active by applying for and following up on the applications for modifying or renewing the permits, if necessary, during the period of performance.

C. The Contractor shall coordinate the operation of the dewatering system with any other Work.

D. The Contractor shall be prepared to modify the dewatering system and methods as required by actual field conditions encountered during construction, at no additional cost to the City. Any component of the dewatering system that

malfunctions or is damaged during its operation shall be promptly repaired or replaced by the Contractor at no additional cost to the City.

E. The Contractor shall measure water levels periodically in observation wells / piezometers installed adjacent to nearby structures to ensure drawdown outside the excavation is within permissible limits specified in the Detailed Specifications.

F. Surface areas adjacent to the excavation shall be graded and/or curbed to prevent flow of surface water into the excavation.

G. The Contractor shall install observation wells / piezometers and monitor groundwater lowering at nearby structures due to construction dewatering. Any damage caused to nearby structures due to construction dewatering shall be repaired by the Contractor at no cost to the City.

3.02 TESTING

A. The Contractor is responsible for monitoring dewatering efforts to determine if the Contract and related permit requirements are being met. The Contractor shall provide observation wells and other means to monitor the dewatering as detailed in the Dewatering Plan.

B. The Contractor shall determine the presence of contaminants in dewatering effluent, including the quantity of fines in the pumped water, by sampling and analyzing in accordance with permit requirements, or once every two weeks, whichever is more frequent.

C. The fines content should be measured in each sump, well or well point being pumped. The permissible maximum fines content is 5 parts per million (ppm) as measured by the Rossum Sand Content tester. If the fines content is exceeded, the Contractor shall modify or re-install the well or wellpoint to satisfy the requirements.

3.03 INSTALLATION AND OPERATION

A. The dewatering system shall provide for an uninterrupted flow of pumped water and shall be maintained and pumped as necessary to drawdown and maintain the groundwater levels as specified. Unless otherwise specified, pumping shall maintain those depressed levels until the permanent under drainage system has been installed, tested, accepted and is operational or until the permanent structure, or a portion thereof, is capable of withstanding hydrostatic pressures as determined by the Engineer.

B. The Contractor shall furnish, operate and maintain sufficient drainage and pumping facilities to dewater the site and its underlying soil. Dewatering operations shall operate in such a manner so that the excavation can proceed while maintaining stable slopes and the designed lateral support for the perimeter support of excavation walls, without disturbing the bearing subgrades for the structure and provide stable conditions. The ground water level as

measured in observation wells shall be lowered and maintained at least two feet below the prevailing excavation level, or it shall be lowered to a point no higher than 2 feet above the top of impermeable stratum if the subgrade is in the impermeable stratum.

C. The dewatering system shall be installed and operated in such a manner as to avoid the movement of fines or loss of ground below the bearing level and shall not influence the stability of surrounding areas. Well points and deep wells shall be properly sanded in and sumps shall be sheeted and provided with proper filter material.

D. A sufficient number of observation wells shall be installed and water levels monitored by the Contractor, at least weekly, to demonstrate that the goals of the Dewatering System are being met. If applicable, the Contractor may make use of existing observation wells as shown on the Contract Drawings.

E. Open pumping with sumps and ditches resulting in boils, loss of fines, softening of the ground or instability of slopes will not be permitted.

F. Any sign of subgrade disturbance due to seepage or unaccountable reduction in effluent flow rate shall be immediately reported to the Engineer and steps immediately taken to correct the condition.

G. All wells and piezometers shall be abandoned at the completion of the work, except as directed by the Engineer, in accordance with NYSDEC guidelines.

3.04 SURFACE WATER

A. Surface water on and around the site shall be collected into local sumps by means of trenches, pipes, or other means. The Contractor shall discharge the water into the City wastewater collection system. Direct surface water to minimize surface erosion, ponding and softening of slopes and berms, including haul roads and equipment working stations. Slope protection by means of polyethylene sheets, held in place by tires or otherwise, shall be provided locally as required. At the perimeter of the excavation, surface water is to be directed into the storm sewer system and not permitted to enter the excavation. Curbs shall be maintained and, where necessary, extended across intersections, curb cuts and defective curb sections. Surface cracks in the adjacent streets are to be sealed and re-sealed as necessary. Should adjacent settlement occur during the work, curbs shall be raised or water-tight mounds shall be installed as directed by the Engineer to prevent flow into the site. Measures for preventing the pollution of and discharging storm water shall be in accordance with General Specification 02371 -- Dust, Soil Erosion and Sedimentation Control.

1. If surface water flows to a point across a potentially contaminated surface (e.g., contaminated or hazardous soils) or otherwise unsuitable/impermeable surface (e.g., mud mat), removal of said water

via pumping to storm sewers shall require the appropriate dewatering permits from the NYSDEC or NYCDEP Bureau of Water and Sewer Operations (BWSO) Division of Permitting and Connections. The Contractor shall obtain all necessary permits in a timely manner so as not to delay the Work.

3.05 PRETREATMENT OF DEWATERING EFFLUENT

A. The Contractor shall provide appropriately sized settling tanks to collect and store dewatering effluent commensurate with dewatering discharge rates to allow for settlement of suspended solids and sampling as required by disposal/discharge criteria. The tanks shall be equipped with an overflow collection system to prevent accidental release of dewatering effluent. Routine inspection of the tanks shall be carried out daily to ensure that tank integrity is being maintained, and that all valves or tank openings are properly locked out to avoid accidental discharge. Settling tanks shall be cleaned frequently to prevent excess deposition of solids which could overflow from the tank. Removed solids shall be classified and disposed of in accordance with the requirements of General Specification 02105 - Soil Sampling and Analysis. Transportation and Disposal including waste manifests shall be in accordance with General Specification 02316 - Excavation.

1. The settling tank shall be concrete or steel as manufactured by Rockford, Belvidere, IL or an approved equal, and sized based upon the maximum groundwater flow times a 1.5 safety factor.

B. The Contractor shall provide appropriately sized oil/water separators to prevent discharge of hydrocarbons, grease and other floatable materials to surface water or the sewer system. Oil/water separators shall be cleaned frequently and collected materials classified and disposed of in accordance with General Specifications 02105 - Soil Sampling and Analysis and 02316 - Excavation requirements for manifests and material transport and disposal.

1. The oil/water separator shall be concrete or steel as manufactured by Rockford, Belvidere, IL or an approved equal, and sized based upon the maximum groundwater flow times a 1.5 safety factor.

C. The Contractor shall provide treatment for, or remove from the site to an approved disposal facility, all dewatering effluent or groundwater which exceeds any limit set for surface water or sewer discharge, whichever is applicable. Classification and disposal shall conform to General Specifications 02105 - Soil Sampling and Analysis and 02316 - Excavation requirements for manifests and material transport and disposal. .

3.06 DISPOSAL OF DEWATERING EFFLUENT

A. Dewatering effluent may be affected by rainfall. The Contractor shall provide adequate equalization and holding tanks to allow work to proceed in the case of restricted discharge capability during rain events.

B. The Contractor shall provide sufficient clean water to flush all sewers and drains when necessary. If any sewer, drain, catch basin, or inlet becomes filled or partially filled with sediment or debris, the Contractor shall promptly and satisfactorily remove such deposits.

C. The Contractor shall collect dewatering effluent samples as required by the permits and the Dewatering Plan. If pretreatment, other than oil/water separators and settling tanks, is required, the Contractor shall continue to collect effluent samples during dewatering operations, and analyze for all listed parameters at intervals based on dewatering discharge volume as a verification of discharge compliance. Intervals will be as defined in the Dewatering Plan. A copy of all analytical results shall be submitted to the Engineer for review and approval, no later than one day after receipt of such data. The Contractor shall provide for prompt sampling and turn-around times so as not to delay the project, but in no case shall turn-around time be longer than 5 calendar days.

D. The Contractor shall obtain and pay for all permits, applications and licenses required by law that are associated with the disposal of dewatering effluent, including NYSDEC SPDES Permit, if applicable.

E. The Contractor shall select and supply Personal Protective Equipment (PPE) in accordance with the Contractor's Site Health and Safety Plan.

F. Unless otherwise required in the Detailed Specifications, all wells shall be abandoned in place and all other portions of the dewatering system shall be removed by the Contractor after completion of dewatering activities and in accordance with NYSDEC requirements.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02316
Excavation

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This Section describes excavation work and reuse or disposal of all material as specified herein, shown on the Contract Drawings or required by the Engineer, for any purpose pertinent to the construction of the Work.

B. Excavation Work includes stripping and stockpiling of topsoil; sheeting and bracing; excavation over the site; excavation for roads, pipelines and structures; removal and control of water in and around excavations; segregation and stockpiling of excavated material; disposal of unsuitable material and excess excavated material; reuse of suitable material; and trimming, shaping and grading of excavations.

C. The following index of this Section is included for convenience:

1.02 PAYMENT

A. Unless otherwise provided in the Detailed Specifications, no separate payment will be made for performing any Work required under this Section and the Contractor shall include all costs thereof in its lump sum price bid for the Contract.

1.03 RELATED SECTIONS

A.	General Specification 02105	-	Soil Sampling and Analysis
B.	General Specification 02230	-	Site Clearing
C.	General Specification 02240	-	Dewatering
D.	General Specification 02317	-	Backfilling
E.	General Specification 02318		Rock Excavation
F.	General Specification 02371 Control	-	Dust, Soil Erosion and Sedimentation
G.	General Specification 02821	-	Metal Fence
H.	General Specification 02920	-	Soil Mixes
I.	General Specification 05120	-	Structural Steel

1.04 REFERENCES

A. ASTM D1557 - Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3)

B. Occupational Safety and Health Administration (OSHA); OSHA 1926 Subpart P-Excavations

C. U.S. Department of Labor (DOL)

D. Industrial Board of Appeals, N.Y.S. Department of Labor, Part 23 Protection in Construction, Demolition and Excavation Operations latest editions

E. New York City Rules and Regulations (RCNY)

F. New York State Department of Transportation (NYSDOT)

G. New York City Department of Transportation (NYCDOT)

H. New York State Department of Environmental Conservation (NYSDEC)

I. U.S. Department of Transportation, Federal Highway Administration

J. U.S. Environmental Protection Agency (EPA)

K. New York City Building Code

1.05 DEFINITIONS

A. Suitable Material - any material whose composition is satisfactory for use as fill. Any mineral (inorganic) soil, blasted or broken rock and similar materials of natural or man-made (i.e. recycled) origin, including mixtures thereof, are considered suitable materials. Determinations of whether a specific natural material is suitable shall be made by the Engineer on the above basis.

1. Recycled materials that the Engineer has evaluated and approved for general use shall be considered to be suitable material subject to the conditions for use as determined by the City. In general, the use of recycled materials must be sanctioned by NYSDEC, usually in the form of a Beneficial Use Determination (BUD). See definition below.

B. Unsuitable Materials – any material containing vegetable or organic matter such as muck, peat, organic silt, topsoil or sod, that is not satisfactory for the use as fill material. Certain man-made deposits of industrial waste, or contaminated materials may also be determined to be unsuitable materials.

C. Pre-Determined Beneficial Use Determination (BUD) – NYSDEC allows soil to be reused on site under a Pre-Determined BUD under the following conditions: 6NYCRR 360.1.15(b)(7) uncontaminated soil which has been excavated as part of a construction project, and which is being used as a fill material, in place of soil native to the site of disposition; 360.1.15(b)(8) non-hazardous, contaminated soil which has been excavated as part of a construction project, other than a NYSDEC-approved or undertaken inactive hazardous waste disposal site remediation program, and which is used as backfill for the same excavation or excavations containing similar contaminants at the same site. Excess materials on these projects are subject to the requirements of Part 360. No *de minimus* quantity of solid waste or historic fill is allowed when reusing soils under both 360.1.15(b)(7) and 360.1.15(b)(8), with the exception of reuse in the same excavation. Refer to General Specification 02105 – Soil Sampling and Analysis, Article 1.06 for sampling requirements for uncontaminated soil and non-hazardous, contaminated soil, and Article 3.01 for a list of parameters to be analyzed for soils to be reused on-site, or soils to be reused or disposed off-site.

D. Excavated Material: All material regardless of its nature, except rock or boulders that have been excavated. The requirements for excavation of rock and boulders are set forth in General Specification 02318 - Rock Excavation.

E. Topsoil: Topsoil shall consist of natural loam, free from subsoil, obtained from an area which has never been stripped. Topsoil is friable clay loam surface soil found in a depth of not less than 4 inches, and is substantially free of subsoil, clay lumps, stones, and other objects over 2 inches in diameter, and without weeds, roots, and other objectionable material. Topsoil shall be as further defined under General Specification 02920 - Soil Mixes. Topsoil meeting this

definition and General Specification 02920 – Soil Mixes shall be considered suitable for use on-site.

F. Backfill: Material to be excavated and proposed for reuse as backfill must meet the solid waste cessation requirements of 6NYCRR 360.1.15(b) for a Pre-Determined BUD or 6 NYCRR 360.1.15(d) for a Case-Specific BUD. Backfill shall be non-hazardous and shall meet the requirements of General Specification 02317 – Backfilling.

G. Case-Specific Beneficial Use Determination (BUD) – Under 6 NYCRR 360.1.15 (d), NYSDEC sets forth the requirements for petitioning NYSDEC to obtain a Case-Specific BUD, and the criteria for reviewing, granting, or denying of the BUD. For reuse of a solid waste to be determined a beneficial use, the petition must demonstrate the following:

1. The use will not adversely affect human health and safety, the environment, or natural resources.
2. The solid waste is an effective substitute for a commercial product or can be used beneficially in the manufacture of a commercial product.
3. The essential nature of the use constitutes a legitimate reuse and not disposal.

1.06 DESIGN REQUIREMENTS

A. In designing the sheeting, take note of the minimum load diagram requirements of the Department, shown in the Attachments A and B at the end of this Section, unless otherwise shown on the Contract Drawings or in the Detailed Specifications. However, when it is anticipated that heavier crane or equipment loads will fall within the influence line of the excavation, increase design loads accordingly.

1.07 SUBMITTALS

A. Sheeting and Bracing: Before commencing any excavating operations, submit for approval Shop Drawings of all sheeting and bracing, cofferdams, bridging, decking, soldier beams and lagging, and other temporary or permanent supporting structures. Shoring and underpinning submittals shall be as required by General Specification 02250 – Shoring and Underpinning.

1. Shop Drawings shall show types of materials, dimensions and details of the entire bracing system, including wale splices and corner connections, stressing/jacking methods, reaction systems, posting and rebracing, if necessary.
2. Provide plans, details and procedures for jacking-in preload at struts.
3. For sheeting and shoring not shown on the Contract drawings submit engineering calculations and design assumptions for determination of loads and stresses acting in the wall and lateral supports during

installation, as well as final conditions. Show locations at which the temporary or permanent supporting structures will be used. The proposed design shall take into account the excavation procedures, dewatering operations, surcharge loading, soil properties, material stresses, temperatures, permanent construction, stages of work and all other conditions which could affect the excavation support system and the permanent structure. These drawings and calculations shall be prepared and stamped by a Professional Engineer licensed in the State of New York.

B. Soil Excavation, Reuse, Transport and Disposal Plan (SERTD Plan): Submit a SERTD Plan to the Engineer for approval at least 30 calendar days prior to the start of excavation. The SERTD Plan shall include two protocols: the Excavation Protocol and the Reuse, Transport and Disposal Protocol.

1. The Excavation Protocol shall include, but not be limited to, the following:

   a. Limits of excavation

   b. Excavation methods

   c. Protection methods:

      1) Sheeting and bracing

      2) Fencing, bridging and decking

2. The Reuse, Transport and Disposal Protocol shall address the following waste classifications defined in General Specification 02105 – Soil Sampling and Analysis: hazardous solid waste; non-hazardous contaminated waste (e.g., historic fill, urban, industrial waste, etc.); non-hazardous petroleum-contaminated waste; construction and demolition (C&D) debris; and non-regulated solid waste (e.g., uncontaminated soil reused for fill material, topsoil destined for reuse). The Protocol shall include the following:

   a. Details on proposed reuse on-site or off-site.

      1) Identities of BUD site(s) with copy (ies) of their regulatory approvals, as applicable. Unless otherwise reused under a Pre-Determined BUD, details shall include all supporting back-up information sent to and received from NYSDEC or other applicable out-of-state agency. See General Specification 02105 - Soil Sampling and Analysis for on-site reuse criteria.

      2) As applicable, each BUD site or disposal facility's requirements for sampling, including analytical

parameters, frequencies, protocols, and minimum detection limits.

b. Transportation details.

1) Identities of waste transporters, supporting NYSDEC Part 364 Waste Transporter Permit(s) and other out-of-state transporter permits required to transport the wastes to the TSD facilities (TSDFs).

c. Disposal details.

1) Identities of disposal facilities solicited including names and locations, insurance certificate, permit documentation including the types of materials allowed and not allowed, and chemical and physical material acceptance criteria. If no concentrations are indicated, then the facility must indicate the types of material that it is allowed to accept under its permit. Treatment, storage, or disposal (TSD) of any waste generated by excavation work shall be at a facility permitted to accept such waste by an authorized state or local government agency, or the EPA, as applicable.

d. Provisions for submittals for DEP signature as generator. The Contractor shall provide waste profiles, facility letters of acceptance of DEP waste, advance copies of waste manifest(s), and Land Disposal Restriction (LDR) Notification and Certification Form (if hazardous waste) for the Engineer's review and approval and DEP signature as generator.

3. The SERTD Plan shall be coordinated with the Field Sampling Plan (FSP) and reuse site, waste disposal facility selection and materials acceptance requirements specified in Detailed Specification 02105 – Soil Sampling and Analysis, as applicable.

4. The SERTD Plan shall be prepared in accordance with all applicable Federal, State and local hauling and disposal codes and regulations.

5. Reuse of excavation spoils either on or off-site must be prioritized over disposal. Disposal facilities shall only be approved where reuse options are not available.

C. Manifest Requirements and Submittals: Manifests shall include measurements of the volume of all excavated material to be removed from the site prior to transporting to an approved beneficial use site or disposal facility. The Contractor shall also prepare all vehicles and manifests necessary for transporting all material. Non-hazardous waste shall be manifested in a fashion similar to that for hazardous waste. The Contractor shall comply with all

Federal, State and local regulations regarding the transport of hazardous and non-hazardous waste.

1. Applicable Regulations: All Work that concerns the transport of hazardous and non-hazardous waste shall comply with the appropriate EPA and NYSDEC regulations and DOT hazardous material transportation regulations.

2. EPA Hazardous Waste Manifest: The Contractor shall obtain an appropriate number of hazardous waste manifest forms (EPA Form 8700-22 (Rev. 3-05) or latest version), sequentially numbered for this Contract based on the quantity of hazardous waste to be removed from site. The name of the generator, transporter and disposal facility, and their appropriate EPA identification number, shall be typed on each form. All other pertinent information shall be included on the manifest. A copy of the partially completed manifest including the above information shall be submitted for approval at least 3 weeks prior to commencement of excavation.

    a. Routing: The Contractor shall provide a map and written description of the route which will be taken to the approved treatment, storage or disposal facility by the hazardous waste transporter.

3. Non-hazardous Waste Manifest/Bill of Lading: Manifests/Bills of Lading shall be provided for each truckload of non-hazardous material (i.e., non-hazardous contaminated soil, uncontaminated soil, etc.) removed from the site. The form of the Manifest/Bill of Lading shall be approved by the Engineer. Non-hazardous waste shall be transported in accordance with all applicable Local, State and Federal DOT regulations by properly licensed and permitted waste haulers. Uncontaminated soil shall be removed by a properly licensed hauler.

    a. Routing: The Contractor shall provide a map and written description of the route which will be taken to the approved treatment, storage or disposal facility by the non-hazardous waste transporter.

4. The Contractor shall submit written evidence that selected TSDFs have accepted or will accept the wastes generated during excavation. The Contractor shall also submit copies of the completed manifest, signed and dated by the initial transporter, in accordance with Federal and State requirements and with associated documentation (e.g., Waste Profile and Hazardous Waste LDR Notification and Certification Form). Copies of completed and signed waste manifests from TSDFs shall be provided to the Engineer within seven (7) days of waste shipment off-site.

1.08 REGULATORY REQUIREMENTS

A. General: Before proceeding with any excavation, obtain all necessary permits required by City Departments having jurisdiction and consents from owners of private property where their interests may be affected by the Work, such as for temporary or permanent occupation, for disposal or storage of materials, or other encroachment except where temporary easements may have been obtained by the City in connection with permanent easements or otherwise.

B. Excavation operations and related work shall be performed in strict compliance with the applicable sections of OSHA 1926 Subpart P-Excavations, New York City Department of Buildings Regulations and N.Y.S. Department of Labor, Industrial Board of Appeals, Part 23 Protection in Construction, Demolition and Excavation Operations latest editions.

C. In the period of 2 to 10 days prior to starting excavation, notify all utilities of intended work locations and have utility locations marked. In NYC, location, the New York City Long Island One Call Center (800-272-4480) is available for this use. Upstate locations are served by Dig Safely NY (800 962-7962 or 811).

1.09 CERTIFICATION OF LABORATORY SERVICES

A. For certification of Laboratory Services see General Specification 02105-Soil Sampling and Analysis.

1.10 SITE CONDITIONS

A. Actual Conditions: Perform any geotechnical investigations deemed necessary to determine actual site conditions. Geotechnical data reports, if they are available, will be described in the Detailed Specifications.

B. Underground Utilities: Locate and identify all existing underground utilities prior to the commencement of work.

1.11 SPECIAL REQUIREMENTS

A. Dust, Soil Erosion and Sedimentation Control: The Contractor's operations shall conform to the requirements of General Specification 02371 - Dust, Soil Erosion and Sedimentation Control.

PART 2 PRODUCTS

2.01 GENERAL

A. Steel for struts, braces, and whalers shall meet the requirements of General Specification 05120 – Structural Steel and the Contract Drawings.

PART 3 EXECUTION

3.01 GENERAL

A. No excavation Work below the water table shall begin before the Dewatering Plan is approved, as specified in General Specification 02240 - Dewatering.

B. Clearing and Grubbing: Clear and grub the site of all open cut excavations and all areas shown on the Contract Drawings and specified. The Contractor shall comply with the requirements of General Specification 02230 - Site Clearing.

C. Stripping: Completely strip all topsoil and earth containing roots away from areas which have been cleared and grubbed. Topsoil which is determined by the Engineer to be suitable for future reuse by the City shall be stripped separately and stockpiled at locations on the site as directed by the Engineer. Topsoil to be reused on-site shall comply with the requirements of General Specification 02920 – Soil Mixes. Topsoil to be reused on-site or off-site may require testing to meet the requirements for a NYSDEC Pre-Determined or Case-Specific BUD, or applicable out-of-state agency requirements for a Case-Specific BUD. For further discussion on topsoil reuse refer to General Specification 02105 – Soil Sampling and Analysis and General Specification 02317 – Backfilling.

D. Sheeting and Bracing: The Contractor shall provide all labor, equipment, materials and incidental items and services necessary to perform sheeting and bracing as indicated on the Contract Drawings and specified herein and in the Detailed Specifications. Sheeting and bracing shall include but not limited to:

1. Furnish, install, preload and maintain a system of wales, struts, kickers and bracing appurtenances to shore portions of the earth support walls as shown on the Contract Drawings.

2. After support is provided, including installation of base slabs, unload and remove wales, struts, kickers and bracing as required.

3. The arrangement, construction, testing and maintenance of the lateral bracing system shall be the responsibility of the Contractor.

E. Structure Excavation:

1. Excavations shall be of sufficient size to permit the Work to be safely and properly constructed in the manner and of the size specified, except where limits of excavation are provided on the Contract Drawings. The bottom of the excavation in earth and rock shall have the shape and dimensions of the underside of the structure with allowance for the concrete work mat or compacted aggregate base layer.

2. Exercise care to prevent disturbing or loosening of the soil in the excavation. Densify the bearing surface for all structures with an approved type vibratory compactor to 95 percent of the maximum dry density obtainable by ASTM D1557 before the construction of any

foundations. Where the depth of disturbed or loosened soils is greater than 12 inches or; as determined by the Engineer, that it will require special compaction; the Contractor shall propose the appropriate method of compaction and submit to the Engineer for approval. All disturbed or loosened soils as determined by the Engineer that should be removed shall be replaced in accordance with the requirements of Paragraph 3.01J "Unauthorized Excavation".

3. Whenever abandoned existing piles are encountered during excavation, they shall be cut off at least 18 inches below the bottom of new footings, unless otherwise indicated on the Contract Drawings, and shall not be pulled.

F. Site Excavation: Excavate over the site within the limits of site grading to conform to finished site grades. Arrange the excavation work to permit continuous surface drainage off the site, eliminate low spots and surface ponding, and prevent runoff from flowing into the surrounding areas.

G. Protection of Plants and Structures: Before starting excavation, clear away all obstructions which are to be removed or relocated. Properly brace and protect trees, shrubs, poles and other structures which are to be preserved. Comply with the requirements of General Specification 02230 - Site Clearing.

H. Trench Excavation:

1. Maintain the minimum trench width adequate to place, joint and backfill the pipe or conduit properly. The clear width of the trench at the level of the top of the pipe shall not exceed the sum of the outside diameter of the pipe barrel plus 20 inches for pipe 4 through 24 inches in diameter nor the outside diameter of the pipe barrel plus 2 feet for pipe more than 24 inches in diameter, unless otherwise approved by the Engineer. The banks of pipe trenches shall be as near to vertical as practicable.

2. Length of Excavation: Make excavation for the sewers, drains, ducts, conduits or pipe lines only a reasonable distance in advance of pipe laying, at the discretion of the Engineer, and as may be indicated by the supply of materials on hand.

3. In sheeted trenches, measure the clear width of the trench at the level of the top of the pipe to the inside of the sheeting.

   a. Pipes placed in trenches wider than specified above shall be provided with concrete cradle or encasement as directed by the Engineer. No separate payment will be made for such cradles or encasement.

   b. Do not overexcavate the bottom of the trenches. The bottom of trenches shall be graded accurately to provide uniform bearing and support for each section of the pipe on undisturbed soil at

every point along its entire length (except for the portions of the pipe sections where it is necessary to excavate for bell hole, for the proper sealing of pipe joints, and as hereinafter specified).

c. Dig bell holes and depressions for joints after the trench bottom has been graded. In order that the pipe rests on the prepared bottom for as nearly its full length as practicable, make bell holes and depressions only of such length, depth, and width as required for properly making the particular type of joint. Remove stones as necessary to avoid point bearing. Except as hereinafter specified for wet or otherwise unstable material, backfill overdepths with materials specified for backfilling the lower portion of trenches. Whenever wet or otherwise unstable material that is incapable of properly supporting the pipe is encountered in the bottom of the trench, over excavate such material (a minimum of 2 feet below pipe) to a depth to allow for construction of stable pipe bedding. Backfill the trench to the proper grade with suitable approved materials as per General Specification 02317 – Backfilling.

d. If unstable material is exposed at the level of the bottom of the trench excavation, it shall be excavated in accordance with Paragraph 3.01I "Authorized Additional Excavation". When the Engineer judges that the unstable material extends to an excessive depth, he may advise the Contractor, in writing, to stabilize the trench bottom with additional select fill or pipe bedding material or to ensure firm support for the pipe or electrical duct by other suitable methods. Payment for such trench stabilization will be made as described for "Authorized Additional Excavation."

e. The open, excavated trench preceding the pipe laying operation and the unfilled trench with pipe in place shall be kept to a minimum length, causing the least possible disturbance. Means of egress shall be located so as to require no more than 25 feet of lateral travel by employees. Ladders shall extend a minimum of 36 inches above the top of the sheeting or be tied down with a grabrail provided.

f. No water shall be allowed to rise in the trench excavation until sufficient backfill has been placed to prevent pipe flotation.

I. Authorized Additional Excavation: In case the materials encountered at the elevations shown on the Contract Drawings are not suitable, or in case it is found desirable or necessary to go to an additional depth or to an additional depth and width, carry the excavation to such additional depth and width as the Engineer may direct in writing. Refill such excavated space with either 2,500

psi concrete or compacted select fill materials, as ordered. Where necessary, compact fill materials to avoid future settlement. Use select fill materials meeting the requirements of General Specification 02317 - Backfilling and compact to attain a minimum degree of compaction of 95 percent of the maximum dry density as determined by ASTM D1557. Place backfill in lifts not exceeding 9 inches in loose thickness.

J. Unauthorized Excavation: Wherever the excavation is carried beyond or below the lines and grades shown on the Contract Drawings or given by the Engineer, except as specified in Paragraph 3.01I "Authorized Additional Excavation", refill all such excavated space with such material and in such a manner as may be directed by the Engineer to insure the stability of the various structures. Areas excavated beneath all manholes, structures, pipelines or conduits without authority shall be refilled by the Contractor at his own expense with 2,500 psi concrete or compacted select fill material and properly compacted as ordered by the Engineer.

K. Explosives: Do not use explosives for any clearing, grubbing or excavation work as per General Specification 02230 – Site Clearing.

3.02 LINES AND GRADES

A. General: Excavate for sewers, drains, conduits, pipe lines, walls, foundations, footings, and other structures, including any excavating indicated on the Contract Drawings or necessary, to the lines and grades shown on the Contract Drawings, specified or required.

B. Demolition: Cut pavements, curbs and sidewalks with non-impact tools or other equipment approved by the Engineer. Breaking of pavements, curbs and sidewalks by impact, such as with the use of a ball, is not permitted. When removing sections next to sections that are to remain, sawcut the full depth of the concrete and asphalt.

C. Adequate Space: Do all trimming, grading and other incidental work to the grades and slopes shown on the Contract Drawings, specified or required as approved by the Engineer. Perform all excavations of sufficient size for the proper execution and inspection of the work. Keep excavation in good condition at all times and fill all voids which may endanger existing structures to the satisfaction of the Engineer.

3.03 SUBGRADE CONSOLIDATION

A. Consolidating Suitable Materials: Materials used in the bottom of excavation to replace boggy and other yielding or unsuitable materials, for providing solid and firm foundations for the structures to be built thereon, where approved in writing, may be either select fill or lean concrete.

3.04 FROST PREVENTION

A. Protection shall be provided against the penetration of frost into material below the bearing level during work in the winter months. This protection shall consist of a temporary blanket of straw or salt hay covered with a plastic membrane or other approved means.

3.05 SEGREGATION, STORAGE AND DISPOSAL OF MATERIALS

A. Segregating: All unsuitable material which may be excavated by the Contractor shall be kept separated from suitable excavated material which may be reused on-site or off-site under a NYSDEC Pre-Determined or Case-Specific BUD or other applicable out-of-state agency's Case-Specific BUD, or disposed off-site. Unsuitable material shall be sampled and analyzed in accordance with the requirements of General Specification 02105-Soil Sampling and Analysis. Removal and disposal of hazardous waste and non-hazardous waste shall be as described in the approved Soil Excavation, Transport and Disposal Plan.

B. Stockpiling:

1. Excavated material to be used for backfilling on-site under the NYSDEC Pre-Determined or Case-Specific BUD shall be so piled and placed as not to encumber sidewalks or roadways, or wash away or obstruct the free flow of surface or drainage water. Excavated material shall not be placed closer to the edge of an excavation than a distance equal to 1-1/2 times the depth of the excavation, unless the excavation is in rock or the sides of the excavation have been sloped or sheeted and shored to withstand the lateral forces imposed by such superimposed loads.

2. Stockpile cover and liner material and installation requirements should be as specified in General Specification 02371 – Dust, Soil Erosion and Sedimentation Control.

C. Excess Materials: The Contractor shall make arrangements for transportation and reuse of the soil on-site or off-site under a NYSDEC Pre-Determined or Case-Specific BUD, or applicable out-of-state agency's Case-Specific BUD. If reuse is not an option, only then may the Contractor dispose of excess materials.

3.06 SHEETING AND BRACING

A. General: All excavations shall be excavated with vertical sides and properly sheeted and braced for the full depth of the excavations, unless otherwise shown on the Contract Drawings, specified or ordered in writing by the Engineer. All excavation shall be shored and braced in accordance with 29 CFR 1926 Subsection P requirements and New York City Department of Buildings regulations.

B. Pilot cuts for excavations shall not exceed five feet in depth and shall be made with equipment approved by the Engineer. The equipment to be used and the

method to be employed in starting the sheeting operation shall be submitted for approval and must be approved in writing by the Engineer before the start of work.

C. Exception: Excavation for structures or pipe lines five feet in depth or less need not be sheeted and braced except where excavation is in close proximity to existing footings or conduits and where unsupported sides may be unstable.

D. Design and install sheeting and bracing in excavations for pipe lines so that at no time shall sheeting be braced or blocked against the sides of pipe or conduit. Do not drive sheeting for pipelines below the elevation of the bottom of the pipe. If it is necessary to drive the sheeting below that elevation in order to obtain a dry trench or satisfactory working conditions, cut off the sheeting and leave in place below the top of the pipe at no additional cost to the City.

1. Contractor shall design and provide additional and supplemental sheeting and bracing as needed to perform the excavation.

2. Adjust field locations of wales, rakers, struts and braces as required and approved by the Engineer to avoid interference with new work and provide sufficient bearing. Block between wales and sheets with steel shims immediately after installing braces.

3. Struts shall be wedged, posted and tied to form a stiff support. Rakers and struts to be preloaded shall be jacked to the loads shown on the Contract Drawings. Rakers and struts shall be preloaded in the presence of the Engineer.

4. Provide web stiffeners, plates or angles as needed to prevent rotation, crimping or buckling of connections and points of bearing between structural steel members and/or jacks occasioned by eccentricities caused by field fabrication, assembly or conditions.

5. Protect bracing members from damage by construction equipment and other causes. Repair any damage promptly and erect temporary barriers to secure area of damage, as required.

E. Where permitted or ordered in writing by the Engineer, slope the sides of the excavation to elevations approved by the Engineer and excavate below such elevations with vertical sides, properly sheeted and braced. Side slopes must be stable. Banks more than 5 feet high shall be shored and sloped to the angle of repose in accordance with current OSHA standards to furnish safe working conditions, to prevent shifting of material, to prevent damage to structures or other work and to avoid delay to the work, all in compliance with U.S. Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 and under Contract Work Hours and Safety Standards Act, as amended. The minimum shoring, sheeting and bracing for trench excavations shall meet the general

trenching requirements of the applicable safety and health regulations. However, in no case shall the sides of trench excavations for pipe or conduit be sloped to elevations lower than two feet above the top of the pipe or conduit.

F. Removal of sheeting:

1. When the sheeting and bracing for the vertical sides of such trench excavations is not required to be left in place, such sheeting and bracing shall be removed, and backfill shall be placed and compacted to an elevation at least 1'-6" above the top of the pipe or conduit. Any exception to this requirement will be specified in the Detailed Specifications or shown on the Contract Drawings.

2. Where sheeting and bracing is removed, it shall be done as the excavation is refilled in a manner to avoid the caving in of the bank or disturbance to adjacent areas or structures, except as otherwise shown on the Contract Drawings or directed. Carefully fill voids left by the withdrawal of the sheeting by ramming or otherwise as directed by the Engineer.

3. Obtain permission of the Engineer before the removal of any shoring, sheeting or bracing. Such permission by the Engineer shall not relieve the Contractor of responsibility for injury to structures or to other property or persons resulting from failure to leave such sheeting and bracing in place.

4. Load from rakers, struts and corner braces shall be released in a controlled fashion by cutting kickers and removing wedges and shims, as approved by the Engineer.

G. Credit: Sheeting and bracing required to be provided by the Contract Drawings or the Sections and subsequently allowed or ordered in writing by the Engineer to be omitted shall be subject to suitable credit to the City. Measurement of sheeting and bracing limits subject to suitable credit shall extend from the subgrade to within 18 inches of the ground surface in the case of vertical sides, regardless of stages; and shall extend from the subgrade to 12 inches above the junction of the vertical and sloping sides in the case of excavations with sloped sides above and vertical sides below. Sheeting and bracing indicated to be omitted on the Contract Drawings or in the Detailed Specifications will not be subject to credit.

H. Width: The width of trenches, between inner faces of sheeting or rock, as the case may be, shall not exceed the width of the structure to be installed by more than three feet. Where two or more stages of sheeting are used, the width of trench shall not exceed the width of structure by three feet at the lowest stage of sheeting to a point two feet above the top of pipe or conduit.

I. In cases where sheeting and bracing will not adequately protect adjacent structures from damage and settlement, the Contractor shall employ other methods, such as underpinning. He shall hold the City harmless from all claims for damage arising from failure to adequately protect all structures. He will be presumed to have fully examined and inspected the buildings before estimating the costs and hazards involved.

J. If, in the opinion of the Engineer, any of the approved temporary or permanent supporting structures are inadequate or unsuitable for the actual conditions in the field, the Engineer may direct the Contractor to strengthen the supporting structures at no additional cost to the City. The Contractor shall be responsible for the sufficiency of all temporary and permanent supporting structures whether or not directed by the Engineer to strengthen them.

3.07 SHEETING AND BRACING LEFT IN PLACE

A. All sheeting and bracing in excavations for sewer pipelines, including manholes and chambers, shall be left in place except where otherwise shown on the Contract Drawings, specified or ordered in writing by the Engineer. Sheeting left in place shall be cut off at the elevation shown on the Contract Drawings, or at least 18 inches below final grade. Bracing remaining in place shall be driven up tight.

B. Where it is necessary to remove cross braces to make way for sewer pipe, manholes, and chambers, rebrace the sheeting in a manner approved by the Engineer, but in no case shall sheeting be braced against the sides of pipe or structures, unless approved in writing by the Engineer.

C. Leave sheeting and bracing in place in excavations for structures other than pipe lines where shown on the Contract Drawings, specified or ordered in writing by the Engineer to be left in place. Where such sheeting is to be left in place, the original braces shall not be removed and the sheeting shall be rebraced against the structure unless it is approved by the Engineer.

D. Sheeting and bracing to be left in place shall include all elements of the sheeting and bracing regardless of the type used, except such braces required to be removed to make way for the structure or pipeline being constructed. Where lagging and "soldier" beams are used, the "soldier" beams shall also be left in place.

E. In excavations with vertical sides for the full depth, cut off sheeting left in place at the elevations provided in writing by the Engineer, but in general, such cutoffs shall not be less than 18 inches below the existing ground surface. In excavations with sloped sides above and vertical sides below, cut off sheeting at the top of the vertical sides of the excavation. Cut off timber sheeting by sawing, and steel sheeting or "soldier" beams by burning. Breaking off sheeting will not be permitted.

F. Do not remove sheeting and bracing not shown on the Contract Drawings or specified to be left in place without first obtaining a statement in writing from the Engineer that such sheeting may be removed.

G. No separate payment will be made for sheeting and bracing left in place, the cost thereof shall be included in the price or prices bid for the work under this Contract, except when separate payment for sheeting and bracing ordered in writing by the Engineer to be left in place is provided for in the Detailed Specifications.

3.08 REMOVAL OF WATER

A. Conform to the requirements of General Specifications 02240 - Dewatering and 02371 - Dust, Soil Erosion and Sedimentation Control.

B. Care of Water: At all times during the Work, including final inspection, provide and maintain ample means and suitable equipment with which to promptly remove and properly dispose of all water entering excavations or other parts of the Work. Keep all excavations dry at all times until the structures to be built therein are completed and backfilled to approximately final grades except where otherwise approved by the Engineer in writing. Do not permit sewage from existing sewers and house connections to flow into excavations.

C. To prevent flotation or uplift of the structure or portions of the structure under construction, provide approved dewatering or freezing methods which shall operate under supervision 24 hours per day, including holidays and weekends. Maintain this dewatering or other system in continuous operation until the structure or portions of the structure are substantially completed to a gravity load 10 percent greater than the upward load caused by the ground water uplift pressure measured and computed from the original ground water level. Place backfill and mechanically compact it to approximately final grade after the structure has achieved the required strength, except where otherwise approved by the Engineer in writing. In addition, provide and have available at the work site suitable standby equipment for prompt replacement during breakdowns of operating equipment.

D. The dewatering system shall be maintained in operation as required in Section 02240 – Dewatering.

E. Obtain written approval from the Engineer before discontinuing the dewatering or other groundwater control system.

F. Where water or sewage has accumulated or is flowing in the completed or partly completed structures, remove and dispose of such water or sewage during the time covered by the Contract, unless otherwise directed by the Engineer.

G. The Contractor shall take care of all sewer drainage interfered with by his operations to the satisfaction of the Engineer. Drainage into trench excavations is expressly prohibited.

3.09 FENCING, BRIDGING AND DECKING

A. All excavations or openings made under this Contract in any public street, park or place, or in any adjoining property, shall be immediately enclosed by a guard fence constructed in a neat and workmanlike manner in accordance with the requirements of General Specification 02821-Metal Fence. Where a tight board fence is specified, no guard fence will be required, provided there is no delay in the erection of the tight board fence.

B. Wherever a driveway occurs, construct a bridge of adequate strength and width and provide with side railings to span the excavation.

C. Wherever the distance between available crossings over the excavation is, in the opinion of the Engineer, excessive, he may order a temporary foot bridge with side rails to be constructed.

D. At all street intersections, excavations made from the surface shall be decked over in a substantial manner so that traffic can be maintained at all times except as herein provided for. The removal of the pavement and the placing of the decking shall be done during the hours of a day or night which will cause the least inconvenience to adjoining property owners and to public traffic in general. During certain designated hours of the day or night, sections of planking not more than ten feet in length may be temporarily removed for the purpose of removing excavated material, receiving materials of construction or for backfilling.

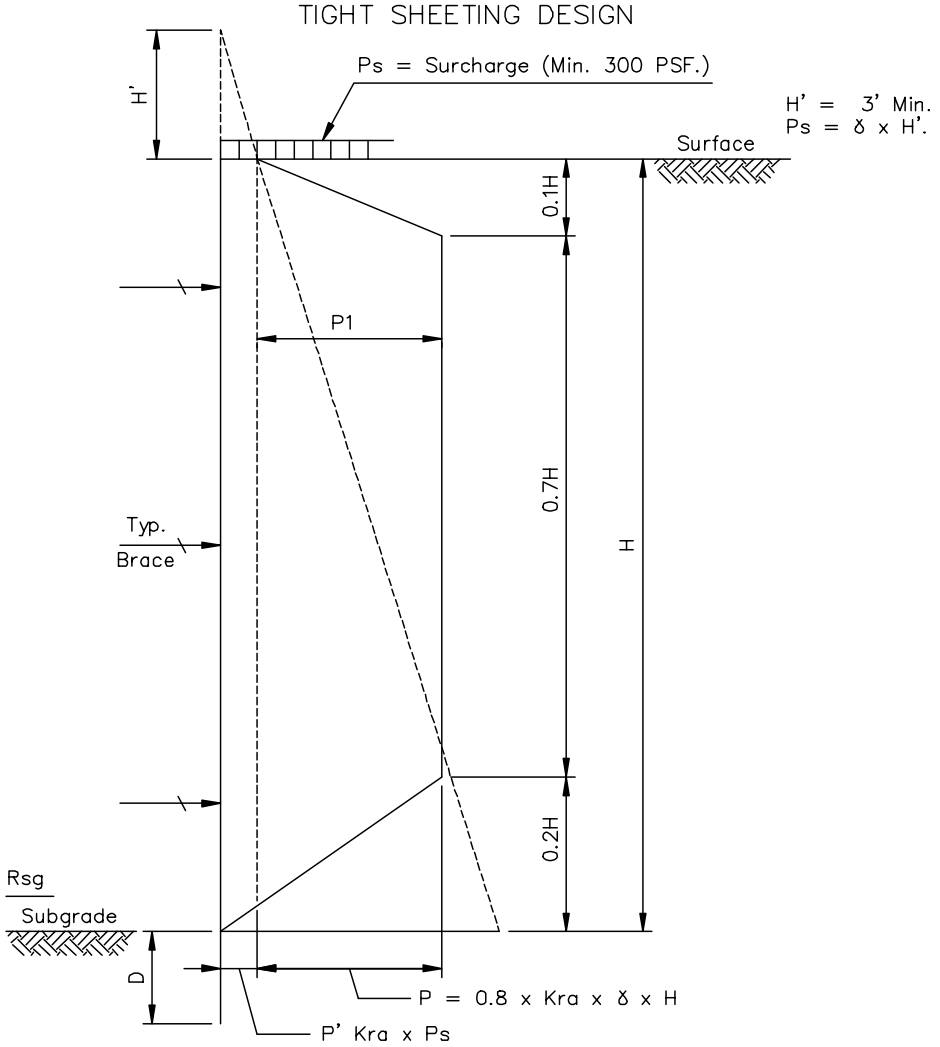
END OF SECTION

ATTACHMENTS A and B, SHOWING THE MINIMUM NORMAL LOAD DIAGRAM REQUIREMENTS OF NYC DEP FOR SHEETING DESIGN DURING EXCAVATION ARE GIVEN IN THE FOLLOWING PAGES (ALSO SEE PARAGRAPH 1.06)

Attachment A

(Revised 9/88)

MINIMUM LOAD DIAGRAM FOR NON–WATER TIGHT SHEETING DESIGN



δ = Unit Weight of Soil

δw = Unit Weight of Water

δs = Unit Weight of Submerged Soil

ø = Angle of Internal Friction of Soil

$Kra = \frac{(1 - \sin ø)}{(1 + \sin ø)}$ For Active Earth Pressure

$Krp = \frac{(1 + \sin ø)}{(1 - \sin ø)}$ For Passive Earth Pressure

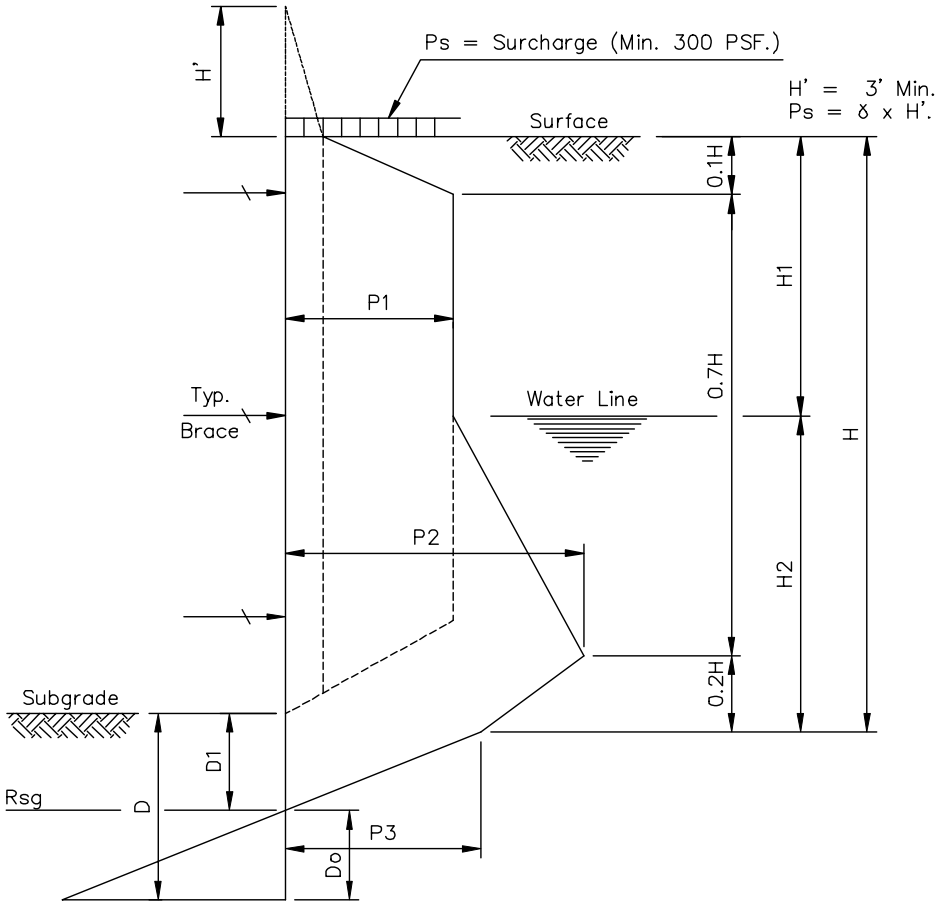
$D = \sqrt{\frac{2\ Rsg}{δ(Krp - Kra)}}$ (1.3)

(Min. 2'–0")

Attachment B

(Revised 9/88)

MINIMUM LOAD DIAGRAM FOR WATER TIGHT SHEETING DESIGN



$P' = Kra \times Ps$

$P1 = P' + 0.8 \times Kra \times (\gamma H1 + \gamma sH2)$

$P2 = P1 + \gamma w\ (H2 - 0.2H)$

$P3 = \gamma w \times H2$

$$D1 = \frac{P3}{\gamma s\ (Krp - Kra)}$$

$$Do = \sqrt{\frac{2\ Rsg}{\gamma s\ (Krp - Kra)}}$$

$D = (D1 + Do)\ (1.3)$

SECTION 02317
Backfilling

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Backfilling Work includes furnishing, placing and compacting all fill material necessary to bring excavations and site work to final grade as shown, specified or required.

B. Backfilling – If the soil meets the requirements for a NYSDEC Pre-Determined or Case-Specific Beneficial Use Determination (BUD), maximize reuse of soil on-site for backfilling rather than import soil from other sources.

C. The following index of this Section is included for convenience:

1.02 PAYMENT

A. Unless otherwise provided in the Detailed Specifications, no separate payment will be made for performing any Work required under this Section and the Contractor shall include all costs thereof in its lump sum price bid for the Contract.

1.03 RELATED SECTIONS

A. General Specification 02105 – Soil Sampling and Analysis

B. General Specification 02371 - Dust, Soil Erosion and Sedimentation Control

C. General Specification 02910 - Plantings

D. General Specification 03300 - Cast-in-Place Concrete

1.04 REFERENCES

A. ASTM C131 - Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

B. ASTM C143 - Standard Test Method for Slump of Hydraulic-Cement Concrete

C. ASTM C330 - Lightweight Aggregates for Structural Concrete

D. ASTM D422 - Standard Test Method for Particle-Size Analysis of Soils

E. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))

F. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

G. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft (2,700 kN-m/m^3))

H. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method

I. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils

J. ASTM D4832 - Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Cylinders

K. ASTM D6023 - Standard Test Method for Density (Unit Weight), Yield, Cement Content, and Air Content (Gravimetric) of Controlled Low Strength Material (CLSM)

L. ASTM D6024 - Test Method for Ball Drop on Controlled Low Strength Material (CLSM) to Determine Suitability for Load Application

M. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

N. DER-10, Technical Guidance for Site Investigation and Remediation, NYSDEC Division of Environmental Remediation

O. Commissioner Policy CP-51 Soil Cleanup Guidance Policy, Issued 10/21/2010; Effective 12/03/2010, NYSDEC Division of Environmental Remediation

P. 6 NYCRR Part 375, Environmental Remediation Programs

Q. 6 NYCRR Part 360, Solid Waste Management Facilities NYC Building Code

1.05 DEFINITIONS

A. Suitable Material -- any material whose composition is satisfactory for use as fill. Any mineral (inorganic) soil, blasted or broken rock and similar materials of natural or man-made (i.e. recycled) origin, including mixtures thereof, are considered suitable materials. Determinations of whether a specific natural material is suitable shall be made by the Engineer on the above basis.

1. Recycled materials that the Engineer has evaluated and approved for general use shall be considered to be suitable material subject to the conditions for use as determined by the City. In general, the use of recycled materials must be sanctioned by NYSDEC, usually in the form of a BUD. See definition below.

B. Unsuitable Materials – any material containing vegetable or organic matter such as muck, peat, organic silt, topsoil or sod, that is not satisfactory for use as fill material. Certain man-made deposits of industrial waste, or contaminated materials may also be determined to be unsuitable materials.

C. Pre-Determined Beneficial Use Determination (BUD) – NYSDEC allows soil to be reused on site under a Pre-Determined BUD under the following conditions: 360.1.15(b)(7) uncontaminated soil which has been excavated as part of a construction project, and which is being used as a fill material, in place of soil native to the site of disposition; 360.1.15(b)(8) non-hazardous, contaminated soil which has been excavated as part of a construction project, other than a NYSDEC-approved or undertaken inactive hazardous waste

disposal site remediation program, and which is used as backfill for the same excavation or excavations containing similar contaminants at the same site.

D. Case-Specific Beneficial Use Determination (BUD): Under 6 NYCRR 360.1.15 (d), NYSDEC sets forth the requirements for petitioning NYSDEC to obtain a Case-Specific BUD, and the criteria for reviewing, granting, or denying of the BUD. For reuse of a solid waste to be determined a beneficial use, the petition must demonstrate the following:

1. The use will not adversely affect human health and safety, the environment, or natural resources.
2. The solid waste is an effective substitute for a commercial product or can be used beneficially in the manufacture of a commercial product.
3. The essential nature of the use constitutes a legitimate reuse and not disposal.

1.06 SUBMITTALS

A. The Contractor shall submit shop drawings for the approval of the Engineer. Submittals shall include, but not be limited to:

1. Name and location of all suppliers.
2. Certificate of compliance with standard specified for each source of material.
3. The Contractor shall submit all laboratory analytical reports, which shall include a Summary Table listing the analytical results with highlighted exceedances of 6 NYCRR Part 375 SCOs.
4. Prior to stockpiling or placing of select fill materials at the job site, submit for approval approximately 100-pound samples representative of the fill at the proposed borrow source. In addition, submit documentation of the availability of the required fill quantities at any proposed borrow source.
5. Submit optimum moisture – maximum density curves and reports for all fill materials before placement of fill.
6. Results of all compaction tests for fill placement.
7. Mix design for flowable fill, including all materials used and trial mix test results.
8. Certification by the lightweight fill producer of the gradation, dry loose unit weight, dry compacted unit weight and Los Angeles Abrasion Test lost for the proposed lightweight fill source.

1.07 QUALITY CONTROL

A. Testing: The Contractor shall retain the services of an independent materials testing laboratory to perform the following laboratory and field tests.

B. All materials used in construction, whether brought to the site or developed from on-site sources, shall be tested for optimum moisture-maximum density curve, and reports of the test results for each source shall be submitted promptly. The tests shall be as follows:

Test	ASTM Standard	Tests Per Volume Delivered
Gradation	D422	1 per 200 C.Y.
Compaction or Density	D1557	1 per 200 C.Y.

C. Acceptability of completed compaction shall be demonstrated by tests performed by the Contractor and accepted by the Engineer. The minimum number of tests shall be determined by quantity of material placed, and reports of the test results shall be submitted promptly. The Contractor shall perform either of the following tests subject to the approval of the Engineer:

Test	ASTM Standard	Tests Per Volume Placed
In-Place Density	D2167 D6938	1 per 200 cy

D. The Contractor shall engage the services of a testing laboratory, with the qualifications required by General Specification 03300 - Cast-in-Place Concrete, and experienced in design and testing of flowable fill materials and mixes, to perform material evaluation tests and to design mixes for flowable fill. A trial mix shall be performed to verify the flowable fill mix design. The trial mix shall also report slump, air content, yield, cement content, and dry unit weight per ASTM C143 and ASTM D6023.

E. Any fill material being brought to the site that is composed of soil or a mixture of soil (excluding gravel, crushed stone, limestone screenings, other granular materials or flowable fill), as well as any soil being used for drainage fill, common fill and pipe bedding for small piping, must comply with the following protocol:

1. Testing shall be performed on all soil brought on-site (fill and topsoil) and shall demonstrate chemical quality meeting the lower of 6 NYCRR Part 375-6.8(b) Protection of Public Health – Residential and Protection

of Groundwater SCOs in accordance with General Specification 02105 – Soil Sampling and Analysis, unless otherwise approved by the Engineer. Fill material to be used in ecologically sensitive sites (e.g., wetlands) shall meet the SCOs for the Protection of Ecological Resources, unless otherwise approved.

2. Chemical analyses shall include the 6 NYCRR Part 375-6 compounds and shall be performed by a testing laboratory certified by the New York State Department of Health Environmental Laboratory Accreditation Program (NYSDOH-ELAP). The frequency of testing per volume of fill shall be:

   a. 1 per 500 CY of material purchased from a registered/permitted processing or recycling facility; or

   b. 1 per 1000 CY of native materials (e.g., non-regulated soil and sand with no manmade materials) purchased from an operating gravel pit or similar facility.

F. When testing is required to confirm the reuse of on-site excavation spoils under a Pre-Determined BUD, or under a Case-Specific BUD, sample the soils in accordance with General Specification 02105 – Soil Sampling and Analysis.

1.08 DELIVERY AND STORAGE

A. Materials delivered to the site shall be stored in a manner to prevent contamination and segregation. .

PART 2 PRODUCTS

2.01 BACKFILL MATERIAL - GENERAL

A. Backfill shall be composed of suitable materials.

1. On-site Materials: Soil that is excavated and reused as backfill on-site must meet the solid waste cessation requirements of 6 NYCRR 360.1.15(b) for a Pre-Determined BUD or 6 NYCRR 360.1.15(d) for a Case-Specific BUD. Backfill may require sampling and analyses as per General Specification 02105 – Soil Sampling and Analysis. Reuse of soils under a NYSDEC Pre-Determined BUD or Case-Specific BUD is preferred over the importation of soil from off-site sources.

2. Off-site Imported Materials: Fill that is brought on site to be used as backfill must meet the lower of 6 NYCRR Part 375-6.8(b) Protection of Public Health – Residential and Protection of Groundwater SCOs, unless otherwise approved by the Engineer. Fill material to be used in ecologically sensitive sites (e.g., wetlands) shall meet the SCOs for the protection of Ecological Resources, unless otherwise approved.

B. Follow common fill requirements whenever drainage or select fill is not specified. Determine and obtain the approval of the Engineer for the appropriate test method where more than one compaction test method is specified.

C. Do not use wet or frozen material for backfilling.

D. The maximum stone size shall be two-thirds of the thickness of the backfill lift, but in no case shall material containing stones over 10 inches in the largest dimension be used for backfill.

2.02 DRAINAGE FILL

A. Use clean gravel, crushed stone, or other suitable material conforming to the gradation specified for drainage fill. Clay and fine particles are unacceptable in drainage fill. Provide drainage fill that complies with the following gradation limits:

U.S. Standard Sieve	Percent Passing By Weight
1-1/2 inch	100
1 inch	95-100
1/2 inch	45-65
#4	5-15
#16	0-4

2.03 SELECT FILL

A. Use gravel, crushed stone, limestone screenings or other granular or similar materials, as approved, which can be readily and thoroughly compacted to not less than 95 percent of the maximum dry density obtainable by ASTM D1557. Very fine sand, uniformly graded sands and gravels, or other materials that have tendency to flow under pressure when wet are unacceptable as select fill. Provide select fill that complies with the following gradation limits:

U.S. Standard Sieve	Percent Passing By Weight
2 inch	100
1-1/2 inch	90-100
1 inch	75-95
1/2 inch	45-70

U.S. Standard Sieve	Percent Passing By Weight
#4	25-50
#10	15-40
#200	5-15

2.04 COMMON FILL

A. Material from on-site excavation may be used as common fill provided that it can be readily compacted to not less than 90 percent of the maximum dry density obtainable by ASTM D1557, and does not contain unsuitable material as per Articles 1.05B. Additionally, existing on-site soil must comply with the sampling requirements for a NYSDEC Pre-Determined BUD or a Case-Specific BUD as per General Specification 02105 - Soil Sampling and Analysis. Select fill may be used as common fill at no change in the Contract Price.

B. Granular on-site material that complies with the following gradation limits may be used as granular common fill:

U.S. Standard Sieve	Percent Passing By Weight
3 inch	100
#10	50-100
#60	20-90
#200	0-20

C. Cohesive site material may be used as common fill as follows:

1. The gradation requirements do not apply to cohesive common fill.
2. Use material having a liquid limit less than or equal to 40 and a plasticity index less than or equal to 20, as determined by ASTM D4318.

D. All material used as common fill is subject to approval by the Engineer. If there is insufficient suitable material on site, import whatever additional material is required which conforms to the sections, at no additional cost to the City.

2.05 PIPE BEDDING

A. Gradation for Small Piping: For pipe 18 inches or less in diameter, use pipe bedding material of which 90 percent will be retained on a No. 8 sieve and 100 percent of which will pass a 1/2 inch sieve and be well graded between those limits.

B. Gradation for Large Piping: For pipe larger than 18 inches in diameter, use the same pipe bedding material as specified for smaller pipe or use a similar well graded material of which 90 percent will be retained on a No. 8 sieve, 100 percent will pass a 1-inch sieve, and will be well graded between those limits.

2.06 LIGHTWEIGHT FILL

A. Lightweight fill shall be a lightweight aggregate produced by the rotary kiln method and meeting the requirements of ASTM C330. No byproduct slags or cinders are permitted.

B. The material shall meet the grading requirements of ASTM C330, Table 1, Coarse Aggregate: 3/4 inch to No. 4.

C. Dry loose unit weight shall be maximum of 55 pcf. Dry compacted unit weight shall be a maximum of 60 pcf when measured by a one-point test performed in accordance with ASTM D698.

D. Maximum Los Angeles Abrasion Test loss of 50 percent when tested in accordance with ASTM C131 (B grading).

2.07 FLOWABLE FILL

A. Flowable fill (also known as controlled low strength material) shall be a uniform mixture of sand, Type II Portland cement, fly ash, slag, admixtures, and water. The mix design shall produce a flowable material with little or no bleed water which produces a minimum compressive strength of 50 psi and maximum compressive strength of 100 psi at 56 days. The cured material shall be excavatable and have a maximum dry unit weight of 100 pounds per cubic foot. Slump shall be from 7 inches to 10 inches.

B. Admixtures specifically designed for flowable fill shall be used to improve flowability, reduce unit weight, control strength development, reduce settlement and reduce bleed water. Admixtures shall be:

1. Rheocell-Rheofill manufactured by BASF;
2. DaraFill manufactured by W.R. Grace Construction Products;
3. Or an approved equal.

All other materials shall be as specified in General Specification 03300 - Cast-in-Place Concrete.

PART 3 EXECUTION

3.01 GENERAL

A. Backfill all excavations to the original surface of the ground or to such other grades as may be shown or required. For areas to be covered by lawn mix, leave or stop backfill 12 inches below the finished grade or as otherwise required to

provide adequate depth of lawn mix to satisfy the requirements of General Specification 02910 – Plantings.

B. Remove from all backfill, and from the space being backfilled, any compressible, putrescible, or destructible rubbish and refuse before backfilling is started. Dispose of the rubbish and refuse in accordance with the requirements of Detailed Specifications.

C. Leave sheeting and bracing in place or remove as the Work progresses, as shown in the Contract drawings, specified or directed by the Engineer.

D. Do not permit backfilling construction equipment to travel against or over cast-in-place concrete structures until the specified concrete strength has been obtained, as verified by concrete test cylinders. In special cases where conditions warrant, the above restriction may be modified provided the concrete has gained sufficient strength, as determined from test cylinders, to satisfy design requirements for the removal of forms and the application of load.

E. All stockpiled materials shall be adequately handled as required in General Specification 02371 – Dust, Soil Erosion and Sedimentation Control.

F. No material shall be placed until satisfactory test reports for material type and compaction requirements have been approved by the Engineer.

G. Warning tape/ribbon shall be placed and/or restored as required when backfilling new and existing utility lines.

3.02 ELECTRICAL DUCT AND STRUCTURE BEDDING

A. All electrical ducts and precast manhole bases shall be bedded in well graded, compacted, select fill material. Select fill shall be placed in uniform layers not greater than 9 inches in loose thickness and compacted in place with suitable mechanical or pneumatic tools to not less than 95 percent of the maximum dry density as determined by ASTM D1557. Bedding thickness shall be not less than 6 inches after compaction. Bedding below electrical ducts shall extend the full width of the trench.

B. Existing underground structures, tunnels, conduits and pipes crossing the excavation shall be bedded with compacted select fill material. Place bedding material under and around each existing underground structure, tunnel, conduit or pipe and extend underneath and on each side to a distance equal to the depth of the trench below the structure, tunnel, conduit or pipe.

C. Cast-in-place manhole bases and other foundations for structures shall be cast against a concrete work mat in clean and dry excavations, unless otherwise shown, specified or required.

3.03 PIPE BEDDING AND INITIAL BACKFILL

A. Place select fill by hand for initial pipe backfill from top of bedding to 1 foot over top of pipes in uniform layers not greater than 6 inches in loose thickness.

Tamp under pipe haunches and thoroughly compact in place the select fill with suitable mechanical or pneumatic tools to not less than 95 percent of the maximum dry density as determined by ASTM D1557.

B. Do not place stone fragments larger than 2-inch size in the pipe bedding or in the backfill to 1 foot over the top of pipes, nor any stone fragments larger than 3-inch size nearer than 2 feet from any pipe, conduit or concrete wall.

C. Pipe bedding containing very fine sand, uniformly graded sands and gravels, or other materials that have a tendency to flow under pressure when wet is unacceptable.

D. Bed pipelines or electrical ducts placed in short tunnels in select fill, flowable fill, or 2500 psi concrete. Completely fill the remainder of the annular space between the outside of the pipe wall and the tunnel wall with select fill, flowable fill, suitable job-excavated material, or 2500 psi concrete, as approved. Pipes and ducts in short tunnels shall be supported to permit placing and compaction of backfill.

3.04 PLACEMENT OF FLOWABLE FILL

A. Flowable fill shall be batched and premixed by an approved producer, dispensed from ready-mix trucks, and placed by approved methods and equipment.

B. Flowable fill shall be placed so as to completely fill the space to receive it with no trapped air pockets or other voids. Positive means of allowing air to escape shall be provided where necessary. Where placed against and around existing structures, lift heights shall be limited so as not to overload the structure. Lift heights shall be as approved by the Engineer.

C. Where flowable fill is placed around piping and other elements subject to floating within the fill, positive means shall be taken to provide temporary balancing loads to prevent uplift, or fill lift heights shall be limited to prevent uplift.

D. Application of loads or placement of other fill materials or concrete on top of flowable fill shall not occur until the flowable fill surface is determined to be suitable for loading per ASTM D6024.

3.05 TRENCH BACKFILL

A. Backfill trenches from 1 foot over the top of the pipe, from the top of electrical duct bedding or as shown to the bottom of pavement base course, subgrade for lawns or lawn replacement, to the top of the existing ground surface or to such other grades as may be shown or required. Backfill trenches as soon as, in the opinion of the Engineer, it can be done without injury to the concrete or pipe lines.

B. Provide select fill, suitable job-excavated material or other material, as specified and as approved for trench backfill.

C. Depth of Placement - General: Except under pavements, walkways, railroad tracks, and street or highway appurtenances, or as otherwise specified, place trench backfill in uniform layers not greater than 9 inches in loose thickness and thoroughly compact in place using suitable mechanical or pneumatic equipment. Compact backfill to not less than 90 percent of the maximum dry density as determined by ASTM D1557.

D. Depth of Placement - Traffic Areas and Under Utilities: Where pavements, walkways, railroad tracks and street or highway appurtenances are to be placed over trenches and under utilities or utility services crossing the trench, provide trench backfill using select fill placed in uniform layers not greater than 9 inches in loose thickness and thoroughly compacted in place with equipment as specified above. Compact backfill to not less than 95 percent of the maximum dry density as determined by ASTM D1557.

E. Depth of Placement - Undeveloped Areas: In undeveloped areas and where select fill material or hand-placed backfill are not specified or required, place suitable job-excavated material or other approved backfill in lifts not exceeding 12 inches in loose thickness. When the trench is full, consolidate the backfill by jetting, spading, tamping or puddling to ensure complete filling of the excavation. Mound the top of the trench approximately 12 inches to allow for consolidation of backfill.

F. Backfill trenches in such a way as to prevent dropping material directly on top of any conduit or pipe through any great vertical distance. Do not allow backfilling material from a bucket to fall directly on a structure or pipe and, in all cases, lower the bucket so that the shock of falling earth will not cause damage.

G. Break up lumps and distribute any stones, pieces of crushed rock or lumps which cannot readily be broken up, throughout the mass so that all interstices are solidly filled with fine material.

H. Retain backfill in trenches by temporary bulkheads only and remove them as the backfilling progresses. Do not make bulkheads of stone.

I. Do not cover sewers, drains, basin connections, ends of sewers and branches until the Engineer orders or gives permission to backfill.

J. After completion of backfilling in City streets, remove all surplus material, and regrade and leave free, clear, and in good order all roadways and sidewalks. Deposit and compact a temporary surface of asphalt, or other equivalent and suitable material to a depth of six inches on all backfilled areas where ordered by the Engineer in writing. Until areas are restored to their original condition, maintain the surface of the temporary pavement in good and safe condition and

promptly fill all depressions caused by settlement of the backfill with the temporary surfacing materials and compact the same. Wet the temporary surface by spraying with water when necessary to prevent a dust nuisance.

3.06 STRUCTURE BACKFILL

A. Backfill excavations as soon as, in the opinion of the Engineer, it can be done without injury to the concrete or structures.

B. Use select fill underneath all structures, and adjacent to structures where pipes, connections, electrical ducts and structural foundations are to be located within this fill. Use select fill beneath all pavements, walkways, and railroad tracks, and extend to the bottom of pavement base course or ballast.

1. Place select fill in uniform layers not greater than 8 inches in loose thickness and thoroughly compact in place with suitable approved mechanical or pneumatic equipment.

2. Compact select fill to not less than 95 percent of the maximum dry density as determined by ASTM D1557.

C. When specified in the Detailed Specifications, shown on the Contract Drawings, or approved by the Engineer, lightweight fill shall be used to raise the grade in areas that are to support pavements, walkways, railroad tracks and other structures.

1. Place lightweight fill in uniform horizontal layers not greater than 12 inches in loose thickness.

2. Lightweight fill shall be compacted by four complete coverages with an approved smooth drum vibratory roller having a minimum static weight of 14,000 pounds, a minimum dynamic force of 23,000 pounds, and a total force not less than 5,500 pounds per foot of compactor drum width.

D. Use of common granular fill adjacent to structures in all areas not specified above, unless otherwise shown or specified. Select fill may be used in place of common granular fill at no additional cost.

1. Extend such backfill from the bottom of the excavation or top of bedding to the underside of the lawn mix for seeded, sodded or hydroseeded areas, the top of previously existing ground surface or to such other grades as may be shown or required.

2. Place backfill in uniform layers not greater than 8 inches in loose thickness and thoroughly compact in place with suitable equipment, as specified above.

3. Compact backfill to not less than 90 percent of the maximum dry density as determined by ASTM D1557.

E. In unpaved areas adjacent to structures, for the top 1 foot of fill directly under the lawn mix, use cohesive backfill conforming to Article 2.04C, placed in 6-inch lifts. The cohesive backfill shall extend to the limits of the excavated area. Compact to not less than 90 percent of the maximum dry density as determined by ASTM D1557.

F. When shown on the Contract Drawings or specified in the Detailed Specifications, flowable fill shall be used for backfilling of structures. Backfilling with flowable fill shall be as specified in Article 3.04.

G. When sheeting is withdrawn, solidly fill all cavities in or adjoining the trench or other excavation. When sheeting is left in place, solidly fill all cavities behind such sheeting.

3.07 DRAINAGE BLANKET

A. Provide a drainage blanket consisting of drainage fill where shown, specified, or required. Place drainage fill in uniform layers not greater than 8 inches in loose thickness.

B. Where drainage fill is required underneath structures or adjacent to structures where pipes, connections, electrical ducts and structural foundations will be located within the fill, compact the fill with suitable mechanical or pneumatic equipment to not less than 95 percent of the maximum dry density as determined by ASTM D1557.

C. Where drainage fill is required in areas not specified in Paragraph 3.08B, compact with suitable mechanical or pneumatic equipment to not less than 90 percent of the maximum dry density as determined by ASTM D1557.

3.08 EARTH EMBANKMENTS

A. Make all earth embankments of approved cohesive common fill material.

B. Place fill in uniform layers not greater than 10 inches in loose thickness. Compact in place with suitable approved mechanical equipment.

C. Compact earth embankments to not less than 90 percent of the maximum dry density as determined by ASTM D1557.

D. Do not use cohesionless, granular material as earth embankment backfill, unless otherwise shown or required.

3.09 COMPACTION EQUIPMENT

A. Equipment and Methods: Perform all compaction with suitable approved equipment and methods.

B. Compact clay and other cohesive material with sheep's-foot rollers or similar equipment where practicable. Use hand held pneumatic tampers elsewhere for compaction of cohesive fill material.

C. Compact low cohesive soils with pneumatic-tire rollers or large vibratory equipment where practicable. Use small vibratory equipment elsewhere for compaction of cohesionless fill material.

D. Do not use heavy compaction equipment over pipelines or other structures, unless the depth of fill is sufficient to adequately distribute the load.

3.10 FINISH GRADING

A. Perform finish grading in accordance with the completed contour elevations and grades shown on the Contract Drawings and blend into conformation with remaining natural ground surfaces.

1. Leave all finished grading surfaces smooth and firm to drain. Areas shall be finished to the degree obtainable by either blade or scraper operations and suitable for application of topsoil.

2. Bring finish grades to elevations within plus or minus 0.10 foot of elevations or contours shown.

3. Areas which are anticipated to be undisturbed for a period of more than 30 days shall receive temporary seeding of rye grass at a rate of three bushels per acre, weather and season permitting. This seeding shall be repeated as necessary to maintain a continuing ground cover.

B. Grade outside of building or structure lines in a manner to prevent accumulation of water within the area. Where necessary or where shown, extend finish grading to ensure that water will be carried to drainage ditches, and the site area left smooth and free from depressions holding water.

3.11 FIELD QUALITY CONTROL

A. Sampling and Testing of Select, Common and Lightweight Backfill:

1. Provide sampling, testing, and laboratory methods in accordance with ASTM D1556 or other method as determined by the Engineer for select fill and common fill.

2. Lightweight fill shall be tested as described in Paragraph 2.06C in accordance with ASTM D698.

3. Subject all backfill to these tests to the satisfaction of the Engineer. These tests shall be the basis for acceptance or rejection by the Engineer of the compaction. Failure to achieve the specified densities shall require the Contractor to recompact or remove the material as required.

B. Sampling and Testing of Flowable Fill:

1. The Contractor shall provide all facilities as may be necessary for the ready procurement of samples of flowable fill from the Work or truck mixers as required by the Engineer for test purposes.

2. The DEP/QA/QC Consultant will provide personnel and equipment for making periodic determinations in the field of slump, air content, ambient and concrete temperature, unit weight and yield and for the preparation of compressive strength test cylinders as required in compliance with applicable ASTM tests and procedures. In compliance with ASTM D4832, a minimum of two cylinders will be tested at 7 days, two at 28 days, and three at 56 days. Tests shall be made on material at point of discharge into the work. Tests shall be made for each 200 cubic yards of material placed but not less than one test for each day flowable fill is placed.

3. The Contractor shall supply all equipment necessary to perform the required tests including, but not limited to, cylinder molds, tags, capping compound, slump cones, platform scale, two buckets (each 2 cubic feet in size), thermometers, pressure air meter, and roller meter.

C. Correction of Work:

1. Correction of Work: Correct any areas of unsatisfactory compaction by removal and replacement, or by scarifying, aerating or sprinkling as needed and recompaction in place prior to placement of a new lift. The Contractor shall, if necessary, increase the compactive effort by increasing the number of passes, using heavier or more suitable compaction equipment, or by reducing the lift thickness. The Contractor shall adjust the moisture content of the soil to bring it to the optimum range by drying or adding water, as required.

2. Correct any depression which may develop from settlement in backfilled areas within one year after the work is fully completed. Provide, as needed, backfill material, pavement base replacement, permanent pavement, sidewalk, curb and driveway repair or replacement, and lawn replacement, and perform the necessary reconditioning and restoration work to bring such depressed areas to proper grade as approved.

END OF SECTION

SECTION 02318
Rock Excavation

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This Section describes the excavation and disposal of all material as specified here or shown on the Contract Drawings, for the purpose of building structures, conduits, pipe lines and other structures as well as grading and completing the work in every respect.

B. The following index of this Section is included for convenience:

1.02 PAYMENT

A. The quantity, in cubic yards, to be measured for payment shall be the volume of rock excavated between the top surface of the rock and the payment lines or planes shown, indicated or specified.

B. Where rock excavation is not begun from the top surface of the rock, as in tunnel construction, such excavation will be measured between the payment lines or planes shown, indicated or specified.

C. Where no payment line or plane is shown on the Contract Drawings or specified, or where the Engineer orders additional rock excavation, such excavation shall be measured between planes six inches outside of and parallel to the true face lines of the structure or the limits of work established for additional excavation and the surface of the rock.

D. Rock excavation will be paid for as provided in the Detailed Specifications.

E. Payment for sheeting and bracing ordered left in place will be made as provided in the Detailed Specifications.

F. No separate payment will be made for unauthorized excavations, for the disposal of such excavated materials, nor for the refilling of such excavations with suitable material or concrete.

1.03 RELATED SECTIONS

A. General Specification 02240 - Dewatering

B. General Specification 02250 - Shoring and Underpinning

C. General Specification 02316 - Excavation

1.04 DEFINITION

A. The word "rock" as used here includes all materials requiring barring or wedging for their removal from their original beds and specifically includes all ledge or bed rock and boulders or masonry larger than one-half cubic yard in volume, but excludes pavements and pavement foundations.

1.05 SUBMITTALS

A. Before proceeding with any excavation work, obtain all necessary permits required by City Departments having jurisdiction and all written consents from owners of private property affected by the prosecution of the work, which may necessitate temporary or permanent occupation, easements, storage of materials, or other physical encroachments.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 NOTIFICATION OF ENGINEER TO MEASURE ROCK

A. Notify the Engineer before commencing rock excavation. The Engineer will measure or cross-section the rock. Rock removed before being measured or cross-sectioned will not be paid for.

3.02 SHAPING AND TRIMMING

A. Make all excavations of adequate size to properly construct the structures in the manner and of the size specified and shown on the Contract Drawings, and to remove any material, which the Engineer may deem unsuitable for foundations.

Whenever the nature of the ground will permit, form the bottom to the shape and dimensions of the outside of the masonry. In order to secure this shape provide proper templates, firmly set and held to the proper line and grade.

3.03 BLASTING

A. Unless otherwise permitted in the Detailed Specifications, no blasting will be allowed.

3.04 PREVENTION OF DUST HAZARD

A. Provide for the installation, maintenance and effective operation of appliances and methods for the elimination of harmful dust which have been approved by the Industrial Board of the Department of Labor of the State of New York, as provided in Section 222-a of the Labor Law. If the provisions of said Section 222-a are not complied, this Contract shall be void.

3.05 OVERBREAKAGE AND UNAUTHORIZED EXCAVATION.

A. All overbreakage and unauthorized excavation carried outside the lines and grades given, except as hereinafter specified, together with the removal of the excavated materials, shall be at the Contractor's expense. Backfill unauthorized excavations as directed with compacted, suitable material, except for unauthorized excavations under structures, which shall be refilled with Class 15 concrete, unless otherwise permitted by the Engineer.

3.06 ADDITIONAL EXCAVATION

A. Excavate outside the established lines only when authorized in writing by the Engineer.

3.07 SHEETING, BRACING AND UNDERPINNING

A. Where required, support the sides of excavations with adequate sheeting and bracing. Where the character of rock, boulders or masonry in excavation is such as to render it necessary, closely drive the sheeting. Support structures requiring underpinning before the general excavation is started. Sheeting, underpinning and bracing shall conform to the requirements of General Specification 02250 – Shoring and Underpinning.

3.08 FENCING, BRIDGING AND DECKING

A. Immediately enclose excavations in a public street, park or place, or in property adjoining the site with a satisfactory guard fence. When a tight board fence is specified, no guard fence will be required, provided there is no delay in the erection of the tight board fence.

B. Where required for vehicular traffic, construct a substantial timber bridge, with side railings, across the excavation to permit the passage of vehicles.

C. Construct substantial temporary foot bridges, with side rails, wherever required by the Engineer.

D. At street intersections, provide substantial decking for traffic over excavations made from the surface. Maintain decking at all times except as hereinafter specified. The Contractor shall be fully responsible for the adequacy of the decking. Remove pavement and place decking during hours of day or night, which will cause the least inconvenience to adjoining property owners, to the public, and to traffic in general. During certain designated hours of the day or night, sections of planking not more than ten feet in length may be temporarily removed for the purpose of the excavating operations.

E. Obtain approval from the Engineer for designs for all fencing, bridging and decking before erection.

3.09 REMOVAL OF WATER

A. At all times during the construction of the work and until final acceptance thereof, provide and maintain ample means and equipment with which to promptly remove and properly dispose of water and sewage entering the excavations or other parts of the work, and keep said excavations dry until the structures to be built therein are completed and backfilled to the level of ground water except where otherwise approved by the Engineer in writing. Dewatering and disposal of water shall conform to the requirements of General Specification 02240 - Dewatering.

3.10 DISPOSAL OF EXCAVATED MATERIAL

A. Dispose of excavated material not required or permitted to be used for backfilling in accordance with General Specification 02316 - Excavation.

3.11 SHEETING LEFT IN PLACE

A. Cut off at the elevations ordered all sheeting or bracing ordered in writing by the Engineer to be left in place in accordance with General Specification 02316 – Excavation In general, such cut-offs shall not be less than 18 inches below the final ground surface. Do not remove sheeting without first securing the permission of the Engineer. Give particular attention to securing the stability of footings, which parallel and lie close to the excavation work.

B. The Contractor shall be fully responsible for injury to structures, property, or persons resulting from failure to leave in place sufficient sheeting and bracing.

END OF SECTION

SECTION 02371
Dust, Soil Erosion and Sedimentation Control

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall provide all labor, materials, tools, equipment, and incidentals required to assure adequate environmental protection including implementation of all erosion and sediment control measures and maintenance of storage areas as directed by the Engineer.

B. The Contractor shall provide an Erosion and Sedimentation Control Plan (E&SCP) that establishes methods and procedures to prevent migration of contaminated stormwater and sediment and to prevent erosion of features of the Work.

C. The Contractor shall minimize erosion and prevent discharge of sediment to surface water features, watercourses, drainage systems, public streets or private property from construction activities. The Contractor shall provide methods to prevent construction activities from generating contaminated stormwater runoff. Methods of constructing berms and dikes to direct clean stormwater runoff around the work area to the local drainage system shall be included.

D. The Contractor shall comply with all Federal, State, or local laws, codes, ordinances, and regulations which govern the control of sediment, erosion, and stormwater during construction activities.

E. The Contractor shall provide Best Management Practices (BMPs) including, but not limited to silt fences, straw bales, diversion dikes, swales, sedimentation basins/traps, truck wash areas/decontamination stations, stabilized construction entrances and/or other means as a temporary structural practice to minimize erosion and sediment runoff.

F. The Contractor shall provide and implement, if applicable, a Stormwater Pollution Prevention Plan (SWPPP) prepared in accordance with the current New York State Department of Conservation (NYSDEC) State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity unless otherwise specified in the Detailed Specification. For activities in the New York City Water Supply watershed, the Contractor shall provide and implement, if applicable, a Stormwater Pollution Prevention Plan (SWPPP) prepared in accordance with the current Rules and Regulations for the Protection from Contamination, Degradation, and Pollution of the New York City Water Supply and its Sources (Watershed Regulations).

G. If applicable, the SWPPP shall be prepared in accordance with the existing SWPPP for the site/facility. The Contractor shall coordinate with the Operating

Bureau to review the Operating Bureau's existing SWPPP and address all requirements as applicable.

H. The Contractor shall control dust caused by operation and movement of vehicles and equipment in accordance with the latest DEP and OSHA standards, and all other applicable Federal, State and local regulations.

I. The following index of this Section is included for convenience:

1.02 PAYMENT

A. Unless otherwise provided in the Detailed Specifications, no separate payment will be made for performing any Work required under this Section and the Contract shall include all costs thereof in its lump sum price bid for the Contract.

1.03 RELATED SECTIONS

A. General Specification 02105 - Soil Sampling and Analysis

B. General Specification 02230 - Site Clearing

C. General Specification 02240 - Dewatering

D. General Specification 02316 - Excavation

1.04 REFERENCES

A. Comply with applicable provisions and recommendations of the following except as otherwise shown or specified.

1. NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-15-002, or latest version)

2. New York City Watershed Regulations (April 4, 2010, or latest version)

3. New York State Standards and Specifications for Erosion and Sediment Control (aka "Blue Book") (NYSDEC, Aug 2005, or latest version)

4. New York State Stormwater Management Design Manual (latest version)

1.05 DEFINITIONS

A. Best Management Practices: Physical, structural, and/or managerial practices that, when used singly or in combination, prevent or reduce pollution of water, and have been approved by DEP or NYSDEC.

B. Commencement of Construction: The initial disturbance of soils associated with clearing, grading or excavation activities; or other construction related activities that disturb or expose soils such as demolition, stockpiling of fill material, and the initial installation of erosion and sediment control practices.

C. Erosion: The wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as geological creep, detachment, movement of soil or rock fragments by water, wind, ice, or gravity.

D. Erosion/Sediment Control: Any temporary or permanent measures taken to reduce erosion, control siltation and sedimentation, and ensure that sediment-laden water does not leave the site.

E. Final Stabilization: All soil-disturbing activities at the site have been completed and uniform, perennial vegetative cover with the density of eighty (80) percent has been established or equivalent stabilization measures (such as the use of mulches or geo-textiles) have been employed on all unpaved areas and areas not covered by permanent structures, concrete or pavement.

F. Receiving Waters: Bodies of water or surface water systems receiving water from upstream manmade (or natural) streams

G. Sediment: Fragmented material that originates from weathering and erosion of rocks and unsolicited deposits, and is transported by, suspended in, or deposited in water.

1.06 SUBMITTALS

A. The Contractor shall submit Shop Drawings and other documentation, required to show conformance to the requirements of the Contract Drawings, for the

approval to the Engineer. Shop Drawings shall show details of the Sediment and Stormwater Control System. The Submittals shall include, but not limited to the following:

1. Plan locations of all components of the Sediment/Stormwater Control System.
2. Details of all applicable BMPs (e.g., silt fence, diversion dike, straw bale berm, decontamination stations, etc.).
3. All of the planned components of the Erosion and Sediment Control Plan, as detailed below in Paragraph B.
4. All components of the SWPPP to be constructed on site, as detailed in Paragraph C below.
5. The Contractor shall submit manufacturer's descriptive literature and installation instructions for stockpile liner and cover material as specified in Paragraph 2.01.B and Part 3.02.

B. Erosion and Sediment Control Plan (E&SCP): The Contractor shall develop and submit to the Engineer for approval, prior to commencement of construction activities, an E&SCP. The E&SCP shall address schedules and measures that will be taken to prevent migration of contaminated stormwater/sediment, and to prevent erosion of features of the Work. The E&SCP shall include the following at a minimum:

1. Measures to capture and mitigate stormwater runoff from active, disturbed areas.
2. Provisions for silt fences and other measures to limit migration of sediments.
3. Provisions for straw bale berms and silt fences or other measures to prevent contaminant and sediment migration.
4. Diversion of stormwater: The Contractor shall include provisions for controlling stormwater runoff in and around excavation areas.
5. Soil Storage Area: All details of temporary soil storage to be implemented as specified in this section.
6. Soil Stabilization Practices: All details of soil stabilization practices to be implemented, as specified in this section.
7. Provisions for all other applicable Best Management Practices.

C. The Contractor shall develop and submit to the Engineer for approval a SWPPP prepared by a Qualified Professional in accordance with the requirements of the current NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity unless otherwise specified in the Detailed Specification. For activities in the New York City Water Supply watershed, the Contractor

shall provide and implement, if applicable, a Stormwater Pollution Prevention Plan (SWPPP) prepared in accordance with the current Rules and Regulations for the Protection from Contamination, Degradation, and Pollution of the New York City Water Supply and its Sources (Watershed Regulations). The SWPPP shall be developed and submitted to the Engineer for approval prior to the initiation of construction activities. The SWPPP shall include the following at a minimum:

1. Provide background information about the scope of the project, including the location, type and size of project;
2. Provide a site map for the project, including a general location map. The site map should show the total site area; all improvements; areas of disturbance; areas that will not be disturbed; existing vegetation; on-site and adjacent off-site surface water(s), wetlands and drainage patterns that could be affected by the construction activity; existing and final slopes; locations of off-site material, waste, borrow or equipment storage areas; and location(s) of the stormwater discharge(s);
3. Provide a map and a description of the soil(s) present at the site;
4. Provide a Construction Phasing Plan describing the intended sequence of construction activities, including clearing and grubbing, excavation and grading, utility and infrastructure installation and any other activity at the site that results in soil disturbance. Consistent with the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-15-002 or latest version), there shall not be more than five (5) acres of disturbed soil at any one time without prior written approval from the NYSDEC;
5. Provide a description of the pollution prevention measures that will be used to control litter, construction chemicals and construction debris from becoming a pollutant source in the stormwater discharges;
6. Provide a description of construction and waste materials expected to be stored on-site with updates as appropriate, and a description of controls to reduce pollutants from these materials including storage practices to minimize exposure of the materials to stormwater, and spill prevention response;
7. Describe the temporary and permanent structural and vegetative measures to be used for soil stabilization, runoff control and sediment control for each stage of the project from initial land clearing and grubbing to project closeout;
8. Identify and show on a site map the specific location(s), size(s), and length(s) of each erosion and sediment control practice;

9. Provide the dimensions, material specifications, and installation details for all erosion and sediment control practices, including the siting and sizing of any temporary sediment basins;

10. Identify temporary practices that will be converted to permanent control measures;

11. Provide an implementation schedule for staging temporary erosion and sediment control practices, including the timing of initial placement and the placement and the duration that each practice should remain in place;

12. Provide a maintenance schedule to ensure continuous and effective operation of the erosion and sediment control practices;

13. Provide the name(s) of the receiving water(s);

14. Provide a delineation of SWPPP implementation responsibilities for each part of the site;

15. Provide a description of structural practices to divert flows from exposed soils, store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site to the degree attainable; and

16. Provide any existing data that describes the stormwater runoff characteristics at the site.

D. Inspection Reports: The Contractor shall conduct inspections and submit inspection reports consistent with requirements of the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-15-002 or latest version) including:

1. Site inspections shall be conducted by the Qualified Inspector.

2. Site inspections are conducted a minimum of once every seven (7) calendar days and twice every seven (7) calendar days for sites with greater than 5 acres of soil disturbance. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

3. Inspection reports shall be maintained in a logbook at the site with SWPPP and other required documentation.

1.07 QUALITY ASSURANCE

A. Permits and Regulations:

1. The Contractor shall obtain all necessary permits and be responsible for implementing the terms and requirements of these permits as needed and for payment of all fees.

2. The Contractor shall handle all material in compliance with applicable requirements of OSHA and other governing authorities having jurisdiction.

3. Certifications. The Contractor must sign a copy of the certification statements below, as provided in GP-0-15-002 (or certifications in latest version), before undertaking any construction activity at the site identified in the SWPPP. All certifications must be included in the SWPPP.

   a. "I hereby certify that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the qualified inspector during a site inspection. I also understand that the NYCDEP must comply with the terms and conditions of the New York State Pollutant Discharge Elimination System ("SPDES") General Permit for Stormwater Discharges from Construction Activity (GP-0-15-002, or latest version) and that it is unlawful for any person to cause or contribute to a violation of water quality standards. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings."

   b. The certification statements must include the name and title of the person providing the signature, address and telephone number of the contracting firm, the address of the site, and the date the certification is made. The certification must be signed by an authorized representative of the firm.

4. Inspections. The Contractor must have a qualified inspector conduct an assessment of the site prior to the commencement of construction and certify in an inspection report that the appropriate erosion and sediment controls described in the SWPPP have been adequately installed or implemented to ensure overall preparedness of the site for the commencement of construction. Following commencement of construction, site inspections shall be conducted at least once every seven (7) calendar days and twice a week for sites with soil disturbance greater than 5 acres unless otherwise specified in the Detailed Specification. The two (2) inspections shall be separated by a minimum of two (2) full calendar days. The inspection reports must be kept on file at the construction site with the SWPPP, if applicable, for review by a NYSDEC inspector.

5. Stabilization. The contractor shall initiate stabilization measures as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased.

6. If a SWPPP is required, it shall be kept current on file at the construction site for review by a NYSDEC inspector. If there is a significant change

in construction which may have a significant effect on the potential for the discharge of pollutants to surface waters of the State and which has not otherwise been addressed in the SWPPP, it would require that the SWPPP be updated to reflect those required changes. The SWPPP would also require an amendment if the SWPPP proves to be ineffective in eliminating or significantly minimizing pollutants from sources identified in the SWPPP or achieving the general objectives of controlling pollutants in stormwater discharges from permitted construction activity. Additionally, the SWPPP shall be amended to identify any new subcontractor and their associated responsibilities.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Soil Stabilization: The stabilization practices to be implemented shall include one or a combination of the following: temporary seeding, mulching, geotextiles, sod stabilization, vegetative buffer strips, erosion control mats, protection of trees and shrubs, preservation of mature vegetation. Protection of trees shall be in accordance with General Specification 02230 – Site Clearing. Stabilization practices shall be implemented as approved by the Engineer. The Contractor shall record the dates when the major grading activities occur (i.e. clearing and grubbing, excavation, embankment and grading); when construction activities temporarily or permanently cease on a portion of the site; and when stabilization practices are initiated. Except as provided in paragraphs 1.08A.1 and 1.08A.2 below, stabilization practices shall be initiated as soon as practicable, but no more than fourteen (14) days after construction activities have temporarily or permanently ceased.

1. Unsuitable Conditions: Where the initiation of stabilization measures by the fourteenth day after construction activity temporarily or permanently ceases is precluded by unsuitable conditions caused by the weather. Stabilization practices shall be initiated as soon as practicable after conditions become suitable.

2. Temporary Inactivity Less than 14 Days: Where construction activity will resume on a portion of the site within 14 days after it temporarily ceases, no stabilization practices will be required.

B. Erosion and Sediment Control: Erosion and Sediment control BMPs shall be operational at all times during the Work, specifically during excavation, backfilling and restoration, and decontamination operations. The sediment and erosion control system shall be capable of handling stormwater during construction. Damage to excavation slopes and the migration of contaminated soil to downstream areas resulting from storm events shall be repaired or remediated by the Contractor, at the Contractor's expense.

C. Stormwater: At no time shall the Contractor allow stormwater runoff from soil excavation/stockpiling operations, or effluent from decontamination operations

to migrate off to contaminate soils in other areas or percolate into the groundwater. The Engineer will monitor any overflow or leakage that occurs, and may at his discretion require the Contractor to perform soil sampling within all areas affected by such overflow. Any soils that have been contaminated by such overflow shall be removed, treated and disposed of by the Contractor at no additional cost to the City. All sampling and analyses of soils required to determine the contamination or remediation of these soils shall be performed in accordance with General Specification 02105 – Soil Sampling and Analysis.

D. Disposal of Water: Water collected from decontamination areas and dewatering operations shall be handled in accordance with General Specification 02240 - Dewatering.

1.09 PROJECT CONDITIONS

A. Existing Work: All BMPS (e.g., silt fences, straw bales, swales, sumps, pumps, piping) and other sediment/stormwater controls shall be installed such that other aspects of the Work are not adversely impacted or endangered. All installations shall be subject to the approval of the Engineer.

B. Dust Control: The Contractor shall be responsible for controlling visible dust caused by Work operations and the moving of vehicles and equipment. Dust control shall be implemented when soils are exposed, before, during and after Work activity ceases. Dust control will also be required on the weekends. The Contractor shall utilize the application of water or other methods, subject to the Engineer's approval, when visible dust is present on-site, in accordance with the Health and Safety Plan. The use of chemicals for dust control, including calcium chloride, will not be permitted.

1. All excavation, loading and transport of materials shall minimize the formation of dust and shall conform to General Specification 02316 - Excavation. To prevent dust generation, application of water to roadways and active work areas shall be utilized as required. The Contractor's operations shall include air monitoring and dust minimization measures, consistent with the Detailed Health and Safety Plan (HASP) Specifications.

C. Silt and Sediment Disposal: All silt and sediment which accumulates behind any BMPs used on the site (i.e., straw bale berms or silt fences) shall be removed and disposed of off-site in accordance with all applicable Federal, State and local regulations.

1.10 STORAGE, HANDLING AND REMOVAL

A. The Contractor shall store, handle, and remove material and equipment consistent with requirements of the SWPPP and NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (Permit No. GP-0-15-002) or latest version.

B. Removal of all waste shall be in accordance with the requirements of Detailed Specifications.

PART 2 PRODUCTS

2.01 MATERIALS

A. All components/controls must be designed in conformance with the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, and the New York State Stormwater Management Design Manual. Where erosion and sediment control practices are not designed in conformance with these technical standards, the Contractor must demonstrate equivalence to the technical standard.

B. Stockpile cover and liner fabric shall be a composite structure of fiber-reinforced polyethylene (RPE) fabric (minimum 20-mils). The fabric shall be inert to biological degradation and naturally encountered chemicals, alkalis and acids. Its permeability coefficient shall be less than 10^{-3} cm/sec.

PART 3 EXECUTION

3.01 INSTALLATION AND MAINTENANCE

A. All installation of erosion and sediment control BMPs must be consistent with the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, and the New York State Stormwater Management Design Manual. Where erosion and sediment control practices are not designed in conformance with these technical standards, the Contractor must demonstrate equivalence to the technical standard.

B. Maintenance: The Contractor shall maintain the temporary and permanent vegetation, erosion and sediment control measures, and other protective measures in good and effective operating condition at all times consistent with the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, and the New York State Stormwater Management Design Manual.

3.02 STOCKPILING

A. Cover and Liner Requirements

1. Soil Stockpiles: Stockpiles of excavated soil to be used for backfilling on-site under the NYSDEC Pre-Determined or Case-Specific BUD, or stockpiles of other soil mixes being brought onsite for landscaping purposes, shall be stored as follows:

a. Contaminated Soil: Stockpiles of excavated soil that are known to be or potentially could be contaminated (pending analysis), shall be lined on the bottom and covered with an impermeable, RFP fabric, as specified in 2.01.B above.

b. Uncontaminated Soil: Stockpiles of excavated uncontaminated soil shall have a cover only; a bottom liner is not required. The cover fabric shall be as specified in 2.01.B above.

2. Demolition Waste Stockpiles: Stockpiles of demolition waste that are to be recycled (on-site or off-site) or disposed of at a sanitary landfill shall be stored as follows:

a. Contaminated Demolition Waste: Stockpiles of demolition waste that are known to be or potentially could be contaminated (pending analysis), shall be lined on the bottom and covered with an impermeable, RFP fabric, as specified in 2.01.B above.

b. Uncontaminated Demolition Waste: Stockpiles of uncontaminated demolition waste shall have a cover only; a bottom liner is not required. The cover fabric shall be as specified in 2.01.B above.

3. Stockpiles of materials classified as contaminated, hazardous waste shall be stored with a cover and liner as specified above for contaminated soil or contaminated demolition waste, and transported off-site promptly in DOT-approved hazardous waste shipping containers. Temporary hazardous waste storage areas shall comply with and the requirements of the Contract and applicable Federal, State and local regulations.

4. All stockpiles shall be covered during non-working hours and during periods of no construction activity. The terminal edges of the fabric cover panels shall be secured to prevent uplift by wind.

B. Stockpile Areas and Placement

1. Stockpiling of excavated materials will be permitted on-site within areas as designated on the Contract Drawings for construction staging, or as directed by the Engineer. All stockpiling areas on-site must be approved by the Engineer in advance.

2. The Contractor shall make his or her own arrangements to provide additional stockpiling area on-site or off-site, if required, for excavated material at no additional cost to the City. Additional stockpiling areas whether on-site or off-site shall be approved by the Engineer.

3. Stockpiles of excavated material to be used for backfilling on-site under the NYSDEC Pre-Determined or Case-Specific BUD shall be so piled and placed as not to encumber sidewalks or roadways, or wash away or obstruct the free flow of surface or drainage water. Stockpiles shall be suitably bermed for run-off containment of any water that drains from the soils.

4. Stockpiles shall not be placed closer to the edge of an excavation than a distance equal to 1-1/2 times the depth of the excavation, unless the excavation is in rock or the sides of the excavation have been sloped or sheeted and shored to withstand the lateral forces imposed by such superimposed loads.

3.03 FIELD QUALITY CONTROL

A. Inspections: Site Inspections shall be conducted consistent with the requirements of the SWPPP and the current NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-15-002 or latest version). The Qualified Inspector shall inspect disturbed areas of the construction site, areas used for storage of materials that are exposed to precipitation that have not been finally stabilized, stabilization practices, structural practices, other controls, areas where vehicles exit the site daily and all other requirements listed in the most current NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-15-002 or latest version).

B. Inspection of soil and material stockpiles shall be done daily to ensure the integrity of the cover and liner is maintained.

3.04 CLEANING

A. The Contractor shall clean the site and equipment consistent with requirements of the SWPPP and the current New York State Standards and Specifications for Erosion and Sediment Control. Where appropriate, truck washes/decontamination stations should be installed to minimize the migration of sediment off-site as specified in the Detailed Specifications.

END OF SECTION

SECTION 02372
Embankment and Channel Protection

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for furnishing and placing a protective covering of erosion-resistant material on embankment slopes, streambanks, at culvert inlets or outlets, on bottoms and side slopes of channels, at structure foundations, and at other locations shown on the Contract Drawings or as directed by the Engineer. The work shall be done in accordance with these specifications and in conformity with the lines, grades, thicknesses, and typical sections shown on the Contract Drawings or established by the Engineer.

B. Embankment and channel protection includes stone filling, dry riprap, grouted riprap, concrete block paving, gabions and bedding material for stone.

C. This Section is based on Section 620 of the New York State Department of Transportation (NYSDOT) Standard Specifications.

D. The following index of this Section is included for convenience:

1.02 PAYMENT

A. Unless otherwise provided in the Detailed Specifications, no separate payment will be made for performing any Work required under this Section and the Contractor shall include all costs thereof in its lump sum price bid for the Contract.

1.03 RELATED SECTIONS

A.	General Specification 02230	-	Site Clearing
B.	General Specification 02316	-	Excavation
C.	General Specification 02317	-	Backfilling
D.	General Specification 02371	-	Dust, Soil Erosion and Sedimentation Control

1.04 REFERENCES

A.	ASTM C88	-	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium
B.	ASTM C140	-	Standard Test Methods for Sampling and testing Concrete Masonry Units and Related Units
C.	ASTM C150	-	Standard Specification for Portland Cement

D. American Association of State Highway and Transportation Officials (AASHTO) Standards

E. New York State Department of Transportation (NYSDOT) Standard Specifications

F. NYSDOT Materials Bureau, Materials Method 29

1.05 DEFINITIONS

A. Stone Filling: Stone filling shall consist of well-graded stone placed as protective material on earth embankments, on streambanks, in channels and elsewhere, as shown, specified or required.

B. Dry Riprap: Dry riprap shall consist of stone fitted and placed on streambanks or in channels in order to provide protection against erosion.

C. Grouted Riprap: Grouted riprap shall consist of stone similar to dry riprap but with all spaces between the stones filled with cement grout.

D. Bedding Material. Bedding material shall consist of granular material placed in a layer, where required, on the ground surface prior to placing stone filling or riprap. The purpose of the bedding material is to prevent underlying finer materials from passing into and through the stone filling or riprap.

E. Concrete Block Paving: Concrete block paving shall consist of concrete blocks placed on embankment slopes under structures as protection against erosion.

F. Cushion Sand: Cushion sand shall consist of fine aggregate placed on the ground prior to placing concrete block paving.

G. Gabions: Gabions shall consist of open wire mesh baskets, filled with stones.

1.06 QUALITY ASSURANCE

A. The soundness of all material used for stone filling, riprap, fine aggregate and gabion stones shall be approved on the basis of it satisfying the following criteria:

1. Stone Filling and Riprap:

a. Freeze-Thaw Test: A maximum 10 percent loss, by weight, after 25 cycles of freezing and thawing. Test shall be performed in accordance with NYSDOT Materials Bureau, Materials Method 29, Test Method No. 703-08 P,G.

b. Magnesium Sulfate Soundness Test: A maximum 10 percent loss by weight, after 10 cycles of the magnesium sulfate soundness test. Test shall be performed in accordance with ASTM C88 and NYSDOT Materials Bureau, Materials Method 29, Test Method No. 703-07 P,G.

2. Fine Aggregate:

a. Magnesium Sulfate Soundness Test: A maximum 30 percent loss, by weight, after 5 cycles of the magnesium sulfate soundness test performed in accordance with ASTM C88 and NYSDOT Materials Bureau, Materials Method 29, Test Method No. 703-06 P,G.

b. Organic Impurities Test performed in accordance with NYSDOT Materials Bureau, Materials Method 29, Test Method No. 703-03 P,G and AASHTO T-21 shall result in Organic Plate lighter than 3 and Gardner Color lighter than 11.

1.07 SUBMITTALS

A. Certified laboratory reports showing the following, as applicable:

1. Stone filling or riprap meets the criteria of the freeze thaw test and the magnesium sulfate soundness test requirements specified herein in the subsection headed "Quality Assurance."

2. Bedding material conforms to gradation requirements.

3. Grout sand conforms to gradation requirements for grout for grouting riprap or grout for concrete block paving, as applicable.

4. Cushion sand for concrete block paving conforms to gradation requirements.

5. Gabion wire mesh, tie wire and stone meet the specified material requirements.

PART 2 PRODUCTS

2.01 MATERIALS

A. Stone Filling

1. The gradation of materials furnished for use as stone filling shall be as specified below, and will be accepted or rejected based on a visual examination of the material by the Engineer.

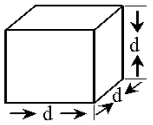
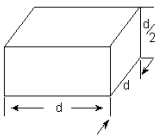
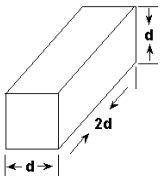
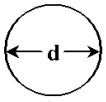
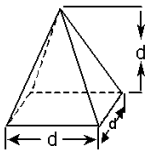
STONE FILLING GRADATION REQUIREMENTS

Stone Filling Item	See These Notes Below	Stone Size[1]	Percent of Total by Weight
Fine	2, 3, 4	Smaller than 8 inches Larger than 3 inches Smaller than No. 10 Sieve	90 - 100 50 - 100 0 - 10
Light	2, 3, 4	Lighter than 100 lbs. Larger than 6 inches Smaller than ½ inch	90 - 100 50 - 100 0 – 10
Medium	2, 4	Heavier than 100 lbs. Smaller than 4 inches	50 - 100 0 – 10
Heavy	2, 4, 5	Heavier than 600 lbs. Smaller than 6 inches	50 - 100 0 – 10

NOTES:

1. Stone sizes, other than weights, refer to the average of the maximum and minimum dimensions of a stone particle as estimated by the Engineer.
2. Materials shall contain less than 20 percent of stones with a ratio of maximum to minimum dimension greater than three.
3. Air-cooled blast furnace slag, cobbles or gravel having at least one fractured face per particle are acceptable substitutes for stone under these items, provided that soundness and gradation requirements are met.
4. Materials shall contain a sufficient amount of stones smaller than the average stone size to fill the spaces between the larger stones.
5. Heavier gradings of this item may be required on some projects, in which case the requirements will be stated on the Contract Drawings or in the Detailed Specifications.

2. The following table is provided to assist the Contractor and the Engineer in evaluating the gradation of materials considered for use as Stone Filling or Riprap.

CORRELATION OF STONE WEIGHTS AND DIMENSIONS					
SPECIFIED **Weights and Sizes**	APPROXIMATE SHAPE				
					
600 lbs	d = 18 ins.	d = 23 ins.	d = 15 ins.	d = 23 ins.	d = 27 ins.
300 lbs.	d = 15 ins.	d = 18 ins.	d = 12 ins.	d = 18 ins.	d = 21 ins.
150 lbs.	d = 12 ins.	d = 15 ins.	d = 9 ins.	d = 15 ins.	d = 17 ins.
100 lbs.	d = 10 ins.	D = 13 INS.	d = 8 ins.	d = 13 ins.	d = 15 ins.
d = 8 ins.	50 lbs.	25 lbs.	100 lbs.	25 lbs.	16 lbs.
d = 6 ins.	20 lbs.	10 lbs.	40 lbs.	10 lbs.	7 lbs.

B. Dry Rip Rap.

1. Dry riprap shall consist of stones shaped as nearly as practicable in the form of right rectangular prisms. At least 50 percent, by weight, of the stones shall weigh in excess of 300 pounds each, and the remainder of the stones shall weigh from 100 to 300 pounds each. One dimension of each of the stones furnished shall be at least equal to the thickness of the riprap as shown on the Contract Drawings.

2. The gradation of materials furnished for use as dry riprap will be accepted or rejected based on a visual examination of the material by the Engineer.

C. Grouted Riprap. The requirements for the stone used for grouted riprap shall be the same as specified for Dry Riprap. The grout shall consist of one part cement conforming to the requirements of ASTM C150 for Portland Cement Type II, and three parts of fine aggregate, conforming to the requirements for fine aggregate set forth in the subsection headed "Quality Assurance." When dry, the fine aggregate shall conform to the following gradation requirements:

SIEVE SIZE	Percent Passing by Weight	
	Minimum	Maximum
3/8 inch	100	--
No. 4	90	100
No. 8	75	100
No. 16	50	85
No. 30	25	60
NO. 50	10	30
No. 100	1	10
No. 200 (Wet)	0	3

D. Bedding Material: Bedding material shall be composted of crushed stone, crushed air-cooled blast furnace slab, or gravel, free of soft, non-durable particles, organic material, and thin or elongated particles. Bedding material shall meet the following gradation requirements:

Sieve Designation	Percent by Weight Passing
4 in.	100
1 IN.	15 to 60
1/4 in.	0 to 25
No. 40	0 to 10

E. Concrete Block Paving

1. The concrete blocks shall be designed to have a compressive strength of 2,500 psi, and shall have the following minimum dimensions:

LENGTH:	THICKNESS:	**Width:**
16 to 20 inches	6 inches (solid)	8 inches

2. The standard dimensions of the block shall be the specified nominal dimensions minus 3/8 of an inch. The maximum permissible variation in dimensions of individual units from standard dimensions shall be no more than 1/8 inch. The size of block used shall be consistent throughout any continuously paved area, and only one nominal length shall be used in any contract. All units shall be sound and free from cracks or other defects that would interfere with the proper placing of the blocks or impair the strength, permanence and appearance of the construction.

3. Sampling and Testing

   a. Sampling: Samples of the block will be selected by the Engineer from production lot quantities in accordance with the following:

LOT SIZE (NUMBER OF UNITS)	**NUMBER OF SAMPLES**
0 - 10,000	6
10,001 - 99,999	12
100,000 - 150,000	18
For each additional 50,000 or fraction thereof	6 additional samples

   b. In no case will less than 6 blocks be selected as samples. Additional specimens may be required at the discretion of the Engineer. Samples may be taken at the manufacturing plant or at the job site, at the option of the Engineer.

   c. Testing

      1) Compressive strength tests of the block will be performed in accordance with the requirements of the Detailed Specifications. The minimum average compressive strength of concrete paving block samples shall be 2500 pounds per square inch. This strength shall be determined on full size block samples, by load application in a direction parallel to the slope upon which the block is to be placed. The compressive strength of any individual unit shall be not less than 2000 pounds per square inch.

2) The maximum average absorption of concrete paving block samples representing any lot shall not exceed 10 percent by weight. The absorption of any individual unit shall not exceed 12 percent by weight.

3) All test procedures shall be in accordance with ASTM C140.

F. Cushion Sand

1. Cushion sand for concrete block paving shall consist of clean, hard, durable, uncoated particles, free from lumps of clay and all deleterious substances. When dry, the cushion sand shall meet the following gradation requirements:

Sieve Size	**Percent by Weight Passing**
1/4 in.	100
No. 50	0 - 35
No. 100	0 - 10

2. The sand will not be approved for cushion sand if it contains more than 10 percent by volume of loam or silt. The cushion sand will be accepted on the basis of gradation tests and visual inspection at the point of use.

3. Grout, where used, shall consist of one part cement conforming to the requirements of ASTM C150 for Portland Cement Type II, and two parts fine aggregate, conforming to the requirements for fine aggregate set forth in the subsection headed "Quality Assurance." When dry, the fine aggregate shall conform to the following gradation requirements:

SIEVE SIZE	**Percent by Weight Passing**
No. 4	100
No. 8	95 - 100
No. 50	10 - 40
No. 100	0 - 15

4. As an alternative, the fine aggregate may be the same as that specified above for grouting riprap.

G. Gabions. Gabions shall be constructed with galvanized wire or galvanized wire with coating of polyvinyl chloride (PVC) as shown on the Contract Drawings or specified in the Detailed Specifications. The wire mesh, tie wire, basket construction, and stone fill shall meet the material requirements set forth in Section 712-15, Gabions, of the NYSDOT Standard Specifications. Test reports on the wire and stone shall be conducted and certified by a testing facility approved by the City.

PART 3 EXECUTION

3.01 INSTALLATION

A. General. The ground surface on which bank or channel protection is to be placed shall be free of brush, trees, stumps, and other objectionable material and shall be dressed to a smooth surface in accordance with General Specification 02230 – Site Clearing. All soft or spongy material shall be removed to the depth shown on the Contract Drawings or as directed by the Engineer and replaced with approved material. Excavation shall be in conformance with General Specification 02316 - Excavation. Filled areas shall be compacted in accordance with applicable provisions of General Specification 02317 - Backfilling. Dust, soil erosion and sedimentation control measures shall be performed in accordance with General Specification 02371 – Dust, Soil Erosion and Sedimentation Control. Protection for structure foundations shall be provided as early as the foundation construction permits. The type of protection shall be placed as shown on the Contract Drawings or called for by the Detailed Specifications.

B. Stone Filling

1. Stone filling shall be placed in a manner that will produce a reasonable well-graded mass of stone with smaller stone fragments filling the space between the larger ones, so as to result in the minimum practicable percentage of voids. The final section of stone filling shall be in conformance with the lines, grades and thicknesses shown on the Contract Drawings. Stone filling used for bank or channel protection shall be placed to its full course thickness in one operation, unless otherwise directed by the Engineer or specified in the Detailed Specifications, and in such a manner that the underlying material will not be displaced or worked into the layer of stone filling. Placement of stone upon finished bedding material, when used, shall be carefully controlled to avoid disruption and damage to the layer of bedding material. The stone shall be so placed and distributed that there will be no pockets of uniform size material.

2. The desired distribution of the various sizes of stone throughout the mass shall be obtained by selective loading of the material at the quarry or other source; by controlled dumping of successive loads during final

placing; or by other methods of placement which will produce the specified results. Rearranging of individual stones by mechanical equipment or by hand shall be done to the extent necessary to secure the specified results. When stone filling is dumped under water, methods shall be used that will minimize segregation.

C. Dry Riprap. The stones shall be placed so that the dimension approximately equal to the layer thickness is perpendicular to the slope surface and that the weight of the stone is carried by the underlying material and not by the adjacent stones. On slopes, the largest stones shall be placed at the bottom of the slope. The dry riprap shall be properly aligned and placed so as to minimize void spaces between adjacent stones. The spaces between the stones shall be filled with spalls of suitable size.

D. Grouted Riprap

1. The procedure of placing the stones shall be the same as described in Paragraph 3.01C for Dry Riprap, except that the space between the stones shall be filled with grout rather than spalls. Material upon which the grouted riprap is laid shall not be allowed to occupy the space between the stones.

2. When the stones are in place, the spaces between them shall be completely filled with grout and the surface of the stones cleaned to remove accumulations of grout. Riprap shall not be grouted in freezing weather. The grouted riprap shall be kept moist for seven days after grouting. A suitable curing compound may be employed, if approved by the Engineer.

3. The Engineer may direct that occasional spaces be left ungrouted for relief of hydrostatic pressure. The ungrouted spaces shall be chinked with spalls of suitable size.

E. Bedding Material. When called for on the Contract Drawings, specified in the Detailed Specifications, or directed by the Engineer, stone filling and dry riprap shall be placed on bedding material. The bedding material shall be placed on the prepared area to the full specified thickness of each layer in one operation, using methods which will not cause segregation of particles sizes. Contamination of bedding material by natural soils or other materials shall be prevented at all times. Bedding material that becomes contaminated shall be removed and replaced with uncontaminated bedding material at no expense to the City.

F. Concrete Block Paving

1. Blocks shall be laid on a 3-inch bed of cushion sand in running bond with the long dimension transverse to the slope and all joints tight.

Blocks shall be thoroughly rammed in place to provide a uniformly even surface and solid bedding under each block.

2. In the areas where grouting is called for, the concrete block shall be laid in running bond with the length parallel to the slope and with 1/4" joints. Following the laying of blocks, in the area to be grouted, sufficient sand of the same gradation as that used in the grout shall be spread over the surface and swept into the joints to fill the joints to four inches from the surface. The block shall be wetted to the satisfaction of the Engineer before any grout is placed. The joints shall be filled with grout from the bottom flush with the top of the block.

3. After grouting has been completed and the grout has sufficiently hardened, the blocks shall be wetted, covered and cured with curing covers for the first seven days after grouting. Grout shall not be poured during freezing weather.

G. Gabions

1. Each gabion unit shall be assembled by binding together all vertical edges with wire ties on approximately six-inch spacing or by a continuous piece of connecting wire stitched around the vertical edges with a coil about every four inches. Empty gabion units shall be set to line and grade as shown on the Contract Drawings. For structural integrity, wire ties or connecting wire shall be used to join the gabions together along the perimeter of all contact surfaces according to the manufacturer's instructions. Internal tie wires shall be uniformly spaced and securely fastened in each outside cell of the structure in accordance with the manufacturer's instructions or where ordered by the Engineer. When gabions are being placed as slope protection, the cross-connecting wire may be deleted if ordered by the Engineer.

2. A standard fence stretcher, chain fall, or iron rod may be used to stretch the wire baskets and hold alignment.

3. The gabions shall be filled with stone carefully placed by hand or machine to assure alignment and avoid bulges with a minimum of voids. After a gabion has been filled, the lid shall be bent over until it meets the side and edges. The lid shall then be secured to the sides, ends and diaphragms with the wire ties or connective wire in the same manner as described above for assembling.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02461
Steel Sheet Piling

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall furnish all labor, equipment and material required to handle, store and install all steel sheet piling and bracing systems as shown on the Contract Drawings, specified in the Detailed Specifications and as specified herein.

B. Steel sheet piling and all necessary structural shapes, bracing, bolts, washers, nuts, connections and miscellaneous appurtenances shall be of the form, weights, shapes and lengths as shown on the Contract Drawings and specified in the Detailed Specifications.

C. An index of the Articles in this Section is presented hereinafter for the convenience of the Contractor.

1.02 MEASUREMENT AND PAYMENT

A. Measurement:

1. The quantity, in pounds, to be measured for payment shall be in accordance with the latest Code of Standard Practice for Steel Buildings and Bridges of the AISC.

2. Only the weight of steel sheet piling below the cutoff lines indicated on the Contract Drawings or specified in the Detailed Specifications shall be measured for payment.

3. Cutoffs, wales, anchors, ties, struts and bracing and removal of material will not be included in measurement, but shall be considered as included in the price paid for the work of this section.

B. Payment:

1. No payment will be made for steel sheet piling which the Contractor uses for his own purposes or for steel sheet piling required to complete the work under another item of the Contract, except where such piling is left in place on written order of the Engineer.

2. Payment for steel sheet piling work will be as provided in the Detailed Specifications and will be made at the unit prices bid for weight of sheet piling in pound The unit price bid shall include the cost of furnishing all labor, materials, equipment and incidentals necessary to complete the work.

1.03 RELATED SECTIONS

A. General Specification 02316 - Excavation

B. General Specification 05081 - Galvanizing

C. General Specification 05120 - Structural Steel

D. General Specification 05501 - Metal Fabrications

E. General Specification 09900 - Painting

1.04 REFERENCES

A. ASTM A6 - General Requirements for Rolled Structural Steel Bars, Plates, Shapes and Sheet Piling.

B. ASTM A36 - Carbon Structural Steel.

C. ASTM A307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.

D. ASTM A325 - Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

E. ASTM A328 - Steel Sheet Piling.

F. ASTM A370 - Test Methods and Definitions for Mechanical Testing of Steel Products.

G. ASTM A572 - High Strength Low-Alloy Columbium-Vanadium Structural Steel.

H. ASTM A673 - Sampling Procedure for Impact Testing of Structural Steel.

I. ANSI/AWS D1.1 - Structural Welding Code.

J. ANSI/AWS QC1 - Qualification and Certification of Welding Inspectors.

K. New York City Building Code (NYBC).

L. New York City Board of Standards and Appeals (BS&A).

M. American Institute of Steel Construction (AISC).

N. Specifications for Structural Joints Using ASTM A325 or A490 Bolts (AISC).

O. Code of Standard Practice for Steel Buildings and Bridges (AISC).

1.05 SUBMITTALS

A. The Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited to:

1. Details of pile driving equipment
2. Certification that materials meet ASTM requirements
3. Detail drawings of steel sheet piling, shoring and bracing
4. Details of all connections and brackets, including corner details
5. Schedule of procedures and operations
6. Sample of driving record forms
7. Sheet piling installation sequence
8. Sheet piling location survey (project record documents).

B. After locations of utilities and other underground obstructions have been confirmed, provide drawings showing the actual locations of existing utilities, structures or other interferences in relation to the proposed locations of steel sheet piling and bracing.

C. Any variations proposed by the Contractor between the Contract Drawings and requirements in this Section shall be submitted for review and approval to the Engineer and shall also require approval by the City. For all proposed variations or alternatives, the Contractor shall submit engineering calculations and design assumptions for determinations of loads and stresses acting in the wall and lateral supports during installation, as well as final conditions. The redesign shall take into account the excavation procedures, dewatering operations, surcharge loading, soil properties, material stresses, temperatures, permanent construction, stages of work and all other conditions which could affect the excavation support system. These calculations must be prepared and stamped by a Professional Engineer licensed in the State of New York.

D. After installation, prepare dimensioned as-built CAD drawings of the complete support system and of the portion of the system left in place.

1.06 SCHEDULE OF PROCEDURES AND OPERATIONS

A. Before commencing any steel sheet pile installation, the Contractor shall submit to the Engineer for approval, a schedule of the procedures he intends to use.

B. The schedule shall show in detail his proposed method, sequence and timing of all steel sheet piling driving operations, catalog data and manufacturer's specification for all hammers and anvils to be used, method of lifting, handling, driving and cutting off of steel sheet piles.

1.07 QUALIFICATIONS

A. The work shall be performed by a General Contractor or a specialty Subcontractor specializing in the specified steel sheet piling system and having experience installing the specified system under similar conditions.

1.08 SEISMIC MONITORING

A. When driving steel sheet piling, the Contractor shall provide the monitoring stations at locations shown on the Contract Drawings or specified in the Detailed Specifications.

B. All pile driving, removal of piling, demolition and related sheet piling activities shall be performed in a manner so that the following criteria shall not be exceeded; peak resultant particle velocity of one-inch per second at location of sensitive instruments and two-inches per second at concrete structures.

C. The Engineer reserves the right to change the locations of the monitoring stations, as required during construction. The Contractor shall engage the services of an approved geotechnical consultant (who shall be a registered Professional Engineer in the State of New York) experienced in the monitoring of vibrations, to install, maintain and monitor an approved seismic monitoring system.

D. Particle velocity shall be measured by using seismographs capable of measuring peak component particle velocities in the range of 0.2 to 0.4 in/sec. All pile driving vibrations shall be monitored for the duration of pile driving unless otherwise ordered to be discontinued by the Engineer. In the event that the monitoring is ordered to be discontinued a suitable credit shall be due the City.

E. All vibration monitoring of specified locations shall be implemented in such a manner that peak component particle velocity can be determined shortly after instances where the vibrations exceed the above criteria. Both the Contractor and the Engineer shall be notified within 30 minutes after any such occurrence and the actual peak particle velocity identified.

F. Permanent vibrations monitoring records of each day's work shall be maintained until the completion of the work or until such time when monitoring is ordered to be discontinued. Such records shall be turned over to the Engineer upon completion of all seismic monitoring work. Monthly reports shall include a tabulation of all instances of vibration levels in excess of the seismic criteria noted above.

G. The cost of the work specified under this section shall be included in the lump sum price bid for the Contract unless otherwise specified in the Detailed Specifications.

1.09 EXAMINATION OF THE SITE

A. Prior to starting steel sheet piling driving operations, the Contractor, the City and the Engineer shall make a joint inspection of the accessible existing structures, pavement and improvements adjacent to the pile driving site to examine and document their present condition.

B. Photographs and measurements shall be taken by the Contractor to record any conditions that may become the subject of possible damage claims.

C. The Contractor shall prepare a report of such conditions, verified by the photographs, and signed by the personnel of the Contractor, the City and the Engineer participating in the investigation.

1.10 DELIVERY, STORAGE AND HANDLING

A. Storage of sheet piling and other excavation support materials shall be such that sagging which would produce permanent deformation shall be prevented. Concentrated loads which occur during stacking or lifting shall be kept below the level which would produce permanent deformation of the material.

1.11 JOB CONDITIONS

A. The excavation support system must retain the adjacent soil, water, structures, utilities, streets and other features and must protect them from damage due to settlement, lateral movements, loss-of-ground or any other causes related to this construction. The Contractor shall be responsible for taking all precaution

necessary to prevent such damage. An important function of the sheeting is to act as a ground water cutoff so as to prevent disturbance of subgrade at bearing level due to groundwater inflow into the excavation.

B. The Contractor shall be fully responsible for installing and maintaining the rakers, and corner bracing as necessary to minimize movements of the wall during all stages of construction.

C. Expose active utilities by hand, where they lie within work areas. All existing utilities affected by construction shall be temporarily supported and protected from harm.

D. If existing utilities interfere with the method of excavation support shown on the Contract Drawings, relocate the utilities as approved by the Engineer.

E. Use continuous members for the excavation support system unless otherwise approved by the Engineer.

PART 2 PRODUCTS

2.01 MATERIALS

A. Steel sheet piling shall conform to the requirements of ASTM A328 or ASTM A572. Sheet piles shall be new and shall consist of rolled sections of the continuous interlocking type of the section, length, weight and ASTM shown on the Contract Drawings or specified in the Detailed Specifications.

1. Sheet piling utilized for temporary construction shall conform to ASTM A328.

2. Sheet piling installed as permanent construction shall conform to ASTM A572.

a. Each heat shall meet the Charpy V-notch impact test requirements of ASTM A370. Samples shall be machined in a set of three and tested at the following minimum requirements for temperature and test value:

Temperature	Test Value
30°F	25 ft-lb
0°F	15 ft-lb

b. When using subsize samples, that is thickness of less than one-half inch as specified in ASTM A673, the following minimum requirements shall be met:

Temperature	Test Value
30EF	19 ft-lb
0EF	11 ft-lb

c. In the event that the average ft-lbs of the three samples does not meet the above requirements when tested at both temperatures, all the material manufactured from that sheet shall be rejected.

B. All structural shapes, plates and similar members shall conform to the requirements of ASTM A6 and A36, and General Specifications 05120 – Structural Steel and 05501 – Metal Fabrications.

C. Bolts, nuts and washers shall conform to the requirements of ASTM A325 or A307. All hardware for permanent construction shall be galvanized in accordance with General Specification 05081 - Galvanizing.

D. Minimum web and flange thickness of the steel sheet piling shall be 3/8 inch unless otherwise shown on the Contract Drawings or specified in the Detailed Specifications.

E. Opening of socket at interlock shall be checked with manufacturer supplied tolerance gages.

2.02 WELDING

A. Welding shall be performed in accordance with the requirements of:

1. ANSI/AWS D1.1 Structural Welding Code.
2. Relevant sections of the NYBC.
3. Latest rules of the BS&A.

B. All shop and field welding shall be performed by certificated welders under the immediate supervision of a representative of a standard testing agency or an inspection agency reporting directly to and under the control of the Department of Environmental Protection. The Contractor shall submit the name of such agency to the Commissioner for approval before starting work. The costs of all welding inspections shall be borne by the Contractor.

PART 3 EXECUTION

3.01 FABRICATION

A. Steel sheet piling shall be new and so fabricated that when driven in place, it will form a continuously interlocked wall to the extent shown on the Contract Drawings. Steel sheet piles with bends or springs, or with damaged interlocks shall not be used.

B. Steel sheet piling shall be full length, no splices will be permitted.

C. Walers and braces may be prefabricated or fabricated in place. All welding shall conform to the requirements of Article 2.02, Welding.

3.02 DRIVING

A. Steel sheet piling shall be carefully positioned at the locations shown on the Contract Drawings and driven in a plumb position, to the minimum tip elevations shown on the Contract Drawings or specified in the Detailed Specifications.

B. Sheet piling shall penetrate to approved depth in firm subsurface material and each sheet pile shall interlock with the adjacent sheet pile so as to form a single continuous wall. Piling shall be driven in vertical increments limited in such a manner so that driving proceeds without erratic advance of individual sheets.

C. Sheet piles shall be driven in such a manner as to insure continuous interlocking throughout the length of the sheet piles. Sheet piles shall be driven in pairs with ball end leading.

D. Steel sheet piling shall be framed with and connected to other structural members and shapes as shown on the Contract Drawings or specified in the Detailed Specifications.

E. In the event the sheet piling cannot be driven to the minimum tip elevation, the Contractor shall immediately notify the Engineer for corrective measures.

3.03 PILE HAMMER

A. Pile hammers shall have a sufficient reserve capacity for driving the sheet piles to the design requirements, including any contingencies occurring during driving. The minimum hammer energy and maximum hammer energy in foot-pounds per blow shall be as shown on the Contract Drawings or specified in the Detailed Specifications, and in accordance with NYBC.

B. The lower end of the hammer shall be fitted with an anvil base that is built to fit the top of the steel sheet piling and to hold the sheet piling under the center of the hammer during driving.

3.04 EXCAVATION

A. Excavation shall conform to General Specification 02316 – Excavation and shall not be carried in advance of or below the bottom of the steel sheet piling.

B. Excavation within the sheet piling shall not be performed until the bracing system, if required by the Contract Drawings or Detailed Specifications, has been installed at the stage and in the sequence as approved by the Engineer.

3.05 JETTING

A. Steel sheet piling shall be jetted only when written permission is given by the Engineer. Sufficient jets and adequate water pressure shall be used to erode the material adjacent to the pile without impairing the penetration of steel sheet piling already in place.

B. Before the desired penetration is reached, the jets shall be withdrawn and the steel sheet piling shall be driven with the hammer alone to obtain the required penetration in the subsurface material.

3.06 OBSTRUCTIONS

A. Any obstructions encountered in driving the steel sheet piling shall be removed or otherwise disposed of by the Contractor so as to permit the proper installation of the sheet piling.

B. After the removal of the obstructions, the steel sheet piling shall be redriven to the required penetration. It is essential that the Contractor familiarize himself with the site conditions and the subsurface conditions at the site so as to be prepared for removal of obstructions.

C. The Contractor shall have on hand suitable equipment for removing obstructions, and shall employ this equipment, in a manner satisfactory to the Engineer.

3.07 TOLERANCE

A. Steel sheet piling shall be driven plumb to the lines, grades and depths shown on the Contract Drawings or specified in the Detailed Specifications with secure interlocking for the entire length of the sheet piling.

B. Driving shall be done with fixed leads to hold the sheet piling firmly in position and alignment and in axial alignment with the hammer.

3.08 SHEET PILING CUTOFF

A. The Contractor shall cutoff sheet piling left in place to the grades established on the Contract Drawings or specified in the Detailed Specifications.

B. Cutoffs are the property of the Contractor and shall be disposed of off-site.

3.09 SURVEY WORK

A. The Contractor shall engage the services of a licensed surveyor, approved by the Commissioner, for the performance of the survey work.

B. Before starting work, the Contractor shall survey adjacent structures and improvements, establishing exact elevations at fixed points to act as benchmarks. He shall clearly identify benchmarks and record existing elevations. Datum level used to establish benchmark elevations shall be located

at a sufficient distance so as not to be affected by movement resulting from excavation or construction operations.

C. During excavation, the Contractor shall resurvey benchmarks as required by the Detailed Specifications. The Contractor shall maintain an accurate log of surveyed elevations for comparison with original elevations, and shall promptly notify the Engineer if changes occur or if cracks, sags or other damage is evident.

D. The installed location of the sheet piling shall be established by survey and shown on drawings prepared for this purpose as project record documents. Upon completion of the sheet piling installation, the Contractor shall submit to the City, mylars of drawings showing installed location of the sheet piling as related to column lines, center of footings or other reference points and lines, the cutoff elevation, and length below cutoff for each pile. Mylars shall be the same size as the Contract Drawings.

3.10 DAMAGED SHEET PILING

A. Any sheet piling, which at any time becomes damaged, displaced, separated from adjacent sheets or otherwise injured, shall be withdrawn and replaced with new sheet piling at the expense of the Contractor.

B. All damaged sheet piling shall be removed from the site by the Contractor.

3.11 PAINTING

A. Structural steel braces and supports attached to the steel sheet piling and exposed in the finished work and indicated to remain shall be thoroughly cleaned, prepared for painting and painted in accordance with the requirements of General Specification 09900 - Painting.

3.12 INSPECTION

A. All inspections will be performed by the Engineer designated for controlled inspection.

B. The driving of each sheet piling section is a mandatory hold point for which prior notification of the Engineer is required, and driving of each piling section shall be performed in the presence of the Engineer. Driving records will be kept by the Engineer.

C. The Contractor shall cooperate with the Engineer in determining the resistance to penetration and shall mark each piling section at one foot intervals before driving or as required by the Engineer.

END OF SECTION

SECTION 02501
Reinforced Concrete Sewer Pipe

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall furnish and install reinforced concrete sewer pipe, fittings and specials.

B. The following index of this Section is included for convenience:

1.02 RELATED SECTIONS

A. General Specification 02505 - Leakage Tests

B. General Specification 03300 - Cast-in-Place Concrete

C. General Specification 03410 - Precast Structural Concrete

1.03 PAYMENT

A. Payment will be made as described in the Detailed Specifications.

1.04 REFERENCES

A.	ASTM A283	-	Low and Intermediate Tensile Strength Carbon Steel Plates
B.	ASTM A1011	-	Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
C.	ASTM B127	-	Nickel-Copper Alloy (UNS N04400) Plate, Sheet, and Strip
D.	ASTM C31	-	Making and Curing Concrete Test Specimens in the Field
E.	ASTM C39	-	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
F.	ASTM C76	-	Reinforced Concrete Culvert, Storm Drain and Sewer Pipe
G.	ASTM C361	-	Reinforced Concrete Low-Head Pressure Pipe
H.	ASTM C443	-	Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
I.	ASTM C497	-	Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile
J.	AWWA C302	-	Reinforced Concrete Pressure Pipe, Noncylinder Type

1.05 DESIGN REQUIREMENTS

A. Concrete shall conform to General Specifications 03300 – Cast-in-Place Concrete and 03410 – Precast Structural Concrete, and when tested at the end of 28 days shall have the following minimum compressive strengths:

1.	PRECAST PIPE	-	4,000; 5,000; 6,000 psi
2.	MONOLITHIC SEWERS	-	3,500 psi
3.	CRADLES AND ENCASEMENT	-	3,500 psi

B. Design: Provide the classes of reinforced concrete sewer pipe as shown or specified. Conform pipe designs to the following requirements.

1. Use diameter, wall thickness, compressive strength of concrete and area of circumferential reinforcement as prescribed for Classes I to IV in Tables 1 to 5 in ASTM C76, except do not use Wall A thickness, elliptical reinforcing cages or quadrant reinforcing mats. Do not substitute modified designs for designs shown in the tables.

2. Provide special designs only for pipe with diameters and loads beyond those shown in Tables 1 to 5, pipe diameters that do not have steel reinforcement areas shown in the tables and pipe subject to thrust forces encountered in

jacking operations. Conform special designs with the requirements of Section 7.2.2 of ASTM C 76, except do not use Wall A thickness, elliptical reinforcing cages or quadrant reinforcing mats without prior approval. Retain a Registered Professional Engineer, licensed in the State of New York, to prepare, sign and seal all special designs for pipe.

C. Precast reinforced concrete pipe shall conform to the requirements of ASTM C76 for circular steel reinforcement and the three-edge bearing strength test requirements for the load to produce the 0.01 inch crack and for the ultimate load. When the strength test requirements specified in the Detailed Specifications are greater than the strength test requirements of ASTM C76, the thickness of the pipe wall may be increased, the area of circular steel reinforcement increased, or a combination of these, all as approved by the Engineer.

D. Joints:

1. Provide joints for pipe, fittings and specials in gravity sewer and drain lines meeting the requirements of ASTM C443 and this Specification.

2. Provide joints for pipe, fittings and specials in concrete pressure lines with test pressures of 125 ft. or less meeting the requirements of ASTM C361 and these specifications.

3. Provide joints for pipe, fittings and specials in concrete pressure lines with test pressures over 125 ft. as described in the Detailed Specifications.

1.06 SUBMITTALS

A. The Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited to:

1. All diameters and classes of reinforced concrete pipe, fittings and specials and for concrete sills showing dimensions, strength and materials specifications and standards, joint details and reinforcement position

2. Area of all cages of reinforcing steel

3. A minimum clearance of one inch for each cage of circumferential reinforcing steel shown

4. Angle of the joint

5. Length and thickness of bell and spigot

6. Length and thickness of joint

7. Manufacturer, size and type of gasket

8. Manufacturer's recommendations for gap dimension and tolerance for a properly installed pipe joint

9. Signature and title of authorized representative of the manufacturer

10. All requirements of the latest ASTM Specifications for Precast Reinforced Concrete Pipe as called for in these specifications will be complied with in the manufacture of the pipe

B. Joint Compliance: Submit notarized affidavit of joint compliance with ASTM C443 and these specifications for each pipe size. The statement shall include date of test.

C. Quality Control: Submit certified results of all shop tests for approval.

1.07 QUALITY ASSURANCE

A. General: Provide concrete pipe, fittings and specials that are precast or machine made and are the product of a company that can demonstrate by tests and installation records satisfactory experience in manufacturing concrete pipe of the quality and type specified.

1.08 DELIVERY, STORAGE AND HANDLING

A. Do not ship pipe to the site of the work until the pipe test results are certified by the Engineer.

PART 2 PRODUCTS

2.01 REINFORCED CONCRETE PIPE

A. Manufacture:

1. Do not use admixtures or blends in concrete without prior approval.

2. The manufacturer shall maintain a satisfactory manufacturing schedule and shall have adequate storage facilities so that the work will not be delayed.

3. Cast pipe in steel forms to the exact dimensions shown, specified or required. Unless otherwise shown or specified, the inner and outer rings of reinforcement shall be concentric. Provide chairs and spacers to insure and maintain the proper position of reinforcement steel with respect to the protective concrete covering. Pipes in which reinforcing steel is placed beyond the tolerances allowed by ASTM C76 will be rejected. Use metal spacers at the top between the inner and outer forms to maintain uniform wall thickness in casting pipe. Where reinforcement mesh is used in the pipe, curve such reinforcement to shape on rolls having grooves for the longitudinal wires. In casting pipe, do not cut wires for form spacers or for other purposes. Provide continuous internal vibration of concrete during the pouring operation.

4. The Contractor will be responsible for meeting all requirements for the manufacture of precast pipe and checking at regular intervals all of such requirements.

B. Lengths: Manufacture all reinforced concrete pipe in lengths of not more than 16 feet and not less than 8 feet as follows, except where shorter lengths are required and approved for pipeline curves or at junctions with structures.

1. Furnish subaqueous pressure pipe in lengths of not less than 16 feet for pipe up to and including 84 inches in diameter. Pipe larger than 84 inches in diameter may be of lengths less than 16 feet, decreased on a sliding scale in accordance with the manufacturer's recommendations and as approved by the Engineer.

2. Furnish pressure pipe to be installed inland in lengths not less than 12 feet, except that pipe to be laid in sheeted trench shall be furnished in lengths not less than 8 feet.

C. Labeling: Immediately after the stripping of forms, all pipe manufactured for the Department of Environmental Protection as required under this contract shall be marked and identified with the following data: DEP, contract name and number, class and diameter of pipe, number of pipe, date of manufacture and the name of the manufacturer. The numbering of the pipe shall be consecutive for each diameter of pipe. Brass lettering templates designed to stencil this information on each pipe shall be provided by the pipe manufacturer. The aforementioned data shall be stenciled on the inside and outside of each length of pipe with waterproof ink or paint. Any pipe arriving at the location of the work without this information stenciled thereon will be rejected. At the end of each day of casting of the pipe, the manufacturer shall forward to the Engineer three copies of a report giving the diameters and the respective numbers of pipe cast that day.

D. Monolithic Sewers:

1. Forms for monolithic concrete sewers shall be smooth, regular and true to shape. Forms which do not meet these requirements or which result in interior surfaces or thicknesses inferior to commercial precast concrete pipe shall not be used. Forms shall be thoroughly cleaned and approved by the Engineer before re-use. Sheeting shall not be used as exterior forms for monolithic concrete sewers.

2. Concreting, unless otherwise approved by the Engineer, shall proceed in lengths of not less than 12 feet.

3. Construction joints both longitudinal and transverse in monolithic concrete sewers shall have fabricated nickel-copper roofing sheet water stops conforming to the requirements of ASTM B127.

2.02 REINFORCED CONCRETE FITTINGS AND SPECIALS

A. General: Provide reinforced concrete fittings and specials where shown, specified or required, and manufactured in accordance with the applicable sections of the respective standard for the adjoining pipe. Provide joints the same as in the adjoining pipe. Provide the interior surface of bends of the same smoothness and

diameter as the adjoining pipe. Provide the center line radius of curvature of bends to be equal, in dimension, to the inside diameter of the pipe.

B. Strength: Design all reinforced concrete fittings and specials to have the same strength as the class of the adjoining pipe. Retain a Registered Professional Engineer, licensed in the State of New York to prepare, sign and seal all designs for fittings and specials.

C. Standard fitting such as bends, tees, wyes and reducers shall be formed of steel, cut, shaped and welded to the proper form. Interior and exterior concrete or mortar shall be placed in approved manner.

D. Special pieces and openings in standard pipe such as closures, wall fittings, adapters, manholes, air valve outlets, blow-offs and branches shall conform to details approved by the Engineer.

2.03 JOINTS

A. General: Rubber gaskets shall be stored in as cool a location as practicable, preferably at 70 degrees F or less. In no case shall gaskets be exposed to the direct rays of the sun for a total of more than 24 hours.

B. Gravity Sewer and Drain Lines:

1. Manufacture all gravity sewer and drain pipe, fittings and specials with watertight joints using rubber gaskets in accordance with the requirements of ASTM C443. Provide a preformed groove in the tongue or spigot of sufficient depth to hold the gasket securely in place and produce the proper gasket compression. Reinforced concrete pipe joints shall be optional as to shape, except that no joint shall have a groove in which the wall thickness of the pipe is reduced to less than one-half, other than by a slight draw or taper, unless approved by the Engineer in writing.

2. Manufacture the pipe with perfectly machined castings for forming the bells and spigots so that they will be true circles and when laid together the annular space for the rubber gasket will be perfectly uniform. The diameters of the bell and spigot surfaces, depended upon to compress the gasket, shall not vary from the theoretical diameters by more than 1/16 inch. The joint shall not project beyond the body of the pipe.

3. Reinforce the bells of the pipe with a single cage of steel in which the circumferential members are the same gauge as those in the body of the pipe, but spaced on no more than 1 inch centers.

4. The type and the manufacturer of the flexible rubber gaskets to be used shall be submitted for approval before pipe laying begins.

C. Concrete Pressure Lines:

1. Provide all concrete pressure pipe, fittings and specials with watertight joints using rubber gaskets in accordance with the requirements of ASTM C361 and this Specification.

2. Connect adjacent pipes by self-centering steel joint rings sealed with a continuous round rubber gasket. The joint shall be tight under normal conditions of service, and shall be sufficiently flexible to permit expansion and contraction as well as slight deflection due to normal earth settlement.

3. Specially shape the rings which form the joint so that they will join with a close, sliding fit. The joint surfaces shall be such that the rubber gasket will be confined on all sides.

4. Provide the spigot ring with an external groove accurately sized to receive the gasket. Special section steel for spigot rings shall conform to ASTM A283/A283M, Grade A or B.

5. Place the bell ring to permit gradual deformation of the gasket when the joint is assembled. The minimum thickness of bell rings shall be 3/16 inch. Bell rings for pipe sizes 42 inches and larger shall have a minimum thickness of 1/4 inch. Bell rings 1/4 inch and thicker shall conform to ASTM A283/A283M, Grade A or B. Bell rings less than 1/4 inch thick shall conform to ASTM A570/A570M, Grade A.

6. Precisely size each ring by expansion beyond the elastic limit of the steel and then gaging on an accurate template. Protect all exposed surfaces of both rings with a corrosion-resistant coating of zinc applied by an approved metalizing process after cleaning.

7. Provide a continuous rubber gasket with smooth surfaces free from imperfections. It shall be circular and shall fill the grooved recess between the assembled joint rings. Rubber compound used shall conform to the requirements of Section 4.4.10 of AWWA C302.

2.04 CURING

A. Cure all pipe, fittings and specials by steam or membrane curing. Water curing is not permitted.

2.05 SHOP TESTING

A. Test concrete sewer pipe in accordance with the applicable provisions of ASTM C497, as required by the ASTM Specification for the pipe and as specified herein.

B. Test cylinders: Each day the Contractor shall prepare two test cylinders made from the concrete used for manufacturing the pipe under this contract.

1. Make test cylinders in accordance with the requirements of ASTM C31 and cure and store them under identical conditions with the pipe. Test cylinders shall be properly marked for identification and dated.

2. The Engineer will have the cylinders tested to determine whether the concrete complies with the strength requirements. Of each pair of test cylinders, one cylinder will be tested at 7 days, and the other test cylinder will be tested at 28 days. Test cylinders will be tested in accordance with ASTM C39 and the cost of such tests will be borne by the City.

C. Test Pipe Sections:

1. When lengths of pipe are 8 feet or less, the Engineer will select one length from every fifty lengths of each diameter and class.

2. When lengths of pipe are more than 8 feet, the Contractor shall provide a pipe test specimen four feet long for every 50 lengths of each diameter and class. Each test specimen shall be manufactured, marked for identification and shall meet the strength test requirements as specified for the pipe it represents. The manufacturing and marking of the pipe test specimen shall be witnessed by the Engineer.

3. Where less than 50 lengths are required for any pipe diameter, one eight-foot length of pipe will be selected by the Engineer or one pipe test specimen shall be provided for testing purposes; however, the Engineer may waive this requirement at his discretion.

4. Age of Pipe: Pipe selected or pipe tested specimens provided as specified for testing purposes shall be at least twenty-eight days old but shall not be over thirty days old at the time of testing.

   a. Due to unforeseen conditions beyond the control of the Engineer and the manufacturer, special permission will be given in writing by the Engineer to delay a test beyond the thirty day aging period.

   b. The three-edge load bearing strength at 0.01-inch crack and the ultimate load strength of pipe tested after twenty-eight days will be corrected to the twenty-eight day strength by deducting 1/2 of one percent of the recorded strength for each day beyond the twenty-eight day age.

   c. The Contractor may request tests to be made on pipe which has aged at least fourteen days and not more than 28 days but the tests must meet the 28 day strength test requirement in order to be accepted by the Engineer for installation in the work.

D. Basis of Acceptance: Conform the basis of acceptance for reinforced concrete pipe to Section 5.1.1 of ASTM C76 and this Specification.

1. The Engineer will reject all pipe of the lot which the tested length of pipe represents if the actual or corrected strength of the pipe tested fails to meet the three-edge load bearing strength test requirements. However, if the eight-foot length of pipe selected by the Engineer fails to meet the three-edge loading bearing strength test requirements, the Contractor may request

that tests be made on two other eight-foot lengths of pipe representing that lot from which the original pipe tested was selected. The Engineer will select these two lengths of pipe. Should the tests on these two lengths of pipe prove satisfactory, the lot, represented by these lengths of pipe will be accepted. Should the tests on one or two of these lengths of pipe prove unsatisfactory, no further tests on any other lengths of pipe from this lot will be made, and all the pipe in this particular lot will be rejected.

2. The Engineer may accept precast pipe which meets the 0.01-inch crack strength test requirements but does not meet the ultimate load strength test requirements; however, the City will deduct 1/2 of one percent of the price bid per linear foot for that item which covers that particular pipe diameter and test strength requirements, for each one percent by which the ultimate load is below the required ultimate load. This deduction will be made on all pipe represented by the test specimen.

E. Proof-of-Adequacy Tests for Special Designs: Prior to manufacturing production run pipe of special design, test one pipe of at least four feet in length of each diameter and class by the three-edge-bearing method to confirm that the pipe meets both the 0.01-inch crack and ultimate load requirements for which it is designed.

F. Joint Adequacy Tests:

1. Prior to manufacturing production run pipe, fittings and specials, conduct all tests required by Sections 9 and 10 of ASTM C443 for each diameter of pipe.

2. Give two weeks' notice in writing, before the day of testing, to both the Engineer and the approved laboratory, to witness the tests. The Department of Environmental Protection reserves the right to have an inspector or authorized representative present at the time of the tests.

3. All manufacturers supplying reinforced concrete pipe to the Department of Environmental Protection shall, for each size of pipe and gasket combination submitted for approval, have on file with the Department a Certified Statement attested thereto by the City inspector or representative that the hydrostatic test on pipe and on rubber gasket was performed in accordance with the above-mentioned ASTM designation and passed.

G. Location of Tests: The pipe selected or the pipe test specimen provided for test shall be delivered by the Contractor to an approved testing laboratory and removed by the Contractor after the test has been made. The Contractor may request that tests be made at the manufacturer's plant; however, the pipe manufacturer shall provide an approved and certified testing machine with a hydraulically-operated jack and direct-reading gauges requiring no calibration.

H. Test Witnessing: All strength tests will be witnessed by the Engineer.

I. Costs of Tests: The Contractor shall pay all costs associated with tests and test witnessing.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install all reinforced concrete sewer pipe, fittings and specials in accordance with the manufacturer's recommendations and approved shop drawings, and as follows.

1. Precast pipe lines shall be true to line and grade. The interior surface shall be smooth and uniform.
2. Season pipe 28 days prior to laying.
3. With the gasket in place, align the pipe, and draw the joints home with an approved tackle and apparatus. Prior to the use of such apparatus and method, demonstrate to the Engineer for approval the effectiveness and practicability of the proposed method of drawing the joints home.
4. The position and condition of the gasket will be examined from the inside of the pipe before successive pipe lengths are installed. If an unsatisfactory condition is located, the pipe shall be taken out and the operation of drawing the pipe together repeated with a new gasket.
5. Provide approved concrete sills for the temporary support of pipes which are to be permanently supported on concrete cradles for maintaining proper alignment and grade until the concrete cradle is poured. Completely embed such sills in the concrete cradle.
6. Cast concrete cradles for pipe in one pour to the exact size and dimensions shown on the Contract Drawings.

B. Jointing Pipe at Structures:

1. At manholes and other structures in precast concrete pipe lines, the construction may be of monolithic concrete. Submit details of such joints to the Engineer for approval.
2. Where precast concrete pipe for pressure pipe lines is joined to monolithic concrete pipe, cast iron or steel pipe, or other structure, the joint shall be similar to the joint between individual precast concrete pipes, enlarged if required. Submit details of such joints to the Engineer for approval.
3. Where provisions for future connections are required, provide similar joints and coat with an approved asphaltic compound for protection. If necessary, in the opinion of the Engineer, place a suitable collar entirely around the pipe at all such joints.

3.02 LEAKAGE TESTS

A. Test the reinforced concrete sewers for leakage after completion in accordance with General Specification 02505 - Leakage Tests.

3.03 SCHEDULES

A. Refer to the schedule contained in the Detailed Specifications for information on the piping that is to be constructed using the pipe materials and methods specified herein.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02502

Vitrified Clay Pipe Sewers

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall furnish and install all clay pipe and fittings, including perforated clay pipe. Clay pipe and fittings shall be used only where specifically shown or specified.

B. The following index of this Section is included for convenience:

1.02 RELATED SECTIONS

A. General Specification 02505 - Leakage Tests

1.03 PAYMENT

A. Payment for vitrified clay pipe sewers will be made as provided for in the Detailed Specifications.

B. No direct payment will be made for jointing materials; the cost thereof shall be included in the price for vitrified clay pipe sewers.

1.04 REFERENCES

A. ASTM C12 - Standard Practice for Installing Vitrified Clay Pipe Lines

B. ASTM C425 - Compression Joints for Vitrified Clay Pipe and Fittings

C. ASTM C700 - Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated

1.05 SUBMITTALS

A. The Contractor shall submit Shop Drawings and the following:

1. Complete detailed drawings, including piping layouts and schedules of all pipe.

1.06 QUALITY ASSURANCE

A. Crushing Strength Tests:

1. For crushing strength tests, the Engineer will select one pipe length from each one hundred lengths of each pipe diameter manufactured as required for this Contract. Where less than one hundred lengths of pipe are to be required for any pipe diameter, at least one pipe length will be selected for testing purposes, however, the Engineer may waive this requirement at his discretion.

2. The test specimen shall be tested for crushing strength by the three-edge bearing method. The minimum crushing strength required will be those strengths listed in Table 1 of ASTM C700.

3. The tests shall be performed at the manufacturer's plant on an approved and certified testing machine with a hydraulically-operated jack and direct reading gauges requiring no calibration, supplied by the manufacturer.

4. The Engineer will reject all pipe of the lot from which the tested length specimen has been taken if the actual strength of the pipe tested fails to meet the three-edge load bearing strength test requirements. However, the Contractor may request that two other lengths of pipe be tested representing the same lot. The Engineer will select these two lengths of pipe. Should the tests on these two lengths of pipe prove satisfactory, the lot, represented by these lengths of pipe will be accepted. Should the tests on one or both of these lengths of pipe prove unsatisfactory, no further test on any other lengths of pipe from this lot will be made, and all the pipe in this particular lot will be rejected.

5. Pipe shall not be released from the manufacturer's plant for shipment to the work site until the results of the tests are certified by the Engineer. All tests on pipe shall be witnessed by the Engineer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Vitrified Clay pipe sewers shall be as manufactured by:

1. Logan Clay Products Company, Logan, Ohio
2. Superior Clay Corporation, Uhrichsville, Ohio
3. Or approved equal.

2.02 MATERIALS

A. Clay pipe and fittings shall meet the requirements of ASTM C700. Extra strength pipe shall be provided unless otherwise specified. Perforated clay pipe shall be used only where specifically shown or specified.

1. No more than one brand of pipe for any one size will be permitted.
2. Pipe shall be free from laminations and surface roughness.
3. Minimum laying length of pipe shall be 3 feet.

B. Joints shall be compression type joints meeting the requirements of ASTM C425.

C. Marking. All pipe shall be marked and identified with the following data as required by ASTM C700: class of pipe, the name of the manufacturer, and the factory at which it was made. Any pipe arriving at the location of the work without this information will be rejected.

D. Shape. The pipe shall be bell and spigot pattern. The bells shall be true circular and concentric with the barrel of the pipe, and the planes of the ends shall be at right angles to the axis of the pipe. Butt joints with collars shall be used only when indicated or specified.

E. Glazing. The pipe shall be smoothly salt-glazed over the entire inner and outer surfaces, except that the inner surface of the socket and the outer surface of the spigot end may be unglazed for two-thirds the depth of the socket.

F. Scoring. The inner surface of the socket and outer surface of the spigot end, if glazed, shall be scored in conformity with ASTM C700.

PART 3 EXECUTION

3.01 INSTALLATION

A. All clay pipe shall be installed in accordance with ASTM C12, the manufacturer's recommendations and approved shop drawings. When so indicated, specified or required, the sewer shall be encased in concrete.

B. No section of sewer shall be laid before the subgrade or cradle has been approved by the Engineer.

C. Pipe sections shall be laid with ends abutting and shall be fitted together and matched so that when laid in the work they will form a sewer with a smooth and uniform invert. Unless otherwise permitted or directed, not less than 15 feet of pipe sewer shall be laid in one operation.

3.02 WHEN NO CRADLE IS REQUIRED

A. When the sewer is to be laid without a cradle, the bottom of the trench shall be excavated to fit the lower third of the pipe and to receive the bell. All irregularities in the bottom of the trench shall be filled up to the required grade with suitable material and the pipe shall then be evenly bedded therein.

3.03 CONCRETE CRADLE

A. Concrete cradles for pipe shall be cast in one pour to the exact sizes and dimensions shown on the Contract Drawings.

B. Concrete sills of approved shapes and dimension shall be used for the temporary support of pipes which are to be permanently supported on concrete cradles. Such sills shall be completely imbedded in the concrete cradle. Working drawings of these sills shall be submitted for approval before pipe laying begins.

3.04 BROKEN STONE OR GRAVEL CRADLE

A. When the sewer is to be laid in a gravel or broken stone cradle, the cradle shall consist of clean gravel or sound broken stone, all of which shall pass through a 1-1/4-inch mesh screen and be retained on a 3/8-inch mesh screen.

B. The stone shall be deposited and tamped for the full width of the trench to the required height. The pipe shall then be bedded therein and the remainder of the stone deposited and carefully tamped in such a manner as to avoid disturbing the sewer.

3.05 SEWER TO BE KEPT CLEAN

A. The interior of the sewer shall be kept clean of all dirt, cement and superfluous materials as the work progresses.

3.06 EXPOSED END TO BE COVERED

A. During the progress of the work, the exposed end of the sewer shall be provided with an approved temporary cover to exclude earth and other materials.

B. The dead end of the sewer shall be closed with a bulkhead of 8-inch thick brick masonry, or vitrified clay.

3.07 FIELD QUALITY CONTROL

A. Clay pipelines shall be tested for leakage as specified in General Specification 02505 – Leakage Tests.

3.08 SCHEDULES

A. Refer to the schedule contained in the Detailed Specifications for information on the piping that is to be constructed using the pipe materials and methods specified herein.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02504
Sanitary and Storm Sewer Structures

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for furnishing and installing precast and cast-in-place manholes, catch basins, trench drains, and other structures in sanitary sewers and storm sewers including all appurtenances.

B. Concrete drainage structures include, but are not limited to, inlets, catch basins, trench drains, area drains, manholes, pipe cradles and encasements, and splash pads.

C. The following index of this Section is included for convenience:

1.02 PAYMENT

A. Unless otherwise provided in the Detailed Specifications, no separate payment will be made for performing any Work required under this Section and the Contractor shall include all costs thereof shall be included in the lump sum price Contract.

1.03 RELATED SECTIONS

A.	General Specification 02505	-	Leakage Tests
B.	General Specification 03210	-	Reinforcing Steel
C.	General Specification 03300	-	Cast-in-Place Concrete
D.	General Specification 05561	-	Miscellaneous Metal Castings

1.04 REFERENCES

A.	ASTM C32	-	Sewer and Manhole Brick (Made from Clay or Shale)
B.	ASTM C39	-	Standard Test Method for Compressive Strength for Cylindrical Concrete Specimens
C.	ASTM C78	-	Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
D.	ASTM C139	-	Concrete Masonry Units for Construction of Catch Basins and Manholes
E.	ASTM C140	-	Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
F.	ASTM C144	-	Aggregate for Masonry Mortar
G.	ASTM C279	-	Chemical-Resistant Masonry Units
H.	ASTM C443	-	Joints for Concrete Sewer and Manholes, Using Rubber Gaskets
I.	ASTM C478	-	Circular Precast Reinforced Concrete Manhole Sections
J.	ASTM C666	-	Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing Freeze Thaw Stability of Concrete Specimens
K.	ASTM D1785	-	Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
L.	AWWA C302	-	Reinforced Concrete Pressure Pipe, Non-cylinder Type

M. City of New York Department of Environmental Protection Sewer Design Standards

1.05 DESIGN REQUIREMENTS

A. Except as otherwise shown or specified, construct sewer manholes and catch basins of precast reinforced concrete sections conforming to ASTM C478.

B. Unless otherwise shown, manholes and catch basins shall be built in accordance with the Sewer Design Standards of the Department of Environmental Protection, except that they shall be constructed without steps.

C. Trench drains shall be constructed of precast, interlocking modular components.

D. Fiberglass trench drains shall be constructed of resin vinylester suitable for 15% sodium hypochlorite at 100°F with a resin of Hetron 922 or approved equal.

1.06 SUBMITTALS

A. Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited to:

1. Shop and field test reports of concrete samples tested in an approved laboratory.

1.07 DELIVERY, STORAGE AND HANDLING

A. General: Take every precaution to prevent injury to the structures during transportation and unloading. Unload manhole sections and other precast items using skids, pipe hooks, rope slings, or suitable power equipment, if necessary, and keep the items under control at all times. Do not allow the items to be dropped, dumped or dragged under any conditions. Follow applicable requirements specified in Contract Documents Damaged Section: If any precast manhole section or other structural unit is damaged in the process of transportation or handling, reject and immediately remove the item from the site, and replace it at no increase in Contract Amount.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Polymer Concrete Trench Drains shall be as manufactured by:

1. ABT, Inc., Troutman, NC.
2. ACO Polymer Products, Inc., Chardon, OH.
3. Or approved equal

B. Fiberglass Trench Drains shall be as manufactured by:

1. ACO Polymer Products, Inc., Chardon, OH.
2. Aqueduct, Inc., Waltham, MA.
3. Or approved equal

C. Precast Manholes shall be as manufactured by:

1. Monarch Precast Concrete Corp., Allentown, PA
2. Precast Concrete Sales Company, Valley Cottage, NY

3. Long Island Precast, Inc., Holtsville, NY.
4. Or approved equal

D. Precast Inlets shall be as manufactured by:

1. Monarch Precast Concrete Corp., Allentown, PA
2. Penn-Cast Products, Inc., Fredericksburg, VA
3. Precast Concrete Sales Company, Valley Cottage, NY
4. Or approved equal

E. Precast Catch Basins shall be as manufactured by:

1. Monarch Precast Concrete Corp., Allentown, PA
2. Penn-Cast Products, Inc., Fredericksburg, VA
3. Long Island Precast, Inc., Brookhaven, NY
4. Precast Concrete Sales Company, Valley Cottage, NY
5. Or approved equal

2.02 MATERIALS

A. Concrete, Steel Reinforcement and Aggregates: For precast manholes, catch basins, inlets, and other sanitary and storm sewer structures, reinforced concrete, cementitious materials, aggregates and steel reinforcement shall conform to the requirements of ASTM C478. If concrete rings are used for adjusting manhole frames to grade, they shall conform to the requirements of ASTM C139. For cast-in-place structures, these materials shall conform to General Specifications 03300 – Cast-in-Place Concrete and 03210 – Reinforcing Steel.

B. Brick: If brick is used for adjusting manhole and catch basin frames to grade, it shall conform to ASTM C32, Grade MS, with minimum dimensions of 2 1/4 by 3 1/2 by 7 1/2 inches. Brick shall be new, solid, sound, hard burned throughout and uniform in size and quality.

C. Mortar: Provide mortar that is composed of one part Type II Portland cement or Portland pozzolan cement to two parts sand. Sand shall be natural sand that conforms to the requirements of ASTM C144.

D. Frames and Covers: Frames, covers, gratings and miscellaneous metal castings shown in the Sewer Design Standards or on the Contract Drawings for installation on manholes, catch basins, trench drains and other sanitary structures shall be gray iron and shall meet the requirements of General Specification 05561- Miscellaneous Metal Casting. Grating for trench drains shall be compatible with the trench drain manufacturer’s systems and recommendations.

E. O-Ring Rubber Gaskets: Provide O-ring rubber gaskets conforming to ASTM C443 for joining manhole sections.

F. Polymer Concrete Trench Drains.

1. The trench drain shall be formed from high strength, durable polymer concrete, meeting or exceeding the following requirements:.

Property	ASTM Designation	Polymer Concrete
Compressive Strength	C39	14,000 psi
Tensile Strength	C78	1,500 psi
Freeze Thaw	C666	1,700 cycles (no weight loss)
Chemical Resistance	C279	Resistant to most acids and alkali
Absorption of Moisture	C140	Less than 0.2 (surface wetting only)

2. Sealant for Polymer Concrete Trench Drains. Joints between channel sections shall be sealed during installation with a material recommended by manufacturer.

G. Fiberglass Trench Drains:

1. Fiberglass trench drains shall be manufactured from fiberglass reinforced plastic utilizing vinylester. FRP fabrication shall be of the hand lay-up type. The trench drain systems utilizing polymer resins with aggregate or sand are not acceptable. To reduce air entrapment, no pigment shall be used on the resin system. A double synthetic veil shall be provided on the inner trench surfaces and an ultraviolet inhibitor shall be provided. Cobalt compounds shall not be used in any way.

2. The trench drains shall have a built-in slope of not less than 1%, and shall be furnished in modular lengths of 6 feet. Modules shall have a bottom radius of not less than 2 inches expanding to a nominal inlet opening of 8 inches. Modules shall be joined together with a lap joint not less than 2 inches to provide a positive seal, and joint shall be designed so as to minimize disturbance of flow. Joints between channel sections shall be sealed during installation with a material recommended by manufacturer.

3. Channel modules shall incorporate flanges predrilled to accept the appropriate grate frame, as specified. Frames shall be of all welded construction with welded stainless steel concrete anchors and threaded for grate lockdown.

4. Written certification from the manufacturer is required for each of the specified materials and fabrication techniques.

H. Trench Drain Inlet and Outlets. Size and arrangement shall be as shown on Contract Drawings or as specified in Detailed Specifications.

2.03 CONSTRUCTION OF MANHOLES

A. Manhole Base Section: Unless otherwise shown, provide manhole base sections consisting of a base riser section with an integral floor. When benches are made at the manufacturing site, provide concrete used for benched inverts conforming to the requirements for concrete used for precast sections. When benches are made in the field, Class 45 concrete may be used. Benches shall be float finished and sloped to drain.

B. O-ring Joints: Join riser, cone and flat slab top sections with O-ring rubber gasket joints or selfsealing butyl gaskets, as shown in the Sewer Design Standards. Fill voids in the joints completely with mortar after assembly of the sections.

2.04 SOURCE QUALITY CONTROL

A. Concrete Strength: Manhole sections will be inspected and tested by an independent, certified testing laboratory, retained by the City, to establish the strength of the concrete and the adequacy of curing, to certify the date that the sections were cast and to confirm that the reinforcing steel has been properly placed. This inspection and testing will be performed by the laboratory at the manufacturing plant prior to shipment.

1. A minimum of one set of three cylinders will be taken each day that manhole sections are cast, with batch samples to be designated by the laboratory representative. At least one set of cylinders will be taken from each 9 cubic yards of concrete used in manhole section construction. These samples will be tested for strength. If the samples fail to meet specified minimum concrete strength requirements, all manhole sections manufactured from the concrete from which the cylinders were made will be rejected.

2. The City reserves the right to core manholes either at the job site or point of delivery to validate strength of concrete and placement of steel. If cores fail to demonstrate the required strength or indicate incorrect placement of reinforcing steel, all sections not previously tested will be considered rejected until sufficient additional cores are tested, at no increase in Contract Amount, to substantiate conformance to these requirements.

B. Acceptance of flat slab tops will be based on the tops passing a proof-of-design test in accordance with ASTM C478. One flat slab top for each design shall be tested.

2.05 PRECAST PRODUCTS

A. Unless otherwise shown or specified, precast concrete products shall be used for sanitary and storm sewer structures.

B. The number of joints in manhole and catch basin riser sections shall be kept to a minimum by using sections 8'-0" long in so far as possible. Joints shall be tongue and groove type conforming to AWWA C302, with continuous steel reinforcement in the tongue and bell.

C. Wet-cast methods only shall be used. Forms shall leave the surfaces smooth and free of irregularities or honeycombing.

D. Unless otherwise shown or specified, the following design loadings shall be used with 30 percent impact allowance in roads and 15 percent elsewhere.

1. Earth = 130 PC

2. Wheel = H-20

E. Unless otherwise shown or specified, wall thickness for manholes and catch basins shall be not less than:

1. 5 inches for walls

2. 8 inches for top slab

F. No more than two (2) tapered lifting holes shall be provided per section of manhole or lifting holes shall be filled with tapered rubber plugs.

G. The point of intersection (P.I.) of pipes shall be marked with a pin in the manhole floor.

H. The date of manufacture and the manufacturer’s trademark shall be marked inside each manhole and catch basin barrel.

PART 3 EXECUTION

3.01 INSTALLATION

A. Manhole Frames: Firmly embed manhole frames in mortar. Provide wedges or shims for accurate and level placing of the frames.

B. Connections to Riser Section: Manufacture riser sections with openings properly located for making connections to sewers. The minimum distance between a joint in a manhole section and the nearest edge of an opening for a connecting sewer and the diameter of such openings shall be as shown in the Sewer Design Standards.

C. Coatings: Precast structures below grade shall be coated with coal tar epoxy applied in two (2) coats, eight (8) mils each.

D. Laying Masonry:

1. Bricks shall be wetted before applying mortar.

2. Full bed, end and side joints shall be formed in one operation.

3. Horizontal joints shall be 3/8 inch maximum and radial joints shall be 1/4 inch maximum.

4. Keyways shall be completely filled with mortar.

5. The total amount of adjustment by bricks or concrete rings shall not exceed 12 inches.

E. Precast Items:

1. Place on crushed stone bed or concrete cradle set level as shown.

2. Place backfill in even lifts on all sides to prevent overturning loads.

F. Stubs for Future Connections: Where shown, provide stubs or bells cast in walls and provide approved plugs or caps.

G. Trench Drains: Follow manufacturer's recommendations for installation methods. Forming system for fiberglass trench drains shall be designed so that no portion of fiberglass form is exposed to traffic upon completion of installation.

H. Grading:

1. Manholes and catch basins shall be installed such that covers will be at final grade.

2. Structures shall not project above finished pavements.

3. Structures in areas with temporary working grades shall be initially installed to match the temporary grade, and adjusted later to final grade prior to regrading.

4. Contractor shall be responsible for setting structures to the proper grade. The Engineer's review will be general and will apply to components only.

I. Test for leakage as required by General Specification 02505 – Leakage Tests.

3.02 MANUFACTURER'S SERVICES

A. If a fiberglass trench drain system is provided, the Contractor shall furnish the services of an accredited representative of the fiberglass trench drain system manufacturer for the period specified in the Detailed Specifications to supervise the installation.

END OF SECTION

SECTION 02505
Leakage Tests

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Leakage testing for all pipelines and structures required to be watertight or airtight.

B. The following index of this Section is included for convenience:

1.02 PAYMENT

A. Unless otherwise provided in the Detailed Specifications, no separate payment will be made for performing any work required under this Section and the Contractor shall include all costs thereof in its lump sum price bid for the Contract.

1.03 REFERENCES

A. ACI 350.1-10 - Specification for Tightness Testing of Environmental Engineering Concrete Containment Structures and Commentary

B. AWWA C600-10 - Installation of Ductile-Iron Mains and Their Appurtenances

C. New York City Building Code

1.04 PERFORMANCE REQUIREMENTS

A. Written Notification of Testing: Provide written notice at least two weeks prior to date of testing.

B. No tests shall be conducted without an approved written procedure.

C. All leakage tests shall be conducted in the presence of the Engineer. The tests shall be repeated in the presence of local authorities having jurisdiction if required.

D. The Contractor shall furnish all labor, equipment, air, water and materials, including meters, gauges, blower, pumps, compressors, fuel, water, bulkheads, temporary weirs, valves, plugs and accessory equipment.

1.05 SUBMITTALS

A. The Contractor shall submit Shop Drawings and the following:

1. Testing procedures shall be submitted for approval at least 30 days prior to the test.

2. Testing Report: Prior to placing the piping system or structure in service, submit for review and approval a detailed bound report summarizing the leakage test data, describing the test procedure and showing the calculations on which the leakage test data is based.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

A. All pipelines and structures required to be watertight or airtight shall be tested for leakage. Piping and structures which fail the leakage test shall be repaired or replaced to the satisfaction of the Engineer and retested until leakage test results are acceptable.

B. Operation of Existing Facilities: Conduct all tests in a manner to minimize as much as possible any interference with the day-to-day operations of existing facilities or other contractors working on the site.

C. Test gravity sewers and drain lines by an Infiltration Test as specified.

D. Test air and gas lines with compressed air.

E. Test all other pipelines, including outfall sewers, with water under the specified pressures.

F. Test vents and drains in plumbing systems and all cast iron soil pipe lines in accordance with Section C26-1606.0 of the New York City Building Code

unless otherwise specified. Unless specified otherwise, test all vents and drains on process piping as for plumbing systems.

G. Leakage in pipelines of other than circular section shall not exceed an amount based on a circular section having an equivalent inner perimeter.

3.02 PRESSURE TESTS OF EXPOSED PIPING

A. Testing: Pressure test exposed pipelines for leakage by the hydrostatic testing method only. The hydrostatic test shall be of at least 2-hour duration at the pressure rating for the pipe and joints as specified by the manufacturers. Examine all accessible joints during the test.

B. Test Pressures: Test the various pipelines for leakage in accordance with the requirements for hydrostatic testing in AWWA or other applicable standards as specified in the Detailed Specifications or approved by the Engineer.

C. Leakage: Stop all visible leakage.

3.03 PRESSURE TESTS OF BURIED OR CONCEALED PIPELINES

A. Testing:

1. Completely backfill all harnessed sections of buried piping before such sections are tested. Non-harnessed sections of buried piping shall be tested before backfilling.

2. Pressure test buried or concealed pipelines for leakage by maintaining the fluid in the pipe at the specified pressure for a minimum period of 4 hours.

3. Pressure test the piping for leakage as a whole or in sections, valved or bulkheaded at the ends. Apply the specified pressure to the piping through a tap in the pipe by means of a hand pump or other approved method.

   a. Do not use air for testing.

B. Test Pressures: Test the pipelines at pressures specified in the Detailed Specifications or in accordance with standards approved by the Engineer.

C. Leakage: Do not allow leakage for any piping, as determined by the above test, to exceed the testing allowance given by the following formula in AWWA Standard C600, Installation of Ductile-Iron Mains and Their Appurtenances:

$$L = \frac{SD\sqrt{\mathrm{P}}}{148{,}000}$$

Where:

L = testing allowance (makeup water), in gallons per hour
S = length of pipe tested, in feet
D = nominal diameter of the pipe, in inches

P = average test pressure during the hydrostatic test, in pounds per square inch (gauge)

3.04 VALVE TESTING

A. Testing: Operate valves in the section under test through several complete cycles of closing and opening. In addition, have the test pressure for each valve, when in the closed position, applied to one side of the valve only. Test each end of the valve in this manner.

B. Test Pressure: Test each valve at the same test pressure as that specified for the pipe in which the valve is installed.

C. Leakage: Stop all external and internal leakage through the valves.

D. Movement: Stop all valve movement or structural distress.

3.05 LEAKAGE TESTS FOR GRAVITY SEWERS

A. Submerged Testing Procedure: When the groundwater level is above the sewer, test sewers for infiltration as follows:

1. Measure the infiltrated flow of water by means of a weir set up in the invert of the sewer at a known distance from a temporary bulkhead or other limiting point of infiltration.

2. Test after the sewer or sewers have been pumped out, if necessary.

3. Do not start testing until normal infiltration conditions are established in the work to be tested.

   a. Inspect gravity sewer visually for infiltration.

   b. Pump the sewers dry and make sure the groundwater level is above the crown of the sewer.

   c. Inspect the sewer on the inside and seal all visible leaks completely.

B. Non-submerged Testing Procedure: If the groundwater level is below the top of the sewer, test for leakage as follows:

1. Construct a bulkhead in the sewer at the manhole at the lower end of the section under test.

2. Fill the section being tested with water until the level of water is four feet above the crown of the sewer in the manhole at the upper end of the test section. For concrete sewers, allow the water to remain in the piping for at least 12 hours before conducting the tests.

3. Leakage will be the measured amount of water added to maintain the water at that level.

C. Carry on tests for a minimum of eight hours with readings at 60-minute intervals.

D. In computing the length of sewer contributing infiltration or leakage, include the length of house connections tested, if any, in the total length.

E. The leakage exfiltration or infiltration for sewers shall not exceed 100 gallons per inch of diameter per mile per 24 hours for any section of the sewer system. The exfiltration or infiltration test shall be performed with a minimum positive head of 24 inches.

F. Repair: When the measured infiltration or leakage exceeds the specified amount, locate and repair defective manholes, pipe or pipe joints. If the defective portions cannot be located, remove and reconstruct as much of the original work as necessary to obtain a sewer within the allowable infiltration limits upon such retesting as necessary.

1. Regardless of the amount of infiltration or leakage measured, repair and seal in an approved manner all visible or detectable leaks in the sewers, manholes, structures, and other appurtenances.

3.06 REPAIR OF PIPING LEAKS

A. Procedures: Repair leaks as follows:

1. Replace broken pipe or joint assemblies found to leak.

2. When leakage occurs in excess of the specified amount, locate and repair defective valves, pipe, cleanouts or joints.

3. If defective portions cannot be located, remove and reconstruct as much of the original work as necessary to obtain piping that meets the leakage requirements specified herein and retest, all at no addition to the Contract Price.

3.07 LEAKAGE TESTS FOR CONCRETE STRUCTURES

A. Leakage tests of wet wells, tanks, channels, containment areas, and other water retaining structures shall be performed following the requirements of ACI 350.1and as specified herein. The Contractor shall supply all materials and labor needed to conduct the test as directed by the Engineer.

B. Prior to start of leakage testing, the following requirements shall be met.

1. All elements of the structure which resist any portion of the retained liquid pressure shall be in place and at specified strength levels. All concrete shall be fully cured.

2. Structure walls shall not be backfilled prior to leakage testing.

3. All valves, gates, blind flanges, and other non-concrete items which control the flow or otherwise retain the liquid contents of the structure,

shall be checked for watertightness. If not watertight, means shall be taken to assure watertightness during the period of the leakage test.

4. The portions of the structure to be tested shall be cleaned of all construction debris, standing water, soil, foreign materials and any other material which interferes with the exposed concrete surfaces of the structure.

5. Defective concrete shall be repaired.

6. The Contractor shall notify the Engineer a minimum of 24 hours prior to start of filling of structure for leakage testing. Leakage testing shall not start until the structure is inspected by the Engineer.

C. Filling the Structure with Water

1. The portion of the structure to be tested shall be filled at a rate not to exceed two feet per hour.

2. The structure shall be filled to the normal operating depth of the structure as indicated on the Contract Drawings. Where no operating depth is indicated or where operating depth is controlled by flowing over a weir, the structure shall be filled to a depth 6 inches below the weir or top of wall elevation whichever is lower.

3. Water in the structure shall be maintained at the specified test elevation for a minimum of three days prior to the start of the leakage test.

D. After water has been brought to the test elevation, the exposed elements of the structure shall be inspected for leakage. All locations which exhibit any amount of leakage flow shall be repaired prior to the start of leakage testing.

E. The leakage test duration shall be determined by the Engineer based on ACI 350.1but shall not be less than 3 days.

F. Leakage Allowance

1. For unlined concrete structures, the maximum allowable leakage rate shall be 0.075 percent of the volume per 24-hour period.

2. For concrete structures with walls lined by a waterproof material, the maximum allowable leakage rate shall be 0.050 percent of the volume per 24-hour period.

G. Test Locations

1. Structure cells which are less than 1000 square feet in area shall have measurements of water level taken at two locations which are located approximately 180 degrees apart.

2. Structure cells which are greater than 1000 square feet in area shall have measurements of water level taken at four locations which are located approximately 90 degrees apart.

3. Each test location shall be marked and given a reference number. A reference point shall be marked on the face of the wall above the test water surface in a manner which will prevent its movement or deterioration during the period of the test.

4. Test locations must be approved by the Engineer.

H. Evaporation and Precipitation Measuring

1. In open structures, a clear plastic calibrated open-top container not less than 18 inches in diameter and depth shall be partially filled, floated in the tank, and held in position near each measurement location.

2. The container shall be located so as not to be shaded by tank walls and away from any items passing over it such as beams or pipes.

I. Test Measurements

1. Leakage tests shall not be started when periods of severe weather conditions or major changes in average daily temperature are predicted.

2. The following measurements shall be recorded at each test location at the start of the test period and at 24-hour intervals thereafter:

   a. Distance from reference point to test water surface

   b. Depth of water in the floating container

   c. Temperature of the test water at 18 inches below water surface

   d. Temperature of the water in the evaporation-precipitation container at mid-depth

J. Leakage Determination

1. The change in water surface elevation at each test location shall be averaged and adjusted as follows.

2. The total change in test water surface elevation shall be adjusted by the average change in water surface elevation in the evaporation-precipitation containers.

3. Where averaged water temperature measurements vary by more than 3 degrees from start to completion of the test period, adjustment in tank volume shall be determined by change of water density resulting from the change in the average water temperature.

K. Retesting

1. The leakage test shall be considered as failed if the specified leakage allowance is exceeded or if any leakage is observed.

2. If the test becomes unreliable due to excessive precipitation or other external factors, it shall be restarted.

3. If a leakage test fails, it may be retested immediately without repairs if approved by the Engineer. If subsequent leakage tests fail, the Contractor shall repair all probable areas of leakage and the leakage test shall be repeated. The structure shall be retested until it meets the specified leakage criteria. Repairs shall be made to the probable leakage areas before each retest.

3.08 LEAKAGE TESTS FOR NON-CONCRETE STRUCTURES

A. Steel, poly and fiberglass-reinforced plastic tanks and similar structures shall be tested for leakage by bulkheading the openings and filling the structure with water to 6 inches below the overflow water level. The tank shall be kept full until the water temperature has stabilized, but not less than 24 hours before the start of the leakage test. The leakage test shall consist of measuring the water surface elevation from a fixed point on the tank at two locations 180 degrees apart. Measurements shall be taken at the start of the test and 24 hours later.

B. Testing shall be performed before the installation of mechanical equipment and before applying any waterproofing coatings to the outside surfaces.

C. The exterior surface of the structure shall be inspected for leakage, especially in areas around joints.

D. Where environmental conditions could lead to changes in water level due to evaporation or precipitation, measurement of these factors shall be made as specified for testing concrete structures.

E. The leakage test shall be considered failed if there is any measurable drop in the water surface (after adjusting for evaporation and precipitation) during the 24-hour test period or if there is any visible leakage.

F. If visible leaks appear or if leakage exceeds the allowable limit, the structure shall be repaired by removing and replacing the leaking portions of the structure, waterproofing the inside, or by other approved methods. After repairs are complete, the test shall be repeated.

END OF SECTION

SECTION 02741
Asphaltic Concrete Pavements

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall provide asphaltic concrete pavement roads and walks constructed on properly prepared subgrades and in conformance to the required lines, grades and typical cross sections shown on the Contract Drawings.

B. The following index of this Section is included for convenience:

1.02 PAYMENT

A. Unless otherwise provided in the Detailed Specifications, no separate payment will be made for performing any Work required under this Section and the Contractor shall include all costs thereof in its lump sum price bid for the Contract.

1.03 REFERENCES

A.	ASTM D1557	-	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3))
B.	ASTM D3786	-	Standard Test Method for Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method
C.	ASTM D4253	-	Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
D.	ASTM D4354	-	Practice for Sampling of Geosynthetics and Rolled Erosion Control Products (RECPs) for Testing
E.	ASTM D4355	-	Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus
F.	ASTM D4439	-	Terminology for Geosynthetics
G.	ASTM D4491	-	Test Methods for Water Permeability of Geotextiles by Permittivity
H.	ASTM D4533	-	Test Method for Trapezoid Tearing Strength of Geotextiles
I.	ASTM D4595	-	Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method
J.	ASTM D4632	-	Test method for Grab Breaking Load and Elongation of Geotextiles
K.	ASTM D4759	-	Practice for Determining the Specification Conformance of Geosynthetics
L.	ASTM D4751	-	Test Method for Determining Apparent Opening Size of a Geotextile
M.	ASTM D4833	-	Test Method for Index Puncture Resistance of Geomembranes and Related Products
N.	ASTM D4873	-	Guide for Identification, Storage and Handling of Geosynthetic Rolls and Samples

O. Federal Highway Administration (FHWA) - Geosynthetic Design and Construction Guidelines, Publication No. FHWA HI-95-038, May 1995

P. Geosynthetic Accreditation Institute (GAI) - Laboratory Accreditation Program (LAP)

Q. International Standards Organization (ISO) 9001 - Quality management systems — Requirements

R. New York State Department of Transportation (NYSDOT) Standard Specifications

S. New York City Department of Transportation (NYCDOT), Bureau of Highway Operations Standard Specifications

T. Federal Specification TT-P-115 - Paint, Traffic, Highway, White and Yellow

1.04 DEFINITIONS

A. California Bearing Ratio (CBR): The ratio of (1) the force per unit area required to penetrate a soil mass with a 19 sq. cm (3 sq.in.) circular piston (approximately 51 mm (2 in.) diameter) at the rate of 1.3mm/min (.05 in/min) to (2) that required for corresponding penetration of a standard material.

B. Minimum Average Roll Value (MARV): Property value calculated as typical minus two standard deviations. Statistically, it yields a 97.7 percent degree of confidence that any sample taken during quality assurance testing will exceed value reported.

C. Typical Roll Value: Property value calculated from average or mean obtained from test data.

1.05 SUBMITTALS

A. The Contractor shall submit shop drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited to:

1. Manufacturer's literature including physical, mechanical and chemical properties of the geotextile.

2. Certification of geotextile's minimum average roll values and tests used to determine those properties.

3. Certificate of Compliance stating that the geotextile conforms to the Specifications and the manufacturer is aware of and agrees with its intended use.

4. Geotextile manufacturer's qualifications: ISO 9001 certified or equivalent.

5. Manufacturing quality control test results on geotextiles.

6. The bituminous mix design for both the binder course and the wearing course, which shall include the sources of all ingredient materials, the penetration of the asphaltic cement and the percentages by weight and the number of pounds of each of the materials making up one batch.

7. The laboratory analysis of the bituminous mix and the laboratory compacted density.

1.06 QUALITY ASSURANCE FOR GEOTEXTILE

A. Manufacturer Qualifications: The manufacturer shall be ISO 9001 certified. Provide proof of certification or demonstrate that the standards and experience required for certification are possessed, all to the satisfaction of the Engineer.

1.07 DELIVERY, STORAGE AND HANDLING OF GEOTEXTILE

A. Wrap geotextile in black protective wrap.

B. The geotextile rolls shall be labeled as per ASTM D4873.

C. Deliver, store and handle rolls in manner to prevent damage.

D. After unloading, inspect rolls for defects and damage.

E. Do not leave covered rolls exposed to elements for more than 30 days unless additional heavy-duty waterproof cover is provided. At no time shall the geotextile be exposed to ultraviolet light for a period exceeding 14 days.

F. Store rolls off ground, protected from precipitation, ultraviolet radiation, strong chemicals, sparks and flames, temperatures in excess of 71 degrees C (160 degrees F) and other environmental conditions that could cause damage to geotextile.

G. Prevent damage to wrappings and geotextile.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Geotextiles shall be as manufactured by:

1. Amoco Fabrics & Fibers Co. Amoco 2006, Austell, GA.
2. Nicolon Mirafi Group/600X, Pendergrass, GA.
3. Synthetic Industries/Geotex315ST, Chickamauga, GA.
4. Or approved equal

2.02 MATERIALS

A. Geotextile: Provide geotextile fabric conforming to the requirements specified in this section:

1. Woven slit film polypropylene geotextile; individual slit films woven together in manner to provide dimensional stability relative to each other.
2. Resistant to ultraviolet degradation and biological and chemical environments normally found in soils.
3. Minimum Average Roll Values:

Property	Test Method	Units	Results
Wide Width Tensile Strength	ASTM D4595	kN/m (lbs/in)	31x30.6 (175 x 175)
Grab Tensile Strength	ASTM D4632	N (lbs)	1335 x 1335
Grab Elongation	ASTM D4632	Percent	15 x 15
Puncture Strength	ASTM D4833	N (lbs)	555 (125)
Mullen Burst	ASTM D3786	KPa (psi)	4475 (650)
Trapezoidal Tear	ASTM D4533	N (lbs)	530 x 530
Apparent Opening Size	ASTM D4751	mm	0.212
Permittivity	ASTM D4491	sec-1	0.06
Water Flow Rate	ASTM D4491	1/min/m^2 (gpm/ft^2)	200 (5)
UV Resistance (percent retained at 500 hours)	ASTM D4355	Percent	90

B. Roads: Provide asphaltic concrete pavement for roadways conforming to the requirements specified in this Section and to the following standards:

1. Bottom Course: Broken stone, NYCDOT, Bureau of Highway Operations Standard Specifications, Section 2.02, Aggregate-Coarse, Type 1, Grade B, Sizes No. 1, No. 2 and No. 4. Provide bottom course consisting of a uniform mixture of broken stone, Size Nos. 1 and 2, and add No. 4 as a filler after the coarser mixture has been rolled and compacted.

2. Tack Coat: Asphalt emulsion, NYSDOT Standard Specifications, material designation 702-90

3. Binder Course: Binder mixture, NYSDOT Standard Specifications, Subsections 401-2.01 through 401.2.05, Table 401-1, Type 3

4. Wearing Course: NYSDOT Standard Specifications, Subsections 401-2.01 through 401-2.05, Table 401-1, Type 6F

5. Walks: Provide asphaltic pavement for walks conforming to the requirements specified in this section and to the following standards:

6. Bottom Course: Asphaltic concrete mixture, NYSDOT Standard Specifications, Subsections 401-2.01 through 401-2.05, Table 401-1, Type 3

7. Wearing Course: NYSDOT Standard Specifications, Subsections 401-2.01 through 401-2.05, Table 401-1, Type 6F

8. Tack Coat: Asphalt emulsion, NYSDOT Standard Specifications, material designation 702-90

C. Traffic and Parking Markings:

1. Color: As shown

2. Conform to Fed. Spec. TT-P-115, Type III, quick drying, non-bleaching

2.03 QUALITY CONTROL OF GEOTEXTILE

A. Manufacturing Quality Control: Testing shall be performed at a laboratory accredited by GAI-LAP for tests required for the geotextile, at frequency exceeding ASTM D 4354, with following minimum acceptable testing frequency:

Property	Test Method	Test Frequency sq m (sq ft)
Grab Tensile Strength	ASTM D4632	1/10,000 (100,000)
Grab Elongation	ASTM D4632	1/10,000 (100,000)
Trapezoidal Tear	ASTM D4533	1/10,000 (100,000)
Mullen Burst	ASTM D3786	1/10,000 (100,000)

B. Conformance Testing:

1. Upon delivery to site, Engineer will remove samples of geotextile and send to laboratory for testing.

2. Testing will be performed at a laboratory accredited by GAI-LAP in accordance with ASTM D4759, Practice A.

PART 3 EXECUTION

3.01 ROADS

A. General: Asphaltic concrete pavement roads shall consist of

1. A layer of woven geotextile fabric,

2. A bottom course of broken stone,

3. A tack coat of asphalt emulsion,

4. An intermediate course of asphaltic concrete (close binder type),

5. A tack coat of asphalt emulsion, and

6. A wearing course of fine surface mix asphaltic concrete (top mix).

B. Preparation of Subgrade:

1. Remove to a depth of 24 inches, top soil, boulders, muck, soft clay, spongy material and any other objectionable material and replace them with broken stone, sand and gravel or other approved fill to promote positive drainage.

2. On sites where it appears that there may be some areas containing objectionable materials, proof roll to locate the unsuitable materials.

3. Exercise care during stripping operations to prevent excessive disturbance to subgrade. Use lightweight dozers or grade-alls for low strength, saturated, noncohesive and low cohesive soils.

4. For extremely soft ground such as peat bog areas, do not over excavate surface materials to take advantage of root mat strength.

5. If vegetation is present, cut at ground surface and place sawdust or sand over stumps and roots extending above ground surface.

6. Scrape and fill subgrades, as necessary, and thoroughly consolidate them to the required lines and grades. Consolidate subgrades for pavements by means of a smooth steel-wheel roller having a nominal gross weight of not less than 10 tons, and exerting a minimum force of not less than 300 pounds per inch of width on the compression roll faces, or approved equivalent.

7. Compact subgrade to not less than 75 percent relative density as determined by ASTM D4253, or not less than 95 percent of the maximum dry density as determined by ASTM D1557, as applicable.

8. In places where the use of a roller is impractical, compact subgrades with hand tampers weighing not less than 40 pounds and having a face not exceeding 80 square inches in area.

9. Subgrade shall be prepared not less than 100 feet in advance of the pavement to be immediately constructed.

C. Installation of Geotextile:

1. After subgrade has been prepared, place geotextile in same direction as the new roadway aggregate is being laid down.

2. Do not drag geotextile across subgrade. Place entire roll on subgrade surface and roll out smoothly. Remove wrinkles and folds by stretching and holding down with sandbags as required.

3. Join parallel rolls of geotextile as follows:

California Bearing Ratio (CBR)	Method of Joining
Over 2	300-450 mm (12-18 in) overlap
1-2	600-900 mm (24-36 in) overlap
0.5-1	900 mm (36 in) overlap or sewn
Less than 0.5	Sewn
All roll ends	900 mm (36 in) overlap or sewn

4. If the CBR of the subgrade is not known, join parallel rolls by sewing them together.

5. For subgrades with CBR less than or equal to 1, where the geotextile is to provide reinforcement, the geotextile shall be pretensioned in the following manner:

   a. Proofroll with heavily loaded, rubber-tired vehicle. Wheel load of truck shall be equivalent to maximum expected for site. Vehicle to make at least four passes over first lift in each area of site.

   b. Once design aggregate has been placed, use roadway prior to paving to prestress geotextile-aggregate system.

6. If required, the geotextile may be held in place prior to subbase placement with sandbags. The use of pins to anchor the geotextile will not be permitted, except at edges of existing pavement as specified below.

7. Do not place overlaps along anticipated primary wheel path locations. Place overlaps at end of rolls in direction of aggregate placement with previous roll on top.

8. When sewn seams are required, strength of seams shall be greater than or equal to 80 percent of tensile strength of unseamed geotextile as determined by same testing methods.

9. When placing woven geotextile on curves, fold or cut geotextile and overlap in direction of turn with previous fabric on top. Staple or pin folds in geotextile approximately 0.6 m (2 ft) on center.

10. When geotextile intersects an existing pavement area, extend geotextile to edge of old system and anchor it by trenching and covering the edge of the fabric with stone, or staple or pin the fabric to the ground. For widening or intersecting existing roads where geotextiles have been used, excavate edge of roadway down to existing geotextile and sew the

new geotextile to the existing geotextile, or overlap and staple or pin the new fabric to the old and into the ground.

11. Prior to covering, inspect geotextile for excessive damage, including holes, rips and tears.

    a. If excessive defects are observed, repair affected area by placing new layer of geotextile over damaged area.

    b. Extend new layer beyond damaged area the same distance as required for overlap of adjacent rolls.

12. End-dump base aggregate on previously placed aggregate. End dumping or tail-gate dumping of the aggregate directly on the geotextile will not be permitted.

    a. For subgrades with CBR less than or equal to 1, limit pile heights to prevent possible subgrade failure.

    b. Maximum placement thickness for subgrades with CBR less than or equal to 1 shall not exceed design thickness of road.

13. Spread and grade first lift of aggregate to 300 mm (12 in) or to design thickness if less than 300 mm (12 in) prior to compaction. Do not allow traffic on soft roadway with less than 200 mm (8 in) of aggregate over geotextile, except 150 mm (6 in) for CBR greater than or equal to 3.

14. Compact the bottom course as specified in Paragraph D.2. Vibratory compaction shall not be used on the initial lift over the geotextile.

15. Perform construction parallel to road alignment.

16. Fill ruts formed during construction to maintain adequate cover over geotextile. Do not blade ruts down.

17. Place remaining base aggregate in lifts not exceeding 250 mm (10 in) in loose thickness and compact to specified density.

18. Equipment may operate on roadway without aggregate for geotextile installation under permeable bases if subgrade is of sufficient strength.

    a. For soils with CBR less than or equal to 0.5, use lightweight construction vehicles for access on first lift.

    b. Limit construction vehicles in size and weight to limit rutting in initial lift to 75 mm (3 in).

    c. If rut depths exceed 75 mm (3 in), decrease construction vehicle size or weight or increase lift thickness.

19. Turning will not be permitted on first lift of base aggregate. Construct turn-outs at roadway edge to facilitate construction.

D. Bottom Course:

1. Spreading

a. Spread the mixture of No. 1 and No. 2 broken stone uniformly on the geotextile with shovels from piles along the side of the roadway or from dumping boards or by means of vehicles of approved design constructed especially for this purpose, but in no case dump the material directly on the geotextile.

b. The loose lift thickness shall be a minimum of 1.5 times the maximum particle size. The Contractor shall control the lift thickness, provided that the thickness shall not exceed the thickness limitations specified in Paragraph C, above, for installation of aggregate over geotextile, and shall not exceed the maximum allowed according to the equipment classifications in Subparagraph 2. *Compaction Equipment* of Subsection 203-3.03.C, Compaction, of New York State Department of Transportation Standard Specifications, and the equipment meets all specified class criteria of that Standard.

c. Spread broken stone in sufficient quantity to provide the required thickness after rolling. The depth of stone shall be gauged by the use of cubical concrete blocks of the required thickness, or other approved means.

d. Remove all segregated fine or coarse stone and replace it with well graded stone.

e. Do not spread the broken stone over wet geotextile.

f. Do not place broken stone adjacent to manhole heads or other structures until such structures have been set to the required lines and grades.

2. Rolling and Filling

a. After the No. 1 and No. 2 stone mixture has been laid loose, thoroughly roll it with an approved smooth steel-wheel roller having a nominal gross weight of not less than 10 tons and exerting a minimum force of 300 pounds per inch of width on the compression roll faces.

b. Start rolling longitudinally at the sides and proceed toward the center, overlapping on successive trips by at least one-half the width of a rear wheel. A minimum of 8 passes shall be applied over each lift with the roller operating at a speed not exceeding 6 feet per second. Rolling shall be continued until there is no movement of the stone ahead of the roller.

c. After the bottom course is thoroughly compacted, as measured by the method described in Paragraph f, below, uniformly spread No. 4 stone over the compacted area from piles along the side of the roadway or from dumping boards. Broom the filler in and roll it dry until no more filler can be forced into the voids. Remove excess filler.

d. Do not lay over 500 lineal feet of the bottom course without it being rolled and thoroughly filled.

e. The maximum layer thickness prior to compaction shall be 300 mm (12 in.) as specified in Paragraph 3.01C, and the final compacted thickness shall be as shown on the Contract Drawings. In confined areas as defined by the Engineer the maximum compacted layer thickness shall be 6 inches.

f. Do not allow the surface of the completed bottom course to deviate more than one-quarter inch in five feet from the nearest point of contact nor more than 3/8-inch in eighteen feet when tested by means of an eighteen foot straight-edge placed parallel to the centerline of the roadway.

g. If any irregularities develop in the surface during or after rolling of the bottom course, remedy them by loosening the surface and removing or adding broken stone as may be required, and follow by rolling the entire area, including the surrounding surface, applying filler and continuing rolling until the course is compacted satisfactorily to a uniform surface.

E. Tack Coat:

1. Before spreading the binder course, spray the bottom course with an asphalt emulsion tack coat in the amount of 0.25 gallon per square yard. Allow the tack coat to cure until sticky or tacky. Renew and repair or replace damaged coating.

2. Tack coat shall be applied evenly by means of a truck having appropriate spray nozzles. All nozzles shall be kept free of clogs.

3. Paint contact surfaces of all curbing, gutters, manholes and adjacent pavement edges with the tack coat material.

4. Tack coat shall not be applied on a wet pavement surface or when the temperature is below 45^{o}F.

F. Binder Course:

1. Preparation: Clean the bottom course of all dirt and loose material, thoroughly dry it and obtain the Engineer=s approval before laying the binder course.

2. Weather Limitations: Bituminous material or mixture shall not be applied on any soft surfaces, when the surface is wet, when the temperature of the surface on which the mixture is to be placed is below 45°F, or when other weather conditions would prevent proper construction of the pavement.

3. Forms: When side forms are required, accurately set them to line and grade and securely stake and brace them in place sufficiently to withstand all construction operations. Thoroughly clean and oil forms before use.

4. Spreading:

   a. Dump the binder course into the hopper of the spreader. Spread and screed it immediately to the full width required for the pavement and to such a depth that, when rolled, the required thickness is obtained. The maximum allowable compacted thickness shall be 4 inches.

   b. When the mixture is to be spread by hand, dump it on approved steel dump sheets outside of the area on which it is to be spread and immediately distribute it into place and spread it in a uniformly loose layer.

   c. Remove material from areas which show an excess or lack of bituminous material or an inconsistent mix and fill with new material. Re-spread or otherwise rectify areas which show segregation to obtain a uniform mixture in the course.

   d. Do not use mixture which has been over 45 minutes out of the mixer, or if longer, the mixture must be over 250°F when spread.

   e. Do not lay over 500 lineal feet of binder material without it being rolled and properly compacted.

5. Compacting:

   a. Rake the mixture after spreading and immediately compress it thoroughly and uniformly by either of the following methods:

      1) Option A - Three-roller Compaction Train: Under this option, the binder course shall be initially rolled with an approved steel-wheel roller. The roller shall overlap the previous roller pass by one-half the width of the roller.

         a) Immediately following the initial rolling, the course shall be rolled with an approved pneumatic rubber-tired roller. A minimum of three passes of the rubber-tired roller shall be made. One pass is defined as one movement of

the roller over any point of the pavement in either direction.

b) Immediately following the intermediate rolling, the course shall be finish rolled with a steel-wheel tandem roller. This final rolling shall be both longitudinal and diagonal as directed by the Engineer and shall remove all shallow ruts and ridges and other irregularities from the surface. Rolling shall be continued until all roller marks are eliminated.

c) Under this option, the course shall not be compacted to a thickness in excess of 4 inches. No rollers shall move at speeds in excess of 3 miles per hour unless otherwise approved.

2) Option B - Vibratory Compaction: Under this option, the Contractor shall use vibratory compaction equipment appearing on the current Approved List - Bituminous Concrete Vibratory Compaction Equipment in the NYSDOT Standard Specifications. The Contractor may substitute one vibratory roller in lieu of the initial roller and the pneumatic roller in the conventional three-roller compaction train stipulated under Option A. Under this option, the course shall be finish rolled with a steel-wheel tandem roller having a minimum weight of 8 tons. This finish roller shall add a minimum of two passes closely following the vibratory roller or as directed by the Engineer.

a) One vibratory roller and one steel-wheel tandem roller shall be provided for each nominal 12-foot width of paving. Dual vibrating drum rollers meeting the requirements of a steel- wheel tandem roller and operating in the static mode may be used as the finish roller. However, this single vibratory roller shall not be used as both the initial roller and the finish roller.

b. To prevent adhesion of the mixture to the roller, keep the drum properly moistened with water. Drums must have working water spray nozzles to keep drums moistened.

c. Compact material thoroughly with hot irons or damp vibratory tampers along curbs, headers, manholes and similar structures and at all places not accessible to the roller.

d. Remedy depressions which develop before the completion of the rolling by loosening the laid mixture and adding new mixture to bring such depressions to a true surface. Should any depressions remain after the final compaction has been obtained, remove the full depth of the mixture, replace it with new mixture, and reroll it to form a true and even surface. Correct all high spots, waves, bunches and honeycombing, to the satisfaction of the Engineer.

e. Remove and replace with new material areas that are unbonded after rolling, areas containing drippings, areas that are fat or lean, and areas evidencing defective construction of any description.

f. Do not allow the surface of the completed binder course to deviate more than 1/16 inch per foot from the nearest point of contact nor more than 1/4 inch maximum when tested longitudinally with an 18-foot straight edge placed parallel to the centerline of the roadway.

g. After final compression, the finished course shall at no point have a density less than 95 percent, as measured by a nuclear density meter, of the laboratory compacted density.

G. Wearing Course:

1. Preparation:

a. Thoroughly clean the binder course of all loose and foreign material before the top mixture is delivered.

b. Apply a tack coat at a rate of 0.03 to 0.07 gallon per square yard as approved by the Engineer.

c. Do not lay mixture until the Engineer approves the binder course and determines in all cases whether the weather conditions are suitable to permit laying.

2. Weather Limitations: Bituminous material or mixture shall not be applied on any soft surfaces, when the surface is wet, when the temperature of the surface on which the mixture is to be placed is below 45^{o}F, or when other weather conditions would prevent proper construction of the pavement

3. Forms: If at the time of laying the mixture, permanent side supports such as curbs, edgings or gutters have not been constructed, firmly fasten in place suitable side forms of wood or steel, true to line and grade. In all cases adequately support the sides of roadways until final compaction has been obtained and the mixture has hardened by cooling.

4. Spreading and Compacting:

   a. Spread and compact the wearing course until it meets the compaction and surface requirements specified above for the binder course.

   b. The Contractor shall have the same options for achieving the required compaction as given for the compaction of the binder course.

   c. Do not lay over 500 lineal feet of wearing course material without it being rolled and properly compacted.

   d. Do not use mixture which has been over 45 minutes out of the mixer, or if longer, the mixture must be over 250^{o}F when spread.

5. Joints: Perform construction as near continuously as possible. Carefully make joints between old and new pavements, or between successive days' work, in a manner which will insure a thorough and continuous bond, as follows:

   a. Cut back the edge of the old surface before recommencing the operation of laying, in order to present a fresh, clean surface for contact with the newly placed material.

   b. Carefully employ hot smoothing irons to heat the old pavement sufficiently (without burning) to insure a proper bond.

6. Shoulders: If temporary forms are used, protect the edges of the finished roadway by placing and thoroughly compacting approved material to form shoulders along the roadway as shown on the Contract Drawings. Construct finished shoulders 1/4 inch above the elevation of the finished roadway edges.

7. If weather conditions necessitate delaying the installation of the wearing course for more than two days, the tack coat shall be reapplied to the binder course at the rate of 0.03 to 0.07 gallon per square yard as approved by the Engineer.

3.02 WALKS

A. General: Asphaltic concrete pavement walks shall consist of

   1. A bottom course of asphaltic concrete (close binder type),

   2. A tack coat of asphalt emulsion, and

   3. A wearing course of fine surface mix asphaltic concrete.

B. Bottom Course:

   1. Before the bottom course is laid, compact the subgrade thoroughly, so that the bottom course, after compaction, will be found satisfactory

when tested by the method given in Paragraph 4, below, and clean it of all loose and foreign material, dry it, and obtain the Engineer=s approval.

2. Paint contact surfaces of all curbing, gutters, manholes and adjacent pavement edges with an asphalt emulsion tack coat at the rate of 0.03 to 0.07 gallon per square yard as approved by the Engineer.

3. Set forms, spread and compact the bottom course as specified above for the binder course for roads.

4. Provide a bottom course surface free from depressions exceeding 3/8-inch when tested with a 10-foot straight edge placed parallel with the center line of the walk.

C. Wearing Course:

1. Clean the bottom course of all loose and foreign material before the wearing course mixture is delivered. Do not lay mixture until the Engineer approves the bottom course and determines in all cases whether the weather conditions are suitable to permit laying.

2. If at the time of laying the mixture, permanent side supports such as curbs, edging or gutters have not been constructed, fasten in place suitable side forms of wood or steel, true to line and grade. In all cases, adequately support the sides of walks until final compaction is obtained and until the mixture hardens.

3. Spread and compact the wearing course as specified for the bottom course.

4. Provide a walk surface free from depressions exceeding 1/8-inch when measured with a 10-foot straight edge placed parallel with the centerline of the walk.

5. Perform construction as near continuously as possible. Carefully make joints between old and new pavements, or between successive days' work, in a manner which will insure a thorough and continuous bond, as follows:

   a. Cut back the edge of the old surface before recommencing the operation of laying, in order to present a fresh, clean surface for contact with the newly placed material.

   b. Carefully employ hot smoothing irons to heat the old pavement sufficiently (without burning) to insure a proper bond.

6. Paving procedure, including compaction requirements, shall be the same as specified above for the wearing course for roads.

3.03 PAVEMENT SAMPLES

A. When required by the Engineer, furnish 4-inch diameter test samples cored from the binder course and from the completed pavement. The Engineer will choose the number of cores and the locations at which the cores shall be taken. Sample cores, when required, shall be taken for every 10,000 square feet of pavement and patch. Density test shall show that the sample is within 90 percent of the laboratory specimen. Replace with new mixture and refinish the areas of pavement so removed without additional compensation.

3.04 PATCHING

A. As directed by Engineer, remove and replace defective areas. Cut such areas and replace with fresh asphaltic concrete and compact to required density.

3.05 CLEANING AND PROTECTION

A. After paving, clear surfaces of excess asphaltic concrete and all foreign matter.

B. Protect new pavement until fully hardened.

C. Cover openings of drainage structures until permanent covers are placed.

3.06 PAVEMENT MARKING

A. Clean with power and hand brooms.

B. Mark edges straight and uniform. Use two coats and comply with manufacturer's recommendations.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02771
Concrete Curbs, Headers and Sidewalks

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall provide all labor, materials, and equipment required to provide concrete curbs, headers, and sidewalks, as shown, specified and required.

B. The following index of this Section is included for convenience:

1.02 PAYMENT

A. Unless otherwise provided in the Detailed Specifications, no separate payment will be made for performing any Work required under this Section and the Contactor shall include all costs thereof in its lump sum price bid for the Contract.

1.03 RELATED SECTIONS

A. General Specification 02316 - Excavation

B. General Specification 02317 - Backfilling

C. General Specification 03100 - Concrete Formwork

D. General Specification 03300 - Cast-in-Place Concrete

E. General Specification 03350 - Concrete Finishes

F. General Specification 05501 - Metal Fabrications

G. General Specification 09900 - Painting

1.04 REFERENCES

A. ASTM A36 - Carbon Structural Steel

B. New York City Department of Transportation (NYCDOT) Standard Highway Specifications (NYCDOT Specifications)

C. NYCDOT Standard Details of Construction

D. NYCDOT Street Design Manual

1.05 DESIGN REQUIREMENTS

A. Concrete curbs, headers, and sidewalks which are outside the building line of the site and under jurisdiction of other City agencies, even though constructed as part of this Contract, shall be constructed in accordance with the Rules and Regulations, Standard Details and Standard Specifications of the governing agency in effect at the time of the award of this Contract and as further defined in the Contract Drawings and Detailed Specifications.

B. Unless otherwise defined in the Contract Drawings or Detailed Specifications, concrete for curbs, headers, and sidewalks which are inside the building line of the site and not under the jurisdiction of other City agencies shall meet the following requirements:

1. 3500 psi minimum 28-day compressive strength.

2. Utilize type II Cement and contain aggregate conforming to ASTM #57.

3. Water-cement ratio not exceeding 0.44 for normal weight structural concrete.

4. Slump values of 1-1/2 inch minimum to 4 inch maximum.

5. Desired air-entrainment of 6.5%, with an allowable range of +/- 1.5%.

6. Concrete shall be proportioned, mixed, placed, cured and protected in accordance with the requirements of General Specification 03300 Cast-in-Place Concrete.

1.06 SUBMITTALS

A. The Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited to:

1. Those required in General Specification 03300 - Cast-in-Place Concrete.

2. Marked-up drawings and shop drawings including shop and field test reports of concrete samples tested in an approved laboratory.

3. Concrete sidewalk and curb layouts showing scoring and joint layouts, including joint and sealant materials to be incorporated.

PART 2 PRODUCTS

2.01 MATERIALS

A. Coarse aggregate, unless otherwise specified, shall conform to the requirements of General Specification 03300 - Cast-in-Place Concrete.

B. Concrete shall be air-entrained in accordance with General Specification 03300 - Cast-in-Place Concrete.

C. Material for foundation of curbs, headers, and sidewalks shall consist Size No. 3 broken stone or gravel complying with the requirements of Section 2.02, NYCDOT Specifications, 100 percent of which passes a 2-1/2-inch square sieve; or other approved broken concrete, 100 percent of which passes a 2-1/2-inch square sieve; or other approved granular material containing not more than 5 percent material passing a No. 200 mesh sieve and not more than 5 percent retained on a 2-inch square sieve.

D. Unless otherwise required by the Detailed Specifications, preformed expansion joint filler shall be Type IV as described in Section 2.15 of the NYCDOT Specifications.

E. Joint sealing compound for horizontal joints shall be Type 2 cold application sealar as described in Section 2.22 of the NYCDOT Specifications.

F. Structural steel shall be ASTM A36 and General Specification 05501 – Metal Fabrications.

2.02 SOURCE QUALITY CONTROL

A. Concrete shall be tested and evaluated for strength and acceptance in accordance with the requirements of General Specification 03300 Cast-in-Place Concrete.

PART 3 EXECUTION

3.01 SIDEWALK INSTALLATION

A. Concrete sidewalk shall be of the width shown or otherwise specified and shall be laid on 6 inches thick compacted broken stone base, unless otherwise specified or shown on the Contract Drawings.

B. Sidewalk shall consist of a single course of concrete 4 inches thick, unless otherwise shown on the Contract Drawings.

C. Concrete shall be pigmented when required by the Detailed Specifications.

D. Excavation and subgrade preparation shall be in accordance with the requirements of General Specification 02316 - Excavation. All existing

material within the required 6 inches of foundation shall be removed in its entirety. Additional depth of foundation material for special conditions shall be placed as required by the Engineer.

E. Materials: Foundation material shall be placed on the prepared subgrade and thoroughly compacted into a course not less than 6 inches thick. The top surface shall be parallel to the finished grade and at a distance below the grade equal to the specified thickness of concrete.

F. Forms: Forms shall be in accordance with General Specification 03100 – Concrete Formwork.

G. Slabs: Concrete sidewalk shall be built in approximately 20-foot lengths between expansion joints. The sidewalk shall be separated from adjoining structures by expansion joints. When directed, these joints shall be filled with dry sand. Expansion joints in sidewalk shall coincide with expansion joints in curb. Tooled control joints not less than 1/2 inch in depth shall be provided where at four-foot intervals unless otherwise shown on the Contract Drawings.

H. Expansion Joints: Transverse expansion joints shall be 1/2 inch in width and shall be filled with preformed joint filler to within 1 inch of the sidewalk surface. The top 1 inch shall be sealed with Type 2 cold application sealer complying with the requirements of Section 2.22 of the NYCDOT Specifications.

I. The foundation material shall be wetted immediately before concrete is placed. The concrete shall be placed within the forms and thoroughly tamped until the surface is at the finished grade.

J. When specified in the Detailed Specifications, the concrete sidewalk shall be pigmented with a minimum of 2 pounds of dispersed carbon black per bag of cement to produce a bluestone color. Either the coloring pigment shall be treated so as not to cause an increase or decrease of the entrained air content in cement mortar or in the concrete of more than 10 percent, or the amount of air-entrainment agent added to the concrete shall be adjusted to meet the specified requirements. All cement used for concrete work specified herein shall be of uniform color. Requirements for other colors are covered in the Detailed Specifications.

K. The top surfaces shall be finished in accordance with General Specification 03350 – Concrete Finishes. Each rectangular slab shall have all edges neatly rounded with proper tools and be bounded on all sides by a troweled border about 1 inch in width. Surface texture of pedestrian ramps shall be transverse grooves, 1/2 inch wide by 1/4 inch deep on 2-inch centers.

L. Backfilling shall follow the removal of forms as soon as practicable and, unless otherwise permitted, shall be of clean earth, satisfactorily compacted.

Backfilling shall conforming to the requirements of General Specification 02317 - Backfilling.

M. Concrete sidewalk shall be cured according to General Specification 03300 Cast-in-Place Concrete.

N. All material types of sidewalk, such as unpigmented, pigmented, bluestone or pavers, and details are outlined in the NYCDOT Street Design Manual.

3.02 CURB AND HEADER INSTALLATION

A. Concrete curbs, headers, and steel faced concrete curbs, except as otherwise detailed and specified, shall be constructed in accordance with the applicable provisions of Sections 4.08 and 4.09, NYCDOT Standard Highway Specifications, except that concrete strength shall conform to Class 25 as indicated in General Specification 03300 Cast-in-Place Concrete. Depressed curbs shall be provided where specified or shown on the Contract Drawings.

B. Steel street curbs shall conform to ASTM A36 of the size indicated on the Contract Drawings. The length of straight runs shall be not less than 10 feet nor more than 20 feet. Curved curb angles shall be bent to the radius indicated, and provided with a straight tangent at each end, 3 feet in length. Special steel curb angles of approved type shall be provided at drop curbs. Where the length of the special drop curb exceeds 20 feet, it shall be spliced with an approved type butt welded joint. Anchors shall be welded to all steel curbing. The steel curbs shall be placed within the forms, upon suitable chairs, to the proper lines and grades. The joints between units of curbing shall be 1/8 inch. All surfaces of steel curbing, including anchors, shall be thoroughly cleaned of all rust, oil, grease, scale or other foreign matter before concrete is placed. All surfaces of steel curbing which are to remain exposed in the finished work shall be painted in the shop in accordance with General Specification 09900 - Painting. Finish coats shall be gray in color.

C. Granite and bluestone street curbs and headers shall be Class A dressed curbs and headers conforming to the requirements of Section 2.12 of the NYCDOT Standard Highway Specifications. When specified, a concrete cradle shall be used conforming to the provisions of Section 4.07 of the NYCDOT Standard Highway Specifications, except that concrete strength shall conform to Class 25 as indicated in General Specification 03300 Cast-in-Place Concrete.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02821
Metal Fence

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes the requirements for metal fencing. Metal fencing shall be as specified herein and in the Detailed Specifications and as shown on the Contract Drawings. The fence shall be all metal, constructed of wire fabric fastened to top, bottom and intermediate horizontal rails and to vertical line posts, corner posts and terminal posts and shall include all system components such as gates, fittings, fastenings and other accessories with polymer coating and other protective coatings as specified.

B. Unless otherwise shown or specified, all metal fencing shall be furnished and installed as specified. It is the intent that the Detailed Specifications will include any variations necessary for specific applications.

C. The Contractor shall implement practices and procedures to meet the project's sustainability goals as identified in the Contract Documents. The Contractor shall ensure that the sustainability requirements of this Section are implemented to the fullest extent.

D. The following index of this Section is presented for convenience:

1.02 PAYMENT

A. Unless otherwise provided in the Detailed Specifications, no separate payment will be made for performing any Work required under this Section and the Contractor shall include all costs thereof in its lump sum price bid for the Contract.

1.03 RELATED SECTIONS

A. General Specification 03300 - Cast-in-Place Concrete

B. General Specification 05081 - Galvanizing

1.04 REFERENCES

A. ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless, Standard Specification for

B. ASTM A90 - Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings, Standard Test Method for

C. ASTM A121 - Metallic-Coated Carbon Steel Barbed Wire, Standard Specification for

D. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products, Standard Specification for

E. ASTM A653 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process, Standard Specification for

F. ASTM A817 - Metallic-Coated Steel Wire for Chain-Link Fence Fabric and Marcelled Tension Wire, Standard Specification for

G. ASTM A824 - Metallic-Coated Steel Marcelled Tension Wire for Use with Chain

			Link Fence, Standard Specification for
H.	ASTM A1011	-	Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength, Standard Specification for
I.	ASTM B6	-	Zinc, Standard Specification for
J.	ASTM F567	-	Installation of Chain-Link Fence, Standard Practice for
K.	ASTM F626	-	Fence Fittings, Standard Specification for
L.	ASTM F900	-	Industrial and Commercial Swing Gates, Standard Specification for
M.	ASTM F1043	-	Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework, Standard Specification for
N.	ASTM F1083	-	Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures, Standard Specification for
O.	ASTM F1184	-	Industrial and Commercial Horizontal Slide Gates, Standard Specification for
P.	CLF-PM0610	-	Chain Link Fence Manufacturers Institute: Product Manual

1.05 SYSTEM DESIGN REQUIREMENTS

A. Comply with the standards of the Chain Link Fence Manufacturers Institute for product and installation requirements and the requirements of ASTM F567. These standards shall represent a minimum level of quality when additional information is not shown or specified in the Contract Documents.

B. The fabricator shall be responsible for providing structural calculations for the metal fence system to Contractor for submittal to Engineer as part of Shop Drawing review. Structural analysis shall verify that all system components including, but not limited to, supports, gates,

fasteners, fittings and connections meet the requirements of the New York City Building Code.

C. Member sizes, thicknesses and weights shown or specified shall be considered minimum. Where structural analysis indicates the need for additional members or increased member size, thickness or weight, these shall be provided at no additional expense to the City.

D. Modifications may be made only as necessary to meet field conditions to ensure proper fitting and support of the Work and only upon submittal of Shop Drawing and receipt of approval by Engineer.

E. Sustainable Design Requirements

1. Recycled Content of Metal Fence: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

F. Project-specific system design requirements will be provided in the Detailed Specifications, if necessary, to supplement requirements given herein or in the Contract Drawings.

1.06 QUALITY ASSURANCE

A. Installer Qualifications:

1. Contractor shall select a single installer regularly engaged in the installation of metal fencing with successful experience in the erection of the type of metal fencing specified. Installer shall agree to employ only tradesmen with specific skill and experience in the erection of this type of work.

2. Contractor shall submit the name and experience record of the installer to Engineer along with the names and telephone numbers of owners, architects or engineers responsible for the project and the approximate contract cost of the metal fencing and the amount of area installed.

3. Contractor shall submit evidence of approval of the installer by the metal fence manufacturer. Installers who have not had the type of experience required to perform the kinds of work required will not be approved.

B. Source Quality Control:

1. Provide metal fencing system as a complete system with all gates, hardware, appurtenances and other components produced by a single manufacturer, including custom erection accessories, fittings, clamps and fastenings as may be necessary or required.

2. Provide fence fabric imprinted with the manufacturer's trade name, country of origin, core wire gauge, and finished outside diameter gauge. Material delivered to the Project site lacking this information will be rejected for use in the work and shall be immediately removed even if discovered after being incorporated in the work, at no additional expense to the City.

3. Provide shipping list for materials used, endorsed with the manufacturer's voucher certifying that the material used in the metal fencing system complies with these Specifications.

4. Structural shapes of satisfactory sections and equal strengths may be substituted if approved by Engineer.

1.07 SUBMITTALS

A. The Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittal shall include, but not be limited to:

1. Each component, fastener, post, rail, support, chain link fabric and other items labeled as to the use and location in the work.

2. Samples approximately 6 inches long, and 6 inches square of all chain link fence fabric materials including framework members, and typical accessories. Engineer's review will be for workmanship only. Compliance with all other requirements is the responsibility of Contractor.

B. Shop Drawings: Submit for approval the following:

1. Copies of manufacturer's technical product information, specifications and certified test reports on physical properties, and installation instructions for all metal fencing system components.

2. All structural calculations verifying that all system components comply with the requirements of the New York City Building Code.

3. Large-scale details drawn at a scale of 3 inches to the foot for all connections and gate details. Drawings at a scale of 1/4 inch equals 1 foot of typical metal fence assembly identifying all components, metal fence heights, locations, and sizes and weights of all rails, posts, braces, supports and footings.

4. A list of all hardware and accessories.

C. Sample Mock-Ups

1. Materials for the work and full size sample mock-up shall be as shown on the Contract Drawings and as specified herein.

2. Contractor, his fabricator and installer shall build a full size sample mock-up at the Project site demonstrating to Engineer the ability to match the quality of workmanship, methods of detailing, and tolerances shown on the Contract Drawings and as specified herein. Once approved, the sample mock-up shall serve as a standard for all metal fence installation work required under the Contract.

3. Full size sample mock-ups that, in the opinion of Engineer, do not adequately demonstrate the ability of the installer to provide the requirements specified will not be approved and Contractor shall proceed to propose an alternative installer to Engineer for approval.

4. Cost of all full size sample mock-ups shall be at the expense of Contractor.

5. Each fabricator and installer proposed by Contractor shall be permitted to build two full size sample mock-ups using approved components as required to obtain Engineer's approval. If after building two mock-ups, Engineer is still uncertain that the fabricator or installer is capable of matching the workmanship, methods of detailing and performance requirements specified, Contractor shall propose alternative fabricators and installers. Contractor will be required to continue this process until the work of an acceptable fabricator and installer is approved.

6. Full size sample mock-up shall not be altered, moved or destroyed until written permission is received from Engineer. Mock-ups destroyed before Contractor receives written permission shall be rebuilt at no additional expense to the City.

D. Sustainable Design Submittals:

1. Environmental Materials Reporting Form (EMRF) Recycled Content. Provide the following information:

   a. Name of Product and Manufacturer.

   b. Material cost breakdowns. Cost breakdowns must include total material-only cost (excluding installation, labor and equipment).

   c. The percentage (by weight) of post-consumer and pre-consumer recycled content for the submitted product.

1.08 DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials:

1. Deliver materials in manufacturer's original, unopened packaging with all tags, labels and other identifying information intact and legible.

B. Storage of Materials:

1. Store all materials under weatherproof cover, off the ground and away from other construction activities. Do not store material in a manner which would create a humidity chamber. Provide for free movement of air under protective cover and between components of the metal fence system.

C. Handling of Materials:

1. Handle material in a manner that is in compliance with product institute standards and that will prevent damaging coatings.

1.09 PROJECT CONDITIONS

A. Field Measurements: Take field measurements and verify layout information and dimensions for metal fencing and gates in relation to property surveys and existing conditions.

B. Do not begin installation and erection of the metal fencing system until final grading is completed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers will be listed, if necessary, in the Detailed Specifications.

2.02 MATERIALS

A. General:

1. All parts of the metal fence system shall be galvanized steel, except that chain link fence fabric shall be aluminum-coated steel and fittings may be galvanized malleable iron, or galvanized wrought iron.

2. Wire gauges shall conform to American Steel and Wire Company gauge.

3. Concrete for footings shall be Class 25 conforming to the requirements of General Specification 03300 – Cast-in-Place Concrete.

4. Pipe sizes shall be commercial pipe sizes complying with ASTM F1083.

5. Tube sizes specified are nominal outside dimensions.

6. Roll-formed section sizes are the nominal outside dimensions.

7. Heat-form all arcs and chords before protective coatings are applied to metal.

8. All sizes specified are given for uncoated steel. All protective coatings are in addition to specified dimensions and sizes.

9. All galvanizing shall be done in accordance with General Specification 05081 - Galvanizing.

B. Chain Link Fence Fabric:

1. Fabric shall be in one-piece widths for fencing 12 feet - 0 inches and less in height to comply with Chain Link Fence Manufacturers Institute, Product Manual.

2. Wire mesh shall be woven throughout in the form of approximately uniform square mesh with parallel sides and horizontal and vertical diagonals of approximately uniform dimensions, of size and gauge as specified in the Detailed Specifications, ASTM A817, Type 1, cold-drawn carbon steel wire with minimum breaking strength of 2,170 pounds and coated with 0.40 ounces of aluminum by the hot-dip process per square foot of wire surface. The fabric shall be recommended by the Chain Link Fence Manufacturers Institute for heavy industrial usage.

3. Provide fabric knuckled on edges to prevent unraveling.

C. Framework:

1. General: The following table is provided for the convenience of Contractor and provides actual OD and equivalent nominal NPS size and trade size of round members. Pipe shall be commercial grade, plain end steel pipe with standard weight walls. Steel strip used in the manufacture of pipe shall be in compliance with ASTM F1083, Schedule 40 pipe with minimum yield strength of 25,000 psi and with 1.8 ounces of hot-dipped zinc coating per square foot of surface area. Type A coating shall be applied both inside and outside according to ASTM F1043, as determined by ASTM A90.

Actual OD	NPS Size	Trade Size
1.315	1	1-3/8
1.660	1-1/4	1-5/8

Actual OD	NPS Size	Trade Size
1.900	1-1/2	2
2.375	2	2-1/2
2.875	2-1/2	3
3.500	3	3-1/2
4.000	3-1/2	4
6.625	6	6-5/8
8.625	8	8-5/8

2. For maximum metal fence system height of 8 feet - 0 inches provide posts, gate frames and rails shall be of the following nominal pipe sizes and minimum weights per linear foot:

   a. Line Posts: 2-1/2 NPS @ 5.79 lbs per foot

   b. End, Corner and Pull Posts: 3 NPS @ 7.58 lbs per foot

   c. Gate Frames: 2 NPS @ 3.65 lbs per foot

   d. Gate Posts:

      1) For single gates 6 ft. wide or less, or double gates 12 ft. wide or less: 3 NPS @7.58 lbs per foot.

      2) For single gates more than 6 ft. wide, or double gates more than 12 ft. wide: 4 NPS @ 10.79 lbs per foot.

   e. Top Rails, Intermediate Rails, Bottom Rails and Braces: 1-1/2 NPS @ 2.72 lbs per foot.

3. Provide manufacturer's longest length rails, with extra-long expansion sleeves making firm connections but permitting expansion and contraction for each joint. Provide means for attaching the top rail securely to each gate, corner, pull and terminal post.

D. Roll-Formed Steel: Rolled steel shapes shall be produced from structural-quality steel conforming to ASTM A1011, Grade 45, or ASTM A446, Grade D, galvanized, with a minimum yield strength of 45,000 psi. Protective coating system shall conform to ASTM F1043, Type A, hot-dipped galvanizing with a minimum of 4.0 ounces of zinc per square foot of surface area in accordance with the requirements of ASTM A653.

E. Fittings and Accessories: All fittings and accessories shall comply with ASTM F626.

1. Post Caps: Pressed steel, cast iron or cast aluminum alloy, fitting snugly over posts to exclude moisture; cone-type caps for terminal posts and loop-type caps for line posts.

2. Rail and Brace Ends: Pressed steel, cast iron or cast aluminum alloy, cup-shaped to receive rail and brace ends.

3. Rail Sleeves: Tubular steel, 0.051-inches thick by 7-inches long, expansion type.

4. Tension Bars: Steel strip, 5/8-inch wide by 3/16-inches thick.

5. Tension Wire: Marcelled 7 gauge steel wire with minimum coating of 0.40 ounces per square foot of wire surface in compliance with ASTM A824.

6. Tension Bands: Pressed steel, 12 gauge thick by 3/4-inch wide.

7. Truss Rods: Steel rod, 3/8-inch diameter merchant quality with turnbuckle.

8. Barbed Wire Arms: Pressed steel, cast iron or cast aluminum alloy fitted with clips or slots for attaching three strands of barbed wire - arms set outward on a 45 degree angle, or vertical, and capable of supporting a 250 pound load at outer barbed wire connecting point without causing permanent deflection.

9. Fence Latches:

   a. Manufacturer's double latching bar latch devices with heavy mil polyvinyl chloride coating.

   b. Padlock eye as integral part of latch.

10. Keeper: Provide a gatekeeper for vehicle gates that automatically engages gate leaf and holds it in the open position until manually released.

11. Gate Hinges: 180 degree offset heavy-industrial hinges; 1-1/2 pair per leaf.

12. Tie Wire: Aluminum; 9 gauge, alloy 1100-H4; polyvinyl chloride coated to match fence fabric.

13. Gate Stops: Provide gate stops for double gates consisting of mushroom-type flush plate with anchors, set in concrete, and designed to engage a center drop rod or plunger bar. A locking device and padlock eyes shall be included as integral parts of the

latch, permitting both gate leaves to be locked with a single padlock.

F. Gates:

1. Swing gates shall comply with ASTM F900.

2. Sliding gates shall comply with ASTM F1184.

G. Hog Rings: Steel wire, 11 gauge, with a minimum zinc coating of 0.80 ounces per square foot of wire surface.

H. Barbed Wire: Commercial quality steel, two strand twisted, 12-1/2 gauge line wire with 14 gauge four point barbs at 5-inch spacing - coating shall consist of 0.40 ounces of aluminum per square foot of wire surface in compliance with ASTM A121.

I. Galvanizing: Zinc for galvanizing shall be of High Grade or Special High Grade conforming to ASTM B6 with a maximum aluminum content of 0.01 percent. Material shall be galvanized by the "hot-dip" process in conformity with the following standards:

Class of Work	ASTM
Structural Iron and Steel Shapes	A123
Fittings and Accessories	F626
Pipe	A53

2.03 FABRICATION

A. Fabrication Tolerances:

1. Fabric, posts, rails, and other supports shall be straight or uniformly curved to provide the profiles shown on the Contract Drawings, to a dimensional tolerance of 1/16 inch in 10 feet - 0 inches without warp or rack in the finished installation.

B. Fabrication shall be in compliance with ASTM F1083 for metal fencing, ASTM F1184 for horizontal slide gates, and ASTM F900 for swing gates.

C. In addition to specified standards, fabrication shall be in compliance with Chain Link Fence Manufacturer's Institute Standard, CLF-PM0610 - Product Manual.

D. Gates:

1. Gate hinges shall be of the double clamping offset type. To hold the gate in the open or closed positions, each gate frame shall be

provided with a keeper which automatically engages a gate shoe set in concrete. Gates shall have a drop latch with provision for a padlock. Each gate shall be provided with a heavy-duty bronze padlock and shackle chain, No. 160DHM with 11/32-inch marine brass shackle as manufactured by:

a. The Master Lock Company, Oak Creek, WI.

b. Or approved equal.

And three keys for each padlock. Where more than one gate is required for the same enclosure, padlocks shall be keyed the same.

2. All gate frames shall have intermediate horizontal rails. Gate frames shall be of welded construction and shall be galvanized after fabrication. Single gates 6 feet wide or wider and double gates 12 feet wide or wider shall be provided with diagonal bracing in one direction, extending from top to bottom rail. The diagonal bracing shall be at least 1/2 inch in diameter and shall be provided with turnbuckles.

PART 3 EXECUTION

3.01 INSTALLATION

A. General:

1. Install metal fencing system in compliance with ASTM F567.

2. Apply fabric to outside of framework. Install fencing on boundary lines inside of property line established by survey.

3. Do not begin metal fence installation and erection before the final grading has been completed, and finish elevations have been established.

B. Excavation:

1. Drill or hand-excavate (using post-hole digger) holes for posts to diameters and spacings shown or specified, in firm, undisturbed or compacted soil.

2. Unless otherwise indicated, excavate hole depths approximately 6 inches lower than post bottom.

3. Spread soil from excavations uniformly adjacent to the fence line, or on adjacent areas of the Project site, as directed.

4. When solid rock is encountered near the surface, drill into rock at least 12 inches for line posts and at least 18 inches for end, pull, corner and gate posts. Drill hole at least 1 inch greater in

diameter than the largest dimension of the post to be placed. Remove rock cores from the Site.

5. If solid rock is below soil overburden, drill to full depth required, except penetration into rock need not exceed the minimum depths specified above.

C. Setting Posts:

1. Remove loose and foreign materials from sides and bottoms of holes, and moisten soil prior to placing concrete.

2. Center and align posts in a continuous pour, and vibrate or tamp concrete for consolidation. Check each post for vertical and top alignment, and hold in position during placement and finishing operations.

3. Posts shall be set in concrete footings, except as otherwise shown or specified. Line posts shall extend at least 3 feet below finished grade, and gate posts shall extend at least four feet below finished grade. Concrete footings shall have a minimum diameter of 15 inches and shall extend at least 6 inches below the bottom of the posts. Tops of concrete footings shall receive a troweled finish. Top of footing shall be 2 inches above finish grade and sloped to direct water away from posts. The portion of posts embedded in concrete shall receive two coats of an approved coal tar paint before embedment.

4. Line posts shall be spaced not more than 10 feet on centers. Install caps on tops of all posts to exclude moisture and to receive the top rail unless equal protection is afforded by combination post top cap and barbed wire supporting arm, where barbed wire is required.

5. Keep exposed concrete surfaces moist for at least seven days after placement, or cure with membrane curing materials, or other acceptable curing method.

6. Grout posts when installed in sleeved holes, concrete constructions, and rock.

7. Allow concrete to attain at least 75 percent of its minimum 28-day compressive strength, but in no case sooner than seven days after placement, before rails, tension wire, or fabric is installed. Do not stretch and tension fabric or wires, and do not hang gates until the concrete has attained its full design strength.

D. Chain Link Fence Fabric:

1. Pull fabric taut so that fabric remains in tension after force is released, with bottom edge 1 inch above grade. Fasten to terminal posts and gate posts with tension bars threaded through mesh and secured with tension bands at maximum intervals of 14 inches. Tie to line posts, gate frames and top and bottom rails with tie wires spaced at maximum 12 inches on posts and 24 inches on rails.

2. The tension bars shall be connected to posts and frames by means of adjustable bolts and bands spaced not more than 14 inches apart.

E. Top Rails, Intermediate Center Rails and Bracing:

1. Install top rails through line post caps, bending to radius for curved runs, connecting sections with sleeves to form a continuous rail between terminal posts.

2. Install center rails only where shown or specified. Install center and bottom rails in one piece between posts and flush with the post on the fabric side, using rail ends and special offset fittings where necessary.

3. Install brace assemblies at end posts and at both sides of corner and pull post panels. Panels adjacent to gates shall have intermediate horizontal rails and diagonal bracing. The diagonal bracing shall run from the center of the first line post to the bottom of the terminal post.

F. Tie Wire: Use U-shaped wires conforming to diameter of pipe. Wire shall clasp pipe and fabric firmly, and each end of the wire shall be wrapped around the fabric at least two full turns and bent to minimize hazard to persons or clothing.

G. Barbed Wire:

1. When barbed wire is shown or specified along the top of the fence, it shall be supported at the posts by arms inclined inward at an angle of 45 degrees.

2. The vertical members of gates shall be extended to receive the barbed wire which shall be fastened securely to prevent movement or displacement.

H. Fasteners: Install nuts for fittings, bands and hardware bolts on side of metal fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

3.02 ADJUSTMENT

A. Gates: After repeated operation of completed installation equivalent to three days of use by normal traffic, readjust gates for optimum operation and safety.

B. Lubricate operating equipment and clean exposed surfaces.

C. Repair and replace all broken or bent components. Repair coatings damaged in the shop or during field erection by recoating with manufacturer's recommended repair compound, applied in accordance with manufacturer's directions.

D. Protect metal fencing system from construction traffic and all other damage until acceptance of the work.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02841
Guide Railing

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for furnishing and installing corrugated steel beam guide railing and concrete median barrier (Jersey barrier).

B. The following index of this Section is presented for convenience:

1.02 PAYMENT

A. Unless otherwise provided in the Detailed Specifications, no separate payment will be made for performing any Work required under this Section and the Contractor shall include all costs thereof in its lump sum price bid for the Contract.

1.03 RELATED SECTIONS

A. General Specification 03210 - Reinforcing Steel

B. General Specification 03300 - Cast-in-Place Concrete

C. General Specification 05081 - Galvanizing

1.04 REFERENCES

A. New York City Department of Transportation (NYCDOT), Bureau of Highway Operations Standard Specifications

B. New York State Department of Transportation (NYSDOT), Office of Engineering Standard Specifications

C. NYSDOT Standard Sheet Nos. 606-8R1, 606-9R1 and 606-10R1

D. ASTM A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement, Standard Specification for

1.05 SYSTEM DESCRIPTION

A. Beam Type Guide Rails shall consist of steel rail elements affixed to and supported by structural steel beam posts. Except as otherwise shown on the Contract Drawings, specified, or directed by the Engineer, the material, manufacturer, fabrication and installation or erection of guide rails shall be in compliance with current New York State Department of Transportation (N.Y.S.-DOT) Standard Sheet Nos. 606-8R1, 606-9R1 and 606-10R1.

B. Precast concrete barrier shall be fabricated to conform to the shapes and sizes shown on the Contract Drawings and, except as otherwise specified, shall conform to the requirements of the current NYSDOT Standard Specifications.

1.06 SUBMITTALS

A. The Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited to:

1. The location of steel guide rails and precast concrete barriers.

2. The form dimensions and location and type of reinforcement in the precast concrete barrier, and shall show the details and dimensioning of the beam guide rails, including location and spacing of steel posts.

3. The test reports on concrete and reinforcing steel certified by an approved testing laboratory.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers will be listed, if necessary, in the Detailed Specifications.

2.02 MATERIALS

A. Materials for beam type guide rails shall be as specified in NYSDOT Standard Specifications.

B. Precast concrete barriers shall be constructed in accordance with the requirements of NYCDOT Standard specifications except that concrete and reinforcing steel shall conform to the requirements of General Specification

03210 – Reinforcing Steel. Concrete shall be Class 40, and reinforcing steel shall comply with ASTM A615, Grade 60.

2.03 FABRICATION

A. Steel Guide Rail:

1. Steel guide rails shall be of the Heavy Post Blocked-Out Corrugated Beam type as shown on the NYSDOT standard sheets.

2. Corrugated beam guide rails to be installed on curves of a radius equal to or less than 150 feet shall be shop curved as required by the NYSDOT Standard Specifications.

B. Precast Concrete Barrier:

1. The length of individual sections of precast concrete barrier shall not exceed 30 feet.

2. The tolerance on placement of reinforcing steel in the barrier shall be +1 inch. The chairs, spacers or other devices used to maintain the reinforcement in position shall have rust resistant tips so that no spots will show on the finished faces.

3. Concrete shall be consolidated in the forms by internal vibrators. Exposed surfaces shall be free from objectionable imperfections, such as honeycomb and air voids, as determined by the Engineer. If air voids collect at the interface of the concrete and forms, the forms shall be tapped on the outside with rubber mallets or similar devices to displace the entrapped air.

4. Curing:

a. The precast barrier sections may be cured by means of quilted covers which shall be kept wet, or by using polyethylene coated burlap blankets which will not require wetting. Polyethylene coated blankets shall be laid dry with the burlap side against the concrete, and adjoining blankets shall be lapped sufficiently to provide a moisture seal. Retention of moisture for curing by any of the above methods shall be continued for a minimum of 7 days.

b. If the precast concrete barrier sections are steam cured, the sections shall be cured in an enclosure free from outside drafts, and cured in a moist atmosphere. The temperature shall be maintained at a temperature between 125 degrees and 160 degrees F by the injection of steam for a period of not less than 12 hours. Steam curing shall not begin in less than 2 hours from the time that the last concrete was placed. Care shall be taken by the manufacturer to prevent localized "hot spots" caused by

the steam lines. A continuous temperature time recorder is required for each enclosure. The temperature of the curing atmosphere for any method shall not be increased or decreased at a greater rate than 40 degrees F per hour.

5. Repair: Where approved by the Engineer, occasional imperfections in manufacture or those caused by mishandling may be repaired. The repairs shall be properly finished and cured. The color of the repaired area shall match as closely as possible the rest of the barrier color. The repairs may be made with a mixture of sand and cement. The repairs shall be made to the satisfaction of the Engineer.

2.04 FINISHES

A. Steel guide rails, posts, anchoring devices, bolts, nuts and washers shall be galvanized in accordance with the requirements of General Specification 05081-Galvanizing.

B. Precast concrete barriers shall not receive a protective coating.

2.05 SOURCE QUALITY CONTROL

A. Tests and Inspections:

1. Precast Concrete Barrier: The acceptance of the manufactured precast concrete barrier sections will be determined by the Engineer in accordance with either of the following methods at the option of the Engineer.

a. Production Testing: Testing shall be performed by the manufacturer, subject to the approval and inspection of the Engineer. It shall consist of testing the freshly-mixed concrete for compliance to the air content required by General Specification 03300 – Cast-in-Place Concrete, and the casting and testing of concrete cylinders for compressive strength determination. Test cylinders used to determine the required compressive strength shall be cured with units they represent. The City reserves the right to test the hardened concrete at any time, in which case the manufacturer shall drill 4-inch diameter cores at the direction of the Engineer.

b. End Product Testing: The testing of hardened concrete for both air content and compressive strength will be performed by an approved testing laboratory on 4-inch diameter cores drilled by the manufacturer where directed by, and in the presence of, the Engineer.

PART 3 EXECUTION

3.01 INSTALLATION

A. Steel Guide Rail:

1. Methods: Posts, rails, end assemblies and other parts of the corrugated beam guide rail system shall be erected parallel to the roadway and as indicated on the NYSDOT standard sheets and in conformance with the requirements of the NYSDOT Standard Specifications, except as specified herein.

2. Curved Rail Elements: Straight lengths of rail elements may be used between end posts when the radius of curvature of a line passing through the centerline of installed posts is equal to or greater than 700 feet. When the said radius of curvature is less than 700 feet and greater than 150 feet, rail elements shall be curved to match the actual radius of curvature.

3. Splicing: Rail elements shall be spliced at each post so that the rail element which is nearest oncoming traffic overlaps the element which is furthest.

4. Attachment: To prevent loosening, bolt threads close to the nut shall be upset after a connection has been tightened to final position. Upset threads shall be completely sealed against corrosion by the application of an approved aluminum paint.

B. Precast Concrete Barrier:

1. Precast concrete barrier sections shall be installed with ½-inch nominal joint openings. The joint opening, at any point in the plane of the joint, shall be not less than ½ inch and no more than 1 inch. Premolded resilient joint filler conforming to the requirements of NYSDOT Standard Specifications Section 705-07 or preformed closed cell foam material conforming to the requirements of Section 705-08, Type II Joint Filler shall be placed in the joint.

3.02 FIELD QUALITY CONTROL

A. Steel Guide Rail:

1. Inspection of Railing: Immediately prior to erection, the railing will be inspected for damage. Bends or kinks in the railing not specifically required by the Contract Drawings shall constitute sufficient cause for rejection. Straightening of such bends or kinks will not be allowed. Bending or curving railing panels or rails, not for uniform bending to form curves with radii greater than 150 feet, but for the purpose of adjusting for misalignment, will not be permitted. The Engineer may

order some bending or curving to allow for necessary minor adjustments.

2. Inspection of Galvanizing: Damage to galvanizing shall constitute sufficient cause for rejection, except for the following conditions:

   a. If the total damaged area of a complete railing panel is less than two percent of the total surface area, or sixteen square inches, whichever is less.

   b. If the total damaged area of a single piece (i.e., post or rail) is six square inches, or less

3. Field Galvanizing for Repair: Field galvanizing repair shall be allowed to be performed upon damaged areas meeting the requirements of Paragraphs 3.02A.2.a. and b. above. Field galvanizing repair shall be made by painting zinc repair materials onto the damaged area in accordance with the requirements of Section 719-01, Galvanized Coatings and Repair Methods, of the NYSDOT Standard Specifications.

   a. All finished surfaces of welds and adjacent surfaces or rails and posts upon which galvanizing has been removed, due to any field welding operation, shall be rejected and replaced.

   b. Any railing panel with a total damaged area in excess of the amount specified or any single piece with a total damaged area in excess of the amount specified shall be rejected and replaced.

4. Field Welding: Field welding will not be permitted unless noted on the Contract Drawings.

B. Precast Concrete Barrier:

1. Inspection of Precast Concrete Barriers: Barrier sections will be inspected by the Engineer before installation in the field to ascertain the type and extent of defects, if any.

2. Defects: Defects are divided into two categories (minor defects and major defects). Minor defects in the barrier may be repaired in the field. Major defects shall be cause for rejection of the section, or the section shall be repaired in the manner directed by the Engineer.

   a. Minor defects are defined as holes, honeycombing or spalls which are six inches, or less, in diameter, and which do not expose the outermost surface of the steel reinforcement. Surface voids 5/8 inch, or less, in diameter, and 1/4 inch, or less, in depth are not considered defects and they do not require repair.

   b. Major defects are defined as:

1) Any defect which does not meet the definition of a minor defect.

2) Minor defects which, in aggregate, comprise more than 5 percent of the surface area of the barrier section.

3. Repair of hardened concrete shall be as follows:

a. Minor Defect Repair: Repair shall be made with a material meeting the requirements of Section 701-04 of the NYSDOT Standard Specifications. Methods of repair shall be acceptable to the Engineer. The color of the repaired portion shall match, as nearly as practicable, the color of the surrounding concrete. Repaired portions shall exactly match shape requirements. The repaired portion shall withstand a moderate blow from a 16-ounce hammer.

b. Major defect repair shall be preapproved by the Engineer.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02910
Planting

PART 1 GENERAL

1.01 SUMMARY

A. Planting as specified herein includes, but is not limited to, the following:

1. Furnishing and installing new trees, shrubs, grasses, and all other plant materials.
2. Furnishing and installing new seeded, hydroseeded, and sodded areas.
3. Staking and guying of trees, only where shown on the Drawings or as directed.
4. Furnishing and installing filter fabric and drainage gravel under planted areas, in areas as shown on the Drawings.
5. Furnishing and installing mulch.
6. Protection and maintenance of all plant materials and the replacement of plantings as required until Substantial Completion.
7. Guarantee of all new plant materials for 18 months after Substantial Completion, unless otherwise required in the Detailed Specifications.
8. Plant protection, maintenance and replacements during guarantee period.

B. The Contractor shall implement practices and procedures to meet the project's sustainability goals as identified in the Contract Documents. The Contractor shall ensure that the sustainability requirements of this Section are implemented to the fullest extent.

C. The following index of this Section is included for convenience:

1.02 PAYMENT

A. No separate payment will be made for performing any work of this Section and the Contractor shall include all costs thereof in its lump sum price bid for the Contract, except as provided for otherwise in the Detailed Specifications.

1.03 RELATED SECTIONS

A.	General Specification 02317	-	Backfilling
B.	General Specification 02371	-	Dust, Soil Erosion & Sedimentation Control
C.	General Specification 02920	-	Soil Mixes

1.04 REFERENCES

A. American Nursery and Landscape Association (ANLA)

1. American Standard for Nursery Stock (ASNS), ANSI Z60, current edition

B. International Society of Arboriculture (ISA)

1. American National Standard for Arboricultural Operations – Pruning, Repairing, Maintenance, and Removing Trees, and Cutting Brush – Safety Requirements, ANSI Z133, current edition

C. Tree Care Industry Association (TCIA), Standards

1. American National Standard for Tree Care Operations – Tree, Shrub and Other Woody Plant Management – Standard Practices, ANSI A300, current edition.

D. Manual of Vascular Plants of Northeastern United States and Adjacent Canada, 2nd ed., 1991, by Henry A Gleason and Arthur Cronquist (G&C), New York Botanical Garden

E. Revised Checklist of New York State Plants (NYSPC), Richard S. Mitchell and Gordon C. Tucker, New York State Museum

F. New York Flora Atlas (http://newyork.plantatlas.usf.edu/Default.aspx)

G. USDA Plant Database (http://plants.usda.gov/java/) & USDA Plant Hardiness Zone Map (http://planthardiness.ars.usda.gov/PHZMWeb/)

1.05 SYSTEM DESIGN REQUIREMENTS

A. Contractor shall locate all required plant materials and be present for their inspection, as directed by the Engineer or the Engineer's designated representative, at the nursery prior to transport or upon delivery of the materials on site. Notify the Engineer at least 14 days in advance of the Contractor's desired inspection dates and locations.

B. Inspection at Nursery: All plants may be inspected and selected by the Engineer or designated representative at the nursery for conformity to the requirements of the Contract. Whether plant materials are inspected or not at the nursery, the Contractor shall make all preselection arrangements required by the Engineer to ensure an efficient selection procedure. Approval of plant materials at the nursery shall not affect the rights to inspect or reject the materials upon delivery or later.

C. Inspection at Delivery On-Site: Notify the Engineer at least five (5) working days in advance of delivery of plants to the site.

1. The Engineer or Engineer's designated representative will inspect all plants upon delivery to site.

2. Contractor shall schedule a time for on-site inspection prior to planting, and shall arrange for adequate labor and equipment on-site at the time of inspection to unload, open, and handle plants during inspection.

3. The Engineer or Engineer's designated representative may reject any plant material prior to or upon delivery to the site.

a. All plant material that is dead, dying or appears unhealthy will be rejected.

b. All plant material that has been improperly maintained, dug, transported or handled in such a way as to impair its appearance or health will be rejected.

D. The Engineer or Engineer's designated representative will be the sole judge of the condition of the plants.

1. All material that is rejected on site shall be removed immediately from site, and replaced with new material selected or approved by the Engineer, at no additional cost to the City.

E. Sustainable Design Requirements:

1. Regional Materials: Provide plant materials that were grown and harvested, or extracted, within 250 miles of the project site unless otherwise required in the Detailed Specifications or shown on the Drawings.

F. Project-specific system design requirements will be provided in the Detailed Specifications, if necessary, to supplement requirements given herein or in the Contract Drawings.

1.06 QUALITY ASSURANCE

A. Comply with all rules, regulations, laws and ordinances of local, state and federal authorities having jurisdiction. Provide labor, materials, equipment and services necessary for work to comply with such requirements at no additional cost to City.

B. Procure and pay for permits and licenses required for work of this Section. Obtain all required permits in a timely manner to avoid delays to the work.

1.07 SUBMITTALS

A. Submit a Statement of Qualifications for the landscape subcontractor. Qualifications shall show experience in the installation of landscape work of a similar type and scale to this project within the last six (6) years.

B. Statement of Qualifications for the landscape subcontractor shall consist of the following information:

1. Company name and address
2. Number of years in business under this name
3. Number of current full-time, part-time, and seasonal employees
4. Estimated number of employees intended for this project
5. Current workload:
    a. Name and address of current projects
    b. Types and dollar amounts of work for which landscape subcontractor is responsible in each current project
    c. Estimated completion date for each current project
6. References for three (3) projects completed within the last six (6) years, which are similar in scope to this project, including the following information for each project:
    a. Name and address of project
    b. General description of work
    c. Dollar amount of landscape work performed

d. Dates landscape work was started and completed

e. Verified contact information for at least one (1) representative of the owner or prime construction contractors in each projects:

1) Name,

2) Mailing address,

3) E-mail address, and

4) Telephone numbers (Office and Direct).

f. Contact information similar to above for at least one (1) representative of the Architect, Engineer, Landscape Architect, or other representative of the designer or construction manager for each project given as reference.

C. Samples: Submit samples of the following items:

1. Mulch: One (1) pound bag with manufacturer's certification of content

D. Growers/Nurseries: Contractor shall submit a list of proposed growers/nurseries prior to the commencement of any landscaping work, with sufficient advance notice of at least 60 days or as stated in the Detailed Specification.

E. For nurseries, a copy of state inspection certificate for current year must be submitted.

F. Materials/Certificates: Contractor shall submit a list of all materials and certificates specified in this Section prior to the commencement of any landscaping work, with sufficient advance notice of at least 30 days or as stated in the Detailed Specification.

G. All necessary state, federal and other inspection certificates as may be required by law.

H. Product Data - Where applicable, the following product data shall be submitted:

1. Manufacturers' product information for filter fabric, showing conformance with the specified requirements.

2. Analysis of each seed or hydroseed mix to be used, showing percentage of purity, weed content and germination of seed.

3. Identification of sod source and certification that all sod material is true to name, type, purity and other criteria in conformance with these specifications.

4. Certified analysis for each treatment, amendment, and fertilizer material specified and as used, including weight for packaged material.

I. Documentation: The Contractor shall submit written documentation at least 30 days prior to scheduled start of planting that all plant material has been ordered.

J. Maintenance Program: Submit written schedule of maintenance operations proposed for the guarantee period. Schedule shall be in the form of a list of all proposed maintenance tasks, with dates showing when each maintenance task will be performed and its frequency of occurrence.

K. Sustainable Design Submittals:

1. Environmental Materials Reporting Form (EMRF) Regional Materials. Provide the following information:

a. Name of Product and Manufacturer.

b. Material cost breakdowns. Cost breakdowns must include total material-only cost (excluding installation, labor and equipment).

c. Indicate the location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. For assemblies, include the percentage by weight that is considered regional.

1.08 DELIVERY, STORAGE AND HANDLING

A. Packaged Materials

1. Deliver packaged materials in unopened bags or containers, each clearly bearing the name of the producer, the material composition, manufacturers' certified analysis, and the weight of the material.

2. All packaged products shall be stored, handled and applied in strict accordance with manufacturers' instructions.

B. Dig and handle all plant material to prevent injury to trunks, branches and roots.

1. All plants specified as B & B (balled and burlapped) in the Plant List shall be dug to depths as required in the Detailed Specifications with sufficient roots and shall have a solid ball of earth securely held in place by burlap and rope.

2. Do not prune prior to delivery.

3. Do not bend or bind-tie trees in such manner as to damage bark, break branches or destroy natural shape.

C. Pack and ship all plant material to ensure arrival at site in good condition. Provide protective covering during delivery.

D. If planting is delayed more than 24 hours after delivery, Contractor shall provide adequate means of protection from freezing and from the drying effects of wind and sun.

1. Rootballs shall be protected with soil, wet mulch, or other acceptable material.

2. Provide shade structures or other covering as required to protect branches and leaves.

3. Water as necessary until planted. Do not allow plant material to wilt or show signs of stress from lack of water. Provide all water and equipment for water distribution at no additional cost to the City.

E. Immediately remove rejected or damaged plant material from the site and replace with plants approved by Engineer. All replacement plants shall be subject to the same requirements as the original material.

1.09 COORDINATION

A. The Contractor shall coordinate its work with that of other Contractors. Such coordination shall include, but not be limited to:

1. Location of all underground utility lines and structures

2. Scheduling of planting operations

3. Scheduling of maintenance operations

1.10 SUBSTANTIAL COMPLETION

A. Contractor shall submit a written request to the Engineer, for a formal inspection of the planting work for Substantial Completion.

B. To be accepted at the time of formal inspection of planting work, all plant material must be alive, healthy, and installed as specified.

1. If plants are dead, dying, or unhealthy, or if landscaping does not serve its visual or soil stabilization functions, or if workmanship is unacceptable to the Engineer or Engineer's Representative for other reasons, written notice will be given to the Contractor in the form of a punch list that itemizes all remedial work required for Substantial Completion.

2. This work may include plant replacement or maintenance which must be carried out prior to issuance of the Certificate of Substantial Completion.

3. The Certificate of Substantial Completion will not be issued until a written maintenance program, as described herein below, has been approved by the Engineer and the Engineer's designated representative.

1.11 WARRANTY (GUARANTEE PERIOD)

A. All new plant material shall be guaranteed for a period of 18 months after the date of Substantial Completion, unless otherwise required in the Detailed Specifications.

B. Protection and Maintenance

1. At least 30 days prior to the date of the written request for Substantial Completion, Contractor shall submit a written protection and maintenance program and schedule to the Engineer for approval.

2. Protection and Maintenance program shall be revised and resubmitted as required until approved by Engineer.

3. During the guarantee period, the Contractor shall maintain all plant materials as specified herein, and as noted in the approved maintenance schedule, and shall replace, at no additional cost to the City, any and all plant material that has died or, in the opinion of the Engineer or Engineer's designated representative, is in unhealthy or unsightly condition.

4. The Contractor is responsible for providing and maintaining adequate protection measures for all planted areas throughout the guarantee period in order to protect plantings from by any subsequent construction operations or other types of physical damage.

   a. Protection measures may include, but not be limited to, approved temporary fencing, tree guards, signage and other measures as determined to be necessary during the guarantee period.

   b. Local fence ordinances and guidelines may also apply to the work requiring the Contractor to submit at no additional cost to the City design drawings or other documents for obtaining the necessary local permits or approvals.

C. Replacements

1. There will be no limit to the number of times replacements are made of individual plants, unless conditions causing the failure can be proved to be beyond the control of the Contractor.

2. The Contractor is responsible for replacing any and all plant material and any associated compacted soils that are damaged by the Contractor's own operations or the operations of any of its subcontractors, or due to other damage resulting from a lack of adequate protective measures, at no additional cost to the City.

3. All replacements shall be in accordance with original specification or, if it is determined that specified plants are inappropriate for as-built conditions, they may be replaced with the approval of Engineer or Engineer's Representative to more appropriate species as identified by a Restoration Specialist, Landscape Architect or other qualified professional.

4. Cost of all replacements shall be included in the Contract price. No additional payment will be made therefor.

5. Replace unacceptable plant material no later than the next succeeding planting season.

6. Guarantee all replaced material for a period of 18 months after the date of replacement, unless otherwise required in the Detailed Specifications.

7. All areas damaged or soiled by replacement planting operations are to be fully restored to their original condition at no additional cost to the City.

D. Site Inspection

1. Approximately one (1) month prior to the expiration of the guarantee period, the Contractor shall arrange a site inspection by the Engineer.

2. At this time, the Engineer will prepare a list of all remedial work required, including plant replacement and maintenance.

3. This work shall be carried out before the end of the guarantee period, unless weather conditions cause delays, in which case such work shall be carried out as soon as is practical.

E. Final Acceptance

1. Following the completion of all remedial work and replacement plantings, the Contractor shall request the Engineer in writing for a formal inspection of the landscape work for Final Acceptance.

2. If replacement plantings are required, Final Acceptance will be provisional upon a final inspection at the end of the guarantee period for the plant replacements.

F. All of the materials and labor required for plant protection, maintenance and replacements during the guarantee period shall be included in the Contractor's bid price. No additional payments will be made therefor.

PART 2 PRODUCTS

2.01 MANUFACTURERS AND SUPPLIERS

A. Acceptable manufacturers and suppliers of planting materials shall be as indicated below unless otherwise specified in the Detailed Specifications.

1. Hardscrabble Farms Nursery, North Salem, NY (www.hardscrabblefarms.com)

2. Pinelands Nursery, Columbus, NJ (www.pinelandsnursery.com)

3. New England Wetland Plants, Inc., Amherst, PA (www.newp.com)

4. Sylva Native Nursery & Seed Company, Glen Rock, PA (www.sylvanative.com)
5. Octoraro Native Plant Nursery, Kirkwood, PA (www.octoraro.com)
6. Northcreek Nurseries, Oxford, PA (http://www.northcreeknurseries.com)
7. Or Approved Equal

B. All nurseries supplying plant material shall have a registration certificate from the Department of Agriculture and Markets, Division of Plant Industry, New York (or similar organization in the state from which plant material is obtained) certifying that the plant material is apparently free of injurious insects and diseases.

2.02 MATERIALS

A. Plants

1. Provide plant material to meet or exceed applicable ANLA standards in all ways in addition to other standards specified. Plant names, size and grading standards shall conform to those prepared by American Nursery and Landscape Association (American National Standards Institute), American Standard for Nursery Stock (ANSI Z60.1, latest edition). Plants shall be true to species and, if specified as to variety or cultivar, shall be as listed in http://newyork.plantatlas.usf.edu/Default.aspx to determine nativity and as listed in http://plants.usda.gov/java/ for taxonomy. Plants shall be typical of their species or variety with normal habits of growth, in accordance with ASNS: Sound, healthy and vigorous, well-branched and densely foliated when in leaf, with healthy well developed root systems; free from disease, abrasions of the bark, insect pests, eggs or larvae.
2. Plant species native to the Eastern United States, as specified in the planting plan and Detailed Specification, shall be provided by the Contractor. Non-native species shall not be considered as substitutes for native species.
3. Native plant material shall be derived from the local genotypes of the native plants specified to the greatest extent practicable. Plants must be nursery grown in hardiness zones no warmer or colder than the project sites as determined by the USDA Agricultural Research Service, Plant Hardiness Zone Map.
4. Plants that have escaped cultivation, or have accidentally been introduced into native habitats, shall not be considered native to the Eastern United States. Refer to USDA Plants Database for taxonomy and to G&C, NYSPC and the New York Flora Atlas to determine nativity.

a. No plant material shall be collected or harvested from non-nursery areas.

b. All trees shall be freshly dug for this project.

5. Sources: Nursery sources of supply shall have been investigated by the Contractor prior to submitting its bid to confirm that size, variety, and quantity of plant material specified on the Plant List can be supplied. Failure to take this precaution will not relieve the Contractor from the responsibility for furnishing and installing all plant material in strict accordance with the Contract requirements and without additional expense to the City.

6. Quality: All woody plant material shall be nursery grown in accordance with good horticultural practice, for at least two (2) years under climatic conditions and soils similar to those at project site. All plants shall be of specimen quality. All trees are to be uniform and matched. All trees shall have straight trunks with leader intact, undamaged and uncut. Trees with damaged or crooked leaders, bark or abrasions, sunscald, disfiguring knots, or insect damage will not be accepted.

7. Depth of planting shall be checked on all trees being tagged at the nursery. Remove all soil or other fill material above the natural point where the tree trunk begins to spread, (the flare), prior to digging and ball and burlap operations.

8. Size:

a. Caliper measurement shall be taken on the trunk at 6 inches above the natural ground line for trees up to and including 4 inches in caliper, and 12 inches above the ground for trees greater than 4 inches in caliper.

b. Height and spread dimensions refer to the main body of plant, and not from branch tip to tip.

c. If a range of size is given, no plant shall be less than the minimum size and not less than 50 percent of the plants shall be as large as the maximum size specified.

d. Plants that meet measurements but do not possess a normal balance between height and spread shall be rejected.

e. Plants larger than specified may be used only if approved by Engineer. Use of such plants shall not increase the contract price. If larger plants are approved, the root ball shall be increased in proportion to the size of the plant. The Contractor shall verify that the size of the root ball will fit in prepared planting pits.

9. All trees shall be balled and burlapped stock (B&B), with a compact natural ball of earth, firmly wrapped and tied in burlap fabric.
    a. Root ball sizes shall be in accordance with standards specified in ASNS.
    b. Plants with cracked or broken rootballs will not be accepted.
    c. Only natural burlap fabric shall be acceptable for balling. Plastic and other non-biodegradable fabrics will not be accepted.

B. Staking and Guying Materials
1. Stakes (where specified only): 3-inch diameter cedar, fir, or hemlock stakes, with pointed ends. Stakes shall be straight, sound, and free from defects that may impair strength.
2. Tree tie: ¾-inch thick polypropylene woven tree tie

C. Drainage Gravel
1. Drainage fill shall conform to the requirements of General Specification 02317 - Backfilling, and shall be clean, free from silt and organic materials.

D. Mulch
1. Mulch shall be a double-shredded natural forest product of a uniform grade, partially decomposed, dark brown in color, free from sawdust, with no additives or any other treatment. Size of bark shall be from 5/8 inch to one and 1-1/4 inch. The pH range shall be 5.8 to 6.2.
2. Mulch sources shall be free of diseases or pest infestations including but not limited to the Emerald Ash Borer or Asian Longhorned Beetle. Use of material from any areas that have been designated for quarantine of wood products by any state or federal agency is strictly prohibited.

E. Sod Grass
1. All sod shall be vigorously growing, thick, uniform, fully established, and well-developed turf grasses from an approved single source sod farm, New York State Certified.
2. All sod shall conform to the following seed types and proportions:
    a. 30% - One or two of the following Bluegrasses: Victa, Blacksberg, Preakness, Rugby, Dragon, Challenger or Unique
    b. 35% - One or two of the following shade-tolerant Bluegrasses: Able, Eclipse, Nustar, Warrens A-34, Bristol, Touchdown, or P-105
    c. 30% - One of the following fine fescues: Aurora, Shadow or Discovery

3. Quality

   a. All sod shall be certified free of disease, insect pests, eggs, larvae, fungi, and blight, as required by regulatory authorities.

   b. All sod shall be free from noxious weeds, annual grasses, moss, large stones, tree roots, or other materials harmful to growth or that will interfere with future mowing or other maintenance of the sodded areas.

   c. Sod sections shall be strong enough to support their own weight when held vertically with a firm grasp on upper 10 percent of pad.

   d. All sod sections shall be uniformly moist and not excessively dry or wet.

   e. Broken pieces and torn or uneven ends shall not be accepted.

4. Size

   a. All sod shall be machine cut strips, in supplier's standard widths and lengths, but not less than 12 inches wide.

   b. Thickness of pad shall be uniformly 3/4-inch ("1/4"), excluding top growth and thatch.

   c. Each sod piece shall be cut to a uniform size with square corners.

5. Sod shall be freshly harvested, delivered, and installed within a period of 24 hours. Sod not installed within this time period shall be separately approved by the Engineer and shall be subject to conditions of material rejection.

F. Grass Seed for Lawn Areas

1. Grass seed for lawn areas shall be fresh recleaned seed of the latest crop. Unless otherwise specified in the Plans or Detailed Specifications, seed mixture shall have the following proportions by weight:

   a. 60% Kentucky Bluegrass

   b. 20% Fine Fescue

   c. 20% Perennial Ryegrass

2. Seed shall be Tri-Plex General seed mix by Lofts Seed Inc., or approved equal.

3. All seed shall be delivered in standard size bags of the vendor, showing weight, purity, and percentage of seed varieties.

4. Grass seed for lawn areas shall be provided only for areas where lawn is specified. It shall not be furnished for temporary stabilization prior to final site restoration in restoration projects.

G. Grass Seed for Hydroseeded Areas

1. Grass seed mix for hydroseeding shall be fresh recleaned seed of the latest crop. Seed mixture shall have the following proportions by weight:

   a. 40% Creeping Red Fescue

   b. 30% Perennial Ryegrass

   c. 20% Annual Ryegrass

   d. 10% Kentucky Bluegrass

2. All seed shall be delivered in standard size bags of the vendor, showing weight, purity, and percentage of seed varieties.

3. Grass seed for hydroseeding shall be provided only for areas where hydroseeded turfgrass is specified. It shall not be furnished for temporary stabilization prior to final site restoration in restoration projects.

H. Native Grass and Wildflower Seed Mix

1. Seed for native grass and wildflower seeded areas shall be fresh recleaned seed of the latest crop. Seed mixture shall contain the following:

2. Seed shall be as specified on the Drawings or in the Detailed Specifications.

3. All seed shall be delivered in standard size bags of the vendor, showing weight, purity, and percentage of seed varieties.

I. Filter Fabric

1. Filter fabric shall be non-woven type conforming to the requirements of General Specification 02371 - Dust, Soil Erosion & Sedimentation Control.

J. Water

1. The Contractor shall be responsible for supplying all required water to the site at no additional cost to the City. In upstate projects, the Engineer of Record will coordinate with the Contractor to locate a source of water

2. Where water is supplied from City hydrants, the Contractor shall obtain a free hydrant permit from the Department of Environmental Protection, Bureau of Consumer Service, (718 595 6699). Permits are issued for a 30 day period, and the Contractor is responsible for keeping the permit current. The permits are available from each borough office. To obtain a permit, the Contractor should bring a copy of their DEP contract indicating exemption from the permit fee, as described in Article 13,

with a general description of the hydrant location(s) they propose to access.

3. The Contractor must have all tools necessary for using city hydrants in his possession at time of planting to ensure that this section is adhered to. If conditions do not allow the use of New York City water sources, the Contractor must obtain his/her own source of water. No direct payment shall be made for water obtained from other than city sources, but the cost thereof shall be deemed included in of the contract.

   a. All work injured or damaged because of the lack of water, or the use of too much water, or the use of contaminated water shall be the Contractor's responsibility to correct.

   b. Water shall be free from impurities injurious to vegetation.

K. Tree Irrigation Bags

1. Unless otherwise shown on the Drawings, required in the Detailed Specifications, or directed by the Engineer, the Contractor shall furnish tree irrigation bags for all trees over 1-1/2 inch caliper. The irrigation bags shall be 100% reinforced UV stable polyethylene, at least 10 mils. thick with a polyester scrim lining, such as TreeGator, as manufactured by Spectrum Products, Raleigh, NC, or approved equal. The irrigation bags shall have a minimum 20-gallon capacity.

PART 3 EXECUTION

3.01 EXAMINATION

A. Drainage at tree pits: Check drainage at tree pits prior to planting, by performing percolation tests (in dry weather) as follows:

1. Dig out planting hole to required depth and fill hole half full of water. Mark water level with stake.

2. Water level should decrease by a minimum of two (2) inches per hour.

3. If water does not drain adequately from plant pits, amend conditions at tree pits and planting beds as required for satisfactory drainage. If topsoil or subgrade has been over-compacted by the Contractor’s operations, such as by compaction equipment or by allowing vehicles or equipment to pass over the area, the Contractor shall remove and replace over-compacted materials at its own expense.

4. Obtain approval of Engineer for proposed amendments.

5. Do not place trees in pits until approval of drainage conditions by the Engineer.

B. The Contractor shall be liable for all damage to surrounding areas caused by planting operations and shall be required to restore or replace the damaged areas to their original condition.

C. Contractor is responsible for determining the location of all utilities, by contacting the appropriate utility company prior to any planting activities.

1. Verify that underground utilities and irrigation systems in landscape areas are in place, at the proper location, tested (except final irrigation testing) and ready for use.

a. Take proper precautions so as not to disturb or damage sub-surface elements.

2. Coordinate with other trades.

D. The Contractor is liable for any damage to such utilities during the course of construction, and is responsible for making necessary repairs to damaged utilities at its own expense.

3.02 PREPARATION FOR PLANTING

A. Install filter fabric under planted areas, in areas shown on the Drawings.

1. Fabric shall be overlapped by a minimum of six (6) inches.

2. Fabric shall be held in place with wire staples of adequate quantities to prevent movement of fabric during planting operations.

3. Fabric ends shall be secured in trenches as shown on the Drawings.

4. No fabric shall be visible following completion of planting and seeding operations.

B. Planting soil mix materials and installation shall be as specified in General Specification 02920 - Soil Mixes.

C. Exercise extreme caution during excavation to avoid damaging or interrupting existing underground utilities. Use appropriate detection equipment to locate utilities during excavation for planting.

D. Erect barricades, warning signs, or other protective devices as may be required by local, state, or federal laws and regulations to protect open excavations.

3.03 PLANT INSTALLATION

A. For projects within the immediate New York City area, plant only within the following dates, weather permitting. Refer to the Detailed Specification for approved planting dates for projects outside the City. Do not plant in times of high wind, rain, sleet, or snow when the ground is frozen or excessively wet; or when the soil is otherwise in an unsatisfactory condition for planting. Planting at times other than those specified will be at the Contractor's own risk, and will not invalidate any guarantees.

1. B & B Deciduous trees and shrubs:
    a. Spring: March 15 to May 15
    b. Fall: October 15 to December 15
2. The following trees shall be planted during the spring season only:
    a. Acer rubrum
    b. Betula sp.
    c. Crataegus sp.
    d. Liquidambar styraciflua
    e. Liriodendron tulipifera
    f. Platanus acerifolia
    g. Prunus sp.
    h. Quercus sp.
    i. Salix babylonica
    j. Tilia tomentosa
    k. Zelkova sp.
3. B & B Evergreen trees and shrubs
    a. Spring: March 15 to May 15
    b. Fall: September 1 to December 1
4. Container-grown perennials, vines, and ground cover plants:
    a. Spring: March 15 to July 1
    b. Fall: September 1 to November 1
5. Seeding, hydroseeding, and sodding shall be carried out during the following dates:
    a. Spring: April 1 to June 1
    b. Fall: September 1 to October 15
6. Seeding shall be in moderately dry to moist soil, at such times when wind does not exceed five (5) miles per hour.

B. Do not plant until plant material has been approved by the Engineer at site.

C. Placement of Plants

1. Plants shall be set in the center of pits, plumb and straight, in accordance with the planting details, and faced to give best appearance and relationship to adjacent plants and structures.

2. Plant to such depth that the finished grade level of plant, after settlement, will be the same as that at which the plant was grown.

3. Trees must be planted at the depth of the flare, where roots spread from the trunk. The flare must be located and placed at the correct level before continuing planting operations.

D. Planting Balled and Burlapped Trees and Shrubs

1. Excavate plant pits to minimum dimensions shown on the Drawings. If plant pits are mechanically dug, the sides of the pit shall be broken down or roughened with a shovel or other hand tool to eliminate surface glazing.

2. Remove any platforms, wire, and surplus binding from top and sides of ball.

3. Position plants in center of pit, using gentle handling to avoid damage to any part of the plant.

4. Set plants on a bed of compacted soil mix, to position at the correct depth, as shown on the Drawings.

5. Cut and remove burlap, rope ties, and wire baskets from the root ball, backfilling and gently removing burlap and wire basket in sections as needed to support the root ball.

6. If wire baskets are used to contain the root ball, these shall be entirely removed before planting.

7. Fully remove all burlap, non-biodegradable twine and other materials.

8. Cleanly cut off all visible broken or frayed roots.

9. Add mycorrhizal fungi inoculant, if specified, to each tree planting as per the approved manufacturer's or supplier's instructions.

10. Apply water retention additive as per approved manufacturer's or supplier's instructions.

11. Backfilling: Fill plant pit with soil mix by hand, in layers not more than six (6) inches deep, and with each layer thoroughly settled by hand tamping and with water, and free of all voids before next layer is put in place.

12. Install tree irrigation bags and fill with water, unless otherwise specified or directed by the Engineer.

E. Planting Perennials, Vines, and Container Grown Shrubs

1. Excavate plant holes to depth of container and twice the container diameter.

2. Carefully remove plant from container using gentle handling to avoid damage to any part of plant.

3. If roots are loose, spread roots out evenly over a mound of soil mix. If roots are tight and compact, loosen by pulling gently apart. If plant roots will not separate, use a sharp tool to make vertical slits in the root ball, approximately 1/2-inch deep at three or four locations around root mass.

4. Set plants on a bed of compacted soil mix, so that the root ball is level with the surface of the soil.

5. Backfilling: Fill plant pit with soil mix by hand, pushing the mix around and just over the surface of the root ball. Add soil mix in layers not more than four inches (4") deep, and with each layer thoroughly settled by hand tamping and with water, and free of all voids before next layer is put in place.

F. Saucering

1. After backfilling is completed, a saucer shall be made for the retention of water around each plant, unless impracticable because of placement of tree gratings or other paving material over planted area.

2. The saucer shall be of the same diameter as that of the hole dug.

3. The lip shall be level all around and shall be at least 4 inches high for trees, and 2 inches high for shrubs.

G. Watering

1. Immediately after installation of each plant, the soil around it shall be thoroughly saturated with water.

   a. Apply water slowly so as to penetrate the entire root system.

   b. Watering shall continue throughout the maintenance and guarantee period, as frequently as seasonal conditions require, until final acceptance of the work.

   c. Contractor shall be responsible for adequate water both before and after installation of irrigation system.

H. Mulching

1. After planting operations are complete all plant bed areas shall be covered with approved mulch.

   a. Unless otherwise specified in the Drawings, mulch shall be installed at an even depth of three (3) inches over tree pit and shrub areas and two (2) inches over groundcover beds.

b. Mulch shall be contained within the plant bed areas and shall not be permitted to spread onto paved areas. Mulch shall not cover plants.

I. Staking

1. Trees shall be staked only if shown on the Drawings, required in the Detailed Specifications, or directed by the Engineer.

a. Trees shall stand plumb after staking.

b. Do not use tree wrap.

J. Pruning

1. Perform compensatory pruning following planting only as shown on the Drawings, required in the Detailed Specifications, or directed by the Engineer.

a. Excessive pruning at the time of transplanting must be avoided. The extent of top pruning should be based upon the ability of the plant roots to function.

b. Pruning shall be performed by a Certified Arborist in accordance with current best practices of the International Society of Arboriculture.

c. All deadwood, suckers, and broken or badly bruised branches shall be removed.

d. Pruning shall be done with clean, sharp tools.

e. No leaders shall be cut. Each cut shall be made carefully, at the correct location, leaving a smooth surface with no jagged edges or torn bark. The correct anatomical location is just beyond the branch collar.

f. Large or heavy limbs should be removed using three (3) cuts. The first cut undercuts the limb one or two feet from the parent branch or trunk. The second cut is top cut which is made slightly further out on the limb than the undercut. The third cut is to remove the stub.

K. Antidesiccant Spraying

1. Use antidesiccant only as approved by Engineer. Approval is required for each condition of use.

3.04 PREPARATION FOR SEEDING AND SODDING

A. All areas to be seeded or sodded shall be thoroughly loosened to a depth of 6 inches and graded to true lines free from all unsightly variations, bumps, ridges

or depressions. All sticks, stones, roots or other objectionable material shall be removed.

B. Provide 12 inches of lawn soil mix, spread evenly over all areas to be seeded or sodded. Prepare topsoil to provide a crumbly seedbed, firm and level after tilling.

C. After all materials have been worked in, firm up soil by rolling to eliminate all soft spots. Rake entire area into a crumbly state, with one inch of loose soil at the surface, using a wide-toothed rake or tine-harrow.

D. For additional requirements on the use of soil amendments refer to General Specification 02920 – Soil Mixes.

3.05 SODDING & SEEDING OPERATIONS

A. Sodding Operations

1. Water the prepared soil bed between 12 and 24 hours prior to sod installation, sufficient to evenly moisten the soil mix, without over-watering or causing slipperiness.

   a. Watering shall be carried out after the completion of soil mix placement, grading, settlement of soil surface, completion of remedial work and application of soil amendments.

2. Lay sod strips, after watering as specified, perpendicular to slope and edge to edge.

   a. Place first row of sod in a straight line.

   b. Place all subsequent rows parallel with joints butted tightly together and with staggered ends of sod strips.

   c. Perimeter and border areas shall not be laid with less than full width sod or with less than one-half length sod.

   d. Handle and lay without stretching of sod material.

   e. All ends, joints and cuts shall be fitted and tightly joined so there are no voids or overlaps.

   f. The final appearance shall be of a continuous lawn.

3. Tamp the sod lightly to ensure good contact with the soil surface and remove, replace, and re-tamp places of minor depressions or irregularities.

4. Finished grades at sod lawn areas shall be within one (1) inch of finished grades indicated on Drawings, except where lawn meets paved areas, there shall be no change of grade between lawn and pavement.

a. Finished grades shall allow free flow of surface drainage to catch basins without ponding.

5. Top Dressing

a. Following completion of all sod laying, the sod surface shall be top dressed with Lawn Soil Mix, conforming to General Specification 02920 - Soil Mixes.

b. The soil mix shall be screened to remove all materials larger than 1/2-inch.

c. Soil Mix material shall be worked into the seams between the sod pieces with a brush.

d. When finished, the sod shall present a smooth and uniform surface parallel to the finish grade.

e. Water all sod areas immediately following sod installation so that the sod surface and sod bed surface are thoroughly soaked.

B. Seeding Operations

1. Prepare seedbeds in undisturbed areas by lightly tilling or harrowing to a depth of two (2) inches. No fertilizer is to be applied to wildflower or native grass areas. Prior to preparation of undisturbed sites, remove existing grass, vegetation and turf. Contractor shall take particular care so as not to damage existing plant material adjacent to seeding area while preparing seed bed. Dispose of removed vegetation off-site in accordance with all local laws: do not turn over into soil being prepared for native grass and wildflower seeding.

2. Moisten prepared seeding areas before planting if soil is dry. Do not create a muddy soil condition.

3. Apply seed with drop or cyclone spreader to uniformly cover seedbed at the rate required. In general, spring and summer seeding will be at a rate of 30 lbs./acre and winter seeding at a rate of 100 lbs./acre, per NYSDEC guidelines.

4. Small wildflower seeds should be mixed with damp sand and hand sown. Do not seed when wind velocity exceeds 5 miles per hour. Distribute seed evenly over the entire area.

5. Lightly rake seed into soil, and cover entire area with salt hay or straw, to a thickness of one (1) inch.

6. For larger areas, a mechanical power drawn seeder or combination grass planter and land packer or pulverizer may be used. Seed to be planted not deeper than 1/4 inch. Seeding operations shall be kept as close as possible to the contours and not up and down the slopes.

7. Water all seeded areas immediately upon installation, taking care not to wash out the seeds, and regularly during first four (4) weeks following seeding to maintain adequate moisture for deep root growth.

8. Seeding shall not be done on frozen ground or when the temperature is 32^{o} F or lower. Do not use wet seed or seed that is moldy or otherwise damaged in transit or storage.

9. Seeded areas shall be protected during establishment.

C. Hydroseeding

1. All areas to be hydroseeded shall be thoroughly loosened to a depth of 6 inches and graded to true lines free from all unsightly variations, bumps, ridges or depressions. All sticks, stones, roots, or other objectionable material shall be removed.

2. Provide six (6) inches of soil mix and spread evenly over all areas to be hydroseeded. Prepare topsoil to provide a crumbly seedbed, firm and level after tilling. For additional requirements on the use of crushed limestone in the soil mix, see General Specification 02920 – Soil Mixes.

3. Apply hydroseeding solution with a mobile tank with a centrifugal pump, using a seeding nozzle of a design to produce an even distribution of the solution

4. Clean and remove all hyrdoseeding solution from areas outside of the limits of hydroseeding, including removal from structures, walls, paving, trees and other plant material.

D. Watering of Sodded, Seeded and Hydroseeded Areas

1. The Contractor shall provide all labor and arrange for all watering necessary to establish acceptable stands of planting in seeded areas. .

   a. Begin watering immediately following installation.

   b. Watering shall continue throughout the contract period until Substantial Completion.

   c. During the first two (2) weeks after planting, in the absence of adequate rainfall, watering shall be performed up to three (3) times daily or as often as necessary and in sufficient quantities to maintain moist soil to a depth of at least two (2) inches.

   d. After the first two weeks, the Contractor shall water the seeded areas to maintain adequate moisture in the upper two (2) inches of soil, necessary for the promotion of deep root growth.

2. Watering shall be done in a manner that will provide uniform coverage, prevent erosion due to application of excessive quantities over small

areas, and prevent damage to the finished surface by the watering equipment. The Contractor shall furnish sufficient watering equipment to apply one (1) complete coverage to the lawn areas in an eight (8) hour period.

E. Reseeding

1. Any areas that fail to show growth within three (3) weeks of seeding shall be immediately reseeded at no additional cost to the City.

2. Reseeding shall be carried out as many times as necessary until a uniform grass cover is established.

3. Scattered bare spots, none of which are larger than one square foot, will be allowed up to a maximum of 3 percent of any seeded or hydroseeded area.

F. Mowing

1. Mowing of all seeded, hydroseeded and sodded lawn areas shall begin when grasses and other plants are firmly rooted and secure, and shall continue until Substantial Completion.

2. Mow all grass lawn areas to maintain the grass height between 1-1/2 and 2-1/2 inches and meadow areas up to six (6) inches or as directed by the DEP Maintenance Supervisor.

3. Wildflower and native grass seeded areas shall be mown no more than two (2) times per year.

4. First mowing shall be carried out after seed set and shall not be carried out earlier than September 15 nor later than November 15. Mow to a height of not more than 9 inches.

a. Second mowing shall be carried out four (4) to six (6) weeks after first mowing, unless otherwise directed by DEP. Mow to a height of between 5 and 6 inches

3.06 PLANT PROTECTION & MAINTENANCE

A. Plant Protection

1. The Contractor shall provide at its own expense all protection that is deemed necessary for all plants and lawn areas against damage prior to Final Acceptance of the work.

2. Removal of Temporary Protection Measures: All temporary protection measures employed during the construction period shall be removed prior to Substantial Completion unless otherwise directed by the Engineer. All stakes and ties used for temporary bracing of trees shall be removed and disposed of by the Contractor off site at its own expense

at the end of the guarantee period, or earlier at the direction of the Engineer.

B. Plant Maintenance

1. Maintenance of all plant material shall begin immediately after planting, and continue until the end of the guarantee period, unless otherwise noted.

2. Defective work shall be corrected as soon as possible after it becomes apparent and when weather season permits. The Engineer shall be the sole judge of the condition of the plants.

3. Maintenance shall include:

   a. Watering, replanting, reseeding, resodding, repair of ruts and erosion, repair of protection devices, weeding and continuous control of invasive species, fertilizing and mowing of lawn areas.

   b. The removal of all dead, dying or unhealthy plant material, including lawns, and replacement of such material with new plants or seeding to meet all specifications of the original plantings.

   c. Protection from insects, disease, and invasive species to maintain optimum health. Infection or infestation may require removal and disposal off-site followed by replacement with plants free of infection at the discretion of the Engineer's designated representative.

   d. The repeating of any or all phases of planting or lawn work as specified herein, or that may be required to obtain healthy plantings and a uniform, thick, and well developed stand of grass.

4. Specific Maintenance Tasks: Maintenance shall include, but not be limited to the following:

5. Watering: Water lawns and planted areas as required. Do not permit plant material to wilt or to show signs of stress from lack of water. Contractor shall supply and distribute water to all lawns and plantings during the full time of their establishment at the site and provide all equipment for water distribution at no additional cost to the City. Plants and lawns shall be inspected by the Contractor for watering needs at least once each week, and watered as necessary to promote plant growth and vitality.

6. Mowing: As described hereinbefore.

7. Fertilizers: If applicable, apply any approved fertilizers, herbicides, pesticides or fungicides as required, or as directed by the Engineer, to keep all plantings healthy and pest-free throughout the guarantee period. Any fertilizers, herbicides or pesticides must be approved in advance by DEP.

8. Rodents: Protect against and exterminate rodents, and repair of any damage caused by rodent activities.

9. Weeding: Weed to keep all planted areas weed-free throughout the guarantee period.

10. Mulching: Add mulch material as required to maintain mulch at specified depth.

11. Resetting: Reset plant material that has settled, to proper grade and position.

12. Pruning: Prune trees and shrubs to remove all dead or broken branches, throughout the guarantee period. Prune flowering shrubs as necessary to ensure flowering.

13. Trimming: Cut back dead stalks, flowers and foliage from perennials in fall after the first frost. Trim or dead-head spent flower blossoms throughout the guarantee period.

14. Anchoring: Maintain any approved tree stakes, ties and other tree anchoring systems, including tightening, repair or replacement as required, and removal at the end of the guarantee period, or as directed by the Engineer.

15. Irrigation: If applicable, coordinate with irrigation system installer for all adjustments to irrigation as required.

16. Instruct City’s maintenance personnel in all maintenance procedures.

17. Maintenance Program

    a. Prior to Substantial Completion, the Contractor shall arrange a meeting with the Engineer, and with the City's designated maintenance personnel to review together the submitted maintenance program and any modifications required for the duration of the guarantee period.

    b. The Contractor shall make periodic inspections, at no extra cost, during the guarantee period to determine what changes, if any, should be made in the maintenance program.

    c. Any recommended changes shall be submitted in writing to the Engineer.

d. Additional remedial work not included in the maintenance program shall be carried out by the Contractor as deficiencies are identified and reported by the Engineer or designated maintenance personnel.

18. Replacements

a. In accordance with the requirements for Warranty (Guarantee Period) under this Section, the Contractor shall replace, as soon as weather conditions permit, and within a specified planting period, all plants determined dead and/or dying by the Engineer or the City's designated personnel during and at the end of the guarantee period. Replacements shall be made at no additional cost to the City. Labor and all materials needed for installation of replacements shall be included in the warranty. .

b. Plants shall be free of dead or dying branches and shall bear foliage of normal density, size, and color.

c. Trees having lost their central leader or exhibit crown dieback at the end of the guarantee shall be replaced.

d. Replacements shall match adjacent specimens of the same species. Replacements shall be subject to all requirements stated in this Section.

3.07 CLEAN UP

A. At the end of each work day the Contractor shall broom-clean the site, to remove all trash, debris, and loose soil materials. Store materials and equipment where directed.

B. Immediately following the completion of planting operations, the Contractor shall remove all excess materials, stockpiles, waste materials, tools, and equipment, and leave the site in a clear and clean condition.

C. Immediately remove all rejected materials from the site. All rejected materials and other waste or debris shall become the property of the Contractor, who shall legally dispose of same off-site.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02920
SOIL MIXES

PART 1 GENERAL

1.01 SUMMARY

A. The work of this Section includes but is not limited to the following:

1. Supply of component materials and soil amendments for soil mixes or supply of blended soil mixes from approved off-site sources.
2. Reuse of existing topsoil stripped from site.
3. Preparation of soil mixes on site.
4. Installation, placement, spreading, and fine grading of soil mixes.
5. Testing of all soil component materials, soil amendments, and soil mixes.

B. The Contractor shall implement practices and procedures to meet the project's sustainability goals as identified in the Contract Documents. The Contractor shall ensure that the sustainability requirements of this Section are implemented to the fullest extent.

C. The following index of this Section is included for convenience:

1.02 PAYMENT

A. No separate payment will be made for performing any work of this Section and the Contractor shall include all costs thereof in its lump sum price bid for the Contract, except as provided for otherwise in the Detailed Specifications.

1.03 RELATED SECTIONS

A. General Specification 02316 -- Excavation

B. General Specification 02317 -- Backfilling

C. General Specification 02371 -- Dust, Soil Erosion and Sedimentation Control

D. General Specification 02910 -- Planting

1.04 REFERENCES

A. ASTM International (ASTM) Standards

1. ASTM D1556 -- Standard Test Method for Density and Unit Weight of Soil in Place by Sand Cone Method

2. ASTM D1557 -- Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3))

3. ASTM D3385 -- Standard Test Method for Infiltration Rate of Soils in Field Using Double-Ring Infiltrometers

4. ASTM D4318 -- Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils

5. ASTM D6938 -- Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

6. ASTM F1647 -- Standard Test Methods for Organic Matter Content of Athletic Field Rootzone Mixes

B. The Northeast Coordinating Committee for Soil Testing

1. NEC-1012 -- Recommended soil testing procedures for the Northeast United States, Northeastern Regional Publication Number 493

C. The New York City Department of Health and Mental Hygiene

1. Local Law 37 Pesticide Use by City Agencies – Pesticide Product Search https://a816-healthpsi.nyc.gov/ll37/ProductTestPesticide.aspx

D. The New York State Pesticide Product, Ingredient and Manufacturer System (PIMS) http://pmep.cce.cornell.edu/pims/index.html

E. New York State Department of Environmental Conservation (NYSDEC)

1. 6NYCRR Subpart 360-5, Composting Facilities

2. 6NYCRR Subpart 375-6, Remedial Program Soil Cleanup Objectives

1.05 SYSTEM DESIGN REQUIREMENTS

A. All soil mix components shall be tested and approved prior to incorporation into blended soil mixes.

B. Provide adequate quantities of all soil mix materials to attain, after compaction and natural settlement, all design-finished grades.

C. Sustainable Design Requirements

1. Regional Materials: Soil shall be extracted within 250 miles of the project site, unless otherwise required in the Detailed Specifications.

D. Project-specific system design requirements will be provided in the Detailed Specifications, if necessary, to supplement requirements given herein or in the Contract Drawings.

1.06 QUALITY ASSURANCE

A. Contractor shall submit written test reports as required in this Section.

1. Testing shall be carried out by an independent testing laboratory.

2. Engineer's approval of the testing laboratory shall be obtained by the Contractor before it is given any work of this Section.

3. Contractor shall be responsible for timely submittal of samples to the testing laboratory.

B. Each test shall be carried out using the categories and sieve sizes as specified herein. Failure to include any of the required criteria will be sufficient cause for rejection of the test.

C. Each test report shall include the following information:

1. Project title

2. Name of Contractor

3. Name of material supplier or location where material is extracted from

4. Testing laboratory name, address and telephone number

5. Type of test
6. Date of test
7. Test results, including identification of deviations from acceptable ranges.

D. Each sample shall be tested, as applicable, for the following:

1. Mechanical analysis: Sieve method, using sieve sizes specified.
2. pH should be measured according to Recommended Soil Testing Procedures for the Northeastern United States (NEC-1012). Where soil will be used to support plant growth, lab analysis results must include corrective recommendations.
3. Organic matter content: Percentage of oven-dry weight of soil, determined by loss on ignition of moisture-free sample, in accordance with Method A of ASTM F1647.
4. Electrical conductivity (soluble salts): Test by saturated paste method in deciSiemens per meter (dS/m).
5. Soil Fertility Analysis: Analysis for available macronutrients including, at a minimum, phosphorus and potassium in parts per million according to methods as specified in NEC-1012. Test methods and fertility recommendations must be included with results.
6. Chemical Analyses of 6 NYCRR Part 375-6 compounds performed by a testing laboratory certified by the New York State Department of Health Environmental Laboratory Accreditation Program (NYSDOH-ELAP). The frequency of testing per volume of fill shall be:
    a. 1 per 500 CY of material purchased from a registered/permitted processing or recycling facility; or
    b. 1 per 1000 CY of native materials (e.g., non-regulated soil and sand with no manmade materials) purchased from an operating gravel pit or similar facility.

E. The Engineer may take and analyze at any time, such additional samples of materials as deemed necessary for verification of conformance to specification requirements. Contractor shall furnish samples for this purpose upon request and shall perform testing as requested at no additional cost to the City.

F. No component bulk material for soil mix shall be used or blended into a mix, until test reports have been received and approved by the Engineer. As necessary, make any and all soil mix amendments and resubmit test reports indicating amendments, until approved.

G. Comply with all rules, regulations, laws and ordinances of local, state and federal authorities having jurisdiction. Provide labor, materials, equipment and

services necessary for work to comply with such requirements at no additional cost to City.

H. Procure and pay for all permits and licenses required for the Work of this Section.

1.07 SUBMITTALS

A. The Contractor shall submit Shop Drawings and material specifications for the approval of the Engineer. Submittals shall include, but not be limited to:

1. Manufacturer's technical information, including application instructions where relevant, for all soil amendment materials required.
    a. Fertilizers
    b. Soil Inoculants
    c. Herbicides
    d. Water-absorbent Polymer
2. Samples of Soil Mix Components (1-pound package each):
    a. Topsoil -- offsite imported material
    b. Topsoil -- stripped from site
    c. Compost
3. Samples of Blended Soil Mixes (1-pound package each):
    a. Planting Mix
    b. Lawn Mix
    c. Aquatic/Marginal Mix
4. Test Results for Soil Mix Components (written report for each bulk component):
    a. Topsoil -- offsite imported material
    b. Topsoil -- stripped from site
    c. Sand
    d. Compost
5. Test Results for Blended Soil Mixes (written report for each blended soil mix):
    a. Planting Mix
    b. Lawn Mix
    c. Aquatic/Marginal Mix

6. Sources and Manufacturers List: Submit a full list of sources and manufacturers of soil mixes, including component materials and soil amendments.

B. Sustainable Design Submittals:

1. Regional Materials: Provide the following information:

a. Names of product and manufacturer

b. Material cost breakdowns. Cost breakdowns must include total material-only cost (excluding installation, labor and equipment).

c. Indicate the location and distance from the Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. (For assemblies, include the percentage by weight that is considered regional.)

1.08 DELIVERY, STORAGE AND HANDLING

A. Conform to all governmental regulations in regard to the transportation of materials to, from, and at the job site, and secure in advance such permits as may be necessary.

B. Packaged Materials: Deliver packaged materials to the location where planting soil mixes are to be blended, in unopened bags or containers, each bearing the name and trademark of the producer, material composition, manufacturers' certified analysis, and the weight of the material.

1. All bags shall be protected from water and contamination with other materials.

2. Retain packages for inspection by Engineer.

3. All packaged materials shall be stored, handled and applied in strict accordance with manufacturer’s instructions.

C. Stockpiles

1. Each stockpile of bulk materials and soil mixes shall not exceed 50 cubic yards, and shall be no more than 6 feet in height, to prevent anaerobic conditions within the piles.

2. All stockpiled materials shall be adequately handled as required in General Specification 02371 – Dust, Soil Erosion and Sedimentation Control.

PART 2 PRODUCTS

2.01 MANUFACTURERS / SUPPLIERS

A. Fertilizer shall be as manufactured by:

1. Osmocote®,

2. Meister®,

3. Or approved equal.

B. Other product manufacturers will be specified, if necessary in the Detailed Specifications.

2.02 MATERIALS

A. All materials furnished under the work of this Section shall conform to the following applicable requirements unless otherwise required in the Detailed Specifications, shown on the Contract Drawings, or directed in writing by the Engineer or the Engineer's Representative.

B. Topsoil - Offsite Imported Material

1. Imported topsoil or soil blends may not be mined from soils defined by the Natural Resources Conservation Service as prime farmland, unique farmland, or farmland of statewide importance. Imported topsoil shall be:

a. Of uniform quality, free from hard clods, stiff clay, hardpan, sods, roots, chips, sticks, partially disintegrated stone, cement, ashes, slag, concrete, tar residues, tarred paper, boards, or any other undesirable material. No topsoil shall be delivered in a frozen or muddy condition.

b. Free from refuse, material toxic or otherwise deleterious to plant growth, seeds, or other viable propagules of invasive plants. Construction and demolition debris as classified under 6 NYCRR Part 360, other than uncontaminated land clearing debris, shall not be used to amend topsoil.

c. Free of stones over 1 ½ inches in diameter, and will have less than 10 percent gravel.

2. Topsoil shall conform to the following requirements:

a. pH 5.5 to 7.0

b. Organic content 4 - 6%

3. Topsoil shall conform to the following mechanical analysis:

Sieve Size	Percent Passing
1"	100
1/4"	90 - 99
# 10	80 - 100
# 40	40 - 60
# 60	40 - 60
# 100	10 - 30
# 200	10 - 20

4. When the topsoil otherwise complies with the requirements of the specification but shows a deficiency of not more than one percent (1%) organic matter content; then humus, compost, or other approved organic matter may be incorporated when or as permitted by the Engineer.

5. Topsoil shall not contain hazardous waste, petroleum spills or other chemical releases, or industrial waste. Any shipment of topsoil that does not meet this requirement will be rejected by the Engineer and shall not be brought on site.

6. Topsoil being brought on site shall meet the lower of 6 NYCRR Part 375-6.8(b) Protection of Public Health – Residential and Protection of Groundwater SCOs, unless otherwise approved by the Engineer. Topsoil to be used in ecologically sensitive sites (e.g., wetlands) shall meet the SCOs for the protection of Ecological Resources, unless otherwise approved. See General Specification 02317 – Backfilling.

C. Topsoil - Stripped from Site

1. Reuse of topsoil stripped from site shall be used for this work when feasible, provided it meets:

   a. All the requirements of physical properties for imported topsoil as specified hereinbefore; and

   b. The requirements for beneficial use of excavated soil as specified under 6NYCRR § 360-1.15(b). See General Specification 02317 -- Backfilling.

2. Use of topsoil stripped from site in this work may be as described further in the Detailed Specifications.

D. Compost

1. Shall conform to the following requirements:

   a. Material shall be capable of sustaining the growth of vegetation, with no admixture of refuse or material toxic to plant growth.

   b. Material shall be derived from organic wastes such as food and agriculture residues, composted cow or other animal manures, sewage sludge or other materials that meet the specified requirements.

   c. Material shall be screened, and shall be free of any stones, branches, roots, brush, weeds, or wood chips, and all debris such as plastic fragments, glass, and metal fragments.

   d. Organic content: 50% minimum.

   e. pH: 5.5 to 8.0.

   f. Carbon/nitrogen ratio: 25:1 to 35:1.

   g. 100% passing 1/2" screen .

2. Compost shall meet the requirements for “Monthly Average Concentration” pollutant limits, except where the Engineer specifically allows the use of the “Maximum Concentration” pollutant limits, as stated in the current version of 6 NYCRR Part 360.

3. No compost shall be delivered until the approval of samples by the Engineer, but such approval does not constitute final acceptance. The Engineer reserves the right to reject, on or after delivery, any material which does not, in their opinion, meet these specifications. When compost is stored on the job, it shall be done as directed by the Engineer.

4. Certification: Only facilities permitted to compost biosolids under 6 NYCRR Part 360, will be allowed to furnish finished compost for use in topsoil. The certification shall be supplied by the Contractor prior to the delivery of any composted biosolids, topsoil containing sewage sludge, or other such regulated material to the site.

E. Soil Amendment Materials: Note that within the watershed, no fertilizers may be used in the absence of a soil test indicating a need for soil amendment. Recommended materials below may not be used except where they fulfill amendment requirements. Where authorized for use in the Drawings, Detailed Specifications or by written direction of the Engineer, Soil Amendment Materials shall have the following compositions:

1. Soil Fertility Analysis: Available macronutrients including Phosphorus and Potassium should be adequate to support the intended plant community. Available macronutrients shall not be at excessive levels

that could potentially impair plant growth or impact water quality. The determination as to whether available nutrients are low, optimum, or excessive shall be made and reported by the soil testing laboratory based on extraction and test methods used.

a. Only when soil analysis indicates a need and if approved in advance by the Engineer, apply commercial fertilizer and uniformly work in to top one inch of seedbed. The rate of application shall be determined by soil analysis.

b. Do not apply superphosphate except where specifically indicated and as approved by the Engineer. Where required, uniformly work in to top one inch of seedbed. The rate of application shall be determined by soil analysis.

2. In addition to obtaining the Engineer's approval of the type(s) and N-P-K (Nitrogen-Phosphorus-Potassium) analyses of soil amendment materials, proposed based on soil test results, the Contractor shall meet the following requirements:

a. Bonemeal: Shall be finely ground.

b. Commercial Fertilizer: A minimum of 50% of the nitrogen shall be derived from organic sources.

c. Controlled-release Fertilizer: Shall be in granular form.

3. Limestone: Shall be granular limestone, produced from Dolomitic limestone specifically for use in planting, with a minimum of 88% of calcium and magnesium carbonates, conforming to the following requirements:

Sieve Size	**Percent Passing**
# 10	100
# 20	90 minimum
# 100	60 minimum

4. Only when chemical analysis indicates a need and where approved by the Engineer, apply ground limestone and uniformly work in to top one inch of seedbed. The rate of limestone application shall be dependent on the pH of the soil, as determined by chemical analysis, and shall be as follows:

pH of Soil	Rate: Pounds/1000 Square Feet
5.0 to 5.5	100

pH of Soil	Rate: Pounds/1000 Square Feet
5.5 to 6.0	50
6.0 to 6.8	25
over 6.8	0

5. Sulfur: Lower pH if required, by use of elemental sulfur product.
   a. Peat moss or copper sulfate may not be used to lower pH.
6. Mycorrhizal Fungi Inoculant
   a. For tree plantings, the Contractor shall supply Mycorrhizal Fungi Inoculant, if specified, in granular form such as by means of a three ounce (3 oz.) premeasured dry formulation packet, such as Mycor Tree Saver Transplant®, as manufactured by Plant Health Care, Inc., Pittsburgh, PA, or approved equal.
7. Water Retention Additive
   a. Water Retention Additives for tree plantings shall be a granular polyacrylamide polymer of a potassium base and not a sodium base that slowly releases moisture into the root zone such as Terra Sorb, as manufactured by Plant Health Care, Inc., 440 William Pitt Way, Pittsburgh, Pa., or approved equal.

F. Herbicides and Pesticides shall be in compliance with NYC Local Law 37 of 2005 and in conformance with the guidelines of NYC Department of Health for determining whether a pesticide or herbicide is prohibited by the Law.

G. Planting Soil Mix
1. Planting Mix shall conform to the following requirements:
   a. Organic Matter: 4.5 % minimum
   b. pH: 6.0 to 7.0
   c. Electrical Conductivity (soluble salts): 0.7 to 2.0 dS/m
2. Mix shall consist of the following proportions by volume:
   a. Six parts topsoil
   b. Two parts compost
3. The following items shall be added to the above mix if specified in contract drawings or approved in writing by the Engineer:
   a. Five pounds bonemeal per cubic yard of soil mixture
   b. One pound commercial fertilizer per cubic yard of soil mixture

c. One pound controlled release fertilizer per cubic yard of soil mixture

d. Two pounds water absorbent polymer per cubic yard of soil mixture, or as recommended by manufacturer

e. Ground limestone as required for specified pH

H. Lawn Mix

1. Lawn Mix for all sodded, seeded and hydroseeded areas, shall conform to the following requirements:

a. Organic Matter: 4.5 % minimum

b. pH: 6.0 to 7.0

c. Electrical Conductivity (soluble salts): 0.7 to 4.0 dS/m

2. Mix shall consist of the following proportions by volume:

a. Six parts topsoil

b. Two parts compost

c. Two parts sand

d. One part perlite

3. The following items shall be added to the above mix if specified in contract drawings or approved in writing by the Engineer:

a. Five pounds bonemeal per cubic yard of soil mixture.

b. One pound commercial fertilizer per cubic yard of soil mixture.

c. One pound controlled release fertilizer per cubic yard of soil mixture.

d. Two pounds water absorbent polymer per cubic yard of soil mixture, or as recommended by manufacturer.

e. Ground limestone as required for specified pH

I. Marginal/Aquatic Mix

1. Marginal Mix shall conform to the following requirements:

a. Organic Matter: 4 % minimum

b. pH: 6.0 to 7.0

c. Electrical Conductivity (soluble salts): 0.8 - 4.0 dS/m

2. Mix shall consist of the following proportions by volume:

a. Four parts topsoil

b. One part clay

PART 3 EXECUTION

3.01 EXAMINATION

A. Prior to soil mix placement, the Contractor shall examine the site to determine the status of construction and existing condition in and near the areas to be planted.

B. The Contractor shall ascertain the location of all existing and proposed electric cables, conduits, irrigation, under-drainage systems and all other underground or at grade utilities, by contacting the appropriate utility company. The Contractor shall comply with the requirements of General Specification 02316 - Excavation prior to any excavation work.

1. Contractor shall take proper precautions so as not to disturb or damage any sub-surface elements.

2. Contractor shall be liable for and all damage to such utilities during the course of construction, and shall be responsible for making requisite repairs to damaged utilities at Contractor's own expense.

3. Contractor shall be liable for any and all damage to surrounding areas caused by planting operations and shall be required to restore or replace damaged areas to original conditions, to the satisfaction of the Engineer.

C. The Contractor shall comply with the requirements of General Specification 02371 - Dust, Soil Erosion and Sedimentation Control.

D. The Contractor shall coordinate, adjust, and relate together, work of this Section with other work of the Project and with work of other Contractors. Such coordination shall include but not be limited to the following:

1. Scheduling of planting operations

2. Scheduling of maintenance operations

E. The Contractor shall also:

1. Verify that all work requiring access through or adjacent to areas where soil mixes are to be placed has been completed and no further access (other than landscape installation) will be required. In the event that access will be required, this must be coordinated with the Engineer.

2. Perform soil mix blending and site soil work only during suitable weather conditions. Do not handle, haul, place, work, disc or rototill soil when frozen, excessively wet, or in otherwise unsatisfactory condition.

3.02 PREPARATION OF SOIL MIXES

A. Excavation of subgrade shall conform to the applicable requirements of General Specification 02316 - Excavation.

B. Uniformly blend all ingredients as required for each soil mix type, by wind rowing and/or tilling on a hard surfaced area.

1. The components of all soil mixes shall be blended so that ingredients are thoroughly incorporated into the mixture to assure uniform distribution.

2. Do not over-mix, mix shall remain friable and well aerated.

3. Organic matter shall be maintained moist, not wet, during blending.

4. Delay mixing of any approved fertilizers if planting will not follow within a few days.

5. Add mycorrhizal fungi inoculant, if specified, to each tree planting at rate specified by approved manufacturer.

6. Apply water retention additive as per approved manufacturer's instructions.

3.03 PREPARATION OF SUB-GRADE

A. Verify as-constructed or existing sub-grade elevation and perform additional grading operations as necessary to bring the sub-grade to a true, smooth, slope parallel to the finished grade, at all areas to receive soil mixes.

B. Any sub-grades or soils polluted by gasoline, oil, plaster, construction debris, unacceptable soils, or other substances which would render material unsuitable for plant growth, shall be removed from the premises, at no additional cost to the City, whether or not such pollution occurred or existed prior to or during the Contract period. In the event that such material is placed, this material shall be removed and replaced with approved material. All remedial operations associated with soil mixes shall be reviewed and approved by the Engineer.

C. Clean sub-grade and dispose of all debris prior to placement of soil mixes.

1. Remove all large clods, lumps, brush, roots, stumps, litter, trash, and other foreign material and stones one-half inch in diameter or larger.

2. Dispose of removed material legally off-site in accordance with the applicable laws and regulations and the requirements for waste disposal under the Contract.

D. Where specified in contract drawings or approved in writing by the Engineer, spray all vegetation on sub-grade with a pre-emergent weed killer at the rate of application recommended by the manufacturer.

E. Protect adjacent pavements, walls, utilities and other construction from damage or staining by any soil mix placement operations.

3.04 PLACEMENT OF SOIL MIXES

A. Do not place any muddy or wet Soil Mixes.

B. Place and spread soil mix over sub-grade, to a depth sufficiently greater than the depth required for planting areas so that after settlement the completed work will conform to the lines, grades, and elevations shown or otherwise indicated.

C. Place and spread soil mix over the approved sub-grade, in 6-inch lifts, or as directed by Engineer, and settle to eliminate air pockets and minimize settlement. Lightly scarify previously placed surfaces prior to placing subsequent lifts.

D. Compact to 90% Modified Proctor, unless otherwise specified in the plans or Detailed Specifications

1. Provide compaction testing to conform with the specified compaction density.

2. Fills shall not be so compacted as to restrict the flow of air or water through the soil.

E. After completion of compaction operations, protect the installation from additional compaction from vehicular traffic, contamination by toxic materials or trash, and from water containing cement, clay, silt or any other materials.

F. Any soils that are over-compacted or contaminated after placement or otherwise made unsuitable for plant growth shall be removed from the premises and replaced with approved material or satisfactorily remediated at no additional cost to the City.

G. The Contractor shall also meet the applicable requirements on placement of soil mixes for different planting operations in General Specification 02910 – Planting.

3.05 GRADING OF SOIL MIXES

A. After settlement has occurred, add soil to maintain finished grades. If for any reason soil is left exposed for a long duration prior to planting, add soil and regrade as required.

B. Protect placed soil mixes against construction activity with snow fencing or by other acceptable methods.

C. Protect from the eroding effects of wind and rain with filter fabric, as necessary.

3.06 CLEAN UP

A. At the end of each work day the Contractor shall broom-clean the site, to remove all trash, debris, and loose soil materials.

B. Immediately following the completion of soil mix installation operations, the Contractor shall remove all excess materials, stock piles, waste material, tools and equipment, and leave the site in a clear and clean condition.

C. All waste materials shall be disposed offsite by the Contractor in accordance with the applicable laws and regulations and the requirements for waste disposal under the Contract.

END OF SECTION

SECTION 02105G
Soil Sampling and Analysis

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02105 – Soil Sampling and Analysis except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. No separate payment will be made for performing any Work required under this Specification and the Contractor shall include all costs thereof in its lump sum price bid for Contract Item No. G-LS-1, as specified in Detailed Specification 01270 – Measurement and Payment.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02222G
Demolition and Removals

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02222 – Demolition and Removals except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. No separate payment will be made for performing any Work required under this Specification and the Contractor shall include all costs thereof in its lump sum price bid for Contract Item No. G-LS-1, as specified in Detailed Specification 01270 – Measurement and Payment.

B. Payment for remediation action for Unforeseen Hazardous Materials as ordered and approved in writing by the Engineer, shall be included in the Allowance for Contract Item No. G-A-1, as specified in Detailed Specification 01270 - Measurement and Payment.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02230G
Site Clearing

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02230 – Site Clearing except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. No separate payment will be made for performing any Work required under this Specification and the Contractor shall include all costs thereof in its lump sum price bid for Contract Item No. G-LS-1, as specified in Detailed Specification 01270 – Measurement and Payment.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02240G
Dewatering

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02240 – Dewatering and Analysis except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. No separate payment will be made for performing any Work required under this Specification and the Contractor shall include all costs thereof in its lump sum price bid for Contract Item No. G-LS-1, as specified in Detailed Specification 01270 – Measurement and Payment.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02316G
Excavation

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02316 – Excavation except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. No separate payment will be made for performing any Work required under this Specification and the Contractor shall include all costs thereof in its lump sum price bid for Contract Item No. G-LS-1, as specified in Detailed Specification 01270 – Measurement and Payment.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02317G
Backfilling

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02317 - Backfilling except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. No separate payment will be made for performing any Work required under this Specification and the Contractor shall include all costs thereof in its lump sum price bid for Contract Item No. G-LS-1, as specified in Detailed Specification 01270 – Measurement and Payment.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02318G
Rock Excavation

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02318-Rock Excavation except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. No separate payment will be made for performing any Work required under this Specification and the Contractor shall include all costs thereof in its lump sum price bid for Contract Item No. G-LS-1, as specified in Detailed Specification 01270 – Measurement and Payment.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02371G
Dust, Soil Erosion and Sedimentation Control

NOTE: This Detailed Specification 02371G - Dust, Soil Erosion and Sedimentation Control replaces General Specification 02371 - Dust, Soil Erosion and Sedimentation Control in its entirety. Whenever a reference appears in the Contract Documents to General Specification 02371, it shall now be deemed to refer to Detailed Specification 02371G.

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall provide all labor, materials, tools, equipment, and incidentals required to assure adequate environmental protection including implementation of all erosion and sediment control measures and maintenance of storage areas as directed by the Engineer.

B. The Contractor shall provide an Erosion and Sedimentation Control Plan (E&SCP) that establishes methods and procedures to prevent migration of contaminated stormwater and sediment and to prevent erosion of features of the Work.

C. The Contractor shall minimize erosion and prevent discharge of sediment to surface water features, watercourses, drainage systems, public streets or private property from construction activities. The Contractor shall provide methods to prevent construction activities from generating contaminated stormwater runoff. Methods of constructing berms and dikes to direct clean stormwater runoff around the work area to the local drainage system shall be included.

D. The Contractor shall comply with all Federal, State, or local laws, codes, ordinances, and regulations which govern the control of sediment, erosion, and stormwater during construction activities.

E. The Contractor shall provide Best Management Practices (BMPs) including, but not limited to silt fences, straw bales, diversion dikes, swales, sedimentation basins/traps, truck wash areas/decontamination stations, stabilized construction entrances and/or other means as a temporary structural practice to minimize erosion and sediment runoff.

F. The Contractor shall provide and implement, if applicable, a Stormwater Pollution Prevention Plan (SWPPP) prepared in accordance with the current New York State Department of Conservation (NYSDEC) State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater

Discharges from Construction Activity unless otherwise specified in the Detailed Specification. For activities in the New York City Water Supply watershed, the Contractor shall provide and implement, if applicable, a Stormwater Pollution Prevention Plan (SWPPP) prepared in accordance with the current Rules and Regulations for the Protection from Contamination, Degradation, and Pollution of the New York City Water Supply and its Sources (Watershed Regulations).

G. If applicable, the SWPPP shall be prepared in accordance with the existing SWPPP for the site/facility. The Contractor shall coordinate with the Operating Bureau to review the Operating Bureau's existing SWPPP and address all requirements as applicable.

H. The Contractor shall control dust caused by operation and movement of vehicles and equipment in accordance with the latest DEP and OSHA standards, and all other applicable Federal, State and local regulations.

I. The following index of this Section is included for convenience:

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Specification and the Contractor shall include all costs thereof in its lump sum price bid for Contract Item No. G-LS-1, as specified in Detailed Specification 01270 – Measurement and Payment.

1.03 RELATED SECTIONS

A.	General Specification 02105	-	Soil Sampling and Analysis
B.	General Specification 02230	-	Site Clearing
C.	General Specification 02240	-	Dewatering
D.	General Specification 02316	-	Excavation

1.04 REFERENCES

A. Comply with applicable provisions and recommendations of the following except as otherwise shown or specified.

1. NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-15-002, or latest version)
2. New York City Watershed Regulations (April 4, 2010, or latest version)
3. New York State Standards and Specifications for Erosion and Sediment Control (aka “Blue Book”) (NYSDEC, Aug 2005, or latest version)
4. New York State Stormwater Management Design Manual (latest version)

1.05 DEFINITIONS

A. Best Management Practices: Physical, structural, and/or managerial practices that, when used singly or in combination, prevent or reduce pollution of water, and have been approved by DEP or NYSDEC.

B. Commencement of Construction: The initial disturbance of soils associated with clearing, grading or excavation activities; or other construction related activities that disturb or expose soils such as demolition, stockpiling of fill material, and the initial installation of erosion and sediment control practices.

C. Erosion: The wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as geological creep, detachment, movement of soil or rock fragments by water, wind, ice, or gravity.

D. Erosion/Sediment Control: Any temporary or permanent measures taken to reduce erosion, control siltation and sedimentation, and ensure that sediment-laden water does not leave the site.

E. Final Stabilization: All soil-disturbing activities at the site have been completed and uniform, perennial vegetative cover with the density of eighty (80) percent has been established or equivalent stabilization measures (such as the use of mulches or geo-textiles) have been employed on all unpaved areas and areas not covered by permanent structures, concrete or pavement.

F. Receiving Waters: Bodies of water or surface water systems receiving water from upstream manmade (or natural) streams

G. Sediment: Fragmented material that originates from weathering and erosion of rocks and unsolicited deposits, and is transported by, suspended in, or deposited in water.

1.06 SUBMITTALS

A. The Contractor shall submit Shop Drawings and other documentation, required to show conformance to the requirements of the Contract Drawings, for the approval to the Engineer. Shop Drawings shall show details of the Sediment and Stormwater Control System. The Submittals shall include, but not limited to the following:

1. Plan locations of all components of the Sediment/Stormwater Control System.

2. Details of all applicable BMPs (e.g., silt fence, diversion dike, straw bale berm, decontamination stations, etc.).

3. All of the planned components of the Erosion and Sediment Control Plan, as detailed below in Paragraph B.

4. All components of the SWPPP to be constructed on site, as detailed in Paragraph C below.

5. The Contractor shall submit manufacturer's descriptive literature and installation instructions for stockpile liner and cover material as specified in Paragraph 2.01.B and Part 3.02.

B. Erosion and Sediment Control Plan (E&SCP): The Contractor shall develop and submit to the Engineer for approval, prior to commencement of construction activities, an E&SCP. The E&SCP shall address schedules and measures that will be taken to prevent migration of contaminated stormwater/sediment, and to prevent erosion of features of the Work. The E&SCP shall include the following at a minimum:

1. Measures to capture and mitigate stormwater runoff from active, disturbed areas.

2. Provisions for silt fences and other measures to limit migration of sediments.

3. Provisions for straw bale berms and silt fences or other measures to prevent contaminant and sediment migration.

4. Diversion of stormwater: The Contractor shall include provisions for controlling stormwater runoff in and around excavation areas.

5. Soil Storage Area: All details of temporary soil storage to be implemented as specified in this section.

6. Soil Stabilization Practices: All details of soil stabilization practices to be implemented, as specified in this section.

7. Provisions for all other applicable Best Management Practices.

C. The Contractor shall develop and submit to the Engineer for approval a SWPPP prepared by a Qualified Professional in accordance with the requirements of the current NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity unless otherwise specified in the Detailed Specification. For activities in the New York City Water Supply watershed, the Contractor shall provide and implement, if applicable, a Stormwater Pollution Prevention Plan (SWPPP) prepared in accordance with the current Rules and Regulations for the Protection from Contamination, Degradation, and Pollution of the New York City Water Supply and its Sources (Watershed Regulations). The SWPPP shall be developed and submitted to the Engineer for approval prior to the initiation of construction activities. The SWPPP shall include the following at a minimum:

1. Provide background information about the scope of the project, including the location, type and size of project;

2. Provide a site map for the project, including a general location map. The site map should show the total site area; all improvements; areas of disturbance; areas that will not be disturbed; existing vegetation; on-site and adjacent off-site surface water(s), wetlands and drainage patterns that could be affected by the construction activity; existing and final slopes; locations of off-site material, waste, borrow or equipment storage areas; and location(s) of the stormwater discharge(s);

3. Provide a map and a description of the soil(s) present at the site;

4. Provide a Construction Phasing Plan describing the intended sequence of construction activities, including clearing and grubbing, excavation and grading, utility and infrastructure installation and any other activity at the site that results in soil disturbance. Consistent with the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-15-002 or latest version), there shall not be more than five (5) acres of disturbed soil at any one time without prior written approval from the NYSDEC;

5. Provide a description of the pollution prevention measures that will be used to control litter, construction chemicals and construction debris from becoming a pollutant source in the stormwater discharges;
6. Provide a description of construction and waste materials expected to be stored on-site with updates as appropriate, and a description of controls to reduce pollutants from these materials including storage practices to minimize exposure of the materials to stormwater, and spill prevention response;
7. Describe the temporary and permanent structural and vegetative measures to be used for soil stabilization, runoff control and sediment control for each stage of the project from initial land clearing and grubbing to project closeout;
8. Identify and show on a site map the specific location(s), size(s), and length(s) of each erosion and sediment control practice;
9. Provide the dimensions, material specifications, and installation details for all erosion and sediment control practices, including the siting and sizing of any temporary sediment basins;
10. Identify temporary practices that will be converted to permanent control measures;
11. Provide an implementation schedule for staging temporary erosion and sediment control practices, including the timing of initial placement and the placement and the duration that each practice should remain in place;
12. Provide a maintenance schedule to ensure continuous and effective operation of the erosion and sediment control practices;
13. Provide the name(s) of the receiving water(s);
14. Provide a delineation of SWPPP implementation responsibilities for each part of the site;
15. Provide a description of structural practices to divert flows from exposed soils, store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site to the degree attainable; and
16. Provide any existing data that describes the stormwater runoff characteristics at the site.

D. Inspection Reports: The Contractor shall conduct inspections and submit inspection reports consistent with requirements of the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-15-002 or latest version) including:

1. Site inspections shall be conducted by the Qualified Inspector.

2. Site inspections are conducted a minimum of once every seven (7) calendar days and twice every seven (7) calendar days for sites with greater than 5 acres of soil disturbance. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

3. Inspection reports shall be maintained in a logbook at the site with SWPPP and other required documentation.

1.07 QUALITY ASSURANCE

A. Permits and Regulations:

1. The Contractor shall obtain all necessary permits and be responsible for implementing the terms and requirements of these permits as needed and for payment of all fees.

2. The Contractor shall handle all material in compliance with applicable requirements of OSHA and other governing authorities having jurisdiction.

3. Certifications. The Contractor must sign a copy of the certification statements below, as provided in GP-0-15-002 (or certifications in latest version), before undertaking any construction activity at the site identified in the SWPPP. All certifications must be included in the SWPPP.

a. "I hereby certify that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the qualified inspector during a site inspection. I also understand that the NYCDEP must comply with the terms and conditions of the New York State Pollutant Discharge Elimination System ("SPDES") General Permit for Stormwater Discharges from Construction Activity (GP-0-15-002, or latest version) and that it is unlawful for any person to cause or contribute to a violation of water quality standards. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings."

b. The certification statements must include the name and title of the person providing the signature, address and telephone number of the contracting firm, the address of the site, and the date the certification is made. The certification must be signed by an authorized representative of the firm.

4. Inspections. The Contractor must have a qualified inspector conduct an assessment of the site prior to the commencement of construction and certify in an inspection report that the appropriate erosion and sediment controls described in the SWPPP have been adequately installed or implemented to ensure overall preparedness of the site for the commencement of construction. Following commencement of construction, site inspections shall be conducted at least once every seven (7) calendar days and twice a week for sites with soil disturbance greater than 5 acres unless otherwise specified in the Detailed Specification. The two (2) inspections shall be separated by a minimum of two (2) full calendar days. The inspection reports must be kept on file at the construction site with the SWPPP, if applicable, for review by a NYSDEC inspector.

5. Stabilization. The contractor shall initiate stabilization measures as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased.

6. If a SWPPP is required, it shall be kept current on file at the construction site for review by a NYSDEC inspector. If there is a significant change in construction which may have a significant effect on the potential for the discharge of pollutants to surface waters of the State and which has not otherwise been addressed in the SWPPP, it would require that the SWPPP be updated to reflect those required changes. The SWPPP would also require an amendment if the SWPPP proves to be ineffective in eliminating or significantly minimizing pollutants from sources identified in the SWPPP or achieving the general objectives of controlling pollutants in stormwater discharges from permitted construction activity. Additionally, the SWPPP shall be amended to identify any new subcontractor and their associated responsibilities.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Soil Stabilization: The stabilization practices to be implemented shall include one or a combination of the following: temporary seeding, mulching, geotextiles, sod stabilization, vegetative buffer strips, erosion control mats, protection of trees and shrubs, preservation of mature vegetation. Protection of trees shall be in accordance with General Specification 02230 – Site Clearing. Stabilization practices shall be implemented as approved by the Engineer. The Contractor shall record the dates when the major grading activities occur (i.e. clearing and grubbing, excavation, embankment and grading); when construction activities temporarily or permanently cease on a portion of the site; and when stabilization practices are initiated. Except as provided in paragraphs 1.08A.1 and 1.08A.2 below, stabilization practices shall be initiated as soon as

practicable, but no more than seven (7) days after construction activities have temporarily or permanently ceased.

1. Unsuitable Conditions: Where the initiation of stabilization measures by the seventh day after construction activity temporarily or permanently ceases is precluded by unsuitable conditions caused by the weather. Stabilization practices shall be initiated as soon as practicable after conditions become suitable.

2. Temporary Inactivity Less than 7 Days: Where construction activity will resume on a portion of the site within 7 days after it temporarily ceases, no stabilization practices will be required.

B. Erosion and Sediment Control: Erosion and Sediment control BMPs shall be operational at all times during the Work, specifically during excavation, backfilling and restoration, and decontamination operations. The sediment and erosion control system shall be capable of handling stormwater during construction. Damage to excavation slopes and the migration of contaminated soil to downstream areas resulting from storm events shall be repaired or remediated by the Contractor, at the Contractor's expense.

C. Stormwater: At no time shall the Contractor allow stormwater runoff from soil excavation/stockpiling operations, or effluent from decontamination operations to migrate off to contaminate soils in other areas or percolate into the groundwater. The Engineer will monitor any overflow or leakage that occurs, and may at his discretion require the Contractor to perform soil sampling within all areas affected by such overflow. Any soils that have been contaminated by such overflow shall be removed, treated and disposed of by the Contractor at no additional cost to the City. All sampling and analyses of soils required to determine the contamination or remediation of these soils shall be performed in accordance with General Specification 02105 – Soil Sampling and Analysis.

D. Disposal of Water: Water collected from decontamination areas and dewatering operations shall be handled in accordance with General Specification 02240 - Dewatering.

1.09 PROJECT CONDITIONS

A. Existing Work: All BMPS (e.g., silt fences, straw bales, swales, sumps, pumps, piping) and other sediment/stormwater controls shall be installed such that other aspects of the Work are not adversely impacted or endangered. All installations shall be subject to the approval of the Engineer.

B. Dust Control: The Contractor shall be responsible for controlling visible dust caused by Work operations and the moving of vehicles and equipment. Dust control shall be implemented when soils are exposed, before, during and after Work activity ceases. Dust control will also be required on the weekends. The

Contractor shall utilize the application of water or other methods, subject to the Engineer's approval, when visible dust is present on-site, in accordance with the Environmental Health and Safety Plan. The use of chemicals for dust control, including calcium chloride, will not be permitted.

1. All excavation, loading and transport of materials shall minimize the formation of dust and shall conform to General Specification 02316 - Excavation. To prevent dust generation, application of water to roadways and active work areas shall be utilized as required. The Contractor's operations shall include air monitoring and dust minimization measures, consistent with the Detailed Environmental Health and Safety Plan (EHASP) Specifications.

C. Silt and Sediment Disposal: All silt and sediment which accumulates behind any BMPs used on the site (i.e., straw bale berms or silt fences) shall be removed and disposed of off-site in accordance with all applicable Federal, State and local regulations.

1.10 STORAGE, HANDLING AND REMOVAL

A. The Contractor shall store, handle, and remove material and equipment consistent with requirements of the SWPPP and NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (Permit No. GP-0-15-002) or latest version.

B. Removal of all waste shall be in accordance with the requirements of Detailed Specifications.

PART 2 PRODUCTS

2.01 MATERIALS

A. All components/controls must be designed in conformance with the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, and the New York State Stormwater Management Design Manual. Where erosion and sediment control practices are not designed in conformance with these technical standards, the Contractor must demonstrate equivalence to the technical standard.

B. Stockpile cover and liner fabric shall be a composite structure of fiber-reinforced polyethylene (RPE) fabric (minimum 20-mils). The fabric shall be inert to biological degradation and naturally encountered chemicals, alkalis and acids. Its permeability coefficient shall be less than 10^{-3} cm/sec.

PART 3 EXECUTION

3.01 INSTALLATION AND MAINTENANCE

A. All installation of erosion and sediment control BMPs must be consistent with the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, and the New York State Stormwater Management Design Manual. Where erosion and sediment control practices are not designed in conformance with these technical standards, the Contractor must demonstrate equivalence to the technical standard.

B. Maintenance: The Contractor shall maintain the temporary and permanent vegetation, erosion and sediment control measures, and other protective measures in good and effective operating condition at all times consistent with the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, and the New York State Stormwater Management Design Manual.

3.02 STOCKPILING

A. Cover and Liner Requirements

1. Soil Stockpiles: Stockpiles of excavated soil to be used for backfilling on-site under the NYSDEC Pre-Determined or Case-Specific BUD, or stockpiles of other soil mixes being brought onsite for landscaping purposes, shall be stored as follows:

   a. Contaminated Soil: Stockpiles of excavated soil that are known to be or potentially could be contaminated (pending analysis), shall be lined on the bottom and covered with an impermeable, RFP fabric, as specified in 2.01.B above.

   b. Uncontaminated Soil: Stockpiles of excavated uncontaminated soil shall have a cover only; a bottom liner is not required. The cover fabric shall be as specified in 2.01.B above.

2. Demolition Waste Stockpiles: Stockpiles of demolition waste that are to be recycled (on-site or off-site) or disposed of at a sanitary landfill shall be stored as follows:

   a. Contaminated Demolition Waste: Stockpiles of demolition waste that are known to be or potentially could be contaminated (pending analysis), shall be lined on the bottom and covered with an impermeable, RFP fabric, as specified in 2.01.B above.

   b. Uncontaminated Demolition Waste: Stockpiles of uncontaminated demolition waste shall have a cover only; a bottom liner is not required. The cover fabric shall be as specified in 2.01.B above.

3. Stockpiles of materials classified as contaminated, hazardous waste shall be stored with a cover and liner as specified above for contaminated soil or contaminated demolition waste, and transported off-site promptly in DOT-approved hazardous waste shipping containers. Temporary hazardous waste storage areas shall comply with and the requirements of the Contract and applicable Federal, State and local regulations.

4. All stockpiles shall be covered during non-working hours and during periods of no construction activity. The terminal edges of the fabric cover panels shall be secured to prevent uplift by wind.

B. Stockpile Areas and Placement

1. Stockpiling of excavated materials will be permitted on-site within areas as designated on the Contract Drawings for construction staging, or as directed by the Engineer. All stockpiling areas on-site must be approved by the Engineer in advance.

2. The Contractor shall make his or her own arrangements to provide additional stockpiling area on-site or off-site, if required, for excavated material at no additional cost to the City. Additional stockpiling areas whether on-site or off-site shall be approved by the Engineer.

3. Stockpiles of excavated material to be used for backfilling on-site under the NYSDEC Pre-Determined or Case-Specific BUD shall be so piled and placed as not to encumber sidewalks or roadways, or wash away or obstruct the free flow of surface or drainage water. Stockpiles shall be suitably bermed for run-off containment of any water that drains from the soils.

4. Stockpiles shall not be placed closer to the edge of an excavation than a distance equal to 1-1/2 times the depth of the excavation, unless the excavation is in rock or the sides of the excavation have been sloped or sheeted and shored to withstand the lateral forces imposed by such superimposed loads.

3.03 FIELD QUALITY CONTROL

A. Inspections: Site Inspections shall be conducted consistent with the requirements of the SWPPP and the current NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-15-002 or latest version). The Qualified Inspector shall inspect disturbed areas of the construction site, areas used for storage of materials that are exposed to precipitation that have not been finally stabilized, stabilization practices, structural practices, other controls, areas where vehicles exit the site daily and all other requirements listed in the most current NYSDEC SPDES General

Permit for Stormwater Discharges from Construction Activity (GP-0-15-002 or latest version).

B. Inspection of soil and material stockpiles shall be done daily to ensure the integrity of the cover and liner is maintained.

3.04 CLEANING

A. The Contractor shall clean the site and equipment consistent with requirements of the SWPPP and the current New York State Standards and Specifications for Erosion and Sediment Control. Where appropriate, truck washes/decontamination stations should be installed to minimize the migration of sediment off-site as specified in the Detailed Specifications.

B. Concrete truck washes/decontamination stations shall be required to be installed to minimize the migration of sediment off-site as specified herein:

1. Work

a. Under this item, the Contractor shall reduce or prevent the discharge of pollutants to stormwater from concrete waste by conducting washout offsite, or performing onsite washout in a designated area to prevent pollutants from entering the soil, storm drains, surface waters or groundwater.

2. Intent

a. Concrete washout area best management practices shall be implemented on construction projects where concrete is used as a construction material. It is not possible to dispose of all concrete wastewater and washout offsite (ready mix plant, etc.); and concrete trucks, pumpers, or other concrete coated equipment are washed onsite.

3. Education

a. Discuss the concrete management techniques described in this Specification with the ready-mix concrete supplier before any deliveries are made.

b. Educate employees and subcontractors on the concrete waste management techniques.

c. Arrange for contractor's superintendent or New York State stormwater pollution prevention certified Qualified Inspector to oversee and enforce concrete waste management procedures.

d. A sign shall be installed adjacent to each temporary concrete washout facility to clearly identify the designated concrete

washout area so as to inform concrete equipment operators/concrete suppliers to utilize the proper facilities.

4. Contracts

   a. Concrete waste management requirements as specified herein shall be incorporated into concrete supplier and subcontractor agreements.

5. Materials

   a. Unless otherwise specified, the materials shall meet the requirements of Section B, “Materials and Methods of Construction”.

   b. Minimum 20-mil thick high-density polyethylene (HDPE) liner for self-installed concrete washout areas.

6. Installation

   a. The following steps shall be taken to reduce stormwater pollution from concrete wastes:

   b. Perform washout of concrete trucks offsite or in designated concrete washout areas only.

   c. Provide and use potable water for concrete washout.

   d. Do not wash out concrete trucks onto the ground, or into storm drains, open ditches, streets, or streams.

   e. Do not allow excess concrete to be dumped onsite, except in designated concrete washout areas.

   f. Concrete washout areas may be portable prefabricated water-tight concrete washout containers, or self-installed structures (above-grade or below-grade).

   g. Prefabricated containers are typically most resistant to damage and protect against spills and leaks if properly constructed and maintained. Companies may offer delivery service and provide regular maintenance and disposal of solid and liquid waste from such containers.

   h. If self-installed concrete washout areas are used, below-grade structures are preferred over above-grade structures because they are less prone to spills and leaks.

   i. Self-installed above-grade watertight structures should only be used if excavation is not practical.

j. Washout areas shall be watertight and constructed and operated such that no waste is released from the designated washout area.

7. Location and Placement

a. Washout area(s) shall be located a minimum of 50 feet from sensitive areas such as storm drain inlets, open ditches and drainage facilities, watercourses and water bodies, including wetlands.

b. Convenient access for concrete trucks shall be provided, preferably near the site exit.

c. The number of facilities to be installed shall correspond with the expected demand for storage capacity.

d. On large sites with extensive concrete work, washouts shall be placed in multiple locations for ease of use by concrete truck drivers.

8. Onsite Temporary Concrete Washout Facility, Transit Truck Washout Procedures

a. Concrete washout facilities shall be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.

1) Approximately 7 gallons of wash water are used to wash one truck chute.

2) Approximately 50 gallons are used to wash out the hopper of a concrete pump truck.

3) Washout of concrete trucks shall be performed in designated areas only.

b. Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed of offsite.

c. Once concrete wastes are washed into the designated area and allowed to harden, the concrete shall be broken up, removed, and disposed of per applicable solid waste regulations. Disposal of hardened concrete shall be performed on a regular basis.

9. Temporary Above-Grade Concrete Washout Facility

a. Temporary concrete washout facility (type above grade) shall be constructed as shown on the Details, with a recommended minimum length and minimum width of 10 ft., but with

sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations.

b. Straw bales and staking materials shall conform to the Standard Details.

c. Plastic lining material shall be a minimum of 20-mil HDPE liner and be free of holes, tears, or other defects that compromise the impermeability of the material.

d. The HDPE liner shall be of sufficient width to have no seams when installed.

10. Temporary Below-Grade Concrete Washout Facility

a. Temporary concrete washout facilities (type below grade) shall be constructed as shown on the Erosion Control Details drawing, with a recommended minimum length and minimum width of 12 feet. The quantity and volume shall be sufficient to contain all liquid and concrete waste generated by washout operations.

b. Plastic lining material shall be a minimum of 20-mil HDPE liner and be free of holes, tears, or other defects that compromise the impermeability of the material.

c. The installed HDPE liner shall be of sufficient width to have no seams when installed.

d. Soil base shall be prepared to be free of rocks or other debris that may cause tears or holes in the plastic lining material.

e. Detail is provided on the Erosion Control Details drawing.

11. Inspection and Maintenance

a. Inspect and verify that concrete washout area(s) are in place prior to the commencement of concrete work.

b. During periods of concrete work, inspect daily to verify continued performance.

1) Check overall condition and performance.

2) Verify washout area is visibly retaining wash water such that it is watertight.

3) Check remaining capacity (% full).

4) If using self-installed washout facilities, verify plastic liners are intact, watertight, and sidewalls and bottom are not damaged.

5) If using prefabricated containers, check for good physical condition and no leaks.

c. Washout facilities shall be maintained to provide adequate holding capacity with a minimum freeboard of 12 inches.

d. Washout facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.

e. If the washout is nearing capacity, vacuum and dispose of the waste material off-site in an approved manner.

1) Do not discharge liquid or slurry to waterways, storm drains or directly onto ground.

2) Do not discharge liquid or slurry into separate sanitary or combined sewer without local approval and any required pretreatment.

3) Remove and dispose of hardened concrete and return the structure to a functional condition. Concrete shall be hauled away for off-site disposal or recycling.

f. Place a secure, non-collapsing, non-water collecting cover over the concrete washout area prior to predicted wet weather to prevent accumulation and overflow of precipitation.

g. When removing materials from the self-installed concrete washout, build a new structure; or, if the previous structure is still intact, inspect for signs of weakening or damage, and make any necessary repairs. Any liner damage shall be sufficient repaired in accordance with manufacturer's instructions or fully replaced such that the area remains watertight as determined necessary and complete by the Resident Engineer.

12. Removal

a. When temporary concrete washout facilities are no longer required for the work, the hardened concrete, slurries and liquids shall be removed and properly disposed of off site. Materials used to construct temporary concrete washout facilities shall be removed from the work site and disposed of or recycled. Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities shall be backfilled, compacted, repaired, and stabilized to prevent erosion.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02372G
Embankment and Channel Protection

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02372 – Embankment and Channel Protection except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. No separate payment will be made for performing any Work required under this Specification and the Contractor shall include all costs thereof in its lump sum price bid for Contract Item No. G-LS-1, as specified in Detailed Specification 01270 – Measurement and Payment.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02373
Oil-Water Separator

NOTE: Detailed Specification 02373 has been prepared specifically for the work of this Contract. There is no corresponding General Specification 02373.

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for furnishing and installing precast concrete, fiberglass or steel oil water separator and cast-in-place manholes, including all appurtenances.

B. List of acceptable manufacturers and suppliers

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Specification and the Contractor shall include all costs thereof in its lump sum price bid for Contract Item No. G-LS-1, as specified in Detailed Specification 01270 – Measurement and Payment.

1.03 RELATED SECTIONS

A. Derailed Specification 02105 - Excavation

B. Detailed Specification 03300 - Cast-In-Place Concrete

1.04 REFERENCES

A. Concrete Tank:

1. ASTM Standard C913 for Precast Water and Wastewater Structures.
2. ACI-318-89 Building Code Requirements For Reinforced Structural Concrete.
3. ACI-350R-89 Environmental Engineering Concrete Structures.
4. ASTM Standard C890 Minimum Structural Design Loading of Precast Concrete Water and Wastewater Structures.
5. AASHTO Vehicle Loads at Grade.

B. Fiberglass Tank:

1. API Manual on Disposal of Refinery Wastes.

2. API Bulletin No. 1630 (1st Edition).

3. API Bulletin No. 421.

4. Tank manufactured per ASTM D-4021.

5. Tank manufactured per U.L. 1316.

6. NFPA 30 - Flammable and Combustible Liquids Code.

C. Steel Tank:

1. Tank manufactured per U.L. 58.

2. Corrosion control system in strict conformance with Sti-P3 Specifications with a 30 year warranty. Tank manufacturer shall be a licensee of the Steel Tank Institute.

3. NFPA 30.

D. Standards:

1. The oil water separator shall be designed in accordance with Stokes Law and the American Petroleum Institute Manual on Disposal of Refinery Wastes, Volume on Liquid Wastes as stated in Chapter 5, Oil Water Separator Process Design and API Bulletin No. 1630 First Edition, Waste Water Handling and Treatment Manual for Petroleum Marketing Facilities.

1.05 SYSTEM DESCRIPTION

A. The separator system shall be designed to perform as specified for variable, intermittent and continuous flows up to and including 20 gpm and containing 1000 ppm oil and grease with a specific gravity range of 0.68 and 0.9.

B. The unit shall incorporate a parallel plate coalescer enabling the removal of fine and widely dispersed oil and grease droplets by means of buoyant displacement to the underside of the plates where they undergo subsequent detachment in the form of globules rising to an upper self-contained holding and storage zone.

1.06 SUBMITTALS

A. Waiver of Submittal

1. The “Waiver of Certain Submittal Requirements”, does not apply to this Section.

B. Product Data

1. Catalog cuts with dimensions, specifications, installation instructions. Include one copy of operation and maintenance instructions for informational purposes.

C. Performance

1. Defined by influent and effluent characteristics.

D. Factory Test

1. Test certification for the tank.

E. Accessory Sensors and Alarms: Schematic wiring diagrams and bill of materials for each component of each sensor/alarm system.

F. Contract Closeout Submittals: Provide two additional copies of operation and maintenance instructions to the Director's Representative.

1.07 WARRANTY

A. Manufacturer's Warranty

1. The tank manufacturer shall warrant the oil/water separator tank for a period of 30 years against leakage due to internal corrosion, external corrosion, and structural failure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Concrete Tank

1. Oldcastle/Spancrete North, Inc., 123 County Route 101, P.O. Box 534, South Bethlehem, NY 12161, (518) 767-9390; or approved equal

B. Fiberglass Tank

1. Fluid Containment, Inc., Route 20, Box 1380, Conroe, TX 77301-4124, (409) 756-7731; or approved equal

C. Steel Tank

1. Highland Tank and Manufacturing Co., One Highland Road, Stoystown, PA 15563, (814) 893-5701.

2. McTighe Industries, Inc., 2100 North Kimball Street, P.O. Box 928, Mitchell, SD 57301, (605) 996-1162.

3. Mohawk Metal Products Co., Inc., 2175 Beechgrove Place, Utica, NY 13501, (315) 793-3000.

2.02 TANK MATERIAL OPTION

A. The oil/water separator tank may be fabricated from concrete, fiberglass, or steel at the Contractor's option.

2.03 SEPARATOR TANK

A. Type:

1. Heavy duty underground single wall tank

a. Flanged inlet and outlet connections, including isolation spools for metal tanks.

b. Internal inlet velocity head diffusion baffle or tee.

c. Sediment chamber.

d. Sludge baffle.

e. Oil water separation chamber containing a parallel corrugated plate coalescer and a removable "Petroscreen" polypropylene coalescer designed to intercept oil droplets > 20 microns in size and to produce an effluent quality of 10 ppm or less of free oil and grease.

f. Internal effluent downpipe for discharge of treated water to effluent pump-out chamber.

g. Fittings for vents.

h. Four-inch diameter oil pump out and sampling pipe.

i. Two-inch diameter sensor pipe.

j. Two 24-inch diameter manways, with extensions (if required), covers, gaskets, and bolts.

k. Lifting lugs for installation.

l. Metal tanks coated inside and out per manufacturer's recommendations. Concrete tanks coated inside with heavy coat of "Resist-All" sealant produced by Sealing Systems, Inc., 23230 W. Thomess Blvd., Lorretto, MN 55357, (612) 478-2057. Concrete tanks below grade shall be coated with coal tar epoxy in two (2) coats, eight (8), mils each.

2. Capacity: 1000 gallons minimum.

3. Loading Conditions

a. Internal Load: Five pounds per square inch (PSIG) above ground air test. Contractor shall test prior to installation with a soap solution applied to weld seams in search of leaks.

b. Surface Loads: Withstand surface H-20 axle loads when properly installed.

c. Tank shall support accessory equipment when installed according to tank manufacturer's recommendations and limitations.

B. Miscellaneous Materials

1. Galvanized Pipe (For Vents). 3 inch - Schedule 40.

2. Steel Retaining Riser (For Manways): Size and length to be determined by tank manufacturer and site conditions.

3. Concrete Pad with Tank Hold-Down Device: Comply with manufacturer's recommendations.

a. Straps with neoprene liners and turnbuckles.

b. Anchors.

c. Separating Pads: Made of inert dielectric material.

C. Access Hatch Covers

1. Provide aluminum hatch covers suitable for H-20 wheel loading for access to tank manways.

2. Size recommended by the oil/water separator manufacturer.

3. Cover shall lay flat without any protrusions rising above the frame.

4. Acceptable Door: Type JD-2, double leaf, aluminum access door with automatic hold-open arm, torsion bar counter balances and removable key wrench, all as manufactured by Bilco Company, New Haven, CT 06505, (203) 934-6363; or approved equal

PART 3 EXECUTION

3.01 INSTALLATION

A. Perform tests in accordance with manufacturer's printed recommendations.

1. Air test steel separator tanks above ground at 5 psig while a soap solution is applied to the weld seams to detect leaks.

B. Repair damaged coating with manufacturer's touch-up kit.

C. Excavate and install tank in accordance with manufacturer's recommendations.

D. Extend tank vents as indicated on contract drawings.

E. Backfill in accordance with manufacturer's printed recommendations.

F. Fill separator tank with clean water ballast. After ballasting is complete, check elevations for proper tolerances.

G. Field locate the control panel with alarm where indicated and as directed.

H. Provide electric service to the control panel(s) and make necessary electrical interconnection of panel(s), pumps, oil and water level sensors, and alarm.

1. Electric work shall conform to the National Electrical Code (NEC).

3.02 CLEANING INFLUENT/EFFLUENT LINES

A. Flush existing lines connected to the oil/water separator and dispose of the effluent in accordance with NYS Department of Conservation Regulations.

END OF SECTION

SECTION 02374
STORM WATER TREAMENT DEVICE – CDS UNIT

NOTE: Detailed Specification 02374 has been prepared specifically for the work of this Contract. There is no corresponding General Specification 02374.

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The furnishing and installation of the stormwater quality in-line treatment devise; selected CDS® by Contech Engineered Solutions LLC, or approved equal, complete and operable as shown and as specified herein, in accordance with the requirements of the plans and contract documents.

B. The Contractor shall furnish all labor, equipment and materials necessary to install the storm water treatment device(s) (SWTD) and appurtenances specified in the Drawings and these specifications.

C. The manufacturer of the SWTD shall be one that is regularly engaged in the engineering design and production of systems deployed for the treatment of storm water runoff for at least five (5) years and which have a history of successful production, acceptable to the Engineer. In accordance with the Drawings, the SWTD(s) shall be a CDS® device manufactured by:

D. Contech Engineered Solutions LLC
9025 Centre Pointe Drive
West Chester, OH, 45069
Tel: 1 800 338 1122

E. RELATED SECTIONS

1. Detailed Specification 02240: Dewatering
2. Detailed Specification 02461: Temporary Sheeting
3. Detailed Specification 02316: Excavation
4. Detailed Specification 02317: Backfilling

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Specification and the Contractor shall include all costs thereof in its lump sum price bid for Contract Item No. G-LS-1, as specified in Detailed Specification 01270 – Measurement and Payment.

1.03 SUBMITTALS

A. The Contractor shall submit Shop Drawings and other documentation, required to show conformance to the requirements of the Contract Drawings, for the approval to the Engineer. Shop Drawings shall show details of the Stormwater Control Treatment Devices. The Submittals shall include, but not limited to the following:

1. A "Manufacturer's Performance Certification" certifying that each SWTD is capable of achieving the specified removal efficiencies listed in these specifications. The certification shall be supported by independent third-party research.
2. Detail plans and product information
3. Design and calculations
4. Installation procedures
5. Operation and Maintenance Manual

PART 2 PRODUCTS

2.01 DESCRIPTION

A. All components shall be subject to inspection by the engineer at the place of manufacture and/or installation. All components are subject to being rejected or identified for repair if the quality of materials and manufacturing do not comply with the requirements of this specification. Components which have been identified as defective may be subject for repair where final acceptance of the component is contingent on the discretion of the Engineer.

B. The manufacturer shall guarantee the SWTD components against all manufacturer originated defects in materials or workmanship for a period of twelve (12) months from the date the components are delivered to the owner for installation. The manufacturer shall upon its determination repair, correct or replace any manufacturer originated defects advised in writing to the manufacturer within the referenced warranty period. The use of SWTD components shall be limited to the application for which it was specifically designed.

C. The SWTD manufacturer shall submit to the Engineer of Record a "Manufacturer's Performance Certification" certifying that each SWTD is capable of achieving the specified removal efficiencies listed in these specifications. The certification shall be supported by independent third-party research.

D. No product substitutions shall be accepted unless submitted 10 days prior to project bid date, or as directed by the Engineer of Record. Submissions for substitutions require review and approval by the Engineer of Record, for hydraulic performance, impact to project designs, equivalent treatment performance, and any required project plan and report (hydrology/hydraulic, water quality, stormwater pollution) modifications that would be required by the approving jurisdictions/agencies. Contractor to coordinate with the Engineer of Record any applicable modifications to the project estimates of cost,

bonding amount determinations, plan check fees for changes to approved documents, and/or any other regulatory requirements resulting from the product substitution.

2.02 MATERIALS

A. Housing unit of stormwater treatment device shall be constructed of pre-cast or cast-in-place concrete, no exceptions. Precast concrete components shall conform to applicable sections of ASTM C 478, ASTM C 857 and ASTM C 858 and the following:

1. Concrete shall achieve a minimum 28-day compressive strength of 4,000 pounds per square-inch (psi);

2. The precast concrete sections shall be designed to withstand lateral earth and AASHTO H-20 traffic loads;

3. Cement shall be Type III Portland Cement conforming to ASTM C 150;

4. Aggregates shall conform to ASTM C 33;

5. Reinforcing steel shall be deformed billet-steel bars, welded steel wire or deformed welded steel wire conforming to ASTM A 615, A 185, or A 497.

6. Joints shall be sealed with preformed joint sealing compound conforming to ASTM C 990.

7. Shipping of components shall not be initiated until a minimum compressive strength of 4,000 psi is attained or five (5) calendar days after fabrication has expired, whichever occurs first.

B. Internal Components and appurtenances shall conform to the following:

1. Screen and support structure shall be manufactured of Type 316 and 316L stainless steel conforming to ASTM F 1267-01;

2. Hardware shall be manufactured of Type 316 stainless steel conforming to ASTM A 320;

3. Fiberglass components shall conform to the ASTM D-4097.

C. Access system(s) conform to the following:

1. Manhole castings shall be designed to withstand AASHTO H-20 loadings and manufactured of cast-iron conforming to ASTM A 48 Class 30.

2.03 PERFORMANCE

A. The SWTD shall be sized to either achieve an 80 percent average annual reduction in the total suspended solid load or treat a flow rate designated by the jurisdiction in which the project is located. Both methods should be sized using a particle size distribution having a mean particle size (d50) of 125 microns unless otherwise stated.

B. The SWTD shall be capable of capturing and retaining 100 percent of pollutants greater than or equal to 2.4 millimeters (mm) regardless of the pollutant's specific gravity (i.e.:

floatable and neutrally buoyant materials) for flows up to the device's rated-treatment capacity. The SWTD shall be designed to retain all previously captured pollutants addressed by this subsection under all flow conditions. The SWTD shall be capable of capturing and retaining total petroleum hydrocarbons. The SWTD shall be capable of achieving a removal efficiency of 92 and 78 percent when the device is operating at 25 and 50 percent of its rated-treatment capacity. These removal efficiencies shall be based on independent third-party research for influent oil concentrations representative of storm water runoff (20 ± 5 mg/L). The SWTD shall be greater than 99 percent effective in controlling dry-weather accidental oil spills.

C. The SWTD shall be designed with a sump chamber for the storage of captured sediments and other negatively buoyant pollutants in between maintenance cycles. The minimum storage capacity provided by the sump chamber shall be in accordance with the volume listed in Table 1. The boundaries of the sump chamber shall be limited to that which do not degrade the SWTD's treatment efficiency as captured pollutants accumulate. The sump chamber shall be separate from the treatment processing portion(s) of the SWTD to minimize the probability of fine particle re-suspension. In order to not restrict the Owner's ability to maintain the SWTD, the minimum dimension providing access from the ground surface to the sump chamber shall be 16 inches in diameter.

D. The SWTD shall be designed to capture and retain Total Petroleum Hydrocarbons generated by wet-weather flow and dry-weather gross spills and have a capacity listed in Table 1 of the required unit.

E. The SWTD shall convey the flow from the peak storm event of the drainage network, in accordance with required hydraulic upstream conditions as defined by the Engineer. If a substitute SWTD is proposed, supporting documentation shall be submitted that demonstrates equal or better upstream hydraulic conditions compared to that specified herein. This documentation shall be signed and sealed by a Professional Engineer registered in the State of the work. All costs associated with preparing and certifying this documentation shall be born solely by the Contractor.

F. The SWTD shall have completed field tested following TARP Tier II protocol requirements

TABLE 1
Storm Water Treatment Device
Storage Capacities

CDS Model	**Minimum Sump Storage Capacity (yd^3)/(m^3)**	**Minimum Oil Storage Capacity (gal)/(L)**
CDS4030-8	5.6(4.3)	426(1,612)
CDS4040-8	5.6 (4.3)	520(1,970)

CDS4045-8	5.6 (4.3)	568(2,149)
CDS5640-10	8.7(6.7)	758(2,869)
CDS5653-10	8.7(6.7)	965(3,652)
CDS5668-10	8.7(6.7)	1,172(4,435)

PART 3 EXECUTION

3.01 INSTALLATION

A. The contractor shall exercise care in the storage and handling of the SWTD components prior to and during installation. Any repair or replacement costs associated with events occurring after delivery is accepted and unloading has commenced shall be borne by the contractor.

B. The SWTD shall be installed in accordance with the manufacturer's recommendations and related sections of the contract documents. The manufacturer shall provide the contractor installation instructions and offer on-site guidance during the important stages of the installation as identified by the manufacturer at no additional expense. A minimum of 72 hours notice shall be provided to the manufacturer prior to their performance of the services included under this subsection.

C. The contractor shall fill all voids associated with lifting provisions provided by the manufacturer. These voids shall be filled with non-shrinking grout providing a finished surface consistent with adjacent surfaces. The contractor shall trim all protruding lifting provisions flush with the adjacent concrete surface in a manner, which leaves no sharp points or edges.

D. The contractor shall removal all loose material and pooling water from the SWTD prior to the transfer of operational responsibility to the Owner.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02375
STORMWATER CHAMBER

NOTE: Detailed Specification 02375 has been prepared specifically for the work of this Contract. There is no corresponding General Specification 02375.

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall furnish and install STORMWATER CHAMBERS in accordance with the plans, specifications, manufacturer recommendations, and directions of the Engineers.

B. The Contractor shall furnish all labor, equipment and materials necessary to install the storm water chamber retention system and appurtenances specified in the Drawings and these specifications.

C. The manufacturer of the stormwater chamber shall be one that is regularly engaged in the engineering design and production of systems deployed for the retention of storm water runoff for at least five (5) years and which have a history of successful production, acceptable to the Engineer. The chambers shall be Model no. 150XLHD, as manufactured by Cultec, Brookfield, CT, or approved equal.

1.02 PAYMENT

A. No separate payment will be made for performing any Work required under this Specification and the Contractor shall include all costs thereof in its lump sum price bid for Contract Item No. G-LS-1, as specified in Detailed Specification 01270 – Measurement and Payment.

1.03 RELATED SECTIONS

1. Detailed Specification 02240 - Dewatering
2. Detailed Specification 02461 - Temporary Sheeting
3. Detailed Specification 02316 - Excavation
4. Detailed Specification 02317 - Backfilling

1.04 SUBMITTALS

A. Product Data

1. Catalog cuts with dimensions, specifications, installation instructions. Include one copy of operation and maintenance instructions for informational purposes.

B. Approved Equal:

1. If the Contractor proposes a system other than the one specified above, they shall submit all technical data of the proposed system, including calculations, demonstration that the proposed system handles the same or more volume of stormwater than the specified system. The Contractor shall also submit shop drawings showing all dimensions of the chambers and deviations of the layout from the contract plans.

C. Certifications:

1. The contractor shall submit testing results from an independent laboratory certifying that the system meets an AASHTO rating of H-20 (32,000 lbs./axle) with 18" of cover.

PART 2 PRODUCTS

2.01 DESCRIPTION

A. All components shall be subject to inspection by the engineer at the place of manufacture and/or installation. All components are subject to being rejected or identified for repair if the quality of materials and manufacturing do not comply with the requirements of this specification. Components which have been identified as defective may be subject for repair where final acceptance of the component is contingent on the discretion of the Engineer.

2.02 MATERIALS

A. CHAMBER:

1. The polypropylene storm chambers shall be manufactured from high density polyethylene and shall conform to the requirements of ASTM F2418, F2922, and design requirements of ASTM F2787.

2. The chambers shall be Model no. 150XLHD, as manufactured by Cultec, Brookfield, CT, or approved equal.

3. Chambers shall conform to the requirements of ASTM F2418, “Standard Specification for Polypropylene (PP) Corrugated Wall Stormwater Collection Chambers”.

4. The chamber shall be injection molded of Polypropylene resin to be inherently resistant to environmental stress cracking (ESCR), and to maintain adequate stiffness through higher temperatures experienced during installation and service.

5. The chamber shall be open-bottomed and shall have a continuously curved section profile.

6. The nominal chamber dimensions shall be 18.50" tall, 33" wide and 11’ long. The installed length of a joined chamber shall be 10.25’.

7. The chamber shall incorporate an overlapping corrugation joint system to allow chamber rows of almost any length to be created. The overlapping corrugation joint system shall be effective while allowing a chamber to be trimmed to shorten its overall length.

8. The chamber shall have both of its ends open to allow for unimpeded hydraulic flows and visual inspections down a row’s entire length.

9. The chamber shall be manufactured in an ISO 9001:2000 certified facility.

B. END CAPS.

1. The end cap shall be injection molded of Polypropylene resin to be inherently resistant to environmental stress cracking, and to maintain adequate stiffness through higher temperatures experienced during installation and service.

2. The end cap shall be designed to fit into any corrugation of a chamber, which allows capping a chamber that has its length trimmed: segmenting rows into storage basins of various lengths.

3. The end cap shall have saw guides to allow easy cutting for various diameters of pipe that may be used to inlet the system.

4. The end cap shall have excess structural adequacies to allow cutting an orifice of any size at any invert elevation.

5. The primary face of an end cap shall be curved outward to resist horizontal loads generated near the edges of beds.

6. The end cap shall be manufactured in an ISO 9001:2000 certified facility.

C. GEOTEXTILE:

1. Geotextile shall be non-woven class 2 and shall conform to AASHTO-M-288. Geotextile shall be ADS 601, or approved equal, as specified.

D. BROKEN STONE:

1. Broken stone shall be 1.5" to 2.5" diameter, clean, crushed, angular stone, as specified.

E. INSPECTION PORT:

1. There shall be one inspection port for each grouping of chambers located approximately in the center of the systems layout in order to facilitate inspection and maintenance of the system. The inspection port shall be comprised of a Neenah foundry Model R-5900A, or equivalent, heavy duty frame surrounded by a 24” square reinforced collar of concrete as well as a 12.0" SDR-35 / SCH. 40 PVC collar and 6” SDR-35 / SCH. 40 PVC riser connected to the center of one of the

systems chambers' knock-out port, see plans, details and manufacturer's instructions for recommended location, list of materials and complete installation instructions. The inspection port installation and materials will be paid for under this contract item.

PART 3 EXECUTION

3.01 INSTALLATION

A. Shall be in accordance with the plans, specifications, manufacturer recommendations, and confirm to all applicable New York City regulations, and at the directions of the Engineer.

B. Excavation and Preparation of Site

1. Excavate and level the designated area. Be sure to excavate at least one extra foot around the perimeter to allow for proper fit and adequate compaction.

2. Excavation must be free of standing water. Dewatering measures must be taken if required. Positive drainage of the excavation must be maintained.

3. Prepare the chamber bed subgrade soil as outlined in the Engineer's drawings.

4. Place AASHTO M288 Class 2 non-woven filter fabric over the prepared subgrade soils and up the excavated walls. The filter fabric must overlap at least 2' where the fabric edges meet.

5. Place AASHTO M288 Class 2 non-woven filter fabric around the perimeter of the excavated bed including the manifold system as specified in the Engineering drawing.

6. Perforated pipe outlet underdrains may be designed within the one-foot stone perimeter or under the chambers with a minimum pipe crest to chamber foot clearance of 6". Install perforated pipe outlet underdrains as required by the Engineer's drawings.

7. Place acceptable nominal ¾-2" clean, crushed, angular stone foundation material over the entire bottom surface of the bed.

8. Compact the stone using a vibratory roller with its full dynamic force applied to achieve a flat surface.

C. Assembling Inlet Pipes

1. Temporarily layout the header/manifold system according to the Engineer's drawings.

2. Place a minimum 12.5 feet of AASHTO M288 Class 2 non-woven geotextile over the bedding stone under each inlet stub off the manifold system. Check the Engineer's drawing to determine if an additional scour control measures are required.

3. Set the first chamber of each row aligned with their inlet pipes if applicable. A minimum 6" clear spacing, measured between feet, is required between adjacent rows. Separate chambers and inlet fittings as necessary to maintain 6" clear space between chamber rows.

4. With a reciprocating saw, cut an opening for the inlet piping in the applicable endcaps at the specified invert height.

5. Inlet pipe openings may be cut anywhere on an endcap. To do this, take a short length of pipe and use a marker to draw an outline of the pipe on the endcap at the correct height.

6. Insert the distribution pipes into the endcaps.

7. Once chamber spacing requirements are met, the header/manifold system may be permanently assembled.

*6" is the minimum spacing. A wider spacing may be required as indicated on the Engineer's drawings.

D. Joining the Chambers and Attaching the End Caps: A Chamber's end corrugations are sized differently to allow for an overlapping joint. To ensure proper joint fit, orient all chambers in the bed with their arrows pointing in the direction of the build. The chamber's overlapping feet are a distinguishing feature to help quickly identify the proper chamber orientation.

1. Construct the chamber bed by overlapping the chambers lengthwise in rows. Attach chambers by overlapping the end corrugation of one chamber onto the end corrugation of the last chamber in the row. Be sure that chamber placement does not exceed the reach of the construction equipment used to place the stone. Do not overlap more than one corrugation.

2. Lift the end of the chamber a few inches off the ground. With the curved face of the end cap facing outward, place the end cap into the chamber's end corrugation.

3. End caps are required only at the beginning and the end of each row of chambers.

E. Placing Stones Over the Chambers

1. Clean, crushed, angular stone meeting the specifications may be placed over the chambers with an excavator, pushed with a dozer or walked in with a stone conveyer boom. The 6" minimum clear spacing must always be maintained between adjacent Storm chamber rows, and construction vehicle loads must not exceed the specified requirements.

F. Backfilling

1. Cover the installation area with AASHTO M288 Class 2 non-woven filter fabric. Take the fabric from the trench walls and lay it over the top of the stone. The filter fabric must overlap at least 2 feet where the edges of the fabric meet.

2. The first 12 inches of fill material must meet the Storm requirements. Backfill over the top of the filter fabric in lifts that do not exceed 6 inches. Distribute the fill with a construction vehicle that meets the maximum wheel loads or ground pressure limits,

3. Compact each lift of backfill as specified in the Engineer's drawings. Storm requires compacting to a minimum of 95% of the Standard Proctor density until Storm minimum cover requirements are met. Use a walk-behind or vibratory roller not to exceed a maximum gross vehicle weight of 12,000 lbs. and a maximum dynamic force of 20,000 lbs.

4. The backfill height differential should never differ by more than 2 feet over adjacent chambers. Minimum cover heights must be met before vehicles are allowed on top of the system.

- END OF SECTION -

SECTION 02461G
Steel Sheet Piling

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02461 – Steel Sheet Piling except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. No separate payment will be made for performing any Work required under this Specification and the Contractor shall include all costs thereof in its lump sum price bid for Contract Item No. G-LS-1, as specified in Detailed Specification 01270 – Measurement and Payment.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02501G
Reinforced Concrete Sewer Pipe

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02501 – Reinforced Concrete Sewer Pipe except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. No separate payment will be made for performing any Work required under this Specification and the Contractor shall include all costs thereof in its lump sum price bid for Contract Item No. G-LS-1, as specified in Detailed Specification 01270 – Measurement and Payment.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02502G
Vitrified Clay Pipe Sewers

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02502 – Vitrified Clay Pipe Sewers except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. No separate payment will be made for performing any Work required under this Specification and the Contractor shall include all costs thereof in its lump sum price bid for Contract Item No. G-LS-1, as specified in Detailed Specification 01270 – Measurement and Payment.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02504G
Sanitary and Storm Sewer Structures

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02504 – Sanitary and Storm Sewer Structures except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. No separate payment will be made for performing any Work required under this Specification and the Contractor shall include all costs thereof in its lump sum price bid for Contract Item No. G-LS-1, as specified in Detailed Specification 01270 – Measurement and Payment.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02505G
Leakage Tests

NOTE: All Work for this section shall be in accordance with the requirements of General Specification Section 02505 - Leakage Tests except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. No separate payment will be made for performing any Work required under this Specification and the Contractor shall include all costs thereof in its lump sum price bid for Contract Item No. G-LS-1, as specified in Detailed Specification 01270 – Measurement and Payment.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02741G
Asphaltic Concrete Pavements

NOTE: All Work for this section shall be in accordance with the requirements of General Specification SECTION 02741 - Asphaltic Concrete Pavements except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. No separate payment will be made for performing any Work required under this Specification and the Contractor shall include all costs thereof in its lump sum price bid for Contract Item No. G-LS-1, as specified in Detailed Specification 01270 – Measurement and Payment.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02771G
Concrete Curbs, Headers and Sidewalks

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02771 - Concrete Curbs, Headers and Sidewalksexcept as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. No separate payment will be made for performing any Work required under this Specification and the Contractor shall include all costs thereof in its lump sum price bid for Contract Item No. G-LS-1, as specified in Detailed Specification 01270 – Measurement and Payment.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02821G
Metal Fence

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02821 – Metal Fence except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. No separate payment will be made for performing any Work required under this Specification and the Contractor shall include all costs thereof in its lump sum price bid for Contract Item No. G-LS-1, as specified in Detailed Specification 01270 – Measurement and Payment.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02841G
Guide Railing

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02841 – Guide Railing except as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. No separate payment will be made for performing any Work required under this Specification and the Contractor shall include all costs thereof in its lump sum price bid for Contract Item No. G-LS-1, as specified in Detailed Specification 01270 – Measurement and Payment.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02910G
Planting

NOTE: This Detailed Specification 02910G - Planting replaces General Specification 02910 - Planting in its entirety. Whenever a reference appears in the Contract Documents to General Specification 02910, it shall now be deemed to refer to Detailed Specification 02910G.

PART 1 GENERAL

1.01 SUMMARY

A. Planting as specified herein includes, but is not limited to, the following:

1. Furnishing and installing new trees, shrubs, grasses, and all other plant materials.
2. Furnishing and installing new hydroseeded lawns.
3. Staking and guying of trees, only where shown on the Drawings or as directed.
4. Furnishing and installing mulch.
5. Protection and maintenance of all plant materials and the replacement of plantings as required until Substantial Completion.
6. Guarantee of all new plant materials for a period of 4 months.
7. Maintenance of plantings during this 24-month guarantee period.

B. The Contractor shall implement practices and procedures to meet the project's sustainability goals as identified in the Contract Documents. The Contractor shall ensure that the sustainability requirements of this Section are implemented to the fullest extent.

C. The following index of this Section is included for convenience:

1.02 PAYMENT

A. Payment for all work specified in this Section, with the exception of the 24-month maintenance and guarantee, shall be made as part of the lump sum price bid for Contract Reference Item No. G-LS-1, as described in Detailed Specification 01270 – Measurement and Payment.

B. No separate payment shall be made after Milestone M3, Completion of Work. Payment for the guarantee retainage shall be based on the DEP's acceptance and approval of the submitted maintenance report. The approved copy of the report shall be included in the payment request for the guarantee retainage.

C. During the maintenance period the Contractor shall submit annual maintenance reports which will include a detailed maintenance schedule of maintenance tasks performed that year. Any replacement plantings shall be implemented as per the requirements of the Contract. No separate payment shall be made to the Contractor for all associated maintenance requirements to document and comply with the guarantee requirements.

1.03 RELATED SECTIONS

A.	General Specification 02317	-	Backfilling
B.	General Specification 02371	-	Dust, Soil Erosion & Sedimentation Control
C.	General Specification 02920	-	Soil Mixes
D.	Detailed Specification 01270	-	Measurement and Payment.

1.04 REFERENCES

A. American Nursery and Landscape Association (ANLA)

1. American Standard for Nursery Stock (ASNS), ANSI Z60, current edition

B. International Society of Arboriculture (ISA)

1. American National Standard for Arboricultural Operations – Pruning, Repairing, Maintenance, and Removing Trees, and Cutting Brush – Safety Requirements, ANSI Z133, current edition

C. Tree Care Industry Association (TCIA), Standards

1. American National Standard for Tree Care Operations – Tree, Shrub and Other Woody Plant Management – Standard Practices, ANSI A300, current edition.

D. Manual of Vascular Plants of Northeastern United States and Adjacent Canada, 2nd ed., 1991, by Henry A Gleason and Arthur Cronquist (G&C), New York Botanical Garden

E. Revised Checklist of New York State Plants (NYSPC), Richard S. Mitchell and Gordon C. Tucker, New York State Museum

F. New York Flora Atlas (http://newyork.plantatlas.usf.edu/Default.aspx)

G. USDA Plant Database (http://plants.usda.gov/java/) & USDA Plant Hardiness Zone Map (http://planthardiness.ars.usda.gov/PHZMWeb/)

1.05 SYSTEM DESIGN REQUIREMENTS

A. Contractor shall locate all required plant materials and be present for their inspection, as directed by the Engineer or the Engineer's designated representative, at the nursery prior to transport or upon delivery of the materials on site. Notify the Engineer at least 14 days in advance of the Contractor's desired inspection dates and locations.

B. Inspection at Nursery: All plants may be inspected and selected by the Engineer or designated representative at the nursery for conformity to the requirements of the Contract. Whether plant materials are inspected or not at the nursery, the Contractor shall make all preselection arrangements required by the Engineer to ensure an efficient selection procedure. Approval of plant materials at the nursery shall not affect the rights to inspect or reject the materials upon delivery or later.

C. Inspection at Delivery On-Site: Notify the Engineer at least five (5) working days in advance of delivery of plants to the site.

1. The Engineer or Engineer's designated representative will inspect all plants upon delivery to site.

2. Contractor shall schedule a time for on-site inspection prior to planting, and shall arrange for adequate labor and equipment on-site at the time of inspection to unload, open, and handle plants during inspection.

3. The Engineer or Engineer's designated representative may reject any plant material prior to or upon delivery to the site.

   a. All plant material that is dead, dying or appears unhealthy will be rejected.

   b. All plant material that has been improperly maintained, dug, transported or handled in such a way as to impair its appearance or health will be rejected.

D. The Engineer or Engineer's designated representative will be the sole judge of the condition of the plants.

1. All material that is rejected on site shall be removed immediately from site, and replaced with new material selected or approved by the Engineer, at no additional cost to the City.

E. Sustainable Design Requirements:

1. Regional Materials: Provide plant materials that were grown and harvested, or extracted, within 250 miles of the project site unless otherwise required in the Detailed Specifications or shown on the Drawings.

F. Project-specific system design requirements will be provided in the Detailed Specifications, if necessary, to supplement requirements given herein or in the Contract Drawings.

1.06 QUALITY ASSURANCE

A. Comply with all rules, regulations, laws and ordinances of local, state and federal authorities having jurisdiction. Provide labor, materials, equipment and services necessary for work to comply with such requirements at no additional cost to City.

B. Procure and pay for permits and licenses required for work of this Section. Obtain all required permits in a timely manner to avoid delays to the work.

1.07 SUBMITTALS

A. Submit a Statement of Qualifications for the landscape subcontractor. Qualifications shall show experience in the installation of landscape work of a similar type and scale to this project within the last six (6) years.

B. Statement of Qualifications for the landscape subcontractor shall consist of the following information:

1. Company name and address

2. Number of years in business under this name
3. Number of current full-time, part-time, and seasonal employees
4. Estimated number of employees intended for this project
5. Current workload:
    a. Name and address of current projects
    b. Types and dollar amounts of work for which landscape subcontractor is responsible in each current project
    c. Estimated completion date for each current project
6. References for three (3) projects completed within the last six (6) years, which are similar in scope to this project, including the following information for each project:
    a. Name and address of project
    b. General description of work
    c. Dollar amount of landscape work performed
    d. Dates landscape work was started and completed
    e. Verified contact information for at least one (1) representative of the owner or prime construction contractors in each projects:
        1) Name,
        2) Mailing address,
        3) E-mail address, and
        4) Telephone numbers (Office and Direct).
    f. Contact information similar to above for at least one (1) representative of the Architect, Engineer, Landscape Architect, or other representative of the designer or construction manager for each project given as reference.
    g. Representative photographs

C. Samples: Submit samples of the following items:
1. Mulch: One (1) pound bag with manufacturer's certification of content
2. Erosion Control Mat: 10" x 10" sample of material 30 (thirty) days prior to installation for approval by City and Engineer.

D. Growers/Nurseries: Contractor shall submit a list of proposed growers/nurseries prior to the commencement of any landscaping work, with sufficient advance notice of at least 90 (ninety) days.

E. For nurseries, a copy of state inspection certificate for current year must be submitted.

F. Materials/Certificates: Contractor shall submit a list of all materials and certificates in this Section prior to the commencement of any landscaping work, with sufficient advance notice of at least 90 (ninety) days.

G. All necessary state, federal and other inspection certificates as may be required by law.

H. Product Data - Where applicable, the following product data shall be submitted:

1. Manufacturers' product information for erosion control mat, showing conformance with the specified requirements.

2. Analysis of each seed or hydroseed mix to be used, showing percentage of purity, weed content and germination of seed.

3. Identification of sod source and certification that all sod material is true to name, type, purity and other criteria in conformance with these specifications.

4. Certified analysis for each treatment, amendment, and fertilizer material specified and as used, including weight for packaged material.

I. Documentation: The Contractor shall submit written documentation at least 60 (sixty) days prior to scheduled start of planting that all plant material has been ordered.

J. Maintenance Program: Submit written schedule of maintenance operations proposed for the guarantee period. Schedule shall be in the form of a list of all proposed maintenance tasks, with dates showing when each maintenance task will be performed and its frequency of occurrence.

K. Sustainable Design Submittals:

1. Environmental Materials Reporting Form (EMRF) Regional Materials. Provide the following information:

a. Name of Product and Manufacturer.

b. Material cost breakdowns. Cost breakdowns must include total material-only cost (excluding installation, labor and equipment).

c. Indicate the location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. For assemblies, include the percentage by weight that is considered regional.

1.08 DELIVERY, STORAGE AND HANDLING

A. Packaged Materials

1. Deliver packaged materials in unopened bags or containers, each clearly bearing the name of the producer, the material composition, manufacturers' certified analysis, and the weight of the material.

2. All packaged products shall be stored, handled and applied in strict accordance with manufacturers' instructions.

B. Dig and handle all plant material to prevent injury to trunks, branches and roots.

1. All plants specified as B & B (balled and burlapped) in the Plant List shall be dug to depths as required in the Detailed Specifications with sufficient roots and shall have a solid ball of earth securely held in place by burlap and rope.

2. Do not prune prior to delivery.

3. Do not bend or bind-tie trees in such manner as to damage bark, break branches or destroy natural shape.

C. Pack and ship all plant material to ensure arrival at site in good condition. Provide protective covering during delivery.

D. If planting is delayed more than 24 hours after delivery, Contractor shall provide adequate means of protection from freezing and from the drying effects of wind and sun.

1. Rootballs shall be protected with soil, wet mulch, or other acceptable material.

2. Provide shade structures or other covering as required to protect branches and leaves.

3. Water as necessary until planted. Do not allow plant material to wilt or show signs of stress from lack of water. Provide all water and equipment for water distribution at no additional cost to the City.

E. Immediately remove rejected or damaged plant material from the site and replace with plants approved by Engineer. All replacement plants shall be subject to the same requirements as the original material.

1.09 COORDINATION

A. The Contractor shall coordinate its work with that of other Contractors. Such coordination shall include, but not be limited to:

1. Location of all underground utility lines and structures

2. Scheduling of planting operations

3. Scheduling of maintenance operations

1.10 SUBSTANTIAL COMPLETION

A. Contractor shall submit a written request to the Engineer, for a formal inspection of the planting work for Substantial Completion.

B. To be accepted at the time of formal inspection of planting work, all plant material must be alive, healthy, and installed as specified.

1. If plants are dead, dying, or unhealthy, or if landscaping does not serve its visual or soil stabilization functions, or if workmanship is unacceptable to the Engineer or Engineer's Representative for other reasons, written notice will be given to the Contractor in the form of a punch list that itemizes all remedial work required for Substantial Completion.

2. This work may include plant replacement or maintenance which must be carried out prior to issuance of the Certificate of Substantial Completion.

3. The Certificate of Substantial Completion will not be issued until a written maintenance program, as described herein below, has been approved by the Engineer and the Engineer's designated representative.

1.11 WARRANTY (GUARANTEE PERIOD)

A. All new plant material shall be guaranteed for a period of 24 months after the date of Substantial Completion.

B. Protection and Maintenance

1. At least 30 days prior to the date of the written request for Substantial Completion, Contractor shall submit a written protection and maintenance program and schedule to the Engineer for approval.

2. Protection and Maintenance program shall be revised and resubmitted as required until approved by Engineer.

3. During the guarantee period, the Contractor shall maintain all plant materials as specified herein, and as noted in the approved maintenance schedule, and shall replace, at no additional cost to the City, any and all plant material that has died or, in the opinion of the Engineer or Engineer's designated representative, is in unhealthy or unsightly condition.

4. The Contractor is responsible for providing and maintaining adequate protection measures for all planted areas throughout the guarantee period in order to protect plantings from by any subsequent construction operations or other types of physical damage.

a. Protection measures may include, but not be limited to, approved temporary fencing, tree guards, signage and other measures as determined to be necessary during the guarantee period.

b. Local fence ordinances and guidelines may also apply to the work requiring the Contractor to submit at no additional cost to

the City design drawings or other documents for obtaining the necessary local permits or approvals.

C. Replacements

1. There will be no limit to the number of times replacements are made of individual plants, unless conditions causing the failure can be proved to be beyond the control of the Contractor.

2. The Contractor is responsible for replacing any and all plant material and any associated compacted soils that are damaged by the Contractor's own operations or the operations of any of its subcontractors, or due to other damage resulting from a lack of adequate protective measures, at no additional cost to the City.

3. All replacements shall be in accordance with original specification or, if it is determined that specified plants are inappropriate for as-built conditions, they may be replaced with the approval of Engineer or Engineer's Representative to more appropriate species as identified by a Restoration Specialist, Landscape Architect or other qualified professional.

4. Cost of all replacements shall be included in the Contract price. No additional payment will be made therefor.

5. Replace unacceptable plant material no later than the next succeeding planting season.

6. Guarantee all replaced material for a period of 24 months after the date of replacement.

7. All areas damaged or soiled by replacement planting operations are to be fully restored to their original condition at no additional cost to the City.

D. Site Inspection

1. Approximately one (1) month prior to the expiration of the guarantee period, the Contractor shall arrange a site inspection by the Engineer.

2. At this time, the Engineer will prepare a list of all remedial work required, including plant replacement and maintenance.

3. This work shall be carried out before the end of the guarantee period, unless weather conditions cause delays, in which case such work shall be carried out as soon as is practical.

E. Final Acceptance

1. Following the completion of all remedial work and replacement plantings, the Contractor shall request the Engineer in writing for a formal inspection of the landscape work for Final Acceptance.

2. If replacement plantings are required, Final Acceptance will be provisional upon a final inspection at the end of the guarantee period for the plant replacements.

F. All of the materials and labor required for plant protection, maintenance and replacements during the guarantee period shall be included in the Contractor's bid price. No additional payments will be made therefor.

PART 2 PRODUCTS

2.01 MANUFACTURERS AND SUPPLIERS

A. Acceptable manufacturers and suppliers of planting materials shall be as indicated below unless otherwise specified in the Detailed Specifications.

1. Hardscrabble Farms Nursery, North Salem, NY (www.hardscrabblefarms.com)
2. Pinelands Nursery, Columbus, NJ (www.pinelandsnursery.com)
3. New England Wetland Plants, Inc., Amherst, PA (www.newp.com)
4. Sylva Native Nursery & Seed Company, Glen Rock, PA (www.sylvanative.com)
5. Octoraro Native Plant Nursery, Kirkwood, PA (www.octoraro.com)
6. Northcreek Nurseries, Oxford, PA (http://www.northcreeknurseries.com)
7. Or Approved Equal

B. All nurseries supplying plant material shall have a registration certificate from the Department of Agriculture and Markets, Division of Plant Industry, New York (or similar organization in the state from which plant material is obtained) certifying that the plant material is apparently free of injurious insects and diseases.

2.02 MATERIALS

A. Plants

1. Provide plant material to meet or exceed applicable ANLA standards in all ways in addition to other standards specified. Plant names, size and grading standards shall conform to those prepared by American Nursery and Landscape Association (American National Standards Institute), American Standard for Nursery Stock (ANSI Z60.1, latest edition). Plants shall be true to species and, if specified as to variety or cultivar, shall be as listed in http://newyork.plantatlas.usf.edu/Default.aspx to determine nativity and as listed in http://plants.usda.gov/java/ for taxonomy. Plants shall be typical of their species or variety with normal habits of growth, in accordance with ASNS: Sound, healthy and

vigorous, well-branched and densely foliated when in leaf, with healthy well developed root systems; free from disease, abrasions of the bark, insect pests, eggs or larvae.

2. Plant species native to the Eastern United States, as specified in the planting plan and Detailed Specification, shall be provided by the Contractor. Non-native species shall not be considered as substitutes for native species.

3. Native plant material shall be derived from the local genotypes of the native plants specified to the greatest extent practicable. Plants must be nursery grown in hardiness zones no warmer or colder than the project sites as determined by the USDA Agricultural Research Service, Plant Hardiness Zone Map.

4. Plants that have escaped cultivation, or have accidentally been introduced into native habitats, shall not be considered native to the Eastern United States. Refer to USDA Plants Database for taxonomy and to G&C, NYSPC and the New York Flora Atlas to determine nativity.

    a. No plant material shall be collected or harvested from non-nursery areas.

    b. All trees shall be freshly dug for this project.

5. Sources: Nursery sources of supply shall have been investigated by the Contractor prior to submitting its bid to confirm that size, variety, and quantity of plant material specified on the Plant List can be supplied. Failure to take this precaution will not relieve the Contractor from the responsibility for furnishing and installing all plant material in strict accordance with the Contract requirements and without additional expense to the City.

6. Quality: All woody plant material shall be nursery grown in accordance with good horticultural practice, for at least two (2) years under climatic conditions and soils similar to those at project site. All plants shall be of specimen quality. All trees are to be uniform and matched. All trees shall have straight trunks with leader intact, undamaged and uncut. Trees with damaged or crooked leaders, bark or abrasions, sunscald, disfiguring knots, or insect damage will not be accepted.

7. Depth of planting shall be checked on all trees being tagged at the nursery. Remove all soil or other fill material above the natural point where the tree trunk begins to spread, (the flare), prior to digging and ball and burlap operations.

8. Size:

a. Caliper measurement shall be taken on the trunk at 6 inches above the natural ground line for trees up to and including 4 inches in caliper, and 12 inches above the ground for trees greater than 4 inches in caliper.

b. Height and spread dimensions refer to the main body of plant, and not from branch tip to tip.

c. If a range of size is given, no plant shall be less than the minimum size and not less than 50 percent of the plants shall be as large as the maximum size specified.

d. Plants that meet measurements but do not possess a normal balance between height and spread shall be rejected.

e. Plants larger than specified may be used only if approved by Engineer. Use of such plants shall not increase the contract price. If larger plants are approved, the root ball shall be increased in proportion to the size of the plant. The Contractor shall verify that the size of the root ball will fit in prepared planting pits.

9. All trees shall be balled and burlapped stock (B&B), with a compact natural ball of earth, firmly wrapped and tied in burlap fabric.

a. Root ball sizes shall be in accordance with standards specified in ASNS.

b. Plants with cracked or broken rootballs will not be accepted.

c. Only natural burlap fabric shall be acceptable for balling. Plastic and other non-biodegradable fabrics will not be accepted.

B. Staking and Guying Materials

1. Stakes (where specified only): 3-inch diameter cedar, fir, or hemlock stakes, with pointed ends. Stakes shall be straight, sound, and free from defects that may impair strength.

2. Tree tie: ¾-inch thick polypropylene woven tree tie

C. Mulch

1. Mulch shall be a double-shredded natural forest product of a uniform grade, partially decomposed, dark brown in color, free from sawdust, with no additives or any other treatment. Size of bark shall be from 5/8 inch to one and 1-1/4 inch. The pH range shall be 5.8 to 6.2.

2. Mulch sources shall be free of diseases or pest infestations including but not limited to the Emerald Ash Borer or Asian Longhorned Beetle. Use of material from any areas that have been designated for quarantine of wood products by any state or federal agency is strictly prohibited.

D. Grass Seed for Lawn Areas

1. Grass seed for lawn areas shall be fresh recleaned seed of the latest crop. Unless otherwise specified in the Plans or Detailed Specifications, seed mixture shall have the following proportions by weight:

   a. 60% Kentucky Bluegrass

   b. 20% Fine Fescue

   c. 20% Perennial Ryegrass

2. All seed shall be delivered in standard size bags of the vendor, showing weight, purity, and percentage of seed varieties.

3. Grass seed for lawn areas shall be provided only for areas where lawn is specified. It shall not be furnished for temporary stabilization prior to final site restoration in restoration projects.

4. Seed shall be stored in original unopened packages, kept dry and not opened until needed for use. Damaged or faulty packages shall not be used and will be rejected. Seed shall have been harvested from the previous growing season.

5. Seed shall be no less than 75% Pure Live Seed (PLS). Quantities shall be calculated by quantity of PLS. Legume seed shall be inoculated with Rhizobia bacteria.

6. Seed shall be delivered to site in separate packages and shall be machine mixed of hand broadcast in smaller areas where appropriate, on site as approved by the Engineer or Engineer's Designated Representative.

7. Apply seed with drop or cyclone spreaders to uniformly cover seedbed at the rate required.

8. Carrier Medium for Seed Applied by Conventional Seeding Methods:

   a. Seed Mix shall be missed with clean moistened sand. Sand shall consist of clean, hard, durable, uncoated stone particles, free from lumps of clay and all deleterious substances. Sand shall be so graded that when dry, one-hundred percent (100%) shall pass through a one-quarter inch (1/4") square opening sieve; not more than thirty-five percent (35%) by shall pass a No. 50 sieve and not more than ten percent (10%) by weight shall pass a No. 100 sieve. Sand may be rejected for this class if it contains more than ten percent (10%) by weight of loam and/or silt. Sand shall be mixed at a rate of 10 parts sand to 1 part seed.

E. No Mow Lawn Mix

1. No Mow Lawn Mix shall be fresh recleaned seed of the latest crop.

2. Seed mix shall be as specified on the Contract Drawings.
3. All seed shall be delivered in standard size bags of the vendor, showing weight, purity, and percentage of seed varieties.
4. Seed shall be stored in original unopened packages, kept dry and not opened until needed for use. Damaged or faulty packages shall not be used and will be rejected. Seed shall have been harvested from the previous growing season.
5. Seed shall be no less than 75% Pure Live Seed (PLS). Quantities shall be calculated by quantity of PLS.
6. Seed shall be delivered to site in separate packages and shall be machine mixed of hand broadcast in smaller areas where appropriate, on site as approved by the Engineer or Engineer's Designated Representative.
7. Apply seed with drop or cyclone spreaders to uniformly cover seedbed at the rate required.
8. Carrier Medium for Seed Applied by Conventional Seeding Methods:
    a. Seed Mixes shall be mixed with clean moistened sand. Sand shall consist of clean, hard, durable, uncoated stone particles, free from lumps of clay and all deleterious substances. Sand shall be so graded that when dry, one-hundred percent (100%) shall pass through a one-quarter inch (1/4") square opening sieve; not more than thirty-five percent (35%) by shall pass a No. 50 sieve and not more than ten percent (10%) by weight shall pass a No. 100 sieve. Sand may be rejected for this class if it contains more than ten percent (10%) by weight of loam and/or silt. Sand shall be mixed at a rate of 10 parts sand to 1 part seed.

F. Erosion Control Mat

1. Erosion control mat shall meet the following requirements:

Netting	One Side Only, Organic Leno Weave Jute, 100% Biodegradable 0.5" x 1.0" opening
Matrix	100% Agriculture Straw 0.55 lbs/yd^2 298.4g/m^2
Thread	1.5" stitch space, 100% Biodegradable

Index Value Properties

Property	Test Method	Typical
Mass/Unit Area	ASTM D6475	10.00 oz/yd^2
Thickness	ASTM D6525	.40 in
Tensile Strength-MD	ASTM D6818	106 lb/ft
Elongation-MD	ASTM D6818	16.7%
Tensile Strength-TD	ASTM D6818	118 lb/ft
Elongation-TD	ASTM D6818	26.8%
Light Penetration	ASTM D6567	6%
Water Absorption	ASTM D1117	322%
Unvegetated Shear Stress	ASTM D6460	1.55 lbs/ft^2
Slope		3:1 or flatter

2. The Erosion Control Mat must be ECS-1B, by East Coast Erosion Blankets, Bernville, PA; BioNet S75BN by North American Green, Evansville, IN; US-1SNN by L and M Supply Co., Pearson, GA; or approved equal.

3. Wire Staples must consist of 12-inch lengths of No. 11 gauge wire bent to form a "U" or other wire staples as approved.

G. Water

1. The Contractor shall be responsible for supplying all required water to the site at no additional cost to the City. In upstate projects, the Engineer of Record will coordinate with the Contractor to locate a source of water

2. Where water is supplied from City hydrants, the Contractor shall obtain a free hydrant permit from the Department of Environmental Protection, Bureau of Consumer Service, (718 595 6699). Permits are issued for a 30 day period, and the Contractor is responsible for keeping the permit current. The permits are available from each borough office. To obtain a permit, the Contractor should bring a copy of their DEP contract indicating exemption from the permit fee, as described in Article 13, with a general description of the hydrant location(s) they propose to access.

3. The Contractor must have all tools necessary for using city hydrants in his possession at time of planting to ensure that this section is adhered to. If conditions do not allow the use of New York City water sources, the Contractor must obtain his/her own source of water. No direct payment shall be made for water obtained from other than city sources, but the cost thereof shall be deemed included in of the contract.

   a. All work injured or damaged because of the lack of water, or the use of too much water, or the use of contaminated water shall be the Contractor's responsibility to correct.

b. Water shall be free from impurities injurious to vegetation.

H. Tree Irrigation Bags

1. Unless otherwise shown on the Drawings, required in the Detailed Specifications, or directed by the Engineer, the Contractor shall furnish tree irrigation bags for all trees over 1-1/2 inch caliper. The irrigation bags shall be 100% reinforced UV stable polyethylene, at least 10 mils. thick with a polyester scrim lining, such as TreeGator, as manufactured by Spectrum Products, Raleigh, NC, or approved equal. The irrigation bags shall have a minimum 20-gallon capacity.

PART 3 EXECUTION

3.01 EXAMINATION

A. Drainage at tree pits: Check drainage at tree pits prior to planting, by performing percolation tests (in dry weather) as follows:

1. Dig out planting hole to required depth and fill hole half full of water. Mark water level with stake.

2. Water level should decrease by a minimum of two (2) inches per hour.

3. If water does not drain adequately from plant pits, amend conditions at tree pits and planting beds as required for satisfactory drainage. If topsoil or subgrade has been over-compacted by the Contractor's operations, such as by compaction equipment or by allowing vehicles or equipment to pass over the area, the Contractor shall remove and replace over-compacted materials at its own expense.

4. Obtain approval of Engineer for proposed amendments.

5. Do not place trees in pits until approval of drainage conditions by the Engineer.

B. The Contractor shall be liable for all damage to surrounding areas caused by planting operations and shall be required to restore or replace the damaged areas to their original condition.

C. Contractor is responsible for determining the location of all utilities, by contacting the appropriate utility company prior to any planting activities.

1. Verify that underground utilities and irrigation systems in landscape areas are in place, at the proper location, tested (except final irrigation testing) and ready for use.

a. Take proper precautions so as not to disturb or damage sub-surface elements.

2. Coordinate with other trades.

D. The Contractor is liable for any damage to such utilities during the course of construction, and is responsible for making necessary repairs to damaged utilities at its own expense.

3.02 PREPARATION FOR PLANTING

A. Install erosion control mat over permanently seeded areas immediately following seeding and in areas as shown on Drawings.

1. Erosion control mat must be placed on topsoil perpendicular to slope contours where directed by the Engineer. Erosion control mat must be laid without stretching so that it lies loosely on the soil and in contact with the soil at all points and must be pressed firmly into the soil surface by rolling or tamping. If seeding is required, it must be done prior to the installation of the erosion control mat.Fabric shall be overlapped by a minimum of six (6) inches.

2. The upper end of each roll of erosion control mat must be turned and buried to a depth of six (6) inches, with the soil firmly tamped against it. Erosion control matting must have a minimum lap of six (6) inches on all sides. Ends of rolls must also have a minimum lap of six (6) inches with the upgrade section on top.

3. Check slots must be constructed at intervals of 50 feet, unless otherwise directed by placing a fold of erosion control mat six (6) inches vertically into the ground with replaced soil tamped firmly against it.

4. Erosion control mat must be held tightly to the soil by staples driven firmly into the ground. Staples must be spaced not more than three (3) feet apart, along the sides and center of the erosion control mat and not more than one (1) foot apart at roll ends, check slots and at other critical areas as determined by the Engineer.

B. Planting soil mix materials and installation shall be as specified in General Specification 02920 - Soil Mixes.

C. Exercise extreme caution during excavation to avoid damaging or interrupting existing underground utilities. Use appropriate detection equipment to locate utilities during excavation for planting.

D. Erect barricades, warning signs, or other protective devices as may be required by local, state, or federal laws and regulations to protect open excavations.

3.03 PLANT INSTALLATION

A. For projects within the immediate New York City area, plant only within the following dates, weather permitting. Refer to the Detailed Specification for approved planting dates for projects outside the City. Do not plant in times of high wind, rain, sleet, or snow when the ground is frozen or excessively wet; or when the soil is otherwise in an unsatisfactory condition for planting. Planting

at times other than those specified will be at the Contractor's own risk, and will not invalidate any guarantees.

1. B & B Deciduous trees and shrubs:
    a. Spring: March 1st to May 15th
    b. Fall: October 15th to December 15th
2. The following trees shall be planted during the spring season only:
    a. Acer rubrum
    b. Betula sp.
    c. Crataegus sp.
    d. Liquidambar styraciflua
    e. Liriodendron tulipifera
    f. Platanus acerifolia
    g. Prunus sp.
    h. Quercus sp.
    i. Salix babylonica
    j. Tilia tomentosa
    k. Zelkova sp.
3. B & B Evergreen trees and shrubs
    a. Spring: March 15th to May 15th
    b. Fall: September 1st to October 15th
4. Container-grown perennials, vines, and ground cover plants:
    a. Spring: April 15th to June 15th
    b. Fall: August 15th to September 15th
5. Seeding, hydroseeding, and sodding shall be carried out during the following dates:
    a. Spring: April 1 to June 1
    b. Fall: September 1 to October 15
6. Seeding shall be in moderately dry to moist soil, at such times when wind does not exceed five (5) miles per hour.

B. Do not plant until plant material has been approved by the Engineer at site.

C. Placement of Plants

1. Plants shall be set in the center of pits, plumb and straight, in accordance with the planting details, and faced to give best appearance and relationship to adjacent plants and structures.
2. Plant to such depth that the finished grade level of plant, after settlement, will be the same as that at which the plant was grown.
3. Trees must be planted at the depth of the flare, where roots spread from the trunk. The flare must be located and placed at the correct level before continuing planting operations.

D. Planting Balled and Burlapped Trees and Shrubs

1. Excavate plant pits to minimum dimensions shown on the Drawings. If plant pits are mechanically dug, the sides of the pit shall be broken down or roughened with a shovel or other hand tool to eliminate surface glazing.
2. Remove any platforms, wire, and surplus binding from top and sides of ball.
3. Position plants in center of pit, using gentle handling to avoid damage to any part of the plant.
4. Set plants on a bed of compacted soil mix, to position at the correct depth, as shown on the Drawings.
5. Cut and remove burlap, rope ties, and wire baskets from the root ball, backfilling and gently removing burlap and wire basket in sections as needed to support the root ball.
6. If wire baskets are used to contain the root ball, these shall be entirely removed before planting.
7. Fully remove all burlap, non-biodegradable twine and other materials.
8. Cleanly cut off all visible broken or frayed roots.
9. Add mycorrhizal fungi inoculant, if specified, to each tree planting as per the approved manufacturer's or supplier's instructions.
10. Apply water retention additive as per approved manufacturer's or supplier's instructions.
11. Backfilling: Fill plant pit with soil mix by hand, in layers not more than six (6) inches deep, and with each layer thoroughly settled by hand tamping and with water, and free of all voids before next layer is put in place.
12. Install tree irrigation bags and fill with water, unless otherwise specified or directed by the Engineer.

E. Planting Perennials, Vines, and Container Grown Shrubs

1. Excavate plant holes to depth of container and twice the container diameter.
2. Carefully remove plant from container using gentle handling to avoid damage to any part of plant.
3. If roots are loose, spread roots out evenly over a mound of soil mix. If roots are tight and compact, loosen by pulling gently apart. If plant roots will not separate, use a sharp tool to make vertical slits in the root ball, approximately 1/2-inch deep at three or four locations around root mass.
4. Set plants on a bed of compacted soil mix, so that the root ball is level with the surface of the soil.
5. Backfilling: Fill plant pit with soil mix by hand, pushing the mix around and just over the surface of the root ball. Add soil mix in layers not more than four inches (4") deep, and with each layer thoroughly settled by hand tamping and with water, and free of all voids before next layer is put in place.

F. Saucering

1. After backfilling is completed, a saucer shall be made for the retention of water around each plant, unless impracticable because of placement of tree gratings or other paving material over planted area.
2. The saucer shall be of the same diameter as that of the hole dug.
3. The lip shall be level all around and shall be at least 4 inches high for trees, and 2 inches high for shrubs.

G. Watering

1. Immediately after installation of each plant, the soil around it shall be thoroughly saturated with water.
    a. Apply water slowly so as to penetrate the entire root system.
    b. Watering shall continue throughout the maintenance and guarantee period, as frequently as seasonal conditions require, until final acceptance of the work.
    c. Contractor shall be responsible for adequate water both before and after installation of irrigation system.

H. Mulching

1. After planting operations are complete all plant bed areas shall be covered with approved mulch.
    a. Unless otherwise specified in the Drawings, mulch shall be installed at an even depth of three (3) inches over tree pit and shrub areas and two (2) inches over groundcover beds.

b. Mulch shall be contained within the plant bed areas and shall not be permitted to spread onto paved areas. Mulch shall not cover plants.

I. Staking

1. Trees shall be staked only if shown on the Drawings, required in the Detailed Specifications, or directed by the Engineer.

a. Trees shall stand plumb after staking.

b. Do not use tree wrap.

J. Pruning

1. Perform compensatory pruning following planting only as shown on the Drawings, required in the Detailed Specifications, or directed by the Engineer.

a. Excessive pruning at the time of transplanting must be avoided. The extent of top pruning should be based upon the ability of the plant roots to function.

b. Pruning shall be performed by a Certified Arborist in accordance with current best practices of the International Society of Arboriculture.

c. All deadwood, suckers, and broken or badly bruised branches shall be removed.

d. Pruning shall be done with clean, sharp tools.

e. No leaders shall be cut. Each cut shall be made carefully, at the correct location, leaving a smooth surface with no jagged edges or torn bark. The correct anatomical location is just beyond the branch collar.

f. Large or heavy limbs should be removed using three (3) cuts. The first cut undercuts the limb one or two feet from the parent branch or trunk. The second cut is top cut which is made slightly further out on the limb than the undercut. The third cut is to remove the stub.

K. Antidesiccant Spraying

1. Use antidesiccant only as approved by Engineer. Approval is required for each condition of use.

3.04 PREPARATION FOR SEEDING AND SODDING

A. All areas to be seeded or sodded shall be thoroughly loosened to a depth of 6 inches and graded to true lines free from all unsightly variations, bumps, ridges

or depressions. All sticks, stones, roots or other objectionable material shall be removed.

B. Provide 12 inches of lawn soil mix, spread evenly over all areas to be seeded or sodded. Prepare topsoil to provide a crumbly seedbed, firm and level after tilling.

C. After all materials have been worked in, firm up soil by rolling to eliminate all soft spots. Rake entire area into a crumbly state, with one inch of loose soil at the surface, using a wide-toothed rake or tine-harrow.

D. For additional requirements on the use of soil amendments refer to General Specification 02920 – Soil Mixes.

3.05 SODDING & SEEDING OPERATIONS

A. Seeding Operations

1. Prepare seedbeds in undisturbed areas by lightly tilling or harrowing to a depth of two (2) inches. No fertilizer is to be applied to wildflower or native grass areas. Prior to preparation of undisturbed sites, remove existing grass, vegetation and turf. Contractor shall take particular care so as not to damage existing plant material adjacent to seeding area while preparing seed bed. Dispose of removed vegetation off-site in accordance with all local laws: do not turn over into soil being prepared for native grass and wildflower seeding.

2. Moisten prepared seeding areas before planting if soil is dry. Do not create a muddy soil condition.

3. Apply seed with drop or cyclone spreader to uniformly cover seedbed at the rate required. In general, spring and summer seeding will be at a rate of 30 lbs./acre and winter seeding at a rate of 100 lbs./acre, per NYSDEC guidelines.

4. Small wildflower seeds should be mixed with damp sand and hand sown. Do not seed when wind velocity exceeds 5 miles per hour. Distribute seed evenly over the entire area.

5. Lightly rake seed into soil, and cover entire area with salt hay or straw, to a thickness of one (1) inch.

6. For larger areas, a mechanical power drawn seeder or combination grass planter and land packer or pulverizer may be used. Seed to be planted not deeper than 1/4 inch. Seeding operations shall be kept as close as possible to the contours and not up and down the slopes.

7. Water all seeded areas immediately upon installation, taking care not to wash out the seeds, and regularly during first four (4) weeks following seeding to maintain adequate moisture for deep root growth.

8. Seeding shall not be done on frozen ground or when the temperature is 32^{o} F or lower. Do not use wet seed or seed that is moldy or otherwise damaged in transit or storage.

9. Seeded areas shall be protected during establishment.

10. Permanent seeded areas must be covered with erosion control mat and as indicated by Contract Drawings or as directed by the Engineer, immediately following seeding.

B. Hydroseeding

1. All areas to be hydroseeded shall be thoroughly loosened to a depth of 6 inches and graded to true lines free from all unsightly variations, bumps, ridges or depressions. All sticks, stones, roots, or other objectionable material shall be removed.

2. Provide six (6) inches of soil mix and spread evenly over all areas to be hydroseeded. Prepare topsoil to provide a crumbly seedbed, firm and level after tilling. For additional requirements on the use of crushed limestone in the soil mix, see General Specification 02920 – Soil Mixes.

3. Apply hydroseeding solution with a mobile tank with a centrifugal pump, using a seeding nozzle of a design to produce an even distribution of the solution

4. Clean and remove all hydroseeding solution from areas outside of the limits of hydroseeding, including removal from structures, walls, paving, trees and other plant material.

C. Watering of Sodded, Seeded and Hydroseeded Areas

1. The Contractor shall provide all labor and arrange for all watering necessary to establish acceptable stands of planting in seeded areas. .

   a. Begin watering immediately following installation.

   b. Watering shall continue throughout the contract period until Substantial Completion.

   c. During the first two (2) weeks after planting, in the absence of adequate rainfall, watering shall be performed up to three (3) times daily or as often as necessary and in sufficient quantities to maintain moist soil to a depth of at least two (2) inches.

d. After the first two weeks, the Contractor shall water the seeded areas to maintain adequate moisture in the upper two (2) inches of soil, necessary for the promotion of deep root growth.

2. Watering shall be done in a manner that will provide uniform coverage, prevent erosion due to application of excessive quantities over small areas, and prevent damage to the finished surface by the watering equipment. The Contractor shall furnish sufficient watering equipment to apply one (1) complete coverage to the lawn areas in an eight (8) hour period.

D. Reseeding

1. Any areas that fail to show growth within three (3) weeks of seeding shall be immediately reseeded at no additional cost to the City.

2. Reseeding shall be carried out as many times as necessary until a uniform grass cover is established.

3. Scattered bare spots, none of which are larger than one square foot, will be allowed up to a maximum of 3 percent of any seeded or hydroseeded area.

E. Mowing

1. Mowing of all seeded areas shall begin when lawn is firmly rooted and secure, and has reached a height of 3 inches, and shall continue until Substantial Completion.

2. Mow all grass lawn areas to maintain the grass height between 1-1/2 and 2-1/2 inches and meadow areas up to six (6) inches or as directed by the DEP Maintenance Supervisor.

3. Wildflower and native grass seeded areas shall be mown no more than two (2) times per year.

4. First mowing shall be carried out after seed set and shall not be carried out earlier than September 15 nor later than November 15. Mow to a height of not more than 9 inches.

a. Second mowing shall be carried out four (4) to six (6) weeks after first mowing, unless otherwise directed by DEP. Mow to a height of between 5 and 6 inches

3.06 PLANT PROTECTION & MAINTENANCE

A. Plant Protection

1. The Contractor shall provide at its own expense all protection that is deemed necessary for all plants and lawn areas against damage prior to Final Acceptance of the work.

2. Removal of Temporary Protection Measures: All temporary protection measures employed during the construction period shall be removed prior to Substantial Completion unless otherwise directed by the Engineer. All stakes and ties used for temporary bracing of trees shall be removed and disposed of by the Contractor off site at its own expense at the end of the guarantee period, or earlier at the direction of the Engineer.

B. Plant Maintenance

1. Maintenance of all plant material shall begin immediately after planting, and continue until the end of the guarantee period, unless otherwise noted.

2. Defective work shall be corrected as soon as possible after it becomes apparent and when weather season permits. The Engineer shall be the sole judge of the condition of the plants.

3. Maintenance shall include:

   a. Watering, replanting, reseeding, resodding, repair of ruts and erosion, repair of protection devices, weeding and continuous control of invasive species, fertilizing and mowing of lawn areas.

   b. The removal of all dead, dying or unhealthy plant material, including lawns, and replacement of such material with new plants or seeding to meet all specifications of the original plantings.

   c. Protection from insects, disease, and invasive species to maintain optimum health. Infection or infestation may require removal and disposal off-site followed by replacement with plants free of infection at the discretion of the Engineer's designated representative.

   d. The repeating of any or all phases of planting or lawn work as specified herein, or that may be required to obtain healthy plantings and a uniform, thick, and well developed stand of grass.

4. Specific Maintenance Tasks: Maintenance shall include, but not be limited to the following:

5. Watering: Water lawns and planted areas as required. Do not permit plant material to wilt or to show signs of stress from lack of water. Contractor shall supply and distribute water to all lawns and plantings during the full time of their establishment at the site and provide all equipment for water distribution at no additional cost to the City. Plants and lawns shall be inspected by the Contractor for watering needs at

least once each week, and watered as necessary to promote plant growth and vitality.

6. Mowing: As described hereinbefore.

7. Fertilizers: If applicable, apply any approved fertilizers, herbicides, pesticides or fungicides as required, or as directed by the Engineer, to keep all plantings healthy and pest-free throughout the guarantee period. Any fertilizers, herbicides or pesticides must be approved in advance by DEP.

8. Rodents: Protect against and exterminate rodents, and repair of any damage caused by rodent activities.

9. Weeding: Weed to keep all planted areas weed-free throughout the guarantee period.

10. Mulching: Add mulch material as required to maintain mulch at specified depth.

11. Resetting: Reset plant material that has settled, to proper grade and position.

12. Erosion Control Mat: The Contractor shall maintain the areas of the erosion control mat installation until final acceptance of the contract. Maintenance shall consist of providing protection for erosion control mat and repair of areas damaged by equipment, erosion, fire, or other causes, as well as re-establishment of the grade and conditions of the area as specified.

13. Pruning: Prune trees and shrubs to remove all dead or broken branches, throughout the guarantee period. Prune flowering shrubs as necessary to ensure flowering.

14. Trimming: Cut back dead stalks, flowers and foliage from perennials in fall after the first frost. Trim or dead-head spent flower blossoms throughout the guarantee period.

15. Anchoring: Maintain any approved tree stakes, ties and other tree anchoring systems, including tightening, repair or replacement as required, and removal at the end of the guarantee period, or as directed by the Engineer.

16. Irrigation: If applicable, coordinate with irrigation system installer for all adjustments to irrigation as required.

17. Instruct City’s maintenance personnel in all maintenance procedures.

18. Maintenance Program

    a. Prior to Substantial Completion, the Contractor shall arrange a meeting with the Engineer, and with the City's designated

maintenance personnel to review together the submitted maintenance program and any modifications required for the duration of the guarantee period.

b. The Contractor shall make periodic inspections, at no extra cost, during the guarantee period to determine what changes, if any, should be made in the maintenance program.

c. Any recommended changes shall be submitted in writing to the Engineer.

d. Additional remedial work not included in the maintenance program shall be carried out by the Contractor as deficiencies are identified and reported by the Engineer or designated maintenance personnel.

e. The guarantee of all replacement plants shall extend for an additional period of 24 months from the date of their acceptance after replacement.

19. Replacements

a. In accordance with the requirements for Warranty (Guarantee Period) under this Section, the Contractor shall replace, as soon as weather conditions permit, and within a specified planting period, all plants determined dead and/or dying by the Engineer or the City's designated personnel during and at the end of the guarantee period. Replacements shall be made at no additional cost to the City. Labor and all materials needed for installation of replacements shall be included in the warranty. .

b. Plants shall be free of dead or dying branches and shall bear foliage of normal density, size, and color.

c. Trees having lost their central leader or exhibit crown dieback at the end of the guarantee shall be replaced.

d. Replacements shall match adjacent specimens of the same species. Replacements shall be subject to all requirements stated in this Section.

3.07 CLEAN UP

A. At the end of each work day the Contractor shall broom-clean the site, to remove all trash, debris, and loose soil materials. Store materials and equipment where directed.

B. Immediately following the completion of planting operations, the Contractor shall remove all excess materials, stockpiles, waste materials, tools, and equipment, and leave the site in a clear and clean condition.

C. Immediately remove all rejected materials from the site. All rejected materials and other waste or debris shall become the property of the Contractor, who shall legally dispose of same off-site.

END OF SECTION

SECTION 02920G

Soil Mixes

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02920 – Soil Mixes except as modified herein.

PART 1 GENERAL

1.01 SECTION INCLUDES

Replace 1.01.A.3 with the following:

3. Preparation of soil mixes off site.

1.02 PAYMENT -

Replace 1.02.A with the following:

A. Payment for all work specified in the Section shall be made as part of the lump sum price bid for Contract Reference Item No. G-LS-1, as described in Detailed Specification 01270 – Measurement and Payment.

1.03 RELATED SPECIFICATIONS

Add the following to 1.03.

E. Detailed Specification 01270 – Measurement and Payment.

1.06 TESTING

Replace Article 1.06.E with the following:

E. The Engineer may take and analyze at any time, such additional samples of material as deemed necessary for verification of conformance to specification requirements. Contractor shall furnish samples for this purpose upon request and shall perform testing as required at no additional cost to the City. All soil to be used for planting shall be tested upon arrival on site.

1.07 SUBMITTALS

Delete the following from 1.07.A:

2.b. Topsoil – stripped from site
3.c. Aquatic/Marginal Mix
4.b. Topsoil – stripped from site
5.c. Aquatic/Marginal Mix

1.08 DELIVERY AND STORAGE

Replace 1.08.C with the following:

C. Stockpiles

1. Bulk materials shall not be stockpiled on site.
2. The quantity of bulk materials delivered to the site shall not exceed the amount of material that can be placed and spread on the day of delivery.
3. Material dumping locations shall be pre-approved by the Engineer in Charge.

PART 2 PRODUCTS

2.02 MATERIALS

Replace 2.02.B.2 with the following:

2. Topsoil shall conform to the following requirements:
    1. pH: 5.5 to 6.8, inclusive
    2. Organic content: 5 to 8%

Add the following after 2.02.B.6.:

7. Soil salinity by the electrical conductivity method shall not exceed 2.0 millimhos per centimeter at 25˚ Celsius as determined by the saturated soil test method described in the USDA circular No. 982.

Add the following after 2.02.D.1.a:

Compost shall be fully cured with a Maturity Index of 8.

Amend 2.02.D.1.b to the following:

b. Material shall be derived from organic wastes such as food and agriculture residues, composted cow or other animal manures, commercial grade composted sewage sludge or other materials that meet the specified requirements.

2.05 SOIL AMENDMENT MATERIALS

Replace 2.02.E.5. with the following:

E. Iron Sulfate plus Sulfur: Add to plant soil to lower pH level if required.
   1. Peat moss or copper sulfate may not be used to lower pH.

Replace 2.02.F. with the following:

F. Herbicides: Acceptable products:

   1. Post-emergent, non-selective herbicides, for bare ground and spot treatments: Acceptable types include Roundup Pro Concentrate, EPA 524-529, manufactured by Monsanto Company, St. Louis MO 63167, and Accord XRT, EPA 62719-517, manufactured by Dow AgroSciences LLC, Indianapolis IN 46268. Or approved equal.

   2. Post-emergent broadleaf herbicide for weed control in established lawns: Acceptable types include Garlon 4 Ultra, EPA 62719-527, manufactured by Dow AgroScience LLC, Indianapolis IN, 46268, Riverdale Vanquish, EPA 228-397, manufactured by NuFarm Americas, Inc., Burr Ridge IL 60627, or approved equal.

   3. Herbicides and Pesticides shall be in compliance with NYC Local Law 37 of 2005 and in conformance with the guidelines of NYC Department of Health for determining whether a pesticide or herbicide is prohibited by the Law.

Delete 2.02.I MARGINAL/AQUATIC MIX in its entirety.

PART 3 EXECUTION

3.02 PREPARATION OF SOIL MIXES

Add the following after 3.02.B.6.:

C. Blending of ingredients to develop soil mix types shall not be performed at the project site but rather soil mixes shall be fully prepared prior to delivery at project site.

3.03 PREPARATION OF SUB-GRADE

Replace 3.03.D with the following:

D. Spray already-germinated weeds with post-emergent herbicide at the application rate recommended by the manufacturer and in accordance with manufacturer's written procedural recommendations unless otherwise directed by the Engineer.

1. All chemical applications shall conform to New York City Local Law 37 (2005).

2. Dispose of spills and surplus products away from City property

3. Keep all records that are or may be required by Federal, State and Local laws. Submit copies of these records to the Engineer within 5 days when so requested.

4. Not less than forty-eight hours prior to a proposed spray operation, submit notification to the Engineer for his/her approval of area to be treated, the chemical trade name, the label, MSDS, and the quantity of mix being prepared.

5. All pesticide/herbicide applications shall be subject to inspections by the Engineer. The Engineer may, at any time, suspend and reschedule a pesticide/herbicide application when, in his determination, the weather conditions are unfavorable, facility operations would be hampered or the Contractor’s methods or materials fail to comply with these specifications.

6. Applicators shall be properly licensed and attired with protective clothing, gloves and other required equipment.

7. Protect all areas from spills and immediately report spills to the Engineer and as required by Federal, State and local regulations.

-END OF SECTION-

SECTION 02105G

Soil Sampling and Analysis

NOTE: The Work of this Section shall be in accordance with the requirements of General Specification 02105 – Soil Sampling and Analysis, except as modified herein.

PART 1 GENERAL

1.01 SECTION INCLUDES

Delete Paragraph 1.01.A and 1.01B, and replace with the following:

A. The Contractor shall provide all labor, materials, tools, and equipment to perform all operations necessary to determine the requirements for handling and onsite reuse of all materials to be excavated.

B. When sampling is deemed necessary, stockpiling of excavated material on-site or ex-situ sampling will be allowed only with written approval from the Engineer.

Add the following new paragraph after Paragraph 1.01B, and renumber existing Paragraph 1.01C accordingly:

C. Soils from miscellaneous excavations shall be reused in the same excavation or elsewhere onsite without sampling. Sampling of excess soils is anticipated if unanticipated conditions (e.g., hot spots) are encountered; or excess soils are generated that cannot be reused onsite.

1.02 PAYMENT

Delete Paragraph 1.02A, and replace with the following:

A. There shall be no separate payment for the Work of this Section, all costs shall be included in the Lump Sum price bid for this Contract as specified in Section 01270 – Measurement and Payment.

B. Payment for additional sampling required by unanticipated conditions will be made from the allowance, as described in Section 01355 – Hazardous Materials Control.

1.06 SAMPLING REQUIREMENTS

Delete Paragraphs 1.06A.1 & 2, and replace with the following:

A. Fill material:

1. If it is determined by the Contractor's EP that unanticipated conditions are encountered; sampling of excess soils shall be performed.

2. When sampling is necessary, excess soils shall be sampled for RCRA characteristics, including ignitability, corrosivity, reactivity, and Toxicity Characteristics Leaching Procedure (TCLP) for metals, SVOCs, VOCs, and pesticides and herbicides, asbestos (NYS only), and volume of physical contaminants (if present) (NYS only), in addition to any other parameters required by the reuse/disposal facility. Frequency of sampling shall be as required by the reuse/disposal facility.

Delete Paragraphs 1.06A.3 & 4 and replace with the following, renumber Paragraph 1.06A.5 accordingly, and delete Paragraphs 1.06A.6 & 7 in their entirety:

3. When reusing in New York State, fill material samples, at a minimum, shall be analyzed for metals, PCBs/pesticides, SVOCs, VOCs listed in 6 NYCRR Part 375, Subdivision 375-6.8(b), asbestos, and volume of physical contaminants (if present) based on visual observation. Sampling is performed within the planned excavation boundaries at frequencies as defined in 6 NYCRR Part 360, Section 360.13(e)(1), Table 1: Minimum Analysis Frequency for Fill Material.

1.07 SUBMITTALS

Delete Paragraph 1.07A.2.b and replace with the following:

b. For in-situ soil sampling, each composite sample will be comprised of multiple (3-5) discrete samples that are representative of the horizontal and vertical extent of the excavation footprint. For ex-situ soil sampling, each composite sample will be comprised of multiple representative discrete samples throughout the soil stockpile. Surface soil shall not be used as sampling material. Multiple samples shall be classified based on biased worst case to be considered fully representative of the soils being sampled for reuse in New York State (NYS).

1) VOC analysis will require two (2) discrete (biased worst case) VOC samples to be collected for every one (1) composite sample.

2) When soils are visibly heterogenous, composite and discrete (for VOCs), samples will be obtained to represent each visually different stratum or section of the excavation site, regardless of the overall excavation volume.

1.11 PROJECT CONDITIONS

Delete Paragraph 1.11A. and replace with the following:

A. Stockpiling: No stockpiling of excavated material on-site or ex-situ sampling will be allowed without written approval from the Engineer. Soils stockpiled for onsite reuse do not require sampling.

PART 3 EXECUTION

3.01 EXAMINATION/PREPARATION

Delete Paragraph 3.01A. and replace with the following:

A. Testing shall be in accordance with the sampling requirements of Article 1.06.A.

1. Parameters analyzed for excess soils to be reused or disposed off-site shall be the RCRA characteristics, including ignitability, corrosivity, reactivity, and Toxicity Characteristic Leaching Procedure (TCLP) for metals, SVOCs, VOCs, and pesticides and herbicides, asbestos (NYS only), and volume of physical contaminants (if present) (NYS only), in addition to any other parameters required by the beneficial use facility or TSDF.

2. If any soil sample results are greater than 5 ppm lead by TCLP the Contractor shall immediately notify the Engineer. (See Section 01355 – Hazardous Materials Control for implementation of a Community Air Monitoring Program (CAMP) in the event that hazardous levels of lead are detected in soil.)

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02116
Above Ground Storage Tank Removal and Disposal

Note: Detailed Specification 02116 has been prepared specifically for the work of this Contract. There is no corresponding General Specification 02116.

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Contractor shall remove and dispose of an existing 200-gallon concrete chemical waste-containing Above Ground Storage Tank (AST), located in the basement crawlspace, which is considered to be a non-permit required confined space, and all associated piping and appurtenances, as identified in Table 26 attached to Section 01355 - Hazardous Materials Control, and shown in the Hazardous Materials Survey Report for the Kensico Laboratory, Rev. 1, May 2018, prepared by Bidwell Environmental, LLC., in accordance with all applicable Federal, State, and local regulations and codes. The Contractor shall provide a Closure Report that includes a map of the exact location of the AST and associated piping prior to removal.

B. The tank is assumed to contain mercury and corrosive hazardous waste. The Contractor shall sample and inventory the AST prior to removal to determine the exact contents (type and volume of liquid/solid residuals) of the tank. The Contractor shall supply an inventory of tank contents to the Engineer.

C. The Contractor shall provide all labor, materials, equipment, and incidentals required to purge, decontaminate, remove, and dispose of the AST, associated piping and appurtenances without the release of any product or derivatives.

D. The Contractor shall fully comply with all City, State, and Federal codes and regulations governing removal and disposal of the AST and its contents.

1.02 REFERENCES

A. Water Environment Federation Manual of Practice No. 1, Safety in Wastewater Works.

B. National Fire Protection Association (NFPA) Bulletin No. 30, "A Guide to Flammable Liquids."

C. NFPA No. 326, Standard for the Safeguarding of Tanks and Containers for

Entry, Cleaning, or Repair.

D. American Welding Society F4.1, Safe Practices for the Preparation of Containers and Piping for Welding, Cutting, and Allied Processes, dated January 1, 2017.

E. The Occupational Safety and Health Act of 1970, OSHA and the Code of Federal Regulations (CFR) Title 29, Parts 1910 and 1926, OSHA.

F. 6NYCRR Part 371, Section 371.3, Toxicity Characteristic Leachate Procedure (TCLP) for VOCs, semi-VOCS, metals, pesticides, herbicides and CFR Section 261, Identification and Listing of Hazardous Wastes.

G. American Petroleum Institute (API) Standard 2015, Requirements for Safe Entry and Cleaning of Petroleum Storage Tanks

H. API Standard 2217A Guidelines for Safe Work in Inert Confined Spaces in the Petroleum and Petrochemical Industries

I. API Recommended Practice (RP) 1604, Closure of Underground Petroleum Storage Tanks

J. NYS DEC Regulations:

1. 6 NYCRR Part 597 - Hazardous Substance Identification, Release Prohibition and Release Reporting

2. 6 NYCRR Part 598 – Handling and Storage of Hazardous Substances

K. NYSDEC Spill Guidance Manual, Spill Reporting and Initial Notification

L. New York City Fire Department (FDNY) - Fire Code (FC) Chapter 34, Flammable and Combustible Liquids

M. New York City Department of Environmental Protection (NYCDEP):

1. Environmental Health and Safety Policies and Procedures – Vol. IV Chemical Bulk Storage Tank and Container Management

2. Environmental Health and Safety Policies and Procedures – Vol. IV. Petroleum Bulk Storage Tank and Container Management

3. Environmental Health and Safety Policies and Procedures - Vol. IV Spill Prevention, Environmental Release Reporting and Investigation

1.03 PAYMENT

A. There shall be no separate payment for the work of this Specification and all costs shall be included in the Lump Sum price bid for Contract Item G-LS-1, as specified in Section 01270 - Measurement and Payment.

B. For bidding purposes, the Contractor shall assume that the AST has not been emptied; therefore, the AST will need to be emptied, the hazardous waste contents properly disposed of, and will require cleaning to remove any remaining residuals.

1.04 SUBMITTALS

A. The Contractor shall provide all submittals, including the following, as specified in Detailed Specification 01330 – Submittal Procedures.

1. AST Removal and Disposal Plan: The Contractor shall submit to the Engineer for approval at least 30 calendar days prior to beginning removal work a removal and disposal plan for the AST, their contents, wastes, piping materials, and cleaning solutions. The Contractor shall disconnect, remove, and cap designated lines within demolition areas.

a. Provide evidence that the subcontractor for tank removal is licensed by the applicable local government authority.

b. Describe means and methods for tank content removal, tank and pipe cleaning, waste handling, tank closure and disposal of all generated wastes at appropriately permitted facilities. Permits of all disposal facilities shall be provided in the Plan.

c. Where temporary waste storage is anticipated, provide details of storage area construction with secondary containment, demarcations, and posting of inventory and weekly inspection reports.

d. Describe labeling requirements for waste containers and storage areas.

e. Provide a task-specific health and safety protocol for all tank closure activities.

f. Identify and estimate volumes for each anticipated waste stream, including but not limited to tank contents, cleaning solutions, and personal protective equipment.

g. Provide a waste analysis plan detailing waste characterization methods for each anticipated waste stream. At a minimum, it is expected that representative samples of each waste stream shall be collected by a qualified Environmental Professional and analyzed for total PCBs and full RCRA characterization (reactivity, ignitability, corrosivity and full toxicity [TCLP]), and any additional parameters required by the disposal facilities. Waste analysis shall be performed by a NYSDOH ELAP-certified laboratory, as documented by current ELAP certificates included in the Plan.

h. Provide waste characterization documents/waste profiles for each waste stream.

i. Identify waste transporters for each anticipated waste stream, and provide current NYSDEC Part 364 Waste Transporter Permit(s) required to transport the wastes to the recycling facility or TSD (Treatment, Storage & Disposal) facility. The Plan shall include the name, address, 24-hr phone number and qualifications for each vendor or facility that will be transporting, storing, testing or disposing of the wastes.

j. Provisions for advance copies of waste profiles, waste manifests, Land Disposal Restrictions (LDR) Notification and Certification Form (if hazardous waste) for the Engineer's review and approval and DEP signature as generator. Advance copies shall be provided no less than 2 weeks prior to removal of the waste.

2. Manifest Requirements: Manifests shall include measurements of the volume of all waste materials from the site prior to transporting to an approved recycling or disposal facility. The Contractor shall also prepare all vehicles and manifests necessary for transporting all material. Nonhazardous waste shall be manifested in a fashion similar to that for hazardous waste. The Contractor shall comply with all Federal, State and local regulations regarding the transport of hazardous and nonhazardous waste.

a. Applicable Regulations: All project work that concerns the transport of non-hazardous waste shall comply with the appropriate EPA and DEC regulations and DOT hazardous material transportation regulations.

b. EPA Hazardous Waste Manifest: If waste stream analysis identifies any hazardous wastes, the Contractor shall obtain an appropriate number of hazardous waste manifest forms (EPA Form 8700-22 (Rev. 12-17) or latest version), sequentially numbered for this project based on the quantity of hazardous waste to be removed from site. The name of the generator, transporter and disposal facility, and their appropriate EPA identification number, shall be typed on each form. All other pertinent information shall be included on the manifest. A copy of the partially completed manifest including the above information shall be submitted for approval at least 2 weeks prior to removal of the waste.

c. Non-hazardous Waste Manifest: Material classified as non-hazardous shall be transported and measured in a similar manner to that specified for hazardous material. Manifests shall be provided for each truckload of material removed from the site. The form of the manifest shall be approved by the Engineer. Nonhazardous waste shall be transported in accordance with all applicable Local, State and Federal DOT regulations by properly licensed and permitted waste haulers.

d. Routing: The Contractor shall provide a map and written description of the route which will be taken to the approved recycling or TSD facilities by the waste transporter(s).

e. The Contractor shall submit written evidence that selected recycling or TSD facilities have accepted or will accept the wastes generated by tank removal activities. The Contractor shall also submit copies of the completed manifest, signed and dated by the initial transporter, in accordance with Federal and State requirements and with associated documentation (e.g., Waste Profile and Hazardous Waste Land Disposal Restrictions (LDR) Notification and Certification Form). Copies of completed and signed waste manifests from recycling or TSD facilities shall be provided to the Engineer within seven (7) days of waste shipment offsite.

3. Site Information: The Contractor shall confirm the following information and submit required documents before AST removal:

a. Review record construction drawings, if available;

b. Locate the AST, product piping, and associated vent lines to be removed;

c. Provide Map of AST location;

d. Locate and map piping and ancillary equipment to be removed or capped. Identify lines and indicate capping locations on Project Record Documents.

4. Spill and Discharge Control Plan: The Contractor shall develop, implement and maintain a comprehensive spill and discharge control plan. The plan shall provide contingency measures for potential spills and discharges from handling and transportation of contaminated residuals and water. The Contractor shall submit the plan, for approval by the Engineer, no later than 30 calendar days prior to the start of tank removal.

5. The Contractor shall notify the Engineer 45 days in advance of the AST removal date to facilitate submittal of the NYSDEC Pre-Work Notification for Bulk Storage (CBS) Tank Installation or Closure Form.

6. Tank Closure Reports: The Contractor shall submit to the Engineer a closure report for the tanks and associated piping removed from the site, which includes the following information:

a. Map showing the exact tank location and layout of associated piping;

b. Description of work performed, including starting and end dates of reporting period;

c. Tank, tank contents, and tank cleaning waste disposal locations;

d. Affidavit of Compliance. When applicable, the Contractor shall file with FDNY an affidavit certifying that a permanently out-of-service storage system was removed and disposed, in compliance with the requirements of FDNY Fire Code (FC) Chapter 34 - Flammable and Combustible Liquids. Such Affidavit shall be executed by a person with the requisite qualifications to supervise the closure of such tanks.

e. All final Closure documentation, including all reports, records, permits, notifications, tank inventory and inspection reports, tank disposal and waste disposal records, and all waste sampling records, including analytical test results.

1.05 QUALITY ASSURANCE

A. Permits and Regulations: The Contractor shall obtain all necessary building

permits, inspection permits, licenses, and all other permits required for above ground storage tank removal.

B. The Contractor shall handle all material in compliance with applicable requirements of NYSDEC, NYC Fire Department, and OSHA and other governing authorities having jurisdiction.

1. Codes and Standards: Federal, State and City laws and code requirements shall govern the hauling and disposal of all materials off site.

1.06 STORAGE, HANDLING AND REMOVAL

A. The AST, piping, and related items removed offsite by the Contractor shall be disposed in accordance with federal, state, and local regulations.

B. Salvageable Items: The Contractor shall carefully remove items to be salvaged, if any, and store them on site in an approved location. Items shall remain the property of the City.

C. Reused Materials: The Contractor shall remove and store materials to be reused or retained in a manner which prevents damage to the material.

D. Marking Closed Tanks: Prior to permanent disposal, the Contractor shall clearly mark the tanks by painting the outside with the following wording:

TANK HAS CONTAINED (Applicable Name)
NOT SUITABLE FOR FOOD OR DRINKING WATER

E. Removal and Disposal of Tank Contents: Tank contents, cleaning solutions, rinse water, and contaminated clothing and equipment shall require a waste analysis in accordance with the Removal and Disposal Plan and shall be disposed of at appropriately permitted facilities. The tanks and all the other contents shall be removed from the site for disposal in accordance with the requirements of the federal, state and local codes and regulations.

1.07 PROJECT CONDITIONS

A. Health and Safety: When working within hazardous areas, the Contractor shall take suitable precautions to ensure safe working conditions. Before entering any hazardous area, the Contractor shall ensure that a safe working atmosphere exists. The basement crawlspace is considered to be a non-permit required confined space. The Contractor shall adhere to all other health and safety requirements in accordance with the Environmental Health and Safety Plan (EHASP).

1.08 SPECIAL REQUIREMENTS

A. Protection of Surrounding Areas: The Contractor shall protect surrounding areas from exposure to material removed during tank closure/removal.

B. Workmanship: AST removal shall be performed by a licensed Contractor employing competent and experienced workers with due regard for safety of other workers, inspectors and the public. The Contractor shall have all appropriate licenses to carry out this work. Based on advance regulatory notification requirements, the Contractor shall notify the Engineer at least 45 days prior to the start of tank removal. Removal shall be performed with as little nuisance as possible.

C. Existing Structures: The Contractor shall protect existing appurtenances and structures and all other areas which are not to be demolished, shall cease operations and notify the Engineer immediately if adjacent structures appear to be endangered, and shall not resume operations until corrective measures have been taken and approval to resume has been received from the Engineer.

D. Air Monitoring: The Contractor shall conduct continuous air monitoring to confirm that unprotected persons (e.g., without the benefit of Personal Protective Equipment) outside the work area are not adversely impacted, and shall be prepared to implement engineering controls to reduce air emissions (e.g., ventilation). At a minimum, the Contractor shall monitor for VOCs and Lower Explosive Limit (LEL) within and at the perimeter of the work area in accordance with the Environmental Health and Safety Plan. However, the Contractor's Safety Professional shall be responsible for identifying other air monitoring appropriate to protect workers based on their knowledge, following sampling, of the tank contents.

E. The Contractor shall schedule permanent closure of the AST in accordance with 6 NYCRR Part 598.10 (c) and 6 NYCRR Part 613-4.5, as applicable.

F. The Contractor shall furnish all the necessary labor, materials, and equipment for:

1. Permanent closure, per 6 NYCRR Part 598.10(c) and 6 NYCRR Part 613-4.5, as applicable, and removal of above ground chemical storage tank and all associated above ground piping systems, fill stations and vent systems.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PREPARATION

A. Tank Purging: The Contractor shall pump out all remaining liquid in the tank. Following removal of the liquids, the tank shall be purged and tested to assure that no explosive gases are present. Any liquid present in piping shall be properly drained and piping purged prior to removal. The tank atmosphere shall be tested to determine if the tank is safe. The tank interior shall be tested for percent oxygen per volume and for percent of lower explosive limit (%LEL). The tank atmosphere shall be greater than 19% oxygen and less than 25% LEL before the tank is considered safe. If the tank is not safe, then inerting and purging must be continued until the tank passes all testing.

B. Pipe Cleaning: After the tank is emptied, the tank and all connecting piping to the tank shall be cleaned and triple rinsed in accordance with all applicable local and state regulations, whichever is more stringent. The Contractor shall dispose of all removed liquids in a method conforming to all applicable Federal, State, and local regulations.

C. Disconnecting Piping: The Contractor shall disconnect piping from all tank openings, and cap or plug all tank openings. All piping indicated on the Contract Drawings shall be removed and disposed of as specified.

D. Excess Liquid: Residual liquid remaining in the tank shall be absorbed by sawdust or fine sand introduced into the tank or other approved method. The Contractor shall dispose of absorbing material in accordance with all applicable State and local regulations. The tank shall not be moved if liquid is still present in the tank. Preventive measures shall be taken to avoid liquid leaking from the tank or associated piping.

E. Initial Tank Cleaning: Initial tank cleaning, prior to tank removal, shall be conducted as follows:

1. Introduce water into the high end of the tank. Pump water, along with any remaining product or sediment, out of the lower end of the tank.

2. During the initial cleaning operations, the following items shall be observed:

   a. The pumps or vacuum lift used in the operation shall be properly grounded and bonded.

   b. Vapors from the vacuum vent system shall be emitted a minimum height of 12 feet above grade and 3 feet above any adjacent structure in accordance with API standards.

   c. Explosive vapors may develop during cleaning procedures. The area in and around the tank site shall be monitored

continuously with direct reading on-line meters for flammable or combustible vapor and total volatile vapor concentrations until the tank is removed from the site.

3. If the vapor concentration exceeds 25% LEL, all work shall be stopped until vapors disperse.

4. Response to any vapor concentration (VOCs and %LEL) condition shall be in accordance with the Contractor's Environmental Health and Safety Plan.

5. All smoking and other ignition sources are prohibited from the tank area at all times.

6. Maintain operable fire extinguishers on site at all times in accordance with the Environmental Health and Safety Plan.

F. Secondary Cleaning: Secondary cleaning procedure involves actual entry into the tank for manual cleaning.

1. Create a large opening into the tank.

2. During secondary cleaning operations, the following items shall be observed:

a. All confined space entry safety precautions and requirements shall be met. Confined space entry shall be in accordance with the provisions of the Environmental Health and Plan.

b. Enter tank only when AST is deemed safe based on monitoring information.

c. Remove all remaining sludge, tar, scaling, etc., using a squeegee. All remaining residue shall be pumped from the bottom of the tank, or absorbed with suitable absorbent material.

d. All residual material shall be recovered, characterized, drummed, labeled and disposed of in accordance with the Removal and Disposal Plan.

e. Inspect the interior wall of the tank for holes or breaks.

G. Gas Freeing: The AST and piping shall be rendered vapor free before removal is initiated. The tanks and piping must be certified gas and vapor free prior to requesting Hot Work Permits. The AST shall be inerted below the specified State and local approved acceptable LEL in accordance with all

applicable Federal, State and local codes and regulations and API recommended procedures. The Contractor shall dispose of any water used in the gas-freeing operation in accordance with applicable regulations and the Removal and Disposal Plan. The AST and piping shall be adequately grounded so that buildup of any static charge is prevented. The Contractor shall remove the tank from the property immediately upon completion of the gas-freeing operation.

H. Gas-free the tank using one of the procedures described in API RP 1604, Closure of Underground Petroleum Storage Tanks.

3.02 REMOVAL

A. Tank Removal: All accessible holes shall be plugged or capped. The tank shall be rendered unusable for further use in accordance with API RP 1604. Immediately remove demolished material from site. In no case shall a removed tank remain on-site for a period of time exceeding 24 hours. Demolition of the AST shall be in compliance with 6 NYCRR 613 and API Standard 2015, Requirements for Safe Entry and Cleaning of Petroleum Storage Tanks, as applicable.

B. Encountered Contamination: Contractor shall notify the Engineer, verbally, within one hour of any contamination encountered, and shall provide a follow-up notification to the Engineer, in writing, within one (1) day. Any spills or drips shall be contained to the maximum extent possible to minimize the spread of encountered contamination. Failure to notify the Engineer will subject the Contractor to additional liability if the encountered contamination spreads in any way.

3.03 DEREGISTRATION

NOT USED.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02222G
Demolition and Removals

NOTE: The Work of this Section shall be in accordance with the requirements of General Specification 02222 – Demolition and Removals, except as modified herein.

PART 1 GENERAL

1.01 SECTION INCLUDES

Delete Paragraph 1.01.C, and replace with the following:

C. The Contractor shall provide for the removal and proper recycling or disposal of universal and other miscellaneous regulated wastes as identified in the Hazardous Materials Survey Report for the Kensico Laboratory, Rev. 1, May 2018, prepared by Bidwell Environmental, LLC. Removals shall be in accordance with Section 01355 – Hazardous Materials Control, Section 01733A – Construction Waste Management, Section 13281 – Asbestos Management, Section 13282 – Mercury Management, Section 13283 – Lead Management, and Section 13284 – PCB Management, as applicable.

1.02 PAYMENT

Delete Paragraph 1.02A, and replace with the following:

E. There shall be no separate payment for the Work of this Section, all costs shall be included in the Lump Sum price bid for this Contract as specified in Section 01270 – Measurement and Payment.

1.03 RELATED SECTIONS

Add the following references to Paragraph 1.03:

D. Section 01355 – Hazardous Materials Control

E. Section 13281 – Asbestos Management

F. Section 13282 – Mercury Management

G. Section 13283 – Lead Management

H. Section 13284 – PCB Management

1.04 REFERENCES

Add the following references to Paragraph 1.04:

E. Hazardous Materials Survey Report for the Kensico Laboratory, Rev. 1, May 2018, prepared by Bidwell Environmental, LLC.

1.06 JOB CONDITIONS

Delete Paragraph 1.06A.6.

PART 3 EXECUTION

3.02 STRUCTURAL REMOVALS

Add the following new paragraph after Paragraph 3.02D:

E. When conducting demolition activities on masonry materials (i.e., brick and concrete), the Contractor shall perform work area and personal exposure monitoring in accordance with applicable regulations and standard industrial hygiene methods, until sufficient data is generated to demonstrate compliance with permissible exposure limits for crystalline silica, as calculated according to 29 CFR 1926.55 and 1926.57. Compliance with permissible exposure levels must be demonstrated with a minimum of three (3) consecutive readings taken seven (7) days apart, for each new work task or change in equipment, process, or control measure.

END OF SECTION

SECTION 02230G
Site Clearing

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02230 – Site Clearing except as modified herein.

1.01 PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. There shall be no separate payment for the Work of this Section, all costs shall be included in the Lump Sum price bid for this Contract as specified in Detailed Specification 01270 – Measurement and Payment except for as detailed below.

3.02 REMOVAL OF TREES AND SHRUBS

A. Tree Removal within Property Limits:

4. Payment for removal of trees greater than 6 inches shall be paid under the following individual unit price items:

a. 02230-0612 for calipers Over 6” to 12”

b. 02230-1218 for calipers Over 12” to 18”

c. 02230-1824 for calipers Over 18” to 24”

d. 02230-0024 for calipers Over 24”

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02240G
Dewatering

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02240 – Dewatering and Analysis except as modified herein.

1.01 PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. There shall be no separate payment for the Work of this Section, all costs shall be included in the Lump Sum price bid for this Contract as specified in Detailed Specification 01270 – Measurement and Payment.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02316G
Excavation

NOTE: The Work of this Section shall be in accordance with the requirements of General Specification 02316 – Excavation, except as modified herein.

PART 1 GENERAL

1.01 SECTION INCLUDES

Add the following new paragraph after Paragraph 1.01B, and renumber existing Paragraph 1.01C accordingly:

C. The Contractor's Environmental Professional (EP) shall oversee the excavation of fill material to ensure that hot spots of suspect soils are segregated and stockpiled for additional testing, as necessary.

1.05 DEFINITIONS

Delete Paragraph 1.05.G, and replace with the following:

G. Unsuitable Materials: Any material containing vegetable or organic matter such as muck, peat, organic silt, topsoil or sod, which is not satisfactory for the use as fill material.

1.08 REGULATORY REQUIREMENTS

Delete Paragraph 1.08C and replace with the following:

A. In the period of 2 to 10 days prior to starting excavation, notify all utilities of intended work locations and have utility locations marked. Upstate locations are served by Dig Safely NY (800 962-7962 or 811).

PART 3 EXECUTION

3.05 SEGREGATION, STORAGE AND DISPOSAL OF MATERIALS

Insert Paragraph 3.05A.2:

2. Soil sample results greater than 5 ppm lead by TCLP shall be reported to the Engineer immediately. (See Section 01355 – Hazardous Materials Control

for implementation of a Community Air Monitoring Program (CAMP) in the event that hazardous levels of lead are detected in soil.)

END OF SECTION

SECTION 02317G
Backfilling

NOTE: The Work of this Section shall be in accordance with the requirements of General Specification 02317 – Backfilling, except as modified herein.

PART 1 GENERAL

1.01 SECTION INCLUDES

Add the following new paragraph after Paragraph 1.01A, and renumber existing Paragraph 1.01B accordingly:

B. Backfilling – The Contractor shall maximize reuse of soil on-site for backfilling rather than import soil from other sources. Fill from an off-site source shall be uncontaminated (General Fill) and shall meet the requirements of this Section.

1.01 PAYMENT

Replace 1.02A. with the following:

A. There shall be no separate payment for the Work of this Section, all costs shall be included in the Lump Sum price bid for this Contract as specified in Detailed Specification 01270 – Measurement and Payment.

1.05 DEFINITIONS

Delete Paragraph 1.05.E, and replace with the following:

E. Unsuitable Materials: Any material containing vegetable or organic matter such as muck, peat, organic silt, topsoil or sod, which is not satisfactory for the use as fill material.

PART 2 PRODUCTS

2.01 BACKFILL MATERIAL - GENERAL

Delete Paragraph 2.01A.1. and replace with the following:

1. Backfill shall be composed of suitable materials as defined in this Section.

   a. On-site Materials: Material to be excavated and proposed for reuse as fill under Pre-Determined Beneficial Use must meet the

requirements of 6 NYCRR Part 360, Section 360.13 (a), Applicability, Section 360.13 (b), Waste Cessation, or Section 360.13 (c), Exemption for On-site Reuse of Fill Material. The Contractor shall maximize reuse of soil on-site for backfilling rather than import soil from other sources.

END OF SECTION

SECTION 02371G
Dust, Soil Erosion and Sedimentation Control

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02371 – Dust, Soil Erosion and Sedimentation Control as modified herein.

PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. There shall be no separate payment for the Work of this Section, all costs shall be included in the Lump Sum price bid for this Contract as specified in Detailed Specification 01270 – Measurement and Payment.

1.08 ENVIRONMENTAL REQUIREMENTS

Replace 1.08A. with the following:

A. Soil Stabilization: The stabilization practices to be implemented shall include one or a combination of the following: temporary seeding, mulching, geotextiles, sod stabilization, vegetative buffer strips, erosion control mats, protection of trees and shrubs, preservation of mature vegetation. Protection of trees shall be in accordance with General Specification 02230 – Site Clearing. Stabilization practices shall be implemented as approved by the Engineer. The Contractor shall record the dates when the major grading activities occur (i.e. clearing and grubbing, excavation, embankment and grading); when construction activities temporarily or permanently cease on a portion of the site; and when stabilization practices are initiated. Except as provided in paragraphs 1.08A.1 and 1.08A.2 below, stabilization practices shall be initiated as soon as practicable, but no more than seven (7) days after construction activities have temporarily or permanently ceased.

1. Unsuitable Conditions: Where the initiation of stabilization measures by the seventh day after construction activity temporarily or permanently ceases is precluded by unsuitable conditions caused by the weather. Stabilization practices shall be initiated as soon as practicable after conditions become suitable.

2. Temporary Inactivity Less than 7 Days: Where construction activity will resume on a portion of the site within 7 days after it temporarily ceases, no stabilization practices will be required.

PART 3

3.04 CLEANING

Add 3.04B as follows:

B. Concrete truck washes/decontamination stations shall be required to be installed to minimize the migration of sediment off-site as specified herein:

WORK: Under this item, the Contractor shall reduce or prevent the discharge of pollutants to stormwater from concrete waste by conducting washout offsite, or performing onsite washout in a designated area to prevent pollutants from entering the soil, storm drains, surface waters or groundwater.

INTENT: Concrete washout area best management practices shall be implemented on construction projects where concrete is used as a construction material. It is not possible to dispose of all concrete wastewater and washout offsite (ready mix plant, etc.); and concrete trucks, pumpers, or other concrete coated equipment are washed onsite.

EDUCATION:

1. Discuss the concrete management techniques described in this Specification with the ready-mix concrete supplier before any deliveries are made.
2. Educate employees and subcontractors on the concrete waste management techniques.
3. Arrange for contractor's superintendent or New York State stormwater pollution prevention certified Qualified Inspector to oversee and enforce concrete waste management procedures.
4. A sign shall be installed adjacent to each temporary concrete washout facility to clearly identify the designated concrete washout area so as to inform concrete equipment operators/concrete suppliers to utilize the proper facilities.

CONTRACTS: Concrete waste management requirements as specified herein shall be incorporated into concrete supplier and subcontractor agreements.

MATERIALS: Unless otherwise specified, the materials shall meet the requirements of Section B, "Materials and Methods of Construction".

Minimum 20-mil thick high density polyethylene (HDPE) liner for self-installed concrete washout areas.

INSTALLATION: The following steps shall be taken to reduce stormwater pollution from concrete wastes:

1. Perform washout of concrete trucks offsite or in designated concrete washout areas only.
2. Provide and use potable water for concrete washout.
3. Do not wash out concrete trucks onto the ground, or into storm drains, open ditches, streets, or streams.
4. Do not allow excess concrete to be dumped onsite, except in designated concrete washout areas.
5. Concrete washout areas may be portable prefabricated water-tight concrete washout containers, or self-installed structures (above-grade or below-grade).
6. Prefabricated containers are typically most resistant to damage and protect against spills and leaks if properly constructed and maintained. Companies may offer delivery service and provide regular maintenance and disposal of solid and liquid waste from such containers.
7. If self-installed concrete washout areas are used, below-grade structures are preferred over above-grade structures because they are less prone to spills and leaks.
8. Self-installed above-grade watertight structures should only be used if excavation is not practical.
9. Washout areas shall be watertight and constructed and operated such that no waste is released from the designated washout area.

    i. Location and Placement

10. Washout area(s) shall be located a minimum of 50 feet from sensitive areas such as storm drain inlets, open ditches and drainage facilities, watercourses and water bodies, including wetlands.
11. Convenient access for concrete trucks shall be provided, preferably near the site exit.
12. The number of facilities to be installed shall correspond with the expected demand for storage capacity.
13. On large sites with extensive concrete work, washouts shall be placed in multiple locations for ease of use by concrete truck drivers.

    i. Onsite Temporary Concrete Washout Facility, Transit Truck Washout Procedures

14. Concrete washout facilities shall be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.
    a. Approximately 7 gallons of wash water are used to wash one truck chute.
    b. Approximately 50 gallons are used to wash out the hopper of a concrete pump truck.
15. Washout of concrete trucks shall be performed in designated areas only.

16. Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed of offsite.
17. Once concrete wastes are washed into the designated area and allowed to harden, the concrete shall be broken up, removed, and disposed of per applicable solid waste regulations. Disposal of hardened concrete shall be performed on a regular basis.

i. Temporary Above-Grade Concrete Washout Facility

18. Temporary concrete washout facility (type above grade) shall be constructed as shown on the Details, with a recommended minimum length and minimum width of 10 ft., but with sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations.
19. Straw bales and staking materials shall conform to the Standard Details.
20. Plastic lining material shall be a minimum of 20-mil HDPE liner and be free of holes, tears, or other defects that compromise the impermeability of the material.
21. The HDPE liner shall be of sufficient width to have no seams when installed.

i. Temporary Below-Grade Concrete Washout Facility

22. Temporary concrete washout facilities (type below grade) shall be constructed as shown on the Erosion Control Details drawing, with a recommended minimum length and minimum width of 12 feet. The quantity and volume shall be sufficient to contain all liquid and concrete waste generated by washout operations.
23. Plastic lining material shall be a minimum of 20-mil HDPE liner and be free of holes, tears, or other defects that compromise the impermeability of the material.
24. The installed HDPE liner shall be of sufficient width to have no seams when installed.
25. Soil base shall be prepared to be free of rocks or other debris that may cause tears or holes in the plastic lining material.
26. Detail is provided on the Erosion Control Details drawing.

i. INSPECTION AND MAINTENANCE

27. Inspect and verify that concrete washout area(s) are in place prior to the commencement of concrete work.
28. During periods of concrete work, inspect daily to verify continued performance.
    a. Check overall condition and performance.
    b. Verify washout area is visibly retaining wash water such that it is watertight.
    c. Check remaining capacity (% full).
    d. If using self-installed washout facilities, verify plastic liners are intact, watertight, and sidewalls and bottom are not damaged.
    e. If using prefabricated containers, check for good physical condition and no leaks.
29. Washout facilities shall be maintained to provide adequate holding capacity with a minimum freeboard of 12 inches.

30. Washout facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.
31. If the washout is nearing capacity, vacuum and dispose of the waste material off-site in an approved manner.
    a. Do not discharge liquid or slurry to waterways, storm drains or directly onto ground.
    b. Do not discharge liquid or slurry into separate sanitary or combined sewer without local approval and any required pretreatment.
    c. Remove and dispose of hardened concrete and return the structure to a functional condition. Concrete shall be hauled away for off-site disposal or recycling.
32. Place a secure, non-collapsing, non-water collecting cover over the concrete washout area prior to predicted wet weather to prevent accumulation and overflow of precipitation.
33. When removing materials from the self-installed concrete washout, build a new structure; or, if the previous structure is still intact, inspect for signs of weakening or damage, and make any necessary repairs. Any liner damage shall be sufficient repaired in accordance with manufacturer's instructions or fully replaced such that the area remains watertight as determined necessary and complete by the Resident Engineer.

REMOVAL: When temporary concrete washout facilities are no longer required for the work, the hardened concrete, slurries and liquids shall be removed and properly disposed of off site. Materials used to construct temporary concrete washout facilities shall be removed from the work site and disposed of or recycled. Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities shall be backfilled, compacted, repaired, and stabilized to prevent erosion.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02372G
Embankment and Channel Protection

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02372 – Embankment and Channel Protection except as modified herein.

1.01 PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. There shall be no separate payment for the Work of this Section, all costs shall be included in the Lump Sum price bid for this Contract as specified in Detailed Specification 01270 – Measurement and Payment.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02374
STORM WATER TREAMENT DEVICE – CDS UNIT

NOTE: Detailed Specification 02374 has been prepared specifically for the Work of this Contract. There is no corresponding General Specification 02374.

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The furnishing and installation of the stormwater quality in-line treatment devise; selected CDS® by Contech Engineered Solutions LLC, or approved equal, complete and operable as shown and as specified herein, in accordance with the requirements of the plans and contract documents.

B. The Contractor shall furnish all labor, equipment and materials necessary to install the storm water treatment device(s) (SWTD) and appurtenances specified in the Drawings and these specifications.

C. The manufacturer of the SWTD shall be one that is regularly engaged in the engineering design and production of systems deployed for the treatment of storm water runoff for at least five (5) years and which have a history of successful production, acceptable to the Engineer. In accordance with the Drawings, the SWTD(s) shall be a CDS® device manufactured by:

D. Contech Engineered Solutions LLC
9025 Centre Pointe Drive
West Chester, OH, 45069
Tel: 1 800 338 1122

E. RELATED WORK SPECIFIED ELSEWHERE

1. Section 02240: Dewatering
2. Section 02461: Temporary Sheeting
3. Section 02316: Excavation
4. Section 02317: Backfilling

1.02 PAYMENT

Replace 1.02A. with the following:

A. There shall be no separate payment for the Work of this Section, all costs shall be included in the Lump Sum price bid for this Contract as specified in Detailed Specification 01270 – Measurement and Payment.

PART 2 PRODUCTS

2.01 DESCRIPTION

A. All components shall be subject to inspection by the engineer at the place of manufacture and/or installation. All components are subject to being rejected or identified for repair if the quality of materials and manufacturing do not comply with the requirements of this specification. Components which have been identified as defective may be subject for repair where final acceptance of the component is contingent on the discretion of the Engineer.

B. The manufacturer shall guarantee the SWTD components against all manufacturer originated defects in materials or workmanship for a period of twelve (12) months from the date the components are delivered to the owner for installation. The manufacturer shall upon its determination repair, correct or replace any manufacturer originated defects advised in writing to the manufacturer within the referenced warranty period. The use of SWTD components shall be limited to the application for which it was specifically designed.

C. The SWTD manufacturer shall submit to the Engineer of Record a "Manufacturer's Performance Certification" certifying that each SWTD is capable of achieving the specified removal efficiencies listed in these specifications. The certification shall be supported by independent third-party research

D. No product substitutions shall be accepted unless submitted 10 days prior to project bid date, or as directed by the Engineer of Record. Submissions for substitutions require review and approval by the Engineer of Record, for hydraulic performance, impact to project designs, equivalent treatment performance, and any required project plan and report (hydrology/hydraulic, water quality, stormwater pollution) modifications that would be required by the approving jurisdictions/agencies. Contractor to coordinate with the Engineer of Record any applicable modifications to the project estimates of cost, bonding amount determinations, plan check fees for changes to approved documents, and/or any other regulatory requirements resulting from the product substitution.

2.02 MATERIALS

A. Housing unit of stormwater treatment device shall be constructed of pre-cast or cast-in-place concrete, no exceptions. Precast concrete components shall conform to applicable sections of ASTM C 478, ASTM C 857 and ASTM C 858 and the following:

1. Concrete shall achieve a minimum 28-day compressive strength of 4,000 pounds per square-inch (psi);

2. The precast concrete sections shall be designed to withstand lateral earth and AASHTO H-20 traffic loads;

3. Cement shall be Type III Portland Cement conforming to ASTM C 150;

4. Aggregates shall conform to ASTM C 33;

5. Reinforcing steel shall be deformed billet-steel bars, welded steel wire or deformed welded steel wire conforming to ASTM A 615, A 185, or A 497.

6. Joints shall be sealed with preformed joint sealing compound conforming to ASTM C 990.

7. Shipping of components shall not be initiated until a minimum compressive strength of 4,000 psi is attained or five (5) calendar days after fabrication has expired, whichever occurs first.

B. Internal Components and appurtenances shall conform to the following:

1. Screen and support structure shall be manufactured of Type 316 and 316L stainless steel conforming to ASTM F 1267-01;

2. Hardware shall be manufactured of Type 316 stainless steel conforming to ASTM A 320;

3. Fiberglass components shall conform to the ASTM D-4097.

C. Access system(s) conform to the following:

1. Manhole castings shall be designed to withstand AASHTO H-20 loadings and manufactured of cast-iron conforming to ASTM A 48 Class 30.

2.03 PERFORMANCE

A. The SWTD shall be sized to either achieve an 80 percent average annual reduction in the total suspended solid load or treat a flow rate designated by the jurisdiction in which the project is located. Both methods should be sized using a particle size distribution having a mean particle size (d50) of 125 microns unless otherwise stated.

B. The SWTD shall be capable of capturing and retaining 100 percent of pollutants greater than or equal to 2.4 millimeters (mm) regardless of the pollutant's specific gravity (i.e.: floatable and neutrally buoyant materials) for flows up to the device's rated-treatment capacity. The SWTD shall be designed to retain all previously captured pollutants addressed by this subsection under all flow conditions. The SWTD shall be capable of capturing and retaining total petroleum hydrocarbons. The SWTD shall be capable of achieving a removal efficiency of 92 and 78 percent when the device is operating at 25 and 50 percent of its rated-treatment capacity. These removal efficiencies shall be based on independent third-party research for influent oil concentrations representative of storm water runoff (20 ± 5 mg/L). The SWTD shall be greater than 99 percent effective in controlling dry-weather accidental oil spills.

C. The SWTD shall be designed with a sump chamber for the storage of captured sediments and other negatively buoyant pollutants in between maintenance cycles. The minimum storage capacity provided by the sump chamber shall be in accordance with the volume listed in Table 1. The boundaries of the sump chamber shall be limited to that which do not degrade the SWTD's treatment efficiency as captured pollutants accumulate. The sump chamber shall be separate from the treatment processing portion(s) of the SWTD to

minimize the probability of fine particle re-suspension. In order to not restrict the Owner's ability to maintain the SWTD, the minimum dimension providing access from the ground surface to the sump chamber shall be 16 inches in diameter.

D. The SWTD shall be designed to capture and retain Total Petroleum Hydrocarbons generated by wet-weather flow and dry-weather gross spills and have a capacity listed in Table 1 of the required unit.

E. The SWTD shall convey the flow from the peak storm event of the drainage network, in accordance with required hydraulic upstream conditions as defined by the Engineer. If a substitute SWTD is proposed, supporting documentation shall be submitted that demonstrates equal or better upstream hydraulic conditions compared to that specified herein. This documentation shall be signed and sealed by a Professional Engineer registered in the State of the work. All costs associated with preparing and certifying this documentation shall be born solely by the Contractor.

F. The SWTD shall have completed field tested following TARP Tier II protocol requirements

TABLE 1
Storm Water Treatment Device
Storage Capacities

CDS Model	**Minimum Sump Storage Capacity (yd^3)/(m^3)**	**Minimum Oil Storage Capacity (gal)/(L)**
CDS4030-8	5.6(4.3)	426(1,612)
CDS4040-8	5.6 (4.3)	520(1,970)
CDS4045-8	5.6 (4.3)	568(2,149)
CDS5640-10	8.7(6.7)	758(2,869)
CDS5653-10	8.7(6.7)	965(3,652)
CDS5668-10	8.7(6.7)	1,172(4,435)

PART 3 EXECUTION

3.01 INSTALLATION

A. The contractor shall exercise care in the storage and handling of the SWTD components prior to and during installation. Any repair or replacement costs associated with events occurring after delivery is accepted and unloading has commenced shall be borne by the contractor.

B. The SWTD shall be installed in accordance with the manufacturer's recommendations and related sections of the contract documents. The manufacturer shall provide the contractor installation instructions and offer on-site guidance during the important stages of the installation as identified by the manufacturer at no additional expense. A minimum of 72 hours notice shall be provided to the manufacturer prior to their performance of the services included under this subsection.

C. The contractor shall fill all voids associated with lifting provisions provided by the manufacturer. These voids shall be filled with non-shrinking grout providing a finished surface consistent with adjacent surfaces. The contractor shall trim all protruding lifting provisions flush with the adjacent concrete surface in a manner, which leaves no sharp points or edges.

D. The contractor shall removal all loose material and pooling water from the SWTD prior to the transfer of operational responsibility to the Owner.

END OF SECTION

NO TEXT ON THIS PAGE

NOTE: Detailed Specification 02411 has been prepared specifically for the Work of this Contract. There is no corresponding General Specification 02411.

1.01 SUMMARY

A. Section Includes:
   1. Demolition and removal of selected portions of building or structure.

1.02 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.

B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.03 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
   1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.04 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site
   1. Inspect and discuss condition of construction to be selectively demolished.
   2. Review structural load limitations of existing structure.

3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection , for dust control. Indicate proposed locations and construction of barriers.

C. Schedule of Selective Demolition Activities: Indicate the following:
1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of stairs.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

D. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Submit before Work begins.

E. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

F. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.06 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

1.07 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.08 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: Present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
   1. Hazardous material remediation is specified elsewhere in the Contract Documents.
   2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
   3. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.
   4. If additional suspected hazardous materials are encountered, do not disturb; immediately contact Architect and Owner for instructions on how to proceed.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
   1. Maintain fire-protection facilities in service during selective demolition operations.

1.09 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition or construction, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor before proceeding. Existing warranties include the following:

1. Sika Sarnafil roofing

B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

1.10 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ASSE A10.6 and NFPA 241.

3.01 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

A. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

B. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

C. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.
1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.02 PREPARATION

A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.03 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. Arrange to shut off utilities with utility companies.
3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.

    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
    f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.04 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.

3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

C. Remove temporary barricades and protections where hazards no longer exist.

3.05 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain fire watch during and for at least 2 hours after flame-cutting operations.
6. Maintain adequate ventilation when using cutting torches.
7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
10. Dispose of demolished items and materials promptly.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.06 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.

B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.

C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.

D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.

E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings."

3.07 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.

B. Do not allow demolished materials to accumulate on-site.

C. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

D. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

E. Burning: Do not burn demolished materials.

3.08 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION

NOTE: Detailed Specification 02411 has been prepared specifically for the Work of this Contract. There is no corresponding General Specification 02411.

1.01 SUMMARY

A. Section Includes:
   1. Demolition and removal of selected portions of building or structure.

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B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.03 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
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1.04 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site
   1. Inspect and discuss condition of construction to be selectively demolished.
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3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection , for dust control. Indicate proposed locations and construction of barriers.

C. Schedule of Selective Demolition Activities: Indicate the following:
1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of stairs.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

D. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Submit before Work begins.

E. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

F. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.06 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

1.07 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

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A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

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C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

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   1. Hazardous material remediation is specified elsewhere in the Contract Documents.
   2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
   3. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.
   4. If additional suspected hazardous materials are encountered, do not disturb; immediately contact Architect and Owner for instructions on how to proceed.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
   1. Maintain fire-protection facilities in service during selective demolition operations.

1.09 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition or construction, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor before proceeding. Existing warranties include the following:

1. Sika Sarnafil roofing

B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

1.10 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ASSE A10.6 and NFPA 241.

3.01 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

A. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

B. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

C. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.
1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.02 PREPARATION

A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.03 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. Arrange to shut off utilities with utility companies.
3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.

    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
    f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.04 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.

3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

C. Remove temporary barricades and protections where hazards no longer exist.

3.05 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain fire watch during and for at least 2 hours after flame-cutting operations.
6. Maintain adequate ventilation when using cutting torches.
7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
10. Dispose of demolished items and materials promptly.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.06 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.

B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.

C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.

D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.

E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings."

3.07 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.

B. Do not allow demolished materials to accumulate on-site.

C. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

D. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

E. Burning: Do not burn demolished materials.

3.08 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION

SECTION 02501G
Reinforced Concrete Sewer Pipe

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02501 – Reinforced Concrete Sewer Pipe except as modified herein.

1.01 PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. There shall be no separate payment for the Work of this Section, all costs shall be included in the Lump Sum price bid for this Contract as specified in Detailed Specification 01270 – Measurement and Payment.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02502G
Vitrified Clay Pipe Sewers

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02502 – Vitrified Clay Pipe Sewers except as modified herein.

1.01 PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. There shall be no separate payment for the Work of this Section, all costs shall be included in the Lump Sum price bid for this Contract as specified in Detailed Specification 01270 – Measurement and Payment.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02504G
Sanitary and Storm Sewer Structures

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02504 – Sanitary and Storm Sewer Structures except as modified herein.

1.01 PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. There shall be no separate payment for the Work of this Section, all costs shall be included in the Lump Sum price bid for this Contract as specified in Detailed Specification 01270 – Measurement and Payment.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02505G
Leakage Tests

NOTE: All Work for this section shall be in accordance with the requirements of General Specification SECTION 02505 - Leakage Tests except as modified herein.

1.01 PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. There shall be no separate payment for the Work of this Section, all costs shall be included in the Lump Sum price bid for this Contract as specified in Detailed Specification 01270 – Measurement and Payment.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02741G
Asphaltic Concrete Pavements

NOTE: All Work for this section shall be in accordance with the requirements of General Specification Section 02741 - Asphaltic Concrete Pavements except as modified herein.

1.01 PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. There shall be no separate payment for the Work of this Section, all costs shall be included in the Lump Sum price bid for this Contract as specified in Detailed Specification 01270 – Measurement and Payment.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02771G
Concrete Curbs, Headers and Sidewalks

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02771 - Concrete Curbs, Headers and Sidewalks except as modified herein.

1.01 PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. There shall be no separate payment for the Work of this Section, all costs shall be included in the Lump Sum price bid for this Contract as specified in Detailed Specification 01270 – Measurement and Payment.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02821G
Metal Fence

Work for this section shall be in accordance with the requirements of General Specification 02821 – Metal Fence except as modified herein.

1.01 PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. There shall be no separate payment for the Work of this Section, all costs shall be included in the Lump Sum price bid for this Contract as specified in Detailed Specification 01270 – Measurement and Payment.

End of Section

NO TEXT ON THIS PAGE

SECTION 02841G
Guide Railing

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02841 – Guide Railing except as modified herein.

1.01 PART 1 GENERAL

1.02 PAYMENT

Replace 1.02A. with the following:

A. There shall be no separate payment for the Work of this Section, all costs shall be included in the Lump Sum price bid for this Contract as specified in Detailed Specification 01270 – Measurement and Payment.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 02910G
Planting

NOTE: All Work for this section shall be in accordance with the requirements of General Specification 02910 – Planting except as modified herein.

PART 1 GENERAL

1.01 SECTION INCLUDES

Replace 1.01A.2. with the following:

2. Furnishing and installing new hydroseeded lawns.

Replace 1.01A.7. with the following:

7. Guarantee of all new plant materials for a period of 24 months.

Replace 1.01A.8. with the following:

8. Maintenance of plantings during the 24-month guarantee period.

Delete 1.01A.4. in its entirety.

1.02 RELATED SPECIFICATIONS

Add the following to 1.02.

E. Detailed Specification 01270 – Measurement and Payment.

1.02 PAYMENT

Replace 1.02 with the following:

A. Payment for all work specified in this Section, with the exception of the 24-month maintenance and guarantee, shall be made as part of the lump sum price bid for Contract Reference Item No. G-LS-1, as described in Detailed Specification 01270 – Measurement and Payment.

B. No separate payment shall be made after Milestone M3, Completion of Work. Payment for the guarantee retainage shall be based on the DEP's acceptance and approval of the

submitted maintenance report. The approved copy of the report shall be included in the payment request for the guarantee retainage.

C. During the maintenance period the Contractor shall submit annual maintenance reports which will include a detailed maintenance schedule of maintenance tasks performed that year. Any replacement plantings shall be implemented as per the requirements of the Contract. No separate payment shall be made to the Contractor for all associated maintenance requirements to document and comply with the guarantee requirements.

1.07 SUBMITTALS

Add the following after 1.07.C.1.

2. Erosion Control Mat: 10” x 10” sample of material 30 (thirty) days prior to installation for approval by City and Engineer.

Replace 1.07.D with the following:

D. Growers/Nurseries: Contractor shall submit a list of proposed growers/nurseries prior to the commencement of any landscaping work, with sufficient advance notice of at least 90 (ninety) days.

Replace 1.07.F with the following:

F. Materials/Certificates: Contractor shall submit a list of all materials and certificates in this Section prior to the commencement of any landscaping work, with sufficient advance notice of at least 90 (ninety) days.

Replace 1.07.I with the following

I. Documentation: The Contractor shall submit written documentation at least 60 (sixty) days prior to scheduled start of planting that all plant material has been ordered.

Replace 1.07.H.1 with the following:

1. Manufacturers’ product information for erosion control mat, showing conformance with the specified requirements

1.11 WARRANTY (GUARANTEE PERIOD)

Replace 1.11.A with the following:

A. All new plant material shall be guaranteed for a period of 24 months after the date of Substantial Completion.

Replace 1.11.C.6 with the following:

C.6 Guarantee all replaced material for a period of 24 months after the date of replacement.

2.02 MATERIALS

Delete 2.02.C DRAINAGE GRAVEL in its entirety.

Delete 2.02.E SOD GRASS in its entirety.

Add the following to Grass Seed for Lawn Areas after 2.02.F.4:

5. Seed shall be stored in original unopened packages, kept dry and not opened until needed for use. Damaged or faulty packages shall not be used and will be rejected. Seed shall have been harvested from the previous growing season.
6. Seed shall be no less than 75% Pure Live Seed (PLS). Quantities shall be calculated by quantity of PLS. Legume seed shall be inoculated with Rhizobia bacteria.
7. Seed shall be delivered to site in separate packages and shall be machine mixed of hand broadcast in smaller areas where appropriate, on site as approved by the Engineer or Engineer's Designated Representative.
8. Apply seed with drop or cyclone spreaders to uniformly cover seedbed at the rate required.
9. Carrier Medium for Seed Applied by Conventional Seeding Methods:
    a. Seed Mix shall be missed with clean moistened sand. Sand shall consist of clean, hard, durable, uncoated stone particles, free from lumps of clay and all deleterious substances. Sand shall be so graded that when dry, one-hundred percent (100%) shall pass through a one-quarter inch (1/4") square opening sieve; not more than thirty-five percent (35%) by shall pass a No. 50 sieve and not more than ten percent (10%) by weight shall pass a No. 100 sieve. Sand may be rejected for this class if it contains more than ten percent (10%) by weight of loam and/or silt. Sand shall be mixed at a rate of 10 parts sand to 1 part seed.

Delete 2.02.F.2 in its entirety.

Delete 2.02.G GRASS SEED FOR HYDROSEEDED AREAS in its entirety

Delete 2.02.H Native Grass and Wildflower Seed Mix in its entirety

Replace 2.02.I FILTER FABRIC with the following:

I. Erosion Control Mat

1. Erosion control mat shall meet the following requirements:

Netting	One Side Only, Organic Leno Weave Jute, 100% Biodegradable 0.5” x 1.0” opening
Matrix	100% Agriculture Straw 0.55 lbs/yd^2 298.4 g/m^2
Thread	1.5” stitch space, 100% Biodegradable

Index Value Properties

Property	Test Method	Typical
Mass/Unit Area	ASTM D6475	10.00 oz/yd^2
Thickness	ASTM D6525	.40 in
Tensile Strength-MD	ASTM D6818	106 lb/ft
Elongation-MD	ASTM D6818	16.7%
Tensile Strength-TD	ASTM D6818	118 lb/ft
Elongation-TD	ASTM D6818	26.8%
Light Penetration	ASTM D6567	6%
Water Absorption	ASTM D1117	322%
Unvegetated Shear Stress	ASTM D6460	1.55 lbs/ft^2
Slope		3:1 or flatter

2. The Erosion Control Mat must be ECS-1B, by East Coast Erosion Blankets, Bernville, PA; BioNet S75BN by North American Green, Evansville, IN; US-1SNN by L and M Supply Co., Pearson, GA; or approved equal.

3. Wire Staples must consist of 12-inch lengths of No. 11 gauge wire bent to form a "U" or other wire staples as approved.

3.02 PREPARATION FOR PLANTING

Replace 3.02.A. with the following:

A. Install erosion control mat over permanently seeded areas immediately following seeding and in areas as shown on Drawings.
   1. Erosion control mat must be placed on topsoil perpendicular to slope contours where directed by the Engineer. Erosion control mat must be laid without stretching so that it lies loosely on the soil and in contact with the soil at all points and must be pressed firmly into the soil surface by rolling or tamping. If seeding is required, it must be done prior to the installation of the erosion control mat.

1. The upper end of each roll of erosion control mat must be turned and buried to a depth of six (6) inches, with the soil firmly tamped against it. Erosion control matting must have a minimum lap of six (6) inches on all sides. Ends of rolls must also have a minimum lap of six (6) inches with the upgrade section on top.

2. Check slots must be constructed at intervals of 50 feet, unless otherwise directed by placing a fold of erosion control mat six (6) inches vertically into the ground with replaced soil tamped firmly against it.

3. Erosion control mat must be held tightly to the soil by staples driven firmly into the ground. Staples must be spaced not more than three (3) feet apart, along the sides and center of the erosion control mat and not more than one (1) foot apart at roll ends, check slots and at other critical areas as determined by the Engineer.

3.03 PLANT INSTALLATION

Planting shall occur on the dates indicated in the Specification with exceptions as follows:

Replace 3.03.A.1 B&B DECIDUOUS TREES AND SHRUBS with the following:

1. Spring: March 1st to May 15th

2. Fall: October 15th to December 15th

Replace 3.03.A.3 B&B EVERGREEN TREES AND SHRUBS with the following:

a. Spring: March 15th to May 15th

b. Fall: September 1st to October 15th

Replace 3.03.A.4 CONTAINER-GROWN PERRENIALS, VINES AND GROUNDCOVER PLANTS:

a. Spring: April 15th to June 15th

b. Fall: August 15th to September 15th

3.05 SODDING & SEEDING OPERATIONS

Delete 3.05.A SODDING OPERATIONS in its entirety.

Add the following after 3.05.B.9:

10. Permanent seeded areas must be covered with erosion control mat and as indicated by Contract Drawings or as directed by the Engineer, immediately following seeding.

Replace 3.05.F.1 MOWING with the following:

1. Mowing of all seeded areas shall begin when lawn is firmly rooted and secure, and has reached a height of 3 inches, and shall continue until Substantial Completion.

3.06 PLANT PROTECTION & MAINTENANCE

Add the following after 3.06.B.10:

Erosion Control Mat: The Contractor shall maintain the areas of the erosion control mat installation until final acceptance of the contract. Maintenance shall consist of providing protection for erosion control mat and repair of areas damaged by equipment, erosion, fire, or other causes, as well as re-establishment of the grade and conditions of the area as specified.

Add the following after 3.06.B.18.d:

e. The guarantee of all replacement plants shall extend for an additional period of 24 months from the date of their acceptance after replacement.

-END OF SECTION-

REFERENCES

R-1 Geotechnical Report

HALEY ALDRICH

www.haleyaldrich.com

GEOTECHNICAL ENGINEERING REPORT
WATERFOWL MANAGEMENT PROGRAM BUILDING
VALHALLA, NEW YORK

by Haley & Aldrich of New York
Rocky Hill, Connecticut

for Hazen and Sawyer
New York, New York

File No. 130464-002
August 2018

Haley & Aldrich of New York
100 Corporate Place
Suite 105
Rocky Hill, CT 06067
860.282.9400

27 August 2018
File No. 130464-002

Hazen and Sawyer
498 Seventh Ave, 11th Floor
New York, NY 10018

Attention: Christakis Roumbas, P.E.

Subject: Geotechnical Engineering Report
Waterfowl Management Program Building
Valhalla, New York

Ladies and Gentlemen:

This report presents the results of our subsurface investigation and provides geotechnical engineering and environmental recommendations for the proposed Waterfowl Management Program Building, Valhalla, New York. Our services have been provided in accordance with our August 25, 2017 Agreement.

In summary, the proposed building may be supported on spread footings bearing on a minimum 12-in. thickness of compacted Granular Fill. The floor may be designed as a soil-supported slab-on-grade bearing on a minimum of 6-in. thickness of compacted Granular Fill. Environmentally, the soil has unrestricted reuse on or off site.

Geotechnical engineering recommendations are presented in Section 3, environmental soil and groundwater management considerations are included in Section 4 and construction considerations are in Section 5. We appreciate the opportunity to provide engineering services on this project. Please contact us if you have any questions or comments.

Sincerely yours,
HALEY & ALDRICH OF NEW YORK, INC.

Richard A. Genovesi, P.E. (CT)	Timothy Crowl, P.E. (NY)	Thomas W. Nolan, P.E. (CT)
Senior Geotechnical Engineer	Senior Project Manager	Senior Consultant

Enclosures
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1. INTRODUCTION

1.1 GENERAL

This report presents geotechnical engineering and environmental recommendations for the proposed Waterfowl Management Program Building, Valhalla, New York. The site location is shown on the Project Locus, Figure 1. The project owner is the New York Department of Environmental Protection (NYDEP).

1.2 PURPOSE AND SCOPE

A subsurface investigation was undertaken to obtain information on subsurface soil, rock, and groundwater conditions and to provide geotechnical engineering and environmental recommendations for the proposed building. The scope of geotechnical engineering and environmental services included:

- visiting the site to observe existing conditions
- reviewing available information on subsurface soil and bedrock conditions and groundwater levels
- locating borings in the field
- providing private utility locating services
- implementing an integrated geotechnical and environmental subsurface exploration program
- installing a groundwater monitoring well behind the existing lab to facilitate long-term groundwater level measurements (by others)
- performing geotechnical laboratory testing
- conducting environmental laboratory chemical testing
- conducting laboratory corrosion testing
- performing geotechnical analyses
- performing environmental analyses
- preparing this report.

1.3 ELEVATION DATUM

The elevations in this report refer to North American Vertical Datum of 1988 (NAVD 88).

1.4 EXISTING CONDITIONS

The Waterfowl Building will be located along the side of West Lake Drive in a grassed area that slopes down to the Kensico Reservoir, about 90 to 100 ft away. The ground surface at the proposed building ranges from about El. 361 to El. 364.5. There is a gravel road boat ramp between the existing trailer and the Kensico Reservoir. We understand that the normal reservoir level is between El. 355 and El. 357, with a typical minimum level of El. 352. Shaft 18 (a major effluent structure connecting two aqueducts) is located about 160 ft to the south of the proposed Waterfowl building.

The following site history is based on review of historic maps, literature and construction drawings. The Kensico Reservoir was originally built in 1885, then expanded in 1915 to 1917. In order to contain the expanded reservoir, a dike was constructed at the Waterfowl Building site. Around 1938, Shaft 18 was constructed, including an inlet channel into the reservoir and an aeration basin. At that time, the dike

was relocated near Shaft 18 and to the west, but no major changes were made at the Waterfowl Building site.

1.5 PROPOSED CONSTRUCTION

The project consists of constructing an approximately 3,000 sq. ft Waterfowl Management Program building in the vicinity of Shaft 18 on the west shore of Kensico Reservoir in Valhalla, New York. The building will be at-grade with no basement, with a lowest floor at El. 364 (+/- 0.5 ft). A porch is planned along the east side of the building with stairs stepping down to about El. 361. An approximately 600 sq. ft boat wash area is planned within the bump-out off the west side of the proposed building. We understand that the occupied interior space will be primarily used as office-space for NYCDEP personnel and/or subcontractors to the NYCDEP. Conceptual Drawings are in Appendix A.

1.6 LIMITATIONS

This report has been prepared for specific application to the project based on available information related to what is planned at this time. In the event that changes in the nature, design, or location of structures are planned or made, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing. The analyses and recommendations submitted in this report are based in part upon data obtained from referenced explorations. The nature and extent of variations between the explorations may not become evident until construction. If variations then appear evident, it will be necessary to reevaluate the recommendations of this report.

The planned construction will be supported on or in the soil or rock at the site and below-grade structures may be close to or penetrate the design groundwater level for the project. Any recommendations presented in this report for foundation and floor drainage, moisture protection and waterproofing address only the conventional geotechnical engineering related aspects of design and construction and are not intended to provide an environment that would prohibit infestation of mold or other biological pollutants. Our work scope did not include the development of criteria or procedures to minimize the risk of mold or other biological pollutant infestations in or near any structure.

This report is prepared for the exclusive use of the project design team in connection with the geotechnical aspects of the project.

2. FIELD AND LABORATORY INVESTIGATIONS

2.1 SUBSURFACE EXPLORATIONS

Haley & Aldrich planned and monitored a test boring program consisting of 5 test borings (B1 through B5-OW). B1 through B4 are located within (or near) the proposed Waterfowl Building footprint. B5-OW is located behind the former laboratory off Aerator Road. Craig Test Borings Co., Inc. of Mays Landing, New Jersey drilled the borings on 12 and 13 July 2018. The borings were advanced with 4.0-in. I.D. steel casing to depths ranging from 22 to 37 ft below ground surface. Standard penetration tests were performed at maximum 5-ft intervals. B1 and B2 terminated at refusal on probable rock. A groundwater observation well was installed in B5-OW.

Boring locations are shown on Figure 2. Test boring logs and well installation reports are included in Appendix B. Ground surface elevations at the test borings were estimated by Haley & Aldrich using the contours on Figure 2.

2.2 SUBSURFACE CONDITIONS

Subsurface explorations revealed the following materials at the proposed Waterfowl Building, described below in order of increasing depth below ground surface. Refer to the log for B5-OW for conditions encountered in the former lab area. Approximate strata thicknesses observed in the explorations are indicated below and summarized on Table I.

Approximate Range in Thickness, ft.	**Generalized Description**
0 to 0.8	TOPSOIL– Loose loamy silt and sand, with roots and root fibers.
15 to 17	FILL – Loose to medium dense brown silty SAND, occasional gravel, root fibers and wood fragments. Stratum contains pavement base materials (typical 11 in. thick concrete pavement over roughly 6 in. thickness of brown well-graded sand and gravel) in existing paved areas.
6.5 to >20	GLACIAL OUTWASH – Loose to medium dense gray-brown silty SAND with occasional gravel. Stratum becomes denser at about 30 ft depth.
4.2 to 6.5	GLACIAL TILL – Medium dense to dense gray brown silty SAND with gravel. Stratum likely contains cobbles and boulders.

The fill appears to be associated with historic filling for a dike to contain the Kensico Reservoir around 1917. Weathered schist or boulders were encountered at 21 to 36 ft depth in B2 and B1, respectively. B3 and B4 encountered dense material at about 31 ft depth.

2.3 GROUNDWATER CONDITIONS

Groundwater level was El. 358.0 one day after installation of the observation well at B5-OW, which corresponds to 6.5 ft below ground surface in that area. Groundwater was encountered in the borings at the proposed waterfowl building at about El. 354 to 358, 6 to 10 ft below ground surface, during drilling. These levels may not have stabilized. We anticipate normal groundwater level will be within a couple feet of the reservoir surface, thus about El. 355 to 357. Groundwater levels will fluctuate with season, precipitation, nearby reservoir water levels, leakage into or out of utilities, and nearby construction activity.

2.4 LABORATORY TESTING

2.4.1 Geotechnical Testing

A geotechnical laboratory testing program was conducted on representative soil samples in general accordance with the applicable ASTM standards as follows:

a. Natural Moisture Content – Five moisture content tests as indicated on the grain size distribution results in Appendix C.
b. Particle Size Distribution – Five particle size distribution tests as indicated on the grain size distribution results in Appendix C.

2.4.2 Corrosion Potential Testing

Testing Engineers International of Salt Lake City, Utah performed one suite of tests to evaluate corrosivity of site soils to steel and concrete. Tests consisted of pH, soluble sulfates, chloride ion, electrical resistivity, sulfides, and redox potential testing to evaluate corrosion potential on the soil sample. Test results are provided in Appendix D.

2.4.3 Environmental Chemical Testing

Five soil samples were collected to characterize the soil for onsite/offsite reuse. One groundwater sample was collected to characterize groundwater at the existing lab building. The samples were submitted to Complete Environmental Testing (CET) of Stratford, Connecticut (a New York state-certified laboratory).

The following analyses were performed for soil characterization:

- Total Metals by EPA 6010C
- Volatile Organic Compounds (VOCs) by EPA Method 8260C
- Semi-volatile Organic Compounds (SVOCs) by EPA Method 8270D
- Chlorinated Pesticides by EPA Method 8081B
- Chlorinated Herbicides by EPA Method 8151A
- Polychlorinated Biphenyls (PCBs) by EPA Method 8082A
- Waste Characterization parameters: Hexavalent Chromium, Total Cyanide, pH, and REDOX Potential

The following analyses were performed for groundwater characterization:

- VOCs by EPA Method 8260C
- SVOCs by EPA Method 8270D

Chemical test results and chain-of-custody documentation for soil and groundwater testing are provided in Appendix E. The soil and groundwater analytical data are summarized in Tables I and II, respectively. These tables include only detected compounds.

3. GEOTECHNICAL ENGINEERING RECOMMENDATIONS

3.1 FOUNDATION AND SLAB DESIGN

3.1.1 Foundation Type

Design the proposed Waterfowl Management Building to be supported on spread footings bearing on a minimum 12-in thickness of compacted Granular Fill over existing site soils. The fill may be left in place if stable under proof compaction.

Since it will bear near groundwater, a 3-in. thick concrete mudmat may be used to provide a stable subgrade for placement and compaction of compacted Granular Fill. Proof-compaction of the subgrade may be waived if a mudmat is used.

3.1.2 Foundation Design Criteria

- Design footings for a maximum net allowable bearing pressure of 1 ton per square foot (tsf).
- For footings less than 3 ft in least lateral dimensions, design for an allowable bearing pressure in tsf equal to 0.33B, where B is the footing width in feet.
- Allowable footing bearing pressures may be increased by 1/3 for transient loading conditions.
- Allowable footing bearing pressures may be increased by 1/3 at the footing toe for cantilever retaining walls.
- Design for a minimum footing width of 18 in.
- Remove unsuitable material below footings within a 1H:1V splay, and replace with compacted Granular Fill.
- Design footings to bear a minimum 4.0 ft below proposed exterior grade, for frost protection.
- Locate footings to bear below a 1.5H:1V slope from the bottom of new or existing utility pipes, pits or other planned localized excavations.
- If a dike cut-off wall is encountered during foundation construction, span over the cutoff using an approximately 2 to 5 ft length grade beam (depending on wall thickness). Design the grade beam to bear on a minimum 2-in. thick compressible filler (such as insultation board) to avoid a hard spot. We can collaborate with the Structural Engineer to develop a detail to include in the project bid documents.

3.1.3 Floor Slabs

- Design the lowest floor as a soil-supported slab-on-grade bearing on a minimum 6 in. thickness of compacted Granular Fill following excavation of topsoil. Existing fill may remain in place under building slabs provided it is confirmed to be stable during construction.
- Remove topsoil and utilities below the slab, and replaced with compacted Granular Fill.
- Backfill excavations below slabs-on-grade with compacted Granular Fill.
- Design for an unfactored modulus of subgrade reaction (modulus for a 1 ft by 1 ft plate) of 60 lbs. per cu. in.

3.1.4 Foundation Drainage and Vapor Barrier

Proposed slabs are above exterior grade, thus underslab drains are not required.

Provide foundation drainage for retaining walls. The foundation drains should outlet by gravity to the storm drain system. Elevator pits or other below slab pits that do not have foundation drains should be designed to be waterproof with exterior side waterproofing, and designed for hydrostatic pressures.

From a geotechnical perspective, we recommend that a moisture vapor retarder be provided below the ground floor slab beneath finished spaces of the building, especially if building humidity control is desired, if materials will be stored on the floors, or if vapor-tight floor coverings may be used. Without a vapor retarder or other similar preventive measure, moisture will penetrate up through the concrete floors and contribute to building humidity, potential condensation on the concrete floor surfaces, and deterioration of vapor-tight flooring.

3.1.5 Uplift Resistance

Net uplift loads are not anticipated. Details regarding uplift resistance can be provided, if required.

3.2 SETTLEMENT

For the recommended footing bearing pressures, we estimate total settlement of footings will be less than 1 in. Differential settlement is estimated to be less than ½ in. over a distance of 30 ft. These settlements will occur as load is applied.

3.3 SEISMIC DESIGN

The soils at the site are not liquefaction susceptible, however up to about 2 in. of seismically-induced settlement may occur during the design earthquake. Assume this would result in a differential settlement of about 1 in. over a 30 ft length. In accordance with the 2015 NYS Building Code (references ASCE-7), the seismic soil design criteria are as follows:

Site Class = D
S_S=0.268g
S_1=0.072g

3.4 LATERAL EARTH PRESSURES AND RETAINING WALLS

Design restrained walls for at-rest lateral pressures as shown on Figure 3. Design retaining walls free to deflect at the top for active lateral pressures as shown on Figure 4. Pressures are based on a unit weight of 120 pcf and a friction angle of 33 degrees. If there is water behind an undrained retaining wall, the at-rest earth pressure would be an equivalent fluid pressure of 90 pcf and the active earth pressure would be an equivalent fluid pressure of 80 pcf.

Design for a factor of safety against overturning of at least 1.5 and a factor of safety against sliding of at least 1.5. Use a coefficient of sliding of 0.50 between concrete and compacted granular fill. Neglect

resistance to lateral loads provided by passive soil pressure acting against footings and below-grade walls.

3.5 CORROSION

Based on the laboratory testing, the onsite soils are not corrosive to buried steel or concrete. Type I/II cement may be used for concrete.

3.6 BACKFILL MATERIALS

3.6.1 Compacted Granular Fill

Compacted Granular Fill is recommended for the following areas:

- backfill against retaining walls.
- backfill under footings.

Granular Fill should be placed in maximum 12-in. thick lifts and compacted to at least 95 percent of the maximum dry density determined by ASTM D1557. In confined areas, use maximum 6-in. thick lifts. Compaction equipment in confined areas may consist of hand-guided vibratory equipment or mechanical tampers.

Granular Fill should consist of sandy gravel or gravelly sand, free of organic material, environmental contaminants, snow, ice, frozen soil, or other unsuitable material, and be well-graded within the following limits:

U.S. Standard Sieve Size	Percent Finer by Weight
3 in.	100
No. 4	30-80
No. 40	10-50
No. 200	0-8

3.6.2 Crushed Stone Fill

The use of crushed stone within the dike should be avoided. However, crushed stone may be used around the drain pipes for retaining walls provided that a geotextile filter is used between the stone and soil. It should consist of No. 67 crushed stone (3/4-in. size) graded within the following limits:

U.S. Standard Sieve Size	Percent Finer by Weight
1 in.	100
0.75 in.	90-100
0.375 in.	20-55
No. 4	0-10
No. 8	0-5

3.6.3 Common Fill

Common Fill may be used for raising grades below pavement sections and landscaped areas. Common fill should consist of mineral soil, free of clay, organic soils, deleterious material, and particles larger than 10 in. in size, which can be spread and compacted.

3.6.4 Bedding Sand

Bedding sand should consist of mineral sand with a maximum particle size of 3/4-in., a maximum 10% retained on a No. 4 sieve, and a maximum 10% passing a No. 200 sieve. It should be free of clay, organic material, deleterious material, environmental contaminants, snow, ice, and frozen soil.

3.6.5 Compaction

Recommended compaction requirements are as follow:

Location	Minimum Compaction Requirements
Beneath and around footings, under mats and slabs	95%
Parking, roadways and sidewalks	92% up to 3 ft below finished grade 95% in the upper 3 ft
Landscaped areas	90%

Minimum compaction requirements refer to percentages of the maximum dry density determined in accordance with ASTM D1557 Modified Proctor.

3.7 USE OF ON-SITE EXCAVATED SOIL

The goal is to reuse the excavated soil on site to the extent possible. Excavation will be in topsoil and existing fill. Topsoil may be reused as topsoil, subject to meeting nutrient requirements. The fill may be used as Common Fill. The on-site soils can be silty and will be difficult to compact when wet. Thus, during relatively cold or wet weather, these materials may be difficult to reuse. The Contractor should coordinate their work accordingly, including protecting the soil (such as keeping stockpiles covered) to avoid delays.

3.8 SITE DESIGN

3.8.1 Site Retaining Walls

It may be assumed that the foundation design criteria provided above apply to the site retaining walls if the walls less than 5 ft tall and are near the waterfowl building. Design retaining walls to resist lateral loads in Section 3.4.

3.8.2 Pavement Design

Our pavement recommendations below pertain to pavement reconstruction near the proposed waterfowl building, such as to repair the surface at excavations for new structures or utilities in the area. We recommend the following pavement section, with pavement materials referenced to New York State Department of Transportation Standard Specifications Sections 300 and 400. Considering the relatively low volume of traffic, the pavement section below may be used for the roadway and parking areas.

Material	Thickness	Specification
Bituminous Top Course	1.5 in.	402.128902
Bituminous Binder Course	2.5 in.	402.198902
Subbase Course	12 in.	733.0402

The pavement section is based on a 20-year life. The design assumes some risk of misalignment over time due to frost effects, as is normal local practice. To avoid risk of frost effects, a thick (4.0 ft frost depth potential) non-frost susceptible pavement section would be required, which is not commonly provided and would result in significant cost premiums.

Soil subgrades below pavement sections are anticipated to generally be suitable following proof-rolling with a minimum 10-ton vibratory roller. Common fill may be used to raise grade to pavement section subgrade level. Topsoil and forest mat materials will need to be excavated below proposed pavement sections.

3.8.3 Slopes

Permanent site cut and fill slopes should be 2H:1V, or flatter. Steeper slopes may be feasible where covered by riprap, but don't appear warranted.

3.8.4 Utilities

New utilities may include electrical, gas, telecommunications, and water lines. These utilities may be supported on sand bedding, unless the site civil engineer prefers a different material.

4. ENVIRONMENTAL SOIL AND GROUNDWATER MANAGEMENT

4.1 SITE BACKGROUND

The following site history is based on review of historic maps, literature and construction drawings. The Kensico Reservoir was originally built in 1885, then expanded in 1915 to 1917. In order to contain the expanded reservoir, a dike was constructed at the Waterfowl Building site. Around 1938, Shaft 18 was constructed, including an inlet channel into the reservoir and an aeration basin. At that time, the dike was relocated near Shaft 18 and to the west, but no major changes were made at the Waterfowl Building site.

4.2 REGULATORY SETTING

Disposal of soil at landfills is governed by NYSDEC and the disposal facility.

Reuse of soil is governed by NYSDEC 6 NYCRR Part 375. In general, reuse of soil onsite costs less than offsite disposal. Transportation cost and tipping fees can significantly influence cost for offsite reuse or offsite disposal.

Groundwater effluent is governed by NYSDEC 6 NYCRR Part 703.6, TOGS 1.1.1, and Chapter X Division of Water. Kensico Reservoir is Class AA (per 935.6). Groundwater is Class GA (per 703.6).

4.3 LABORATORY CHEMICAL TEST RESULTS

4.3.1 Soil

No compounds were recorded above laboratory detection limits, except metals which were detected at typical background levels.

4.3.2 Groundwater

VOCs are present in the groundwater at B5 at levels below the groundwater effluent limitations provided in NYSDEC 6 NYCRR Part 703.6, TOGS 1.1.1.

4.4 PHOTOIONIZATION DETECTOR RESULTS

The PID results did not indicate that VOC's are present in the soil.

4.5 SOIL REUSE CHARACTERIZATION AND RECOMMENDATIONS

In accordance with NYSDEC 6 NYCRR Part 375, the soil tested meets the "Unrestricted" Soil Cleanup Objectives (SCO). There are no environmental restrictions for on-site reuse of excavated soil.

Excess soil requiring off-site disposal should be taken to a licensed facility such as a landfill or Owner-approved beneficial reuse site. NYSDEC approved Beneficial Use Determination (BUD) sites that can accept soil are listed on the DECs website. Per 6 CRR-NY 360.12, the excess soil requiring off-site disposal is considered a waste type "Soil." There are 28 approved facilities that can accept "Soil." Since the fill at the site meets the "Unrestricted" SCOs, additional documentation for NYSDEC is not required

prior to transport to an approved BUD site. Note that disposal of excess soil at a landfill or BUD site may require the following:

- Preparation of a waste generator letter
- Preparation of waste profile sheet
- Additional sampling if the laboratory data is greater than 1-year old
- Submittal of laboratory data to the facility
- Licensed waste transporter with permit to transport soil to the facility

4.6 GROUNDWATER CHARACTERIZATION

Groundwater at B5 contained low concentrations of VOCs and SVOCs. We do not anticipate encountering groundwater during construction of the Waterfowl Building except perhaps during a wet season. Refer to Section 5.5 below for dewatering considerations.

5. CONSTRUCTION CONSIDERATIONS

5.1 GENERAL

This section provides comments related to foundation construction, earthwork and other geotechnical aspects of the project. It will aid those responsible for the preparation of contract plans and specifications and those involved with construction monitoring. Contractors must evaluate potential construction problems based on their own knowledge and experience in the area and based on similar localities, taking into account their own proposed construction methods and procedures.

5.2 EARTHWORK

Excavations for the building are expected to be up to about 6 ft deep, in existing fill. Conventional heavy construction equipment appears practical for excavation of the soils.

It appears that open cuts will be feasible for the building, but this should be checked based on as-built location of new or relocated utilities, and also based on the contractor's selected excavation plan (means and methods).

Excavation geometry should conform to OSHA excavation regulations contained in 29 CFR Part 1926, latest revision. Temporary soil slopes of 1.5H:1V, or flatter, appear appropriate but should be confirmed during construction based on conditions at the time of excavation.

5.3 FOUNDATION BEARING SURFACE PREPARATION

5.3.1 Footings

Unsuitable materials should be removed within a 1H:1V splay beneath foundations. Footing bearing surfaces should consist of minimum 12 in. thickness of compacted Granular Fill placed over a proof-compacted subgrade. Footing subgrades should be compacted with a vibratory plate compactor with a minimum 5,000 lbs. centrifugal force. The subgrades should be observed in the field by the Geotechnical Engineer's representative to confirm suitability.

Final excavation should be made with a smooth-edged bucket to avoid disturbance to the silty soils. Care should be taken to prevent surface water from collecting on the subgrade. Worker and equipment traffic over bearing surfaces should be minimized. It may be difficult to prepare soil subgrades in cold and wet weather. If subgrade protection difficulties are encountered due to water, various methods can be utilized such as:

- Leave subgrades high until immediately before forming and concreting to minimize the time the subgrade is exposed.
- Overexcavate by 3 in. using a smooth-edged bucket, and place a concrete mudmat, then backfill to the design bearing elevation after the concrete cures.

5.3.2 Slab-On-Grade

Slab-on-grade subgrade will consist of compacted Granular Fill over existing soils after removal of topsoil. Slab bearing surfaces should be compacted with a vibratory plate compactor or vibratory drum roller with a minimum 5,000 lbs. centrifugal force. The subgrades should be observed in the field by the Geotechnical Engineer's representative to confirm suitability.

5.4 ROADWAY SUBGRADE PREPARATION

Topsoil should be stripped below the pavement. Soil subgrades should be compacted with a vibratory plate compactor or vibratory drum roller with a minimum 5,000 lbs. centrifugal force. During proof-compacting, locations that appear soft, exhibit weaving, or are otherwise unstable should be evaluated by the project Geotechnical Engineer to determine if stabilization methods are required, such as overexcavation to firm material or stabilization with compacted Common or Granular Fill.

5.5 DEWATERING

During wet weather, groundwater may be encountered or will be close to the excavation subgrade beneath the footings. Final excavation, subgrade preparation, filling, foundation construction, and utility construction should be conducted "in the dry". Dewatering may be accomplished by pumping from sumps and trenches within and around excavations. Dewatering systems should be designed and operated to lower the water below the excavation subgrade a sufficient distance to avoid disturbance to the subgrade. The dewatering system should also be designed to prevent pumping of fine soils and undermining of previous construction. Surface water runoff should be diverted away from the excavations and work areas, and storm water that accumulates should be dewatered. Where water is present, subgrades may be stabilized by placing granular fill over a geotextile filter. The use of crushed stone should be avoided in the dike.

Environmentally, after appropriate sediment removal, the groundwater may be discharged to the storm drain system or into the ground.

5.6 EARTHWORK DURING FREEZING WEATHER

Precautions should be taken if work takes place while temperatures are below freezing. Frozen soil or soil containing snow or ice should not be used as compacted fill. Placement of fill should not be conducted when air temperatures are below freezing. Soil bearing surfaces below slabs and foundations must be protected against freezing, before and after placement of concrete. Frost protection should be provided as soon as possible after foundations are constructed.

Fill should not be placed on snow, ice or frozen subgrades. At the end of each day's operations, the last lift of placed fill should be rolled by a smooth-wheeled roller to eliminate ridges of uncompacted soil to aid runoff and drainage. Silty site soils are susceptible to disturbance by freezing, especially in the presence of water and traffic.

5.7 CONSTRUCTION MONITORING

The recommendations contained in this report are based on known and predictable behavior of properly engineered and constructed foundations and other facilities. We recommend that personnel

qualified by training and experience perform full-time field observations of the geotechnical aspects of construction, including:

- removal of unsuitable materials
- preparation of foundation and slab on grade subgrades
- placement and compaction of Granular Fill

Haley & Aldrich would be pleased to provide the geotechnical field monitoring during construction. Field observations are intended to confirm compliance with the design concepts and specifications and to allow design changes in the event that subsurface conditions differ from those anticipated prior to construction.

TABLE I
SUMMARY OF ANALYTICAL RESULTS FOR SOIL
VALHALLA WATERFOWL MANAGEMENT BUILDING
VALHALLA, NEW YORK

					LOCATION	B1_0-5	B2_0-5	B3_1-6	B4_0-5	B5_1-6
					SAMPLING DATE	7/13/2018	7/13/2018	7/13/2018	7/13/2018	7/13/2018
					LAB SAMPLE ID	8070435-01	8070435-02	8070435-03	8070435-04	8070435-05
					SAMPLE TYPE					
					SAMPLE DEPTH (ft.)	0-5	0-5	1-6	0-5	1-6
	CasNum	**Unrestricted Use SCO**	**Residential Use SCO**	**Units**		Results	Results	Results	Results	Results
General Chemistry										
Chromium, Hexavalent	18540-29-9	1	22	mg/kg		<0.43	<0.43	<0.46	<0.45	<0.45
Cyanide, Total	57-12-5	27	27	mg/kg		<0.5	<0.55	<0.53	<0.52	<0.52
pH				--		**8.33**	**8.06**	**9.62**	**10.8**	**7.92**
REDOX Potential				mV		**204**	**215**	**-20.9**	**-31.4**	**48.7**
Chlorinated Pesticides (EPA 8081B)										
4,4'-DDD	72-54-8		180	ug/kg		ND(5.6)	ND(6.1)	ND(5.9)	ND(6.2)	ND(5.7)
4,4'-DDE	72-55-9	0.0033	1.8	ug/kg		ND(5.6)	ND(6.1)	ND(5.9)	ND(6.2)	ND(5.7)
4,4'-DDT	50-29-3		94	ug/kg		ND(5.6)	ND(6.1)	ND(5.9)	ND(6.2)	ND(5.7)
Alachlor				ug/kg		ND(56)	ND(61)	ND(59)	ND(62)	ND(57)
Aldrin	309-00-2		1.4	ug/kg		ND(5.6)	ND(6.1)	ND(5.9)	ND(6.2)	ND(5.7)
Alpha-BHC	319-84-6		6.8	ug/kg		ND(5.6)	ND(6.1)	ND(5.9)	ND(6.2)	ND(5.7)
Beta-BHC	319-85-7		14	ug/kg		ND(5.6)	ND(6.1)	ND(5.9)	ND(6.2)	ND(5.7)
Chlordane	57-74-9			ug/kg		ND(34)	ND(37)	ND(35)	ND(37)	ND(34)
Delta-BHC	319-86-8		1000	ug/kg		ND(5.6)	ND(6.1)	ND(5.9)	ND(6.2)	ND(5.7)
Dieldrin	60-57-1		2.8	ug/kg		ND(1.1)	ND(1.2)	ND(1.2)	ND(1.2)	ND(1.1)
Endosulfan I	959-98-8		920	ug/kg		ND(5.6)	ND(6.1)	ND(5.9)	ND(6.2)	ND(5.7)
Endosulfan II	33213-65-9		920	ug/kg		ND(5.6)	ND(6.1)	ND(5.9)	ND(6.2)	ND(5.7)
Endosulfan sulfate	1031-07-8		920	ug/kg		ND(5.6)	ND(6.1)	ND(5.9)	ND(6.2)	ND(5.7)
Endrin	72-20-8		410	ug/kg		ND(5.6)	ND(6.1)	ND(5.9)	ND(6.2)	ND(5.7)
Endrin aldehyde	7421-93-4			ug/kg		ND(5.6)	ND(6.1)	ND(5.9)	ND(6.2)	ND(5.7)
Endrin ketone	53494-70-5			ug/kg		ND(5.6)	ND(6.1)	ND(5.9)	ND(6.2)	ND(5.7)
Gamma-BHC				ug/kg		ND(5.6)	ND(6.1)	ND(5.9)	ND(6.2)	ND(5.7)
Heptachlor	76-44-8		29	ug/kg		ND(5.6)	ND(6.1)	ND(5.9)	ND(6.2)	ND(5.7)
Heptachlor epoxide	1024-57-3			ug/kg		ND(5.6)	ND(6.1)	ND(5.9)	ND(6.2)	ND(5.7)
4,4-Methoxychlor	72-43-5			ug/kg		ND(5.6)	ND(6.1)	ND(5.9)	ND(6.2)	ND(5.7)
Toxaphene	8001-35-2			ug/kg		ND(110)	ND(120)	ND(120)	ND(120)	ND(110)
Chlorinated Herbicides (EPA 8151A)										
2,4,5-T	93-76-5	--	--	ug/kg		ND(91)	ND(91)	ND(96)	ND(95)	ND(95)
2,4,5-TP (Silvex)	93-72-1	3.8	58	ug/kg		ND(91)	ND(91)	ND(96)	ND(95)	ND(95)
2,4-D	94-75-7	--	--	ug/kg		ND(180)	ND(180)	ND(190)	ND(190)	ND(190)
2,4-DB				ug/kg		ND(1800)	ND(1800)	ND(1900)	ND(1900)	ND(1900)
Dalapon				ug/kg		ND(91)	ND(91)	ND(96)	ND(95)	ND(95)
Dicamba				ug/kg		ND(91)	ND(91)	ND(96)	ND(95)	ND(95)
Dichloroprop				ug/kg		ND(180)	ND(180)	ND(190)	ND(190)	ND(190)
Dinoseb				ug/kg		ND(180)	ND(180)	ND(190)	ND(190)	ND(190)
Polychlorinated Biphenyls by ASE (EPA 8082A)										
PCBs, Total	1336-36-3	0.1	1	mg/kg		ND	ND	ND	ND	ND
Semivolatile Organics (EPA 8270D)										
					SUM	ND	ND	ND	ND	ND
Total Metals (EPA 6010C)										
Arsenic, Total	7440-38-2	13	16	mg/kg		**1.5**	**2.5**	**1.7**	**2.3**	**2.7**
Barium, Total	7440-39-3	350	350	mg/kg		**97**	**110**	**83**	**81**	**120**
Beryllium, Total	7440-41-7	7.2	14	mg/kg		ND(1)	ND(1.2)	ND(1.2)	ND(1.2)	ND(1.2)
Cadmium, Total	7440-43-9		60	mg/kg		ND(0.51)	ND(0.6)	ND(0.6)	ND(0.59)	ND(0.58)
Chromium, Total	7440-47-3	--	--	mg/kg		**21**	**25**	**21**	**19**	**25**
Copper, Total	7440-50-8	50	270	mg/kg		**19**	**21**	**19**	**19**	**25**
Lead, Total	7439-92-1	63	400	mg/kg		**4.6**	**7.1**	**2.8**	**7.7**	**6.1**
Manganese, Total	7439-96-5	1600	2000	mg/kg		**330**	**360**	**330**	**480**	**470**
Mercury, Total	7439-97-6	0.18	0.81	mg/kg		ND(0.14)	ND(0.15)	ND(0.14)	ND(0.14)	ND(0.14)
Nickel, Total	7440-02-0	30	140	mg/kg		**16**	**19**	**16**	**13**	**19**
Selenium, Total	7782-49-2	3.9	36	mg/kg		ND(1)	ND(1.2)	ND(1.2)	ND(1.2)	ND(1.2)
Silver, Total	7440-22-4		6800	mg/kg		ND(2)	ND(2.4)	ND(2.4)	ND(2.4)	ND(2.3)
Zinc, Total	7440-66-6	109	2200	mg/kg		**43**	**50**	**46**	**56**	**52**
Volatile Organics (EPA 8260C)										
					SUM	ND	ND	ND	ND	ND

NOTES:

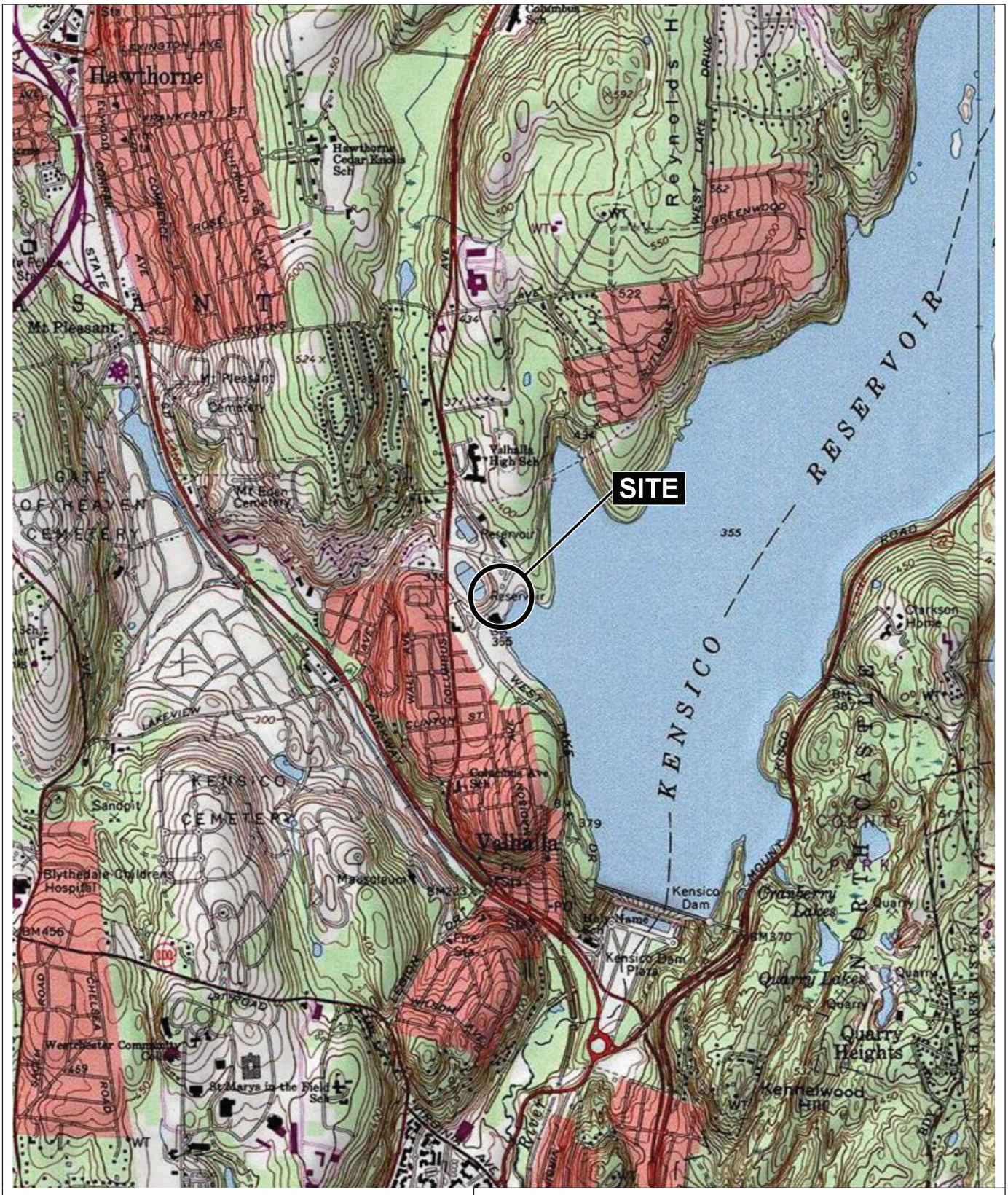
1. This table typically includes only those compounds detected on the dates indicated.
2. SCO refers to the Soil Cleanup Objective tables as set forth by the New York State Department of Environmental Conservation (DEC) 6 NYCRR Part 375 Environmental Remediation Programs, Section 6.
3. SCO criteria are listed in the same units as the analyte test result reported.
4. ND(0.01) means that the compound was not detected above laboratory detection limit. The number in parentheses is the detection limit.
5. - means not applicable or not analyzed.
6. mg/kg means milligrams per kilogram (ppm)
7. Red and bolded cells indicate concentration exceeds SCO criteria for Unrestricted Use.
8. SCO categories for Unrestricted Use and Residential Use take precedence over other SCO categories (Restricted-Residential, Commercial, and Industrial). The other SCO categories are not provided for comparison since the compounds detected did not exceed the more stringent SCO criteria.

TABLE II
SUMMARY OF ANALYTICAL RESULTS FOR GROUNDWATER
VALHALLA WATERFOWL MANAGEMENT BUILDING
VALHALLA, NEW YORK

LOCATION					**B5-OW**
SAMPLING DATE					**7/13/2018**
LAB SAMPLE ID					**8070435-06**
SAMPLE TYPE					**Water**
	CasNum	(groundwater) **6 CRR-NY 703.6**	(surface water) **NY-TOGS-GA**	**Units**	**Results**
Semivolatile Organic Compounds (SVOCs) by EPA 8270D					ND
Volatile Organic Compounds (VOCs) by EPA 8260C					
1,2-Dichlorobenzene	95-50-1	3	3	ug/l	1.6
Chloroform	67-66-3	7	7	ug/l	5.7
Naphthalene	91-20-3	--	10	ug/l	1.3

NOTES:

1. This table typically includes only those compounds detected on the dates indicated.
2. Criteria are listed in the same units as the analyte test result reported.
3. ND means that the compound was not detected above the laboratory detection limit.
4. - means not applicable or not analyzed.
5. mg/L means milligrams per liter (ppm). ug/l means micrograms per liter (ppb).



MAP SOURCE: ESRI

SITE COORDINATES: 41°5'9"N, 73°46'27"W

HALEY ALDRICH

WATERFOWL MANAGEMENT BUILDING
WEST LAKE DRIVE
VALHALLA, NEW YORK

PROJECT LOCUS

APPROXIMATE SCALE: 1 IN = 2000 FT
JULY 2018

FIGURE 1

130464-002_1_LOCUS.PDF

Saved by: RGENOVESI Printed: 8/27/2018 6:40 AM Sheet: HA-FIG-D-P
G:\130464_VALHALLA WATER FOWL\002\CAD\2018-0730-HAI-BLP.DWG

LEGEND

B1 — DESIGNATION AND APPROXIMATE LOCATION OF TEST BORING DRILLED BY CRAIG DRILLING FOR HALEY & ALDRICH ON 12 & 13 JULY 2018

APPROXIMATE LOCATION OF PROPOSED WATERFOWL MANAGEMENT BUILDING

NOTES

1. BASE PLAN IS AUTOCAD FILE "EXISTING CONDITIONS SURVEY AND UTILITIES - UPDATE 3D CURBS-FINAL.DWG" PROVIDED BY HAZEN AND SAWYER.
2. WATERFOWL MANAGEMENT BUILDING LOCATION APPROXIMATED BY HALEY & ALDRICH USING "SITE PLAN_LINEAR PS WITH BOATWASH.JPG" PROVIDED BY HAZEN AND SAWYER.

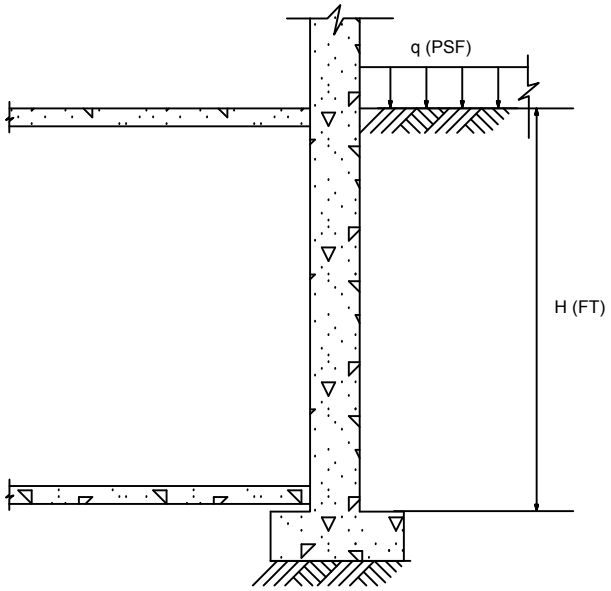
HALEY ALDRICH

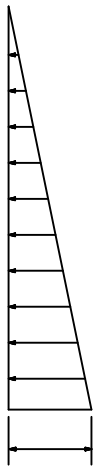
WATERFOWL MANAGEMENT BUILDING
VALHALLA, NEW YORK

BORING LOCATION PLAN

SCALE: AS SHOWN
AUGUST 2018

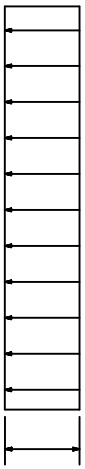
FIGURE 2





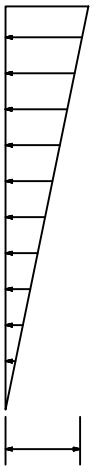
55H
(PSF)

LATERAL EARTH



0.5q
(PSF)

SURCHARGE



10.2H
(PSF)

SEISMIC (6)

NOTES:

1. IT IS ASSUMED THAT BELOW-GRADE WALLS ARE BRACED AT THE TOP BY THE FLOOR SLAB.
2. PRESSURE DISTRIBUTIONS ASSUME WALL BACKFILL IS GRANULAR FILL.
3. PRESSURE DISTRIBUTIONS ASSUME WALLS ARE DRAINED, THEREFORE, THERE IS NO HYDROSTATIC PRESSURE.
4. LATERAL EARTH PRESSURE ASSUMES FINISHED GRADE BEHIND WALL IS FLAT TO A DISTANCE "H" BEHIND WALL.
5. ASSUME 250 PSF SURCHARGE PRESSURE FOR CONSTRUCTION EQUIPMENT AND MATERIALS. HEAVIER LOADS SHOULD NOT BE ALLOWED ADJACENT TO WALLS UNLESS THE WALL IS EXPLICITLY DESIGNED FOR SUCH SURCHARGE LOADS USING THE SURCHARGE PRESSURE DIAGRAM.
6. THE BUILDING CODE DOES NOT REQUIRE THE WALLS BE DESIGNED TO WITHSTAND THE SEISMIC LATERAL PRESSURE.
7. SLIDING:
   SEE REPORT FOR COEFFICIENT OF FRICTION BETWEEN FOOTINGS AND BASE
   F.S. > 1.5
   OVERTURNING:
   F.S. > 1.5

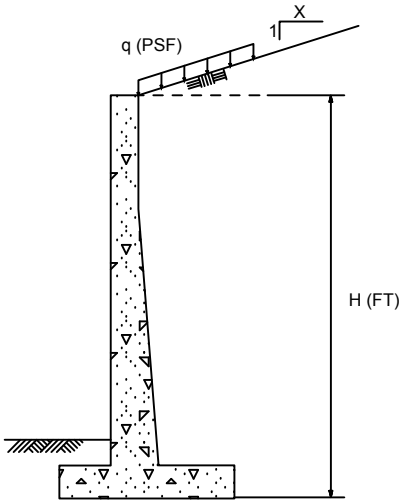
HALEY ALDRICH

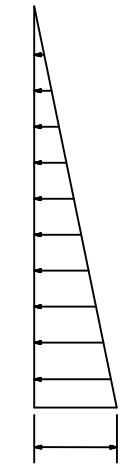
WATERFOWL MANAGEMENT BUILDING
VALHALLA, NEW YORK

AT REST EARTH PRESSURES ON RETAINING WALLS

SCALE: AS SHOWN
AUGUST 2018

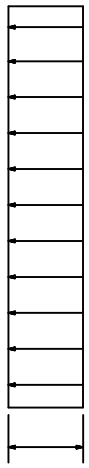
FIGURE 3





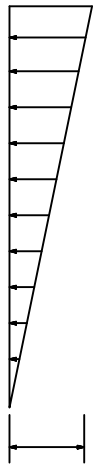
2H : 1V 50H (PSF)
3H : 1V 45H (PSF)
4H : 1V 40H (PSF)
HORIZ. 35H (PSF)

ACTIVE EARTH



0.3q (PSF)

SURCHARGE



10.2H (PSF)

SEISMIC (6)

NOTES:

1. THESE LOADS ARE BASED ON ACTIVE EARTH PRESSURE WHICH APPLY TO WALLS THAT ARE FREE TO DEFLECT AT LEAST 0.001H AT THE TOP.
2. PRESSURE DISTRIBUTIONS ASSUME WALL BACKFILL IS GRANULAR FILL.
3. PRESSURE DISTRIBUTIONS ASSUME WALLS ARE DRAINED, THEREFORE, THERE IS NO HYDROSTATIC PRESSURE.
4. ASSUME 250 PSF SURCHARGE PRESSURE FOR CONSTRUCTION EQUIPMENT AND MATERIALS. HEAVIER LOADS SHOULD NOT BE ALLOWED ADJACENT TO WALLS UNLESS THE WALL IS EXPLICITLY DESIGNED FOR SUCH SURCHARGE LOADS USING THE SURCHARGE PRESSURE DIAGRAM.
5. SLIDING:
   F.S. > 1.5
   OVERTURNING:
   F.S. > 1.5
   SEE REPORT FOR COEFFICIENT OF FRICTION BETWEEN FOOTING AND BASE

   IGNORE PASSIVE RESISTANCE IN FRONT OF WALL.
6. THE BUILDING CODE DOES NOT REQUIRE THE WALLS BE DESIGNED TO WITHSTAND THE SEISMIC LATERAL PRESSURE.

HALEY ALDRICH

WATERFOWL MANAGEMENT BUILDING
VALHALLA, NEW YORK

ACTIVE EARTH PRESSURES ON RETAINING WALLS

SCALE: AS SHOWN
AUGUST 2018

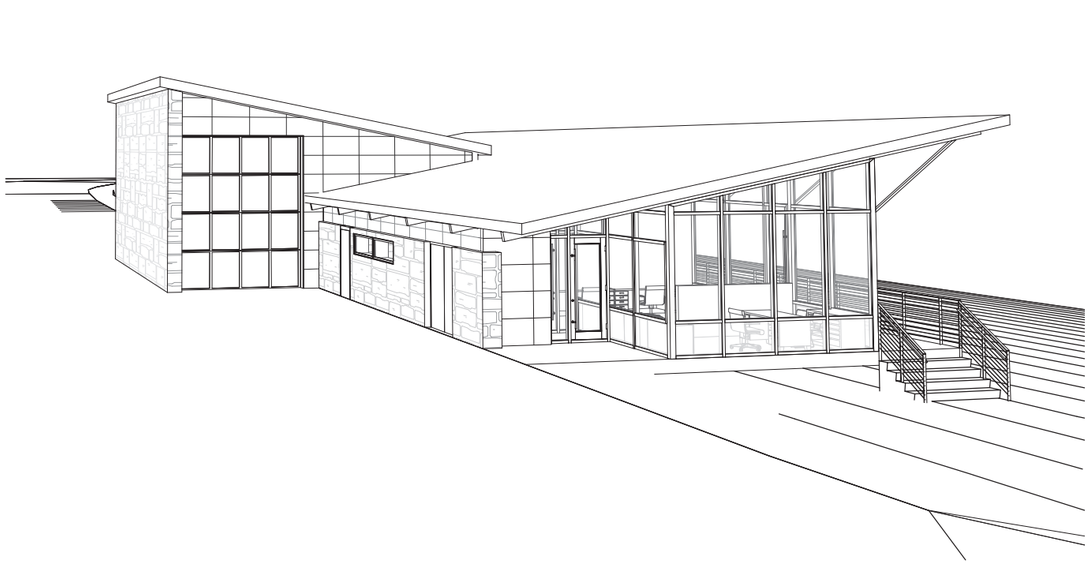
FIGURE 4

APPENDIX A

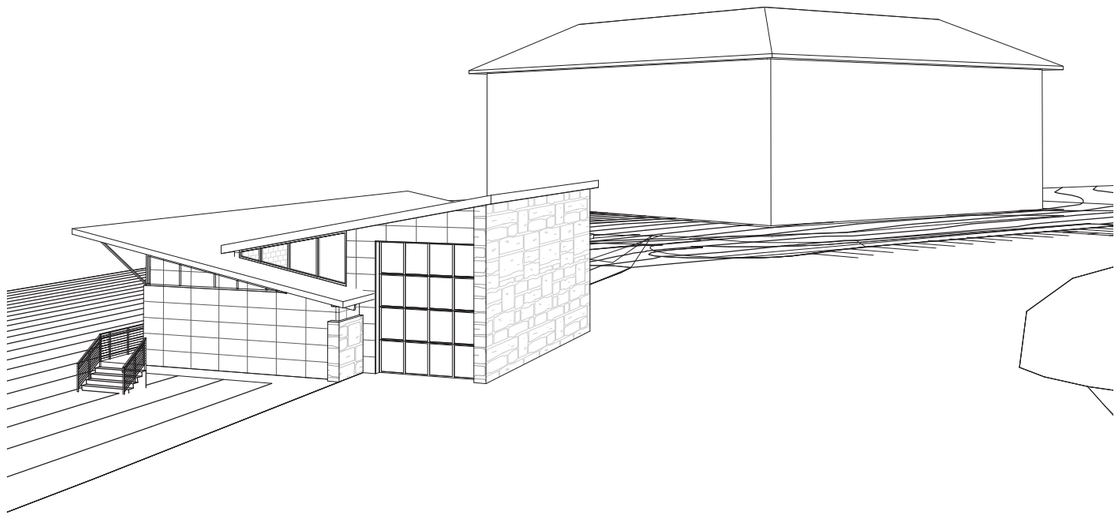
Preliminary Structural and Civil Drawings

Building Views

Waterfowl Management Program Building
Boat Wash | CRO-557



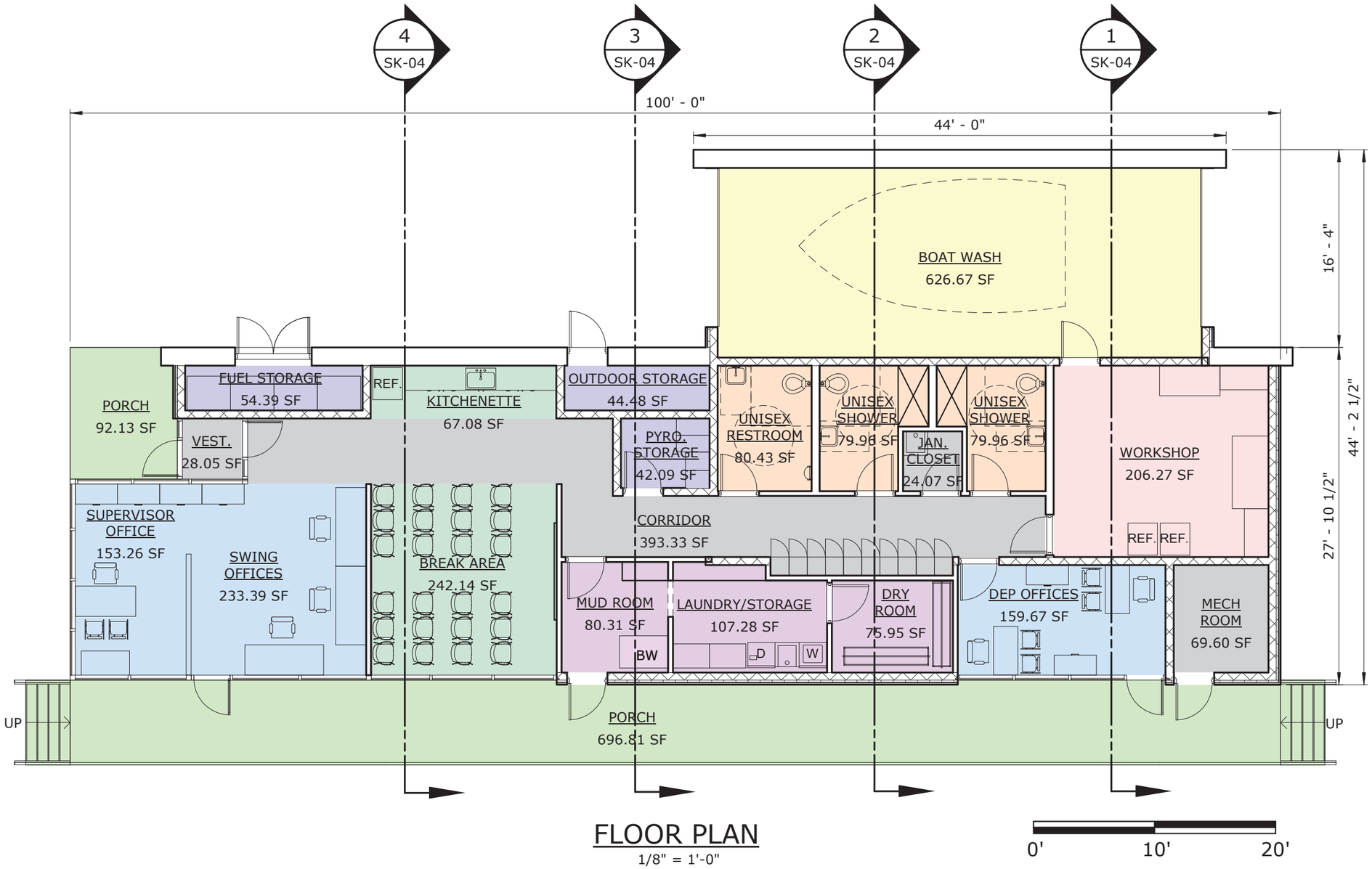
3D VIEW 1



3D VIEW 2

Floor Layout

Waterfowl Management Program Building
Boat Wash | CRO-557

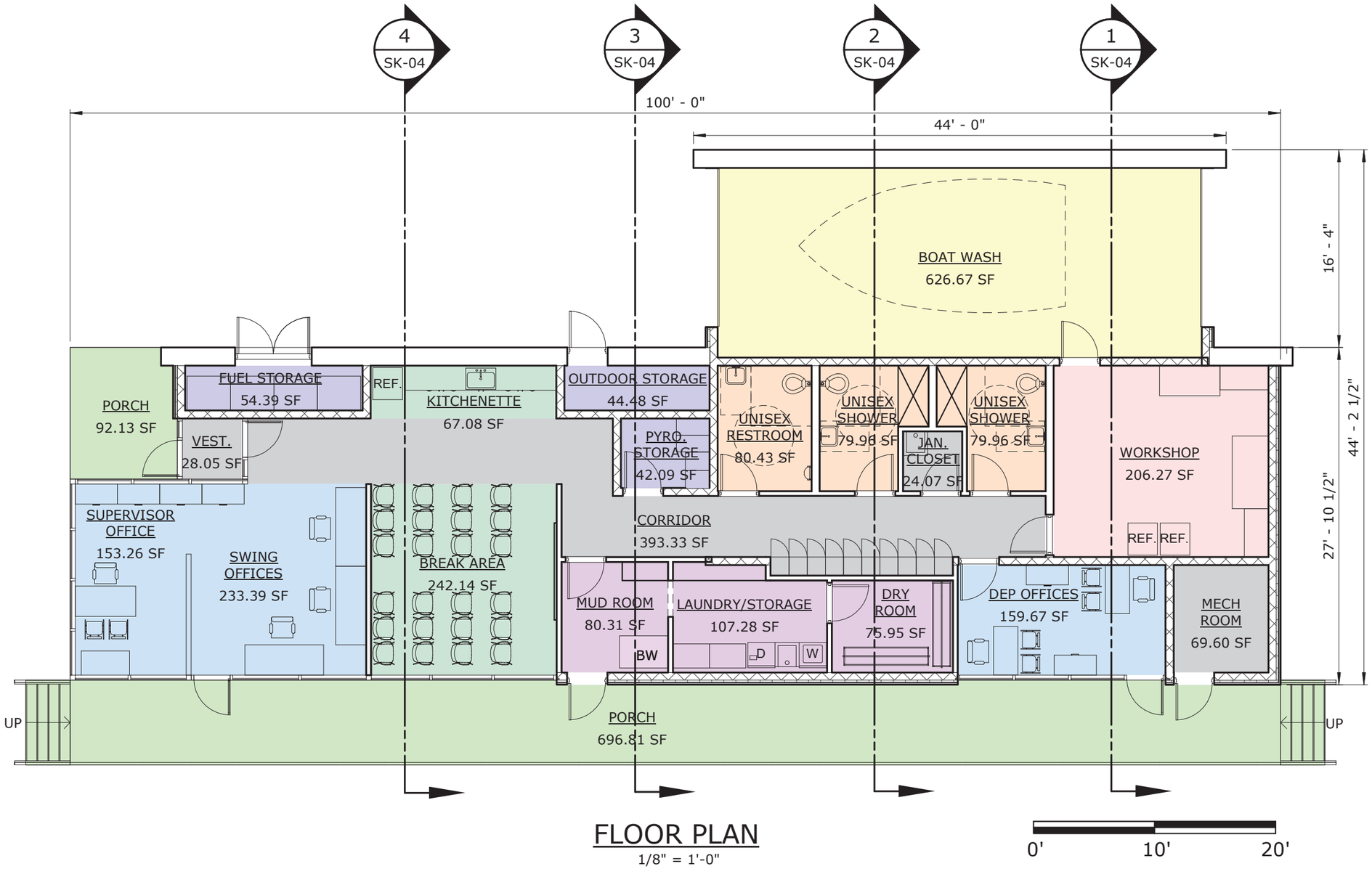


Hazen | GoshowArchitects

Figure 1-3

Floor Layout

Waterfowl Management Program Building
Boat Wash | CRO-557

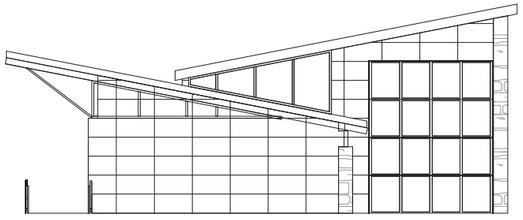


Hazen | GoshowArchitects

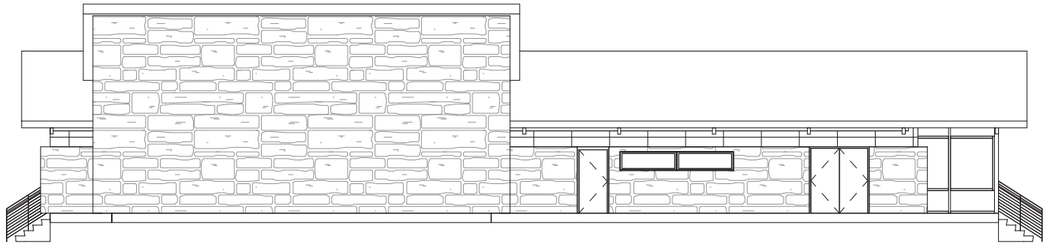
Figure 4-21

Building Elevation

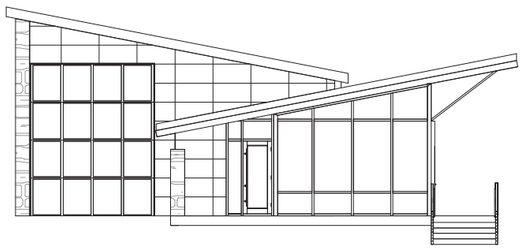
Waterfowl Management Program Building
Boat Wash | CRO-557



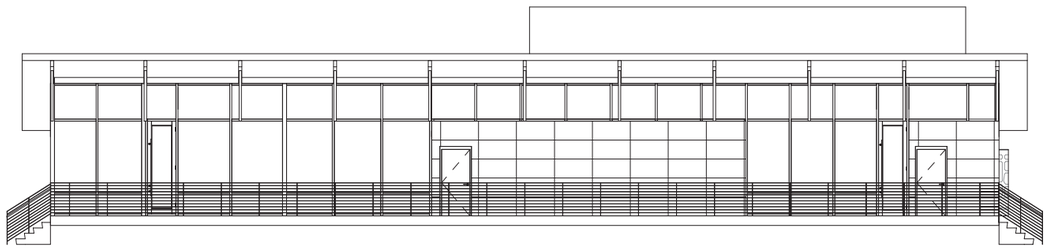
NORTH
1/16" = 1'-0"



WEST
1/16" = 1'-0"



SOUTH
1/16" = 1'-0"



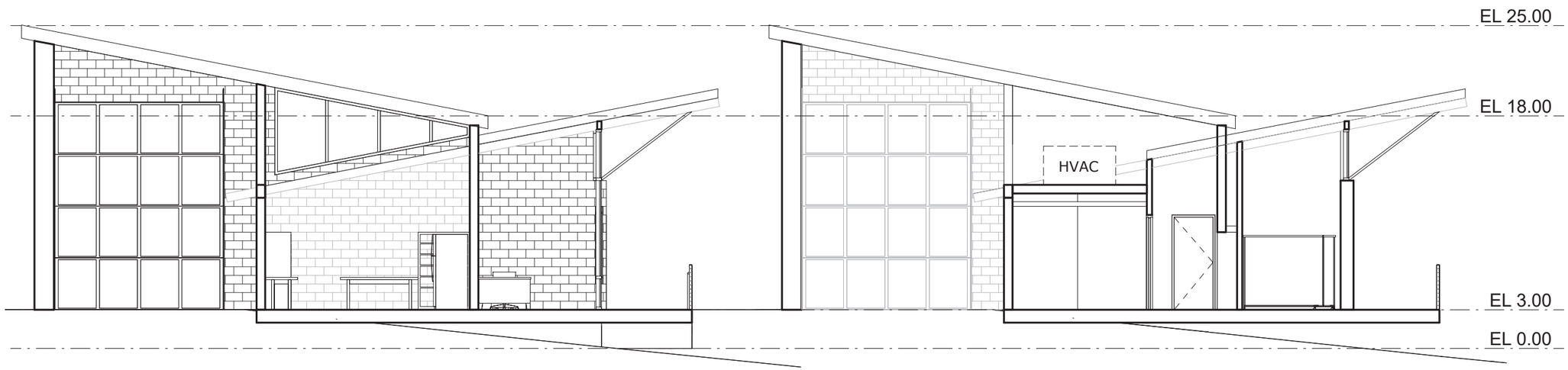
EAST
1/16" = 1'-0"

Hazen | GoshowArchitects

Figure 4-22

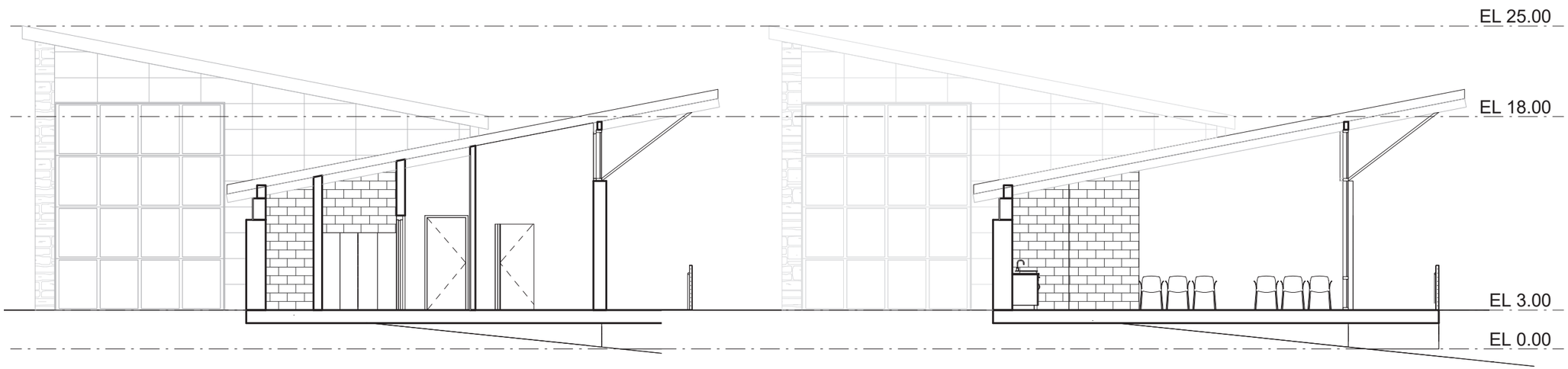
Building Sections

Waterfowl Management Program Building
Boat Wash | CRO-557



SECTION 1
1/8" = 1'-0"

SECTION 2
1/8" = 1'-0"



SECTION 3
1/8" = 1'-0"

SECTION 4
1/8" = 1'-0"

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Figure 4-23

APPENDIX B

Test Boring Logs

TEST BORING REPORT

Boring No. B1

Project	Valhalla Waterfowl Management Building, Valhalla, New York
Client	Hazen Sawyer
Contractor	Craig Drilling

File No. 130464-002
Sheet No. 1 of 2
Start 13 July 2018
Finish 13 July 2018
Driller N. Behler
H&A Rep. R. Genovesi
Elevation 362.5 (est.)
Datum NAVD 88
Location See Plan
N 821273.05
E 692144.12

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HW	S	-	Rig Make & Model: ATV-Mounted CME 750x
Inside Diameter (in.)	4.0	1 3/8	-	Bit Type: Roller Bit
Hammer Weight (lb)	-	140	-	Drill Mud: None
Hammer Fall (in.)	-	30	-	Casing: Driven
				Hoist/Hammer: - Automatic Hammer
				PID Make & Model: MiniRAE 3000 10.6 eV

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0	7 14 11 11	S1 18	0.0 2.0	SM	362.3 0.2	-3 IN. TOPSOIL- Medium dense brown silty SAND with gravel, PID: background	5	10	15	25	25	20				
	11 12 12 8	S2 20	2.0 4.0	SM		Similar to S1 below 1 ft, PID: background	5	10	15	25	25	20				
5	3 3 3 4	S3 0	4.0 6.0			No recovery										
	2 2 2 3	S4 20	6.0 8.0	SM		Loose gray-brown silty SAND, no odor, wet, PID: background		10	10	30	25	25				
10	1 2 2 2	S5 16	10.0 12.0	SM		Loose gray-brown silty SAND, no odor, wet, PID: background		5	10	25	30	30				
15	1 1 1 1	S6 10	15.0 17.0	SM		Very loose gray-brown silty SAND, no odor, wet, PID: background		3	6	17	31	43				
					345.5 17.0	-PROBABLE FILL-										
20	1 2 3 4	S7 14	20.0 22.0	SM		Loose gray-brown silty SAND, no odor, wet, PID: background		10	20	25	25	20				
25						-GLACIAL OUTWASH -										

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water
7/13/2018		drilling			6

Sample ID
O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram
Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary
Overburden (ft) 35.7
Rock Cored (ft) -
Samples 10S

Boring No. B1

Field Tests: **Dilatancy**: R - Rapid S - Slow N - None
Toughness: L - Low M - Medium H - High
Plasticity: N - Nonplastic L - Low M - Medium H - High
Dry Strength: N - None L - Low M - Medium H - High V - Very High

†**Note: Maximum particle size is determined by direct observation within the limitations of sampler size.**

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

HALEY ALDRICH

TEST BORING REPORT

Boring No. B1
File No. 130464-002
Sheet No. 2 of 2

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
25	4 5 4 5	S8 12	25.0 27.0	SM		Similar to S7, PID: background		10	20	25	25	20				
30	3 4 8 10	S9 14	30.0 32.0	SM		Similar to S8 except medium dense, PID: background		10	20	25	25	20				
					330.5 32.0	-GLACIAL OUTWASH -										
						-GLACIAL TILL-										
35	45 60 50/3"	S10 6	35.0 36.3	SM	326.8 35.7	Very dense gray brown silty SAND with gravel, no odor, wet, bedrock in tip, PID: background	10	15	15	20	25	15				
						BOTTOM OF EXPLORATION 35.7 FT Note: Borehole grouted with bentonite/ soil mix.										

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. B1

TEST BORING REPORT

Boring No. B2

Project	Valhalla Waterfowl Management Building, Valhalla, New York
Client	Hazen Sawyer
Contractor	Craig Drilling

File No. 130464-002
Sheet No. 1 of 1
Start 13 July 2018
Finish 13 July 2018
Driller N. Behler
H&A Rep. R. Genovesi
Elevation 364.0 (est.)
Datum NAVD 88
Location See Plan
N 821389.11
E 692174.08

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HW	S	-	Rig Make & Model: ATV-Mounted CME 750x
Inside Diameter (in.)	4.0	1 3/8	-	Bit Type: Roller Bit
Hammer Weight (lb)	-	140	-	Drill Mud: None
Hammer Fall (in.)	-	30	-	Casing: Driven
				Hoist/Hammer: - Automatic Hammer
				PID Make & Model: MiniRAE 3000 10.6 eV

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0	5 8 17 16	S1 18	0.0 2.0	SW-SM	363.6 0.4	-5 IN. TOPSOIL- Medium dense brown well-graded SAND with gravel, no odor, moist, PID: background	10	15	20	20	25	10				
	18 50/3"	S2 8	2.0 2.9	SW-SM		Similar to S1 except very dense, gravel in spoon tip	10	15	20	20	25	10				
5	5 5 5 5	S3 12	5.0 7.0	SM		Medium dense brown to gray-brown silty SAND, no odor, moist, PID: background		4	5	17	31	43				
	9 10 12 8	S4 10	7.0 9.0	SM		Similar to S3 except contains 3 in. wood fragment, PID: background	5	5	10	20	25	35				
10	3 9 14 8	S5 0	10.0 12.0			No recovery -PROBABLE FILL-										
15	10 8 6 6	S6 10	15.0 17.0	GW	349.0 15.0	Medium dense gray-brown well-graded GRAVEL with sand, no odor, wet, PID: background -GLACIAL OUTWASH-	20	30	15	15	15	5				
20	4 18 50/3"	S7 9	20.0 21.2	SP	342.5 21.5	Very dense light gray poorly-graded SAND with gravel, no odor, wet, PID: background. Bottom 4 in. of sample consisted of gray-brown weathered schist. Note: HW casing and sampler refusal at about 21 ft. BOTTOM OF EXPLORATION 21.2 FT Note: Borehole grouted with bentonite/ soil mix.	10	10	25	30	20	5				

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water
7/13/2018		drilling			10

Sample ID
O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram
Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary
Overburden (ft) 21
Rock Cored (ft) -
Samples 7S

Boring No. B2

Field Tests: **Dilatancy**: R - Rapid S - Slow N - None
Toughness: L - Low M - Medium H - High
Plasticity: N - Nonplastic L - Low M - Medium H - High
Dry Strength: N - None L - Low M - Medium H - High V - Very High

†**Note: Maximum particle size is determined by direct observation within the limitations of sampler size.**

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

TEST BORING REPORT

Boring No. B3

Project	Valhalla Waterfowl Management Building, Valhalla, New York
Client	Hazen Sawyer
Contractor	Craig Drilling

File No. 130464-002
Sheet No. 1 of 1
Start 12 July 2018
Finish 12 July 2018
Driller N. Behler
H&A Rep. R. Genovesi
Elevation 364.0 (est.)
Datum NAVD 88
Location See Plan
N 821373.73
E 692133.78

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HW	S	-	Rig Make & Model: ATV-Mounted CME 750x
Inside Diameter (in.)	4.0	1 3/8	-	Bit Type: Roller Bit
Hammer Weight (lb)	-	140	-	Drill Mud: None
Hammer Fall (in.)	-	30	-	Casing: Driven
				Hoist/Hammer: - Automatic Hammer
				PID Make & Model: MiniRAE 3000 10.6 eV

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0					363.0	-11 IN. CONCRETE PAVEMENT-										
	4 5 7 6	S1 18	1.0 3.0	SP	1.0	Medium dense brown poorly-graded SAND, no odor, moist, PID=0.7 ppm		5	35	40	15	5				
	5 8 15 10	S2 20	3.0 5.0	SM		Medium dense dark brown silty SAND with gravel, no odor, moist, PID=0.7 ppm	10	10	20	30	15	15				
5	4 4 4 4	S3 8	5.0 7.0	SM		Similar to S2 except loose, PID=0.5 ppm	10	10	20	30	15	15				
	3 3 6 5	S4 10	7.0 9.0	SM		Loose brown silty SAND, no odor, moist, PID=0.5 ppm		3	4	19	32	42				
10	2 3 10 5	S5 10	10.0 12.0	SM		Medium dense gray-brown silty SAND, no odor, wet, PID: background		10	20	20	25	25				
						-PROBABLE FILL-										
15	2 2 2 2	S6 18	15.0 17.0	SM		Loose gray-brown silty SAND, no odor, wet, PID: background		5	25	25	30	15				
					347.0 17.0											
20	3 3 4 4	S7 10	20.0 22.0	SM		Loose gray-brown silty SAND, no odor, wet, PID: background	5	5	20	25	25	20				
						-GLACIAL OUTWASH-										
25																

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water
7/12/2018		drilling			10

Sample ID
O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram
Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary
Overburden (ft) 37
Rock Cored (ft) -
Samples 10S

Boring No. B3

Field Tests: **Dilatancy**: R - Rapid S - Slow N - None
Toughness: L - Low M - Medium H - High
Plasticity: N - Nonplastic L - Low M - Medium H - High
Dry Strength: N - None L - Low M - Medium H - High V - Very High

†**Note: Maximum particle size is determined by direct observation within the limitations of sampler size.**

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

HALEY ALDRICH

TEST BORING REPORT

Boring No. B3

File No. 130464-002

Sheet No. 2 of 1

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
25	4 6 4 4	S8 16	25.0 27.0	SM		Medium dense gray-brown silty SAND, no odor, wet, PID: background		5	10	15	45	25				
30	4 10 50/2"	S9 12	30.0 31.7	SM		Similar to S8 except very dense		5	10	15	45	25				
					331.5 32.5	-GLACIAL OUTWASH-										
35	33 40 45 43	S10 22	35.0 37.0	SM		Very dense gray-brown silty SAND with gravel, no odor, wet -GLACIAL TILL-	10	10	10	30	25	15				
					327.0 37.0	BOTTOM OF EXPLORATION 37 FT										
						Note: Borehole backfilled with cuttings upon completion.										

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. B3

TEST BORING REPORT

Boring No. B4

Project	Valhalla Waterfowl Management Building, Valhalla, New York
Client	Hazen Sawyer
Contractor	Craig Drilling

File No. 130464-002
Sheet No. 1 of 2
Start 12 July 2018
Finish 12 July 2018
Driller N. Behler
H&A Rep. R. Genovesi
Elevation 364.0 (est.)
Datum NAVD 88
Location See Plan
N 821430.78
E 692155.09

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HW	S	-	Rig Make & Model: ATV-Mounted CME 750x
Inside Diameter (in.)	4.0	1 3/8	-	Bit Type: Roller Bit
Hammer Weight (lb)	-	140	-	Drill Mud: None
Hammer Fall (in.)	-	30	-	Casing: Driven
				Hoist/Hammer: - Automatic Hammer
				PID Make & Model: MiniRAE 3000 10.6 eV

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0					363.0	-11 IN. CONCRETE PAVEMENT-										
	10 5 9 8	S1 12	1.0 3.0	SM	1.0	Medium dense light brown silty SAND with gravel, no odor, moist, PID (composited from S1 and S2) = 0.3 ppm		15	20	30	20	15				
	9 11 10 7	S2 8	3.0 5.0	SM		Medium dense light brown silty SAND, no odor, moist, PID (composited from S1 and S2) = 0.3 ppm			25	30	30	15				
5	4 2 2 2	S3 6	5.0 7.0	SM		Similar to S2 except loose, PID: background			20	20	35	25				
	3 3 5 8	S4 6	7.0 9.0	SM		Similar to S3, PID=0.4 ppm			20	20	35	25				
10	4 4 4 4	S5 0	10.0 12.0			No recovery										
						-PROBABLE FILL-										
15					349.0											
	3 3 2 4	S6 12	15.0 17.0	SM	15.0	Loose gray-brown silty SAND, no odor, wet, PID: background		7	5	19	33	36				
20	4 9 7 7	S7 14	20.0 22.0	SM		Medium dense gray-brown silty SAND with gravel, no odor, wet, contains mica, PID: background	15	10	20	20	20	15				
						-GLACIAL OUTWASH-										
25																

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water
7/12/2018		drilling			9

Sample ID
O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram
Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary
Overburden (ft) 35.9
Rock Cored (ft) -
Samples 10S

Boring No. B4

Field Tests: **Dilatancy**: R - Rapid S - Slow N - None **Toughness**: L - Low M - Medium H - High **Plasticity**: N - Nonplastic L - Low M - Medium H - High **Dry Strength**: N - None L - Low M - Medium H - High V - Very High

†**Note: Maximum particle size is determined by direct observation within the limitations of sampler size.**

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

HALEY ALDRICH

TEST BORING REPORT

Boring No. B4
File No. 130464-002
Sheet No. 2 of 2

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
25	6 9 8 8	S8 22	25.0 27.0	SM		Similar to S9, PID: background	15	10	20	20	20	15				
30	4 4 5 13	S9 20	30.0 32.0	SM	332.5 31.5	Loose gray-brown silty SAND, no odor, wet, PID: background -GLACIAL OUTWASH-		10	20	35	15	20				
35	15 20 50/4"	S10 6	35.0 36.1	SM	327.7 36.3	-GLACIAL TILL- Very dense gray-brown silty SAND, no odor, wet, PID: background		10	20	35	15	20				
						BOTTOM OF EXPLORATION 36.3 FT Note: Borehole backfilled with cuttings upon completion.										

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. B4

TEST BORING REPORT

Boring No. B5-OW

Project	Valhalla Waterfowl Management Building, Valhalla, New York
Client	Hazen Sawyer
Contractor	Craig Drilling

File No. 130464-002
Sheet No. 1 of 1
Start 12 July 2018
Finish 12 July 2018
Driller N. Behler
H&A Rep. R. Genovesi
Elevation 364.5 (est.)
Datum NAVD 88
Location See Plan
N 822128.47
E 692167.72

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HW	S	-	Rig Make & Model: ATV-Mounted CME 750x
Inside Diameter (in.)	4.0	1 3/8	-	Bit Type: Roller Bit
Hammer Weight (lb)	-	140	-	Drill Mud: None
Hammer Fall (in.)	-	30	-	Casing: Driven
				Hoist/Hammer: - Automatic Hammer
				PID Make & Model: MiniRAE 3000 10.6 eV

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	USCS Symbol	Well Diagram	Stratum Change Elev/Depth (ft)	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0						364.0 0.5	-6 IN. BITUMINOUS ASPHALT-										
	5 6 5 5	S1 10	1.0 3.0	SM			Medium dense light brown silty SAND, no odor, moist, PID=0.6 ppm -PROBABLE FILL-		5	10	30	40	15				
	11 12 6 7	S2 14	3.0 5.0	SM		360.5 4.0	Similar to S1, PID=0.6 ppm	5	5	15	30	30	15				
5	2 2 3 2	S3 18	5.0 7.0	SM			Loose brown silty SAND, no odor, wet, PID: background -GLACIAL OUTWASH-		12	3	16	29	40				
	3 2 5 16	S4 20	7.0 9.0	SM			Similar to S3, PID: background			10	30	35	25				
						355.5 9.0											
10	15 25 27 26	S5 18	10.0 12.0	SM			Very dense light brown silty SAND with gravel, no odor, wet, PID: background -GLACIAL TILL-	10	10	15	30	20	15				
15	21 36 50/3"	S6 18	15.0 16.3	SM			Similar to S5, PID: background	10	10	15	30	20	15				
20	21 22 50 50	S7 20	20.0 22.0	SM			Similar to S6, PID: background	10	10	15	30	20	15				
						342.5 22.0	BOTTOM OF EXPLORATION 22 FT Note: Monitoring well installed in borehole.										

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water
7/12/2018	1500	drilling			5
7/13/2018	0700	16 hr			6.5

Sample ID
O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram
Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary
Overburden (ft) 22
Rock Cored (ft) -
Samples 7S

Boring No. B5-OW

Field Tests: **Dilatancy**: R - Rapid S - Slow N - None
Toughness: L - Low M - Medium H - High
Plasticity: N - Nonplastic L - Low M - Medium H - High
Dry Strength: N - None L - Low M - Medium H - High V - Very High

†**Note: Maximum particle size is determined by direct observation within the limitations of sampler size.**

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

GROUNDWATER OBSERVATION WELL INSTALLATION REPORT

HALEY ALDRICH

Well No. B5/ OW
Boring No. B5/ OW

Project Valhalla Waterfowl Management Building
Location Valhalla, New York
Client Hazen Sawyer
Contractor Craig Drilling
Driller N. Behler

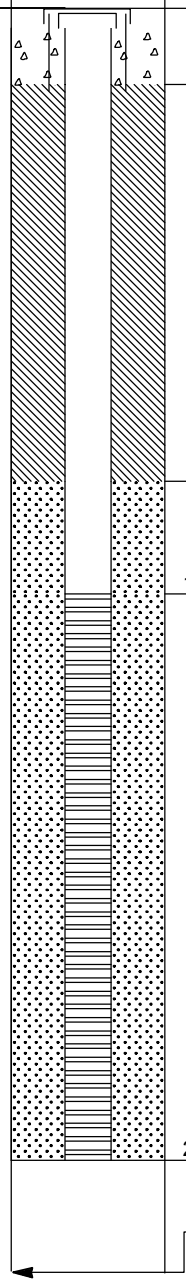
Initial Water Level (depth bgs) 5.0 ft

Well Diagram
- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No. 130464-002
Date Installed 12 Jul 2018
H&A Rep. R. Genovesi
Location N 822128.47
E 692167.72

Ground El. 364.5 (est.)
Datum NAVD 88

SOIL/ROCK CONDITIONS	DEPTH (ft.)	GRAPHIC	WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)
				0.0	364.5
	0.5			1.0	363.5
	4.0			8.0	356.5
				10.0	354.5
				20.0	344.5
	22.0				



WELL CONSTRUCTION DETAILS

Type of protective cover _____

Depth of Roadway Box below ground surface NA

Depth of top of riser below ground surface ft

Type of protective casing Roadway Box

Length _____

Inside diameter _____

Depth of bottom of Roadway Box -

Type of riser pipe Schedule 40 PVC

Inside diameter of riser pipe _____

Depth of bottom of riser pipe 10.0 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Concrete	0.0	1.0
Bentonite	1.0	7.0
Sand	8.0	20.0

Diameter of borehole _____

Depth to top of well screen 10.0 ft

Type of screen Machine slotted Sch 40 PVC

Screen gauge or size of openings 0.010 in.

Diameter of screen _____

Type of Backfill around Screen Sand

Depth to bottom of well screen _____

Bottom of silt trap _____

Depth of bottom of borehole 22.0 ft

COMMENTS:

APPENDIX C

Geotechnical Laboratory Test Results

PO Box 572455 / Salt Lake City UT 84157-2455 / USA
TEL +1 801 262 2448 · FAX +1 801 262 9870 · www.TEi-TS.com

HALEY & ALDRICH INCORPORATED
100 CORPORATE PLACE
SUITE 105
ROCKY HILL CT 06067-1876
USA

Analysis No.	TS-A1807541
Report Date	31 July 2018
Date Sampled	26 July 2018
Date Received	30 July 2018
Where Sampled	Rocky Hill, CT USA
Sampled By	Client

This is to attest that we have examined: Soils, Project: Valhalla Waterfowl Management Building; Site Location: Valhalla, New York; Job Number: 130464-002

When examined to the applicable requirements of:

ASTM D 512 - 12	“Standard Test Methods for Chloride Ion in Water” Method B
ASTM C 1580 - 15	“Standard Test Method for Water-Soluble Sulfate in Soil”
ASTM D 4658 - 15	“Standard Test Method for Sulfide Ion in Water”
ASTM D 4972 - 13	“Standard Test Method for pH of Soils” Method A
ASTM G 200 - 14	“Standard Test Method for Measurement of Oxidation-Reduction Potential (ORP) of Soil”
ASTM G187 – 18	“Standard Test Method for Measurement of Soil Resistivity Using the Two-Electrode Soil Box Method”

Results:

ASTM D512 – Chloride Method B

Sample		Results		Detection Limit
		ppm (mg/kg)	%[1]	
B3_03		<10.	<0.0010	
S1/S2	0 – 5’			

NOTE: [1]Percent by weight as received

ASTM C 1580 – Water Soluble Sulfate

Sample		Results		Detection Limit
		ppm (mg/kg)	%[1]	
B3_03		28.	0.0028	
S1/S2	0 – 5’			

NOTE: [1]Percent by weight as received

Testing Services Analytical Laboratory
3455 South 500 West
Salt Lake City, UT 84115-4234 USA
TEL: +1 801 262 2448
FAX: +1 801 262 9870

CERTIFICATE OF ANALYSIS

ASTM D4658 – Sulfide

Sample		Results		Detection Limit
		ppb (µg/kg)	%[1]	
B3_03		190.	0.000019	10.
S1/S2	0 – 5’			

NOTE: [1]Percent by weight as received

ASTM D 4972 – pH Method A

Sample		Results	Detection Limit
B3_03		5.96	0.01
S1/S2	0 – 5’		

ASTM G 200 – Reduction Oxidation Potential (REDOX)

Sample		Results	Detection Limit
B3_03		156.9 @ 23.9 ºC	0.1 mV
S1/S2	0 – 5’		

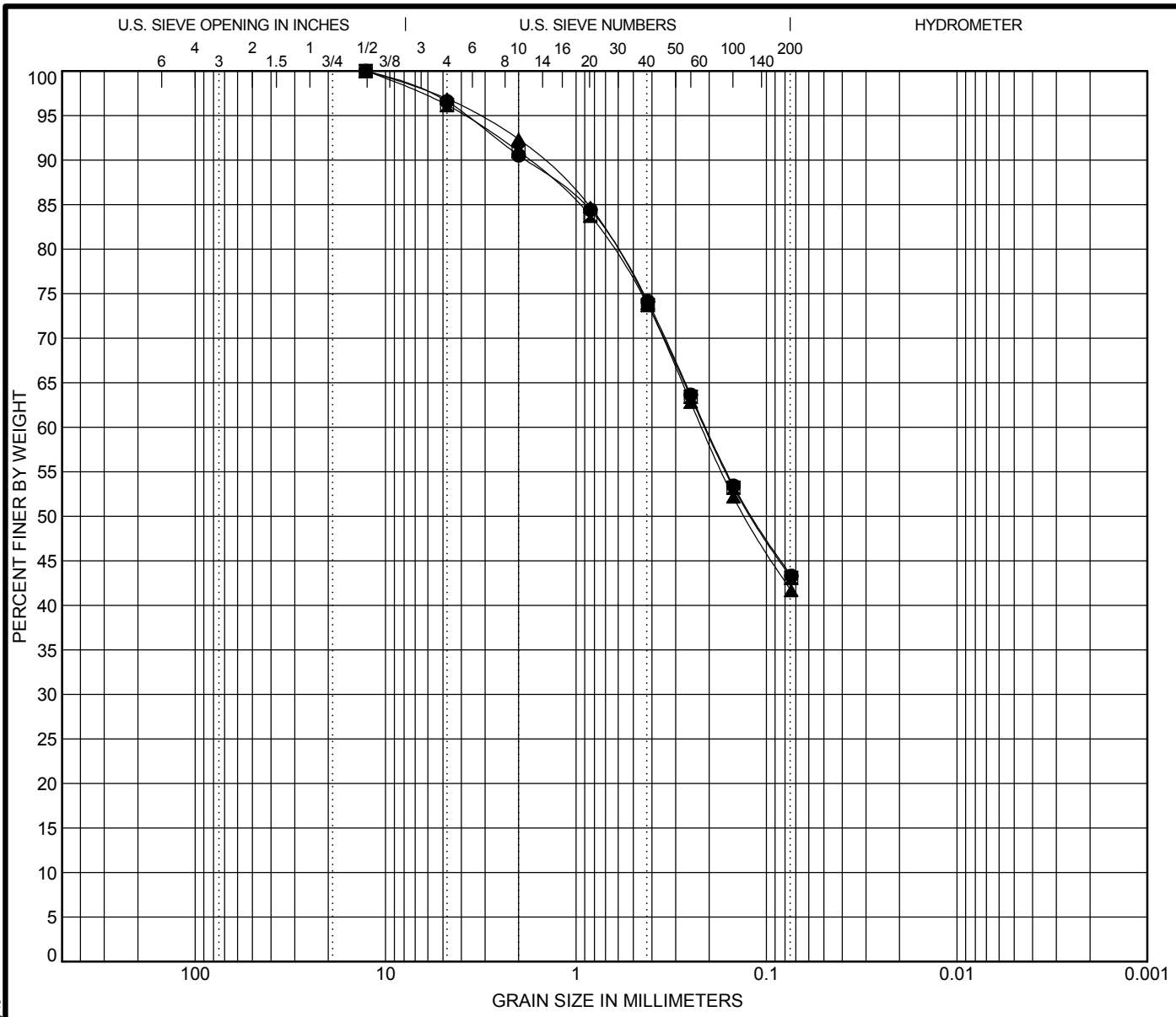
ASTM G 187 – Resistivity (Saturated using Soil Box)

Sample		Results	
		ohms-cm	mho/cm
B3_03		4 750	0.000210
S1/S2	0 – 5’		

END OF ANALYSIS

USEPA Laboratory ID UT00930

Merrill Gee P.E. – Engineer in Charge



	COBBLES	% GRAVEL		% SAND			% FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	% SILT	% CLAY
●		0.0	3.4	6.1	16.4	30.8	43.3	
⊠		0.0	3.8	5.2	17.2	30.6	43.1	
▲		0.0	3.1	4.6	18.5	32.2	41.6	

	Expl. No.	Sample No.	Depth (ft.)	LL	PL	PI	Water Content (%)	Cc	Cu
●	B1	S6	15-17				15.8		
⊠	B2	S3	5-7				12.5		
▲	B3	S4	7-9				12.4		

Sample Description

●	Gray-brown silty SAND (SM)
⊠	Gray-brown silty SAND (SM)
▲	Brown silty SAND (SM)

Remarks:

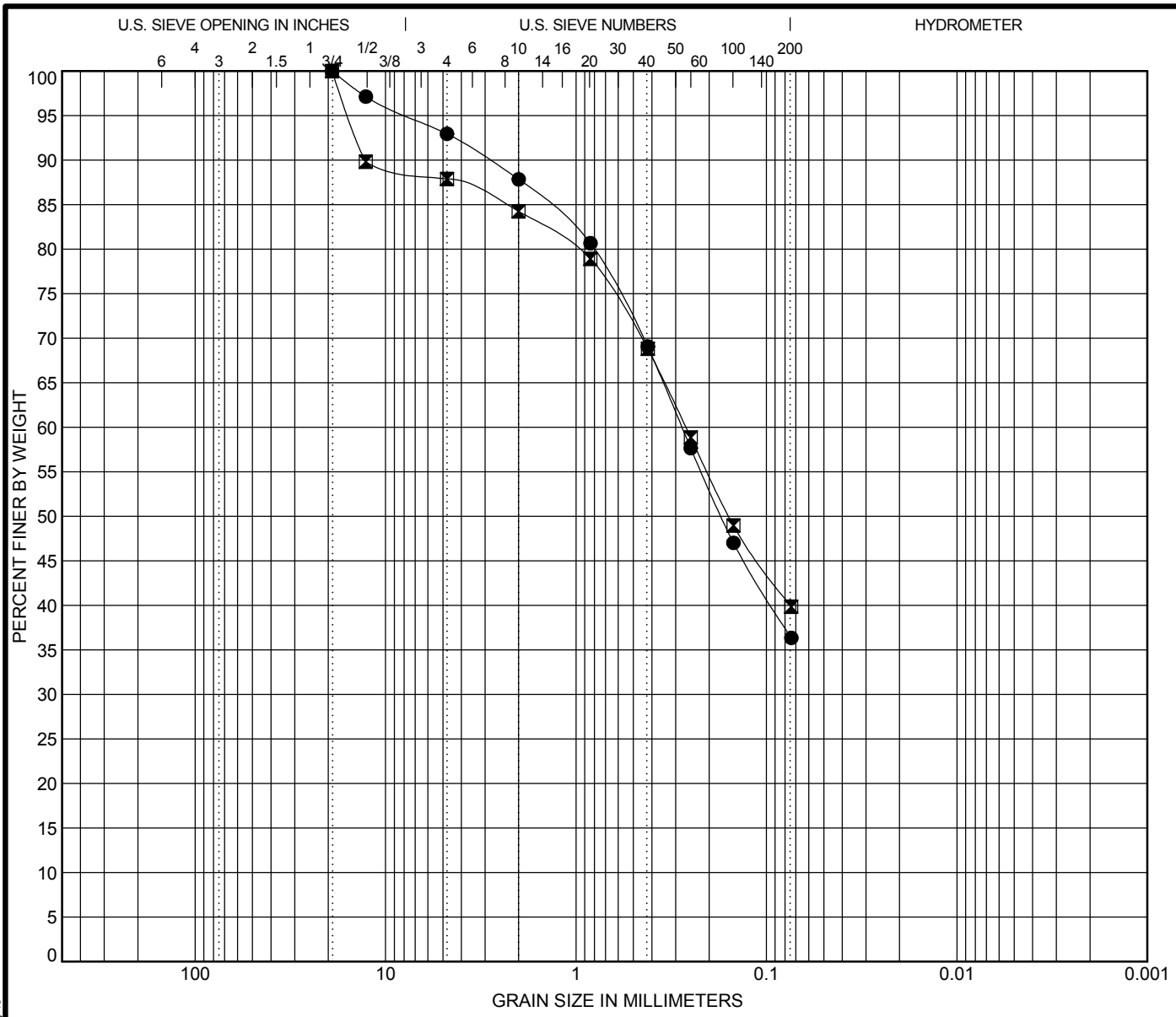
HALEY ALDRICH
Rocky Hill, Connecticut

Waterfowl Management Building
Valhalla, NEW YORK

GRAIN SIZE DISTRIBUTION

Date: 8/2/2018 File No.: 130464-002

H&A SIEVE USCS LABTEMP.GDT G:\130464_VALHALLA WATER FOWL\002\GINT\130464-002_SIEVES.GPJ 2 Aug 18



	COBBLES	% GRAVEL		% SAND			% FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	% SILT	% CLAY
●		**0.0**	**7.0**	**5.1**	**18.8**	**32.7**	**36.3**	
⊠		**0.0**	**12.1**	**3.6**	**15.4**	**28.9**	**39.9**	

	Expl. No.	Sample No.	Depth (ft.)	LL	PL	PI	Water Content (%)	Cc	Cu
●	**B4**	**S6**	**15-17**				**14.4**		
⊠	**B5**	**S3**	**5-7**				**20.1**		

Sample Description

● **Gray-brown silty SAND (SM)**

⊠ **Brown silty SAND (SM)**

Remarks:

HALEY ALDRICH
Rocky Hill, Connecticut

Waterfowl Management Building
Valhalla, NEW YORK

GRAIN SIZE DISTRIBUTION

Date: 8/2/2018 File No.: 130464-002

H&A SIEVE USCS LABTEMP.GDT G:\130464_VALHALLA WATER FOWL\002\GINT\130464-002_SIEVES.GPJ 2 Aug 18

APPENDIX D

Corrosion Potential Laboratory Test Results

PO Box 572455 / Salt Lake City UT 84157-2455 / USA
TEL +1 801 262 2448 · FAX +1 801 262 9870 · www.TEi-TS.com

HALEY & ALDRICH INCORPORATED
100 CORPORATE PLACE
SUITE 105
ROCKY HILL CT 06067-1876
USA

Analysis No.	TS-A1807541
Report Date	31 July 2018
Date Sampled	26 July 2018
Date Received	30 July 2018
Where Sampled	Rocky Hill, CT USA
Sampled By	Client

This is to attest that we have examined: Soils, Project: Valhalla Waterfowl Management Building; Site Location: Valhalla, New York; Job Number: 130464-002

When examined to the applicable requirements of:

ASTM D 512 - 12	“Standard Test Methods for Chloride Ion in Water” Method B
ASTM C 1580 - 15	“Standard Test Method for Water-Soluble Sulfate in Soil”
ASTM D 4658 - 15	“Standard Test Method for Sulfide Ion in Water”
ASTM D 4972 - 13	“Standard Test Method for pH of Soils” Method A
ASTM G 200 - 14	“Standard Test Method for Measurement of Oxidation-Reduction Potential (ORP) of Soil”
ASTM G187 – 18	“Standard Test Method for Measurement of Soil Resistivity Using the Two-Electrode Soil Box Method”

Results:

ASTM D512 – Chloride Method B

Sample		Results		Detection Limit
		ppm (mg/kg)	%[1]	
B3_03		<10.	<0.0010	
S1/S2	0 – 5’			

NOTE: [1]Percent by weight as received

ASTM C 1580 – Water Soluble Sulfate

Sample		Results		Detection Limit
		ppm (mg/kg)	%[1]	
B3_03		28.	0.0028	
S1/S2	0 – 5’			

NOTE: [1]Percent by weight as received

Testing Services Analytical Laboratory
3455 South 500 West
Salt Lake City, UT 84115-4234 USA
TEL: +1 801 262 2448
FAX: +1 801 262 9870

CERTIFICATE OF ANALYSIS

ASTM D4658 – Sulfide

Sample		Results		Detection Limit
		ppb (µg/kg)	%[1]	
B3_03		190.	0.000019	10.
S1/S2	0 – 5’			

NOTE: [1]Percent by weight as received

ASTM D 4972 – pH Method A

Sample		Results	Detection Limit
B3_03		5.96	0.01
S1/S2	0 – 5’		

ASTM G 200 – Reduction Oxidation Potential (REDOX)

Sample		Results	Detection Limit
B3_03		156.9 @ 23.9 ºC	0.1 mV
S1/S2	0 – 5’		

ASTM G 187 – Resistivity (Saturated using Soil Box)

Sample		Results	
		ohms-cm	mho/cm
B3_03		4 750	0.000210
S1/S2	0 – 5’		

END OF ANALYSIS

USEPA Laboratory ID UT00930

Merrill Gee P.E. – Engineer in Charge

APPENDIX E

Chemical Laboratory Test Results

80 Lupes Drive
Stratford, CT 06615

Tel: (203) 377-9984
Fax: (203) 377-9952
e-mail: cet1@cetlabs.com

Client: Mr. Rich Genovesi
Haley & Aldrich
100 Corporate Place, Suite 105
Rocky Hill, CT 06067-1803

Analytical Report

CET# 8070435

Report Date:July 24, 2018
Project: 130464-002, Valhalla, NY
PO Number: 130464-002

Connecticut Laboratory Certificate: PH 0116
Massachusetts Laboratory Certificate: M-CT903
Rhode Island Laboratory Certificate: 199

New York NELAP Accreditation: 11982
Pennsylvania Laboratory Certificate: 68-02927

SAMPLE SUMMARY

The sample(s) were received at 4.2°C.

This report contains analytical data associated with following samples only.

Sample ID	Laboratory ID	Matrix	Collection Date/Time	Receipt Date
B1_0-5	8070435-01	Soil	7/13/2018 10:15	07/16/2018
B2_0-5	8070435-02	Soil	7/13/2018 12:00	07/16/2018
B3_1-6	8070435-03	Soil	7/13/2018 12:30	07/16/2018
B4_0-5	8070435-04	Soil	7/13/2018 10:00	07/16/2018
B5_1-6	8070435-05	Soil	7/13/2018 14:30	07/16/2018
B5-W	8070435-06	Water	7/13/2018 14:30	07/16/2018

Analyte: Percent Solids [SM 2540 G]

Analyst: ALR

Matrix: Soil

Laboratory ID	Client Sample ID	Result	RL	Units	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
8070435-01	B1_0-5	**89**	1.0	%	1	B8G1702	07/17/2018	07/17/2018 12:35	
8070435-02	B2_0-5	**82**	1.0	%	1	B8G1702	07/17/2018	07/17/2018 12:35	
8070435-03	B3_1-6	**83**	1.0	%	1	B8G1702	07/17/2018	07/17/2018 12:35	
8070435-04	B4_0-5	**80**	1.0	%	1	B8G1702	07/17/2018	07/17/2018 12:35	
8070435-05	B5_1-6	**87**	1.0	%	1	B8G1702	07/17/2018	07/17/2018 12:35	

Analyte: Mercury [EPA 7471B]

Analyst: SFJ

Matrix: Soil

Laboratory ID	Client Sample ID	Result	RL	Units	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
8070435-01	B1_0-5	ND	0.14	mg/kg dry	1	B8G1623	07/17/2018	07/17/2018 12:43	
8070435-02	B2_0-5	ND	0.15	mg/kg dry	1	B8G1623	07/17/2018	07/17/2018 12:45	
8070435-03	B3_1-6	ND	0.14	mg/kg dry	1	B8G1623	07/17/2018	07/17/2018 12:51	
8070435-04	B4_0-5	ND	0.14	mg/kg dry	1	B8G1623	07/17/2018	07/17/2018 12:56	
8070435-05	B5_1-6	ND	0.14	mg/kg dry	1	B8G1623	07/17/2018	07/17/2018 13:02	

Testing Performed at: NY11301

Analyte: Hexavalent Chromium [EPA 7196A] **Analyst: subcontract**

Prep: EPA 3060A **Matrix: Soil**

Laboratory ID	Client Sample ID	Result	RL	Units	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
8070435-01	B1_0-5	**< 0.43**	0.43	mg/kg	1		07/20/2018	07/20/2018 00:00	
8070435-02	B2_0-5	**< 0.43**	0.43	mg/kg	1		07/20/2018	07/20/2018 00:00	
8070435-03	B3_1-6	**< 0.46**	0.46	mg/kg	1		07/20/2018	07/20/2018 00:00	
8070435-04	B4_0-5	**< 0.45**	0.45	mg/kg	1		07/20/2018	07/20/2018 00:00	
8070435-05	B5_1-6	**< 0.45**	0.45	mg/kg	1		07/20/2018	07/20/2018 00:00	

Testing Performed at: NY11301

Analyte: pH [EPA 9045D] **Analyst: subcontract**

Matrix: Soil

Laboratory ID	Client Sample ID	Result	RL	Units	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
8070435-01	B1_0-5	**8.33**	NA	pH Units	1		07/18/2018	07/18/2018 17:44	
8070435-02	B2_0-5	**8.06**	NA	pH Units	1		07/18/2018	07/18/2018 17:44	
8070435-03	B3_1-6	**9.62**	NA	pH Units	1		07/18/2018	07/18/2018 17:44	
8070435-04	B4_0-5	**10.8**	NA	pH Units	1		07/18/2018	07/18/2018 17:44	
8070435-05	B5_1-6	**7.92**	NA	pH Units	1		07/18/2018	07/18/2018 17:44	

Testing Performed at: NY11301

Analyte: Redox Potential [SM 2580B-09]

Analyst: subcontract

Matrix: Soil

Laboratory ID	Client Sample ID	Result	RL	Units	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
8070435-01	B1_0-5	**204**	NA	mV	1		07/18/2018	07/18/2018 00:00	
8070435-02	B2_0-5	**215**	NA	mV	1		07/18/2018	07/18/2018 00:00	
8070435-03	B3_1-6	**-20.9**	NA	mV	1		07/18/2018	07/18/2018 00:00	
8070435-04	B4_0-5	**-31.4**	NA	mV	1		07/18/2018	07/18/2018 00:00	
8070435-05	B5_1-6	**48.7**	NA	mV	1		07/18/2018	07/18/2018 00:00	

Testing Performed at: NY11301

Analyte: Cyanide,Total [EPA 9012B]

Analyst: subcontract

Prep: EPA 9013

Matrix: Soil

Laboratory ID	Client Sample ID	Result	RL	Units	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
8070435-01	B1_0-5	**< 0.50**	0.5	mg/kg	1		07/19/2018	07/19/2018 00:00	
8070435-02	B2_0-5	**< 0.55**	0.55	mg/kg	1		07/19/2018	07/19/2018 00:00	
8070435-03	B3_1-6	**< 0.53**	NA	mg/kg	1		07/19/2018	07/19/2018 00:00	
8070435-04	B4_0-5	**< 0.52**	0.52	mg/kg	1		07/19/2018	07/19/2018 00:00	
8070435-05	B5_1-6	**< 0.52**	0.52	mg/kg	1		07/19/2018	07/19/2018 00:00	

Client Sample ID B1_0-5

Lab ID: 8070435-01

Total Metals **Analyst: SS**

Method: EPA 6010C **Matrix: Soil**

Analyte	Result (mg/kg dry)	RL (mg/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**4.6**	2.0	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:32	
Selenium	ND	1.0	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:32	
Cadmium	ND	0.51	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:32	
Chromium	**21**	2.0	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:32	
Arsenic	**1.5**	1.0	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:32	
Barium	**97**	2.0	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:32	
Silver	ND	2.0	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:32	
Copper	**19**	2.0	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:32	
Nickel	**16**	2.0	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:32	
Zinc	**43**	2.0	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:32	
Beryllium	ND	1.0	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:32	
Manganese	**330**	2.0	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:32	

Chlorinated Pesticides **Analyst: JTS**

Method: EPA 8081B **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Alpha-BHC	ND	5.6	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:06	
Gamma-BHC	ND	5.6	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:06	
Heptachlor	ND	5.6	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:06	
Aldrin	ND	5.6	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:06	
Beta-BHC	ND	5.6	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:06	
Delta-BHC	ND	5.6	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:06	
Heptachlor Epoxide	ND	5.6	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:06	
Endosulfan I	ND	5.6	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:06	
4,4-DDE	ND	5.6	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:06	
Dieldrin	ND	1.1	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:06	
Endrin	ND	5.6	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:06	
4,4-DDD	ND	5.6	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:06	
Endosulfan II	ND	5.6	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:06	
4,4-DDT	ND	5.6	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:06	
Endrin Aldehyde	ND	5.6	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:06	
4,4-Methoxychlor	ND	5.6	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:06	
Endosulfan Sulfate	ND	5.6	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:06	
Endrin Ketone	ND	5.6	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:06	

Client Sample ID B1_0-5

Lab ID: 8070435-01

Chlorinated Pesticides

Analyst: JTS

Method: EPA 8081B

Matrix: Soil

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Chlordane	ND	34	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:06	
Toxaphene	ND	110	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:06	
Alachlor	ND	56	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:06	
Surrogate: TCMX [1C]	*93.5 %*	*30 - 150*			B8G1622	07/16/2018	*07/18/2018 16:06*	
Surrogate: DCB [1C]	*110 %*	*30 - 150*			B8G1622	07/16/2018	*07/18/2018 16:06*	
Surrogate: TCMX [2C]	*94.1 %*	*30 - 150*			B8G1622	07/16/2018	*07/18/2018 16:06*	
Surrogate: DCB [2C]	*95.4 %*	*30 - 150*			B8G1622	07/16/2018	*07/18/2018 16:06*	

PCBs by ASE

Analyst: PJB

Method: EPA 8082A

Matrix: Soil

Analyte	Result (mg/kg dry)	RL (mg/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
PCB-1016	ND	0.11	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 21:39	
PCB-1221	ND	0.11	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 21:39	
PCB-1232	ND	0.11	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 21:39	
PCB-1242	ND	0.11	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 21:39	
PCB-1248	ND	0.11	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 21:39	
PCB-1254	ND	0.11	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 21:39	
PCB-1260	ND	0.11	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 21:39	
PCB-1268	ND	0.11	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 21:39	
PCB-1262	ND	0.11	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 21:39	
Surrogate: TCMX [1C]	*88.5 %*	*30 - 150*			B8G1621	07/16/2018	*07/17/2018 21:39*	
Surrogate: TCMX [2C]	*80.0 %*	*30 - 150*			B8G1621	07/16/2018	*07/17/2018 21:39*	
Surrogate: DCB [1C]	*92.1 %*	*30 - 150*			B8G1621	07/16/2018	*07/17/2018 21:39*	
Surrogate: DCB [2C]	*87.1 %*	*30 - 150*			B8G1621	07/16/2018	*07/17/2018 21:39*	

Semivolatile Organics

Analyst: EAS

Method: EPA 8270D

Matrix: Soil

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Phenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
1,3-Dichlorobenzene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
n-Nitroso-di-n-propylamine	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	

Client Sample ID B1_0-5

Lab ID: 8070435-01

Semivolatile Organics **Analyst: EAS**

Method: EPA 8270D **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Pyridine	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
n-Nitroso-dimethylamine	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
bis(2-Chloroethyl)ether	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Aniline	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
2-Chlorophenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
1,4-Dichlorobenzene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Benzyl Alcohol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	*C1
1,2-Dichlorobenzene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
bis(2-Chloroisopropyl)ether	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Hexachloroethane	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
2-Methyl Phenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
3+4 Methyl Phenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Naphthalene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
2-Nitrophenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
2,4-Dichlorophenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Hexachlorobutadiene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
4-Chloro-3-methylphenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Nitrobenzene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Isophorone	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
2,4-Dimethylphenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
bis(2-Chloroethoxy)methane	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Benzoic Acid	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
1,2,4-Trichlorobenzene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
2,6-Dichlorophenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
4-Chloroaniline	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
1,2,4,5-Tetrachlorobenzene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
2-Methyl Naphthalene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Acenaphthylene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Acenaphthene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Dibenzofuran	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Fluorene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Hexachlorocyclopentadiene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	*F1
2,4,6-Trichlorophenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
2,4,5-Trichlorophenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
2,4-Dinitrophenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
4-Nitrophenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
2-Chloronaphthalene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	

Client Sample ID B1_0-5

Lab ID: 8070435-01

Semivolatile Organics **Analyst: EAS**

Method: EPA 8270D **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
2-Nitroaniline	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Dimethylphthalate	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
2,6-Dinitrotoluene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
4-Nitroaniline	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
2,4-Dinitrotoluene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
2,3,4,6-Tetrachlorophenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
4-Chlorophenyl-phenylether	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Diethylphthalate	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Phenanthrene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Anthracene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Carbazole	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Fluoranthene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Pyrene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
n-Nitrosodiphenylamine	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Pentachlorophenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
3-Nitroaniline	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
4,6-Dinitro-2-methylphenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
1,2-Diphenylhydrazine	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
4-Bromophenyl-phenylether	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Hexachlorobenzene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Di-n-butylphthalate	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Pentachloronitrobenzene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Benzo[a]anthracene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Chrysene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Butylbenzylphthalate	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
3,3-Dichlorobenzidine	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
bis(2-Ethylhexyl)phthalate	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Di-n-octylphthalate	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Benzo[b]fluoranthene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Benzo[k]fluoranthene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Benzo[a]pyrene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Indeno[1,2,3-cd]pyrene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Dibenz[a,h]anthracene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Benzo[g,h,i]perylene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:25	
Surrogate: 2-Fluorophenol	*50.2 %*	*30 - 130*			B8G1708	07/17/2018	*07/18/2018 20:25*	
Surrogate: Phenol-d6	*55.5 %*	*30 - 130*			B8G1708	07/17/2018	*07/18/2018 20:25*	
Surrogate: Nitrobenzene-d5	*54.4 %*	*30 - 130*			B8G1708	07/17/2018	*07/18/2018 20:25*	

Client Sample ID B1_0-5

Lab ID: 8070435-01

Semivolatile Organics **Analyst: EAS**

Method: EPA 8270D **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Surrogate: 2-Fluorobiphenyl	*57.3 %*		*30 - 130*		B8G1708	07/17/2018	*07/18/2018 20:25*	
Surrogate: 2,4,6-Tribromophenol	*76.7 %*		*30 - 130*		B8G1708	07/17/2018	*07/18/2018 20:25*	
Surrogate: Terphenyl-d14	*91.3 %*		*30 - 130*		B8G1708	07/17/2018	*07/18/2018 20:25*	

Volatile Organics **Analyst: DAH**

Method: EPA 8260C **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Dichlorodifluoromethane	ND	17	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	*C2
Chloromethane	ND	12	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
Vinyl Chloride	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
Bromomethane	ND	12	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
Chloroethane	ND	12	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
Trichlorofluoromethane	ND	46	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	*C2
Acetone	ND	170	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	*F2
Acrylonitrile	ND	9.2	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
Trichlorotrifluoroethane	ND	46	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
1,1-Dichloroethene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
Methylene Chloride	ND	58	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	*F1*C1
Carbon Disulfide	ND	12	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
Methyl-t-Butyl Ether (MTBE)	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
trans-1,2-Dichloroethene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
1,1-Dichloroethane	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
2-Butanone (MEK)	ND	29	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
2,2-Dichloropropane	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
cis-1,2-Dichloroethene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
Bromochloromethane	ND	2.3	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	*C1
Chloroform	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
Tetrahydrofuran	ND	29	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
1,1,1-Trichloroethane	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
Carbon Tetrachloride	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
1,1-Dichloropropene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
Benzene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
1,2-Dichloroethane	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
Trichloroethene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	

Client Sample ID B1_0-5

Lab ID: 8070435-01

Volatile Organics **Analyst: DAH**

Method: EPA 8260C **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
1,2-Dichloropropane	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
Dibromomethane	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
Bromodichloromethane	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
Methyl Isobutyl Ketone	ND	29	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
cis-1,3-Dichloropropene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
Toluene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
trans-1,3-Dichloropropene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
2-Hexanone	ND	29	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	*F2*C2
1,1,2-Trichloroethane	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
Tetrachloroethene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
1,3-Dichloropropane	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
Dibromochloromethane	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
1,2-Dibromoethane	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
trans-1,4-Dichloro-2-Butene	ND	29	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
Chlorobenzene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
1,1,1,2-Tetrachloroethane	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
Ethylbenzene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
m+p Xylenes	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
o-Xylene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
Styrene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
Bromoform	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
Isopropylbenzene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
1,1,2,2-Tetrachloroethane	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
Bromobenzene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
1,2,3-Trichloropropane	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
n-Propylbenzene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
2-Chlorotoluene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
4-Chlorotoluene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
1,3,5-Trimethylbenzene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
tert-Butylbenzene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
1,2,4-Trimethylbenzene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
sec-Butylbenzene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
1,3-Dichlorobenzene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
4-Isopropyltoluene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
1,4-Dichlorobenzene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
1,2-Dichlorobenzene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	
n-Butylbenzene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	*C2

Client Sample ID B1_0-5

Lab ID: 8070435-01

Volatile Organics **Analyst: DAH**

Method: EPA 8260C **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
1,2-Dibromo-3-Chloropropane	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	*F2*C2
1,2,4-Trichlorobenzene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	*C2
Hexachlorobutadiene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	*C2
Naphthalene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	*F2*C2
1,2,3-Trichlorobenzene	ND	5.8	2.05	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:15	*C2
Surrogate: 1,2-Dichloroethane-d4	*93.3 %*		*70 - 130*		B8G1730	07/17/2018	*07/17/2018 13:15*	
Surrogate: Toluene-d8	*96.3 %*		*70 - 130*		B8G1730	07/17/2018	*07/17/2018 13:15*	
Surrogate: 4-Bromofluorobenzene	*94.8 %*		*70 - 130*		B8G1730	07/17/2018	*07/17/2018 13:15*	

Testing Performed at: NY11301

Chlorinated Herbicides **Analyst: subcontract**

Method: EPA 8151A **Matrix: Soil**

Analyte	Result (ug/kg)	RL (ug/kg)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Dalapon	ND	91	10	EPA 3545A		07/18/2018	07/19/2018 00:00	
Dicamba	ND	91	10	EPA 3545A		07/18/2018	07/19/2018 00:00	
Dichloroprop	ND	180	10	EPA 3545A		07/18/2018	07/19/2018 00:00	
2,4-D	ND	180	10	EPA 3545A		07/18/2018	07/19/2018 00:00	
Silvex	ND	91	10	EPA 3545A		07/18/2018	07/19/2018 00:00	
2,4,5-T	ND	91	10	EPA 3545A		07/18/2018	07/19/2018 00:00	
Dinoseb	ND	180	10	EPA 3545A		07/18/2018	07/19/2018 00:00	
2,4-DB	ND	1800	10	EPA 3545A		07/18/2018	07/19/2018 00:00	
Surrogate: DCPAA [1C]	*67 %*		*30 - 150*			07/18/2018	*07/19/2018 00:00*	

Client Sample ID B2_0-5

Lab ID: 8070435-02

Total Metals **Analyst: SS**

Method: EPA 6010C **Matrix: Soil**

Analyte	Result (mg/kg dry)	RL (mg/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**7.1**	2.4	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:45	
Selenium	ND	1.2	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:45	
Cadmium	ND	0.60	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:45	
Chromium	**25**	2.4	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:45	
Arsenic	**2.5**	1.2	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:45	
Barium	**110**	2.4	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:45	
Silver	ND	2.4	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:45	
Copper	**21**	2.4	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:45	
Nickel	**19**	2.4	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:45	
Zinc	**50**	2.4	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:45	
Beryllium	ND	1.2	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:45	
Manganese	**360**	2.4	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:45	

Chlorinated Pesticides **Analyst: JTS**

Method: EPA 8081B **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Alpha-BHC	ND	6.1	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:17	
Gamma-BHC	ND	6.1	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:17	
Heptachlor	ND	6.1	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:17	
Aldrin	ND	6.1	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:17	
Beta-BHC	ND	6.1	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:17	
Delta-BHC	ND	6.1	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:17	
Heptachlor Epoxide	ND	6.1	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:17	
Endosulfan I	ND	6.1	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:17	
4,4-DDE	ND	6.1	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:17	
Dieldrin	ND	1.2	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:17	
Endrin	ND	6.1	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:17	
4,4-DDD	ND	6.1	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:17	
Endosulfan II	ND	6.1	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:17	
4,4-DDT	ND	6.1	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:17	
Endrin Aldehyde	ND	6.1	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:17	
4,4-Methoxychlor	ND	6.1	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:17	
Endosulfan Sulfate	ND	6.1	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:17	
Endrin Ketone	ND	6.1	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:17	

Client Sample ID B2_0-5

Lab ID: 8070435-02

Chlorinated Pesticides

Analyst: JTS

Method: EPA 8081B

Matrix: Soil

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Chlordane	ND	37	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:17	
Toxaphene	ND	120	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:17	
Alachlor	ND	61	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:17	
Surrogate: TCMX [1C]	*85.5 %*	*30 - 150*			B8G1622	07/16/2018	*07/18/2018 16:17*	
Surrogate: DCB [1C]	*108 %*	*30 - 150*			B8G1622	07/16/2018	*07/18/2018 16:17*	
Surrogate: TCMX [2C]	*92.0 %*	*30 - 150*			B8G1622	07/16/2018	*07/18/2018 16:17*	
Surrogate: DCB [2C]	*101 %*	*30 - 150*			B8G1622	07/16/2018	*07/18/2018 16:17*	

PCBs by ASE

Analyst: PJB

Method: EPA 8082A

Matrix: Soil

Analyte	Result (mg/kg dry)	RL (mg/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
PCB-1016	ND	0.12	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 21:58	
PCB-1221	ND	0.12	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 21:58	
PCB-1232	ND	0.12	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 21:58	
PCB-1242	ND	0.12	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 21:58	
PCB-1248	ND	0.12	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 21:58	
PCB-1254	ND	0.12	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 21:58	
PCB-1260	ND	0.12	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 21:58	
PCB-1268	ND	0.12	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 21:58	
PCB-1262	ND	0.12	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 21:58	
Surrogate: TCMX [1C]	*119 %*	*30 - 150*			B8G1621	07/16/2018	*07/17/2018 21:58*	
Surrogate: TCMX [2C]	*109 %*	*30 - 150*			B8G1621	07/16/2018	*07/17/2018 21:58*	
Surrogate: DCB [1C]	*117 %*	*30 - 150*			B8G1621	07/16/2018	*07/17/2018 21:58*	
Surrogate: DCB [2C]	*109 %*	*30 - 150*			B8G1621	07/16/2018	*07/17/2018 21:58*	

Semivolatile Organics

Analyst: EAS

Method: EPA 8270D

Matrix: Soil

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Phenol	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
1,3-Dichlorobenzene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
n-Nitroso-di-n-propylamine	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	

Client Sample ID B2_0-5

Lab ID: 8070435-02

Semivolatile Organics **Analyst: EAS**

Method: EPA 8270D **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Pyridine	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
n-Nitroso-dimethylamine	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
bis(2-Chloroethyl)ether	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Aniline	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
2-Chlorophenol	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
1,4-Dichlorobenzene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Benzyl Alcohol	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	*C1
1,2-Dichlorobenzene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
bis(2-Chloroisopropyl)ether	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Hexachloroethane	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
2-Methyl Phenol	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
3+4 Methyl Phenol	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Naphthalene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
2-Nitrophenol	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
2,4-Dichlorophenol	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Hexachlorobutadiene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
4-Chloro-3-methylphenol	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Nitrobenzene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Isophorone	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
2,4-Dimethylphenol	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
bis(2-Chloroethoxy)methane	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Benzoic Acid	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
1,2,4-Trichlorobenzene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
2,6-Dichlorophenol	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
4-Chloroaniline	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
1,2,4,5-Tetrachlorobenzene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
2-Methyl Naphthalene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Acenaphthylene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Acenaphthene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Dibenzofuran	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Fluorene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Hexachlorocyclopentadiene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	*F1
2,4,6-Trichlorophenol	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
2,4,5-Trichlorophenol	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
2,4-Dinitrophenol	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
4-Nitrophenol	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
2-Chloronaphthalene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	

Client Sample ID B2_0-5

Lab ID: 8070435-02

Semivolatile Organics **Analyst: EAS**

Method: EPA 8270D **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
2-Nitroaniline	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Dimethylphthalate	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
2,6-Dinitrotoluene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
4-Nitroaniline	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
2,4-Dinitrotoluene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
2,3,4,6-Tetrachlorophenol	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
4-Chlorophenyl-phenylether	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Diethylphthalate	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Phenanthrene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Anthracene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Carbazole	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Fluoranthene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Pyrene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
n-Nitrosodiphenylamine	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Pentachlorophenol	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
3-Nitroaniline	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
4,6-Dinitro-2-methylphenol	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
1,2-Diphenylhydrazine	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
4-Bromophenyl-phenylether	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Hexachlorobenzene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Di-n-butylphthalate	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Pentachloronitrobenzene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Benzo[a]anthracene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Chrysene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Butylbenzylphthalate	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
3,3-Dichlorobenzidine	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
bis(2-Ethylhexyl)phthalate	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Di-n-octylphthalate	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Benzo[b]fluoranthene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Benzo[k]fluoranthene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Benzo[a]pyrene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Indeno[1,2,3-cd]pyrene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Dibenz[a,h]anthracene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Benzo[g,h,i]perylene	ND	360	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 20:58	
Surrogate: 2-Fluorophenol	*58.3 %*	*30 - 130*			B8G1708	07/17/2018	*07/18/2018 20:58*	
Surrogate: Phenol-d6	*61.7 %*	*30 - 130*			B8G1708	07/17/2018	*07/18/2018 20:58*	
Surrogate: Nitrobenzene-d5	*60.6 %*	*30 - 130*			B8G1708	07/17/2018	*07/18/2018 20:58*	

Client Sample ID B2_0-5

Lab ID: 8070435-02

Semivolatile Organics **Analyst: EAS**

Method: EPA 8270D **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Surrogate: 2-Fluorobiphenyl	*63.8 %*		*30 - 130*		B8G1708	07/17/2018	*07/18/2018 20:58*	
Surrogate: 2,4,6-Tribromophenol	*83.9 %*		*30 - 130*		B8G1708	07/17/2018	*07/18/2018 20:58*	
Surrogate: Terphenyl-d14	*93.9 %*		*30 - 130*		B8G1708	07/17/2018	*07/18/2018 20:58*	

Volatile Organics **Analyst: DAH**

Method: EPA 8260C **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Dichlorodifluoromethane	ND	20	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	*C2
Chloromethane	ND	14	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
Vinyl Chloride	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
Bromomethane	ND	14	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
Chloroethane	ND	14	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
Trichlorofluoromethane	ND	55	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	*C2
Acetone	ND	200	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	*F2
Acrylonitrile	ND	11	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
Trichlorotrifluoroethane	ND	55	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
1,1-Dichloroethene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
Methylene Chloride	ND	68	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	*F1*C1
Carbon Disulfide	ND	14	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
Methyl-t-Butyl Ether (MTBE)	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
trans-1,2-Dichloroethene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
1,1-Dichloroethane	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
2-Butanone (MEK)	ND	34	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
2,2-Dichloropropane	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
cis-1,2-Dichloroethene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
Bromochloromethane	ND	2.7	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	*C1
Chloroform	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
Tetrahydrofuran	ND	34	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
1,1,1-Trichloroethane	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
Carbon Tetrachloride	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
1,1-Dichloropropene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
Benzene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
1,2-Dichloroethane	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
Trichloroethene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	

Client Sample ID B2_0-5

Lab ID: 8070435-02

Volatile Organics **Analyst: DAH**

Method: EPA 8260C **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
1,2-Dichloropropane	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
Dibromomethane	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
Bromodichloromethane	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
Methyl Isobutyl Ketone	ND	34	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
cis-1,3-Dichloropropene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
Toluene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
trans-1,3-Dichloropropene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
2-Hexanone	ND	34	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	*F2*C2
1,1,2-Trichloroethane	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
Tetrachloroethene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
1,3-Dichloropropane	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
Dibromochloromethane	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
1,2-Dibromoethane	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
trans-1,4-Dichloro-2-Butene	ND	34	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
Chlorobenzene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
1,1,1,2-Tetrachloroethane	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
Ethylbenzene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
m+p Xylenes	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
o-Xylene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
Styrene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
Bromoform	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
Isopropylbenzene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
1,1,2,2-Tetrachloroethane	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
Bromobenzene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
1,2,3-Trichloropropane	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
n-Propylbenzene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
2-Chlorotoluene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
4-Chlorotoluene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
1,3,5-Trimethylbenzene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
tert-Butylbenzene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
1,2,4-Trimethylbenzene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
sec-Butylbenzene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
1,3-Dichlorobenzene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
4-Isopropyltoluene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
1,4-Dichlorobenzene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
1,2-Dichlorobenzene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	
n-Butylbenzene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	*C2

Client Sample ID B2_0-5

Lab ID: 8070435-02

Volatile Organics **Analyst: DAH**

Method: EPA 8260C **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
1,2-Dibromo-3-Chloropropane	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	*F2*C2
1,2,4-Trichlorobenzene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	*C2
Hexachlorobutadiene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	*C2
Naphthalene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	*F2*C2
1,2,3-Trichlorobenzene	ND	6.8	2.23	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 13:38	*C2
Surrogate: 1,2-Dichloroethane-d4	*97.5 %*		*70 - 130*		B8G1730	07/17/2018	*07/17/2018 13:38*	
Surrogate: Toluene-d8	*97.0 %*		*70 - 130*		B8G1730	07/17/2018	*07/17/2018 13:38*	
Surrogate: 4-Bromofluorobenzene	*95.8 %*		*70 - 130*		B8G1730	07/17/2018	*07/17/2018 13:38*	

Testing Performed at: NY11301

Chlorinated Herbicides **Analyst: subcontract**

Method: EPA 8151A **Matrix: Soil**

Analyte	Result (ug/kg)	RL (ug/kg)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Dalapon	ND	91	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
Dicamba	ND	91	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
Dichloroprop	ND	180	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
2,4-D	ND	180	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
Silvex	ND	91	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
2,4,5-T	ND	91	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
Dinoseb	ND	180	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
2,4-DB	ND	1800	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
Surrogate: DCPAA [1C]	*64 %*		*30 - 150*			07/19/2018	*07/20/2018 00:00*	

Client Sample ID B3_1-6

Lab ID: 8070435-03

Total Metals **Analyst: SS**

Method: EPA 6010C **Matrix: Soil**

Analyte	Result (mg/kg dry)	RL (mg/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**5.8**	2.4	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:49	
Selenium	ND	1.2	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:49	
Cadmium	ND	0.60	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:49	
Chromium	**21**	2.4	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:49	
Arsenic	**1.7**	1.2	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:49	
Barium	**83**	2.4	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:49	
Silver	ND	2.4	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:49	
Copper	**19**	2.4	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:49	
Nickel	**16**	2.4	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:49	
Zinc	**46**	2.4	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:49	
Beryllium	ND	1.2	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:49	
Manganese	**330**	2.4	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:49	

Chlorinated Pesticides **Analyst: JTS**

Method: EPA 8081B **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Alpha-BHC	ND	5.9	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:28	
Gamma-BHC	ND	5.9	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:28	
Heptachlor	ND	5.9	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:28	
Aldrin	ND	5.9	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:28	
Beta-BHC	ND	5.9	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:28	
Delta-BHC	ND	5.9	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:28	
Heptachlor Epoxide	ND	5.9	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:28	
Endosulfan I	ND	5.9	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:28	
4,4-DDE	ND	5.9	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:28	
Dieldrin	ND	1.2	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:28	
Endrin	ND	5.9	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:28	
4,4-DDD	ND	5.9	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:28	
Endosulfan II	ND	5.9	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:28	
4,4-DDT	ND	5.9	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:28	
Endrin Aldehyde	ND	5.9	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:28	
4,4-Methoxychlor	ND	5.9	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:28	
Endosulfan Sulfate	ND	5.9	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:28	
Endrin Ketone	ND	5.9	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:28	

Client Sample ID B3_1-6

Lab ID: 8070435-03

Chlorinated Pesticides

Analyst: JTS

Method: EPA 8081B

Matrix: Soil

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Chlordane	ND	35	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:28	
Toxaphene	ND	120	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:28	
Alachlor	ND	59	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:28	
Surrogate: TCMX [1C]	*89.3 %*	*30 - 150*			B8G1622	07/16/2018	*07/18/2018 16:28*	
Surrogate: DCB [1C]	*107 %*	*30 - 150*			B8G1622	07/16/2018	*07/18/2018 16:28*	
Surrogate: TCMX [2C]	*93.8 %*	*30 - 150*			B8G1622	07/16/2018	*07/18/2018 16:28*	
Surrogate: DCB [2C]	*97.9 %*	*30 - 150*			B8G1622	07/16/2018	*07/18/2018 16:28*	

PCBs by ASE

Analyst: PJB

Method: EPA 8082A

Matrix: Soil

Analyte	Result (mg/kg dry)	RL (mg/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
PCB-1016	ND	0.12	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 22:18	
PCB-1221	ND	0.12	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 22:18	
PCB-1232	ND	0.12	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 22:18	
PCB-1242	ND	0.12	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 22:18	
PCB-1248	ND	0.12	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 22:18	
PCB-1254	ND	0.12	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 22:18	
PCB-1260	ND	0.12	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 22:18	
PCB-1268	ND	0.12	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 22:18	
PCB-1262	ND	0.12	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 22:18	
Surrogate: TCMX [1C]	*115 %*	*30 - 150*			B8G1621	07/16/2018	*07/17/2018 22:18*	
Surrogate: TCMX [2C]	*105 %*	*30 - 150*			B8G1621	07/16/2018	*07/17/2018 22:18*	
Surrogate: DCB [1C]	*110 %*	*30 - 150*			B8G1621	07/16/2018	*07/17/2018 22:18*	
Surrogate: DCB [2C]	*103 %*	*30 - 150*			B8G1621	07/16/2018	*07/17/2018 22:18*	

Semivolatile Organics

Analyst: EAS

Method: EPA 8270D

Matrix: Soil

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Phenol	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
1,3-Dichlorobenzene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
n-Nitroso-di-n-propylamine	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	

Client Sample ID B3_1-6

Lab ID: 8070435-03

Semivolatile Organics **Analyst: EAS**

Method: EPA 8270D **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Pyridine	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
n-Nitroso-dimethylamine	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
bis(2-Chloroethyl)ether	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Aniline	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
2-Chlorophenol	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
1,4-Dichlorobenzene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Benzyl Alcohol	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	*C1
1,2-Dichlorobenzene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
bis(2-Chloroisopropyl)ether	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Hexachloroethane	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
2-Methyl Phenol	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
3+4 Methyl Phenol	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Naphthalene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
2-Nitrophenol	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
2,4-Dichlorophenol	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Hexachlorobutadiene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
4-Chloro-3-methylphenol	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Nitrobenzene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Isophorone	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
2,4-Dimethylphenol	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
bis(2-Chloroethoxy)methane	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Benzoic Acid	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
1,2,4-Trichlorobenzene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
2,6-Dichlorophenol	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
4-Chloroaniline	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
1,2,4,5-Tetrachlorobenzene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
2-Methyl Naphthalene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Acenaphthylene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Acenaphthene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Dibenzofuran	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Fluorene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Hexachlorocyclopentadiene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	*F1
2,4,6-Trichlorophenol	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
2,4,5-Trichlorophenol	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
2,4-Dinitrophenol	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
4-Nitrophenol	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
2-Chloronaphthalene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	

Client Sample ID B3_1-6

Lab ID: 8070435-03

Semivolatile Organics **Analyst: EAS**

Method: EPA 8270D **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
2-Nitroaniline	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Dimethylphthalate	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
2,6-Dinitrotoluene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
4-Nitroaniline	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
2,4-Dinitrotoluene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
2,3,4,6-Tetrachlorophenol	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
4-Chlorophenyl-phenylether	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Diethylphthalate	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Phenanthrene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Anthracene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Carbazole	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Fluoranthene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Pyrene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
n-Nitrosodiphenylamine	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Pentachlorophenol	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
3-Nitroaniline	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
4,6-Dinitro-2-methylphenol	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
1,2-Diphenylhydrazine	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
4-Bromophenyl-phenylether	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Hexachlorobenzene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Di-n-butylphthalate	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Pentachloronitrobenzene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Benzo[a]anthracene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Chrysene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Butylbenzylphthalate	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
3,3-Dichlorobenzidine	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
bis(2-Ethylhexyl)phthalate	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Di-n-octylphthalate	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Benzo[b]fluoranthene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Benzo[k]fluoranthene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Benzo[a]pyrene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Indeno[1,2,3-cd]pyrene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Dibenz[a,h]anthracene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Benzo[g,h,i]perylene	ND	350	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 21:31	
Surrogate: 2-Fluorophenol	*51.3 %*	*30 - 130*			B8G1708	07/17/2018	*07/18/2018 21:31*	
Surrogate: Phenol-d6	*53.2 %*	*30 - 130*			B8G1708	07/17/2018	*07/18/2018 21:31*	
Surrogate: Nitrobenzene-d5	*51.1 %*	*30 - 130*			B8G1708	07/17/2018	*07/18/2018 21:31*	

Client Sample ID B3_1-6

Lab ID: 8070435-03

Semivolatile Organics **Analyst: EAS**

Method: EPA 8270D **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Surrogate: 2-Fluorobiphenyl	*55.2 %*		*30 - 130*		B8G1708	07/17/2018	*07/18/2018 21:31*	
Surrogate: 2,4,6-Tribromophenol	*76.5 %*		*30 - 130*		B8G1708	07/17/2018	*07/18/2018 21:31*	
Surrogate: Terphenyl-d14	*85.2 %*		*30 - 130*		B8G1708	07/17/2018	*07/18/2018 21:31*	

Volatile Organics **Analyst: DAH**

Method: EPA 8260C **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Dichlorodifluoromethane	ND	25	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	*C2
Chloromethane	ND	16	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
Vinyl Chloride	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
Bromomethane	ND	16	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
Chloroethane	ND	16	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
Trichlorofluoromethane	ND	65	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	*C2
Acetone	ND	250	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	*F2
Acrylonitrile	ND	13	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
Trichlorotrifluoroethane	ND	65	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
1,1-Dichloroethene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
Methylene Chloride	ND	82	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	*F1*C1
Carbon Disulfide	ND	16	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
Methyl-t-Butyl Ether (MTBE)	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
trans-1,2-Dichloroethene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
1,1-Dichloroethane	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
2-Butanone (MEK)	ND	41	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
2,2-Dichloropropane	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
cis-1,2-Dichloroethene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
Bromochloromethane	ND	3.3	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	*C1
Chloroform	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
Tetrahydrofuran	ND	41	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
1,1,1-Trichloroethane	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
Carbon Tetrachloride	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
1,1-Dichloropropene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
Benzene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
1,2-Dichloroethane	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
Trichloroethene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	

Client Sample ID B3_1-6

Lab ID: 8070435-03

Volatile Organics **Analyst: DAH**

Method: EPA 8260C **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
1,2-Dichloropropane	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
Dibromomethane	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
Bromodichloromethane	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
Methyl Isobutyl Ketone	ND	41	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
cis-1,3-Dichloropropene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
Toluene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
trans-1,3-Dichloropropene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
2-Hexanone	ND	41	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	*F2*C2
1,1,2-Trichloroethane	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
Tetrachloroethene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
1,3-Dichloropropane	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
Dibromochloromethane	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
1,2-Dibromoethane	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
trans-1,4-Dichloro-2-Butene	ND	41	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
Chlorobenzene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
1,1,1,2-Tetrachloroethane	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
Ethylbenzene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
m+p Xylenes	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
o-Xylene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
Styrene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
Bromoform	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
Isopropylbenzene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
1,1,2,2-Tetrachloroethane	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
Bromobenzene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
1,2,3-Trichloropropane	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
n-Propylbenzene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
2-Chlorotoluene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
4-Chlorotoluene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
1,3,5-Trimethylbenzene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
tert-Butylbenzene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
1,2,4-Trimethylbenzene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
sec-Butylbenzene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
1,3-Dichlorobenzene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
4-Isopropyltoluene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
1,4-Dichlorobenzene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
1,2-Dichlorobenzene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	
n-Butylbenzene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	*C2

Client Sample ID B3_1-6

Lab ID: 8070435-03

Volatile Organics **Analyst: DAH**

Method: EPA 8260C **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
1,2-Dibromo-3-Chloropropane	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	*F2*C2
1,2,4-Trichlorobenzene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	*C2
Hexachlorobutadiene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	*C2
Naphthalene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	*F2*C2
1,2,3-Trichlorobenzene	ND	8.2	2.73	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:01	*C2
Surrogate: 1,2-Dichloroethane-d4	*93.7 %*		*70 - 130*		B8G1730	07/17/2018	*07/17/2018 14:01*	
Surrogate: Toluene-d8	*97.3 %*		*70 - 130*		B8G1730	07/17/2018	*07/17/2018 14:01*	
Surrogate: 4-Bromofluorobenzene	*92.8 %*		*70 - 130*		B8G1730	07/17/2018	*07/17/2018 14:01*	

Testing Performed at: NY11301

Chlorinated Herbicides **Analyst: subcontract**

Method: EPA 8151A **Matrix: Soil**

Analyte	Result (ug/kg)	RL (ug/kg)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Dalapon	ND	96	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
Dicamba	ND	96	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
Dichloroprop	ND	190	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
2,4-D	ND	190	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
Silvex	ND	96	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
2,4,5-T	ND	96	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
Dinoseb	ND	190	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
2,4-DB	ND	1900	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
Surrogate: DCPAA [1C]	*68 %*		*30 - 150*			07/19/2018	*07/20/2018 00:00*	

Client Sample ID B4_0-5

Lab ID: 8070435-04

Total Metals **Analyst: SS**

Method: EPA 6010C **Matrix: Soil**

Analyte	Result (mg/kg dry)	RL (mg/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**7.7**	2.4	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:53	
Selenium	ND	1.2	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:53	
Cadmium	ND	0.59	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:53	
Chromium	**19**	2.4	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:53	
Arsenic	**2.3**	1.2	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:53	
Barium	**81**	2.4	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:53	
Silver	ND	2.4	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:53	
Copper	**19**	2.4	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:53	
Nickel	**13**	2.4	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:53	
Zinc	**56**	2.4	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:53	
Beryllium	ND	1.2	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:53	
Manganese	**480**	2.4	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:53	

Chlorinated Pesticides **Analyst: JTS**

Method: EPA 8081B **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Alpha-BHC	ND	6.2	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:39	
Gamma-BHC	ND	6.2	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:39	
Heptachlor	ND	6.2	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:39	
Aldrin	ND	6.2	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:39	
Beta-BHC	ND	6.2	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:39	
Delta-BHC	ND	6.2	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:39	
Heptachlor Epoxide	ND	6.2	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:39	
Endosulfan I	ND	6.2	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:39	
4,4-DDE	ND	6.2	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:39	
Dieldrin	ND	1.2	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:39	
Endrin	ND	6.2	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:39	
4,4-DDD	ND	6.2	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:39	
Endosulfan II	ND	6.2	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:39	
4,4-DDT	ND	6.2	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:39	
Endrin Aldehyde	ND	6.2	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:39	
4,4-Methoxychlor	ND	6.2	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:39	
Endosulfan Sulfate	ND	6.2	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:39	
Endrin Ketone	ND	6.2	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:39	

Client Sample ID B4_0-5

Lab ID: 8070435-04

Chlorinated Pesticides **Analyst: JTS**

Method: EPA 8081B **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Chlordane	ND	37	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:39	
Toxaphene	ND	120	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:39	
Alachlor	ND	62	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:39	
Surrogate: TCMX [1C]	*86.1 %*	*30 - 150*			B8G1622	07/16/2018	*07/18/2018 16:39*	
Surrogate: DCB [1C]	*106 %*	*30 - 150*			B8G1622	07/16/2018	*07/18/2018 16:39*	
Surrogate: TCMX [2C]	*94.4 %*	*30 - 150*			B8G1622	07/16/2018	*07/18/2018 16:39*	
Surrogate: DCB [2C]	*108 %*	*30 - 150*			B8G1622	07/16/2018	*07/18/2018 16:39*	

PCBs by ASE **Analyst: PJB**

Method: EPA 8082A **Matrix: Soil**

Analyte	Result (mg/kg dry)	RL (mg/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
PCB-1016	ND	0.12	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 22:37	
PCB-1221	ND	0.12	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 22:37	
PCB-1232	ND	0.12	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 22:37	
PCB-1242	ND	0.12	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 22:37	
PCB-1248	ND	0.12	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 22:37	
PCB-1254	ND	0.12	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 22:37	
PCB-1260	ND	0.12	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 22:37	
PCB-1268	ND	0.12	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 22:37	
PCB-1262	ND	0.12	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 22:37	
Surrogate: TCMX [1C]	*126 %*	*30 - 150*			B8G1621	07/16/2018	*07/17/2018 22:37*	
Surrogate: TCMX [2C]	*115 %*	*30 - 150*			B8G1621	07/16/2018	*07/17/2018 22:37*	
Surrogate: DCB [1C]	*115 %*	*30 - 150*			B8G1621	07/16/2018	*07/17/2018 22:37*	
Surrogate: DCB [2C]	*107 %*	*30 - 150*			B8G1621	07/16/2018	*07/17/2018 22:37*	

Semivolatile Organics **Analyst: EAS**

Method: EPA 8270D **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Phenol	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
1,3-Dichlorobenzene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
n-Nitroso-di-n-propylamine	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	

Client Sample ID B4_0-5

Lab ID: 8070435-04

Semivolatile Organics **Analyst: EAS**

Method: EPA 8270D **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Pyridine	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
n-Nitroso-dimethylamine	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
bis(2-Chloroethyl)ether	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Aniline	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
2-Chlorophenol	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
1,4-Dichlorobenzene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Benzyl Alcohol	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	*C1
1,2-Dichlorobenzene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
bis(2-Chloroisopropyl)ether	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Hexachloroethane	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
2-Methyl Phenol	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
3+4 Methyl Phenol	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Naphthalene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
2-Nitrophenol	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
2,4-Dichlorophenol	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Hexachlorobutadiene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
4-Chloro-3-methylphenol	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Nitrobenzene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Isophorone	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
2,4-Dimethylphenol	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
bis(2-Chloroethoxy)methane	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Benzoic Acid	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
1,2,4-Trichlorobenzene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
2,6-Dichlorophenol	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
4-Chloroaniline	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
1,2,4,5-Tetrachlorobenzene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
2-Methyl Naphthalene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Acenaphthylene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Acenaphthene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Dibenzofuran	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Fluorene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Hexachlorocyclopentadiene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	*F1
2,4,6-Trichlorophenol	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
2,4,5-Trichlorophenol	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
2,4-Dinitrophenol	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
4-Nitrophenol	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
2-Chloronaphthalene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	

Client Sample ID B4_0-5

Lab ID: 8070435-04

Semivolatile Organics **Analyst: EAS**

Method: EPA 8270D **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
2-Nitroaniline	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Dimethylphthalate	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
2,6-Dinitrotoluene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
4-Nitroaniline	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
2,4-Dinitrotoluene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
2,3,4,6-Tetrachlorophenol	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
4-Chlorophenyl-phenylether	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Diethylphthalate	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Phenanthrene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Anthracene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Carbazole	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Fluoranthene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Pyrene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
n-Nitrosodiphenylamine	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Pentachlorophenol	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
3-Nitroaniline	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
4,6-Dinitro-2-methylphenol	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
1,2-Diphenylhydrazine	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
4-Bromophenyl-phenylether	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Hexachlorobenzene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Di-n-butylphthalate	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Pentachloronitrobenzene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Benzo[a]anthracene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Chrysene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Butylbenzylphthalate	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
3,3-Dichlorobenzidine	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
bis(2-Ethylhexyl)phthalate	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Di-n-octylphthalate	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Benzo[b]fluoranthene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Benzo[k]fluoranthene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Benzo[a]pyrene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Indeno[1,2,3-cd]pyrene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Dibenz[a,h]anthracene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Benzo[g,h,i]perylene	ND	370	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:04	
Surrogate: 2-Fluorophenol	*49.1 %*	*30 - 130*			B8G1708	07/17/2018	*07/18/2018 22:04*	
Surrogate: Phenol-d6	*59.3 %*	*30 - 130*			B8G1708	07/17/2018	*07/18/2018 22:04*	
Surrogate: Nitrobenzene-d5	*55.3 %*	*30 - 130*			B8G1708	07/17/2018	*07/18/2018 22:04*	

Client Sample ID B4_0-5

Lab ID: 8070435-04

Semivolatile Organics **Analyst: EAS**

Method: EPA 8270D **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Surrogate: 2-Fluorobiphenyl	*56.6 %*		*30 - 130*		B8G1708	07/17/2018	*07/18/2018 22:04*	
Surrogate: 2,4,6-Tribromophenol	*64.0 %*		*30 - 130*		B8G1708	07/17/2018	*07/18/2018 22:04*	
Surrogate: Terphenyl-d14	*82.7 %*		*30 - 130*		B8G1708	07/17/2018	*07/18/2018 22:04*	

Volatile Organics **Analyst: DAH**

Method: EPA 8260C **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Dichlorodifluoromethane	ND	2200	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	*C2
Chloromethane	ND	1500	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
Vinyl Chloride	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
Bromomethane	ND	1500	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
Chloroethane	ND	1500	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
Trichlorofluoromethane	ND	5900	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	*C2
Acetone	ND	22000	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	*F2
Acrylonitrile	ND	1200	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
Trichlorotrifluoroethane	ND	5900	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
1,1-Dichloroethene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
Methylene Chloride	ND	7400	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	*F1*C1
Carbon Disulfide	ND	1500	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
Methyl-t-Butyl Ether (MTBE)	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
trans-1,2-Dichloroethene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
1,1-Dichloroethane	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
2-Butanone (MEK)	ND	3700	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
2,2-Dichloropropane	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
cis-1,2-Dichloroethene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
Bromochloromethane	ND	290	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	*C1
Chloroform	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
Tetrahydrofuran	ND	3700	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
1,1,1-Trichloroethane	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
Carbon Tetrachloride	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
1,1-Dichloropropene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
Benzene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
1,2-Dichloroethane	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
Trichloroethene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	

Client Sample ID B4_0-5

Lab ID: 8070435-04

Volatile Organics **Analyst: DAH**

Method: EPA 8260C **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
1,2-Dichloropropane	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
Dibromomethane	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
Bromodichloromethane	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
Methyl Isobutyl Ketone	ND	3700	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
cis-1,3-Dichloropropene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
Toluene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
trans-1,3-Dichloropropene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
2-Hexanone	ND	3700	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	*F2*C2
1,1,2-Trichloroethane	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
Tetrachloroethene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
1,3-Dichloropropane	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
Dibromochloromethane	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
1,2-Dibromoethane	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
trans-1,4-Dichloro-2-Butene	ND	3700	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
Chlorobenzene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
1,1,1,2-Tetrachloroethane	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
Ethylbenzene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
m+p Xylenes	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
o-Xylene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
Styrene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
Bromoform	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
Isopropylbenzene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
1,1,2,2-Tetrachloroethane	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
Bromobenzene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
1,2,3-Trichloropropane	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
n-Propylbenzene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
2-Chlorotoluene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
4-Chlorotoluene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
1,3,5-Trimethylbenzene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
tert-Butylbenzene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
1,2,4-Trimethylbenzene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
sec-Butylbenzene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
1,3-Dichlorobenzene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
4-Isopropyltoluene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
1,4-Dichlorobenzene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
1,2-Dichlorobenzene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	
n-Butylbenzene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	*C2

Client Sample ID B4_0-5

Lab ID: 8070435-04

Volatile Organics **Analyst: DAH**

Method: EPA 8260C **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
1,2-Dibromo-3-Chloropropane	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	*F2*C2
1,2,4-Trichlorobenzene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	*C2
Hexachlorobutadiene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	*C2
Naphthalene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	*F2*C2
1,2,3-Trichlorobenzene	ND	740	234.74	EPA 5035A-H	B8G1731	07/17/2018	07/17/2018 14:48	*C2
Surrogate: 1,2-Dichloroethane-d4	*101 %*		*70 - 130*		B8G1731	07/17/2018	*07/17/2018 14:48*	
Surrogate: Toluene-d8	*98.9 %*		*70 - 130*		B8G1731	07/17/2018	*07/17/2018 14:48*	
Surrogate: 4-Bromofluorobenzene	*104 %*		*70 - 130*		B8G1731	07/17/2018	*07/17/2018 14:48*	

Testing Performed at: NY11301

Chlorinated Herbicides **Analyst: subcontract**

Method: EPA 8151A **Matrix: Soil**

Analyte	Result (ug/kg)	RL (ug/kg)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Dalapon	ND	95	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
Dicamba	ND	95	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
Dichloroprop	ND	190	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
2,4-D	ND	190	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
Silvex	ND	95	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
2,4,5-T	ND	95	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
Dinoseb	ND	190	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
2,4-DB	ND	1900	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
Surrogate: DCPAA [1C]	*58 %*		*30 - 150*			07/19/2018	*07/20/2018 00:00*	

Client Sample ID B5_1-6

Lab ID: 8070435-05

Total Metals **Analyst: SS**

Method: EPA 6010C **Matrix: Soil**

Analyte	Result (mg/kg dry)	RL (mg/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Lead	**6.1**	2.3	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:57	
Selenium	ND	1.2	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:57	
Cadmium	ND	0.58	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:57	
Chromium	**25**	2.3	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:57	
Arsenic	**2.7**	1.2	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:57	
Barium	**120**	2.3	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:57	
Silver	ND	2.3	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:57	
Copper	**25**	2.3	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:57	
Nickel	**19**	2.3	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:57	
Zinc	**52**	2.3	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:57	
Beryllium	ND	1.2	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:57	
Manganese	**470**	2.3	1	EPA 3051A	B8G1713	07/17/2018	07/17/2018 18:57	

Chlorinated Pesticides **Analyst: JTS**

Method: EPA 8081B **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Alpha-BHC	ND	5.7	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:50	
Gamma-BHC	ND	5.7	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:50	
Heptachlor	ND	5.7	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:50	
Aldrin	ND	5.7	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:50	
Beta-BHC	ND	5.7	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:50	
Delta-BHC	ND	5.7	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:50	
Heptachlor Epoxide	ND	5.7	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:50	
Endosulfan I	ND	5.7	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:50	
4,4-DDE	ND	5.7	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:50	
Dieldrin	ND	1.1	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:50	
Endrin	ND	5.7	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:50	
4,4-DDD	ND	5.7	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:50	
Endosulfan II	ND	5.7	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:50	
4,4-DDT	ND	5.7	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:50	
Endrin Aldehyde	ND	5.7	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:50	
4,4-Methoxychlor	ND	5.7	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:50	
Endosulfan Sulfate	ND	5.7	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:50	
Endrin Ketone	ND	5.7	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:50	

Client Sample ID B5_1-6

Lab ID: 8070435-05

Chlorinated Pesticides **Analyst: JTS**

Method: EPA 8081B **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Chlordane	ND	34	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:50	
Toxaphene	ND	110	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:50	
Alachlor	ND	57	1	EPA 3545A	B8G1622	07/16/2018	07/18/2018 16:50	
Surrogate: TCMX [1C]	*81.7 %*	*30 - 150*			B8G1622	07/16/2018	*07/18/2018 16:50*	
Surrogate: DCB [1C]	*119 %*	*30 - 150*			B8G1622	07/16/2018	*07/18/2018 16:50*	
Surrogate: TCMX [2C]	*87.3 %*	*30 - 150*			B8G1622	07/16/2018	*07/18/2018 16:50*	
Surrogate: DCB [2C]	*108 %*	*30 - 150*			B8G1622	07/16/2018	*07/18/2018 16:50*	

PCBs by ASE **Analyst: PJB**

Method: EPA 8082A **Matrix: Soil**

Analyte	Result (mg/kg dry)	RL (mg/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
PCB-1016	ND	0.11	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 22:56	
PCB-1221	ND	0.11	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 22:56	
PCB-1232	ND	0.11	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 22:56	
PCB-1242	ND	0.11	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 22:56	
PCB-1248	ND	0.11	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 22:56	
PCB-1254	ND	0.11	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 22:56	
PCB-1260	ND	0.11	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 22:56	
PCB-1268	ND	0.11	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 22:56	
PCB-1262	ND	0.11	1	EPA 3545A	B8G1621	07/16/2018	07/17/2018 22:56	
Surrogate: TCMX [1C]	*100 %*	*30 - 150*			B8G1621	07/16/2018	*07/17/2018 22:56*	
Surrogate: TCMX [2C]	*90.0 %*	*30 - 150*			B8G1621	07/16/2018	*07/17/2018 22:56*	
Surrogate: DCB [1C]	*116 %*	*30 - 150*			B8G1621	07/16/2018	*07/17/2018 22:56*	
Surrogate: DCB [2C]	*108 %*	*30 - 150*			B8G1621	07/16/2018	*07/17/2018 22:56*	

Semivolatile Organics **Analyst: EAS**

Method: EPA 8270D **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Phenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
1,3-Dichlorobenzene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
n-Nitroso-di-n-propylamine	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	

Client Sample ID B5_1-6

Lab ID: 8070435-05

Semivolatile Organics **Analyst: EAS**

Method: EPA 8270D **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Pyridine	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
n-Nitroso-dimethylamine	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
bis(2-Chloroethyl)ether	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Aniline	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
2-Chlorophenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
1,4-Dichlorobenzene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Benzyl Alcohol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	*C1
1,2-Dichlorobenzene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
bis(2-Chloroisopropyl)ether	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Hexachloroethane	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
2-Methyl Phenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
3+4 Methyl Phenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Naphthalene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
2-Nitrophenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
2,4-Dichlorophenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Hexachlorobutadiene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
4-Chloro-3-methylphenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Nitrobenzene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Isophorone	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
2,4-Dimethylphenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
bis(2-Chloroethoxy)methane	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Benzoic Acid	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
1,2,4-Trichlorobenzene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
2,6-Dichlorophenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
4-Chloroaniline	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
1,2,4,5-Tetrachlorobenzene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
2-Methyl Naphthalene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Acenaphthylene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Acenaphthene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Dibenzofuran	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Fluorene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Hexachlorocyclopentadiene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	*F1
2,4,6-Trichlorophenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
2,4,5-Trichlorophenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
2,4-Dinitrophenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
4-Nitrophenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
2-Chloronaphthalene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	

Client Sample ID B5_1-6

Lab ID: 8070435-05

Semivolatile Organics **Analyst: EAS**

Method: EPA 8270D **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
2-Nitroaniline	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Dimethylphthalate	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
2,6-Dinitrotoluene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
4-Nitroaniline	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
2,4-Dinitrotoluene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
2,3,4,6-Tetrachlorophenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
4-Chlorophenyl-phenylether	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Diethylphthalate	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Phenanthrene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Anthracene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Carbazole	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Fluoranthene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Pyrene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
n-Nitrosodiphenylamine	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Pentachlorophenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
3-Nitroaniline	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
4,6-Dinitro-2-methylphenol	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
1,2-Diphenylhydrazine	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
4-Bromophenyl-phenylether	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Hexachlorobenzene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Di-n-butylphthalate	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Pentachloronitrobenzene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Benzo[a]anthracene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Chrysene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Butylbenzylphthalate	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
3,3-Dichlorobenzidine	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
bis(2-Ethylhexyl)phthalate	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Di-n-octylphthalate	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Benzo[b]fluoranthene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Benzo[k]fluoranthene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Benzo[a]pyrene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Indeno[1,2,3-cd]pyrene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Dibenz[a,h]anthracene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Benzo[g,h,i]perylene	ND	340	1	EPA 3545A	B8G1708	07/17/2018	07/18/2018 22:37	
Surrogate: 2-Fluorophenol	*53.2 %*	*30 - 130*			B8G1708	07/17/2018	*07/18/2018 22:37*	
Surrogate: Phenol-d6	*56.4 %*	*30 - 130*			B8G1708	07/17/2018	*07/18/2018 22:37*	
Surrogate: Nitrobenzene-d5	*58.5 %*	*30 - 130*			B8G1708	07/17/2018	*07/18/2018 22:37*	

Client Sample ID B5_1-6

Lab ID: 8070435-05

Semivolatile Organics **Analyst: EAS**

Method: EPA 8270D **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Surrogate: 2-Fluorobiphenyl	*63.5 %*		*30 - 130*		B8G1708	07/17/2018	*07/18/2018 22:37*	
Surrogate: 2,4,6-Tribromophenol	*68.6 %*		*30 - 130*		B8G1708	07/17/2018	*07/18/2018 22:37*	
Surrogate: Terphenyl-d14	*78.3 %*		*30 - 130*		B8G1708	07/17/2018	*07/18/2018 22:37*	

Volatile Organics **Analyst: DAH**

Method: EPA 8260C **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Dichlorodifluoromethane	ND	18	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	*C2
Chloromethane	ND	12	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
Vinyl Chloride	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
Bromomethane	ND	12	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
Chloroethane	ND	12	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
Trichlorofluoromethane	ND	48	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	*C2
Acetone	ND	180	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	*F2
Acrylonitrile	ND	9.6	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
Trichlorotrifluoroethane	ND	48	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
1,1-Dichloroethene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
Methylene Chloride	ND	60	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	*F1*C1
Carbon Disulfide	ND	12	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
Methyl-t-Butyl Ether (MTBE)	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
trans-1,2-Dichloroethene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
1,1-Dichloroethane	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
2-Butanone (MEK)	ND	30	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
2,2-Dichloropropane	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
cis-1,2-Dichloroethene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
Bromochloromethane	ND	2.4	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	*C1
Chloroform	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
Tetrahydrofuran	ND	30	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
1,1,1-Trichloroethane	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
Carbon Tetrachloride	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
1,1-Dichloropropene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
Benzene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
1,2-Dichloroethane	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
Trichloroethene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	

Client Sample ID B5_1-6

Lab ID: 8070435-05

Volatile Organics **Analyst: DAH**

Method: EPA 8260C **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
1,2-Dichloropropane	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
Dibromomethane	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
Bromodichloromethane	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
Methyl Isobutyl Ketone	ND	30	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
cis-1,3-Dichloropropene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
Toluene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
trans-1,3-Dichloropropene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
2-Hexanone	ND	30	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	*F2*C2
1,1,2-Trichloroethane	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
Tetrachloroethene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
1,3-Dichloropropane	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
Dibromochloromethane	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
1,2-Dibromoethane	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
trans-1,4-Dichloro-2-Butene	ND	30	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
Chlorobenzene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
1,1,1,2-Tetrachloroethane	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
Ethylbenzene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
m+p Xylenes	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
o-Xylene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
Styrene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
Bromoform	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
Isopropylbenzene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
1,1,2,2-Tetrachloroethane	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
Bromobenzene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
1,2,3-Trichloropropane	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
n-Propylbenzene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
2-Chlorotoluene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
4-Chlorotoluene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
1,3,5-Trimethylbenzene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
tert-Butylbenzene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
1,2,4-Trimethylbenzene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
sec-Butylbenzene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
1,3-Dichlorobenzene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
4-Isopropyltoluene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
1,4-Dichlorobenzene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
1,2-Dichlorobenzene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	
n-Butylbenzene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	*C2

Client Sample ID B5_1-6

Lab ID: 8070435-05

Volatile Organics **Analyst: DAH**

Method: EPA 8260C **Matrix: Soil**

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
1,2-Dibromo-3-Chloropropane	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	*F2*C2
1,2,4-Trichlorobenzene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	*C2
Hexachlorobutadiene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	*C2
Naphthalene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	*F2*C2
1,2,3-Trichlorobenzene	ND	6.0	2.08	EPA 5035A-L	B8G1730	07/17/2018	07/17/2018 14:25	*C2
Surrogate: 1,2-Dichloroethane-d4	*99.5 %*		*70 - 130*		B8G1730	07/17/2018	*07/17/2018 14:25*	
Surrogate: Toluene-d8	*97.2 %*		*70 - 130*		B8G1730	07/17/2018	*07/17/2018 14:25*	
Surrogate: 4-Bromofluorobenzene	*97.0 %*		*70 - 130*		B8G1730	07/17/2018	*07/17/2018 14:25*	

Testing Performed at: NY11301

Chlorinated Herbicides **Analyst: subcontract**

Method: EPA 8151A **Matrix: Soil**

Analyte	Result (ug/kg)	RL (ug/kg)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Dalapon	ND	95	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
Dicamba	ND	95	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
Dichloroprop	ND	190	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
2,4-D	ND	190	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
Silvex	ND	95	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
2,4,5-T	ND	95	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
Dinoseb	ND	190	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
2,4-DB	ND	1900	10	EPA 3545A		07/19/2018	07/20/2018 00:00	
Surrogate: DCPAA [1C]	*62 %*		*30 - 150*			07/19/2018	*07/20/2018 00:00*	

Client Sample ID B5-W

Lab ID: 8070435-06

Semivolatile Organics

Method: EPA 8270D

Analyst: ALM

Matrix: Water

Analyte	Result (ug/L)	RL (ug/L)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Phenol	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
1,3-Dichlorobenzene	ND	5.0	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
n-Nitroso-di-n-propylamine	ND	10	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Pyridine	ND	4.0	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	*F1
n-Nitroso-dimethylamine	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	*F1*C1
bis(2-Chloroethyl)ether	ND	5.0	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Aniline	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
2-Chlorophenol	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
1,4-Dichlorobenzene	ND	5.0	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Benzyl Alcohol	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
1,2-Dichlorobenzene	ND	5.0	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
bis(2-Chloroisopropyl)ether	ND	10	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Hexachloroethane	ND	4.0	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
2-Methyl Phenol	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
3+4 Methyl Phenol	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Naphthalene	ND	1.0	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
2-Nitrophenol	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
2,4-Dichlorophenol	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Hexachlorobutadiene	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
4-Chloro-3-methylphenol	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Nitrobenzene	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Isophorone	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
2,4-Dimethylphenol	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
bis(2-Chloroethoxy)methane	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Benzoic Acid	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	*F1*C1
1,2,4-Trichlorobenzene	ND	5.0	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
2,6-Dichlorophenol	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
4-Chloroaniline	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	*F1
1,2,4,5-Tetrachlorobenzene	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
2-Methyl Naphthalene	ND	1.0	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Acenaphthylene	ND	0.30	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Acenaphthene	ND	1.0	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Dibenzofuran	ND	1.0	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Fluorene	ND	1.0	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Hexachlorocyclopentadiene	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
2,4,6-Trichlorophenol	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
2,4,5-Trichlorophenol	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	

Client Sample ID B5-W

Lab ID: 8070435-06

Semivolatile Organics **Analyst: ALM**

Method: EPA 8270D **Matrix: Water**

Analyte	Result (ug/L)	RL (ug/L)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
2,4-Dinitrophenol	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	*C1
4-Nitrophenol	ND	60	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
2-Chloronaphthalene	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
2-Nitroaniline	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Dimethylphthalate	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
2,6-Dinitrotoluene	ND	75	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
4-Nitroaniline	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
2,4-Dinitrotoluene	ND	75	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
2,3,4,6-Tetrachlorophenol	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
4-Chlorophenyl-phenylether	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	*C2
Diethylphthalate	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Phenanthrene	ND	0.077	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Anthracene	ND	1.0	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Carbazole	ND	1.0	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Fluoranthene	ND	1.0	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Pyrene	ND	1.0	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
n-Nitrosodiphenylamine	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Pentachlorophenol	ND	1.0	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	*C1
3-Nitroaniline	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
4,6-Dinitro-2-methylphenol	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
1,2-Diphenylhydrazine	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
4-Bromophenyl-phenylether	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Hexachlorobenzene	ND	0.077	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Pentachloronitrobenzene	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Di-n-butylphthalate	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Benzo[a]anthracene	ND	0.060	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Chrysene	ND	0.50	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Butylbenzylphthalate	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
3,3-Dichlorobenzidine	ND	75	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	*F2*C1
bis(2-Ethylhexyl)phthalate	ND	2.0	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Di-n-octylphthalate	ND	20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Benzo[b]fluoranthene	ND	0.080	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Benzo[k]fluoranthene	ND	0.30	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Benzo[a]pyrene	ND	0.20	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Indeno[1,2,3-cd]pyrene	ND	0.10	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Dibenz[a,h]anthracene	ND	0.10	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	
Benzo[g,h,i]perylene	ND	0.40	1	EPA 3510C	B8G1717	07/17/2018	07/19/2018 01:40	

Client Sample ID B5-W

Lab ID: 8070435-06

Semivolatile Organics **Analyst: ALM**

Method: EPA 8270D **Matrix: Water**

Analyte	Result (ug/L)	RL (ug/L)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Surrogate: 2-Fluorophenol	*32.5 %*		*15 - 110*		B8G1717	07/17/2018	*07/19/2018 01:40*	
Surrogate: Phenol-d6	*19.3 %*		*15 - 110*		B8G1717	07/17/2018	*07/19/2018 01:40*	
Surrogate: Nitrobenzene-d5	*78.2 %*		*30 - 130*		B8G1717	07/17/2018	*07/19/2018 01:40*	
Surrogate: 2-Fluorobiphenyl	*79.4 %*		*30 - 130*		B8G1717	07/17/2018	*07/19/2018 01:40*	
Surrogate: 2,4,6-Tribromophenol	*104 %*		*15 - 110*		B8G1717	07/17/2018	*07/19/2018 01:40*	
Surrogate: Terphenyl-d14	*89.1 %*		*30 - 130*		B8G1717	07/17/2018	*07/19/2018 01:40*	

Volatile Organics **Analyst: TWF**

Method: EPA 8260C **Matrix: Water**

Analyte	Result (ug/L)	RL (ug/L)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Dichlorodifluoromethane	ND	10	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
Chloromethane	ND	2.7	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	*F1*C1
Vinyl Chloride	ND	1.6	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	*C1
Bromomethane	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	*C1
Chloroethane	ND	5.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	*C1
Trichlorofluoromethane	ND	25	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	*C1
Acetone	ND	50	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	*C1
Acrylonitrile	ND	0.50	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
Trichlorotrifluoroethane	ND	25	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
1,1-Dichloroethene	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
Methylene Chloride	ND	5.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
Carbon Disulfide	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
Methyl-t-Butyl Ether (MTBE)	ND	5.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
trans-1,2-Dichloroethene	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
1,1-Dichloroethane	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
2-Butanone (MEK)	ND	25	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
2,2-Dichloropropane	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
cis-1,2-Dichloroethene	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
Bromochloromethane	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
Chloroform	**5.7**	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
Tetrahydrofuran	ND	5.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
1,1,1-Trichloroethane	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
Carbon Tetrachloride	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
1,1-Dichloropropene	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	

Client Sample ID B5-W

Lab ID: 8070435-06

Volatile Organics **Analyst: TWF**

Method: EPA 8260C **Matrix: Water**

Analyte	Result (ug/L)	RL (ug/L)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
Benzene	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
1,2-Dichloroethane	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
Trichloroethene	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
1,2-Dichloropropane	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
Dibromomethane	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
Bromodichloromethane	ND	0.50	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
Methyl Isobutyl Ketone	ND	25	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
cis-1,3-Dichloropropene	ND	0.50	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
Toluene	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
trans-1,3-Dichloropropene	ND	0.50	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
2-Hexanone	ND	25	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
1,1,2-Trichloroethane	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
Tetrachloroethene	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
1,3-Dichloropropane	ND	0.50	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
Dibromochloromethane	ND	0.50	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
1,2-Dibromoethane	ND	0.50	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
trans-1,4-Dichloro-2-Butene	ND	10	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
Chlorobenzene	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
1,1,1,2-Tetrachloroethane	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
Ethylbenzene	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
m+p Xylenes	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
o-Xylene	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
Styrene	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
Bromoform	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
Isopropylbenzene	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
1,1,2,2-Tetrachloroethane	ND	0.50	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
Bromobenzene	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
1,2,3-Trichloropropane	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	*C2
n-Propylbenzene	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
2-Chlorotoluene	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
4-Chlorotoluene	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
1,3,5-Trimethylbenzene	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
tert-Butylbenzene	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
1,2,4-Trimethylbenzene	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
sec-Butylbenzene	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
1,3-Dichlorobenzene	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
4-Isopropyltoluene	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	

Client Sample ID B5-W

Lab ID: 8070435-06

Volatile Organics **Analyst: TWF**

Method: EPA 8260C **Matrix: Water**

Analyte	Result (ug/L)	RL (ug/L)	Dilution	Prep Method	Batch	Prepared	Date/Time Analyzed	Notes
1,4-Dichlorobenzene	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
1,2-Dichlorobenzene	**1.6**	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
n-Butylbenzene	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
1,2-Dibromo-3-Chloropropane	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
1,2,4-Trichlorobenzene	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
Hexachlorobutadiene	ND	0.45	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
Naphthalene	**1.3**	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	
1,2,3-Trichlorobenzene	ND	1.0	1	EPA 5030C	B8G2046	07/20/2018	07/20/2018 19:54	*C2
Surrogate: 1,2-Dichloroethane-d4	*110 %*		*70 - 130*		B8G2046	07/20/2018	*07/20/2018 19:54*	
Surrogate: Toluene-d8	*109 %*		*70 - 130*		B8G2046	07/20/2018	*07/20/2018 19:54*	
Surrogate: 4-Bromofluorobenzene	*90.2 %*		*70 - 130*		B8G2046	07/20/2018	*07/20/2018 19:54*	

QUALITY CONTROL SECTION

Batch B8G1621 - EPA 8082A

Analyte	Result (mg/kg)	RL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Blank (B8G1621-BLK1)					Prepared: 7/16/2018 Analyzed: 7/17/2018				
PCB-1016	ND	0.10							
PCB-1221	ND	0.10							
PCB-1232	ND	0.10							
PCB-1242	ND	0.10							
PCB-1248	ND	0.10							
PCB-1254	ND	0.10							
PCB-1260	ND	0.10							
PCB-1268	ND	0.10							
PCB-1262	ND	0.10							
Surrogate: TCMX [1C]					*81.4*	*30 - 150*			
Surrogate: TCMX [2C]					*78.6*	*30 - 150*			
Surrogate: DCB [1C]					*68.4*	*30 - 150*			
Surrogate: DCB [2C]					*63.4*	*30 - 150*			
LCS (B8G1621-BS1)					Prepared: 7/16/2018 Analyzed: 7/17/2018				
PCB-1016	0.598	0.10	1.000		59.8	40 - 140			
PCB-1260	0.654	0.10	1.000		65.4	40 - 140			
Surrogate: TCMX [1C]					*75.9*	*30 - 150*			
Surrogate: TCMX [2C]					*70.8*	*30 - 150*			
Surrogate: DCB [1C]					*74.2*	*30 - 150*			
Surrogate: DCB [2C]					*75.2*	*30 - 150*			

Batch B8G1622 - EPA 8081B

Analyte	Result (ug/kg)	RL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Blank (B8G1622-BLK1)					Prepared: 7/16/2018 Analyzed: 7/18/2018				
Alpha-BHC	ND	5.0							
Gamma-BHC	ND	5.0							
Heptachlor	ND	5.0							
Aldrin	ND	5.0							
Beta-BHC	ND	5.0							
Delta-BHC	ND	5.0							
Heptachlor Epoxide	ND	5.0							
Endosulfan I	ND	5.0							
4,4-DDE	ND	5.0							
Dieldrin	ND	1.0							
Endrin	ND	5.0							
4,4-DDD	ND	5.0							
Endosulfan II	ND	5.0							
4,4-DDT	ND	5.0							
Endrin Aldehyde	ND	5.0							
4,4-Methoxychlor	ND	5.0							
Endosulfan Sulfate	ND	5.0							
Endrin Ketone	ND	5.0							
Chlordane	ND	30							
Toxaphene	ND	100							
Alachlor	ND	50							
Surrogate: TCMX [1C]					*92.4*	*30 - 150*			
Surrogate: DCB [1C]					*121*	*30 - 150*			
Surrogate: TCMX [2C]					*100*	*30 - 150*			
Surrogate: DCB [2C]					*113*	*30 - 150*			
LCS (B8G1622-BS1)					Prepared: 7/16/2018 Analyzed: 7/18/2018				
Alpha-BHC	77.2	5.0	100.000		77.2	40 - 140			
Gamma-BHC	85.0	5.0	100.000		85.0	40 - 140			
Heptachlor	102	5.0	100.000		102	40 - 140			
Aldrin	75.3	5.0	100.000		75.3	40 - 140			
Beta-BHC	75.0	5.0	100.000		75.0	40 - 140			
Delta-BHC	95.7	5.0	100.000		95.7	40 - 140			
Heptachlor Epoxide	82.0	5.0	100.000		82.0	40 - 140			
Endosulfan I	84.5	5.0	100.000		84.5	40 - 140			
4,4-DDE	90.5	5.0	100.000		90.5	40 - 140			
Dieldrin	88.9	1.0	100.000		88.9	40 - 140			
Endrin	61.4	5.0	100.000		61.4	40 - 140			
4,4-DDD	91.0	5.0	100.000		91.0	40 - 140			
Endosulfan II	99.1	5.0	100.000		99.1	40 - 140			
4,4-DDT	132	5.0	100.000		132	40 - 140			
Endrin Aldehyde	100	5.0	100.000		100	40 - 140			
4,4-Methoxychlor	134	5.0	100.000		134	40 - 140			
Endosulfan Sulfate	115	5.0	100.000		115	40 - 140			
Endrin Ketone	139	5.0	100.000		139	40 - 140			
Alachlor	736	50	937.500		78.5	40 - 140			
Surrogate: TCMX [1C]					*63.8*	*30 - 150*			
Surrogate: DCB [1C]					*81.4*	*30 - 150*			
Surrogate: TCMX [2C]					*70.5*	*30 - 150*			
Surrogate: DCB [2C]					*78.0*	*30 - 150*			

Batch B8G1623 - EPA 7471B

Analyte	Result (mg/kg)	RL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Blank (B8G1623-BLK1)					Prepared: 7/17/2018 Analyzed: 7/17/2018				
Mercury	ND	0.13							
LCS (B8G1623-BS1)					Prepared: 7/17/2018 Analyzed: 7/17/2018				
Mercury	2.68	0.13	2.500		107	80 - 120			

Batch B8G1702 - SM 2540 G

Analyte	Result (%)	RL (%)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Duplicate (B8G1702-DUP1)		**Source: 8070435-05**			Prepared: 7/17/2018 Analyzed: 7/17/2018				
Percent Solids	87	1.0		87			0.955	5	

Batch B8G1708 - EPA 8270D

Analyte	Result (ug/kg)	RL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Blank (B8G1708-BLK1)					Prepared: 7/17/2018 Analyzed: 7/18/2018				
Phenol	ND	300							
1,3-Dichlorobenzene	ND	300							
n-Nitroso-di-n-propylamine	ND	300							
Pyridine	ND	300							
n-Nitroso-dimethylamine	ND	300							
bis(2-Chloroethyl)ether	ND	300							
Aniline	ND	300							
2-Chlorophenol	ND	300							
1,4-Dichlorobenzene	ND	300							
Benzyl Alcohol	ND	300							
1,2-Dichlorobenzene	ND	300							
bis(2-Chloroisopropyl)ether	ND	300							
Hexachloroethane	ND	300							
2-Methyl Phenol	ND	300							
3+4 Methyl Phenol	ND	300							
Naphthalene	ND	300							
2-Nitrophenol	ND	300							
2,4-Dichlorophenol	ND	300							
Hexachlorobutadiene	ND	300							
4-Chloro-3-methylphenol	ND	300							
Nitrobenzene	ND	300							
Isophorone	ND	300							
2,4-Dimethylphenol	ND	300							
bis(2-Chloroethoxy)methane	ND	300							
Benzoic Acid	ND	300							
1,2,4-Trichlorobenzene	ND	300							
2,6-Dichlorophenol	ND	300							
4-Chloroaniline	ND	300							
1,2,4,5-Tetrachlorobenzene	ND	300							
2-Methyl Naphthalene	ND	300							
Acenaphthylene	ND	300							
Acenaphthene	ND	300							
Dibenzofuran	ND	300							
Fluorene	ND	300							
Hexachlorocyclopentadiene	ND	300							
2,4,6-Trichlorophenol	ND	300							
2,4,5-Trichlorophenol	ND	300							
2,4-Dinitrophenol	ND	300							
4-Nitrophenol	ND	300							
2-Chloronaphthalene	ND	300							
2-Nitroaniline	ND	300							
Dimethylphthalate	ND	300							
2,6-Dinitrotoluene	ND	300							
4-Nitroaniline	ND	300							
2,4-Dinitrotoluene	ND	300							
2,3,4,6-Tetrachlorophenol	ND	300							
4-Chlorophenyl-phenylether	ND	300							
Diethylphthalate	ND	300							
Phenanthrene	ND	300							
Anthracene	ND	300							
Carbazole	ND	300							
Fluoranthene	ND	300							

Analyte	Result (ug/kg)	RL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Blank (B8G1708-BLK1) - Continued					Prepared: 7/17/2018 Analyzed: 7/18/2018				
Pyrene	ND	300							
n-Nitrosodiphenylamine	ND	300							
Pentachlorophenol	ND	300							
3-Nitroaniline	ND	300							
4,6-Dinitro-2-methylphenol	ND	300							
1,2-Diphenylhydrazine	ND	300							
4-Bromophenyl-phenylether	ND	300							
Hexachlorobenzene	ND	300							
Di-n-butylphthalate	ND	300							
Pentachloronitrobenzene	ND	300							
Benzo[a]anthracene	ND	300							
Chrysene	ND	300							
Butylbenzylphthalate	ND	300							
3,3-Dichlorobenzidine	ND	300							
bis(2-Ethylhexyl)phthalate	ND	300							
Di-n-octylphthalate	ND	300							
Benzo[b]fluoranthene	ND	300							
Benzo[k]fluoranthene	ND	300							
Benzo[a]pyrene	ND	300							
Indeno[1,2,3-cd]pyrene	ND	300							
Dibenz[a,h]anthracene	ND	300							
Benzo[g,h,i]perylene	ND	300							
Surrogate: 2-Fluorophenol					*47.5*	*30 - 130*			
Surrogate: Phenol-d6					*44.7*	*30 - 130*			
Surrogate: Nitrobenzene-d5					*41.3*	*30 - 130*			
Surrogate: 2-Fluorobiphenyl					*39.3*	*30 - 130*			
Surrogate: 2,4,6-Tribromophenol					*40.5*	*30 - 130*			
Surrogate: Terphenyl-d14					*58.8*	*30 - 130*			
LCS (B8G1708-BS1)					Prepared: 7/17/2018 Analyzed: 7/18/2018				
Phenol	2230	300	4,000.000		55.9	30 - 130			
1,3-Dichlorobenzene	1920	300	4,000.000		48.0	40 - 140			
n-Nitroso-di-n-propylamine	1950	300	4,000.000		48.7	40 - 140			
Pyridine	1760	300	4,000.000		44.0	40 - 140			
n-Nitroso-dimethylamine	1990	300	4,000.000		49.6	40 - 140			
bis(2-Chloroethyl)ether	2120	300	4,000.000		53.1	40 - 140			
Aniline	1770	300	4,000.000		44.3	40 - 140			
2-Chlorophenol	2090	300	4,000.000		52.3	30 - 130			
1,4-Dichlorobenzene	1610	300	4,000.000		40.2	40 - 140			
Benzyl Alcohol	1920	300	4,000.000		48.0	30 - 130			
1,2-Dichlorobenzene	1660	300	4,000.000		41.4	40 - 140			
bis(2-Chloroisopropyl)ether	2110	300	4,000.000		52.7	40 - 140			
Hexachloroethane	1700	300	4,000.000		42.6	40 - 140			
2-Methyl Phenol	2180	300	4,000.000		54.4	30 - 130			
3+4 Methyl Phenol	2060	300	4,000.000		51.5	30 - 130			
Naphthalene	1760	300	4,000.000		44.1	40 - 140			
2-Nitrophenol	1850	300	4,000.000		46.2	30 - 130			
2,4-Dichlorophenol	1920	300	4,000.000		48.1	30 - 130			
Hexachlorobutadiene	1660	300	4,000.000		41.5	40 - 140			
4-Chloro-3-methylphenol	1910	300	4,000.000		47.8	30 - 130			
Nitrobenzene	1780	300	4,000.000		44.4	40 - 140			
Isophorone	1970	300	4,000.000		49.1	40 - 140			
2,4-Dimethylphenol	1850	300	4,000.000		46.3	30 - 130			

Analyte	Result (ug/kg)	RL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
LCS (B8G1708-BS1) - Continued					Prepared: 7/17/2018 Analyzed: 7/18/2018				
bis(2-Chloroethoxy)methane	1970	300	4,000.000		49.1	40 - 140			
Benzoic Acid	1880	300	4,000.000		47.1	30 - 130			
1,2,4-Trichlorobenzene	1730	300	4,000.000		43.2	40 - 140			
2,6-Dichlorophenol	1690	300	4,000.000		42.3	30 - 130			
4-Chloroaniline	2250	300	4,000.000		56.1	40 - 140			
1,2,4,5-Tetrachlorobenzene	1750	300	4,000.000		43.8	40 - 140			
2-Methyl Naphthalene	1730	300	4,000.000		43.2	40 - 140			
Acenaphthylene	2010	300	4,000.000		50.3	40 - 140			
Acenaphthene	1880	300	4,000.000		46.9	40 - 140			
Dibenzofuran	1830	300	4,000.000		45.7	40 - 140			
Fluorene	1840	300	4,000.000		46.0	40 - 140			
Hexachlorocyclopentadiene	1290	300	4,000.000		**32.2**	40 - 140			**L**
2,4,6-Trichlorophenol	1830	300	4,000.000		45.9	30 - 130			
2,4,5-Trichlorophenol	1900	300	4,000.000		47.5	30 - 130			
2,4-Dinitrophenol	1580	300	4,000.000		39.6	30 - 130			
4-Nitrophenol	1760	300	4,000.000		44.0	30 - 130			
2-Chloronaphthalene	2490	300	4,000.000		62.3	40 - 140			
2-Nitroaniline	2070	300	4,000.000		51.7	40 - 140			
Dimethylphthalate	1910	300	4,000.000		47.7	40 - 140			
2,6-Dinitrotoluene	1930	300	4,000.000		48.4	40 - 140			
4-Nitroaniline	3460	300	4,000.000		86.5	40 - 140			
2,4-Dinitrotoluene	1760	300	4,000.000		43.9	40 - 140			
2,3,4,6-Tetrachlorophenol	1970	300	4,000.000		49.4	30 - 130			
4-Chlorophenyl-phenylether	1760	300	4,000.000		43.9	40 - 140			
Diethylphthalate	1860	300	4,000.000		46.4	40 - 140			
Phenanthrene	1890	300	4,000.000		47.2	40 - 140			
Anthracene	1990	300	4,000.000		49.7	40 - 140			
Carbazole	2920	300	4,000.000		73.0	40 - 140			
Fluoranthene	1990	300	4,000.000		49.7	40 - 140			
Pyrene	1980	300	4,000.000		49.5	40 - 140			
n-Nitrosodiphenylamine	3000	300	4,000.000		74.9	40 - 140			
Pentachlorophenol	1820	300	4,000.000		45.5	30 - 130			
3-Nitroaniline	2710	300	4,000.000		67.9	40 - 140			
4,6-Dinitro-2-methylphenol	1640	300	4,000.000		41.1	30 - 130			
1,2-Diphenylhydrazine	1900	300	4,000.000		47.6	40 - 140			
4-Bromophenyl-phenylether	1840	300	4,000.000		46.0	40 - 140			
Hexachlorobenzene	1840	300	4,000.000		46.0	40 - 140			
Di-n-butylphthalate	1930	300	4,000.000		48.1	40 - 140			
Pentachloronitrobenzene	1870	300	4,000.000		46.6	40 - 140			
Benzo[a]anthracene	2230	300	4,000.000		55.7	40 - 140			
Chrysene	2280	300	4,000.000		56.9	40 - 140			
Butylbenzylphthalate	2160	300	4,000.000		53.9	40 - 140			
3,3-Dichlorobenzidine	4000	300	4,000.000		100	40 - 140			
bis(2-Ethylhexyl)phthalate	2110	300	4,000.000		52.9	40 - 140			
Di-n-octylphthalate	2300	300	4,000.000		57.5	40 - 140			
Benzo[b]fluoranthene	2330	300	4,000.000		58.4	40 - 140			
Benzo[k]fluoranthene	2650	300	4,000.000		66.1	40 - 140			
Benzo[a]pyrene	3060	300	4,000.000		76.4	40 - 140			
Indeno[1,2,3-cd]pyrene	4610	300	4,000.000		115	40 - 140			
Dibenz[a,h]anthracene	4780	300	4,000.000		119	40 - 140			
Benzo[g,h,i]perylene	4480	300	4,000.000		112	40 - 140			
Surrogate: 2-Fluorophenol					*62.2*	*30 - 130*			
Surrogate: Phenol-d6					*59.3*	*30 - 130*			

Analyte	Result (ug/kg)	RL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
LCS (B8G1708-BS1) - Continued					Prepared: 7/17/2018 Analyzed: 7/18/2018				
Surrogate: Nitrobenzene-d5					*50.1*	*30 - 130*			
Surrogate: 2-Fluorobiphenyl					*49.8*	*30 - 130*			
Surrogate: 2,4,6-Tribromophenol					*52.4*	*30 - 130*			
Surrogate: Terphenyl-d14					*57.3*	*30 - 130*			
Duplicate (B8G1708-DUP1)		**Source: 8070435-05**			Prepared: 7/17/2018 Analyzed: 7/18/2018				
Phenol	ND	340		ND				30	
1,3-Dichlorobenzene	ND	340		ND				30	
n-Nitroso-di-n-propylamine	ND	340		ND				30	
Pyridine	ND	340		ND				30	
n-Nitroso-dimethylamine	ND	340		ND				30	
bis(2-Chloroethyl)ether	ND	340		ND				30	
Aniline	ND	340		ND				30	
2-Chlorophenol	ND	340		ND				30	
1,4-Dichlorobenzene	ND	340		ND				30	
Benzyl Alcohol	ND	340		ND				30	
1,2-Dichlorobenzene	ND	340		ND				30	
bis(2-Chloroisopropyl)ether	ND	340		ND				30	
Hexachloroethane	ND	340		ND				30	
2-Methyl Phenol	ND	340		ND				30	
3+4 Methyl Phenol	ND	340		ND				30	
Naphthalene	ND	340		ND				30	
2-Nitrophenol	ND	340		ND				30	
2,4-Dichlorophenol	ND	340		ND				30	
Hexachlorobutadiene	ND	340		ND				30	
4-Chloro-3-methylphenol	ND	340		ND				30	
Nitrobenzene	ND	340		ND				30	
Isophorone	ND	340		ND				30	
2,4-Dimethylphenol	ND	340		ND				30	
bis(2-Chloroethoxy)methane	ND	340		ND				30	
Benzoic Acid	ND	340		ND				30	
1,2,4-Trichlorobenzene	ND	340		ND				30	
2,6-Dichlorophenol	ND	340		ND				30	
4-Chloroaniline	ND	340		ND				30	
1,2,4,5-Tetrachlorobenzene	ND	340		ND				30	
2-Methyl Naphthalene	ND	340		ND				30	
Acenaphthylene	ND	340		ND				30	
Acenaphthene	ND	340		ND				30	
Dibenzofuran	ND	340		ND				30	
Fluorene	ND	340		ND				30	
Hexachlorocyclopentadiene	ND	340		ND				30	
2,4,6-Trichlorophenol	ND	340		ND				30	
2,4,5-Trichlorophenol	ND	340		ND				30	
2,4-Dinitrophenol	ND	340		ND				30	
4-Nitrophenol	ND	340		ND				30	
2-Chloronaphthalene	ND	340		ND				30	
2-Nitroaniline	ND	340		ND				30	
Dimethylphthalate	ND	340		ND				30	
2,6-Dinitrotoluene	ND	340		ND				30	
4-Nitroaniline	ND	340		ND				30	
2,4-Dinitrotoluene	ND	340		ND				30	
2,3,4,6-Tetrachlorophenol	ND	340		ND				30	
4-Chlorophenyl-phenylether	ND	340		ND				30	

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Duplicate (B8G1708-DUP1) - Continued		**Source: 8070435-05**			Prepared: 7/17/2018 Analyzed: 7/18/2018				
Diethylphthalate	ND	340		ND				30	
Phenanthrene	ND	340		ND				30	
Anthracene	ND	340		ND				30	
Carbazole	ND	340		ND				30	
Fluoranthene	ND	340		ND				30	
Pyrene	ND	340		ND				30	
n-Nitrosodiphenylamine	ND	340		ND				30	
Pentachlorophenol	ND	340		ND				30	
3-Nitroaniline	ND	340		ND				30	
4,6-Dinitro-2-methylphenol	ND	340		ND				30	
1,2-Diphenylhydrazine	ND	340		ND				30	
4-Bromophenyl-phenylether	ND	340		ND				30	
Hexachlorobenzene	ND	340		ND				30	
Di-n-butylphthalate	ND	340		ND				30	
Pentachloronitrobenzene	ND	340		ND				30	
Benzo[a]anthracene	ND	340		ND				30	
Chrysene	ND	340		ND				30	
Butylbenzylphthalate	ND	340		ND				30	
3,3-Dichlorobenzidine	ND	340		ND				30	
bis(2-Ethylhexyl)phthalate	ND	340		ND				30	
Di-n-octylphthalate	ND	340		ND				30	
Benzo[b]fluoranthene	ND	340		ND				30	
Benzo[k]fluoranthene	ND	340		ND				30	
Benzo[a]pyrene	ND	340		ND				30	
Indeno[1,2,3-cd]pyrene	ND	340		ND				30	
Dibenz[a,h]anthracene	ND	340		ND				30	
Benzo[g,h,i]perylene	ND	340		ND				30	
Surrogate: 2-Fluorophenol					*52.0*	*30 - 130*			
Surrogate: Phenol-d6					*54.6*	*30 - 130*			
Surrogate: Nitrobenzene-d5					*48.9*	*30 - 130*			
Surrogate: 2-Fluorobiphenyl					*53.7*	*30 - 130*			
Surrogate: 2,4,6-Tribromophenol					*69.1*	*30 - 130*			
Surrogate: Terphenyl-d14					*82.3*	*30 - 130*			
Matrix Spike (B8G1708-MS1)		**Source: 8070435-05**			Prepared: 7/17/2018 Analyzed: 7/18/2018				
Phenol	2680	340	4,545.747	ND	58.9	30 - 130			
1,3-Dichlorobenzene	2140	340	4,545.747	ND	47.0	40 - 140			
n-Nitroso-di-n-propylamine	2610	340	4,545.747	ND	57.5	40 - 140			
Pyridine	1870	340	4,545.747	ND	41.2	40 - 140			
n-Nitroso-dimethylamine	2410	340	4,545.747	ND	52.9	40 - 140			
bis(2-Chloroethyl)ether	2520	340	4,545.747	ND	55.4	40 - 140			
Aniline	2160	340	4,545.747	ND	47.6	40 - 140			
2-Chlorophenol	2700	340	4,545.747	ND	59.5	30 - 130			
1,4-Dichlorobenzene	2200	340	4,545.747	ND	48.4	40 - 140			
Benzyl Alcohol	1350	340	4,545.747	ND	**29.7**	30 - 130			**L**
1,2-Dichlorobenzene	2300	340	4,545.747	ND	50.5	40 - 140			
bis(2-Chloroisopropyl)ether	2220	340	4,545.747	ND	48.7	40 - 140			
Hexachloroethane	2150	340	4,545.747	ND	47.3	40 - 140			
2-Methyl Phenol	2730	340	4,545.747	ND	60.0	30 - 130			
3+4 Methyl Phenol	2690	340	4,545.747	ND	59.2	30 - 130			
Naphthalene	2520	340	4,545.747	ND	55.4	40 - 140			
2-Nitrophenol	2780	340	4,545.747	ND	61.1	30 - 130			
2,4-Dichlorophenol	2880	340	4,545.747	ND	63.3	30 - 130			

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Matrix Spike (B8G1708-MS1) - Continued		**Source: 8070435-05**			Prepared: 7/17/2018 Analyzed: 7/18/2018				
Hexachlorobutadiene	2430	340	4,545.747	ND	53.5	40 - 140			
4-Chloro-3-methylphenol	2750	340	4,545.747	ND	60.5	30 - 130			
Nitrobenzene	2500	340	4,545.747	ND	55.0	40 - 140			
Isophorone	2570	340	4,545.747	ND	56.5	40 - 140			
2,4-Dimethylphenol	2330	340	4,545.747	ND	51.3	30 - 130			
bis(2-Chloroethoxy)methane	2920	340	4,545.747	ND	64.2	40 - 140			
Benzoic Acid	1070	340	4,545.747	ND	**23.4**	30 - 130			**L**
1,2,4-Trichlorobenzene	2490	340	4,545.747	ND	54.7	40 - 140			
2,6-Dichlorophenol	2490	340	4,545.747	ND	54.8	30 - 130			
4-Chloroaniline	2540	340	4,545.747	ND	55.8	40 - 140			
1,2,4,5-Tetrachlorobenzene	2620	340	4,545.747	ND	57.6	40 - 140			
2-Methyl Naphthalene	2650	340	4,545.747	ND	58.4	40 - 140			
Acenaphthylene	2510	340	4,545.747	ND	55.2	40 - 140			
Acenaphthene	2650	340	4,545.747	ND	58.3	40 - 140			
Dibenzofuran	2810	340	4,545.747	ND	61.8	40 - 140			
Fluorene	2750	340	4,545.747	ND	60.5	40 - 140			
Hexachlorocyclopentadiene	2620	340	4,545.747	ND	57.6	40 - 140			
2,4,6-Trichlorophenol	2500	340	4,545.747	ND	55.1	30 - 130			
2,4,5-Trichlorophenol	2740	340	4,545.747	ND	60.2	30 - 130			
2,4-Dinitrophenol	1950	340	4,545.747	ND	42.8	30 - 130			
4-Nitrophenol	1660	340	4,545.747	ND	36.5	30 - 130			
2-Chloronaphthalene	2580	340	4,545.747	ND	56.7	40 - 140			
2-Nitroaniline	2850	340	4,545.747	ND	62.7	40 - 140			
Dimethylphthalate	2830	340	4,545.747	ND	62.2	40 - 140			
2,6-Dinitrotoluene	2820	340	4,545.747	ND	62.1	40 - 140			
4-Nitroaniline	3010	340	4,545.747	ND	66.2	40 - 140			
2,4-Dinitrotoluene	2820	340	4,545.747	ND	62.0	40 - 140			
2,3,4,6-Tetrachlorophenol	2810	340	4,545.747	ND	61.8	30 - 130			
4-Chlorophenyl-phenylether	2850	340	4,545.747	ND	62.7	40 - 140			
Diethylphthalate	2850	340	4,545.747	ND	62.7	40 - 140			
Phenanthrene	2840	340	4,545.747	ND	62.5	40 - 140			
Anthracene	2820	340	4,545.747	ND	62.0	40 - 140			
Carbazole	3190	340	4,545.747	ND	70.2	40 - 140			
Fluoranthene	2920	340	4,545.747	ND	64.3	40 - 140			
Pyrene	2980	340	4,545.747	ND	65.6	40 - 140			
n-Nitrosodiphenylamine	2830	340	4,545.747	ND	62.4	40 - 140			
Pentachlorophenol	2740	340	4,545.747	ND	60.3	30 - 130			
3-Nitroaniline	2870	340	4,545.747	ND	63.2	40 - 140			
4,6-Dinitro-2-methylphenol	2450	340	4,545.747	ND	53.8	30 - 130			
1,2-Diphenylhydrazine	2850	340	4,545.747	ND	62.7	40 - 140			
4-Bromophenyl-phenylether	2830	340	4,545.747	ND	62.3	40 - 140			
Hexachlorobenzene	2850	340	4,545.747	ND	62.7	40 - 140			
Di-n-butylphthalate	3010	340	4,545.747	ND	66.2	40 - 140			
Pentachloronitrobenzene	2620	340	4,545.747	ND	57.7	40 - 140			
Benzo[a]anthracene	2820	340	4,545.747	ND	62.1	40 - 140			
Chrysene	2930	340	4,545.747	ND	64.4	40 - 140			
Butylbenzylphthalate	2690	340	4,545.747	ND	59.1	40 - 140			
3,3-Dichlorobenzidine	3040	340	4,545.747	ND	67.0	40 - 140			
bis(2-Ethylhexyl)phthalate	2820	340	4,545.747	ND	62.0	40 - 140			
Di-n-octylphthalate	2820	340	4,545.747	ND	62.1	40 - 140			
Benzo[b]fluoranthene	2290	340	4,545.747	ND	50.3	40 - 140			
Benzo[k]fluoranthene	2850	340	4,545.747	ND	62.7	40 - 140			
Benzo[a]pyrene	2550	340	4,545.747	ND	56.1	40 - 140			

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Matrix Spike (B8G1708-MS1) - Continued		**Source: 8070435-05**			Prepared: 7/17/2018 Analyzed: 7/18/2018				
Indeno[1,2,3-cd]pyrene	3490	340	4,545.747	ND	76.9	40 - 140			
Dibenz[a,h]anthracene	3420	340	4,545.747	ND	75.3	40 - 140			
Benzo[g,h,i]perylene	3370	340	4,545.747	ND	74.1	40 - 140			
Surrogate: 2-Fluorophenol					*61.5*	*30 - 130*			
Surrogate: Phenol-d6					*59.1*	*30 - 130*			
Surrogate: Nitrobenzene-d5					*61.4*	*30 - 130*			
Surrogate: 2-Fluorobiphenyl					*63.1*	*30 - 130*			
Surrogate: 2,4,6-Tribromophenol					*70.8*	*30 - 130*			
Surrogate: Terphenyl-d14					*68.2*	*30 - 130*			
Matrix Spike Dup (B8G1708-MSD1)		**Source: 8070435-05**			Prepared: 7/17/2018 Analyzed: 7/19/2018				
Phenol	2240	340	4,577.252	ND	48.9	30 - 130	17.7	30	
1,3-Dichlorobenzene	1550	340	4,577.252	ND	**33.9**	40 - 140	**31.7**	30	**L,D**
n-Nitroso-di-n-propylamine	1900	340	4,577.252	ND	41.5	40 - 140	**31.5**	30	**D**
Pyridine	1420	340	4,577.252	ND	**31.0**	40 - 140	27.4	30	**L**
n-Nitroso-dimethylamine	1870	340	4,577.252	ND	40.9	40 - 140	24.9	30	
bis(2-Chloroethyl)ether	1910	340	4,577.252	ND	41.8	40 - 140	27.2	30	
Aniline	1770	340	4,577.252	ND	**38.7**	40 - 140	19.9	30	**L**
2-Chlorophenol	2110	340	4,577.252	ND	46.0	30 - 130	24.8	30	
1,4-Dichlorobenzene	1620	340	4,577.252	ND	**35.3**	40 - 140	**30.6**	30	**L,D**
Benzyl Alcohol	847	340	4,577.252	ND	**18.5**	30 - 130	**45.6**	30	**L,D**
1,2-Dichlorobenzene	1580	340	4,577.252	ND	**34.5**	40 - 140	**37.0**	30	**L,D**
bis(2-Chloroisopropyl)ether	1540	340	4,577.252	ND	**33.6**	40 - 140	**36.0**	30	**L,D**
Hexachloroethane	1480	340	4,577.252	ND	**32.3**	40 - 140	**37.0**	30	**L,D**
2-Methyl Phenol	2060	340	4,577.252	ND	45.1	30 - 130	27.8	30	
3+4 Methyl Phenol	2080	340	4,577.252	ND	45.4	30 - 130	25.8	30	
Naphthalene	1870	340	4,577.252	ND	40.8	40 - 140	29.8	30	
2-Nitrophenol	2110	340	4,577.252	ND	46.1	30 - 130	27.3	30	
2,4-Dichlorophenol	2270	340	4,577.252	ND	49.5	30 - 130	23.7	30	
Hexachlorobutadiene	1790	340	4,577.252	ND	**39.1**	40 - 140	**30.5**	30	**L,D**
4-Chloro-3-methylphenol	2420	340	4,577.252	ND	52.8	30 - 130	12.8	30	
Nitrobenzene	1880	340	4,577.252	ND	41.2	40 - 140	28.1	30	
Isophorone	2070	340	4,577.252	ND	45.2	40 - 140	21.6	30	
2,4-Dimethylphenol	1840	340	4,577.252	ND	40.1	30 - 130	23.8	30	
bis(2-Chloroethoxy)methane	2310	340	4,577.252	ND	50.4	40 - 140	23.5	30	
Benzoic Acid	698	340	4,577.252	ND	**15.2**	30 - 130	**41.8**	30	**L,D**
1,2,4-Trichlorobenzene	1820	340	4,577.252	ND	**39.8**	40 - 140	**30.8**	30	**L,D**
2,6-Dichlorophenol	1920	340	4,577.252	ND	41.9	30 - 130	26.0	30	
4-Chloroaniline	2110	340	4,577.252	ND	46.2	40 - 140	18.2	30	
1,2,4,5-Tetrachlorobenzene	1980	340	4,577.252	ND	43.2	40 - 140	27.8	30	
2-Methyl Naphthalene	2070	340	4,577.252	ND	45.3	40 - 140	24.6	30	
Acenaphthylene	2100	340	4,577.252	ND	46.0	40 - 140	17.6	30	
Acenaphthene	2250	340	4,577.252	ND	49.2	40 - 140	16.2	30	
Dibenzofuran	2450	340	4,577.252	ND	53.6	40 - 140	13.6	30	
Fluorene	2530	340	4,577.252	ND	55.2	40 - 140	8.49	30	
Hexachlorocyclopentadiene	2080	340	4,577.252	ND	45.4	40 - 140	23.0	30	
2,4,6-Trichlorophenol	2190	340	4,577.252	ND	47.9	30 - 130	13.4	30	
2,4,5-Trichlorophenol	2760	340	4,577.252	ND	60.3	30 - 130	0.911	30	
2,4-Dinitrophenol	1940	340	4,577.252	ND	42.4	30 - 130	0.318	30	
4-Nitrophenol	1650	340	4,577.252	ND	36.1	30 - 130	0.519	30	
2-Chloronaphthalene	2040	340	4,577.252	ND	44.6	40 - 140	23.2	30	
2-Nitroaniline	2670	340	4,577.252	ND	58.4	40 - 140	6.43	30	
Dimethylphthalate	2730	340	4,577.252	ND	59.7	40 - 140	3.44	30	

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Matrix Spike Dup (B8G1708-MSD1) - Continued		**Source: 8070435-05**			Prepared: 7/17/2018 Analyzed: 7/19/2018				
2,6-Dinitrotoluene	2660	340	4,577.252	ND	58.1	40 - 140	5.94	30	
4-Nitroaniline	3040	340	4,577.252	ND	66.4	40 - 140	0.903	30	
2,4-Dinitrotoluene	2850	340	4,577.252	ND	62.3	40 - 140	1.32	30	
2,3,4,6-Tetrachlorophenol	2800	340	4,577.252	ND	61.2	30 - 130	0.276	30	
4-Chlorophenyl-phenylether	2640	340	4,577.252	ND	57.6	40 - 140	7.82	30	
Diethylphthalate	2840	340	4,577.252	ND	62.2	40 - 140	0.146	30	
Phenanthrene	2830	340	4,577.252	ND	61.8	40 - 140	0.392	30	
Anthracene	2850	340	4,577.252	ND	62.3	40 - 140	1.14	30	
Carbazole	3270	340	4,577.252	ND	71.4	40 - 140	2.35	30	
Fluoranthene	3030	340	4,577.252	ND	66.2	40 - 140	3.53	30	
Pyrene	3060	340	4,577.252	ND	66.8	40 - 140	2.54	30	
n-Nitrosodiphenylamine	2830	340	4,577.252	ND	61.9	40 - 140	0.0477	30	
Pentachlorophenol	2820	340	4,577.252	ND	61.7	30 - 130	2.91	30	
3-Nitroaniline	2890	340	4,577.252	ND	63.2	40 - 140	0.628	30	
4,6-Dinitro-2-methylphenol	2470	340	4,577.252	ND	53.9	30 - 130	0.904	30	
1,2-Diphenylhydrazine	2690	340	4,577.252	ND	58.8	40 - 140	5.89	30	
4-Bromophenyl-phenylether	2760	340	4,577.252	ND	60.4	40 - 140	2.39	30	
Hexachlorobenzene	2800	340	4,577.252	ND	61.2	40 - 140	1.64	30	
Di-n-butylphthalate	3110	340	4,577.252	ND	68.0	40 - 140	3.35	30	
Pentachloronitrobenzene	2700	340	4,577.252	ND	58.9	40 - 140	2.72	30	
Benzo[a]anthracene	2930	340	4,577.252	ND	64.1	40 - 140	3.75	30	
Chrysene	3050	340	4,577.252	ND	66.6	40 - 140	3.97	30	
Butylbenzylphthalate	2780	340	4,577.252	ND	60.8	40 - 140	3.63	30	
3,3-Dichlorobenzidine	3270	340	4,577.252	ND	71.4	40 - 140	7.16	30	
bis(2-Ethylhexyl)phthalate	2880	340	4,577.252	ND	62.8	40 - 140	1.96	30	
Di-n-octylphthalate	2920	340	4,577.252	ND	63.8	40 - 140	3.40	30	
Benzo[b]fluoranthene	2390	340	4,577.252	ND	52.3	40 - 140	4.54	30	
Benzo[k]fluoranthene	3010	340	4,577.252	ND	65.9	40 - 140	5.59	30	
Benzo[a]pyrene	2670	340	4,577.252	ND	58.3	40 - 140	4.62	30	
Indeno[1,2,3-cd]pyrene	3720	340	4,577.252	ND	81.2	40 - 140	6.20	30	
Dibenz[a,h]anthracene	3680	340	4,577.252	ND	80.3	40 - 140	7.20	30	
Benzo[g,h,i]perylene	3540	340	4,577.252	ND	77.3	40 - 140	4.85	30	
Surrogate: 2-Fluorophenol					*46.8*	*30 - 130*			
Surrogate: Phenol-d6					*49.7*	*30 - 130*			
Surrogate: Nitrobenzene-d5					*46.7*	*30 - 130*			
Surrogate: 2-Fluorobiphenyl					*49.6*	*30 - 130*			
Surrogate: 2,4,6-Tribromophenol					*70.6*	*30 - 130*			
Surrogate: Terphenyl-d14					*70.0*	*30 - 130*			

Batch B8G1713 - EPA 6010C

Analyte	Result (mg/kg)	RL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Blank (B8G1713-BLK1)					Prepared: 7/17/2018 Analyzed: 7/17/2018				
Lead	ND	2.0							
Selenium	ND	1.0							
Cadmium	ND	0.50							
Chromium	ND	2.0							
Arsenic	ND	1.0							
Barium	ND	2.0							
Silver	ND	2.0							
Copper	ND	2.0							
Nickel	ND	2.0							
Zinc	ND	2.0							
Beryllium	ND	1.0							
Manganese	ND	2.0							
LCS (B8G1713-BS1)					Prepared: 7/17/2018 Analyzed: 7/17/2018				
Lead	22.5	2.0	24.802		90.5	80 - 120			
Selenium	42.5	0.99	49.603		85.7	80 - 120			
Cadmium	24.1	0.50	24.802		97.3	80 - 120			
Chromium	23.7	2.0	24.802		95.4	80 - 120			
Arsenic	21.9	0.99	24.802		88.2	80 - 120			
Barium	24.4	2.0	24.802		98.4	80 - 120			
Silver	4.47	2.0	4.960		90.0	80 - 120			
Copper	24.6	2.0	24.802		99.2	80 - 120			
Nickel	23.4	2.0	24.802		94.3	80 - 120			
Zinc	26.5	2.0	24.802		107	80 - 120			
Beryllium	24.0	0.99	24.802		96.6	80 - 120			
Manganese	24.9	2.0	24.802		100	80 - 120			

Batch B8G1717 - EPA 8270D

Analyte	Result (ug/L)	RL (ug/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Blank (B8G1717-BLK1)					Prepared: 7/17/2018 Analyzed: 7/18/2018				
Phenol	ND	20							
1,3-Dichlorobenzene	ND	5.0							
n-Nitroso-di-n-propylamine	ND	10							
Pyridine	ND	4.0							
n-Nitroso-dimethylamine	ND	20							
bis(2-Chloroethyl)ether	ND	5.0							
Aniline	ND	20							
2-Chlorophenol	ND	20							
1,4-Dichlorobenzene	ND	5.0							
Benzyl Alcohol	ND	20							
1,2-Dichlorobenzene	ND	5.0							
bis(2-Chloroisopropyl)ether	ND	10							
Hexachloroethane	ND	4.0							
2-Methyl Phenol	ND	20							
3+4 Methyl Phenol	ND	20							
Naphthalene	ND	1.0							
2-Nitrophenol	ND	20							
2,4-Dichlorophenol	ND	20							
Hexachlorobutadiene	ND	20							
4-Chloro-3-methylphenol	ND	20							
Nitrobenzene	ND	20							
Isophorone	ND	20							
2,4-Dimethylphenol	ND	20							
bis(2-Chloroethoxy)methane	ND	20							
Benzoic Acid	ND	20							
1,2,4-Trichlorobenzene	ND	5.0							
2,6-Dichlorophenol	ND	20							
4-Chloroaniline	ND	20							
1,2,4,5-Tetrachlorobenzene	ND	20							
2-Methyl Naphthalene	ND	1.0							
Acenaphthylene	ND	0.30							
Acenaphthene	ND	1.0							
Dibenzofuran	ND	1.0							
Fluorene	ND	1.0							
Hexachlorocyclopentadiene	ND	20							
2,4,6-Trichlorophenol	ND	20							
2,4,5-Trichlorophenol	ND	20							
2,4-Dinitrophenol	ND	20							
4-Nitrophenol	ND	60							
2-Chloronaphthalene	ND	20							
2-Nitroaniline	ND	20							
Dimethylphthalate	ND	20							
2,6-Dinitrotoluene	ND	75							
4-Nitroaniline	ND	20							
2,4-Dinitrotoluene	ND	75							
2,3,4,6-Tetrachlorophenol	ND	20							
4-Chlorophenyl-phenylether	ND	20							
Diethylphthalate	ND	20							
Phenanthrene	ND	0.077							
Anthracene	ND	1.0							
Carbazole	ND	1.0							
Fluoranthene	ND	1.0							

Analyte	Result (ug/L)	RL (ug/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Blank (B8G1717-BLK1) - Continued					Prepared: 7/17/2018 Analyzed: 7/18/2018				
Pyrene	ND	1.0							
n-Nitrosodiphenylamine	ND	20							
Pentachlorophenol	ND	1.0							
3-Nitroaniline	ND	20							
4,6-Dinitro-2-methylphenol	ND	20							
1,2-Diphenylhydrazine	ND	20							
4-Bromophenyl-phenylether	ND	20							
Hexachlorobenzene	ND	0.077							
Pentachloronitrobenzene	ND	20							
Di-n-butylphthalate	ND	20							
Benzo[a]anthracene	ND	0.060							
Chrysene	ND	0.50							
Butylbenzylphthalate	ND	20							
3,3-Dichlorobenzidine	ND	75							
bis(2-Ethylhexyl)phthalate	ND	2.0							
Di-n-octylphthalate	ND	20							
Benzo[b]fluoranthene	ND	0.080							
Benzo[k]fluoranthene	ND	0.30							
Benzo[a]pyrene	ND	0.20							
Indeno[1,2,3-cd]pyrene	ND	0.10							
Dibenz[a,h]anthracene	ND	0.10							
Benzo[g,h,i]perylene	ND	0.40							
Surrogate: 2-Fluorophenol					*39.3*	*15 - 110*			
Surrogate: Phenol-d6					*22.3*	*15 - 110*			
Surrogate: Nitrobenzene-d5					*82.6*	*30 - 130*			
Surrogate: 2-Fluorobiphenyl					*91.8*	*30 - 130*			
Surrogate: 2,4,6-Tribromophenol					*107*	*15 - 110*			
Surrogate: Terphenyl-d14					*112*	*30 - 130*			
LCS (B8G1717-BS1)					Prepared: 7/17/2018 Analyzed: 7/18/2018				
Phenol	12.4	20	30.000		41.4	30 - 130			
1,3-Dichlorobenzene	20.7	5.0	30.000		69.1	40 - 140			
n-Nitroso-di-n-propylamine	23.8	10	30.000		79.4	40 - 140			
Pyridine	4.48	4.0	30.000		**14.9**	40 - 140			**L**
n-Nitroso-dimethylamine	8.31	8.0	30.000		**27.7**	40 - 140			**L**
bis(2-Chloroethyl)ether	19.5	5.0	30.000		64.9	40 - 140			
Aniline	12.9	10	30.000		42.9	40 - 140			
2-Chlorophenol	21.5	20	30.000		71.6	30 - 130			
1,4-Dichlorobenzene	17.7	5.0	30.000		59.1	40 - 140			
Benzyl Alcohol	22.6	20	30.000		75.3	30 - 130			
1,2-Dichlorobenzene	19.0	5.0	30.000		63.2	40 - 140			
bis(2-Chloroisopropyl)ether	17.0	10	30.000		56.7	40 - 140			
Hexachloroethane	19.7	4.0	30.000		65.8	40 - 140			
2-Methyl Phenol	20.7	20	30.000		69.1	30 - 130			
3+4 Methyl Phenol	22.4	20	30.000		74.7	30 - 130			
Naphthalene	22.8	1.0	30.000		76.1	40 - 140			
2-Nitrophenol	29.1	20	30.000		97.1	30 - 130			
2,4-Dichlorophenol	26.5	20	30.000		88.3	30 - 130			
Hexachlorobutadiene	24.4	20	30.000		81.4	40 - 140			
4-Chloro-3-methylphenol	34.0	20	30.000		113	30 - 130			
Nitrobenzene	23.9	20	30.000		79.8	40 - 140			
Isophorone	30.2	20	30.000		101	40 - 140			
2,4-Dimethylphenol	28.4	20	30.000		94.7	30 - 130			

Analyte	Result (ug/L)	RL (ug/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
LCS (B8G1717-BS1) - Continued					Prepared: 7/17/2018 Analyzed: 7/18/2018				
bis(2-Chloroethoxy)methane	29.0	20	30.000		96.6	40 - 140			
Benzoic Acid	8.23	8.0	30.000		**27.4**	30 - 130			**L**
1,2,4-Trichlorobenzene	21.6	5.0	30.000		72.0	40 - 140			
2,6-Dichlorophenol	21.9	20	30.000		73.0	30 - 130			
4-Chloroaniline	7.79	7.0	30.000		**26.0**	40 - 140			**L**
1,2,4,5-Tetrachlorobenzene	22.0	20	30.000		73.5	40 - 140			
2-Methyl Naphthalene	23.0	1.0	30.000		76.8	40 - 140			
Acenaphthylene	22.6	0.30	30.000		75.4	40 - 140			
Acenaphthene	25.1	1.0	30.000		83.5	40 - 140			
Dibenzofuran	26.8	1.0	30.000		89.2	40 - 140			
Fluorene	26.8	1.0	30.000		89.2	40 - 140			
Hexachlorocyclopentadiene	19.2	10	30.000		63.9	40 - 140			
2,4,6-Trichlorophenol	25.4	20	30.000		84.6	30 - 130			
2,4,5-Trichlorophenol	26.4	20	30.000		88.0	30 - 130			
2,4-Dinitrophenol	17.0	10	30.000		56.7	30 - 130			
4-Nitrophenol	29.5	10	30.000		98.5	30 - 130			
2-Chloronaphthalene	20.5	20	30.000		68.2	40 - 140			
2-Nitroaniline	26.1	20	30.000		87.0	40 - 140			
Dimethylphthalate	28.0	20	30.000		93.3	40 - 140			
2,6-Dinitrotoluene	27.9	10	30.000		93.0	40 - 140			
4-Nitroaniline	39.8	20	30.000		133	40 - 140			
2,4-Dinitrotoluene	30.7	10	30.000		102	40 - 140			
2,3,4,6-Tetrachlorophenol	28.2	20	30.000		93.9	30 - 130			
4-Chlorophenyl-phenylether	29.2	20	30.000		97.4	40 - 140			
Diethylphthalate	29.1	20	30.000		97.0	40 - 140			
Phenanthrene	26.1	0.077	30.000		87.0	40 - 140			
Anthracene	27.1	1.0	30.000		90.3	40 - 140			
Carbazole	30.2	1.0	30.000		101	40 - 140			
Fluoranthene	27.4	1.0	30.000		91.2	40 - 140			
Pyrene	25.9	1.0	30.000		86.4	40 - 140			
n-Nitrosodiphenylamine	24.8	20	30.000		82.7	40 - 140			
Pentachlorophenol	22.9	1.0	30.000		76.2	30 - 130			
3-Nitroaniline	20.7	20	30.000		69.1	40 - 140			
4,6-Dinitro-2-methylphenol	20.6	20	30.000		68.6	30 - 130			
1,2-Diphenylhydrazine	24.9	20	30.000		83.1	40 - 140			
4-Bromophenyl-phenylether	22.9	20	30.000		76.2	40 - 140			
Hexachlorobenzene	26.7	0.077	30.000		88.8	40 - 140			
Pentachloronitrobenzene	32.4	20	30.000		108	40 - 140			
Di-n-butylphthalate	27.3	20	30.000		90.9	40 - 140			
Benzo[a]anthracene	27.3	0.060	30.000		90.9	40 - 140			
Chrysene	27.6	0.50	30.000		92.1	40 - 140			
Butylbenzylphthalate	29.5	20	30.000		98.2	40 - 140			
3,3-Dichlorobenzidine	72.4	10	30.000		**241**	40 - 140			**H**
bis(2-Ethylhexyl)phthalate	31.5	2.0	30.000		105	40 - 140			
Di-n-octylphthalate	33.0	20	30.000		110	40 - 140			
Benzo[b]fluoranthene	25.6	0.080	30.000		85.4	40 - 140			
Benzo[k]fluoranthene	28.7	0.30	30.000		95.6	40 - 140			
Benzo[a]pyrene	25.4	0.20	30.000		84.6	40 - 140			
Indeno[1,2,3-cd]pyrene	21.4	0.10	30.000		71.4	40 - 140			
Dibenz[a,h]anthracene	21.2	0.10	30.000		70.5	40 - 140			
Benzo[g,h,i]perylene	22.2	0.40	30.000		73.9	40 - 140			
Surrogate: 2-Fluorophenol					*64.1*	*15 - 110*			
Surrogate: Phenol-d6					*44.7*	*15 - 110*			

Analyte	Result (ug/L)	RL (ug/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
LCS (B8G1717-BS1) - Continued					Prepared: 7/17/2018 Analyzed: 7/18/2018				
Surrogate: Nitrobenzene-d5					*96.3*	*30 - 130*			
Surrogate: 2-Fluorobiphenyl					*96.0*	*30 - 130*			
Surrogate: 2,4,6-Tribromophenol					*117*	*15 - 110*			**H**
Surrogate: Terphenyl-d14					*95.9*	*30 - 130*			

Batch B8G1730 - EPA 8260C

Analyte	Result (ug/kg)	RL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Blank (B8G1730-BLK1)					Prepared: 7/17/2018 Analyzed: 7/17/2018				
Dichlorodifluoromethane	ND	7.5							
Chloromethane	ND	5.0							
Vinyl Chloride	ND	2.5							
Bromomethane	ND	5.0							
Chloroethane	ND	5.0							
Trichlorofluoromethane	ND	20							
Acetone	ND	75							
Acrylonitrile	ND	4.0							
Trichlorotrifluoroethane	ND	20							
1,1-Dichloroethene	ND	2.5							
Methylene Chloride	ND	25							
Carbon Disulfide	ND	5.0							
Methyl-t-Butyl Ether (MTBE)	ND	2.5							
trans-1,2-Dichloroethene	ND	2.5							
1,1-Dichloroethane	ND	2.5							
2-Butanone (MEK)	ND	13							
2,2-Dichloropropane	ND	2.5							
cis-1,2-Dichloroethene	ND	2.5							
Bromochloromethane	ND	1.0							
Chloroform	ND	2.5							
Tetrahydrofuran	ND	13							
1,1,1-Trichloroethane	ND	2.5							
Carbon Tetrachloride	ND	2.5							
1,1-Dichloropropene	ND	2.5							
Benzene	ND	2.5							
1,2-Dichloroethane	ND	2.5							
Trichloroethene	ND	2.5							
1,2-Dichloropropane	ND	2.5							
Dibromomethane	ND	2.5							
Bromodichloromethane	ND	2.5							
Methyl Isobutyl Ketone	ND	13							
cis-1,3-Dichloropropene	ND	2.5							
Toluene	ND	2.5							
trans-1,3-Dichloropropene	ND	2.5							
2-Hexanone	ND	13							
1,1,2-Trichloroethane	ND	2.5							
Tetrachloroethene	ND	2.5							
1,3-Dichloropropane	ND	2.5							
Dibromochloromethane	ND	2.5							
1,2-Dibromoethane	ND	2.5							
trans-1,4-Dichloro-2-Butene	ND	13							
Chlorobenzene	ND	2.5							
1,1,1,2-Tetrachloroethane	ND	2.5							
Ethylbenzene	ND	2.5							
m+p Xylenes	ND	2.5							
o-Xylene	ND	2.5							
Styrene	ND	2.5							
Bromoform	ND	2.5							
Isopropylbenzene	ND	2.5							
1,1,2,2-Tetrachloroethane	ND	2.5							
Bromobenzene	ND	2.5							
1,2,3-Trichloropropane	ND	2.5							

Analyte	Result (ug/kg)	RL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Blank (B8G1730-BLK1) - Continued					Prepared: 7/17/2018 Analyzed: 7/17/2018				
n-Propylbenzene	ND	2.5							
2-Chlorotoluene	ND	2.5							
4-Chlorotoluene	ND	2.5							
1,3,5-Trimethylbenzene	ND	2.5							
tert-Butylbenzene	ND	2.5							
1,2,4-Trimethylbenzene	ND	2.5							
sec-Butylbenzene	ND	2.5							
1,3-Dichlorobenzene	ND	2.5							
4-Isopropyltoluene	ND	2.5							
1,4-Dichlorobenzene	ND	2.5							
1,2-Dichlorobenzene	ND	2.5							
n-Butylbenzene	ND	2.5							
1,2-Dibromo-3-Chloropropane	ND	2.5							
1,2,4-Trichlorobenzene	ND	2.5							
Hexachlorobutadiene	ND	2.5							
Naphthalene	ND	2.5							
1,2,3-Trichlorobenzene	ND	2.5							
Surrogate: 1,2-Dichloroethane-d4					*106*	*70 - 130*			
Surrogate: Toluene-d8					*97.9*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene					*100*	*70 - 130*			
LCS (B8G1730-BS1)					Prepared: 7/17/2018 Analyzed: 7/17/2018				
Dichlorodifluoromethane	60.3	7.5	50.000		121	70 - 130			
Chloromethane	44.0	5.0	50.000		88.0	70 - 130			
Vinyl Chloride	36.5	2.5	50.000		73.0	70 - 130			
Bromomethane	37.3	5.0	50.000		74.6	70 - 130			
Chloroethane	40.7	5.0	50.000		81.4	70 - 130			
Trichlorofluoromethane	42.2	20	50.000		84.4	70 - 130			
Acetone	146	75	100.000		**146**	70 - 130			**H**
Acrylonitrile	51.2	4.0	50.000		102	70 - 130			
Trichlorotrifluoroethane	41.3	20	50.000		82.7	70 - 130			
1,1-Dichloroethene	39.3	2.5	50.000		78.7	70 - 130			
Methylene Chloride	31.0	25	50.000		**62.0**	70 - 130			**L**
Carbon Disulfide	38.2	5.0	50.000		76.4	70 - 130			
Methyl-t-Butyl Ether (MTBE)	45.5	2.5	50.000		91.0	70 - 130			
trans-1,2-Dichloroethene	36.5	2.5	50.000		73.0	70 - 130			
1,1-Dichloroethane	36.6	2.5	50.000		73.3	70 - 130			
2-Butanone (MEK)	117	13	100.000		117	70 - 130			
2,2-Dichloropropane	40.3	2.5	50.000		80.6	70 - 130			
cis-1,2-Dichloroethene	37.5	2.5	50.000		74.9	70 - 130			
Bromochloromethane	38.9	1.0	50.000		77.9	70 - 130			
Chloroform	37.2	2.5	50.000		74.4	70 - 130			
Tetrahydrofuran	53.3	13	50.000		107	70 - 130			
1,1,1-Trichloroethane	42.9	2.5	50.000		85.8	70 - 130			
Carbon Tetrachloride	43.8	2.5	50.000		87.5	70 - 130			
1,1-Dichloropropene	41.4	2.5	50.000		82.9	70 - 130			
Benzene	39.8	2.5	50.000		79.5	70 - 130			
1,2-Dichloroethane	46.9	2.5	50.000		93.8	70 - 130			
Trichloroethene	58.5	2.5	50.000		117	70 - 130			
1,2-Dichloropropane	40.8	2.5	50.000		81.6	70 - 130			
Dibromomethane	55.7	2.5	50.000		111	70 - 130			
Bromodichloromethane	45.6	2.5	50.000		91.2	70 - 130			
Methyl Isobutyl Ketone	120	13	100.000		120	70 - 130			

Analyte	Result (ug/kg)	RL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
LCS (B8G1730-BS1) - Continued					Prepared: 7/17/2018 Analyzed: 7/17/2018				
cis-1,3-Dichloropropene	47.0	2.5	50.000		94.0	70 - 130			
Toluene	42.3	2.5	50.000		84.5	70 - 130			
trans-1,3-Dichloropropene	52.1	2.5	50.000		104	70 - 130			
2-Hexanone	135	13	100.000		**135**	70 - 130			**H**
1,1,2-Trichloroethane	53.3	2.5	50.000		107	70 - 130			
Tetrachloroethene	47.5	2.5	50.000		95.0	70 - 130			
1,3-Dichloropropane	51.3	2.5	50.000		103	70 - 130			
Dibromochloromethane	53.6	2.5	50.000		107	70 - 130			
1,2-Dibromoethane	54.2	2.5	50.000		108	70 - 130			
trans-1,4-Dichloro-2-Butene	62.5	13	50.000		125	70 - 130			
Chlorobenzene	42.7	2.5	50.000		85.4	70 - 130			
1,1,1,2-Tetrachloroethane	47.8	2.5	50.000		95.6	70 - 130			
Ethylbenzene	41.9	2.5	50.000		83.7	70 - 130			
m+p Xylenes	84.9	2.5	100.000		84.9	70 - 130			
o-Xylene	45.3	2.5	50.000		90.5	70 - 130			
Styrene	47.0	2.5	50.000		93.9	70 - 130			
Bromoform	62.3	2.5	50.000		125	70 - 130			
Isopropylbenzene	48.2	2.5	50.000		96.5	70 - 130			
1,1,2,2-Tetrachloroethane	47.2	2.5	50.000		94.3	70 - 130			
Bromobenzene	41.1	2.5	50.000		82.2	70 - 130			
1,2,3-Trichloropropane	55.9	2.5	50.000		112	70 - 130			
n-Propylbenzene	41.1	2.5	50.000		82.1	70 - 130			
2-Chlorotoluene	41.3	2.5	50.000		82.6	70 - 130			
4-Chlorotoluene	42.6	2.5	50.000		85.3	70 - 130			
1,3,5-Trimethylbenzene	41.5	2.5	50.000		83.0	70 - 130			
tert-Butylbenzene	44.2	2.5	50.000		88.5	70 - 130			
1,2,4-Trimethylbenzene	43.6	2.5	50.000		87.1	70 - 130			
sec-Butylbenzene	43.9	2.5	50.000		87.9	70 - 130			
1,3-Dichlorobenzene	45.9	2.5	50.000		91.7	70 - 130			
4-Isopropyltoluene	46.0	2.5	50.000		92.1	70 - 130			
1,4-Dichlorobenzene	45.3	2.5	50.000		90.6	70 - 130			
1,2-Dichlorobenzene	49.0	2.5	50.000		98.1	70 - 130			
n-Butylbenzene	47.6	2.5	50.000		95.1	70 - 130			
1,2-Dibromo-3-Chloropropane	68.7	2.5	50.000		**137**	70 - 130			**H**
1,2,4-Trichlorobenzene	57.1	2.5	50.000		114	70 - 130			
Hexachlorobutadiene	54.1	2.5	50.000		108	70 - 130			
Naphthalene	70.4	2.5	50.000		**141**	70 - 130			**H**
1,2,3-Trichlorobenzene	61.4	2.5	50.000		123	70 - 130			
Surrogate: 1,2-Dichloroethane-d4					*101*	*70 - 130*			
Surrogate: Toluene-d8					*101*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene					*120*	*70 - 130*			
Matrix Spike (B8G1730-MS1)		**Source: 8070435-01**			Prepared: 7/17/2018 Analyzed: 7/17/2018				
Dichlorodifluoromethane	210	17	111.123	ND	**189**	70 - 130			**H**
Chloromethane	133	11	111.123	ND	120	70 - 130			
Vinyl Chloride	124	5.6	111.123	ND	111	70 - 130			
Bromomethane	113	11	111.123	ND	102	70 - 130			
Chloroethane	117	11	111.123	ND	105	70 - 130			
Trichlorofluoromethane	131	45	111.123	ND	118	70 - 130			
Acetone	306	170	222.245	ND	**138**	70 - 130			**H**
Acrylonitrile	115	8.9	111.123	ND	104	70 - 130			
Trichlorotrifluoroethane	133	45	111.123	ND	120	70 - 130			
1,1-Dichloroethene	125	5.6	111.123	ND	113	70 - 130			

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Matrix Spike (B8G1730-MS1) - Continued		**Source: 8070435-01**			Prepared: 7/17/2018 Analyzed: 7/17/2018				
Methylene Chloride	89.7	56	111.123	ND	80.7	70 - 130			
Carbon Disulfide	125	11	111.123	ND	113	70 - 130			
Methyl-t-Butyl Ether (MTBE)	111	5.6	111.123	ND	99.5	70 - 130			
trans-1,2-Dichloroethene	120	5.6	111.123	ND	108	70 - 130			
1,1-Dichloroethane	114	5.6	111.123	ND	103	70 - 130			
2-Butanone (MEK)	274	28	222.245	ND	123	70 - 130			
2,2-Dichloropropane	132	5.6	111.123	ND	119	70 - 130			
cis-1,2-Dichloroethene	114	5.6	111.123	ND	102	70 - 130			
Bromochloromethane	109	2.2	111.123	ND	98.5	70 - 130			
Chloroform	109	5.6	111.123	ND	98.4	70 - 130			
Tetrahydrofuran	111	28	111.123	ND	100	70 - 130			
1,1,1-Trichloroethane	130	5.6	111.123	ND	117	70 - 130			
Carbon Tetrachloride	134	5.6	111.123	ND	120	70 - 130			
1,1-Dichloropropene	131	5.6	111.123	ND	118	70 - 130			
Benzene	115	5.6	111.123	ND	103	70 - 130			
1,2-Dichloroethane	118	5.6	111.123	ND	106	70 - 130			
Trichloroethene	131	5.6	111.123	ND	118	70 - 130			
1,2-Dichloropropane	114	5.6	111.123	ND	102	70 - 130			
Dibromomethane	115	5.6	111.123	ND	103	70 - 130			
Bromodichloromethane	117	5.6	111.123	ND	105	70 - 130			
Methyl Isobutyl Ketone	232	28	222.245	ND	104	70 - 130			
cis-1,3-Dichloropropene	117	5.6	111.123	ND	105	70 - 130			
Toluene	121	5.6	111.123	ND	109	70 - 130			
trans-1,3-Dichloropropene	118	5.6	111.123	ND	106	70 - 130			
2-Hexanone	264	28	222.245	ND	119	70 - 130			
1,1,2-Trichloroethane	111	5.6	111.123	ND	100	70 - 130			
Tetrachloroethene	145	5.6	111.123	ND	130	70 - 130			
1,3-Dichloropropane	115	5.6	111.123	ND	104	70 - 130			
Dibromochloromethane	111	5.6	111.123	ND	99.7	70 - 130			
1,2-Dibromoethane	112	5.6	111.123	ND	101	70 - 130			
trans-1,4-Dichloro-2-Butene	117	28	111.123	ND	105	70 - 130			
Chlorobenzene	113	5.6	111.123	ND	102	70 - 130			
1,1,1,2-Tetrachloroethane	110	5.6	111.123	ND	99.3	70 - 130			
Ethylbenzene	123	5.6	111.123	ND	111	70 - 130			
m+p Xylenes	252	5.6	222.245	ND	114	70 - 130			
o-Xylene	124	5.6	111.123	ND	111	70 - 130			
Styrene	115	5.6	111.123	ND	103	70 - 130			
Bromoform	113	5.6	111.123	ND	101	70 - 130			
Isopropylbenzene	127	5.6	111.123	ND	114	70 - 130			
1,1,2,2-Tetrachloroethane	101	5.6	111.123	ND	90.5	70 - 130			
Bromobenzene	107	5.6	111.123	ND	96.1	70 - 130			
1,2,3-Trichloropropane	106	5.6	111.123	ND	95.6	70 - 130			
n-Propylbenzene	118	5.6	111.123	ND	106	70 - 130			
2-Chlorotoluene	113	5.6	111.123	ND	102	70 - 130			
4-Chlorotoluene	113	5.6	111.123	ND	102	70 - 130			
1,3,5-Trimethylbenzene	117	5.6	111.123	ND	105	70 - 130			
tert-Butylbenzene	114	5.6	111.123	ND	103	70 - 130			
1,2,4-Trimethylbenzene	116	5.6	111.123	ND	105	70 - 130			
sec-Butylbenzene	117	5.6	111.123	ND	105	70 - 130			
1,3-Dichlorobenzene	108	5.6	111.123	ND	97.6	70 - 130			
4-Isopropyltoluene	121	5.6	111.123	ND	109	70 - 130			
1,4-Dichlorobenzene	105	5.6	111.123	ND	94.7	70 - 130			
1,2-Dichlorobenzene	106	5.6	111.123	ND	95.2	70 - 130			

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Matrix Spike (B8G1730-MS1) - Continued		**Source: 8070435-01**			Prepared: 7/17/2018 Analyzed: 7/17/2018				
n-Butylbenzene	126	5.6	111.123	ND	113	70 - 130			
1,2-Dibromo-3-Chloropropane	109	5.6	111.123	ND	97.9	70 - 130			
1,2,4-Trichlorobenzene	114	5.6	111.123	ND	103	70 - 130			
Hexachlorobutadiene	114	5.6	111.123	ND	103	70 - 130			
Naphthalene	119	5.6	111.123	ND	107	70 - 130			
1,2,3-Trichlorobenzene	115	5.6	111.123	ND	104	70 - 130			
Surrogate: 1,2-Dichloroethane-d4					*99.8*	*70 - 130*			
Surrogate: Toluene-d8					*101*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene					*108*	*70 - 130*			
Matrix Spike Dup (B8G1730-MSD1)		**Source: 8070435-01**			Prepared: 7/17/2018 Analyzed: 7/17/2018				
Dichlorodifluoromethane	217	16	112.023	ND	**194**	70 - 130	3.23	30	**H**
Chloromethane	136	11	112.023	ND	121	70 - 130	1.97	30	
Vinyl Chloride	124	5.5	112.023	ND	110	70 - 130	0.00	30	
Bromomethane	111	11	112.023	ND	99.0	70 - 130	2.03	30	
Chloroethane	123	11	112.023	ND	110	70 - 130	5.62	30	
Trichlorofluoromethane	132	44	112.023	ND	118	70 - 130	1.01	30	
Acetone	352	160	224.045	ND	**157**	70 - 130	14.0	30	**H**
Acrylonitrile	114	8.8	112.023	ND	102	70 - 130	0.872	30	
Trichlorotrifluoroethane	138	44	112.023	ND	123	70 - 130	3.56	30	
1,1-Dichloroethene	132	5.5	112.023	ND	118	70 - 130	5.52	30	
Methylene Chloride	105	55	112.023	ND	93.4	70 - 130	15.4	30	
Carbon Disulfide	129	11	112.023	ND	115	70 - 130	2.61	30	
Methyl-t-Butyl Ether (MTBE)	113	5.5	112.023	ND	101	70 - 130	2.29	30	
trans-1,2-Dichloroethene	123	5.5	112.023	ND	110	70 - 130	2.48	30	
1,1-Dichloroethane	119	5.5	112.023	ND	106	70 - 130	3.65	30	
2-Butanone (MEK)	281	27	224.045	ND	125	70 - 130	2.33	30	
2,2-Dichloropropane	132	5.5	112.023	ND	118	70 - 130	0.213	30	
cis-1,2-Dichloroethene	117	5.5	112.023	ND	104	70 - 130	2.85	30	
Bromochloromethane	110	2.2	112.023	ND	97.9	70 - 130	0.226	30	
Chloroform	112	5.5	112.023	ND	99.6	70 - 130	1.97	30	
Tetrahydrofuran	117	27	112.023	ND	104	70 - 130	4.77	30	
1,1,1-Trichloroethane	134	5.5	112.023	ND	120	70 - 130	3.20	30	
Carbon Tetrachloride	138	5.5	112.023	ND	123	70 - 130	2.84	30	
1,1-Dichloropropene	137	5.5	112.023	ND	122	70 - 130	4.10	30	
Benzene	123	5.5	112.023	ND	110	70 - 130	6.58	30	
1,2-Dichloroethane	117	5.5	112.023	ND	104	70 - 130	0.968	30	
Trichloroethene	141	5.5	112.023	ND	126	70 - 130	7.43	30	
1,2-Dichloropropane	117	5.5	112.023	ND	104	70 - 130	2.53	30	
Dibromomethane	118	5.5	112.023	ND	105	70 - 130	2.93	30	
Bromodichloromethane	118	5.5	112.023	ND	105	70 - 130	0.874	30	
Methyl Isobutyl Ketone	234	27	224.045	ND	105	70 - 130	1.20	30	
cis-1,3-Dichloropropene	120	5.5	112.023	ND	107	70 - 130	2.35	30	
Toluene	128	5.5	112.023	ND	114	70 - 130	5.33	30	
trans-1,3-Dichloropropene	119	5.5	112.023	ND	106	70 - 130	0.390	30	
2-Hexanone	262	27	224.045	ND	117	70 - 130	0.771	30	
1,1,2-Trichloroethane	115	5.5	112.023	ND	102	70 - 130	3.03	30	
Tetrachloroethene	152	5.5	112.023	ND	**135**	70 - 130	4.66	30	**H**
1,3-Dichloropropane	116	5.5	112.023	ND	104	70 - 130	1.09	30	
Dibromochloromethane	115	5.5	112.023	ND	103	70 - 130	3.69	30	
1,2-Dibromoethane	117	5.5	112.023	ND	105	70 - 130	4.64	30	
trans-1,4-Dichloro-2-Butene	114	27	112.023	ND	102	70 - 130	2.32	30	
Chlorobenzene	117	5.5	112.023	ND	105	70 - 130	3.40	30	

Analyte	Result (ug/kg dry)	RL (ug/kg dry)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Matrix Spike Dup (B8G1730-MSD1) - Continued		**Source: 8070435-01**			Prepared: 7/17/2018 Analyzed: 7/17/2018				
1,1,1,2-Tetrachloroethane	115	5.5	112.023	ND	103	70 - 130	4.31	30	
Ethylbenzene	128	5.5	112.023	ND	114	70 - 130	3.83	30	
m+p Xylenes	266	5.5	224.045	ND	119	70 - 130	5.09	30	
o-Xylene	131	5.5	112.023	ND	117	70 - 130	5.55	30	
Styrene	123	5.5	112.023	ND	110	70 - 130	7.00	30	
Bromoform	115	5.5	112.023	ND	103	70 - 130	1.82	30	
Isopropylbenzene	133	5.5	112.023	ND	119	70 - 130	4.41	30	
1,1,2,2-Tetrachloroethane	100	5.5	112.023	ND	89.6	70 - 130	0.202	30	
Bromobenzene	110	5.5	112.023	ND	98.3	70 - 130	3.06	30	
1,2,3-Trichloropropane	109	5.5	112.023	ND	97.2	70 - 130	2.44	30	
n-Propylbenzene	124	5.5	112.023	ND	110	70 - 130	4.75	30	
2-Chlorotoluene	117	5.5	112.023	ND	105	70 - 130	3.53	30	
4-Chlorotoluene	116	5.5	112.023	ND	103	70 - 130	2.05	30	
1,3,5-Trimethylbenzene	122	5.5	112.023	ND	109	70 - 130	4.17	30	
tert-Butylbenzene	121	5.5	112.023	ND	108	70 - 130	5.48	30	
1,2,4-Trimethylbenzene	121	5.5	112.023	ND	108	70 - 130	4.47	30	
sec-Butylbenzene	122	5.5	112.023	ND	109	70 - 130	4.42	30	
1,3-Dichlorobenzene	113	5.5	112.023	ND	101	70 - 130	4.34	30	
4-Isopropyltoluene	125	5.5	112.023	ND	112	70 - 130	3.33	30	
1,4-Dichlorobenzene	109	5.5	112.023	ND	97.7	70 - 130	3.88	30	
1,2-Dichlorobenzene	109	5.5	112.023	ND	97.7	70 - 130	3.41	30	
n-Butylbenzene	127	5.5	112.023	ND	114	70 - 130	1.48	30	
1,2-Dibromo-3-Chloropropane	111	5.5	112.023	ND	99.3	70 - 130	2.28	30	
1,2,4-Trichlorobenzene	116	5.5	112.023	ND	103	70 - 130	1.29	30	
Hexachlorobutadiene	112	5.5	112.023	ND	100	70 - 130	1.64	30	
Naphthalene	125	5.5	112.023	ND	111	70 - 130	4.81	30	
1,2,3-Trichlorobenzene	115	5.5	112.023	ND	103	70 - 130	0.0975	30	
Surrogate: 1,2-Dichloroethane-d4					*97.2*	*70 - 130*			
Surrogate: Toluene-d8					*99.9*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene					*106*	*70 - 130*			

Batch B8G1731 - EPA 8260C

Analyte	Result (ug/kg)	RL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Blank (B8G1731-BLK1)					Prepared: 7/17/2018 Analyzed: 7/17/2018				
Dichlorodifluoromethane	ND	7.5							
Chloromethane	ND	5.0							
Vinyl Chloride	ND	2.5							
Bromomethane	ND	5.0							
Chloroethane	ND	5.0							
Trichlorofluoromethane	ND	20							
Acetone	ND	75							
Acrylonitrile	ND	4.0							
Trichlorotrifluoroethane	ND	20							
1,1-Dichloroethene	ND	2.5							
Methylene Chloride	ND	25							
Carbon Disulfide	ND	5.0							
Methyl-t-Butyl Ether (MTBE)	ND	2.5							
trans-1,2-Dichloroethene	ND	2.5							
1,1-Dichloroethane	ND	2.5							
2-Butanone (MEK)	ND	13							
2,2-Dichloropropane	ND	2.5							
cis-1,2-Dichloroethene	ND	2.5							
Bromochloromethane	ND	1.0							
Chloroform	ND	2.5							
Tetrahydrofuran	ND	13							
1,1,1-Trichloroethane	ND	2.5							
Carbon Tetrachloride	ND	2.5							
1,1-Dichloropropene	ND	2.5							
Benzene	ND	2.5							
1,2-Dichloroethane	ND	2.5							
Trichloroethene	ND	2.5							
1,2-Dichloropropane	ND	2.5							
Dibromomethane	ND	2.5							
Bromodichloromethane	ND	2.5							
Methyl Isobutyl Ketone	ND	13							
cis-1,3-Dichloropropene	ND	2.5							
Toluene	ND	2.5							
trans-1,3-Dichloropropene	ND	2.5							
2-Hexanone	ND	13							
1,1,2-Trichloroethane	ND	2.5							
Tetrachloroethene	ND	2.5							
1,3-Dichloropropane	ND	2.5							
Dibromochloromethane	ND	2.5							
1,2-Dibromoethane	ND	2.5							
trans-1,4-Dichloro-2-Butene	ND	13							
Chlorobenzene	ND	2.5							
1,1,1,2-Tetrachloroethane	ND	2.5							
Ethylbenzene	ND	2.5							
m+p Xylenes	ND	2.5							
o-Xylene	ND	2.5							
Styrene	ND	2.5							
Bromoform	ND	2.5							
Isopropylbenzene	ND	2.5							
1,1,2,2-Tetrachloroethane	ND	2.5							
Bromobenzene	ND	2.5							
1,2,3-Trichloropropane	ND	2.5							

Analyte	Result (ug/kg)	RL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Blank (B8G1731-BLK1) - Continued					Prepared: 7/17/2018 Analyzed: 7/17/2018				
n-Propylbenzene	ND	2.5							
2-Chlorotoluene	ND	2.5							
4-Chlorotoluene	ND	2.5							
1,3,5-Trimethylbenzene	ND	2.5							
tert-Butylbenzene	ND	2.5							
1,2,4-Trimethylbenzene	ND	2.5							
sec-Butylbenzene	ND	2.5							
1,3-Dichlorobenzene	ND	2.5							
4-Isopropyltoluene	ND	2.5							
1,4-Dichlorobenzene	ND	2.5							
1,2-Dichlorobenzene	ND	2.5							
n-Butylbenzene	ND	2.5							
1,2-Dibromo-3-Chloropropane	ND	2.5							
1,2,4-Trichlorobenzene	ND	2.5							
Hexachlorobutadiene	ND	2.5							
Naphthalene	ND	2.5							
1,2,3-Trichlorobenzene	ND	2.5							
Surrogate: 1,2-Dichloroethane-d4					*106*	*70 - 130*			
Surrogate: Toluene-d8					*97.9*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene					*100*	*70 - 130*			
LCS (B8G1731-BS1)					Prepared: 7/17/2018 Analyzed: 7/17/2018				
Dichlorodifluoromethane	60.3	7.5	50.000		121	70 - 130			
Chloromethane	44.0	5.0	50.000		88.0	70 - 130			
Vinyl Chloride	36.5	2.5	50.000		73.0	70 - 130			
Bromomethane	37.3	5.0	50.000		74.6	70 - 130			
Chloroethane	40.7	5.0	50.000		81.4	70 - 130			
Trichlorofluoromethane	42.2	20	50.000		84.4	70 - 130			
Acetone	146	75	100.000		**146**	70 - 130			**H**
Acrylonitrile	51.2	4.0	50.000		102	70 - 130			
Trichlorotrifluoroethane	41.3	20	50.000		82.7	70 - 130			
1,1-Dichloroethene	39.3	2.5	50.000		78.7	70 - 130			
Methylene Chloride	31.0	25	50.000		**62.0**	70 - 130			**L**
Carbon Disulfide	38.2	5.0	50.000		76.4	70 - 130			
Methyl-t-Butyl Ether (MTBE)	45.5	2.5	50.000		91.0	70 - 130			
trans-1,2-Dichloroethene	36.5	2.5	50.000		73.0	70 - 130			
1,1-Dichloroethane	36.6	2.5	50.000		73.3	70 - 130			
2-Butanone (MEK)	117	13	100.000		117	70 - 130			
2,2-Dichloropropane	40.3	2.5	50.000		80.6	70 - 130			
cis-1,2-Dichloroethene	37.5	2.5	50.000		74.9	70 - 130			
Bromochloromethane	38.9	1.0	50.000		77.9	70 - 130			
Chloroform	37.2	2.5	50.000		74.4	70 - 130			
Tetrahydrofuran	53.3	13	50.000		107	70 - 130			
1,1,1-Trichloroethane	42.9	2.5	50.000		85.8	70 - 130			
Carbon Tetrachloride	43.8	2.5	50.000		87.5	70 - 130			
1,1-Dichloropropene	41.4	2.5	50.000		82.9	70 - 130			
Benzene	39.8	2.5	50.000		79.5	70 - 130			
1,2-Dichloroethane	46.9	2.5	50.000		93.8	70 - 130			
Trichloroethene	58.5	2.5	50.000		117	70 - 130			
1,2-Dichloropropane	40.8	2.5	50.000		81.6	70 - 130			
Dibromomethane	55.7	2.5	50.000		111	70 - 130			
Bromodichloromethane	45.6	2.5	50.000		91.2	70 - 130			
Methyl Isobutyl Ketone	120	13	100.000		120	70 - 130			

Analyte	Result (ug/kg)	RL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
LCS (B8G1731-BS1) - Continued					Prepared: 7/17/2018 Analyzed: 7/17/2018				
cis-1,3-Dichloropropene	47.0	2.5	50.000		94.0	70 - 130			
Toluene	42.3	2.5	50.000		84.5	70 - 130			
trans-1,3-Dichloropropene	52.1	2.5	50.000		104	70 - 130			
2-Hexanone	135	13	100.000		**135**	70 - 130			**H**
1,1,2-Trichloroethane	53.3	2.5	50.000		107	70 - 130			
Tetrachloroethene	47.5	2.5	50.000		95.0	70 - 130			
1,3-Dichloropropane	51.3	2.5	50.000		103	70 - 130			
Dibromochloromethane	53.6	2.5	50.000		107	70 - 130			
1,2-Dibromoethane	54.2	2.5	50.000		108	70 - 130			
trans-1,4-Dichloro-2-Butene	62.5	13	50.000		125	70 - 130			
Chlorobenzene	42.7	2.5	50.000		85.4	70 - 130			
1,1,1,2-Tetrachloroethane	47.8	2.5	50.000		95.6	70 - 130			
Ethylbenzene	41.9	2.5	50.000		83.7	70 - 130			
m+p Xylenes	84.9	2.5	100.000		84.9	70 - 130			
o-Xylene	45.3	2.5	50.000		90.5	70 - 130			
Styrene	47.0	2.5	50.000		93.9	70 - 130			
Bromoform	62.3	2.5	50.000		125	70 - 130			
Isopropylbenzene	48.2	2.5	50.000		96.5	70 - 130			
1,1,2,2-Tetrachloroethane	47.2	2.5	50.000		94.3	70 - 130			
Bromobenzene	41.1	2.5	50.000		82.2	70 - 130			
1,2,3-Trichloropropane	55.9	2.5	50.000		112	70 - 130			
n-Propylbenzene	41.1	2.5	50.000		82.1	70 - 130			
2-Chlorotoluene	41.3	2.5	50.000		82.6	70 - 130			
4-Chlorotoluene	42.6	2.5	50.000		85.3	70 - 130			
1,3,5-Trimethylbenzene	41.5	2.5	50.000		83.0	70 - 130			
tert-Butylbenzene	44.2	2.5	50.000		88.5	70 - 130			
1,2,4-Trimethylbenzene	43.6	2.5	50.000		87.1	70 - 130			
sec-Butylbenzene	43.9	2.5	50.000		87.9	70 - 130			
1,3-Dichlorobenzene	45.9	2.5	50.000		91.7	70 - 130			
4-Isopropyltoluene	46.0	2.5	50.000		92.1	70 - 130			
1,4-Dichlorobenzene	45.3	2.5	50.000		90.6	70 - 130			
1,2-Dichlorobenzene	49.0	2.5	50.000		98.1	70 - 130			
n-Butylbenzene	47.6	2.5	50.000		95.1	70 - 130			
1,2-Dibromo-3-Chloropropane	68.7	2.5	50.000		**137**	70 - 130			**H**
1,2,4-Trichlorobenzene	57.1	2.5	50.000		114	70 - 130			
Hexachlorobutadiene	54.1	2.5	50.000		108	70 - 130			
Naphthalene	70.4	2.5	50.000		**141**	70 - 130			**H**
1,2,3-Trichlorobenzene	61.4	2.5	50.000		123	70 - 130			
Surrogate: 1,2-Dichloroethane-d4					*101*	*70 - 130*			
Surrogate: Toluene-d8					*101*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene					*120*	*70 - 130*			

Batch B8G2046 - EPA 8260C

Analyte	Result (ug/L)	RL (ug/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Blank (B8G2046-BLK1)					Prepared: 7/20/2018 Analyzed: 7/20/2018				
Dichlorodifluoromethane	ND	10							
Chloromethane	ND	2.7							
Vinyl Chloride	ND	1.6							
Bromomethane	ND	1.0							
Chloroethane	ND	5.0							
Trichlorofluoromethane	ND	25							
Acetone	ND	50							
Acrylonitrile	ND	0.50							
Trichlorotrifluoroethane	ND	25							
1,1-Dichloroethene	ND	1.0							
Methylene Chloride	ND	5.0							
Carbon Disulfide	ND	1.0							
Methyl-t-Butyl Ether (MTBE)	ND	5.0							
trans-1,2-Dichloroethene	ND	1.0							
1,1-Dichloroethane	ND	1.0							
2-Butanone (MEK)	ND	25							
2,2-Dichloropropane	ND	1.0							
cis-1,2-Dichloroethene	ND	1.0							
Bromochloromethane	ND	1.0							
Chloroform	ND	1.0							
Tetrahydrofuran	ND	5.0							
1,1,1-Trichloroethane	ND	1.0							
Carbon Tetrachloride	ND	1.0							
1,1-Dichloropropene	ND	1.0							
Benzene	ND	1.0							
1,2-Dichloroethane	ND	1.0							
Trichloroethene	ND	1.0							
1,2-Dichloropropane	ND	1.0							
Dibromomethane	ND	1.0							
Bromodichloromethane	ND	0.50							
Methyl Isobutyl Ketone	ND	25							
cis-1,3-Dichloropropene	ND	0.50							
Toluene	ND	1.0							
trans-1,3-Dichloropropene	ND	0.50							
2-Hexanone	ND	25							
1,1,2-Trichloroethane	ND	1.0							
Tetrachloroethene	ND	1.0							
1,3-Dichloropropane	ND	0.50							
Dibromochloromethane	ND	0.50							
1,2-Dibromoethane	ND	0.50							
trans-1,4-Dichloro-2-Butene	ND	10							
Chlorobenzene	ND	1.0							
1,1,1,2-Tetrachloroethane	ND	1.0							
Ethylbenzene	ND	1.0							
m+p Xylenes	ND	1.0							
o-Xylene	ND	1.0							
Styrene	ND	1.0							
Bromoform	ND	1.0							
Isopropylbenzene	ND	1.0							
1,1,2,2-Tetrachloroethane	ND	0.50							
Bromobenzene	ND	1.0							
1,2,3-Trichloropropane	ND	1.0							

Analyte	Result (ug/L)	RL (ug/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Blank (B8G2046-BLK1) - Continued					Prepared: 7/20/2018 Analyzed: 7/20/2018				
n-Propylbenzene	ND	1.0							
2-Chlorotoluene	ND	1.0							
4-Chlorotoluene	ND	1.0							
1,3,5-Trimethylbenzene	ND	1.0							
tert-Butylbenzene	ND	1.0							
1,2,4-Trimethylbenzene	ND	1.0							
sec-Butylbenzene	ND	1.0							
1,3-Dichlorobenzene	ND	1.0							
4-Isopropyltoluene	ND	1.0							
1,4-Dichlorobenzene	ND	1.0							
1,2-Dichlorobenzene	ND	1.0							
n-Butylbenzene	ND	1.0							
1,2-Dibromo-3-Chloropropane	ND	1.0							
1,2,4-Trichlorobenzene	ND	1.0							
Hexachlorobutadiene	ND	0.45							
Naphthalene	ND	1.0							
1,2,3-Trichlorobenzene	ND	1.0							
Surrogate: 1,2-Dichloroethane-d4					*89.3*	*70 - 130*			
Surrogate: Toluene-d8					*93.6*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene					*101*	*70 - 130*			
LCS (B8G2046-BS1)					Prepared: 7/20/2018 Analyzed: 7/20/2018				
Dichlorodifluoromethane	51.3	10	50.000		103	70 - 130			
Chloromethane	34.6	2.7	50.000		**69.2**	70 - 130			**L**
Vinyl Chloride	35.1	1.6	50.000		70.2	70 - 130			
Bromomethane	37.8	1.0	50.000		75.7	70 - 130			
Chloroethane	39.2	5.0	50.000		78.5	70 - 130			
Trichlorofluoromethane	36.6	25	50.000		73.2	70 - 130			
Acetone	73.3	50	100.000		73.3	70 - 130			
Acrylonitrile	48.3	0.50	50.000		96.7	70 - 130			
Trichlorotrifluoroethane	50.1	25	50.000		100	70 - 130			
1,1-Dichloroethene	45.7	1.0	50.000		91.4	70 - 130			
Methylene Chloride	48.7	5.0	50.000		97.3	70 - 130			
Carbon Disulfide	45.2	1.0	50.000		90.3	70 - 130			
Methyl-t-Butyl Ether (MTBE)	45.5	5.0	50.000		91.1	70 - 130			
trans-1,2-Dichloroethene	42.5	1.0	50.000		85.0	70 - 130			
1,1-Dichloroethane	43.6	1.0	50.000		87.2	70 - 130			
2-Butanone (MEK)	88.9	25	100.000		88.9	70 - 130			
2,2-Dichloropropane	43.8	1.0	50.000		87.7	70 - 130			
cis-1,2-Dichloroethene	44.0	1.0	50.000		87.9	70 - 130			
Bromochloromethane	44.1	1.0	50.000		88.2	70 - 130			
Chloroform	43.5	1.0	50.000		87.0	70 - 130			
Tetrahydrofuran	48.8	5.0	50.000		97.6	70 - 130			
1,1,1-Trichloroethane	47.9	1.0	50.000		95.8	70 - 130			
Carbon Tetrachloride	44.8	1.0	50.000		89.6	70 - 130			
1,1-Dichloropropene	50.1	1.0	50.000		100	70 - 130			
Benzene	49.0	1.0	50.000		98.0	70 - 130			
1,2-Dichloroethane	47.4	1.0	50.000		94.8	70 - 130			
Trichloroethene	50.9	1.0	50.000		102	70 - 130			
1,2-Dichloropropane	47.8	1.0	50.000		95.5	70 - 130			
Dibromomethane	57.5	1.0	50.000		115	70 - 130			
Bromodichloromethane	46.4	0.50	50.000		92.7	70 - 130			
Methyl Isobutyl Ketone	99.7	25	100.000		99.7	70 - 130			

Analyte	Result (ug/L)	RL (ug/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
LCS (B8G2046-BS1) - Continued					Prepared: 7/20/2018 Analyzed: 7/20/2018				
cis-1,3-Dichloropropene	49.7	0.50	50.000		99.4	70 - 130			
Toluene	48.5	1.0	50.000		97.0	70 - 130			
trans-1,3-Dichloropropene	49.2	0.50	50.000		98.3	70 - 130			
2-Hexanone	95.8	25	100.000		95.8	70 - 130			
1,1,2-Trichloroethane	50.4	1.0	50.000		101	70 - 130			
Tetrachloroethene	50.8	1.0	50.000		102	70 - 130			
1,3-Dichloropropane	48.5	0.50	50.000		96.9	70 - 130			
Dibromochloromethane	56.7	0.50	50.000		113	70 - 130			
1,2-Dibromoethane	57.5	0.50	50.000		115	70 - 130			
trans-1,4-Dichloro-2-Butene	44.6	10	50.000		89.1	70 - 130			
Chlorobenzene	54.9	1.0	50.000		110	70 - 130			
1,1,1,2-Tetrachloroethane	54.7	1.0	50.000		109	70 - 130			
Ethylbenzene	53.9	1.0	50.000		108	70 - 130			
m+p Xylenes	112	1.0	100.000		112	70 - 130			
o-Xylene	55.4	1.0	50.000		111	70 - 130			
Styrene	55.8	1.0	50.000		112	70 - 130			
Bromoform	56.7	1.0	50.000		113	70 - 130			
Isopropylbenzene	55.5	1.0	50.000		111	70 - 130			
1,1,2,2-Tetrachloroethane	51.5	0.50	50.000		103	70 - 130			
Bromobenzene	52.5	1.0	50.000		105	70 - 130			
1,2,3-Trichloropropane	62.3	1.0	50.000		125	70 - 130			
n-Propylbenzene	55.7	1.0	50.000		111	70 - 130			
2-Chlorotoluene	55.2	1.0	50.000		110	70 - 130			
4-Chlorotoluene	53.2	1.0	50.000		106	70 - 130			
1,3,5-Trimethylbenzene	57.2	1.0	50.000		114	70 - 130			
tert-Butylbenzene	56.8	1.0	50.000		114	70 - 130			
1,2,4-Trimethylbenzene	56.8	1.0	50.000		114	70 - 130			
sec-Butylbenzene	56.7	1.0	50.000		113	70 - 130			
1,3-Dichlorobenzene	57.5	1.0	50.000		115	70 - 130			
4-Isopropyltoluene	56.1	1.0	50.000		112	70 - 130			
1,4-Dichlorobenzene	56.3	1.0	50.000		113	70 - 130			
1,2-Dichlorobenzene	56.9	1.0	50.000		114	70 - 130			
n-Butylbenzene	55.0	1.0	50.000		110	70 - 130			
1,2-Dibromo-3-Chloropropane	58.9	1.0	50.000		118	70 - 130			
1,2,4-Trichlorobenzene	55.9	1.0	50.000		112	70 - 130			
Hexachlorobutadiene	51.7	0.45	50.000		103	70 - 130			
Naphthalene	54.2	1.0	50.000		108	70 - 130			
1,2,3-Trichlorobenzene	55.2	1.0	50.000		110	70 - 130			
Surrogate: 1,2-Dichloroethane-d4					*96.7*	*70 - 130*			
Surrogate: Toluene-d8					*95.5*	*70 - 130*			
Surrogate: 4-Bromofluorobenzene					*99.4*	*70 - 130*			

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COMPLETE ENVIRONMENTAL TESTING, INC.

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Quality Control Definitions and Abbreviations

Internal Standard (IS)	An Analyte added to each sample or sample extract. An internal standard is used to monitor retention time, calculate relative response, and quantify analytes of interest.
Surrogate Recovery	The % recovery for non-target organic compounds that are spiked into all samples. Used to determine method performance.
Continuing Calibration	An analytical standard analyzed with each set of samples to verify initial calibration of the system.
Batch	Samples that are analyzed together with the same method, sequence and lot of reagents within the same time period.
ND	Not detected at or above the specified reporting limit.
RL	Reporting Limit
Dilution	Multiplier added to detection levels (MDL) and/or sample results due to interferences and/or high concentration of target compounds.
Duplicate	Result from the duplicate analysis of a sample.
Result	Amount of analyte found in a sample.
Spike Level	Amount of analyte added to a sample
Matrix Spike Result	Amount of analyte found including amount that was spiked.
Matrix Spike Dup	Amount of analyte found in duplicate spikes including amount that was spike.
Matrix Spike % Recovery	% Recovery of spiked amount in sample.
Matrix Spike Dup % Recovery	% Recovery of spiked duplicate amount in sample.
RPD	Relative percent difference between Matrix Spike and Matrix Spike Duplicate.
Blank	Method Blank that has been taken through all steps of the analysis.
LCS % Recovery	Laboratory Control Sample percent recovery. The amount of analyte recovered from a fortified sample.
Recovery Limits	A range within which specified measurements results must fall to be compliant.
CC	Calibration Verification

Flags:

- H- Recovery is above the control limits
- L- Recovery is below the control limits
- B- Compound detected in the Blank
- P- RPD of dual column results exceeds 40%
- #- Sample result too high for accurate spike recovery.

NELAP ACCREDITED TNI LABORATORY

Connecticut Laboratory Certification PH0116
Massachussets Laboratory Certification M-CT903

New York NELAP Accreditation 11982
Rhode Island Certification 199

All questions related to this report should be directed to David Ditta, Timothy Fusco, or Robert Blake at 203-377-9984.

Sincerely,

David Ditta
Laboratory Director

This technical report was reviewed by Timothy Fusco

Project Manager

Report Comments:

Sample Result Flags:
E- The result is estimated, above the calibration range.
H- The surrogate recovery is above the control limits.
L- The surrogate recovery is below the control limits.
B- The compound was detected in the laboratory blank.
P- The Relative Percent Difference (RPD) of dual column analyses exceeds 40%.
D- The RPD between the sample and the sample duplicate is high. Sample Homogeneity may be a problem.
+- The Surrogate was diluted out.
*C1- The Continuing Calibration did not meet method specifications and was biased low for this analyte. Increased uncertainty is associated with the reported value which is likely to be biased low.
*C2- The Continuing Calibration did not meet method specifications and was biased high for this analyte. Increased uncertainty is associated with the reported value which is likely to be biased high.
*F1- The Laboratory Control Sample recovery is outside of control limits. Reported value for this analyte is likely to be biased on the low side.
*F2- The Laboratory Control Sample recovery is outside of control limits. Reported value for this analyte is likely to be biased on the high side.
I- The Analyte exceeds %RSD limits for the Initial Calibration. This is a non-directional bias.

All results met standard operating procedures unless indicated by a data qualifier next to a sample result, or a narration in the QC report.

For Percent Solids, if any of the following prep methods (3050B, 3540C, 3545A, 3550C, 5035 and 9013A) were used for samples pertaining to this report, the percent solids procedure is within that prep method.

Complete Environmental Testing is only responsible for the certified testing and is not directly responsible for the integrity of the sample before laboratory receipt.

ND is None Detected at or above the specified reporting limit
RL is the Reporting Limit
All analyses were performed in house unless a Reference Laboratory is listed.
Samples will be disposed of 30 days after the report date.

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
EPA 6010C in Soil	
Lead	CT,NY,PA
Selenium	CT,NY,PA
Cadmium	CT,NY,PA
Chromium	CT,NY,PA
Arsenic	CT,NY,PA
Barium	CT,NY,PA
Silver	CT,NY,PA
Copper	CT,NY,PA
Nickel	CT,NY,PA
Zinc	CT,NY,PA
Beryllium	CT,NY,PA
Manganese	CT,NY,PA
EPA 7196A in Soil	
Hexavalent Chromium	CT
EPA 7471B in Soil	
Mercury	CT,NY,PA
EPA 8081B in Soil	
Alpha-BHC	CT,NY,PA
Gamma-BHC	CT,NY,PA
Heptachlor	CT,NY,PA
Aldrin	CT,NY,PA
Beta-BHC	CT,NY,PA
Delta-BHC	CT,NY,PA
Heptachlor Epoxide	CT,NY,PA
Endosulfan I	CT,NY,PA
4,4-DDE	CT,NY,PA
Dieldrin	CT,NY,PA
Endrin	CT,NY,PA
4,4-DDD	CT,NY,PA
Endosulfan II	CT,NY,PA
4,4-DDT	CT,NY,PA
Endrin Aldehyde	CT,NY,PA
4,4-Methoxychlor	CT,NY,PA
Endosulfan Sulfate	CT,NY,PA
Endrin Ketone	CT,NY,PA
Chlordane	CT,NY,PA
Toxaphene	CT,NY,PA
Alachlor	CT
EPA 8082A in Soil	
PCB-1016	CT,NY,PA
PCB-1221	CT,NY,PA
PCB-1232	CT,NY,PA
PCB-1242	CT,NY,PA

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
EPA 8082A in Soil	
PCB-1248	CT,NY,PA
PCB-1254	CT,NY,PA
PCB-1260	CT,NY,PA
PCB-1268	CT,NY,PA
PCB-1262	NY,PA
EPA 8151A in Soil	
Dalapon	CT
Dicamba	CT
Dichloroprop	CT
2,4-D	CT
Silvex	CT
2,4,5-T	CT
Dinoseb	CT
2,4-DB	CT
EPA 8260C in Soil	
Dichlorodifluoromethane	CT,NY,PA
Chloromethane	CT,NY,PA
Vinyl Chloride	CT,NY,PA
Bromomethane	CT,NY,PA
Chloroethane	CT,NY,PA
Trichlorofluoromethane	CT,NY,PA
Acetone	CT,NY,PA
Acrylonitrile	CT,NY
Trichlorotrifluoroethane	CT,NY,PA
1,1-Dichloroethene	CT,NY,PA
Methylene Chloride	CT,NY,PA
Carbon Disulfide	CT,NY,PA
Methyl-t-Butyl Ether (MTBE)	CT,NY,PA
trans-1,2-Dichloroethene	CT,NY,PA
1,1-Dichloroethane	CT,NY,PA
2-Butanone (MEK)	CT,NY,PA
2,2-Dichloropropane	CT,NY,PA
cis-1,2-Dichloroethene	CT,NY,PA
Bromochloromethane	CT,NY,PA
Chloroform	CT,NY,PA
Tetrahydrofuran	CT
1,1,1-Trichloroethane	CT,NY,PA
Carbon Tetrachloride	CT,NY,PA
1,1-Dichloropropene	CT,NY,PA
Benzene	CT,NY,PA
1,2-Dichloroethane	CT,NY,PA
Trichloroethene	CT,NY,PA
1,2-Dichloropropane	CT,NY,PA
Dibromomethane	CT,NY,PA

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
EPA 8260C in Soil	
Bromodichloromethane	CT,NY,PA
Methyl Isobutyl Ketone	CT,NY,PA
cis-1,3-Dichloropropene	CT,NY,PA
Toluene	CT,NY,PA
trans-1,3-Dichloropropene	CT,NY,PA
2-Hexanone	CT,NY,PA
1,1,2-Trichloroethane	CT,NY,PA
Tetrachloroethene	CT,NY,PA
1,3-Dichloropropane	CT,NY,PA
Dibromochloromethane	CT,NY,PA
1,2-Dibromoethane	CT,NY,PA
trans-1,4-Dichloro-2-Butene	CT,NY,PA
Chlorobenzene	CT,NY,PA
1,1,1,2-Tetrachloroethane	CT,NY,PA
Ethylbenzene	CT,NY,PA
m+p Xylenes	CT,NY,PA
o-Xylene	CT,NY,PA
Styrene	CT,NY,PA
Bromoform	CT,NY,PA
Isopropylbenzene	CT,NY,PA
1,1,2,2-Tetrachloroethane	CT,NY,PA
Bromobenzene	CT,NY,PA
1,2,3-Trichloropropane	CT,NY,PA
n-Propylbenzene	CT,NY,PA
2-Chlorotoluene	CT,NY,PA
4-Chlorotoluene	CT,NY,PA
1,3,5-Trimethylbenzene	CT,NY,PA
tert-Butylbenzene	CT,NY,PA
1,2,4-Trimethylbenzene	CT,NY,PA
sec-Butylbenzene	CT,NY,PA
1,3-Dichlorobenzene	CT,NY,PA
4-Isopropyltoluene	CT,NY,PA
1,4-Dichlorobenzene	CT,NY,PA
1,2-Dichlorobenzene	CT,NY,PA
n-Butylbenzene	CT,NY,PA
1,2-Dibromo-3-Chloropropane	CT,NY,PA
1,2,4-Trichlorobenzene	CT,NY,PA
Hexachlorobutadiene	CT,NY,PA
Naphthalene	CT,NY,PA
1,2,3-Trichlorobenzene	CT
EPA 8260C in Water	
Dichlorodifluoromethane	CT,NY
Chloromethane	CT,NY
Vinyl Chloride	CT,NY

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
EPA 8260C in Water	
Bromomethane	CT,NY
Chloroethane	CT,NY
Trichlorofluoromethane	CT,NY
Acetone	CT,NY
Acrylonitrile	CT,NY
Trichlorotrifluoroethane	CT,NY
1,1-Dichloroethene	CT,NY
Methylene Chloride	CT,NY
Carbon Disulfide	CT,NY
Methyl-t-Butyl Ether (MTBE)	CT,NY
trans-1,2-Dichloroethene	CT,NY
1,1-Dichloroethane	CT,NY
2-Butanone (MEK)	CT,NY
2,2-Dichloropropane	CT,NY
cis-1,2-Dichloroethene	CT,NY
Bromochloromethane	NY
Chloroform	CT,NY
Tetrahydrofuran	CT
1,1,1-Trichloroethane	CT,NY
Carbon Tetrachloride	CT,NY
1,1-Dichloropropene	CT,NY
Benzene	CT,NY
1,2-Dichloroethane	CT,NY
Trichloroethene	CT,NY
1,2-Dichloropropane	CT,NY
Dibromomethane	CT,NY
Bromodichloromethane	CT,NY
Methyl Isobutyl Ketone	CT,NY
cis-1,3-Dichloropropene	CT,NY
Toluene	CT,NY
trans-1,3-Dichloropropene	CT,NY
2-Hexanone	CT,NY
1,1,2-Trichloroethane	CT,NY
Tetrachloroethene	CT,NY
1,3-Dichloropropane	CT,NY
Dibromochloromethane	CT,NY
1,2-Dibromoethane	CT,NY
trans-1,4-Dichloro-2-Butene	CT,NY
Chlorobenzene	CT,NY
1,1,1,2-Tetrachloroethane	CT,NY
Ethylbenzene	CT,NY
m+p Xylenes	CT,NY
o-Xylene	CT,NY
Styrene	CT,NY
Bromoform	CT,NY

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
EPA 8260C in Water	
Isopropylbenzene	CT,NY
1,1,2,2-Tetrachloroethane	CT,NY
Bromobenzene	CT,NY
1,2,3-Trichloropropane	CT,NY
n-Propylbenzene	CT,NY
2-Chlorotoluene	CT,NY
4-Chlorotoluene	CT,NY
1,3,5-Trimethylbenzene	CT,NY
tert-Butylbenzene	CT,NY
1,2,4-Trimethylbenzene	CT,NY
sec-Butylbenzene	CT,NY
1,3-Dichlorobenzene	CT,NY
4-Isopropyltoluene	CT,NY
1,4-Dichlorobenzene	CT,NY
1,2-Dichlorobenzene	CT,NY
n-Butylbenzene	CT,NY
1,2-Dibromo-3-Chloropropane	CT,NY
1,2,4-Trichlorobenzene	CT,NY
Hexachlorobutadiene	CT,NY
Naphthalene	CT,NY
1,2,3-Trichlorobenzene	CT,NY
EPA 8270D in Soil	
Phenol	CT,NY,PA
1,3-Dichlorobenzene	CT,NY,PA
n-Nitroso-di-n-propylamine	CT,NY,PA
Pyridine	CT,NY,PA
n-Nitroso-dimethylamine	CT,NY,PA
bis(2-Chloroethyl)ether	CT,NY,PA
Aniline	CT,NY,PA
2-Chlorophenol	CT,NY,PA
1,4-Dichlorobenzene	CT,NY,PA
Benzyl Alcohol	CT,NY,PA
1,2-Dichlorobenzene	CT,NY,PA
bis(2-Chloroisopropyl)ether	CT,NY,PA
Hexachloroethane	CT,NY,PA
2-Methyl Phenol	CT,NY,PA
3+4 Methyl Phenol	CT,NY,PA
Naphthalene	CT,NY,PA
2-Nitrophenol	CT,NY,PA
2,4-Dichlorophenol	CT,NY,PA
Hexachlorobutadiene	CT,NY,PA
4-Chloro-3-methylphenol	CT,NY,PA
Nitrobenzene	CT,NY,PA
Isophorone	CT,NY,PA

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
EPA 8270D in Soil	
2,4-Dimethylphenol	CT,NY,PA
bis(2-Chloroethoxy)methane	CT,NY,PA
Benzoic Acid	CT,NY,PA
1,2,4-Trichlorobenzene	CT,NY,PA
2,6-Dichlorophenol	CT,NY,PA
4-Chloroaniline	CT,NY,PA
1,2,4,5-Tetrachlorobenzene	CT,NY,PA
2-Methyl Naphthalene	CT,NY,PA
Acenaphthylene	CT,NY,PA
Acenaphthene	CT,NY,PA
Dibenzofuran	CT,NY,PA
Fluorene	CT,NY,PA
Hexachlorocyclopentadiene	CT,NY,PA
2,4,6-Trichlorophenol	CT,NY,PA
2,4,5-Trichlorophenol	CT,NY,PA
2,4-Dinitrophenol	CT,NY,PA
4-Nitrophenol	CT,NY,PA
2-Chloronaphthalene	CT,NY,PA
2-Nitroaniline	CT,NY,PA
Dimethylphthalate	CT,NY,PA
2,6-Dinitrotoluene	CT,NY,PA
4-Nitroaniline	CT,NY,PA
2,4-Dinitrotoluene	CT,NY,PA
2,3,4,6-Tetrachlorophenol	CT,NY,PA
4-Chlorophenyl-phenylether	CT,NY,PA
Diethylphthalate	CT,NY,PA
Phenanthrene	CT,NY,PA
Anthracene	CT,NY,PA
Carbazole	CT,NY,PA
Fluoranthene	CT,NY,PA
Pyrene	CT,NY,PA
n-Nitrosodiphenylamine	CT,NY,PA
Pentachlorophenol	CT,NY,PA
3-Nitroaniline	CT,NY,PA
4,6-Dinitro-2-methylphenol	CT,NY,PA
1,2-Diphenylhydrazine	CT
4-Bromophenyl-phenylether	CT,NY,PA
Hexachlorobenzene	CT,NY,PA
Di-n-butylphthalate	CT,NY,PA
Pentachloronitrobenzene	CT,NY,PA
Benzo[a]anthracene	CT,NY,PA
Chrysene	CT,NY,PA
Butylbenzylphthalate	CT,NY,PA
3,3-Dichlorobenzidine	CT,NY,PA
bis(2-Ethylhexyl)phthalate	CT,NY,PA

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
EPA 8270D in Soil	
Di-n-octylphthalate	CT,NY,PA
Benzo[b]fluoranthene	CT,NY,PA
Benzo[k]fluoranthene	CT,NY,PA
Benzo[a]pyrene	CT,NY,PA
Indeno[1,2,3-cd]pyrene	CT,NY,PA
Dibenz[a,h]anthracene	CT,NY,PA
Benzo[g,h,i]perylene	CT,NY,PA
EPA 8270D in Water	
Phenol	CT,NY
1,3-Dichlorobenzene	CT,NY
n-Nitroso-di-n-propylamine	CT,NY
Pyridine	CT,NY
n-Nitroso-dimethylamine	CT,NY
bis(2-Chloroethyl)ether	CT,NY
Aniline	CT,NY
2-Chlorophenol	CT,NY
1,4-Dichlorobenzene	CT,NY
Benzyl Alcohol	CT,NY
1,2-Dichlorobenzene	CT,NY
bis(2-Chloroisopropyl)ether	CT,NY
Hexachloroethane	CT,NY
2-Methyl Phenol	CT,NY
3+4 Methyl Phenol	CT,NY
Naphthalene	CT,NY
2-Nitrophenol	CT,NY
2,4-Dichlorophenol	CT,NY
Hexachlorobutadiene	CT,NY
4-Chloro-3-methylphenol	CT,NY
Nitrobenzene	CT,NY
Isophorone	CT,NY
2,4-Dimethylphenol	CT,NY
bis(2-Chloroethoxy)methane	CT,NY
Benzoic Acid	CT,NY
1,2,4-Trichlorobenzene	CT,NY
2,6-Dichlorophenol	CT,NY
4-Chloroaniline	CT,NY
1,2,4,5-Tetrachlorobenzene	CT,NY
2-Methyl Naphthalene	CT,NY
Acenaphthylene	CT,NY
Acenaphthene	CT,NY
Dibenzofuran	CT,NY
Fluorene	CT,NY
Hexachlorocyclopentadiene	CT,NY
2,4,6-Trichlorophenol	CT,NY

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
EPA 8270D in Water	
2,4,5-Trichlorophenol	CT,NY
2,4-Dinitrophenol	CT,NY
4-Nitrophenol	CT,NY
2-Chloronaphthalene	CT,NY
2-Nitroaniline	CT,NY
Dimethylphthalate	CT,NY
2,6-Dinitrotoluene	CT,NY
4-Nitroaniline	CT,NY
2,4-Dinitrotoluene	CT,NY
2,3,4,6-Tetrachlorophenol	CT,NY
4-Chlorophenyl-phenylether	CT,NY
Diethylphthalate	CT,NY
Phenanthrene	CT,NY
Anthracene	CT,NY
Carbazole	CT,NY
Fluoranthene	CT,NY
Pyrene	CT,NY
n-Nitrosodiphenylamine	CT,NY
Pentachlorophenol	CT,NY
3-Nitroaniline	CT,NY
4,6-Dinitro-2-methylphenol	CT,NY
1,2-Diphenylhydrazine	CT
4-Bromophenyl-phenylether	CT,NY
Hexachlorobenzene	CT,NY
Pentachloronitrobenzene	CT
Di-n-butylphthalate	CT,NY
Benzo[a]anthracene	CT,NY
Chrysene	CT,NY
Butylbenzylphthalate	CT,NY
3,3-Dichlorobenzidine	CT
bis(2-Ethylhexyl)phthalate	CT,NY
Di-n-octylphthalate	CT,NY
Benzo[b]fluoranthene	CT,NY
Benzo[k]fluoranthene	CT,NY
Benzo[a]pyrene	CT,NY
Indeno[1,2,3-cd]pyrene	CT,NY
Dibenz[a,h]anthracene	CT,NY
Benzo[g,h,i]perylene	CT,NY
EPA 9012B in Soil	
Cyanide,Total	CT
EPA 9045D in Soil	
pH	CT,NY,PA
SM 2540 G in Soil	
Percent Solids	CT

Complete Environmental Testing operates under the following certifications and accreditations:

Code	Description	Number	Expires
CT	Connecticut Public Health	PH0116	09/30/2018
NY	New York Certification (NELAC)	11982	04/01/2019
PA	Pennsylvania DEP	68-02927	05/31/2019

8070435

CET

COMPLETE ENVIRONMENTAL TESTING, INC.

CHAIN OF CUSTODY

Volatile Soils Only:
Date and Time in Freezer
Client:
CET:

80 Lupes Drive
Stratford, CT 06615
Tel: (203) 377-9984
Fax: (203) 377-9952
e-mail: cet1@cetlabs.com
Bottle Request e-mail: bottleorders@cetlabs.com

Matrix: A=Air, S=Soil, W=Water, DW=Drinking Water, C=Cassette Solid, Wipe, Other (Specify)

Turnaround Time ** (check one): Same Day *, Next Day *, Two Day *, Three Day *, Std (5-7 Days)

Sample ID/Sample Depths (include Units for any sample depths provided)	Collection Date/Time	Matrix	Same Day *	Next Day *	Two Day *	Three Day *	Std (5-7 Days)	8260 CT List	8260 Aromatics	8260 Halogens	CT ETPH	8270 CT List	8270 PNAs	PCBs ☐ SOX ☐ ASE	Pesticides	Metals: 8 RCRA	13 Priority Poll	15 CT DEP	Total	SPLP	TCLP	Dissolved	Field Filtered	Lab to Filter	Additional Analysis: Total Metals NYC List	PCBs (EPA 8082)	VOCs (EPA 8260C	SVOCs (EPA 8270C)	Pest. Pest. (EPA 8081B)	Metals, TCLP (EPA 6010C)	Metals (TCLP EPA 6010C)	Cr(VI) (TCLP EPA 7196A)	Pest. + Herb (TCLP EPA 6010C)	TOTAL # OF CONT.	NOTE #
B1 - 0-5	7/13/18 1015	S					X									X									X	X	X	X	X					5
B2 - 0-5	7/13/18 1200	S					X									X									X	X	X	X	X					6
B3 - 1-6	7/13/18 1230	S					X									X									X	X	X	X	X					6
B4 - 0-5	7/13/18 1000	S					X									X									X	X	X	X	X					5
B5 - 1-6	7/13/18 230	S					X									X									X	X	X	X	X					6
B5 - W	7/13/18 1430	W					X																				X	X						W

PRESERVATIVE (Cl–HCl, N–HNO_3, S–H_2SO_4, Na–NaOH, C=Cool, O–Other)

CONTAINER TYPE (P–Plastic, G–Glass, V–Vial, O–Other)

Soil VOCs Only (M=MeOH B=Sodium Bisulfate W=Water F=Empty Vial E=Encore)

RELINQUISHED BY:	DATE/TIME	RECEIVED BY:
Richard Genovesi	7-16-18 1145	
	7-16-18 1639	
	DATE/TIME	RECEIVED BY:

NOTES:

Client / Reporting Information

Company Name: Haley & Aldrich Inc.
Address: 100 Corporate Place Suite 105
City: Rocky Hill State: CT Zip: 06067
Report To: Richard Genovesi E-mail: Rgenovesi@haleyaldrich.com
Phone #: 860.986.1875 Fax #:

Project Information

Project: Valhalla Waterfowl PO #: 130464-002
Location: Valhalla, NY Project #:
CET Quote # Collector(s):

QA/QC ☑ Std ☐ Site Specific (MS/MSD) * ☐ RCP Pkg * ☐ DQAW *
Data Report ☑ PDF ☐ EDD - Specify Format Other
RSR Reporting Limits (check one) ☐ GA ☐ GB ☐ SWP ☐ Other
Laboratory Certification Needed (check one) ☐ CT ☐ NY ☐ RI ☐ MA

Temp Upon Receipt 4.2 °C Evidence of Cooling: Y N

PAGE OF

* Additional charge may apply. ** TAT begins when the samples are received at the Lab and all issues are resolved. TAT for samples received after 3 p.m. will start on the next business day. All samples picked up by courier service will be considered next business day receipt for TAT purposes.

REV. 10/16