STORMWATER REPORT

PARAGON BOARDWALK REDEVELOPMENT
189 NANTASKET AVENUE
HULL, MASSACHUSETTS

Applicant:

NANTASKET DUNE HOLDINGS, LLC
1495 HANCOCK STREET, SUITE 400
QUINCY, MASSACHUSETTS 02169

Prepared By:

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CEC Project 185-317

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Civil & Environmental Consultants, Inc.

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1.0 PROJECT NARRATIVE

1.1 INTRODUCTION

On behalf of Nantasket Dune Holdings, LLC (the "Applicant"), Civil & Environmental Consultants, Inc. (CEC) has prepared this stormwater report and analysis to demonstrate compliance with the Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management Standards. This Stormwater Management Report describes the proposed design as depicted on the Site Plans prepared by CEC, dated November 2018.

The Applicant owns three parcels (combined 3.3-acres) of land located in Hull, Massachusetts, between Nantasket Avenue and George Washington Boulevard, south of Wharf Avenue and is proposing to perform construction including exterior improvements on two of the three parcels identified as Assessors Parcels 37-002 and 37-004 (the "Site"). The redevelopment includes a 0.7-acre portion of the Site, within the two parcels, (the "Project Area") in order to construct a retail and entertainment facility consisting of concession areas and outdoor amenity and recreation spaces on the ground level with seating on a balcony level above (the "Project").

1.2 EXISTING CONDITIONS

The Site is located within the Commercial Recreation B zoning district and the Nantasket Beach Overlay and Flood Plain districts and contains ±20,282 SF of existing building area currently occupied by a mix of retail and entertainment spaces. The Project Area is bound by George Washington Boulevard to the west, a Department of Conservation and Recreation (DCR) parking lot to the southwest, a commercial property belonging to the owner to the northwest, by Nantasket Avenue to the northeast, and a high-rise condominium development to the southeast. See Figure 1 for a Site Location Map and Figure 2 for an Aerial Site Plan.

Approximately 78% of the Project Area is covered by impervious areas consisting of the existing building space along Nantasket Avenue, a ±7,800 SF paved area and various concrete stairways/landings in the rear to the property along George Washington Boulevard. The remainder of the rear portion of the Site is covered by a mixture of gravel and grass areas in poor to fair condition.

Topography

Existing topography within the rear portion of the Project Area ranges from elevation 10.5 adjacent to the existing building to be demolished to elevation 8.5 in the rear parking lot at a catch basin. The majority of the Project Area slopes towards the single existing catch basin located within the paved area. The existing building, with primary access off Nantasket Avenue, has a finished floor elevation ranging from 13.1 to 13.4. A portion of the rear of the building contains an elevated concrete landing for maintenance access to the rear of the building at the finished floor elevation. It is assumed that the entire roof area of the existing building within the Project Area drains to the described catch basin based on the visual observation of gutters/downspouts on the southern side of the existing building. See Appendix D for the Existing Conditions Plan included in the Site Plans.

The majority of the stormwater runoff from the Project Area flows into the drainage system in George Washington Boulevard via the outlet pipe from the existing catch basin. A small high point exists along the southerly edge of the parking lot directing stormwater to the south to the adjacent narrow property owned by the Applicant. A more detailed description of the drainage patterns is included in Section 1.3.

Flood Zone

The easterly portion of the Project Area is located within Federal Emergency Management Agency (FEMA) Flood Zone AO (Depth = 3 feet). The westerly portion of the Project Area is located within FEMA Flood Zone AE (Elevation = 10). These are shown on the FEMA Flood Insurance Rate Map (FIRM) for the Town of Hull, Map 25023C0038J effective July 17, 2012 as modified by a Letter of Map Revision (LOMR) in December 13, 2017. Refer to Figure 3.

Wetlands

Lucas Environmental, LLC performed a wetlands investigation in November 2018. The Site is located between the Atlantic Ocean, to the east, and tidal flats associated with the Weir River

Estuary, to the west. The landform underlying the existing development is classified as a barrier beach which is a regulated resource area in accordance with MassDEP regulations. The Project Area is also located within a FEMA Floodzone, which is identified as Land Subject to Coastal Storm Flowage.

The tidal flats and resource areas on the westerly side of George Washington Boulevard have been identified as an Area of Critical Environmental Concern (ACEC) and an Outstanding Resource Water associated with the Weir River Estuary. Refer to the Notice of Intent, prepared by Lucas Environmental, LLC, for additional detail regarding regulated resource areas and wetlands habitat.

The Project Area is located outside Massachusetts Chapter 91 jurisdiction, it is not located within estimated or priority NHESP habitat areas.

Geotechnical

According to the Natural Resources Conservation Service (NRCS) Web Soil Survey, the soils within the Project Area are classified as Urban Land with 0 to 8 percent slopes (#602B). A portion of the Site outside the Project Area is within Udorthents – Urban Land complex (656B).

The Urban Land classification provides little to no information regarding the type of soil at the site, however the nearby Udorthents – Urban Land complex is classified as Hydrologic Soil group (HSG) B. The "Group B" criteria suggests that the soils have a moderate infiltration rate when thoroughly wet, a moderate rate of water transmission, and that the soils are moderately well drained or well drained with a moderately fine texture to a moderately coarse texture. For the purpose of the hydrologic analysis for this Site, HSG B classification was utilized.

1.3 PROPOSED PROJECT

The Project includes the demolition of ±9,530 SF of existing building area in order to allow for the construction of a retail and entertainment facility with concession areas and outdoor amenity and recreation spaces. The retail and entertainment facility consists of a combined ±1,720 SF of building area in the form of separate storage containers modified to meet the Project purposes,

accessible by a proposed decking. A mezzanine level deck is proposed over several of the proposed containers with an overall footprint area of ±2,670 SF. A central multi-use sand court will provide an activity space (volleyball, bocce, etc.) for patrons of the facility. The Project includes the reconstruction of the existing paved parking area in the rear of the Project Area that will provide eight parking spaces and will maintain vehicular access to the loading docks of the adjacent building and relocated waste storage/pick-up area.

The Project will include new water quality and quantity controls designed to protect surface and groundwater resources and adjacent properties from potential impacts resulting from the proposed Project. The proposed improvements will be designed in accordance with the MassDEP Stormwater Management Standards for redevelopments.

In the proposed condition, approximately 59% of the Project Area will be impervious, consisting of paved parking areas, sidewalks, and building roof areas. The remainder of the Project Area will consist of landscaped and undisturbed vegetated areas. The overall drainage patterns on the Project Area will be maintained in the proposed condition with the grades generally consistent with the original grades present outside the existing building area. Stormwater runoff from the paved parking lot and sidewalk areas will be directed to a new water quality catch basin that will provide initial sediment removal as well as oil and gas containment. Stormwater runoff from the proposed retail and entertainment facility will be directed to the central multi-use court where it will percolate through the sand material into installed underdrains, which will connect to the drainage manhole in the rear of the Project Area. Clean runoff from the roof areas of the existing building to remain will be captured and conveyed to the drainage manhole. The proposed project will maintain existing drainage patterns, and will result in a reduction in peak rates of runoff and stormwater volumes from the Site.

Additionally, the Project will provide improved flood conveyance within the FEMA Zone AO Flood by providing a significant amount of open areas between the proposed structures, allowing for a drainage path for flood waters that may be encountered. The proposed structures will be flood proofed to protect the interior spaces from flooding as appropriate.

2.0 STORMWATER MANAGEMENT SYSTEM

2.1 DESCRIPTION OF RUNOFF CONTROLS

The stormwater management improvements consist of components designed to manage runoff from the Site. These components attenuate runoff discharge peaks, minimize erosion, minimize the transport of sediments, improve water quality, and prevent impacts to the municipal drainage system and any downstream resource areas.

The stormwater management system implements a treatment train of the Best Management Practices (BMPs) designed to provide 80% TSS (Total Suspended Solids) removal for stormwater runoff from the proposed drive aisles and parking areas. The proposed stormwater management system will use the following specific control measure:

- Proprietary particle separators (Stormceptor® water quality units): The proposed Stormceptor water quality units provide efficient removal of free oils, debris and total suspended solids (TSS). Although not the main objective of the water quality unit, some removal of heavy metals and other nutrients is also achieved. Water quality units allow for safe and easy removal of collected material and should be inspected and cleaned in accordance with the Operations and Maintenance (O&M) Plan and per manufacturer's recommendations. See the Long Term Pollution Prevention and O&M Plan included in Section 6 and Appendix C for supporting information.

  The use of these units for treatment of stormwater is accepted as a good practice and is in accordance with sound professional standards. A Massachusetts Stormwater Evaluation Project (MASTEP) Technology Review has been performed for the Stormceptor® affirming testing methods are acceptable for achieving the pollutant removal efficiencies noted[1]. See Appendix C for the MASTEP Technology Review.

All of these proposed runoff controls are detailed on the Site Plans included in Appendix D.

[1] University of Massachusetts – Amherst, Stormwater Technologies Clearinghouse http://www.mastep.net/database/data.cfm (accessed October 2014)

2.2 CONSTRUCTION SEQUENCE PLAN

The purpose of the Construction Sequence Plan is to develop a working schedule for the implementation of the proposed stormwater improvements.

Prior to initiating any work, the siltation control barriers will be installed along the limit of work. Once the appropriate permits are obtained, the construction project will commence in the following sequence:

1. Install all necessary erosion and siltation barriers as shown on the design drawings and install temporary fencing as needed.
2. Perform clearing and stripping of the Site, stockpiling materials to be re-used for earthwork activities.
3. Perform demolition of existing building and structures as shown on the design drawings.
4. Perform excavation for building foundation areas and subsurface utilities.
5. Install proposed utilities and stormwater infrastructure and construct building foundations.
6. Place clean fill/pavement base materials and install pavement base and curbing.
7. Construct buildings.
8. Install proposed final landscaping.
9. Remove existing erosion control measures.

All construction water will be collected and treated in accordance with the Erosion and Sediment Control Plan included in Section 5.0.

3.0 STORMWATER ANALYSIS

3.1 METHOD OF ANALYSIS

A hydrologic analysis has been performed for the Site comparing existing conditions and post-development conditions using a software program developed by HydroCAD. This program analyzes site hydrology by the graphic peak discharge method documented in Technical Release No. 20 and Technical Release No. 55 published by the United States Department of Agriculture (USDA) Soil Conservation Service.

The following variables were developed for the contributing watersheds (drainage areas) in order to complete the analysis:

- **Rainfall Depth:** A hydrologic analysis was performed for the 24-hour 2-year, 10-year, 25-year, and 100-year, Type III storm events (3.4, 4.7, 5.6, and 7.0 inches respectively) for each drainage area. The rainfall depths for the study area were obtained from available charts published in Technical Paper No. 40.

- **Runoff Curve Number (RCN):** The RCN is a hydrologic characteristic that contributes to the peak rate of runoff and volume from a given storm event. It is dependent upon soil conditions and land use. Generally, higher curve numbers are associated with less pervious soils and, hence, greater amounts of runoff. As previously noted, based on the NRCS soils maps, HSG B was utilized in determining RCNs.

- **Time of Concentration:** The time of concentration is defined as the time it takes runoff to travel from the hydraulically most distant part of the watershed to the downstream point of interest. This parameter is dependent on the characteristics of the ground surface and conditions of the travel path. Times of concentration were calculated for the various sub catchments using the HydroCAD program, with a minimum time of concentration of six minutes, used in accordance with the protocol outlined in Technical Release No. 55.

3.2 DRAINAGE AREAS

In order to perform the analysis, the contributing drainage areas for pre-development, existing, and post-development conditions were delineated. The delineation of the drainage areas were determined by the topography depicted on the Existing Conditions plan based on the topographic field survey performed in November 2017 and supported with field observations performed in November 2018. Brief descriptions of the existing conditions and proposed conditions drainage areas are as follows:

- **Existing Conditions:** The Site is divided into two drainage areas and the stormwater runoff flows to two design points, which are identified in the municipal drainage system within the Project Area flowing to the southwest, and the adjacent area of the Site (outside the Project Area) to the southeast. Refer to Figure HYD-EX for the existing conditions drainage areas. Descriptions of the existing conditions drainage areas are listed below:

    - Sub catchment 1A-EX is the ±1,890 SF southerly portion of the Project Area consisting of a small portion of the existing paved area and an area of poor/fair stands of grass mixed with gravel. Stormwater runoff from this drainage area flows overland and untreated to the southeast towards the adjacent area of the Site (outside the Project Area).
    - Sub catchment 2A-EX is the ±28,490 SF portion of the Project Area consisting of the existing building, paved lot, and an area of poor/fair stands of grass mixed with gravel. Stormwater runoff from this drainage area flows overland to the existing catch basin located within the paved lot on the southern side of the Project Area where it discharges into the municipal stormwater system.

TABLE 3.1 EXISTING CONDITIONS					
Drainage Area	**Discharge Location**	**Design Point**	**Area (ft^2)**	**Curve Number**	**Time of Concentration (minutes)**
1A-EX	Adjacent land (Southeast)	1	1,890	84	6.0
2A-EX	Municipal Drainage System	2	28,490	94	6.0

- **Proposed Conditions:** The Site is divided into four drainage areas and the stormwater runoff will continue to flow to the two design points. Refer to Figure HYD-PR for the proposed conditions drainage areas. Descriptions of the proposed conditions drainage areas are listed below:

    - Sub catchment 1A-PR is a ±1,700 square-foot area consisting entirely of landscaped/grass areas. Stormwater runoff from this drainage area flows overland to an adjacent area of the Site (outside the Project Area) to the southeast.
    - Sub catchment 2A-PR is a ±15,590 square-foot area consisting of the proposed paved parking lot and sidewalks, with some landscaped areas. Stormwater runoff from this drainage area flows overland to a proposed water quality unit with an inlet and is then conveyed to a stormwater manhole prior to discharging into the municipal stormwater system.
    - Sub catchment 2B-PR is a ±4,320 square-foot area consisting of the roof areas from existing building to remain within the Project Area. Stormwater runoff from this drainage area flows to new downspouts on the southwestern side of the building where the runoff is routed through an underground drain line into the proposed drainage manhole.
    - Sub catchment 2C-PR is a ±8,770 square-foot area consisting of the proposed entertainment and retail facility containing several modified storage container units, gravel areas underlying the proposed decking, and the sand multi-use court. Stormwater runoff within this drainage area flows towards the central multi-use court where it infiltrates into perforated PVC underdrains, which discharge into the proposed drainage manhole.

TABLE 3.2 POST-DEVELOPMENT CONDITIONS					
Drainage Area	**Discharge Location**	**Design Point**	**Area (ft^2)**	**Curve Number**	**Time of Concentration (minutes)**
1A-PR	Adjacent land	1	1,700	61	6.0
2A-PR	Municipal Drainage System	2	15,590	95	6.0
2B-PR	Municipal Drainage System	2	4,320	98	6.0
2C-PR	Municipal Drainage System	2	8,770	87	6.0

3.3 RESULTS OF ANALYSIS

A stormwater analysis was performed for the 2-year, 10-year, 25-year, and 100-year storm events in order to determine that there will be no increase in stormwater runoff once the proposed construction is complete and the stormwater control structures are in place. Detailed calculations are attached in Appendix A. The points of compliance for existing and post-development conditions are the two design points noted above. A summary of the peak stormwater runoff and volumes are provided below.

TABLE 3.3
PROJECT STORMWATER RUNOFF RATES

	Runoff Rate (cfs)							
	2-Year	2-Year	10-Year	10-Year	25-Year	25-Year	100-Year	100-Year
	Ex.	Prop.	Ex.	Prop.	Ex.	Prop.	Ex.	Prop.
1	0.09	0.02	0.15	0.05	0.19	0.07	0.26	0.12
2	2.00	1.94	2.87	2.81	3.46	3.41	4.38	4.34

cfs = cubic feet per second

As shown in Table 3.3, post-development runoff rates do not exceed existing runoff rates. Supporting calculations are provided in Appendix C.

3.3.1 Hydrology

The proposed drainage infrastructure consisting of catch basin inlets, pipes, and diversion swales, have been designed to convey storm events up to and including the 25-year storm event. Drainage channels and diversion swales have been designed to convey flows at non-erosive velocities (<5 feet/second). Refer to Appendix B for supporting calculations.

4.0 STORMWATER CONTROL SYSTEM DESIGN CRITERIA

4.1 MASSDEP STORMWATER MANAGEMENT POLICY

Stormwater discharges from the proposed Project is subject to the Massachusetts DEP Stormwater Management Policy (the Policy). The Policy is designed *"to protect the wetlands and waters of the Commonwealth from adverse impacts of storm water runoff."* To accomplish this goal, the Policy establishes ten performance standards to control stormwater quantity and quality. These standards establish the level of required controls, which can be achieved through the use of site planning, structural and non-structural controls, and other BMPs. The Stormwater Checklist is provided in Appendix A. Stormwater modeling methodology is discussed in detail in section 3.0. Results of the stormwater modeling of the existing and proposed conditions are provided as Appendix C.

4.1.1 Stormwater Management Standards

The following section documents compliance with the MassDEP Stormwater Management Standards.

Standard 1

No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

The project is designed so that there are no new stormwater conveyances that could discharge untreated stormwater into, or cause erosion to, wetlands or waters of the Commonwealth. Runoff from impervious surfaces are routed to the water quality unit providing TSS removal and are then conveyed to the existing drainage connection to the municipal system. The proposed project retains the overall drainage patterns of the pre-development conditions.

Standard 2

Stormwater management systems must be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.

The total post-development peak discharge rates do not exceed pre-development rates for the 2, 10, 25, and 100-year storm events. Stormwater modeling methodology is discussed in detail in Section 3.0. The model output is provided in Appendix C. The results are provided above in Table 3.3.

Standard 3

Loss of annual recharge to groundwater should be minimized through the use of infiltration measures to the maximum extent practicable. The annual recharge from the post-development site should approximate the annual recharge from the pre-development or existing site conditions, based on soil types.

The project is designed to comply with this criteria. The project will result in the reduction of approximately 5,690 SF of impervious areas. Refer to Table 4.1 below for a summary of pre-development and post-development impervious areas.

TABLE 4.1
PROJECT STORMWATER RUNOFF RATES

Area Summary

	Pervious (sf)	**Impervious**		
		Building Roof Areas (sf)	**Pavement and Sidewalks (sf)**	**Impervious Total (sf)**
Existing	6,800	13,850	9,730	23,580
Proposed	12,490	6,040	11,850	17,890
Difference	+5,690	-7,810	+2,120	-5,690

Due to the reduction in impervious areas, the Project will provide additional recharge when compared to the existing conditions.

Standard 4

For new development, stormwater management systems must be designed to remove 80% of the average annual load (post-development conditions) of Total Suspended Solids (TSS). It is presumed that this standard is met when:

A. Suitable nonstructural practices for source control and pollution prevention are implemented;

B. Stormwater management best practices (BMPs) are sized to capture the prescribed runoff volume; and

C. Stormwater management BMPs are maintained as designed.

The proposed development utilizes source reduction of potential TSS generation through sweeping and a proprietary water quality unit. The 1 inch water quality flow rate was calculated to be 0.33 cfs and the proposed water quality unit is capable of providing 80% TSS removal for flows up to 0.40 cfs. Supporting calculations and documentation can be found in Appendix C.

A comprehensive Operations and Maintenance (O&M) Plan has been developed and is included in Section 6.0 of this report.

Standard 5

Stormwater discharges from areas with higher potential pollutant loads require the use of specific stormwater management BMPs. The use of infiltration practices without pre-treatment is prohibited.

The Site will not be classified as a LUHPPL.

Standard 6

Stormwater discharges to critical areas must utilize certain stormwater management BMPs approved for critical areas. Critical areas are Outstanding Resources Waters (ORWs), shellfish beds, bathing beaches, cold water fisheries, and recharge areas for public water supplies.

The project discharges to an ACEC associated with the Weir River Estuary on the westerly side of George Washington Boulevard, which is classified as a critical area. Accordingly, the project has been designed to provide treatment of the 1 inch water quality volume. As a redevelopment, the project provides the water quality treatment via a proprietary water quality unit.

Standard 7

Redevelopment of previously developed sites must meet the Stormwater Management Standards to the maximum extent practicable. Where it is not practicable to meet all the Standards, new (retrofitted or expanded) stormwater management systems must be designed to improve existing conditions.

The project is classified as a redevelopment project, and complies fully with Standards 1 through 5 and Standards 8 through 10. The project complies with the pretreatment and structural stormwater best management practice requirements for Standard 6 to the maximum extent practicable and provides an improvement to the water quality when compared to existing conditions.

Standard 8

Erosion and sediment controls must be implemented to prevent impacts during construction, or land disturbance activities.

Erosion and sediment controls are integral to the project improvements. The plan includes compost silt socks that will be installed down-gradient of the proposed work area and silt sacks that will be installed in the existing catch basins within and down-gradient of the Project Area. A

temporary stabilized construction exit will be constructed as well. A preliminary Erosion and Sediment Control Plan has been developed and is included in Section 5.0 of this report. Measures will be utilized throughout construction to prevent erosion, control sediments, and stabilize exposed soils as discussed in Section 5.0.

Standard 9

All stormwater management systems must have an operations and maintenance plan to ensure that systems function as designed.

A comprehensive O&M Plan has been developed and is included in Section 6.0 of this report.

Standard 10

All illicit discharges to the stormwater management system are prohibited.

There are no illicit discharges at the Site.

5.0 CONSTRUCTION PERIOD POLLUTION PREVENTION AND SEDIMENTATION AND EROSION CONTROL PLAN

5.1 INTRODUCTION

The greatest potential for sediment generation will occur during the construction. An extensive erosion and sedimentation program is proposed and implementation will be diligent during construction of the project. The erosion control program will minimize erosion and sedimentation that could potentially impact resources areas. Water quality will be maintained by minimizing erosion of exposed soils and siltation. Erosion control barriers will be installed and exposed soil areas re-vegetated as soon as possible after work in an area is completed.

This Erosion and Sediment Control Plan includes preliminary measures and requirements for management and implementation of erosion and sediment controls during construction.

Responsible Party for Plan Compliance:

Nantasket Dune Holdings, LLC
1495 Hancock Street, Suite 400
Quincy, MA 02169

Emergency Contact Information:

To be determined.

5.2 CONSTRUCTION PHASE EROSION CONTROL MEASURES

The adjacent resource areas will be protected during construction by implementing siltation control measures, including the placement of compost silt socks as close as feasible to the down gradient limit of construction activity. A temporary stabilized construction exit will be constructed as well. The project may also implement other stabilization methods such as erosion netting and hydro seeding.

5.2.1 Short and Long Term Goals and Criteria

Short and long term goals will include a variety of stabilizing sediment and erosion controls around the limit of work. All construction-phase erosion and sediment controls have been designed to retain sediment on-site to the extent practicable and limit runoff and the discharge of pollutants (sediment) from exposed areas of the Site.

All control measures will be installed and maintained in accordance with the manufacturer's specifications and good engineering practices. Weekly inspections and routine monitoring will be used to determine the effectiveness of controls in use.

Litter and solid construction debris potentially exposed to the stormwater will be prevented from becoming a pollution source through routine monitoring and the use of laborers to "pick" as necessary.

5.2.2 Stabilization Practices

The construction site activities will include numerous stabilizing practices. Sediment and erosion controls such as erosion netting, mulching, and hydro-seeding may act as interim practices. Erosion netting material may include single net straw blankets or coconut blankets. Permanent stabilization practices will include the use of a hydro-seeding over vegetative support soil where additional exposure threatens stormwater quality. Seeding will be carried out with a seed mixture equal to the "Roadside Slope Mix" included below. All siltation barriers will remain in place until all exposed areas are re-vegetated.

PLANTING SCHEDULE FOR EXPOSED AREAS

1. All exposed areas will receive 6 inches of topsoil or compost material.
2. Seed will be equal to "Roadside Slope Mix" as specified by the Mass. Highway Department. Please refer to chart below for specifications. This mixture will be spread at a rate of 5 pounds per 1,000 square feet.

TABLE 5.1 ROADSIDE SLOPE MIX			
Common Name	**Germination Proportion**	**Purity Minimum**	**Minimum**
Creeping Red Fescue	50%	85%	95%
Kentucky 3	30%	85%	95%
Domestic Rye	10%	90%	98%
Red Top	5%	85%	92%
Ladino Clover	5%	85%	96%

5.2.3 Structural Practices

Perimeter controls will consist of compost silt socks. In order to ensure effective performance, proper installation is required. Two-inch by two-inch wooden stakes will be positioned on the downhill side (away from the job Site) of the silt socks. The posts will be driven at least one foot into the ground.

A temporary stabilized construction exit will be constructed. A cross slope will be placed at the entrance to direct runoff to the settling area. If deemed necessary after construction begins, a wash pad may be included to wash off vehicle wheels before leaving the Site.

5.3 NON-STRUCTURAL CONTROLS

5.3.1 Good Housekeeping

Non-structural controls are as effective as structural controls in sediment control. Non-structural controls to be used at the construction Site include:

- Regular sweeping of paved surfaces; and
- Prompt cleanup of any waste or spilled waste materials.

5.3.2 Exposure Minimization

Exposure will be minimized by providing both permanent and temporary soil stabilization (see Section 5.2.2) over areas that have been completely constructed, or areas that will not be revisited within a 30 day period.

Where practicable, industrial materials and activities will be protected from exposure to rain, snow, snowmelt, or runoff.

5.3.3 Preventative Maintenance

A preventative maintenance program includes the timely inspection and maintenance of stormwater management devices. Examples of preventative maintenance include:

- Removal of obstructions, if any, from inlets and outlets.
- Removal of accumulated sediment and vacuuming water from sumps.
- Repairing and re-planting slope areas that experience erosion.

5.3.4 Inspections

An experienced Construction Monitor will conduct inspections of construction areas once every 7 calendar days and within 24 hours of the occurrence of a storm event of 0.25 inches or greater, or the occurrence of runoff from snowmelt sufficient to cause a discharge. Storm event information from a weather station representative of the Site's location may be used to determine if a storm event of 0.25 inches or greater has occurred on the Site. Total rainfall will be measured for any day of rainfall during normal business hours that measures 0.25 inches or greater. Construction areas will be inspection be an experienced Construction Monitor, inspections will include:

- Disturbed areas of the construction Site that have not been finally stabilized,
- Areas used for storage of materials that are exposed to precipitation,
- Structural control measures,
- Locations where vehicles enter or exit the Site, and

- The stormwater management system and discharge outlets.

Disturbed areas and areas used for storage of materials that are exposed to precipitation will be inspected for evidence of, or the potential for, pollutants entering the drainage system.

Sediment and erosion control measures identified will be observed to ensure that they are operating correctly. The discharge locations or points will be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Locations where vehicles enter or exit the Site will be inspected for evidence of offsite sediment tracking.

Based on the results of these routine inspections, the Contractor will correct any deficiencies found as soon as practicable. From the results of the inspections, corrective actions taken in response to any deficiencies, and any opportunities for improvement that are identified will be documented in an inspection report.

5.4 RECORDKEEPING

The following records will be maintained on the Site:

1. Dates when major grading activities occur,
2. Dates when construction activities, temporarily or permanently, cease on a portion of the Site,
3. Dates when stabilization measures are initiated, and
4. In addition, the following records will also be kept:
    - The Order of Conditions; and any additional permit conditions/approvals,
    - All inspection reports, and
    - Any spill reports.

6.0 OPERATIONS AND MAINTENANCE (O&M) PLAN

6.1 GENERAL

Stormwater management systems with multiple components, such as the one proposed for the project, assures the cleanest possible discharges of stormwater to the environment. However, these systems must be routinely maintained to keep them in good working order. Additionally, this plan identifies potential sources of pollution that may affect the quality of stormwater discharges and describes the implementation of Long-Term Pollution Prevention practices to reduce potential pollutants in stormwater discharge. The party identified below will be responsible for the operation and maintenance of the stormwater management system and Site. Schedules and procedures for inspection and maintenance of the existing and proposed stormwater management system components are provided in the following sections.

Responsible Party for Plan Compliance:

Nantasket Dune Holdings, LLC
1495 Hancock Street, Suite 400
Quincy, MA 02169

Emergency Contact Information:

To be determined.

Upon a transfer of ownership, the future owner shall assume the responsibilities for compliance with this O&M Plan.

Estimated O&M Budget:

It is estimated that an annual budget of $1,000-$3,000 should be allocated to performing routine inspections and maintenance identified in this O&M Plan.

6.2 ROUTINE INSPECTIONS

Inspections of the stormwater management system as a whole, and of the individual components of the system, will be carried out on a routine basis in accordance with the schedule identified in Section 6.3. Each will be inspected for sediment buildup, presence of oil, color, and structural damage. The results of each inspection will be entered into an inspection log. Refer to Table 6.1 for the inspection log form.

6.3 MAINTENANCE PLAN

The Responsible Party incorporates a routine maintenance program to assure proper operation of the stormwater management system. Maintenance will be performed based on the results of inspections in accordance with the schedules identified in Table 6.1. The program will include the following maintenance activities:

Water Quality Structures

- See the attached Manufacturer's instructions on operation and maintenance requirements and methodology.
- Inspect and clean twice per year or as required by manufacturer.
- Remove sediment and other trapped pollutants at the frequency or level specified by the manufacturer.

Roof Drain Leaders

- Perform routine roof inspections twice per year, typically in the spring and fall.
- Inspect for blockage and remove debris if required.
- Keep roofs clean and free of debris.
- Keep roof drainage systems clear.
- Keep roof access limited to authorized personnel.

6.4 LONG TERM POLLUTION PREVENTION MAINTENANCE

The Responsible Party should incorporate a routine maintenance program to ensure the continued effectiveness of the structural water quality controls. Maintenance will be performed based on the results of inspections in accordance with the schedules identified below. The program will include the following maintenance activities:

Maintenance of Pavement Systems

Regular maintenance of pavement surfaces will prevent pollutants such as oil and grease, trash, and sediments from entering the stormwater management system. The following practices should be performed:

- Sweep or vacuum asphalt pavement areas quarterly with a commercial cleaning unit and dispose of removed material.
- Routinely pick up and remove litter from the parking areas, islands, and perimeter landscaping.

Maintenance of Vegetated Areas

Proper maintenance of vegetated areas can prevent the pollution of stormwater runoff by controlling the source of pollutants such as suspended sediments, excess nutrients, and chemicals from landscape care products. Practices that should be followed under the regular maintenance of the vegetated landscape include:

- Inspect planted areas on a semi-annual basis and remove any litter.
- Maintain planted areas adjacent to pavement to prevent soil washout.
- Immediately clean any soil deposited on pavement.
- Re-seed bare areas; install appropriate erosion control measures when native soil is exposed or erosion channels are forming.
- Plant alternative mixture of grass species in the event of unsuccessful establishment.
- Grass vegetation should not be cut to a height less than four inches.

- Pesticide/Herbicide Usage – No pesticides are to be used unless a single spot treatment is required for a specific control application.
- Fertilizer usage should be avoided. If deemed necessary, slow release fertilizer should be used. Fertilizer may be used to begin the establishment of vegetation in bare or damaged areas, but should not be applied on a regular basis unless necessary.

Management of Snow and Ice

The Project has been designed such that snow stockpile areas can take advantage of the stormwater BMPs proposed on the Site. Melting snow from the stockpiles will be collected by the site stormwater collection system, which will then be processed through a series of stormwater BMPs to remove sediment, debris, and contaminants from the stockpiled snow. Snow stockpiles areas are not located within 100 feet of any open water body. Under no circumstances shall snow be disposed or stored in stormwater basins, ponds, rain gardens, swales, channels, or trenches.

Additionally, should significant snow fall events occur, which result in stockpiled snow impacting the operation of the Project Site, through the temporary loss of parking or limiting access in any way, the property manager may choose to have snow removed from the site. All snow removal operations will be done in accordance with Massachusetts DEP guidelines BRPG01-01, effective date March 8, 2001.

Salt and Deicing Chemicals

The amount of salt and deicing chemicals to be used on the site shall be reduced to the minimum amount needed to provide safe pedestrian and vehicle travel. The following practices should be followed to control the amount of salt and deicing materials that come into contact with stormwater runoff:

- Devices used for spreading salt and deicing chemicals should be capable of varying the rate of application based on the site specific conditions.
- Sand and salt should be stockpiled under covered storage facilities that prevent precipitation and adjacent runoff from coming in contact with the deicing materials.

6.5 EMPLOYEE TRAINING

Training of personnel is essential to achieving proper operation and maintenance of the stormwater management system. Therefore, those Facility personnel who are responsible for operation and maintenance will be trained on the following subjects:

- Environmental laws and regulations relating to stormwater,
- The components and goals of the current Erosion and Sediment Control Plan,
- Site specific permit conditions and requirements,
- General Facility spill response procedures,
- General good housekeeping procedures, and
- General material management procedures.

Refresher training sessions will be held once a year following the completion of the Site Compliance Evaluation.

6.6 RECORDKEEPING

Records of inspections and maintenance shall be up to date and available for review and inspection, if requested by the Town's official.

Table 6.1 - Stormwater Operations and Maintenance Log

Project Name: Paragon Boardwalk Redevelopment
Project Location: Hull, MA
Project Number: 185-317

Date: 11/17/2018
Prepared By: KPS

Best Management Practice	Inspection Frequency	Date Inspected	Inspector	Minimum Maintenance and Key Items to Check	Cleaning or Repair Needed (List Items if Required)	Date of Cleaning or Repair	Performed by
Pavement Sweeping	Inspect quarterly.			Paved areas will be swept quarterly at a minumum, and as otherwise needed.			
Water Quality Structure	Inspect twice per year or as required by the manufacturer.			Clean twice per year or as required by the manufacturer. Remove sediment and other trapped pollutants at the frequency or level specified by the manufacturer. No use of clamshell buckets without prior approval. Increase inspection frequency, as needed, based on observed sediment loading.			
Roof Drain Leaders	Inspect twice per year, typically in the spring and fall.			Inspect for blockage and remove debris if required.			

Stormwater Supervisor Contact Information:_____

FIGURES

REFERENCE

1. ORTHOGRAPHIC AERIAL IMAGERY, MAPS AND PARCELS ARE BASED ON GIS DATA PROVIDED BY THE BUREAU OF GEOGRAPHIC INFORMATION (MASS GIS), COMMONWEALTH OF MASSACHUSETTS EXECUTIVE OFFICE OR TECHNOLOGY AND SECURITY SERVICES.

SCALE IN FEET

0 1000 2000

Civil & Environmental Consultants, Inc.

31 Bellows Road · Raynham, MA 02767

Ph: 774.501.2176 · 866.312.2024 · Fax: 774.501.2669

www.cecinc.com

PARAGON BOARDWALK
NANTASKET BEACH
HULL, MASSACHUSETTS
NANTASKET DUNE HOLDINGS, LCC.

SITE LOCUS

DRAWN BY:	KFH	CHECKED BY:	KPS	APPROVED BY:	KPS	FIGURE NO.:	1
DATE:	NOVEMBER 2018	DWG SCALE:	1"=1,000'	PROJECT NO:	185-317		

P:\2018\185-317\-CADD\Dwg\185317 - Site Locus.dwg{FIGURE NO.1} LS:(11/19/2018 - khampton) - LP: 11/19/2018 12:13 PM

REFERENCE

1. ORTHOGRAPHIC AERIAL IMAGERY, MAPS AND PARCELS ARE BASED ON GIS DATA PROVIDED BY THE BUREAU OF GEOGRAPHIC INFORMATION (MASS GIS), COMMONWEALTH OF MASSACHUSETTS EXECUTIVE OFFICE OR TECHNOLOGY AND SECURITY SERVICES.

SCALE IN FEET

0 1000 2000

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NANTASKET BEACH
HULL, MASSACHUSETTS
NANTASKET DUNE HOLDINGS, LLC.

AERIAL SITE PLAN

DRAWN BY:	KFH	CHECKED BY:	KPS	APPROVED BY:	KPS	FIGURE NO.:	2
DATE:	NOVEMBER 2018	DWG SCALE:	1"=1,000'	PROJECT NO:	185-317		

P:\2018\185-317\-CADD\Dwg\185317 - Site Locus.dwg{FIGURE NO.2} LS:(11/19/2018 - khampton) - LP: 11/19/2018 10:13 AM

National Flood Hazard Layer FIRMette

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

- **SPECIAL FLOOD HAZARD AREAS**
  - Without Base Flood Elevation (BFE) *Zone A, V, A99*
  - With BFE or Depth *Zone AE, AO, AH, VE, AR*
  - Regulatory Floodway
- **OTHER AREAS OF FLOOD HAZARD**
  - 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
  - Future Conditions 1% Annual Chance Flood Hazard *Zone X*
  - Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
  - Area with Flood Risk due to Levee *Zone D*
- **OTHER AREAS**
  - NO SCREEN — Area of Minimal Flood Hazard *Zone X*
  - Effective LOMRs
  - Area of Undetermined Flood Hazard *Zone D*
- **GENERAL STRUCTURES**
  - Channel, Culvert, or Storm Sewer
  - Levee, Dike, or Floodwall
- **OTHER FEATURES**
  - 20.2 / 17.5 — Cross Sections with 1% Annual Chance Water Surface Elevation
  - Coastal Transect
  - Base Flood Elevation Line (BFE)
  - Limit of Study
  - Jurisdiction Boundary
  - Coastal Transect Baseline
  - Profile Baseline
  - Hydrographic Feature
- **MAP PANELS**
  - Digital Data Available
  - No Digital Data Available
  - Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 11/16/2018 at 9:09:29 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

NORTH

LEGEND:

- 1A–EX — SUBCATCHMENT AREA
- 1 — DESIGN POINT
- 602B — NCRS SOIL MAP UNIT
- SOIL BOUNDARY
- SUBCATCHMENT BOUNDARY
- TIME OF CONCENTRATION PATH

Mass GIS FEMA Zone AO Flood Depth 3' Zone AE Elev.=10'

EXISTING DRAINAGE MANHOLE
RIM=10.3'
INV. IN (8" PC)=4.7'
INV. OUT (10" PC)=4.6

37–002
N/F
IMPERIAL REALTY CO., INC.

LOT AREA=
84,253 SQ.FT.

37–004
N/F
IMPERIAL REALTY CO., INC.

38–100
N/F
HORIZONS CONDO ASSOCIATION

5' PASSAGEWAY

Ramp

Concrete Landing

Concrete Pad

Bulk Head

Chain Link Fence

Sidewalk

EOP

FFE=13.2'

FFE=13.4'

FFE=13.1'

NANTASKET AVE.

EXISTING CATCH BASIN (RIM=12.2')

EXISTING CATCH BASIN (RIM=12.2')

SCALE IN FEET
0 20 40

NOTES:

1. TOPOGRAPHIC AND BOUNDARY SURVEY WAS PERFORMED BY NANTASKET SURVEY ENGINEERING, LLC, ON NOVEMBER 2, 2017 AND IS DEPICTED ON AN EXISTING CONDITIONS PLAN ENTITLED "EXISTING CONDITIONS PLAN" DATED JANUARY 10, 2018. THE INFORMATION DEPICTED ON THIS PLAN WAS SUPPLEMENTED WITH ADDITIONAL FIELD INVESTIGATION PERFORMED BY CEC IN NOVEMBER 2018. CEC IS NOT RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN.
2. THE ENTIRE PROJECT AREA CONSISTS OF TYPE 602B SOIL ACCORDING TO THE NRCS SOIL MAP AS OF NOVEMBER 2018.

Civil & Environmental Consultants, Inc.
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NANTASKET DUNE HOLDINGS, LLC.
PARAGON BOARDWALK
NANTASKET BEACH
HULL, MASSACHUSETTS

DRAINAGE AREAS
EXISTING CONDITIONS

DRAWN BY:	KFH	CHECKED BY:	KPS	APPROVED BY:	
DATE:	NOVEMBER, 2018	DWG SCALE:	1"=20'	PROJECT NO:	185-317

FIGURE NO.: HYD-EX

NORTH

LEGEND:

- 1A–PR — SUBCATCHMENT AREA
- 1 — DESIGN POINT
- 602B — NCRS SOIL MAP UNIT
- SOIL BOUNDARY
- SUBCATCHMENT BOUNDARY
- TIME OF CONCENTRATION PATH

PROPOSED DRAINAGE MANHOLE RIM=8.5'

REPLACE EXISTING DOWNSPOUTS

PROPOSED WATER QUALITY UNIT RIM=8.5' INV. OUT=5.7

INV. IN=5.6

INV. OUT=5.5

EXISTING DRAINAGE MANHOLE RIM=10.3' INV. IN (8" PC)=4.7' INV. OUT (10" PC)=4.6

Mass GIS FEMA Flood Depth 3', Elev. 10.0

5' PASSAGEWAY

Ramp

1A–PR

2A–PR

2B–PR

2C–PR

602B

1

2

37–001 N/F IMPERIAL REALTY CO., INC. LOT 9 AREA= 84,253 SQ.FT.

38–100 N/F HORIZONS CONDO ASSOCIATION

3 N/F IMPERIAL REALTY CO., INC.

NANTASKET AVE.

EXISTING CATCH BASIN (RIM=12.2')

EXISTING CATCH BASIN (RIM=12.2')

SCALE IN FEET
0 20 40

NOTES:

1. TOPOGRAPHIC AND BOUNDARY SURVEY WAS PERFORMED BY NANTASKET SURVEY ENGINEERING, LLC, ON NOVEMBER 2, 2017 AND IS DEPICTED ON AN EXISTING CONDITIONS PLAN ENTITLED "EXISTING CONDITIONS PLAN" DATED JANUARY 10, 2018. THE INFORMATION DEPICTED ON THIS PLAN WAS SUPPLEMENTED WITH ADDITIONAL FIELD INVESTIGATION PERFORMED BY CEC IN NOVEMBER 2018. CEC IS NOT RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN.
2. THE ENTIRE PROJECT AREA CONSISTS OF TYPE 602B SOIL ACCORDING TO THE NRCS SOIL MAP AS OF NOVEMBER 2018.

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NANTASKET BEACH
HULL, MASSACHUSETTS

DRAINAGE AREAS
PROPOSED CONDITIONS

DRAWN BY:	KFH	CHECKED BY:	KPS	APPROVED BY:	FIGURE NO.: HYD-PR
DATE:	NOVEMBER, 2018	DWG SCALE:	1"=20'	PROJECT NO:	185-317

P:\2018\185-317\-CADD\Dwg\DRAINAGE AREAS\185317-SWOX-Drainage Areas.dwg[PR] LS:(11/19/2018 - khampton) - LP: 11/19/2018 11:09 AM

APPENDIX A

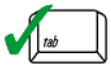
DEP STORMWATER CHECKLIST

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

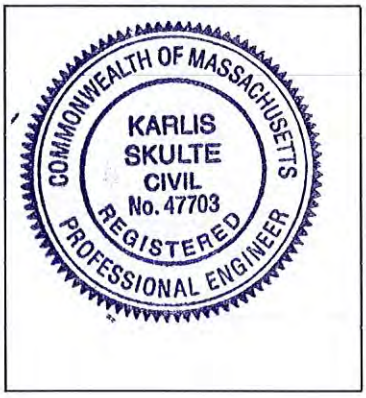
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



11/20/2018

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☐ New development

☒ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☐ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☒ Reduced Impervious Area (Redevelopment Only)
- ☐ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ☐ Credit 1
  - ☐ Credit 2
  - ☐ Credit 3
- ☐ Use of "country drainage" versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☒ Other (describe): Proprietary Water Quality Units

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☐ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☐ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☐ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☐ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☐ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☐ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☒ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☐ The ½" or 1" Water Quality Volume or
- ☒ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☒ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☒ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☒ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☒ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☒ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☒ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☒ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☒ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☐ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☐ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☒ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☐ An Illicit Discharge Compliance Statement is attached;

☒ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

APPENDIX B

GEOTECHNICAL INFORMATION

NRCS Soil Resource Report

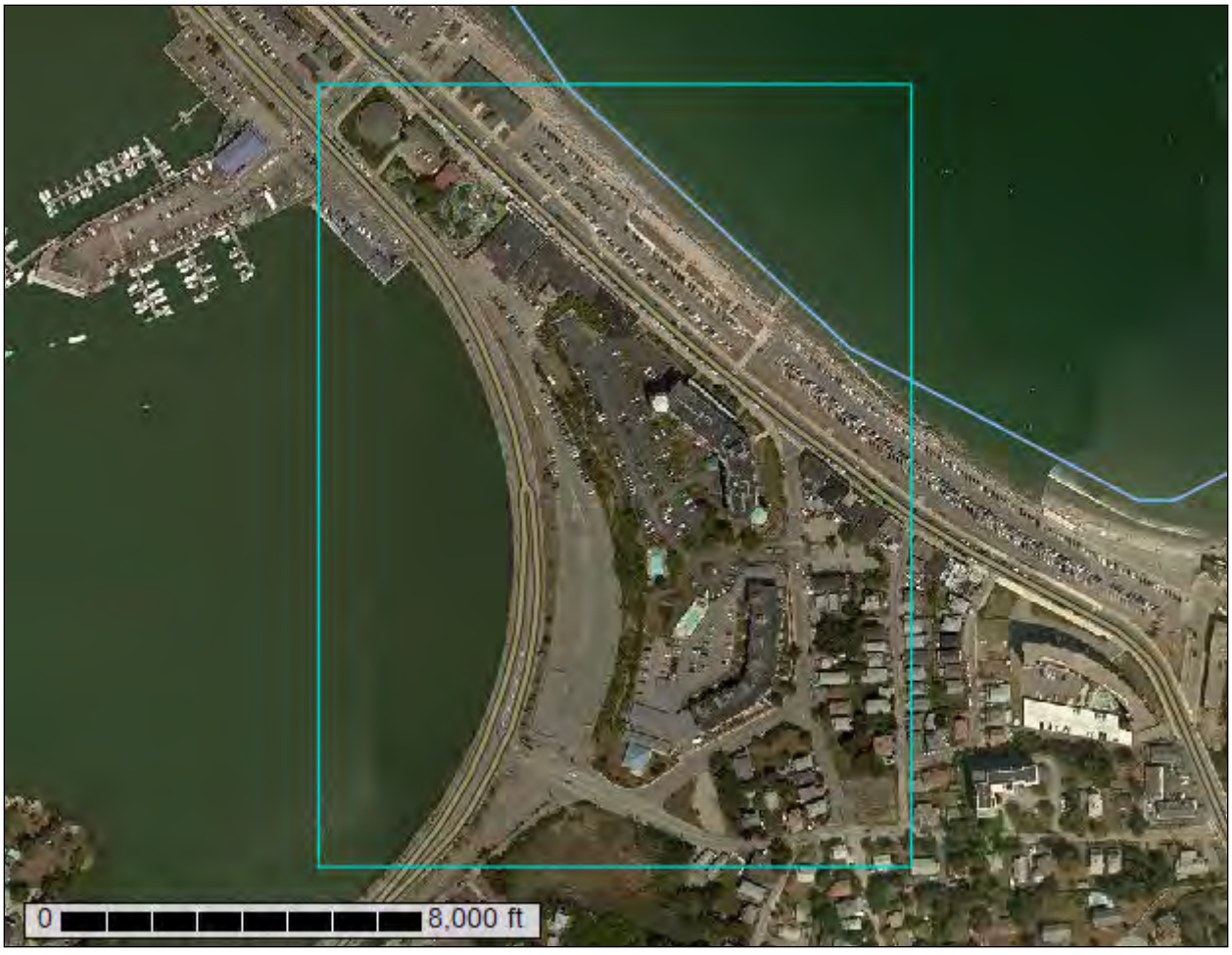
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Plymouth County, Massachusetts



November 12, 2018

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:3,150 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 45 90 180 270

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N 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: Plymouth County, Massachusetts
Survey Area Data: Version 11, Sep 7, 2018

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

Date(s) aerial images were photographed: Aug 10, 2014—Sep 4, 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
66A	Ipswich - Pawcatuck - Matunuck complex, 0 to 2 percent slopes, very frequently flooded	0.5	0.9%
602B	Urban land, 0 to 8 percent slopes	19.4	35.9%
603A	Urban land, wet substratum. 0 to 3 percent slopes	6.5	12.0%
608	Water, ocean	16.3	30.2%
610	Beaches, sandy	1.3	2.4%
635C	Canton - Urban land - Rock outcrop complex, 3 to 15 percent slopes	3.2	6.0%
656B	Udorthents - Urban land complex, 0 to 8 percent slopes	6.9	12.7%
Totals for Area of Interest		**54.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a

given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Plymouth County, Massachusetts

66A—Ipswich - Pawcatuck - Matunuck complex, 0 to 2 percent slopes, very frequently flooded

Map Unit Setting

National map unit symbol: 2tyqm
Elevation: 0 to 10 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Ipswich and similar soils: 50 percent
Pawcatuck and similar soils: 25 percent
Matunuck and similar soils: 15 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ipswich

Setting

Landform: Tidal marshes
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Partially- decomposed herbaceous organic material

Typical profile

Oe - 0 to 42 inches: mucky peat
Oa - 42 to 59 inches: muck

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to very high (0.14 to 99.90 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Very frequent
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to strongly saline (1.0 to 112.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 20.0
Available water storage in profile: Very high (about 26.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: A/D
Ecological site: Tidal Salt Low Marsh mesic very frequently flooded (R144AY001CT), Tidal Salt High Marsh mesic very frequently flooded (R144AY002CT)

Hydric soil rating: Yes

Description of Pawcatuck

Setting

Landform: Tidal marshes
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Partially- decomposed herbaceous organic material over sandy mineral material

Typical profile

Oe - 0 to 46 inches: mucky peat
Cg - 46 to 60 inches: mucky sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to very high (0.14 to 99.90 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Very frequent
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to strongly saline (1.0 to 112.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 20.0
Available water storage in profile: Very high (about 21.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: A/D
Ecological site: Tidal Salt Low Marsh mesic very frequently flooded (R144AY001CT), Tidal Salt High Marsh mesic very frequently flooded (R144AY002CT)
Hydric soil rating: Yes

Description of Matunuck

Setting

Landform: Tidal marshes
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Partially- decomposed herbaceous organic material over glaciofluvial deposits and/or sandy marine deposits

Typical profile

Oe - 0 to 12 inches: mucky peat
Cg - 12 to 72 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained

Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to very high (0.14 to 99.90 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Very frequent
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to strongly saline (1.0 to 112.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 20.0
Available water storage in profile: Moderate (about 8.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: A/D
Ecological site: Tidal Salt Low Marsh mesic very frequently flooded (R144AY001CT), Tidal Salt High Marsh mesic very frequently flooded (R144AY002CT)
Hydric soil rating: Yes

Minor Components

Hooksan

Percent of map unit: 5 percent
Landform: Dunes
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Succotash

Percent of map unit: 5 percent
Landform: Spits on back-barrier flats
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

602B—Urban land, 0 to 8 percent slopes

Map Unit Composition

Urban land: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Minor Components

Urban land, wet substratum
Percent of map unit: 5 percent

603A—Urban land, wet substratum. 0 to 3 percent slopes

Map Unit Composition
Urban land, wet substratum: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Minor Components

Urban land
Percent of map unit: 5 percent

608—Water, ocean

Map Unit Setting
National map unit symbol: bqv2
Elevation: 0 to 70 feet
Mean annual precipitation: 41 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days

Map Unit Composition
Water, ocean: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Minor Components

Beaches, sandy
Percent of map unit: 5 percent
Landform: Back-barrier beaches, barrier beaches, beaches, shores
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: Unranked

610—Beaches, sandy

Map Unit Setting

National map unit symbol: 9y40
Elevation: 0 to 70 feet
Mean annual precipitation: 41 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Beaches, sandy: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Beaches, Sandy

Setting

Landform: Back-barrier beaches, barrier beaches, beaches, shores
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Beach sand

Typical profile

C1 - 0 to 10 inches: sand

Properties and qualities

Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Very frequent
Salinity, maximum in profile: Moderately saline to strongly saline (8.0 to 16.0 mmhos/cm)
Available water storage in profile: Very low (about 0.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: Unranked

Minor Components

Beaches, extremely bouldery

Percent of map unit: 5 percent
Landform: Beaches, shores, back-barrier beaches, barrier beaches
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Linear

Hydric soil rating: Unranked

Water, ocean

Percent of map unit: 3 percent

Beaches, tidal flats

Percent of map unit: 2 percent
Landform: Tidal flats, barrier beaches, beaches, shores
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Unranked

635C—Canton - Urban land - Rock outcrop complex, 3 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9y4x
Elevation: 0 to 400 feet
Mean annual precipitation: 41 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Canton and similar soils: 35 percent
Rock outcrop: 30 percent
Urban land: 25 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton

Setting

Landform: Hills, ridges, till plains
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Coarse-loamy eolian deposits over sandy and gravelly supraglacial meltout till

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
Oe - 1 to 2 inches: moderately decomposed plant material
A - 2 to 3 inches: very fine sandy loam
E - 3 to 4 inches: very fine sandy loam
Bw1 - 4 to 5 inches: very fine sandy loam
Bw2 - 5 to 15 inches: very fine sandy loam
Bw3 - 15 to 24 inches: fine sandy loam
BC - 24 to 28 inches: gravelly loamy sand

2C1 - 28 to 49 inches: gravelly coarse sand
2C2 - 49 to 73 inches: gravelly loamy coarse sand

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: 20 to 36 inches to strongly contrasting textural stratification
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Hydric soil rating: No

Description of Rock Outcrop

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s

Minor Components

Udorthents, loamy

Percent of map unit: 5 percent
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Gloucester

Percent of map unit: 5 percent
Landform: Ground moraines, hills
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

656B—Udorthents - Urban land complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: bd08

Elevation: 0 to 390 feet
Mean annual precipitation: 41 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents, loamy, and similar soils: 45 percent
Urban land: 40 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents, Loamy

Setting

Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy human transported material

Typical profile

^A - 0 to 5 inches: loam
^C1 - 5 to 21 inches: gravelly loam
^C2 - 21 to 80 inches: gravelly sandy loam

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to very high (0.01 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Udipsamments, wet substratum

Percent of map unit: 5 percent
Landform: Dikes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear, convex
Across-slope shape: Linear
Hydric soil rating: No

Udipsamments

Percent of map unit: 5 percent

Landform: Dikes
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Linear, convex
Across-slope shape: Linear
Hydric soil rating: No

Udorthents, wet substratum

Percent of map unit: 5 percent
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Map Scale: 1:3,150 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 45 90 180 270

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

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: Plymouth County, Massachusetts
Survey Area Data: Version 11, Sep 7, 2018

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

Date(s) aerial images were photographed: Aug 10, 2014—Sep 4, 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.

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
66A	Ipswich - Pawcatuck - Matunuck complex, 0 to 2 percent slopes, very frequently flooded	A/D	0.5	0.9%
602B	Urban land, 0 to 8 percent slopes		19.4	35.9%
603A	Urban land, wet substratum. 0 to 3 percent slopes		6.5	12.0%
608	Water, ocean		16.3	30.2%
610	Beaches, sandy		1.3	2.4%
635C	Canton - Urban land - Rock outcrop complex, 3 to 15 percent slopes		3.2	6.0%
656B	Udorthents - Urban land complex, 0 to 8 percent slopes	B	6.9	12.7%
Totals for Area of Interest			**54.1**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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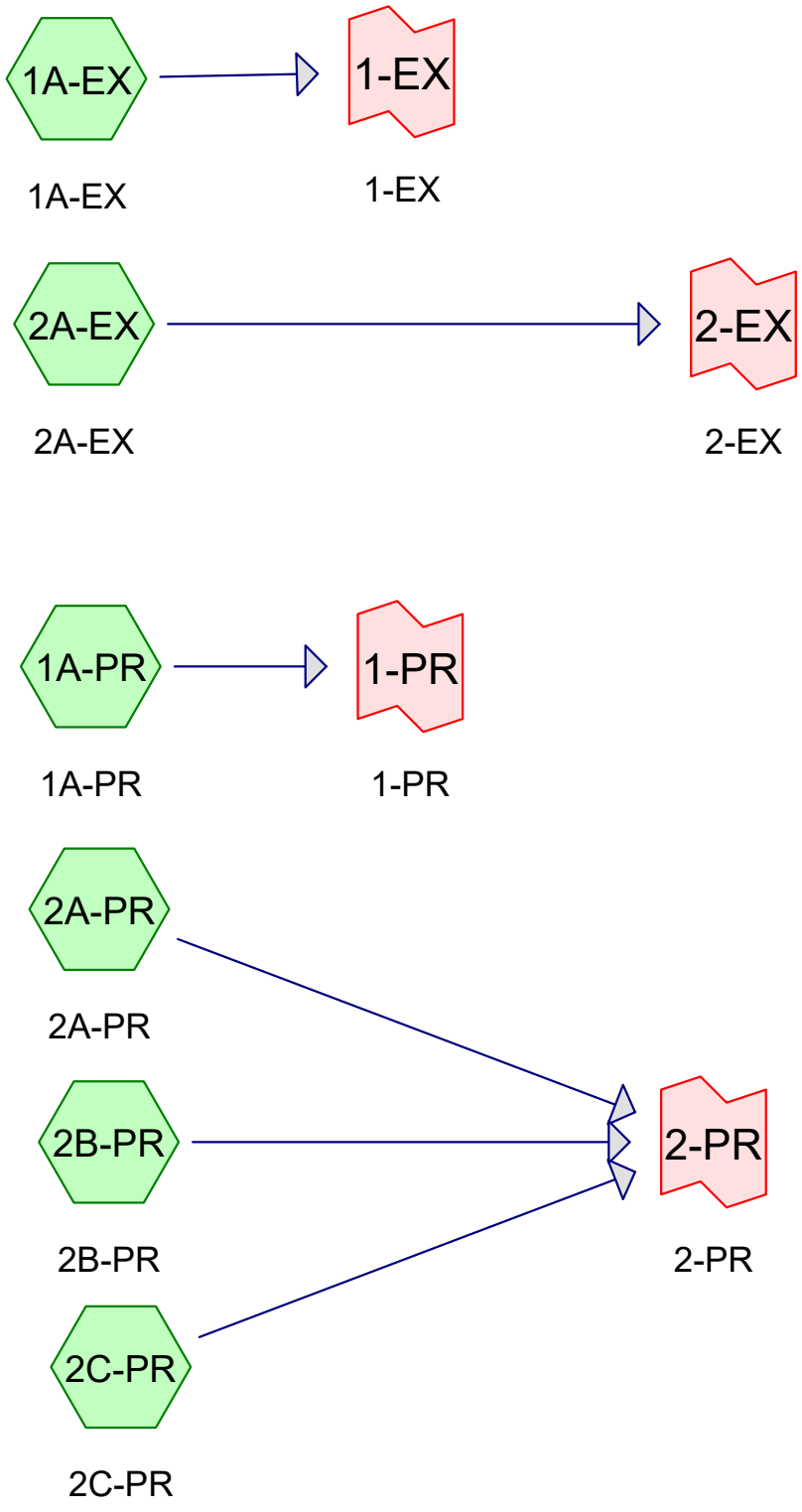
APPENDIX C

SUPPORTING CALCULATIONS

HydroCAD Drainage Analysis
TSS Calculations
Water Quality Volume, Flow Rate Calculations
Pipe Capacity Analysis
Manufacturer's O&M Procedures

HydroCAD Drainage Analysis



Subcat Reach Pond Link

Routing Diagram for 185317-EX
Prepared by CEC, Inc., Printed 11/19/2018

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.156	79	<50% Grass cover, Poor, HSG B (1A-EX, 2A-EX)
0.067	61	>75% Grass cover, Good, HSG B (1A-PR, 2A-PR)
0.150	96	Gravel surface, HSG B (2A-PR, 2C-PR)
0.495	98	Paved parking, HSG B (1A-EX, 2A-EX, 2A-PR)
0.139	98	Roofs, HSG B (2B-PR, 2C-PR)
0.069	70	Sand Multi-Use Court, HSG B (2C-PR)
0.318	98	Unconnected roofs, HSG B (2A-EX)
1.395	**92**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
1.395	HSG B	1A-EX, 1A-PR, 2A-EX, 2A-PR, 2B-PR, 2C-PR
0.000	HSG C	
0.000	HSG D	
0.000	Other	
1.395		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.156	0.000	0.000	0.000	0.156	<50% Grass cover, Poor	1A-EX, 2A-EX
0.000	0.067	0.000	0.000	0.000	0.067	>75% Grass cover, Good	1A-PR, 2A-PR
0.000	0.150	0.000	0.000	0.000	0.150	Gravel surface	2A-PR, 2C-PR
0.000	0.495	0.000	0.000	0.000	0.495	Paved parking	1A-EX, 2A-EX, 2A-PR
0.000	0.139	0.000	0.000	0.000	0.139	Roofs	2B-PR, 2C-PR
0.000	0.069	0.000	0.000	0.000	0.069	Sand Multi-Use Court	2C-PR
0.000	0.318	0.000	0.000	0.000	0.318	Unconnected roofs	2A-EX
0.000	**1.395**	**0.000**	**0.000**	**0.000**	**1.395**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	2B-PR	0.00	0.00	67.0	0.0200	0.012	8.0	0.0	3.0
2	2C-PR	0.00	0.00	190.0	0.0200	0.009	8.0	0.0	4.0

Time span=0.00-24.00 hrs, dt=0.02 hrs, 1201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1A-EX: 1A-EX Runoff Area=1,890 sf 26.98% Impervious Runoff Depth>1.85"
Flow Length=47' Slope=0.0100 '/' Tc=6.0 min CN=84 Runoff=0.09 cfs 0.007 af

Subcatchment1A-PR: 1A-PR Runoff Area=1,700 sf 0.00% Impervious Runoff Depth>0.53"
Flow Length=66' Tc=6.0 min CN=61 Runoff=0.02 cfs 0.002 af

Subcatchment2A-EX: 2A-EX Runoff Area=28,490 sf 80.98% Impervious Runoff Depth>2.74"
Flow Length=185' Slope=0.0100 '/' Tc=6.0 min CN=94 Runoff=2.00 cfs 0.149 af

Subcatchment2A-PR: 2A-PR Runoff Area=15,590 sf 76.01% Impervious Runoff Depth>2.84"
Flow Length=151' Tc=6.0 min CN=95 Runoff=1.12 cfs 0.085 af

Subcatchment2B-PR: 2B-PR Runoff Area=4,320 sf 100.00% Impervious Runoff Depth>3.16"
Flow Length=184' Tc=6.0 min CN=98 Runoff=0.33 cfs 0.026 af

Subcatchment2C-PR: 2C-PR Runoff Area=8,770 sf 19.61% Impervious Runoff Depth>2.09"
Flow Length=247' Tc=6.0 min CN=87 Runoff=0.49 cfs 0.035 af

Link 1-EX: 1-EX Inflow=0.09 cfs 0.007 af
Primary=0.09 cfs 0.007 af

Link 1-PR: 1-PR Inflow=0.02 cfs 0.002 af
Primary=0.02 cfs 0.002 af

Link 2-EX: 2-EX Inflow=2.00 cfs 0.149 af
Primary=2.00 cfs 0.149 af

Link 2-PR: 2-PR Inflow=1.94 cfs 0.146 af
Primary=1.94 cfs 0.146 af

Total Runoff Area = 1.395 ac Runoff Volume = 0.303 af Average Runoff Depth = 2.61"
31.75% Pervious = 0.443 ac 68.25% Impervious = 0.952 ac

Summary for Subcatchment 1A-EX: 1A-EX

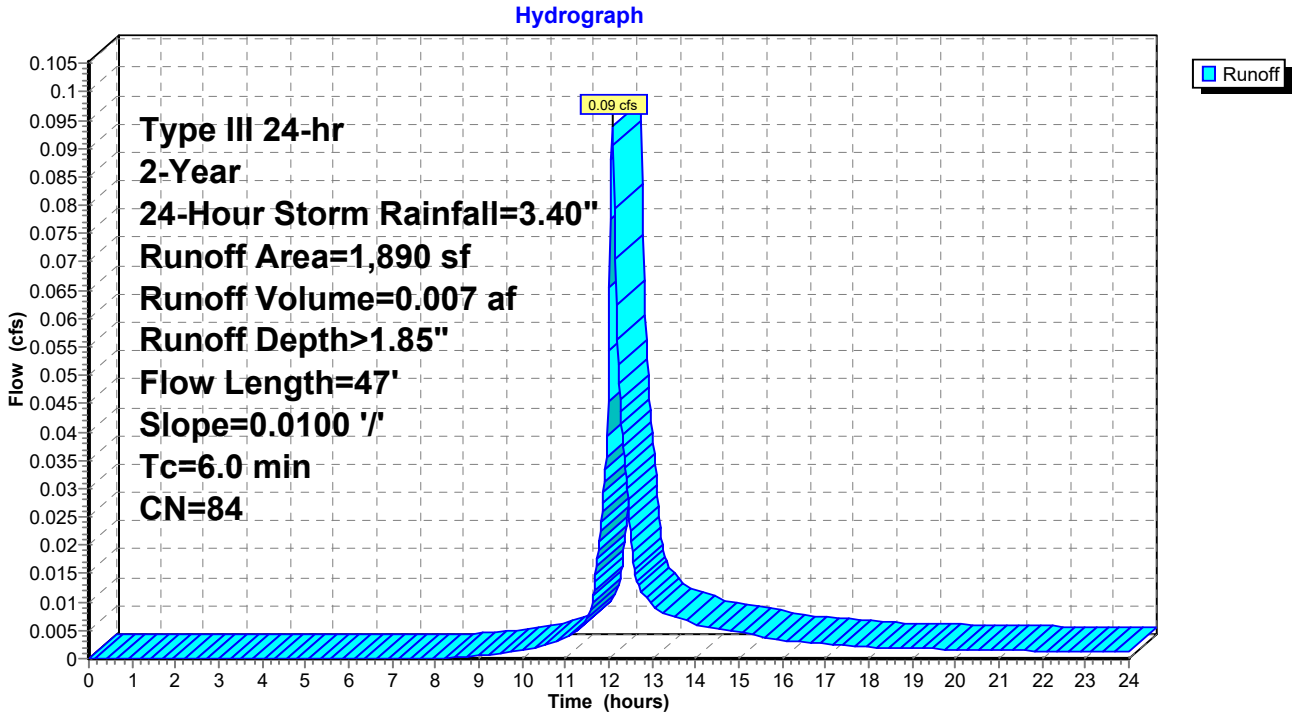
Runoff = 0.09 cfs @ 12.09 hrs, Volume= 0.007 af, Depth> 1.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year, 24-Hour Storm Rainfall=3.40"

Area (sf)	CN	Description
510	98	Paved parking, HSG B
1,380	79	<50% Grass cover, Poor, HSG B
1,890	84	Weighted Average
1,380		73.02% Pervious Area
510		26.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	25	0.0100	0.81		**Sheet Flow, Ex Pavement** Smooth surfaces n= 0.011 P2= 3.40"
0.5	22	0.0100	0.70		**Shallow Concentrated Flow, Ex Grass** Short Grass Pasture Kv= 7.0 fps
1.0	47	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1A-EX: 1A-EX



Summary for Subcatchment 1A-PR: 1A-PR

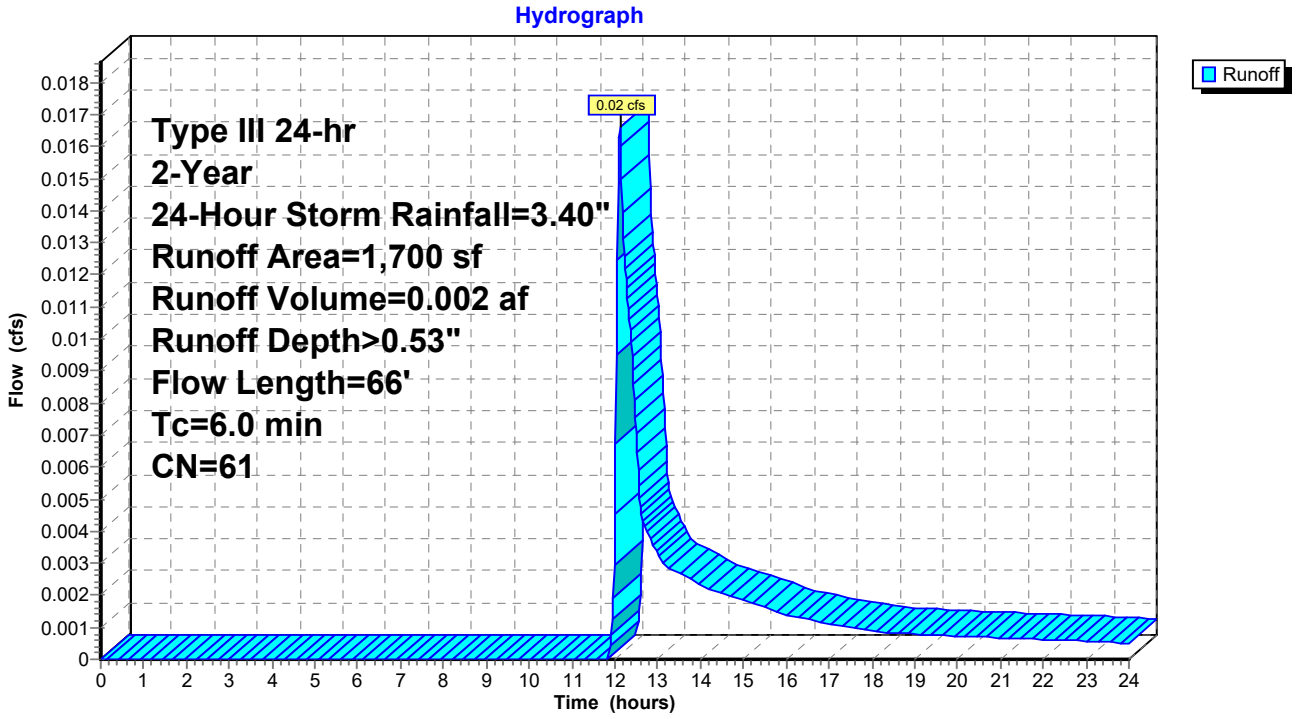
Runoff = 0.02 cfs @ 12.12 hrs, Volume= 0.002 af, Depth> 0.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year, 24-Hour Storm Rainfall=3.40"

Area (sf)	CN	Description
1,700	61	>75% Grass cover, Good, HSG B
1,700		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	21	0.0350	0.16		**Sheet Flow, Pr Grass** Grass: Short n= 0.150 P2= 3.40"
0.5	45	0.0100	1.50		**Shallow Concentrated Flow, Pr Grass Swale** Grassed Waterway Kv= 15.0 fps
2.7	66	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1A-PR: 1A-PR



Summary for Subcatchment 2A-EX: 2A-EX

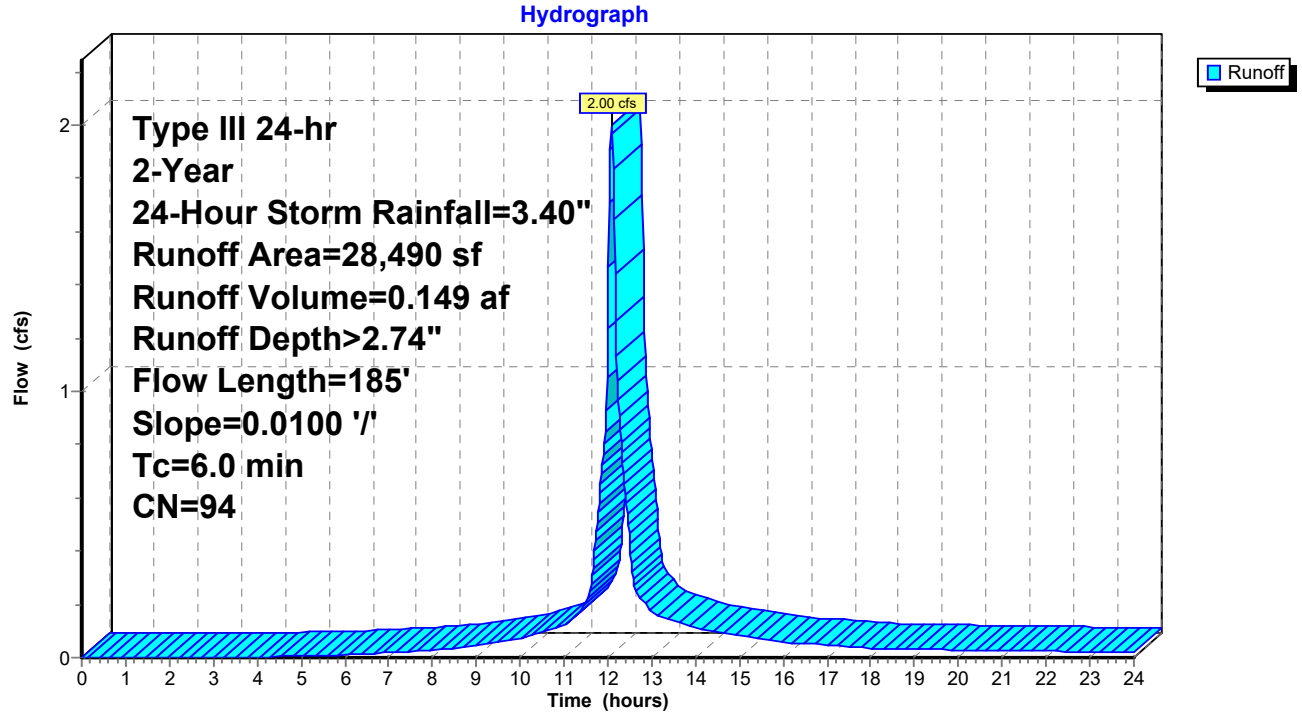
Runoff = 2.00 cfs @ 12.08 hrs, Volume= 0.149 af, Depth> 2.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year, 24-Hour Storm Rainfall=3.40"

Area (sf)	CN	Description
9,220	98	Paved parking, HSG B
13,850	98	Unconnected roofs, HSG B
5,420	79	<50% Grass cover, Poor, HSG B
28,490	94	Weighted Average
5,420		19.02% Pervious Area
23,070		80.98% Impervious Area
13,850		60.03% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	117	0.0100	1.11		**Sheet Flow, Ex Roof** Smooth surfaces n= 0.011 P2= 3.40"
0.6	25	0.0100	0.70		**Shallow Concentrated Flow, Ex Grass** Short Grass Pasture Kv= 7.0 fps
0.4	43	0.0100	2.03		**Shallow Concentrated Flow, Ex Pavement** Paved Kv= 20.3 fps
2.8	185	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2A-EX: 2A-EX



Summary for Subcatchment 2A-PR: 2A-PR

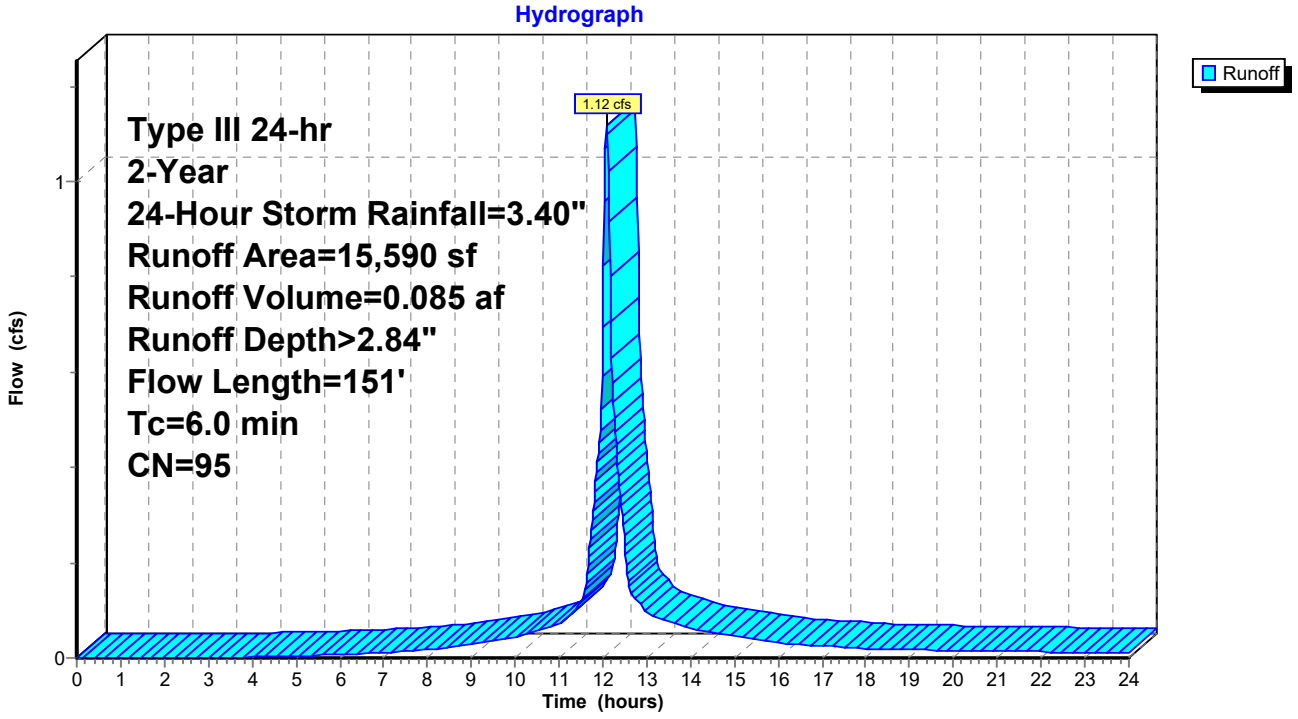
Runoff = 1.12 cfs @ 12.08 hrs, Volume= 0.085 af, Depth> 2.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year, 24-Hour Storm Rainfall=3.40"

Area (sf)	CN	Description
11,850	98	Paved parking, HSG B
1,240	61	>75% Grass cover, Good, HSG B
2,500	96	Gravel surface, HSG B
15,590	95	Weighted Average
3,740		23.99% Pervious Area
11,850		76.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	81	0.0300	1.60		**Sheet Flow, Pr Sidewalk** Smooth surfaces n= 0.011 P2= 3.40"
1.0	40	0.0100	0.70		**Shallow Concentrated Flow, Pr Grass** Short Grass Pasture Kv= 7.0 fps
0.2	30	0.0100	2.03		**Shallow Concentrated Flow, Pr Pavement** Paved Kv= 20.3 fps
2.0	151	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2A-PR: 2A-PR



Summary for Subcatchment 2B-PR: 2B-PR

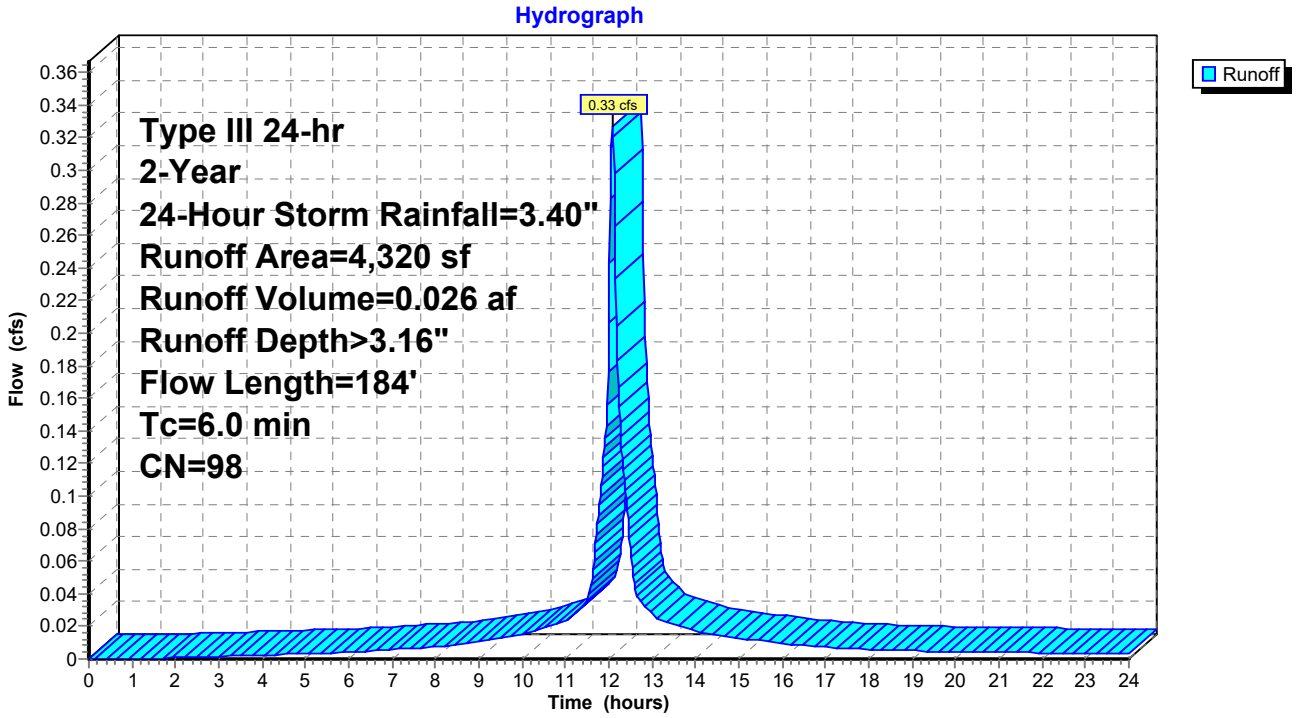
Runoff = 0.33 cfs @ 12.08 hrs, Volume= 0.026 af, Depth> 3.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year, 24-Hour Storm Rainfall=3.40"

Area (sf)	CN	Description
4,320	98	Roofs, HSG B
4,320		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	117	0.0100	1.11		**Sheet Flow, Ex Roof** Smooth surfaces n= 0.011 P2= 3.40"
0.3	67	0.0200	4.34	1.00	**Pipe Channel, Pr Roof Drain** 8.0" Round w/ 3.0" inside fill Area= 0.2 sf Perim= 1.9' r= 0.12' n= 0.012
2.1	184	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2B-PR: 2B-PR



Summary for Subcatchment 2C-PR: 2C-PR

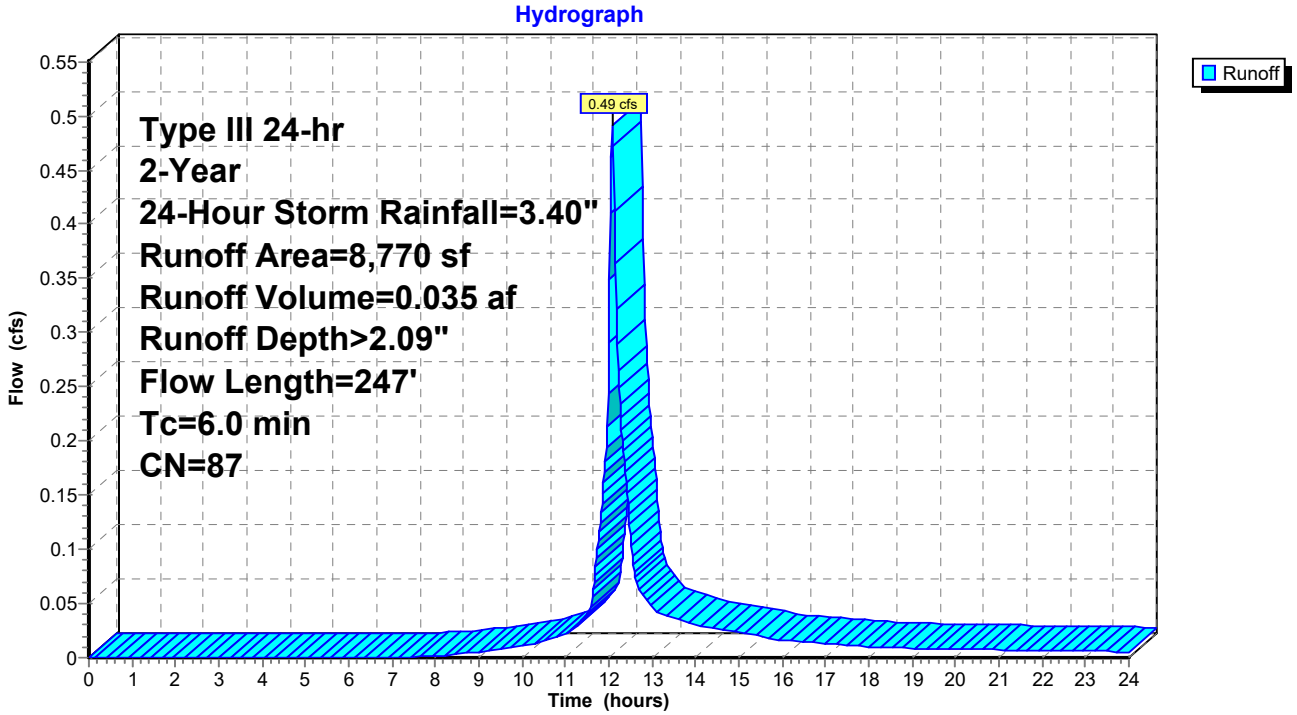
Runoff = 0.49 cfs @ 12.09 hrs, Volume= 0.035 af, Depth> 2.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year, 24-Hour Storm Rainfall=3.40"

	Area (sf)	CN	Description
	1,720	98	Roofs, HSG B
	4,050	96	Gravel surface, HSG B
*	3,000	70	Sand Multi-Use Court, HSG B
	8,770	87	Weighted Average
	7,050		80.39% Pervious Area
	1,720		19.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	57	0.0100	0.29		**Sheet Flow, Pr Gravel** Fallow n= 0.050 P2= 3.40"
0.6	190	0.0200	5.09	0.89	**Pipe Channel, Pr Underdrain** 8.0" Round w/ 4.0" inside fill Area= 0.2 sf Perim= 1.7' r= 0.10' n= 0.009 PVC, smooth interior
3.9	247	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2C-PR: 2C-PR

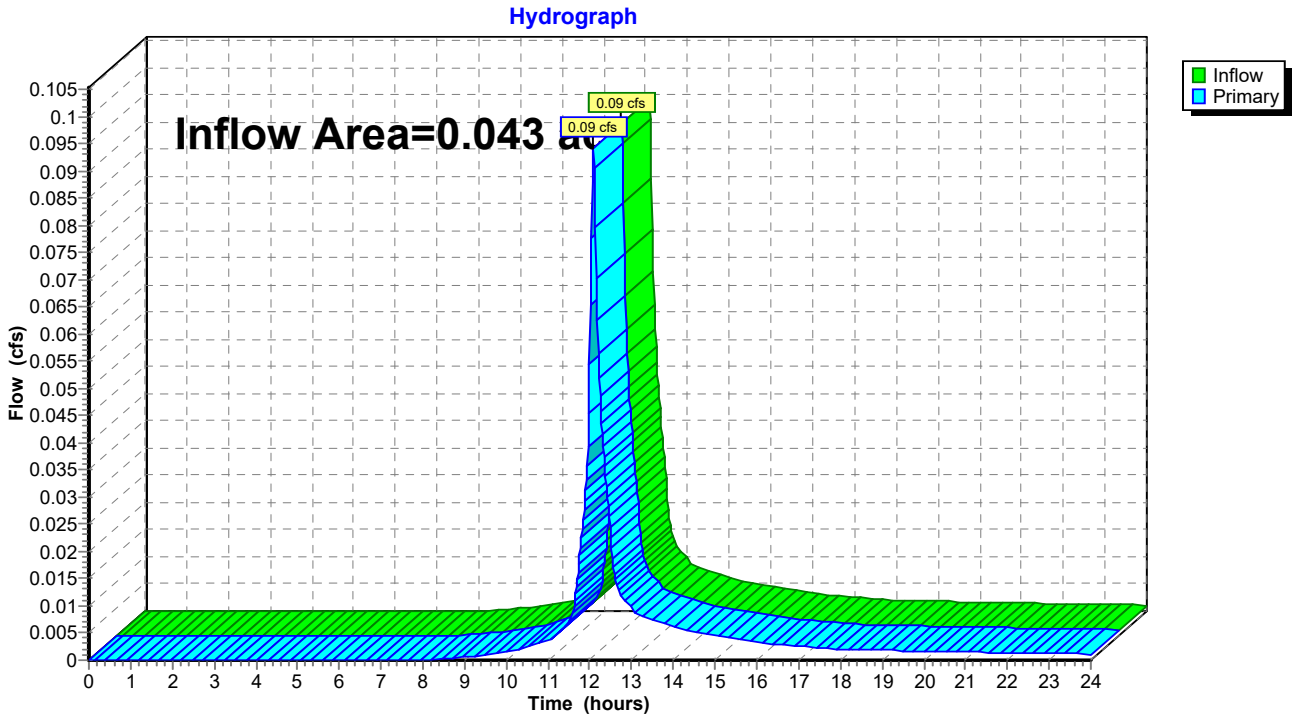


Summary for Link 1-EX: 1-EX

Inflow Area = 0.043 ac, 26.98% Impervious, Inflow Depth > 1.85" for 2-Year, 24-Hour Storm event
Inflow = 0.09 cfs @ 12.09 hrs, Volume= 0.007 af
Primary = 0.09 cfs @ 12.09 hrs, Volume= 0.007 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs

Link 1-EX: 1-EX

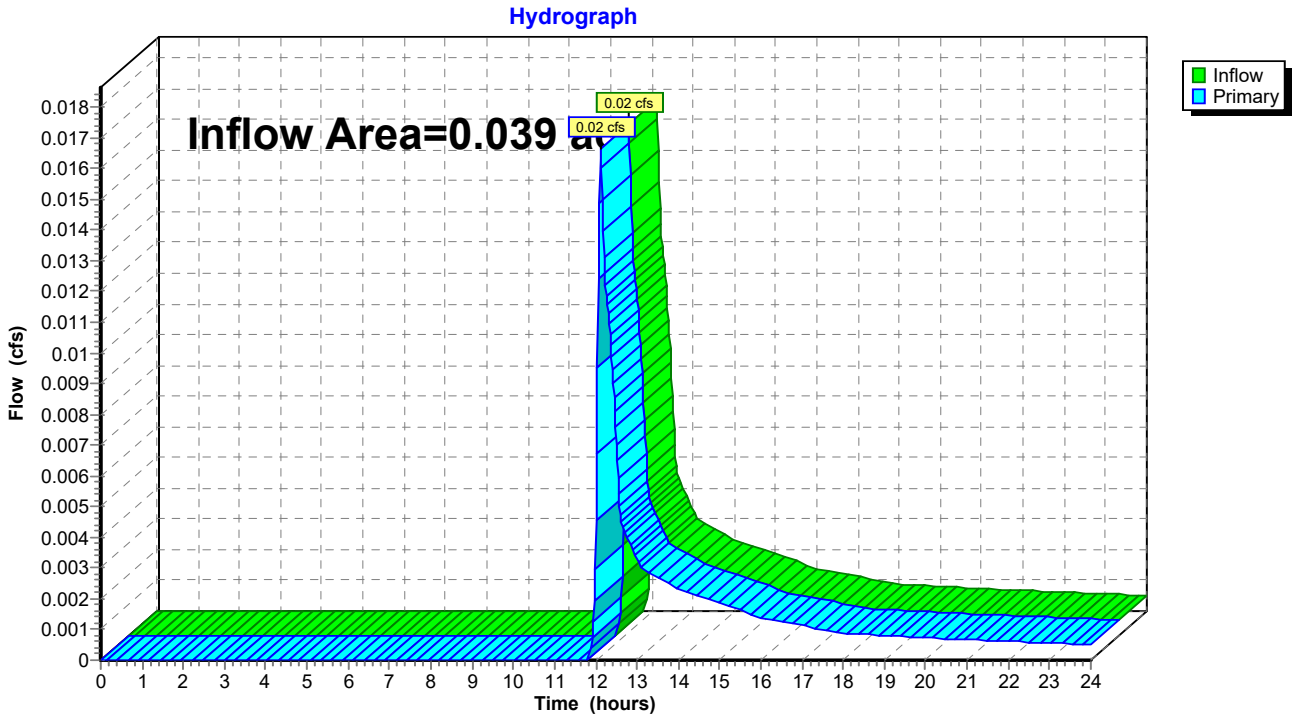


Summary for Link 1-PR: 1-PR

Inflow Area = 0.039 ac, 0.00% Impervious, Inflow Depth > 0.53" for 2-Year, 24-Hour Storm event
Inflow = 0.02 cfs @ 12.12 hrs, Volume= 0.002 af
Primary = 0.02 cfs @ 12.12 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs

Link 1-PR: 1-PR

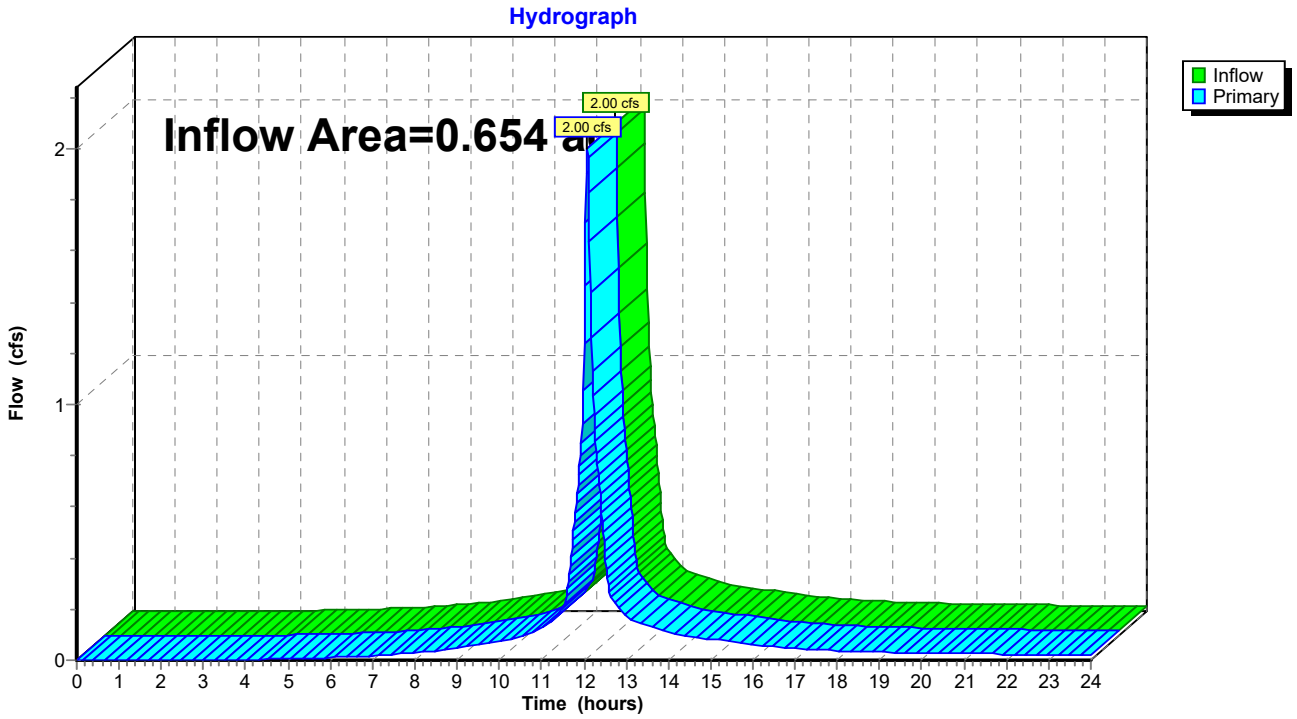


Summary for Link 2-EX: 2-EX

Inflow Area = 0.654 ac, 80.98% Impervious, Inflow Depth > 2.74" for 2-Year, 24-Hour Storm event
Inflow = 2.00 cfs @ 12.08 hrs, Volume= 0.149 af
Primary = 2.00 cfs @ 12.08 hrs, Volume= 0.149 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs

Link 2-EX: 2-EX

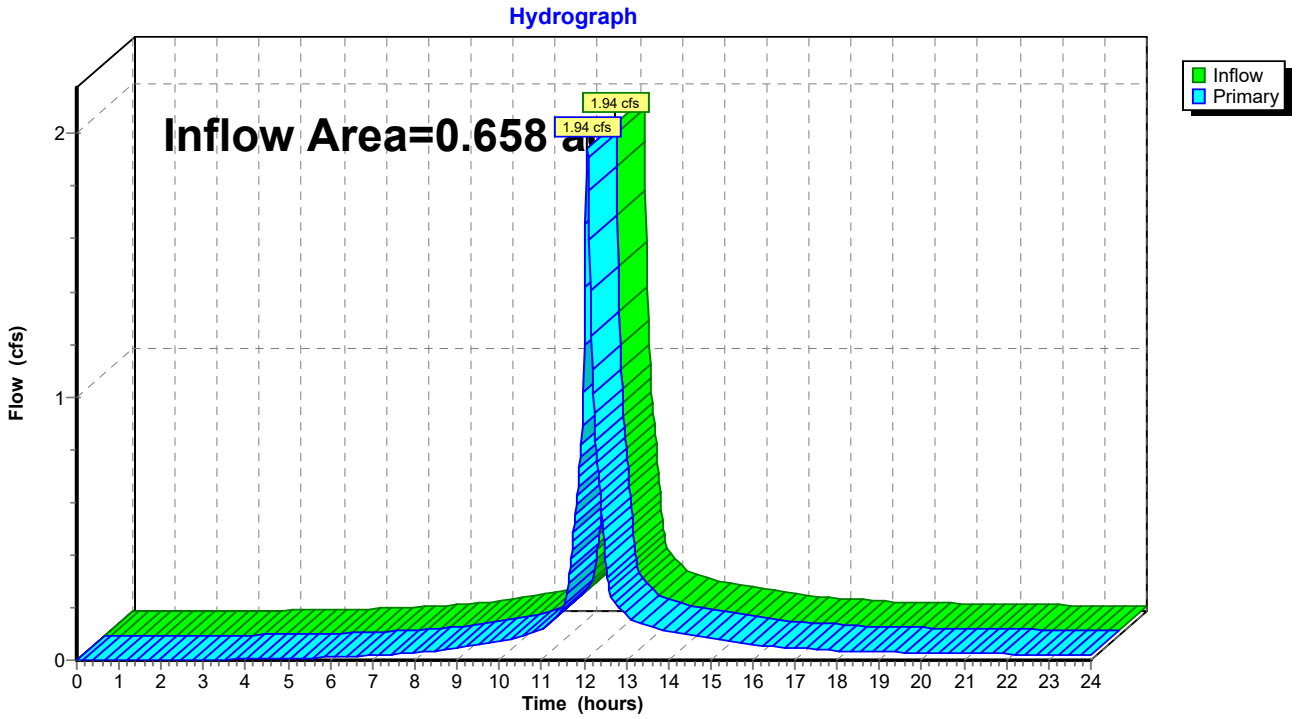


Summary for Link 2-PR: 2-PR

Inflow Area = 0.658 ac, 62.38% Impervious, Inflow Depth > 2.66" for 2-Year, 24-Hour Storm event
Inflow = 1.94 cfs @ 12.09 hrs, Volume= 0.146 af
Primary = 1.94 cfs @ 12.09 hrs, Volume= 0.146 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs

Link 2-PR: 2-PR



Time span=0.00-24.00 hrs, dt=0.02 hrs, 1201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1A-EX: 1A-EX Runoff Area=1,890 sf 26.98% Impervious Runoff Depth>2.99"
Flow Length=47' Slope=0.0100 '/' Tc=6.0 min CN=84 Runoff=0.15 cfs 0.011 af

Subcatchment1A-PR: 1A-PR Runoff Area=1,700 sf 0.00% Impervious Runoff Depth>1.19"
Flow Length=66' Tc=6.0 min CN=61 Runoff=0.05 cfs 0.004 af

Subcatchment2A-EX: 2A-EX Runoff Area=28,490 sf 80.98% Impervious Runoff Depth>4.01"
Flow Length=185' Slope=0.0100 '/' Tc=6.0 min CN=94 Runoff=2.87 cfs 0.219 af

Subcatchment2A-PR: 2A-PR Runoff Area=15,590 sf 76.01% Impervious Runoff Depth>4.12"
Flow Length=151' Tc=6.0 min CN=95 Runoff=1.59 cfs 0.123 af

Subcatchment2B-PR: 2B-PR Runoff Area=4,320 sf 100.00% Impervious Runoff Depth>4.46"
Flow Length=184' Tc=6.0 min CN=98 Runoff=0.46 cfs 0.037 af

Subcatchment2C-PR: 2C-PR Runoff Area=8,770 sf 19.61% Impervious Runoff Depth>3.28"
Flow Length=247' Tc=6.0 min CN=87 Runoff=0.76 cfs 0.055 af

Link 1-EX: 1-EX Inflow=0.15 cfs 0.011 af
Primary=0.15 cfs 0.011 af

Link 1-PR: 1-PR Inflow=0.05 cfs 0.004 af
Primary=0.05 cfs 0.004 af

Link 2-EX: 2-EX Inflow=2.87 cfs 0.219 af
Primary=2.87 cfs 0.219 af

Link 2-PR: 2-PR Inflow=2.81 cfs 0.215 af
Primary=2.81 cfs 0.215 af

Total Runoff Area = 1.395 ac Runoff Volume = 0.448 af Average Runoff Depth = 3.85"
31.75% Pervious = 0.443 ac 68.25% Impervious = 0.952 ac

Summary for Subcatchment 1A-EX: 1A-EX

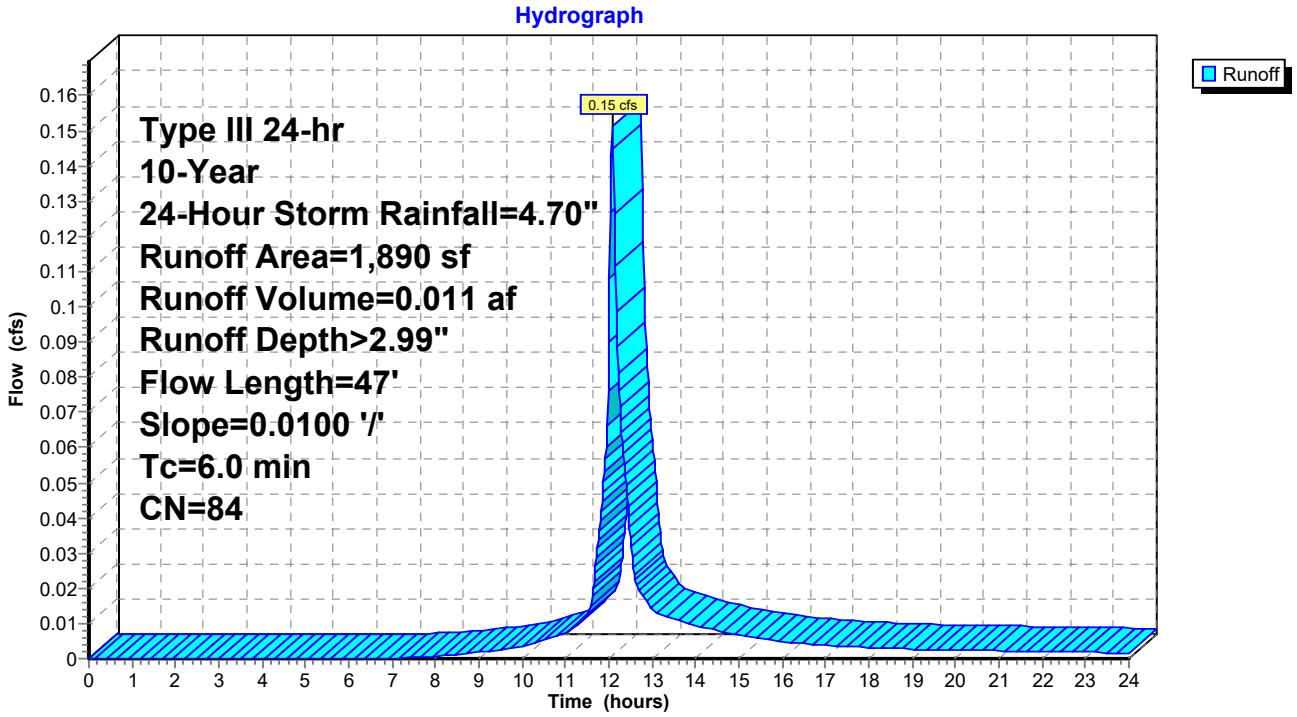
Runoff = 0.15 cfs @ 12.09 hrs, Volume= 0.011 af, Depth> 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year, 24-Hour Storm Rainfall=4.70"

Area (sf)	CN	Description
510	98	Paved parking, HSG B
1,380	79	<50% Grass cover, Poor, HSG B
1,890	84	Weighted Average
1,380		73.02% Pervious Area
510		26.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	25	0.0100	0.81		**Sheet Flow, Ex Pavement** Smooth surfaces n= 0.011 P2= 3.40"
0.5	22	0.0100	0.70		**Shallow Concentrated Flow, Ex Grass** Short Grass Pasture Kv= 7.0 fps
1.0	47	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1A-EX: 1A-EX



Summary for Subcatchment 1A-PR: 1A-PR

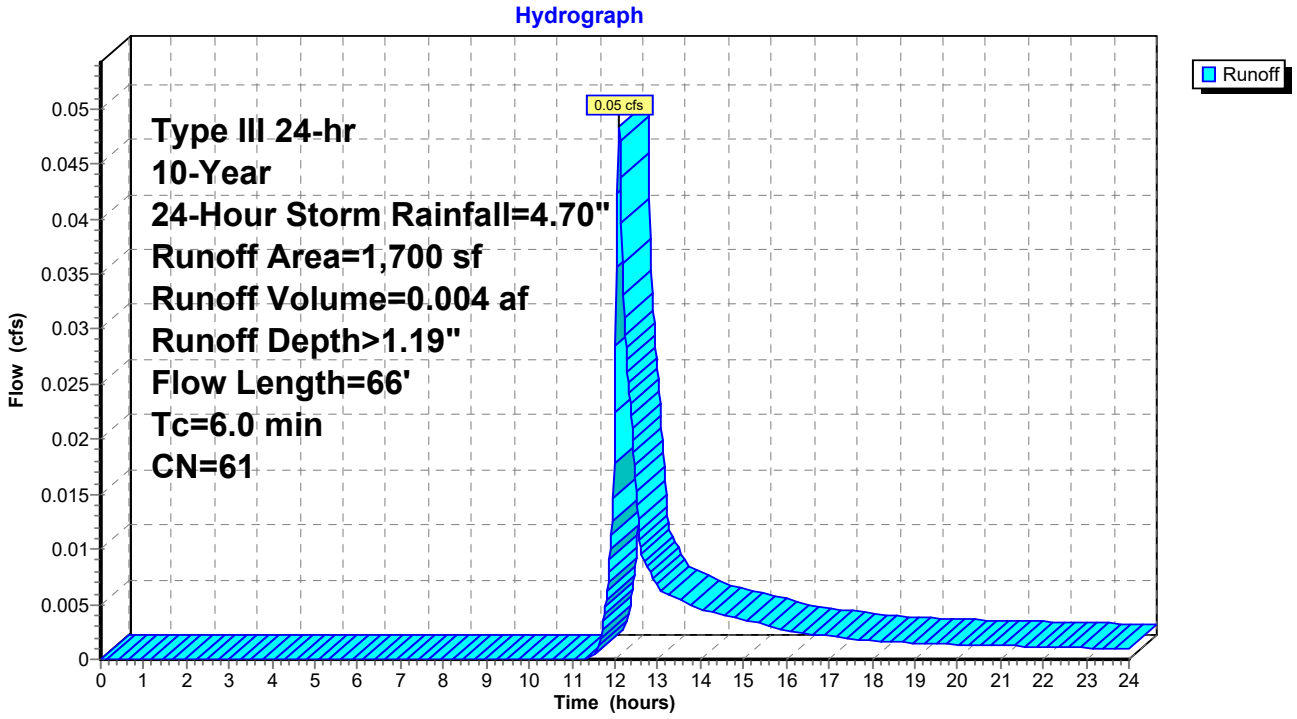
Runoff = 0.05 cfs @ 12.10 hrs, Volume= 0.004 af, Depth> 1.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year, 24-Hour Storm Rainfall=4.70"

Area (sf)	CN	Description
1,700	61	>75% Grass cover, Good, HSG B
1,700		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	21	0.0350	0.16		**Sheet Flow, Pr Grass** Grass: Short n= 0.150 P2= 3.40"
0.5	45	0.0100	1.50		**Shallow Concentrated Flow, Pr Grass Swale** Grassed Waterway Kv= 15.0 fps
2.7	66	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1A-PR: 1A-PR



Summary for Subcatchment 2A-EX: 2A-EX

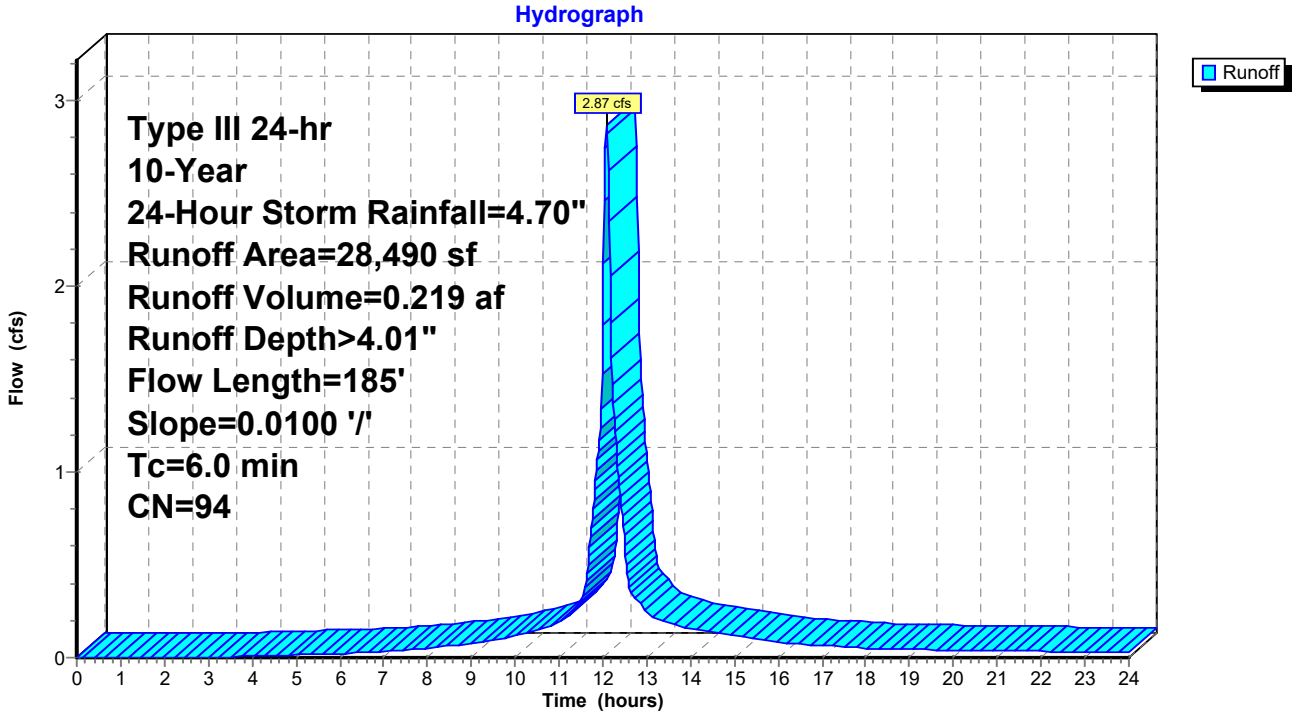
Runoff = 2.87 cfs @ 12.08 hrs, Volume= 0.219 af, Depth> 4.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year, 24-Hour Storm Rainfall=4.70"

Area (sf)	CN	Description
9,220	98	Paved parking, HSG B
13,850	98	Unconnected roofs, HSG B
5,420	79	<50% Grass cover, Poor, HSG B
28,490	94	Weighted Average
5,420		19.02% Pervious Area
23,070		80.98% Impervious Area
13,850		60.03% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	117	0.0100	1.11		**Sheet Flow, Ex Roof** Smooth surfaces n= 0.011 P2= 3.40"
0.6	25	0.0100	0.70		**Shallow Concentrated Flow, Ex Grass** Short Grass Pasture Kv= 7.0 fps
0.4	43	0.0100	2.03		**Shallow Concentrated Flow, Ex Pavement** Paved Kv= 20.3 fps
2.8	185	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2A-EX: 2A-EX



Summary for Subcatchment 2A-PR: 2A-PR

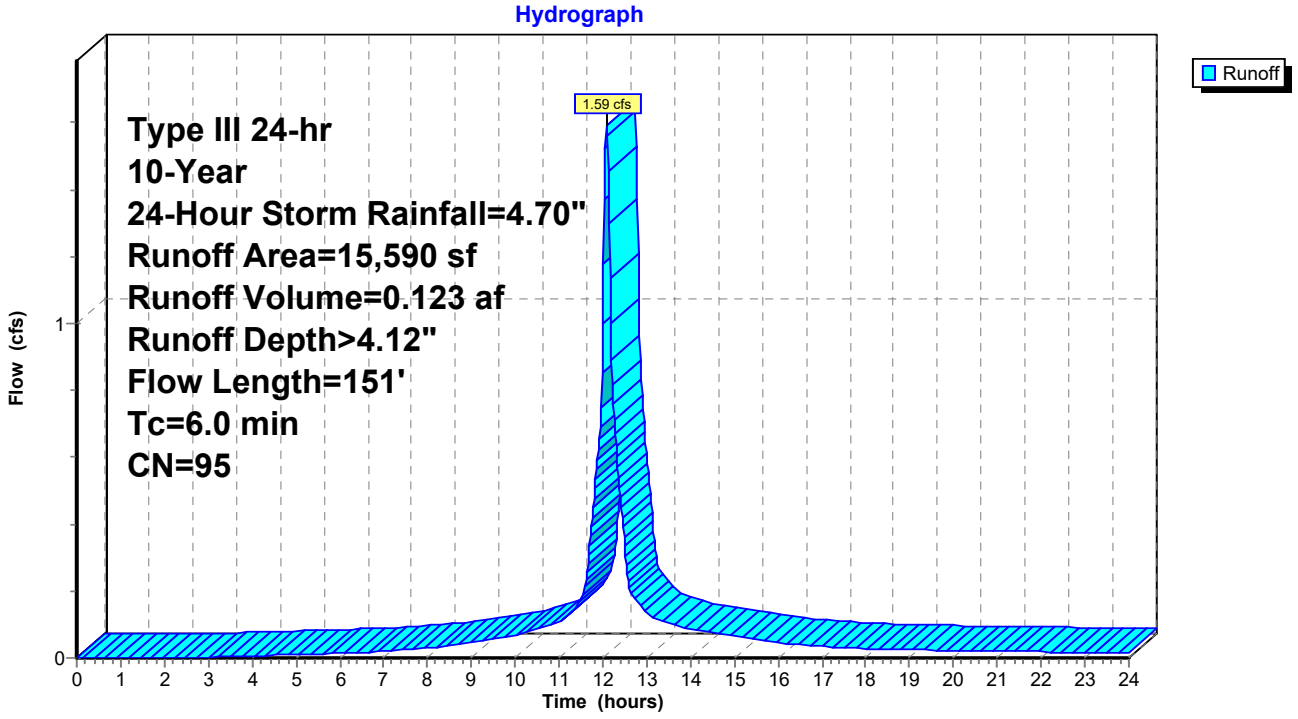
Runoff = 1.59 cfs @ 12.08 hrs, Volume= 0.123 af, Depth> 4.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year, 24-Hour Storm Rainfall=4.70"

Area (sf)	CN	Description
11,850	98	Paved parking, HSG B
1,240	61	>75% Grass cover, Good, HSG B
2,500	96	Gravel surface, HSG B
15,590	95	Weighted Average
3,740		23.99% Pervious Area
11,850		76.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	81	0.0300	1.60		**Sheet Flow, Pr Sidewalk** Smooth surfaces n= 0.011 P2= 3.40"
1.0	40	0.0100	0.70		**Shallow Concentrated Flow, Pr Grass** Short Grass Pasture Kv= 7.0 fps
0.2	30	0.0100	2.03		**Shallow Concentrated Flow, Pr Pavement** Paved Kv= 20.3 fps
2.0	151	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2A-PR: 2A-PR



Summary for Subcatchment 2B-PR: 2B-PR

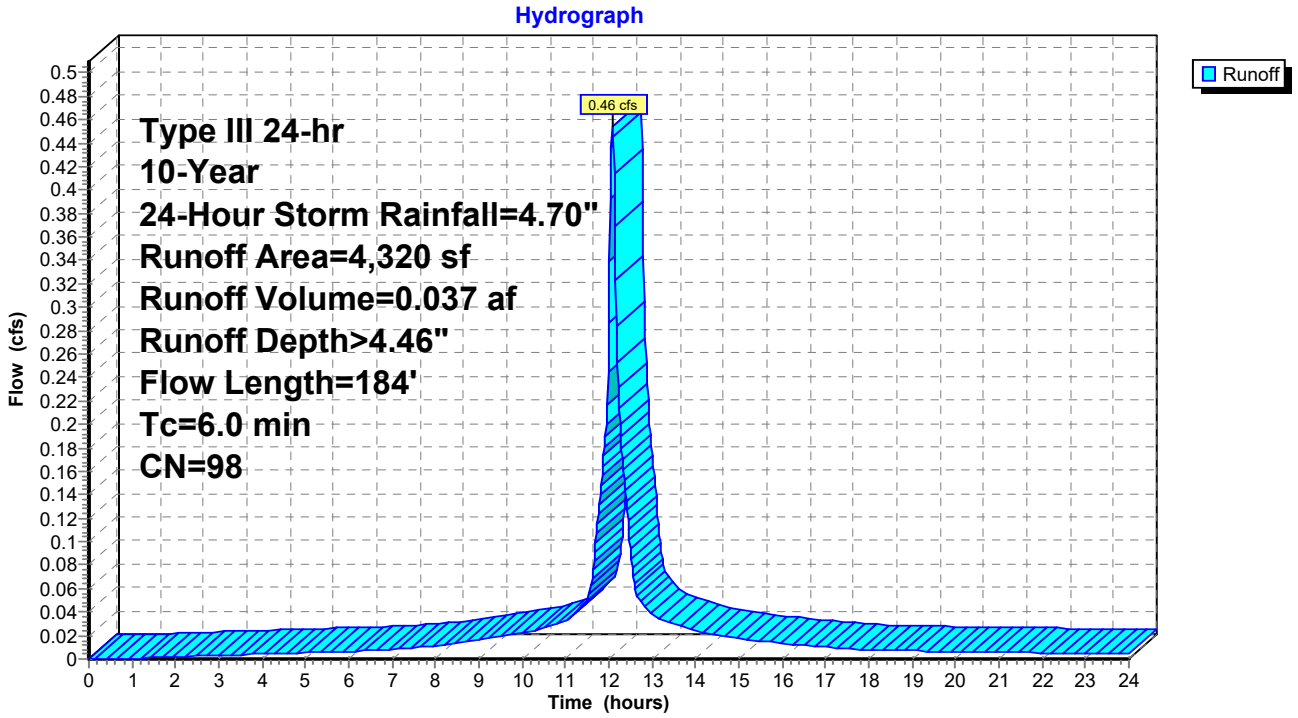
Runoff = 0.46 cfs @ 12.08 hrs, Volume= 0.037 af, Depth> 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year, 24-Hour Storm Rainfall=4.70"

Area (sf)	CN	Description
4,320	98	Roofs, HSG B
4,320		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	117	0.0100	1.11		**Sheet Flow, Ex Roof** Smooth surfaces n= 0.011 P2= 3.40"
0.3	67	0.0200	4.34	1.00	**Pipe Channel, Pr Roof Drain** 8.0" Round w/ 3.0" inside fill Area= 0.2 sf Perim= 1.9' r= 0.12' n= 0.012
2.1	184	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2B-PR: 2B-PR



Summary for Subcatchment 2C-PR: 2C-PR

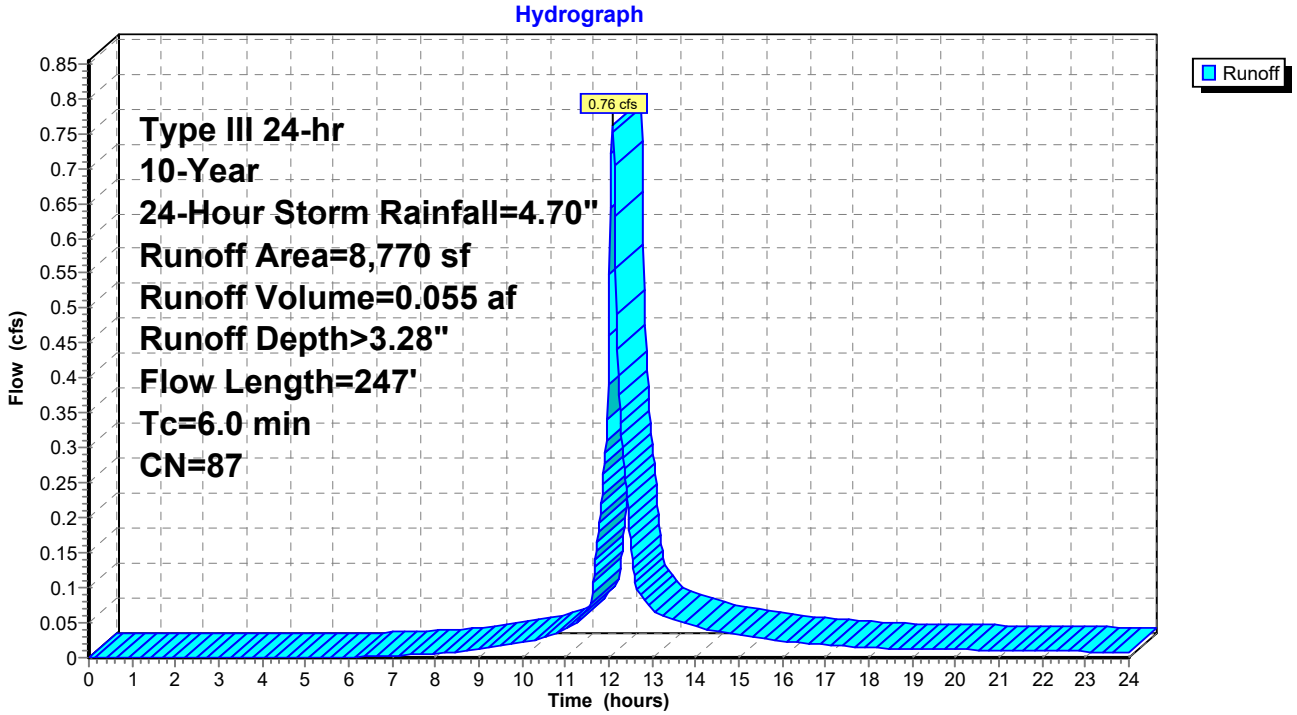
Runoff = 0.76 cfs @ 12.09 hrs, Volume= 0.055 af, Depth> 3.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year, 24-Hour Storm Rainfall=4.70"

	Area (sf)	CN	Description
	1,720	98	Roofs, HSG B
	4,050	96	Gravel surface, HSG B
*	3,000	70	Sand Multi-Use Court, HSG B
	8,770	87	Weighted Average
	7,050		80.39% Pervious Area
	1,720		19.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	57	0.0100	0.29		**Sheet Flow, Pr Gravel** Fallow n= 0.050 P2= 3.40"
0.6	190	0.0200	5.09	0.89	**Pipe Channel, Pr Underdrain** 8.0" Round w/ 4.0" inside fill Area= 0.2 sf Perim= 1.7' r= 0.10' n= 0.009 PVC, smooth interior
3.9	247	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2C-PR: 2C-PR

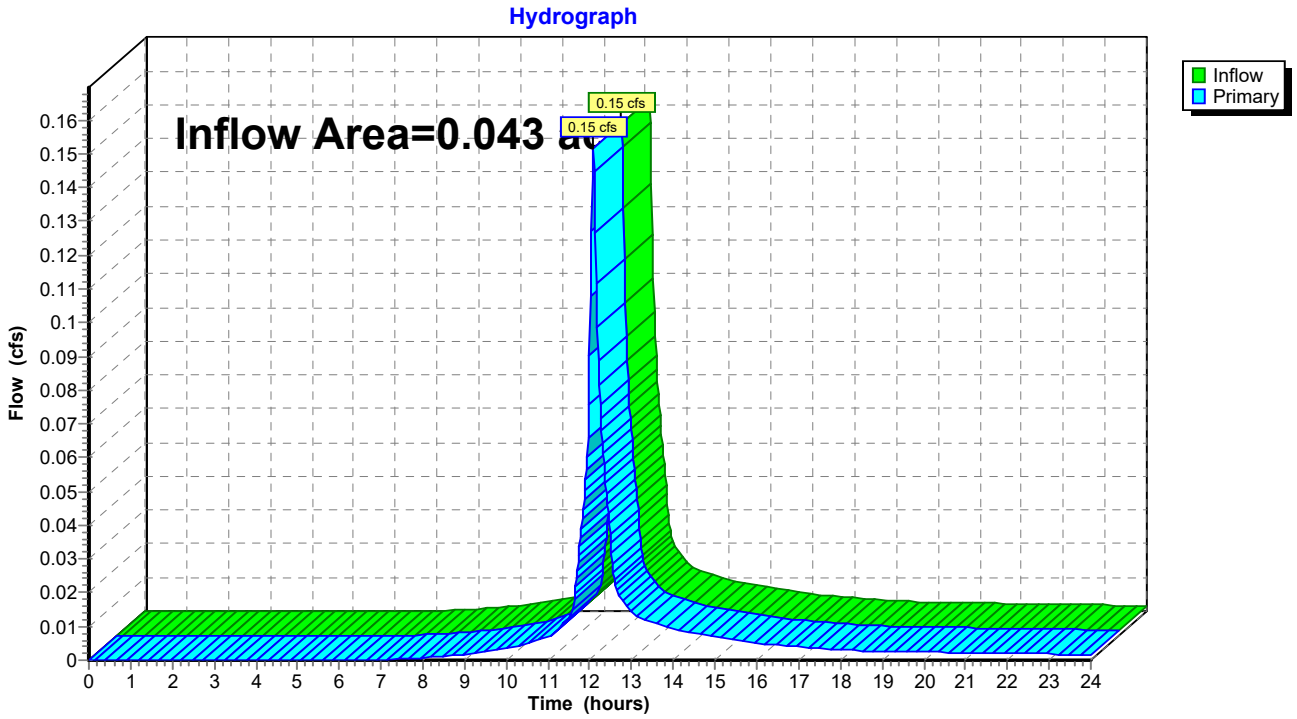


Summary for Link 1-EX: 1-EX

Inflow Area = 0.043 ac, 26.98% Impervious, Inflow Depth > 2.99" for 10-Year, 24-Hour Storm event
Inflow = 0.15 cfs @ 12.09 hrs, Volume= 0.011 af
Primary = 0.15 cfs @ 12.09 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs

Link 1-EX: 1-EX

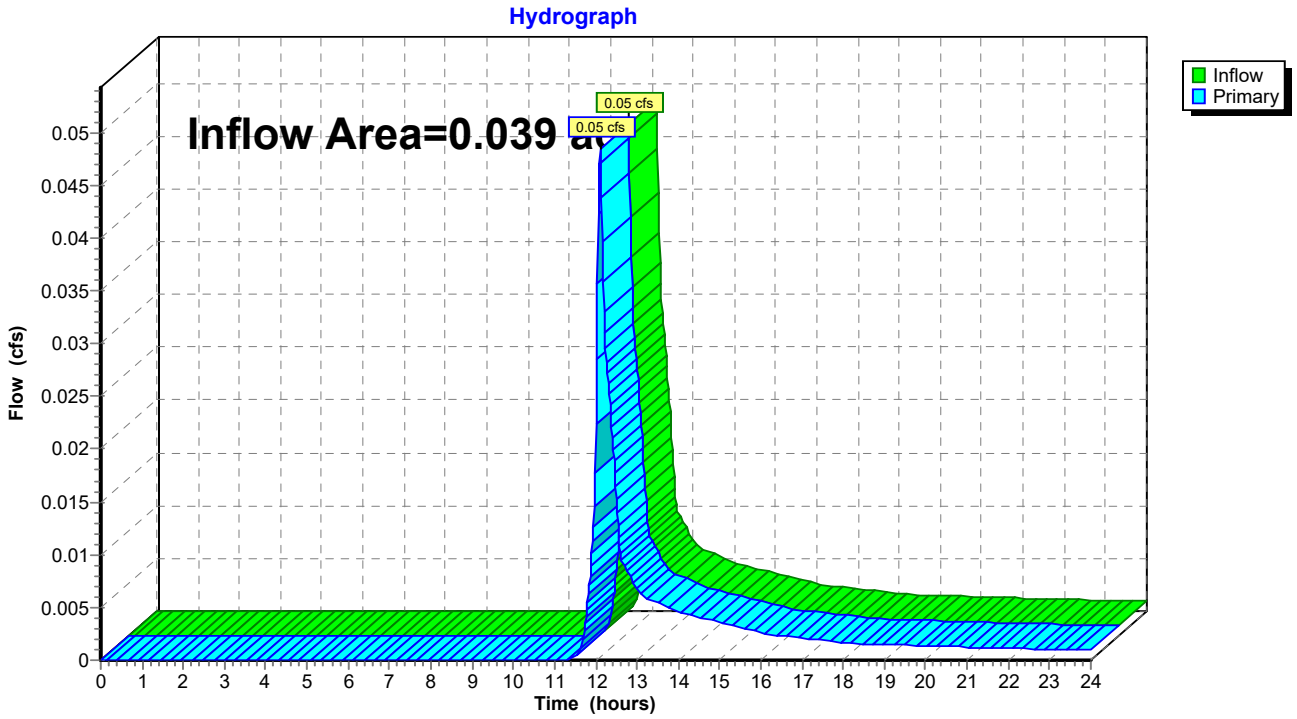


Summary for Link 1-PR: 1-PR

Inflow Area = 0.039 ac, 0.00% Impervious, Inflow Depth > 1.19" for 10-Year, 24-Hour Storm event
Inflow = 0.05 cfs @ 12.10 hrs, Volume= 0.004 af
Primary = 0.05 cfs @ 12.10 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs

Link 1-PR: 1-PR

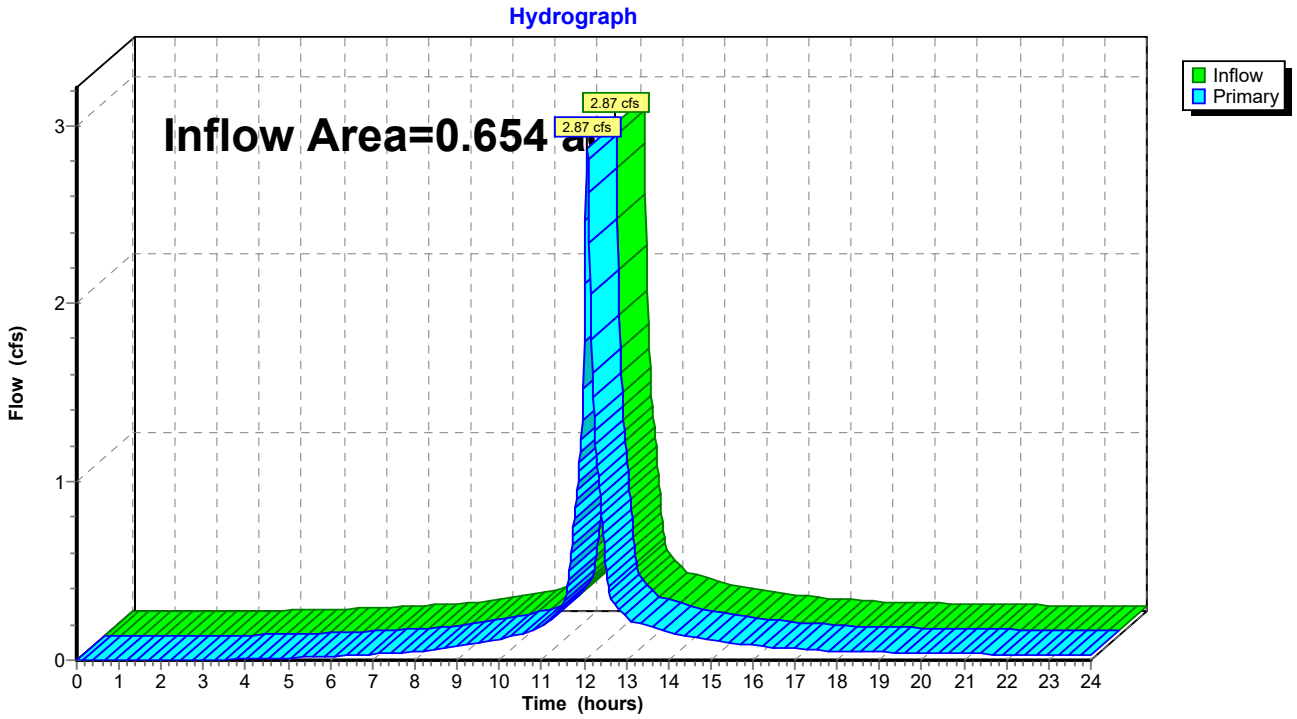


Summary for Link 2-EX: 2-EX

Inflow Area = 0.654 ac, 80.98% Impervious, Inflow Depth > 4.01" for 10-Year, 24-Hour Storm event
Inflow = 2.87 cfs @ 12.08 hrs, Volume= 0.219 af
Primary = 2.87 cfs @ 12.08 hrs, Volume= 0.219 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs

Link 2-EX: 2-EX

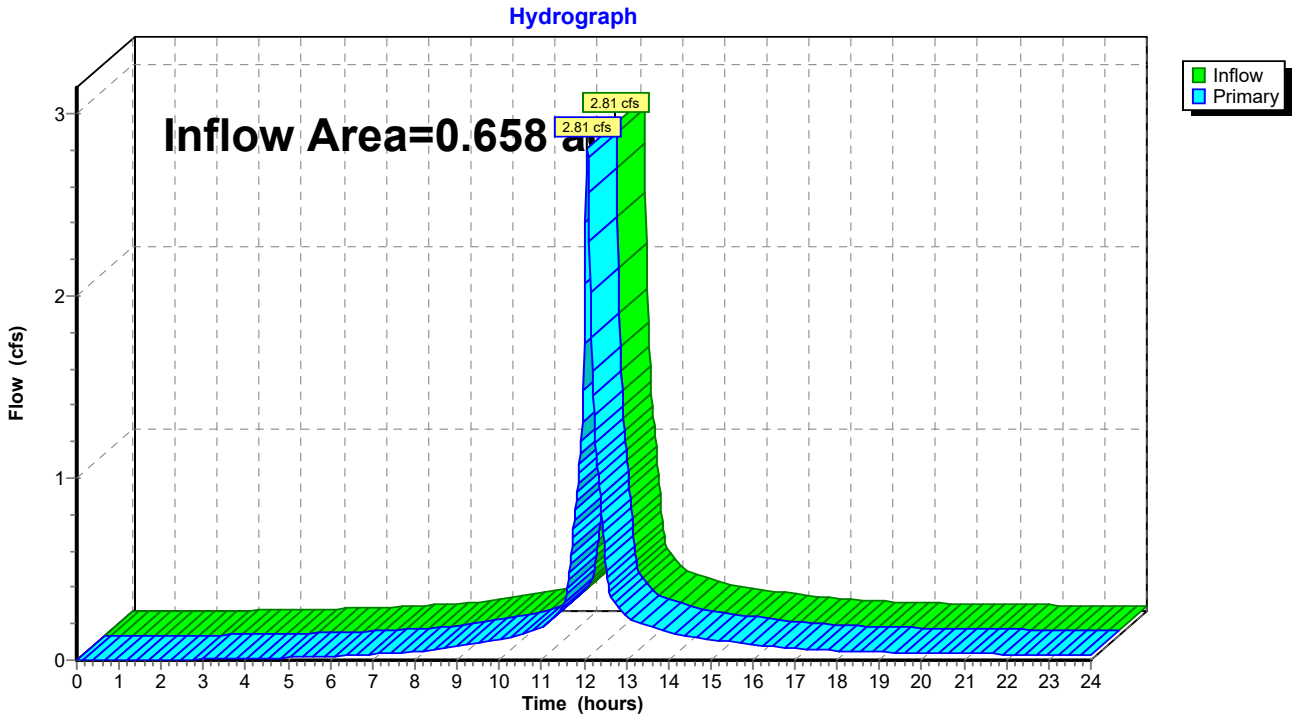


Summary for Link 2-PR: 2-PR

Inflow Area = 0.658 ac, 62.38% Impervious, Inflow Depth > 3.91" for 10-Year, 24-Hour Storm event
Inflow = 2.81 cfs @ 12.08 hrs, Volume= 0.215 af
Primary = 2.81 cfs @ 12.08 hrs, Volume= 0.215 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs

Link 2-PR: 2-PR



Time span=0.00-24.00 hrs, dt=0.02 hrs, 1201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1A-EX: 1A-EX Runoff Area=1,890 sf 26.98% Impervious Runoff Depth>3.82"
Flow Length=47' Slope=0.0100 '/' Tc=6.0 min CN=84 Runoff=0.19 cfs 0.014 af

Subcatchment1A-PR: 1A-PR Runoff Area=1,700 sf 0.00% Impervious Runoff Depth>1.74"
Flow Length=66' Tc=6.0 min CN=61 Runoff=0.07 cfs 0.006 af

Subcatchment2A-EX: 2A-EX Runoff Area=28,490 sf 80.98% Impervious Runoff Depth>4.90"
Flow Length=185' Slope=0.0100 '/' Tc=6.0 min CN=94 Runoff=3.46 cfs 0.267 af

Subcatchment2A-PR: 2A-PR Runoff Area=15,590 sf 76.01% Impervious Runoff Depth>5.01"
Flow Length=151' Tc=6.0 min CN=95 Runoff=1.92 cfs 0.149 af

Subcatchment2B-PR: 2B-PR Runoff Area=4,320 sf 100.00% Impervious Runoff Depth>5.36"
Flow Length=184' Tc=6.0 min CN=98 Runoff=0.54 cfs 0.044 af

Subcatchment2C-PR: 2C-PR Runoff Area=8,770 sf 19.61% Impervious Runoff Depth>4.13"
Flow Length=247' Tc=6.0 min CN=87 Runoff=0.95 cfs 0.069 af

Link 1-EX: 1-EX Inflow=0.19 cfs 0.014 af
Primary=0.19 cfs 0.014 af

Link 1-PR: 1-PR Inflow=0.07 cfs 0.006 af
Primary=0.07 cfs 0.006 af

Link 2-EX: 2-EX Inflow=3.46 cfs 0.267 af
Primary=3.46 cfs 0.267 af

Link 2-PR: 2-PR Inflow=3.41 cfs 0.263 af
Primary=3.41 cfs 0.263 af

Total Runoff Area = 1.395 ac Runoff Volume = 0.549 af Average Runoff Depth = 4.73"
31.75% Pervious = 0.443 ac 68.25% Impervious = 0.952 ac

Summary for Subcatchment 1A-EX: 1A-EX

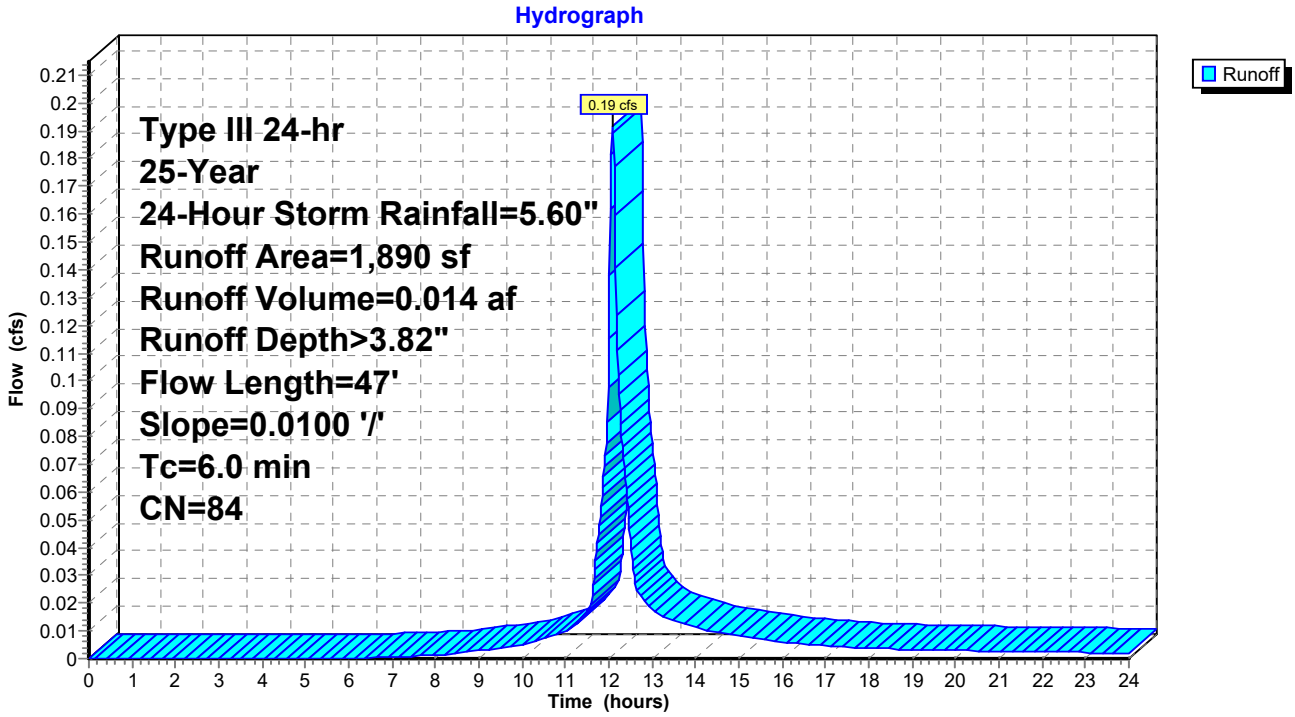
Runoff = 0.19 cfs @ 12.09 hrs, Volume= 0.014 af, Depth> 3.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year, 24-Hour Storm Rainfall=5.60"

Area (sf)	CN	Description
510	98	Paved parking, HSG B
1,380	79	<50% Grass cover, Poor, HSG B
1,890	84	Weighted Average
1,380		73.02% Pervious Area
510		26.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	25	0.0100	0.81		**Sheet Flow, Ex Pavement** Smooth surfaces n= 0.011 P2= 3.40"
0.5	22	0.0100	0.70		**Shallow Concentrated Flow, Ex Grass** Short Grass Pasture Kv= 7.0 fps
1.0	47	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1A-EX: 1A-EX



Summary for Subcatchment 1A-PR: 1A-PR

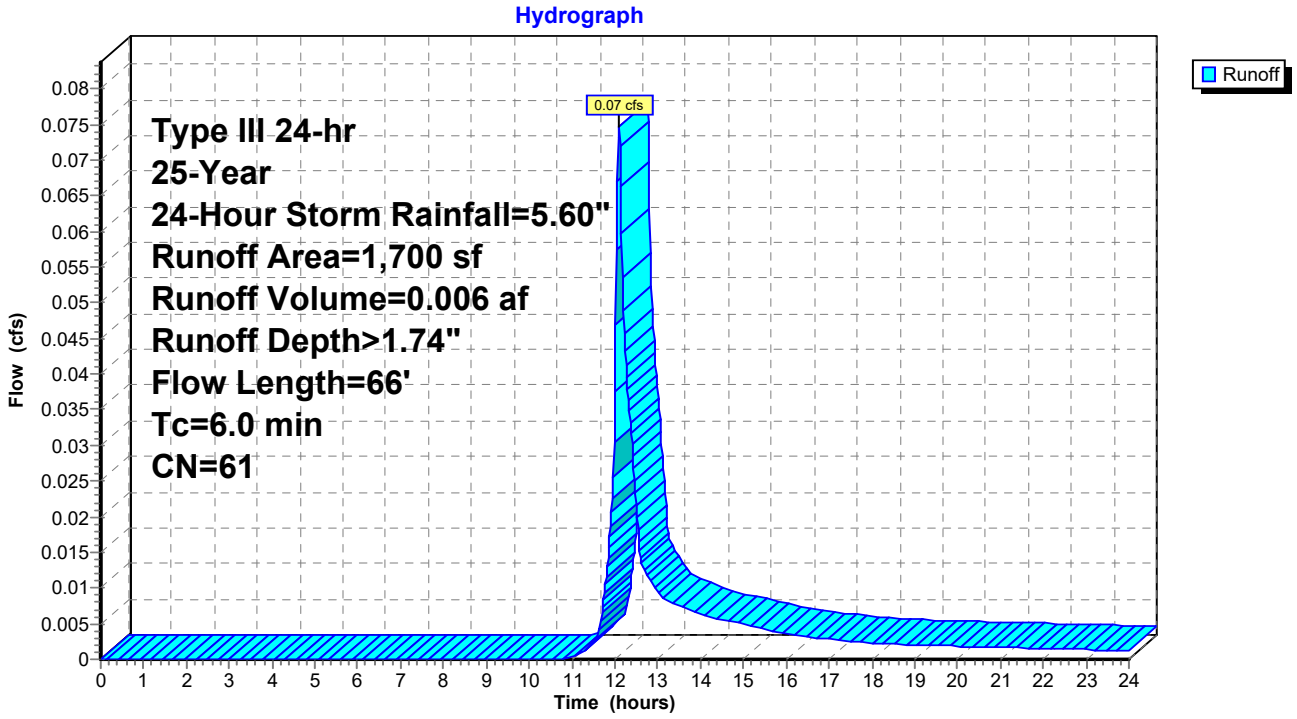
Runoff = 0.07 cfs @ 12.10 hrs, Volume= 0.006 af, Depth> 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year, 24-Hour Storm Rainfall=5.60"

Area (sf)	CN	Description
1,700	61	>75% Grass cover, Good, HSG B
1,700		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	21	0.0350	0.16		**Sheet Flow, Pr Grass** Grass: Short n= 0.150 P2= 3.40"
0.5	45	0.0100	1.50		**Shallow Concentrated Flow, Pr Grass Swale** Grassed Waterway Kv= 15.0 fps
2.7	66	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1A-PR: 1A-PR



Summary for Subcatchment 2A-EX: 2A-EX

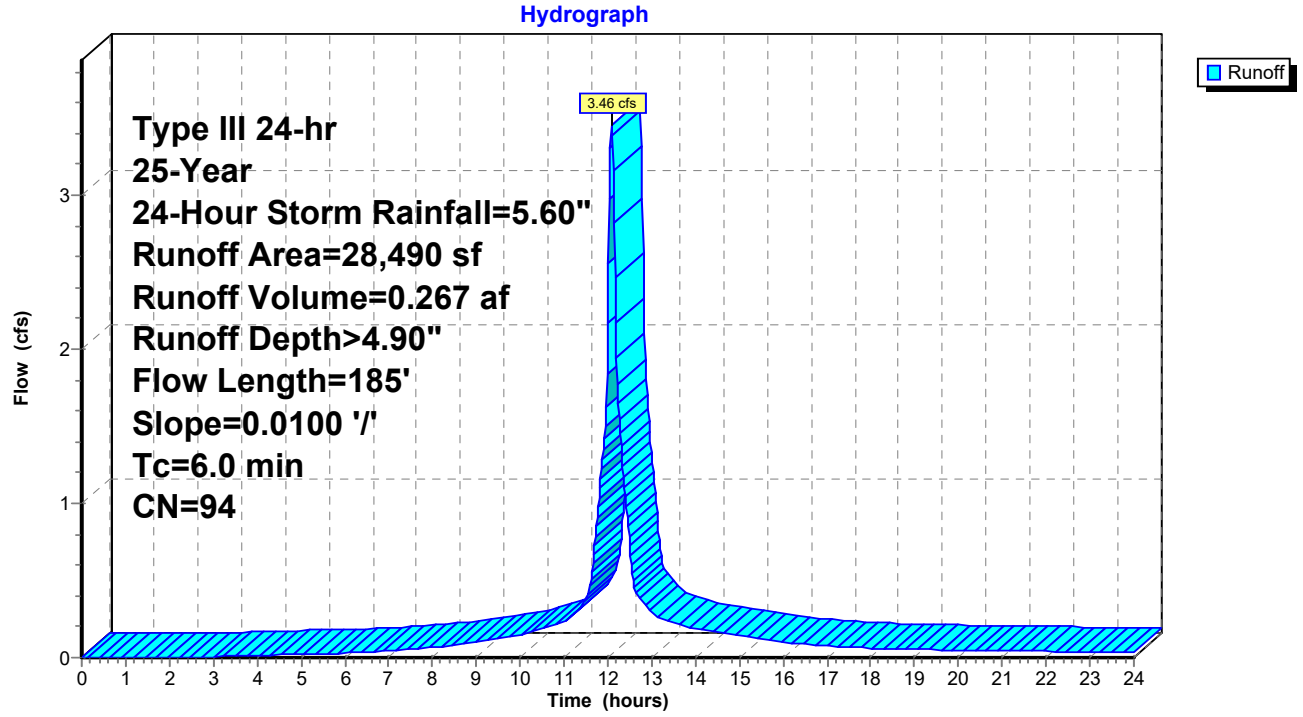
Runoff = 3.46 cfs @ 12.08 hrs, Volume= 0.267 af, Depth> 4.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year, 24-Hour Storm Rainfall=5.60"

Area (sf)	CN	Description
9,220	98	Paved parking, HSG B
13,850	98	Unconnected roofs, HSG B
5,420	79	<50% Grass cover, Poor, HSG B
28,490	94	Weighted Average
5,420		19.02% Pervious Area
23,070		80.98% Impervious Area
13,850		60.03% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	117	0.0100	1.11		**Sheet Flow, Ex Roof** Smooth surfaces n= 0.011 P2= 3.40"
0.6	25	0.0100	0.70		**Shallow Concentrated Flow, Ex Grass** Short Grass Pasture Kv= 7.0 fps
0.4	43	0.0100	2.03		**Shallow Concentrated Flow, Ex Pavement** Paved Kv= 20.3 fps
2.8	185	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2A-EX: 2A-EX



Summary for Subcatchment 2A-PR: 2A-PR

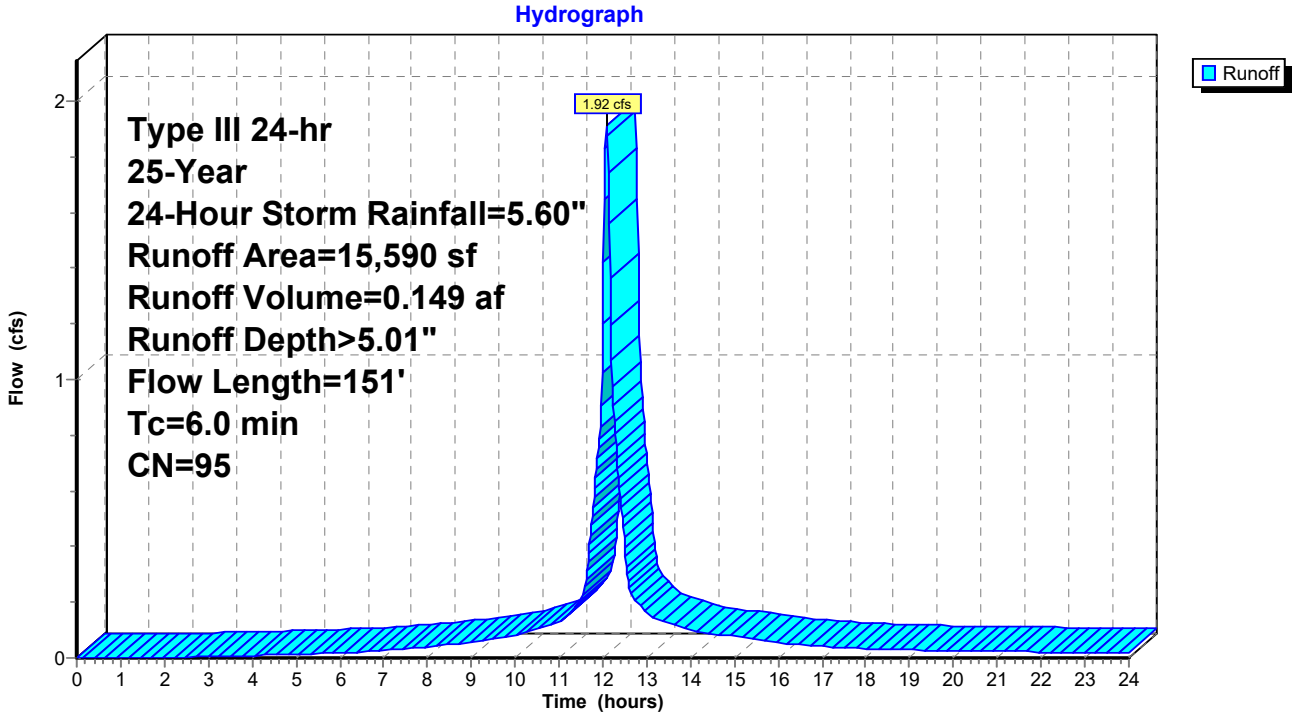
Runoff = 1.92 cfs @ 12.08 hrs, Volume= 0.149 af, Depth> 5.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year, 24-Hour Storm Rainfall=5.60"

Area (sf)	CN	Description
11,850	98	Paved parking, HSG B
1,240	61	>75% Grass cover, Good, HSG B
2,500	96	Gravel surface, HSG B
15,590	95	Weighted Average
3,740		23.99% Pervious Area
11,850		76.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	81	0.0300	1.60		**Sheet Flow, Pr Sidewalk** Smooth surfaces n= 0.011 P2= 3.40"
1.0	40	0.0100	0.70		**Shallow Concentrated Flow, Pr Grass** Short Grass Pasture Kv= 7.0 fps
0.2	30	0.0100	2.03		**Shallow Concentrated Flow, Pr Pavement** Paved Kv= 20.3 fps
2.0	151	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2A-PR: 2A-PR



Summary for Subcatchment 2B-PR: 2B-PR

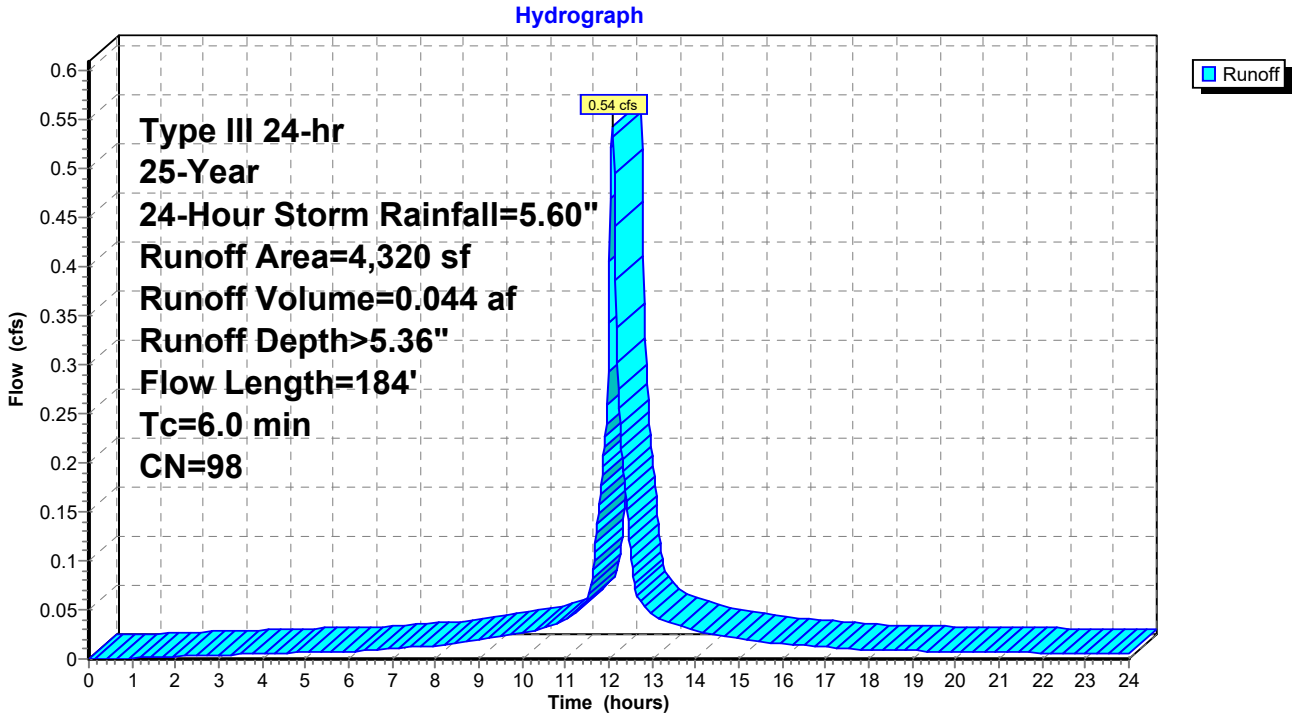
Runoff = 0.54 cfs @ 12.08 hrs, Volume= 0.044 af, Depth> 5.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year, 24-Hour Storm Rainfall=5.60"

Area (sf)	CN	Description
4,320	98	Roofs, HSG B
4,320		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	117	0.0100	1.11		**Sheet Flow, Ex Roof** Smooth surfaces n= 0.011 P2= 3.40"
0.3	67	0.0200	4.34	1.00	**Pipe Channel, Pr Roof Drain** 8.0" Round w/ 3.0" inside fill Area= 0.2 sf Perim= 1.9' r= 0.12' n= 0.012
2.1	184	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2B-PR: 2B-PR



Summary for Subcatchment 2C-PR: 2C-PR

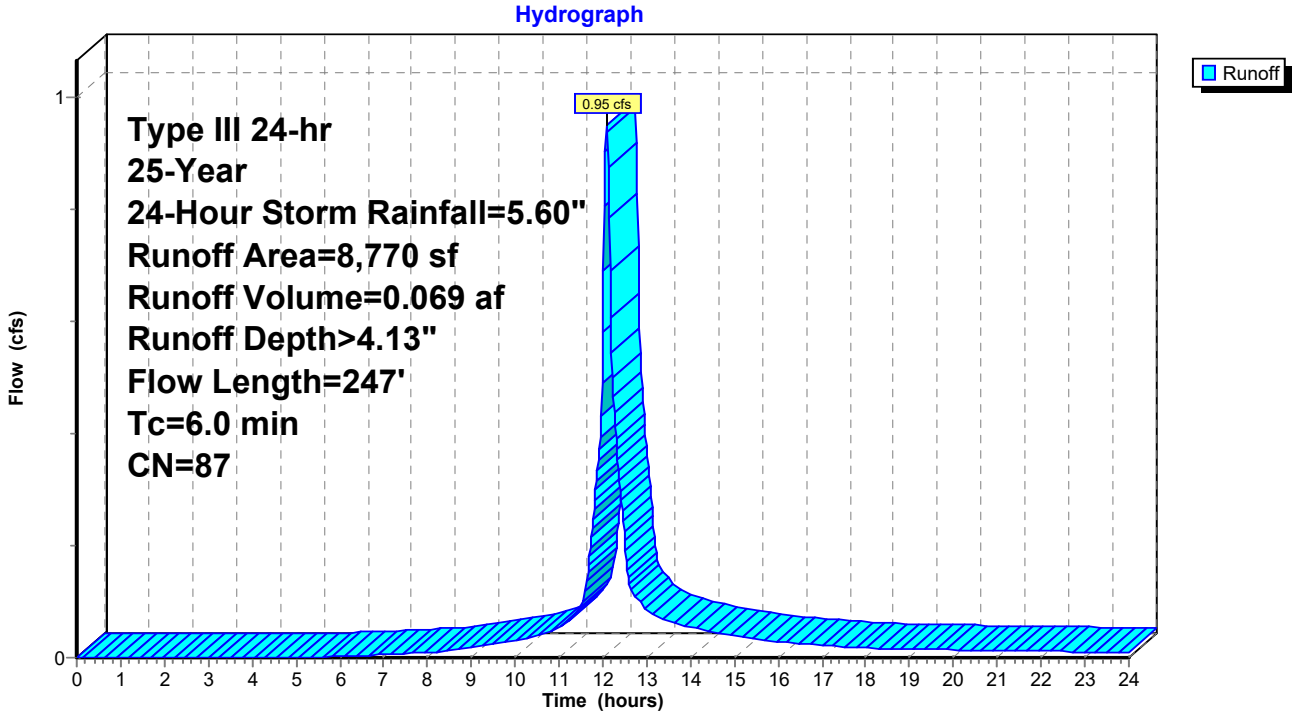
Runoff = 0.95 cfs @ 12.09 hrs, Volume= 0.069 af, Depth> 4.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year, 24-Hour Storm Rainfall=5.60"

	Area (sf)	CN	Description
	1,720	98	Roofs, HSG B
	4,050	96	Gravel surface, HSG B
*	3,000	70	Sand Multi-Use Court, HSG B
	8,770	87	Weighted Average
	7,050		80.39% Pervious Area
	1,720		19.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	57	0.0100	0.29		**Sheet Flow, Pr Gravel** Fallow n= 0.050 P2= 3.40"
0.6	190	0.0200	5.09	0.89	**Pipe Channel, Pr Underdrain** 8.0" Round w/ 4.0" inside fill Area= 0.2 sf Perim= 1.7' r= 0.10' n= 0.009 PVC, smooth interior
3.9	247	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2C-PR: 2C-PR

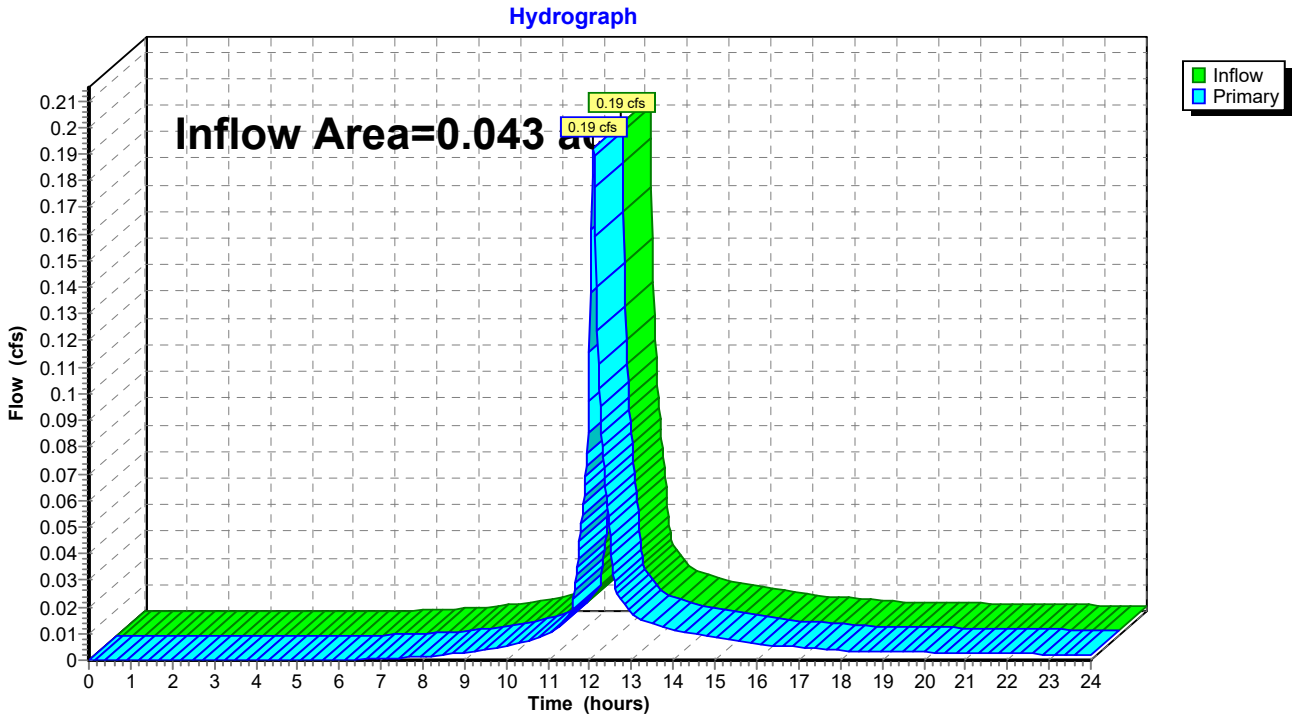


Summary for Link 1-EX: 1-EX

Inflow Area = 0.043 ac, 26.98% Impervious, Inflow Depth > 3.82" for 25-Year, 24-Hour Storm event
Inflow = 0.19 cfs @ 12.09 hrs, Volume= 0.014 af
Primary = 0.19 cfs @ 12.09 hrs, Volume= 0.014 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs

Link 1-EX: 1-EX

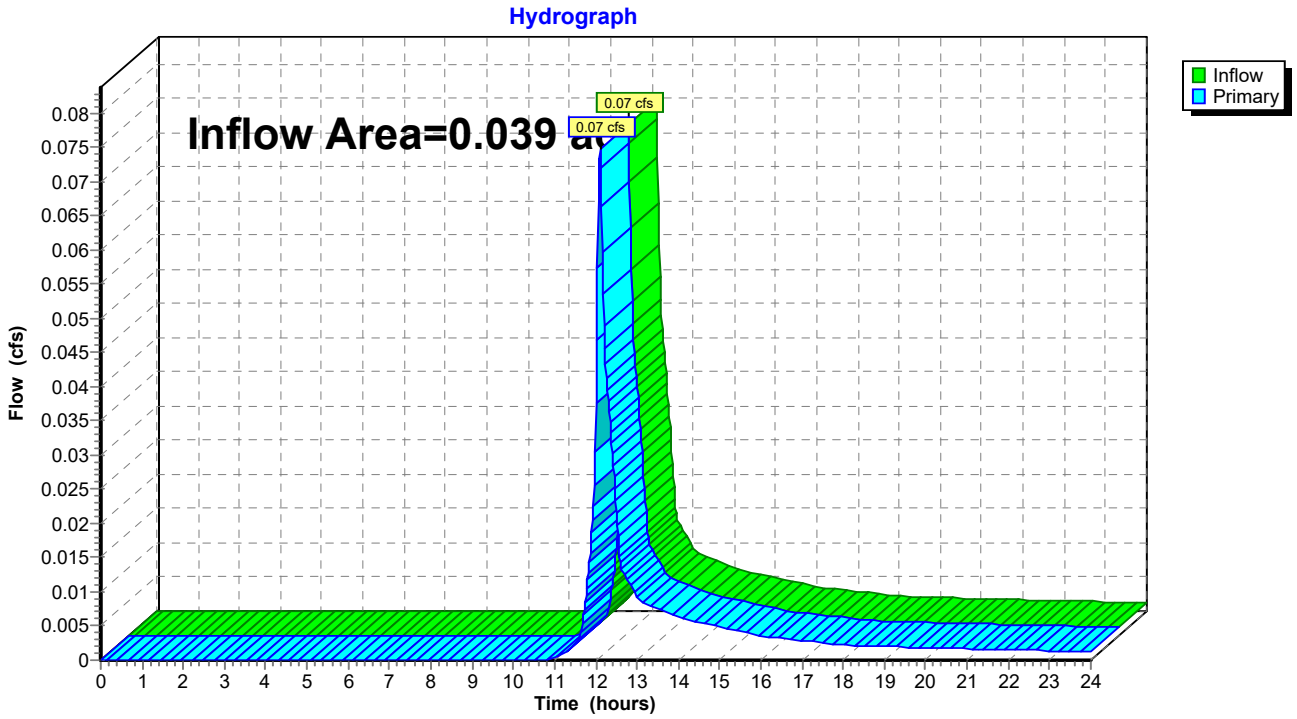


Summary for Link 1-PR: 1-PR

Inflow Area = 0.039 ac, 0.00% Impervious, Inflow Depth > 1.74" for 25-Year, 24-Hour Storm event
Inflow = 0.07 cfs @ 12.10 hrs, Volume= 0.006 af
Primary = 0.07 cfs @ 12.10 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs

Link 1-PR: 1-PR

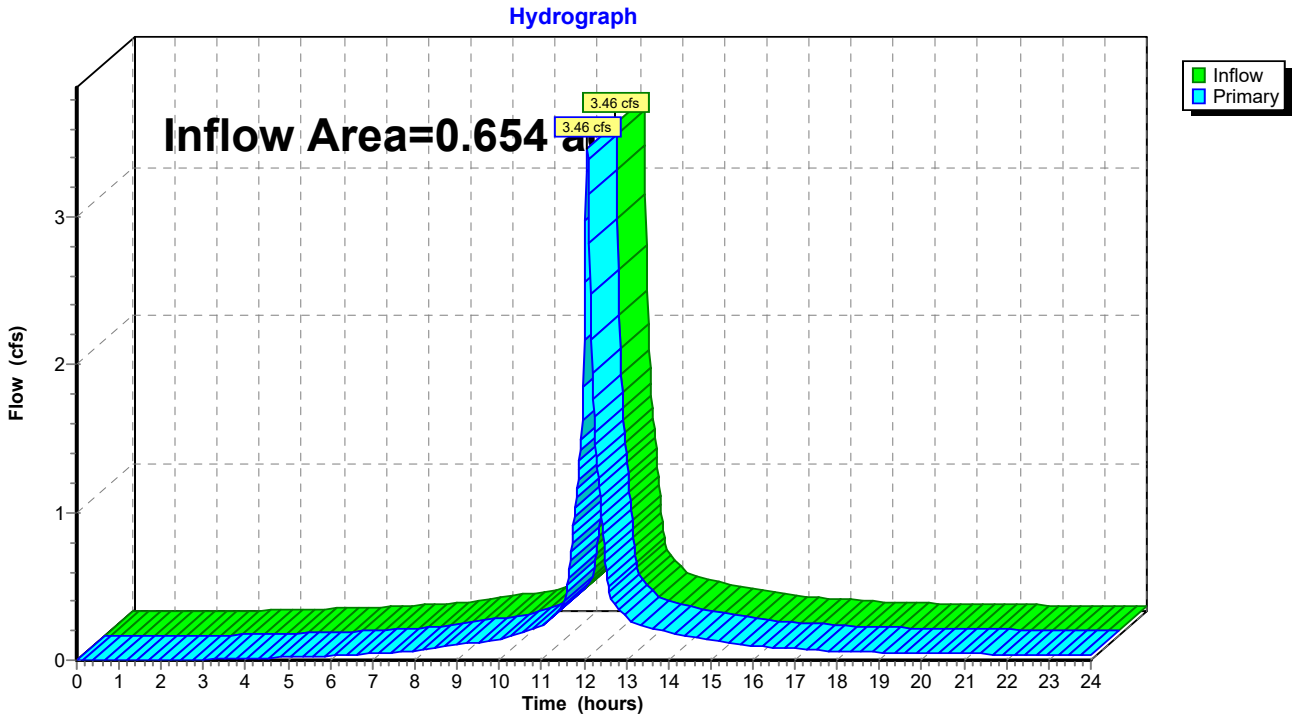


Summary for Link 2-EX: 2-EX

Inflow Area = 0.654 ac, 80.98% Impervious, Inflow Depth > 4.90" for 25-Year, 24-Hour Storm event
Inflow = 3.46 cfs @ 12.08 hrs, Volume= 0.267 af
Primary = 3.46 cfs @ 12.08 hrs, Volume= 0.267 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs

Link 2-EX: 2-EX

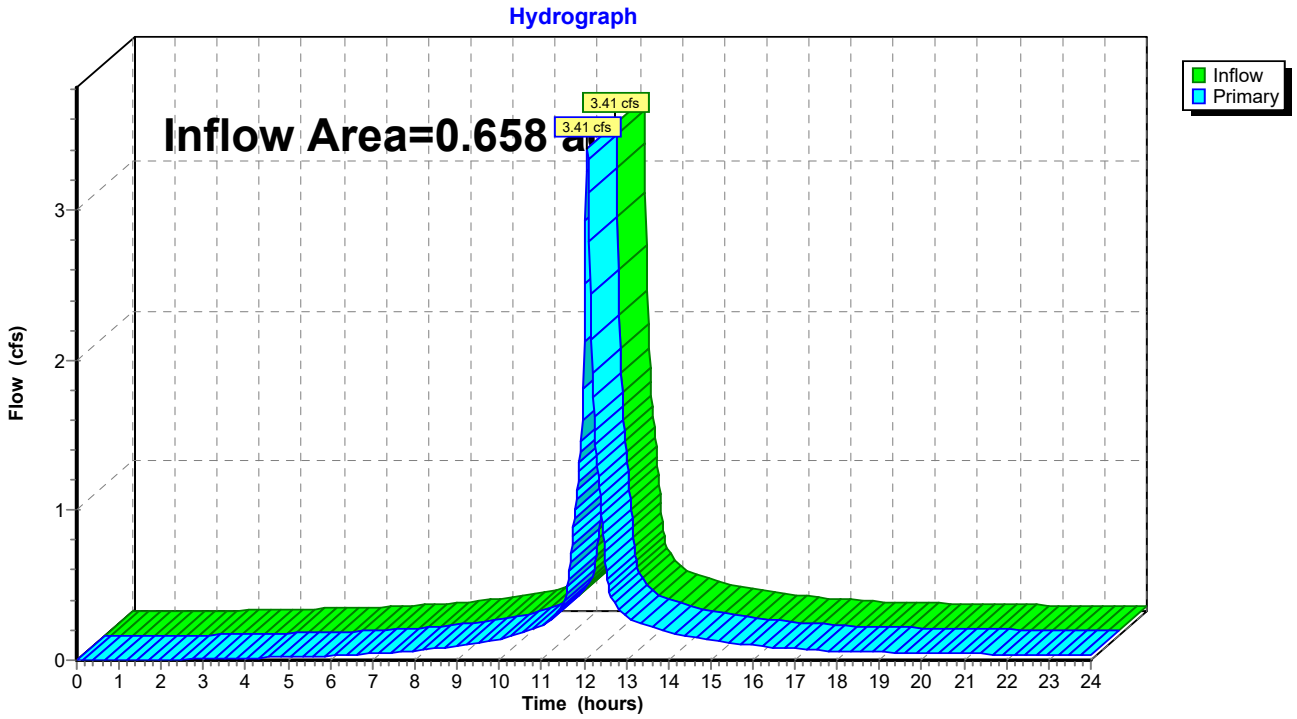


Summary for Link 2-PR: 2-PR

Inflow Area = 0.658 ac, 62.38% Impervious, Inflow Depth > 4.79" for 25-Year, 24-Hour Storm event
Inflow = 3.41 cfs @ 12.08 hrs, Volume= 0.263 af
Primary = 3.41 cfs @ 12.08 hrs, Volume= 0.263 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs

Link 2-PR: 2-PR



Time span=0.00-24.00 hrs, dt=0.02 hrs, 1201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1A-EX: 1A-EX Runoff Area=1,890 sf 26.98% Impervious Runoff Depth>5.14"
Flow Length=47' Slope=0.0100 '/' Tc=6.0 min CN=84 Runoff=0.26 cfs 0.019 af

Subcatchment1A-PR: 1A-PR Runoff Area=1,700 sf 0.00% Impervious Runoff Depth>2.70"
Flow Length=66' Tc=6.0 min CN=61 Runoff=0.12 cfs 0.009 af

Subcatchment2A-EX: 2A-EX Runoff Area=28,490 sf 80.98% Impervious Runoff Depth>6.28"
Flow Length=185' Slope=0.0100 '/' Tc=6.0 min CN=94 Runoff=4.38 cfs 0.342 af

Subcatchment2A-PR: 2A-PR Runoff Area=15,590 sf 76.01% Impervious Runoff Depth>6.40"
Flow Length=151' Tc=6.0 min CN=95 Runoff=2.42 cfs 0.191 af

Subcatchment2B-PR: 2B-PR Runoff Area=4,320 sf 100.00% Impervious Runoff Depth>6.76"
Flow Length=184' Tc=6.0 min CN=98 Runoff=0.68 cfs 0.056 af

Subcatchment2C-PR: 2C-PR Runoff Area=8,770 sf 19.61% Impervious Runoff Depth>5.47"
Flow Length=247' Tc=6.0 min CN=87 Runoff=1.24 cfs 0.092 af

Link 1-EX: 1-EX Inflow=0.26 cfs 0.019 af
Primary=0.26 cfs 0.019 af

Link 1-PR: 1-PR Inflow=0.12 cfs 0.009 af
Primary=0.12 cfs 0.009 af

Link 2-EX: 2-EX Inflow=4.38 cfs 0.342 af
Primary=4.38 cfs 0.342 af

Link 2-PR: 2-PR Inflow=4.34 cfs 0.339 af
Primary=4.34 cfs 0.339 af

Total Runoff Area = 1.395 ac Runoff Volume = 0.708 af Average Runoff Depth = 6.09"
31.75% Pervious = 0.443 ac 68.25% Impervious = 0.952 ac

Summary for Subcatchment 1A-EX: 1A-EX

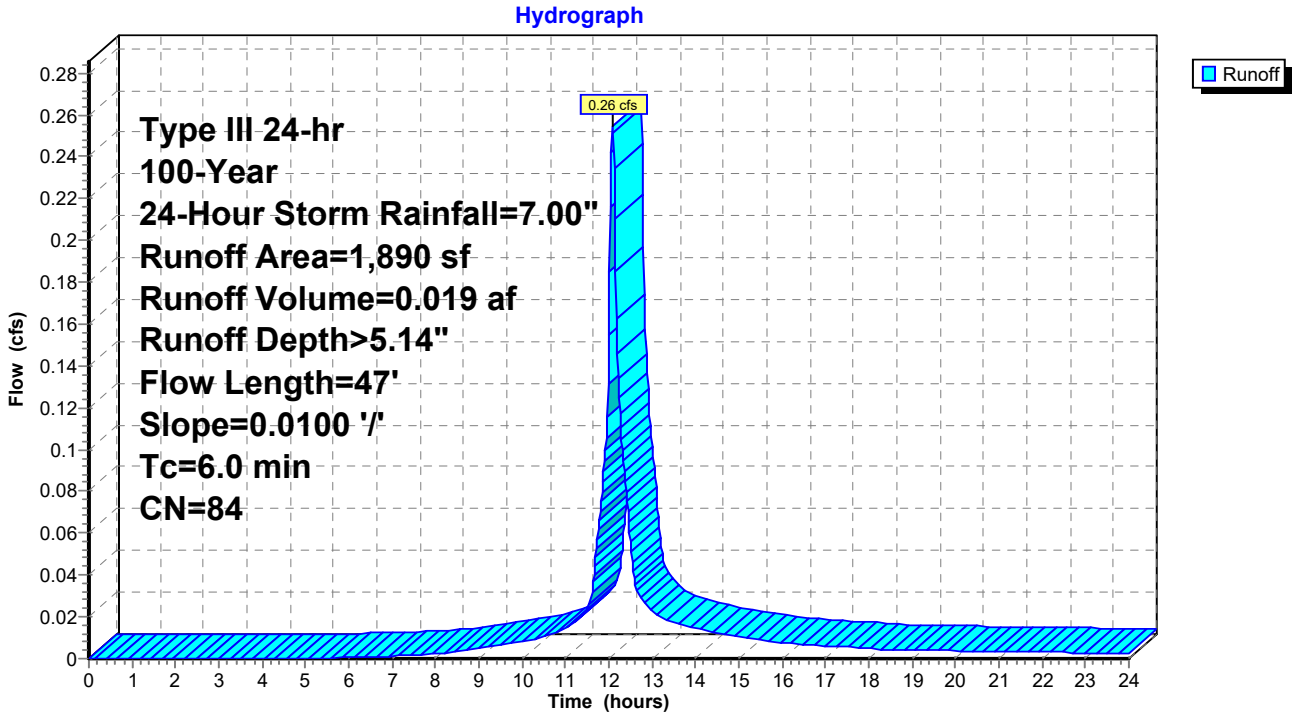
Runoff = 0.26 cfs @ 12.09 hrs, Volume= 0.019 af, Depth> 5.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year, 24-Hour Storm Rainfall=7.00"

Area (sf)	CN	Description
510	98	Paved parking, HSG B
1,380	79	<50% Grass cover, Poor, HSG B
1,890	84	Weighted Average
1,380		73.02% Pervious Area
510		26.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	25	0.0100	0.81		**Sheet Flow, Ex Pavement** Smooth surfaces n= 0.011 P2= 3.40"
0.5	22	0.0100	0.70		**Shallow Concentrated Flow, Ex Grass** Short Grass Pasture Kv= 7.0 fps
1.0	47	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1A-EX: 1A-EX



Summary for Subcatchment 1A-PR: 1A-PR

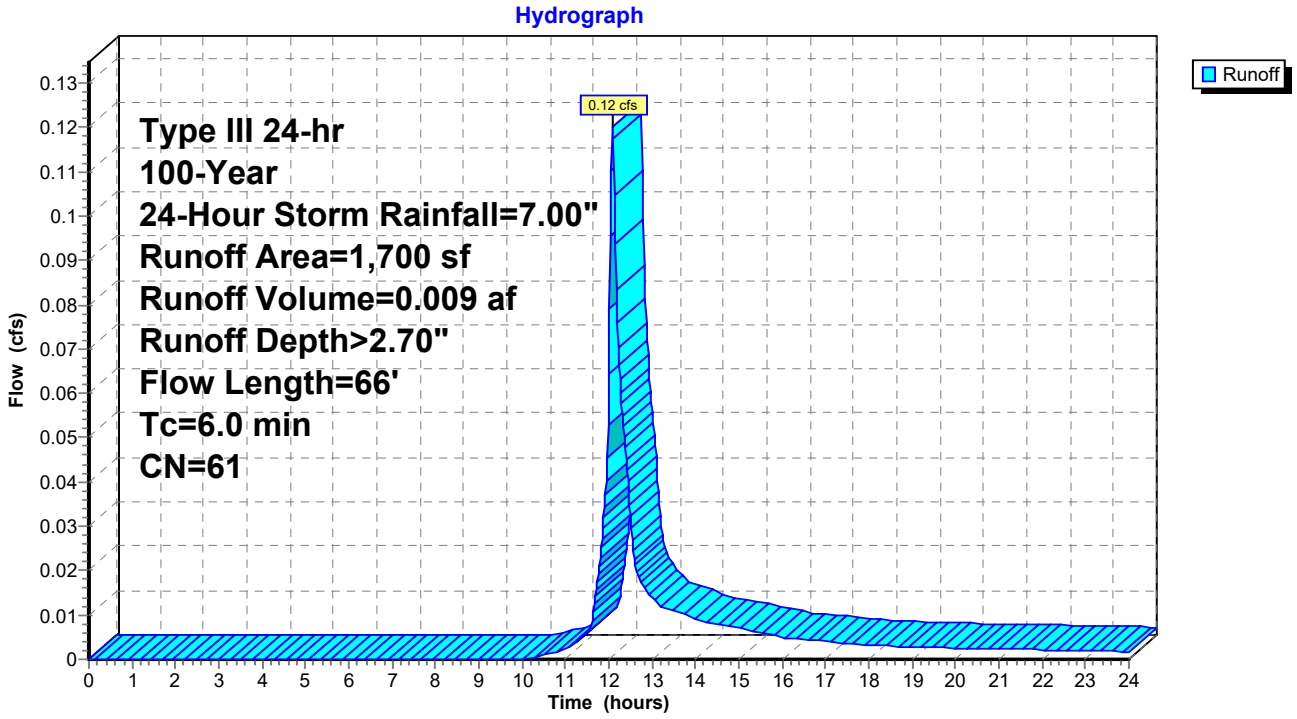
Runoff = 0.12 cfs @ 12.09 hrs, Volume= 0.009 af, Depth> 2.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year, 24-Hour Storm Rainfall=7.00"

Area (sf)	CN	Description
1,700	61	>75% Grass cover, Good, HSG B
1,700		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	21	0.0350	0.16		**Sheet Flow, Pr Grass** Grass: Short n= 0.150 P2= 3.40"
0.5	45	0.0100	1.50		**Shallow Concentrated Flow, Pr Grass Swale** Grassed Waterway Kv= 15.0 fps
2.7	66	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1A-PR: 1A-PR



Summary for Subcatchment 2A-EX: 2A-EX

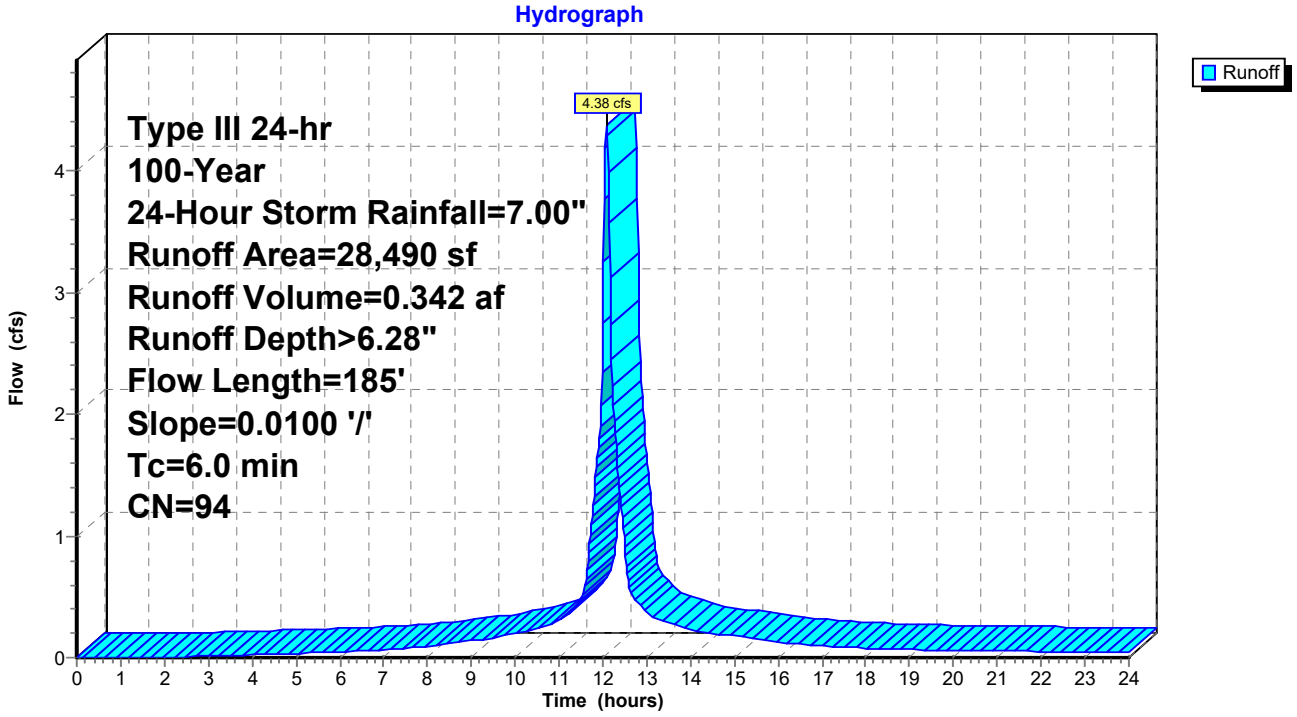
Runoff = 4.38 cfs @ 12.08 hrs, Volume= 0.342 af, Depth> 6.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year, 24-Hour Storm Rainfall=7.00"

Area (sf)	CN	Description
9,220	98	Paved parking, HSG B
13,850	98	Unconnected roofs, HSG B
5,420	79	<50% Grass cover, Poor, HSG B
28,490	94	Weighted Average
5,420		19.02% Pervious Area
23,070		80.98% Impervious Area
13,850		60.03% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	117	0.0100	1.11		**Sheet Flow, Ex Roof** Smooth surfaces n= 0.011 P2= 3.40"
0.6	25	0.0100	0.70		**Shallow Concentrated Flow, Ex Grass** Short Grass Pasture Kv= 7.0 fps
0.4	43	0.0100	2.03		**Shallow Concentrated Flow, Ex Pavement** Paved Kv= 20.3 fps
2.8	185	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2A-EX: 2A-EX



Summary for Subcatchment 2A-PR: 2A-PR

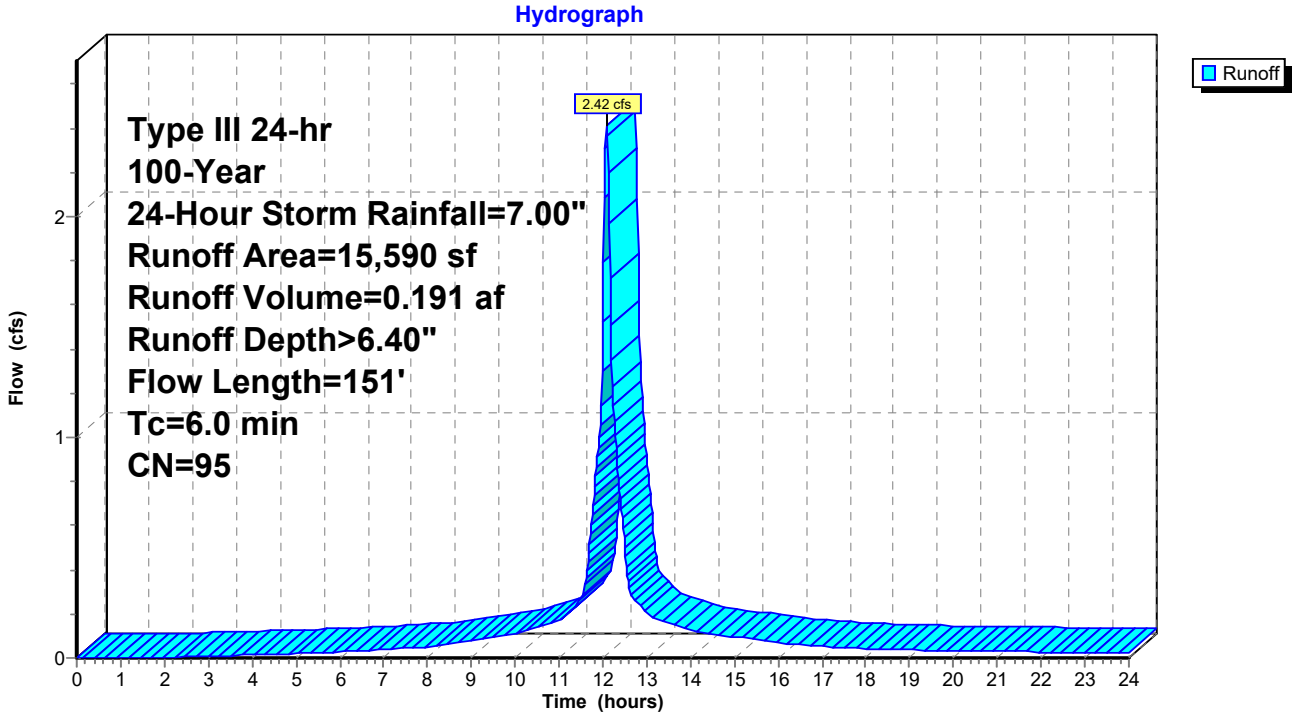
Runoff = 2.42 cfs @ 12.08 hrs, Volume= 0.191 af, Depth> 6.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year, 24-Hour Storm Rainfall=7.00"

Area (sf)	CN	Description
11,850	98	Paved parking, HSG B
1,240	61	>75% Grass cover, Good, HSG B
2,500	96	Gravel surface, HSG B
15,590	95	Weighted Average
3,740		23.99% Pervious Area
11,850		76.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	81	0.0300	1.60		**Sheet Flow, Pr Sidewalk** Smooth surfaces n= 0.011 P2= 3.40"
1.0	40	0.0100	0.70		**Shallow Concentrated Flow, Pr Grass** Short Grass Pasture Kv= 7.0 fps
0.2	30	0.0100	2.03		**Shallow Concentrated Flow, Pr Pavement** Paved Kv= 20.3 fps
2.0	151	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2A-PR: 2A-PR



Summary for Subcatchment 2B-PR: 2B-PR

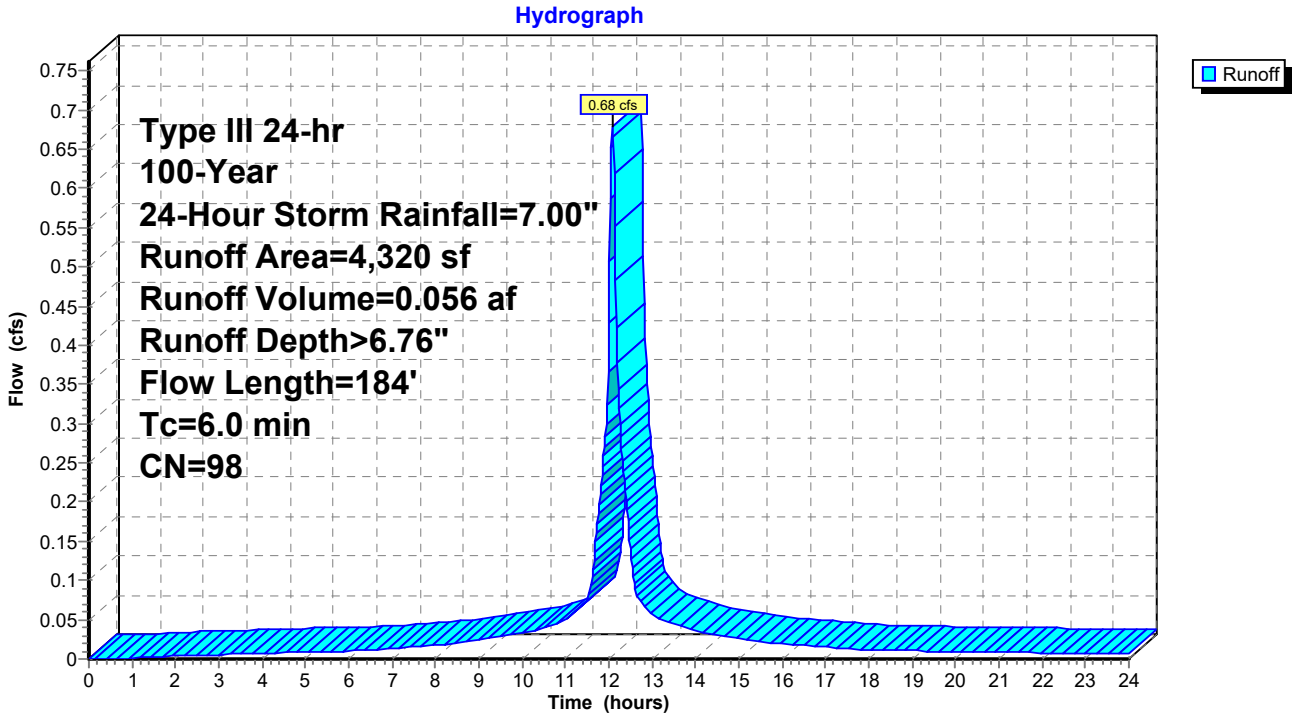
Runoff = 0.68 cfs @ 12.08 hrs, Volume= 0.056 af, Depth> 6.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year, 24-Hour Storm Rainfall=7.00"

Area (sf)	CN	Description
4,320	98	Roofs, HSG B
4,320		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	117	0.0100	1.11		**Sheet Flow, Ex Roof** Smooth surfaces n= 0.011 P2= 3.40"
0.3	67	0.0200	4.34	1.00	**Pipe Channel, Pr Roof Drain** 8.0" Round w/ 3.0" inside fill Area= 0.2 sf Perim= 1.9' r= 0.12' n= 0.012
2.1	184	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2B-PR: 2B-PR



Summary for Subcatchment 2C-PR: 2C-PR

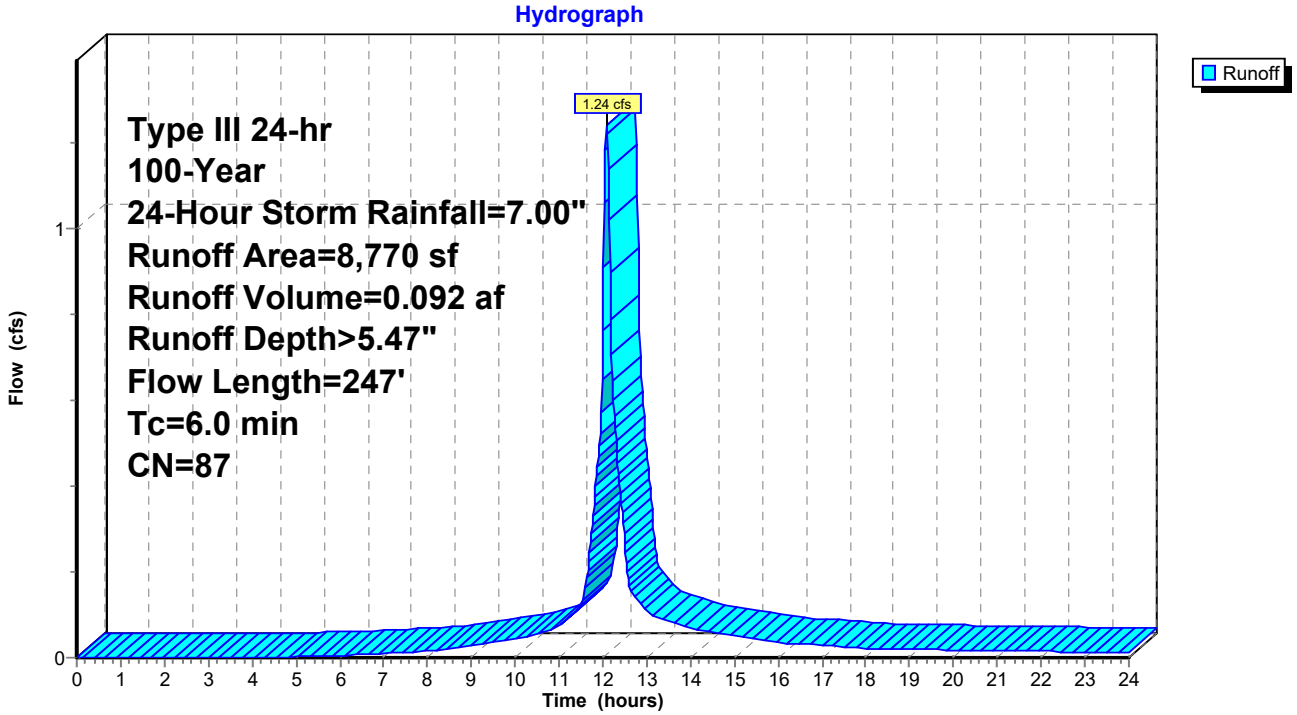
Runoff = 1.24 cfs @ 12.08 hrs, Volume= 0.092 af, Depth> 5.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year, 24-Hour Storm Rainfall=7.00"

	Area (sf)	CN	Description
	1,720	98	Roofs, HSG B
	4,050	96	Gravel surface, HSG B
*	3,000	70	Sand Multi-Use Court, HSG B
	8,770	87	Weighted Average
	7,050		80.39% Pervious Area
	1,720		19.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	57	0.0100	0.29		**Sheet Flow, Pr Gravel** Fallow n= 0.050 P2= 3.40"
0.6	190	0.0200	5.09	0.89	**Pipe Channel, Pr Underdrain** 8.0" Round w/ 4.0" inside fill Area= 0.2 sf Perim= 1.7' r= 0.10' n= 0.009 PVC, smooth interior
3.9	247	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2C-PR: 2C-PR

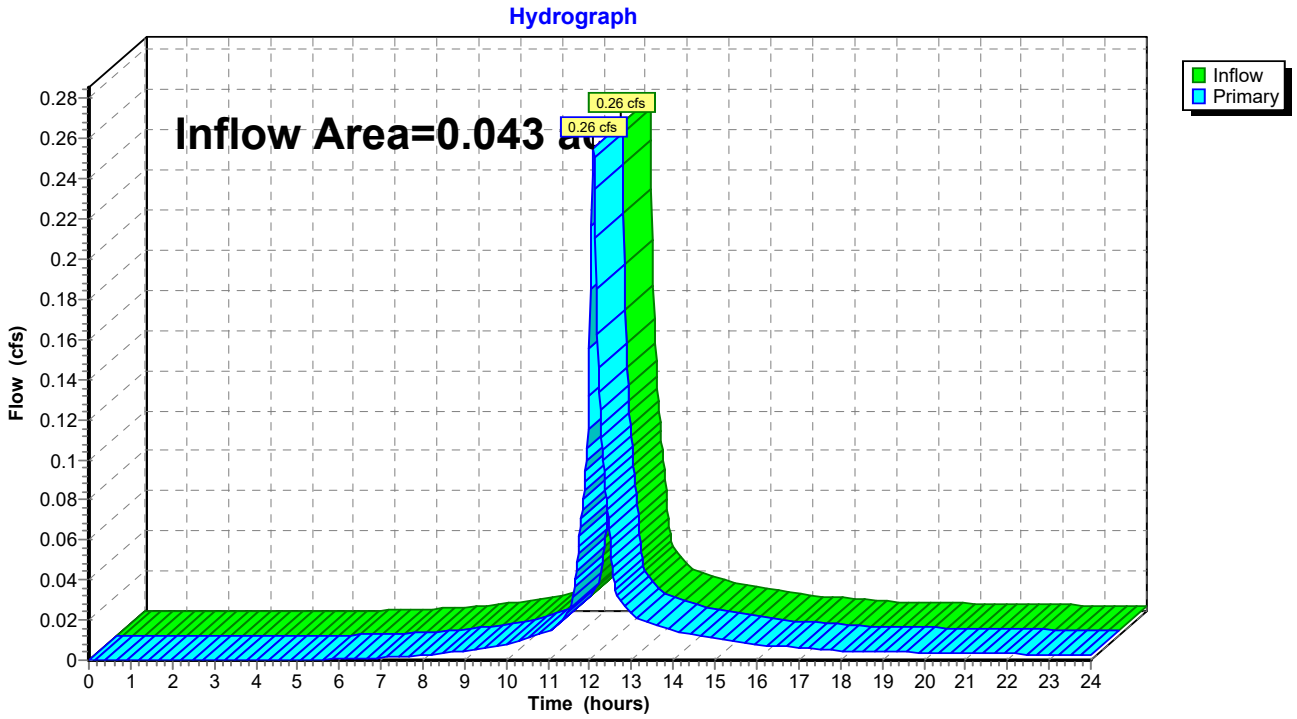


Summary for Link 1-EX: 1-EX

Inflow Area = 0.043 ac, 26.98% Impervious, Inflow Depth > 5.14" for 100-Year, 24-Hour Storm event
Inflow = 0.26 cfs @ 12.09 hrs, Volume= 0.019 af
Primary = 0.26 cfs @ 12.09 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs

Link 1-EX: 1-EX

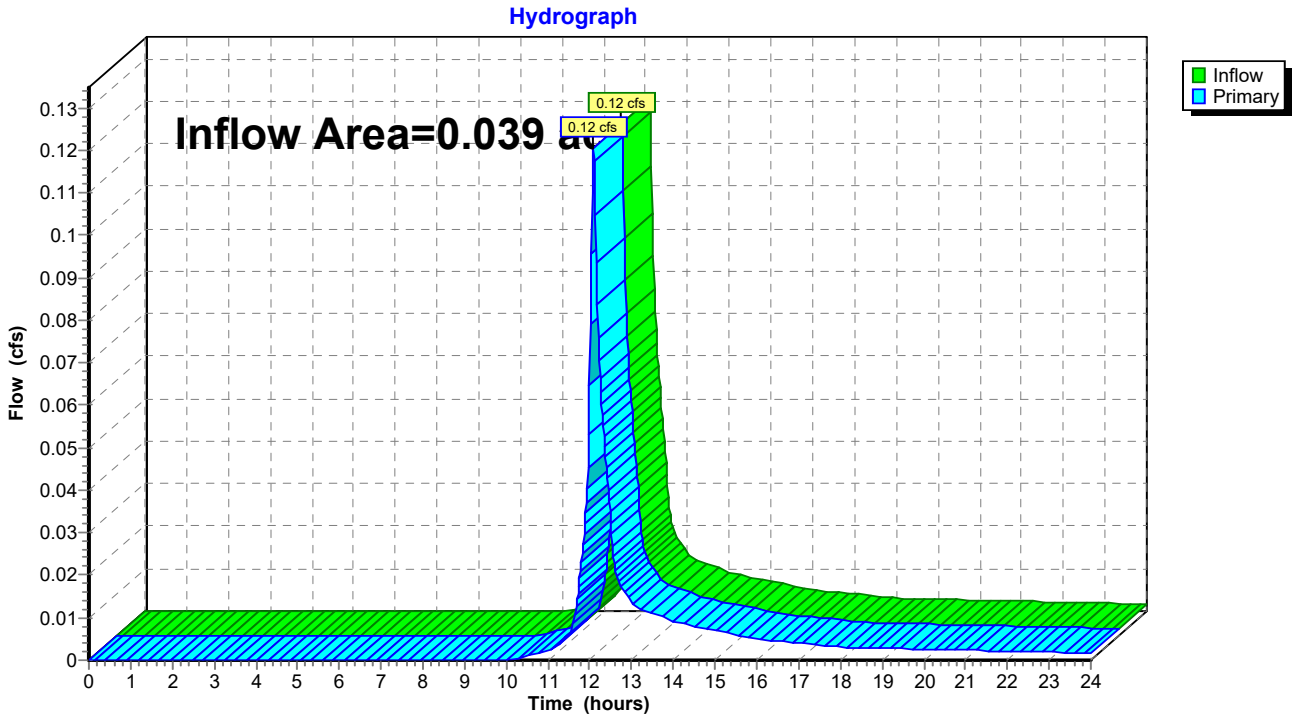


Summary for Link 1-PR: 1-PR

Inflow Area = 0.039 ac, 0.00% Impervious, Inflow Depth > 2.70" for 100-Year, 24-Hour Storm event
Inflow = 0.12 cfs @ 12.09 hrs, Volume= 0.009 af
Primary = 0.12 cfs @ 12.09 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs

Link 1-PR: 1-PR

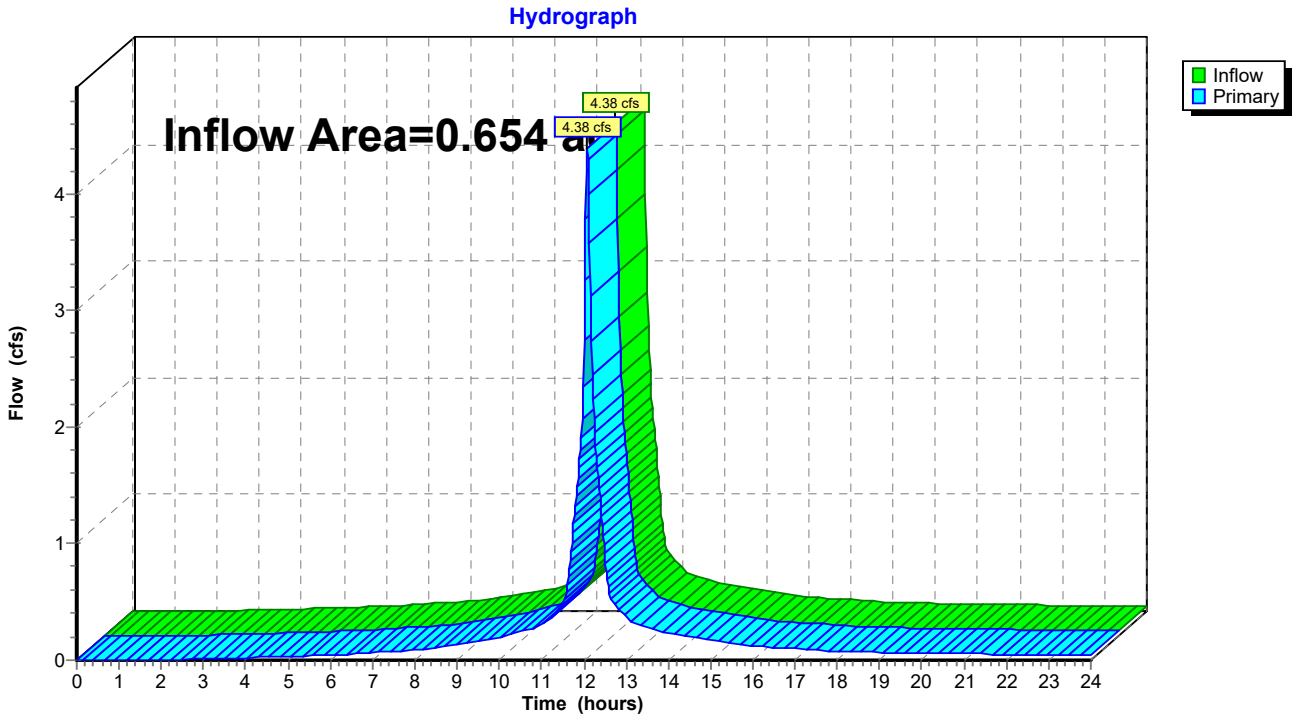


Summary for Link 2-EX: 2-EX

Inflow Area = 0.654 ac, 80.98% Impervious, Inflow Depth > 6.28" for 100-Year, 24-Hour Storm event
Inflow = 4.38 cfs @ 12.08 hrs, Volume= 0.342 af
Primary = 4.38 cfs @ 12.08 hrs, Volume= 0.342 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs

Link 2-EX: 2-EX

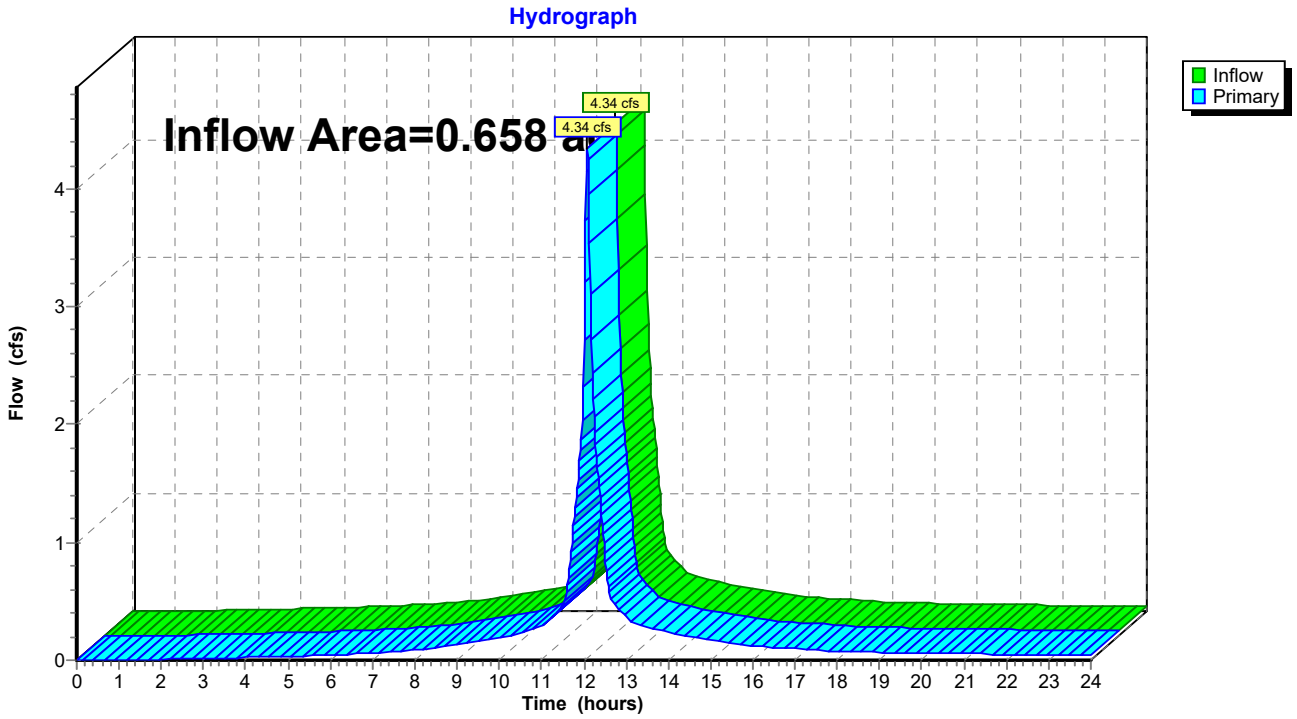


Summary for Link 2-PR: 2-PR

Inflow Area = 0.658 ac, 62.38% Impervious, Inflow Depth > 6.17" for 100-Year, 24-Hour Storm event
Inflow = 4.34 cfs @ 12.08 hrs, Volume= 0.339 af
Primary = 4.34 cfs @ 12.08 hrs, Volume= 0.339 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.02 hrs

Link 2-PR: 2-PR



TSS Calculations

Location: Subcatchment 2A

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Street Sweeping - 5%	0.05	1.00	0.05	0.95
Propprietary Water Quality Unit	0.80	0.95	0.76	0.19
	0.00	0.19	0.00	0.19
	0.00	0.19	0.00	0.19
	0.00	0.19	0.00	0.19

Total TSS Removal = 81%

Project: Paragon Boardwalk Redevelopment
Prepared By: KPS
Date: 11/17/2018

*Equals remaining load from previous BMP (E) which enters the BMP

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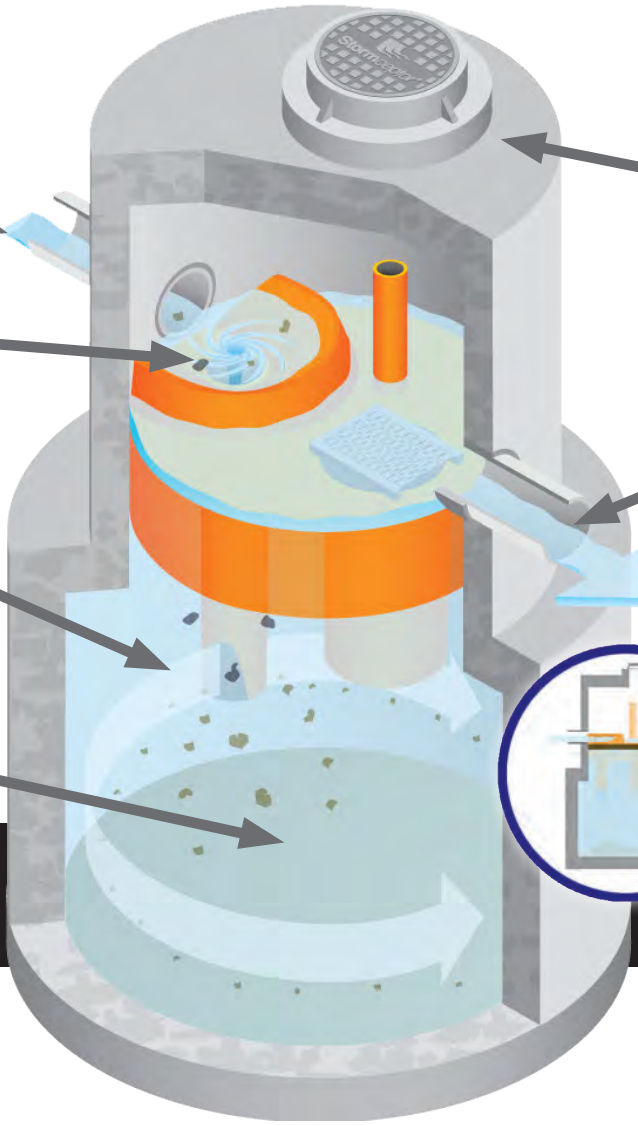

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Stormceptor® is an underground stormwater quality treatment device that is unparalleled in its effectiveness for pollutant capture and retention. With thousands of systems operating worldwide, Stormceptor delivers protection every day in every storm.

With patented technology, optimal treatment occurs by allowing free oil to rise and sediment to settle. The Stormceptor design prohibits scour and release of previously captured pollutants, ensuring superior treatment and protection during even the most extreme storm events.

Stormceptor is very easy to design and provides flexibility under varying site constraints such as tight right-of-ways, zero lot lines and retrofit projects. Design flexibility allows for a cost-effective approach to stormwater treatment. Stormceptor has proven performance backed by the longest record of lab and field verification in the industry.

Tested Performance

- Fine particle capture
- Prevents scour or release
- 95%+ Oil removal

Massachusetts – Water Quality (Q) Flow Rate

Stormceptor STC Model	Inside Diameter	Typical Depth Below Inlet Pipe Invert [1]	Water Quality Flow Rate Q [2]	Peak Conveyance Flow Rate [3]	Hydrocarbon Capacity [4]	Maximum Sediment Capacity [4]
	(ft)	(in)	(cfs)	(cfs)	(Gallons)	(ft^3)
STC 450i	4	68	0.40	5.5	86	46
STC 900	6	63	0.89	22	251	89
STC 2400	8	104	1.58	22	840	205
STC 4800	10	140	2.47	22	909	543
STC 7200	12	148	3.56	22	1,059	839
STC 11000	2 x 10	142	4.94	48	2,792	1,086
STC 16000	2 x 12	148	7.12	48	3,055	1,677

[1] Depth Below Pipe Inlet Invert to the Bottom of Base Slab, and Maximum Sediment Capacity can vary to accommodate specific site designs and pollutant loads. Depths can vary to accommodate special designs or site conditions. Contact your local representative for assistance.
[2] Water Quality Flow Rate (Q) is based on 80% annual average TSS removal of the OK110 particle size distribution.
[3] Peak Conveyance Flow Rate is based upon ideal velocity of 3 feet per second and outlet pipe diameters of 18-inch, 36-inch, and 54-inch diameters.
[4] Hydrocarbon & Sediment capacities can be modified to accommodate specific site design requirements, contact your local representative for assistance.

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MASTEP Technology Review

Technology Name: Stormceptor 450i.

Studies Reviewed: Multi-Phase Physical Model Testing of a Stormceptor STC450i

Date: March 14, 2009

Reviewers: Jerry Schoen

Rating: 2

Brief rationale for rating:

This laboratory study is generally well conducted and documented. No documentation of a quality assurance project, plan but quality control data was reported. Sediment analysis was done by the SSC method, but not the TSS method. Although SSC is considered by many scientists to be the preferred method, it is at odds with Massachusetts stormwater regulations, which are based on TSS treatment. Comparing SSC and TSS results is considered an inexact science.

TARP Requirements Not Met*:

- No documentation of a Quality Assurance Project Plan
- TSS analysis was not performed.

Other Comments

- SSC removal efficiency, calculated according to the NJDEP weighted formula, was 59.5 – 63.6%.
- SSC removal evaluated using event mean concentration and modified mass balance method, the latter considered to be a particularly accurate method of evaluating sediment removal in a laboratory setting.
- Particle Size Distribution (with d50 of 67 microns) closely matched the 55% sand, 40% silt, 5% clay mix recommended by NJDEP.
- A full range of flows (2% - 125%) was tested.
- Scour test was performed at 500% of design flow. This is more rigorous than the 125% recommended for scour tests. Effluent concentrations for the scour tests ranged from 5.9 – 6.1mg/l, not considered a significant level of scour.

* Laboratory testing was based on the NJDEP TARP laboratory testing guidelines.

Water Quality Volume, Flow Rate Calculations & Supporting Information

Water Quality Volume Flow Rate Calculations

Project Name:	Paragon Boardwalk Redevelopment	Date:	11/19/2018
Project Location:	189 Nantasket Avenue, Hull, MA	Calculated By:	KFH
Project Number:	185-317	Checked By:	KPS

Structure Name: WQU-1 Description: Stormceptor 450i

Subcatchment: Subcatchment 2A

Total Drainage Area:	15,590	sq ft
	0.36	ac
Total Impervious Area:	11,850	sq ft
	0.27	ac

** Roof Areas are considred clean and are not subject to WQV calculation*

Runoff Depth to be Treated: 1.0 inches

Required Water Quality Volume:	988	cf
	0.023	ac ft

FLOW RATE CONVERSION

$$Q = (qu)(A)(WQV)$$

Where:

Q = flow rate associated with the depth of runoff, in cfs
qu = the unit peak discharge, in csm/in.
A = impervious surface drainage area, in square miles
WQV = water quality volume in watershed inches

Given:

1-acre =	0.0015625	mi^2
6 minute =	0.01	hours
qu (**1**-inch) =	**774**	csm/in

Calculation:

qu=	**774**	
A=	0.27	ac
WQV=	1.0	in

Required Water Quality Flow Rate: 0.33 cfs

Stormceptor 450i will provide 80% TSS Removal Efficiency for flows up to 0.40 cfs

(Based on Manufacturer's sizing. See attached documentation.)

* Flow rate conversion based on the Massachusetts Department of Environmental Protection Wetlands Program - Standard Method to Convert Required Water Quality Volume to a Discharge Rate for Sizing Flow Based Manufactured Proprietary Stormwater Treatment Practices

Pipe Capacity Analysis

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Nov 19 2018

Subcatchment 2B-PR: 8in. roof drain

Circular

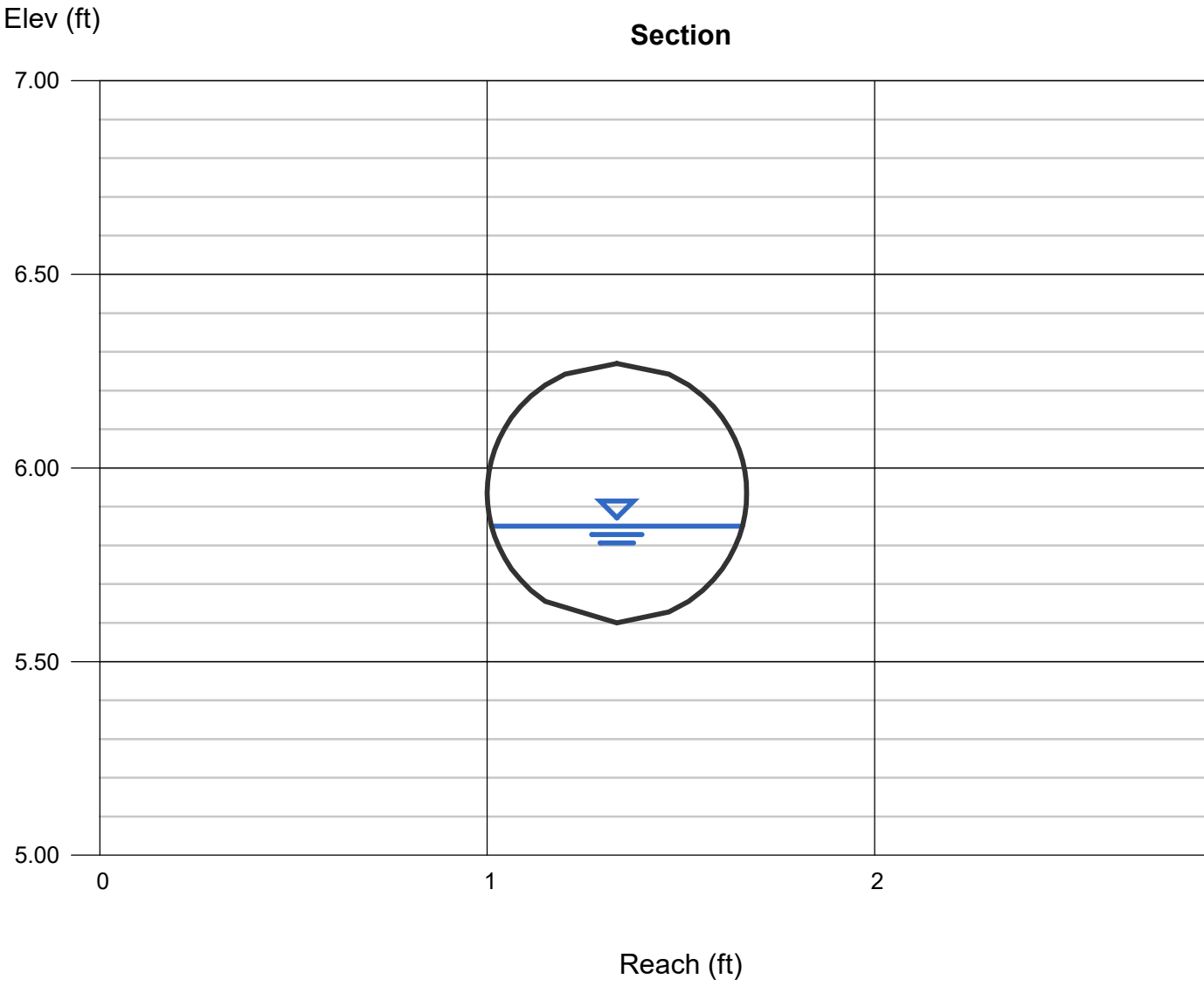
Diameter (ft)	= 0.67
Invert Elev (ft)	= 5.60
Slope (%)	= 2.00
N-Value	= 0.012

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.54

Highlighted

Depth (ft)	= 0.25
Q (cfs)	= 0.540
Area (sqft)	= 0.12
Velocity (ft/s)	= 4.50
Wetted Perim (ft)	= 0.88
Crit Depth, Yc (ft)	= 0.35
Top Width (ft)	= 0.65
EGL (ft)	= 0.56



Channel Report

Subcatchment 2C-PR: 8in. underdrain

Circular

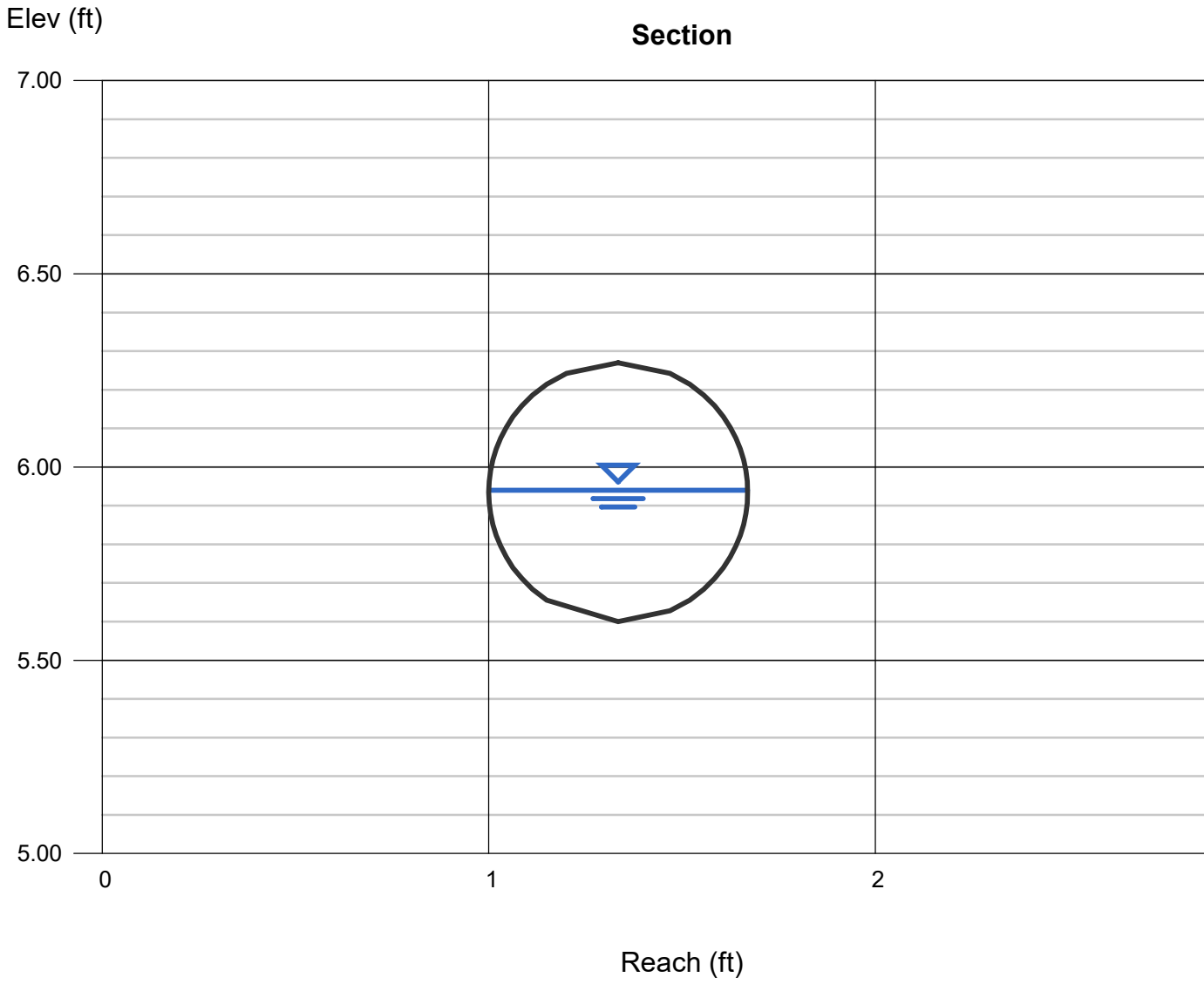
Diameter (ft)	= 0.67
Invert Elev (ft)	= 5.60
Slope (%)	= 2.00
N-Value	= 0.012

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.95

Highlighted

Depth (ft)	= 0.34
Q (cfs)	= 0.950
Area (sqft)	= 0.18
Velocity (ft/s)	= 5.26
Wetted Perim (ft)	= 1.07
Crit Depth, Yc (ft)	= 0.47
Top Width (ft)	= 0.67
EGL (ft)	= 0.77



Manufacturer’s O&M Procedures

Inspection and Maintenance. Easy. Convenient.

When it rains, oils, sediment and other contaminants are captured and contained by over 20,000 Stormceptor units operating worldwide. While Stormceptor's patented scour prevention technology ensures captured pollutants remain in the unit during all rainfall events, the accumulated pollutants must eventually be removed as part of a regular maintenance program.

If neglected, oil and sediment gradually build up and diminish any BMP's efficiency, harming the environment and leaving owners and operators vulnerable to fines, surcharges and bad publicity.

Maintenance is a must

Ease, frequency and cost of maintenance are often overlooked by specifiers when considering the merits of a stormwater treatment system. In reality, maintenance is fundamental to the long-term performance of any stormwater quality treatment device.

While regular maintenance is crucial, it shouldn't be complicated. An ongoing maintenance program with Stormceptor is convenient and practically effortless. With virtually no disruptions, you can concentrate on your core business.

Quick inspections

Inspections are easily carried out above ground from any standard surface access cover through a visual inspection of the orifice and drop tee components. A sludge judge and oil dip-stick are all that are needed for sediment and oil depth measurements.

Easy unit access

Maintenance is typically conducted from the same surface access cover, eliminating the need for confined space entry into the unit. Your site remains undisturbed, saving you time and money.

No muss, no fuss and fast

Maintenance is performed quickly and inexpensively with a standard vacuum truck. Servicing usually takes less than two hours, with no disruption to your site.

A complete stormwater management plan for Stormceptor extends beyond installation and performance to regular maintenance. It's the smart, cost-effective way to ensure your unit continues to remove more pollutants than any other separator for decades to come.

Stormceptor maintenance recommendations

- Units should be inspected post-construction, prior to being put into service.
- Inspect every six months for the first year of operation to determine the oil and sediment accumulation rate.
- In subsequent years, inspections can be based on first-year observations or local requirements.
- Cleaning is required once the sediment depth reaches 15% of storage capacity, (generally taking one year or longer). Local regulations for maintenance frequency may vary.
- Inspect the unit immediately after an oil, fuel or chemical spill.
- A licensed waste management company should remove captured petroleum waste products from any oil, chemical or fuel spills and dispose responsibly.

With over 20,000 units operating worldwide, Stormceptor performs and protects every day, in every storm.

imbrium

www.imbriumsystems.com

USA: (888) 279 8826
CANADA: (800) 565 4801

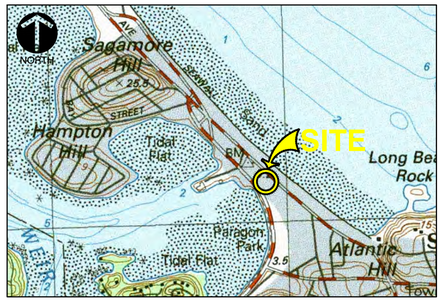
APPENDIX D

SITE PLANS

PARAGON BOARDWALK REDEVELOPMENT

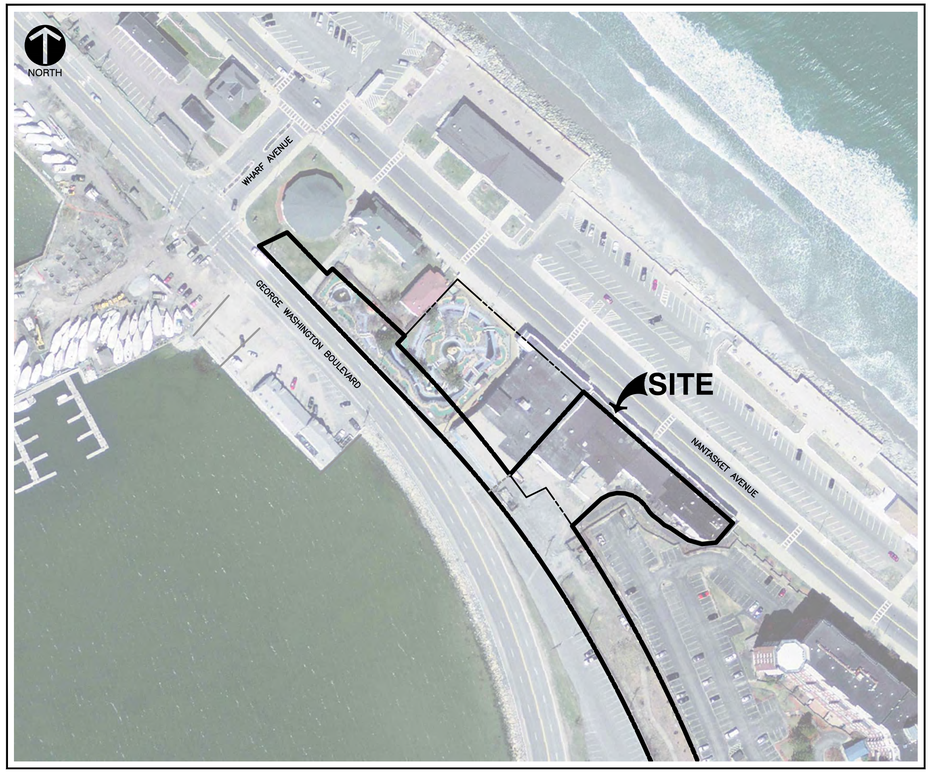
189 NANTASKET AVENUE
HULL, MASSACHUSETTS

LOCAL PERMITTING
NOVEMBER, 2018



VICINITY MAP
SCALE: 1"=1,000'

DRAWING INDEX



SITE MAP
SCALE: 1"=100'

REFERENCE: ORTHORGRAPHIC AERIAL IMAGERY AND MAPS ARE BASED ON GIS DATA OBTAINED FROM MASSGIS PROVIDED BY THE BUREAU OF GEOGRAPHIC INFORMATION (MASSGIS), COMMONWEALTH OF MASSACHUSETTS, EXECUTIVE OFFICE OF TECHNOLOGY AND SECURITY SERVICES.

OWNER/TEAM INFORMATION

CIVIL ENGINEER
CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
31 BELLOWS ROAD
RAYNHAM, MA 02767
PH: (774) 501-2176
CONTACT: KARLIS P. SKULTE, P.E.

LAND SURVEYOR
NANTASKET SURVEY ENGINEERING, LLC
46 EDGEWATER ROAD
HULL, MA 02045
PH: (781) 773-1701

ARCHITECT
HELICON DESIGN GROUP, INC.
76 SUMMER STREET
SUITE 510
BOSTON, MA 02110
PH: (617) 357-4437
CONTACT: TIM CHILSON, AIA

OWNER/APPLICANT
NANTASKET DUNE HOLDINGS, LLC
1495 HANCOCK STREET, SUITE 400
QUINCY, MA 02169

SITE DATA

ADDRESS:	189 NANTASKET AVENUE HULL, MA 02045
PARCEL I.D.:	37-002, 37-004
TOTAL AREA:	2.56 ACRES
ZONING DISTRICT:	COMMERCIAL RECREATION B

Dig Safe Systems, Inc.
1-888-DIG-SAFE
(1-888-344-7233)

SCALE IN FEET
0

COMMONWEALTH OF MASSACHUSETTS
KARLIS SKULTE
CIVIL
No. 47703
REGISTERED
PROFESSIONAL ENGINEER
11/20/2018

REVISION RECORD

NO	DATE	DESCRIPTION

Civil & Environmental Consultants, Inc.
31 Bellows Road · Raynham, MA 02767
Ph: 774.501.2176 · 866.312.2024 · Fax: 774.501.2669
www.cecinc.com

PARAGON BOARDWALK
NANTASKET BEACH
HULL, MASSACHUSETTS
NANTASKET DUNE HOLDINGS, LLC.

COVER SHEET

DATE:	NOVEMBER 20, 2018
DWG SCALE:	AS SHOWN
PROJECT NO.:	185-317
DRAWN BY:	CCR
CHECKED BY:	KPS
APPROVED BY:	KPS

DRAWING NO.: **C000**
SHEET 1 OF 9

P:\2018\185-317\-CAD\Dwg\C001-NOTES\185317-CVR1-C000-COVER.dwg[COVER] LS(1/19/2018 - saulm) - LP: 11/20/2018 8:55 PM

GENERAL NOTES

1. EXISTING CONDITIONS AS DEPICTED ON THESE PLANS ARE GENERAL AND ILLUSTRATIVE IN NATURE. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO EXAMINE THE SITE AND BE FAMILIAR WITH EXISTING CONDITIONS PRIOR TO BIDDING ON THIS PROJECT. IF CONDITIONS ENCOUNTERED DURING EXAMINATION ARE SIGNIFICANTLY DIFFERENT FROM THOSE SHOWN, THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY.
2. TOPOGRAPHIC AND BOUNDARY SURVEY WAS PERFORMED BY NANTASKET SURVEY ENGINEERING, LLC., ON NOVEMBER 2, 2017 AND IS DEPICTED ON AN EXISTING CONDITIONS PLAN ENTITLED "EXISTING CONDITIONS PLAN" DATED JANUARY 10, 2018 TOPOGRAPHIC AND BOUNDARY SURVEY WAS PERFORMED BY NANTASKET SURVEY ENGINEERING, LLC, ON NOVEMBER 2, 2017 AND IS DEPICTED ON AN EXISTING CONDITIONS PLAN ENTITLED "EXISTING CONDITIONS PLAN" DATED JANUARY 10, 2018. CEC IS NOT RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN. THE INFORMATION DEPICTED WAS SUPPLEMENTED WITH RECORD INFORMATION AND OBSERVATIONS FROM FIELD INVESTIGATION PERFORMED BY CEC IN NOVEMBER 2018.
3. THE CONTRACTOR SHALL VERIFY LOCATION AND ELEVATION OF ALL EXISTING UTILITIES (INCLUDING THOSE LABELED PER RECORD DATA) PRIOR TO THE BEGINNING OF CONSTRUCTION OR EARTH MOVING OPERATIONS. INFORM ENGINEER OF ANY CONFLICTS DETRIMENTAL TO THE DESIGN INTENT.
4. THE CONTRACTOR SHALL CALL DIGSAFE AT 1-800-322-4844 AT LEAST 72 HOURS, SATURDAYS, SUNDAYS, AND HOLIDAYS EXCLUDED, PRIOR TO EXCAVATING AT ANY LOCATION. A COPY OF THE DIGSAFE PROJECT REFERENCE NUMBER(S) SHALL BE GIVEN TO THE OWNER AND ENGINEER PRIOR TO EXCAVATION.
5. THE CONTRACTOR AND SUBCONTRACTORS SHALL BE RESPONSIBLE FOR COMPLYING WITH APPLICABLE FEDERAL, STATE AND LOCAL REQUIREMENTS, TOGETHER WITH EXERCISING PRECAUTIONS AT ALL TIMES FOR THE PROTECTION OF PERSONS (INCLUDING EMPLOYEES) AND PROPERTY. IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND SUBCONTRACTORS TO INITIATE, MAINTAIN AND SUPERVISE ALL SAFETY REQUIREMENTS, PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK.
6. THE CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS THE OWNER AND OWNER'S REPRESENTATIVE FOR ANY AND ALL INJURIES AND/OR DAMAGES TO PERSONNEL, EQUIPMENT AND/OR EXISTING FACILITIES OCCURRING IN THE COURSE OF THE DEMOLITION AND CONSTRUCTION DESCRIBED IN THE PLANS AND SPECIFICATIONS.
7. CONTRACTOR SHALL OBTAIN A PERMIT FOR ALL CONSTRUCTION ACTIVITIES IN ACCORDANCE WITH LOCAL, STATE, & FEDERAL REGULATIONS.
8. THE CONTRACTOR SHALL COMPLY WITH ALL LOCAL CODES, OBTAIN ALL APPLICABLE PERMITS, AND PAY ALL REQUIRED FEES PRIOR TO BEGINNING WORK.
9. ANY WORK PERFORMED IN RIGHT OF WAYS SHALL BE IN ACCORDANCE WITH THE APPLICABLE LOCAL OR STATE REQUIREMENTS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN THE NECESSARY PERMITS FOR THE WORK, SCHEDULE NECESSARY INSPECTIONS, AND PROVIDE THE NECESSARY TRAFFIC CONTROL MEASURES AND DEVICES, ETC., FOR WORK PERFORMED IN THE RIGHT OF WAYS.
10. THE CONTRACTOR IS TO PERFORM ALL INSPECTIONS AS REQUIRED BY THE UNITED STATES EPA FOR THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT AND FURNISH OWNERS REPRESENTATIVE WITH WRITTEN REPORTS.
11. CONTRACTOR SHALL IMPLEMENT ALL SOIL AND EROSION CONTROL, PRACTICES IN ACCORDANCE WITH THE EROSION AND SEDIMENT CONTROL PLAN, STORM WATER POLLUTION PREVENTION PLAN AND STATE AND LOCAL REGULATIONS.
12. ALL GROUND SURFACE AREAS THAT HAVE BEEN EXPOSED OR LEFT BARE AS A RESULT OF CONSTRUCTION AND ARE TO FINAL GRADE AND ARE TO REMAIN SO, SHALL BE SEEDED AND MULCHED AS SOON AS PRACTICAL IN ACCORDANCE WITH SPECIFICATIONS. IF NO SPECIFICATIONS ARE SUPPLIED, USE STATE OF MASSACHUSETTS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS.
13. ITEM NUMBERS REFER TO THE MASSACHUSETTS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS, AND ALL CONSTRUCTION WORK SHALL BE DONE ACCORDING TO SAID SPECIFICATIONS AND IN ACCORDANCE WITH APPLICABLE STANDARDS OF THE TOWN OF HULL. WHEN IN CONFLICT, THE TOWN OF HULL REQUIREMENTS SHALL PREVAIL.
14. ALL WORK PERFORMED BY THE CONTRACTOR SHALL CONFORM TO THE LATEST REGULATIONS OF THE AMERICANS WITH DISABILITIES ACT.
15. THE CONTRACTOR SHALL REFER TO OTHER PLANS WITHIN THIS CONSTRUCTION SET FOR OTHER PERTINENT INFORMATION. IT IS NOT THE ENGINEER'S INTENT THAT ANY SINGLE PLAN SHEET IN THIS SET OF DOCUMENTS FULLY DEPICT ALL WORK ASSOCIATED WITH THE PROJECT.
16. BEFORE INSTALLATION OF STORM OR SANITARY SEWER, OR OTHER UTILITY, THE CONTRACTOR SHALL VERIFY ALL CROSSINGS, BY EXCAVATION WHERE NECESSARY, AND INFORM THE OWNER AND THE ENGINEER OF ANY CONFLICTS. THE ENGINEER WILL BE HELD HARMLESS IN THE EVENT HE IS NOT NOTIFIED OF DESIGN CONFLICTS PRIOR TO CONSTRUCTION.
17. ADJUST/RECONSTRUCT ALL EXISTING CASTINGS, CLEANOUTS, ETC. WITHIN PROJECT AREA TO GRADE AS REQUIRED.
18. CONTRACTOR TO REMOVE & REPLACE PAVEMENT AS SPECIFIED.
19. ALL STANDARD PARKING PLACES ARE 9' WIDE BY 20' LONG.
20. SITE SIGNAGE AND STRIPING SHALL BE IN ACCORDANCE WITH THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.

DEMOLITION NOTES

1. ALL EXISTING ABOVE AND BELOW GROUND STRUCTURES WITHIN THE LIMITS OF CONSTRUCTION SHALL BE REMOVED UNLESS NOTED OTHERWISE WITHIN THIS CONSTRUCTION SET AND/OR PROJECT SPECIFICATIONS. THIS INCLUDES FOUNDATION SLABS, WALLS AND FOOTINGS. CAVITIES LEFT BY STRUCTURE REMOVAL SHALL BE BACKFILLED WITH SATISFACTORY MATERIALS AND COMPACTED TO THE GEOTECHNICAL ENGINEER'S RECOMMENDATION.
2. NO TREES SHALL BE REMOVED, NOR VEGETATION DISTURBED BEYOND THE LIMITS OF CONSTRUCTION WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE OWNER'S REPRESENTATIVE.
3. TREE PROTECTION FENCING SHALL BE IN ACCORDANCE WITH THE DETAILED DRAWINGS. DO NOT OPERATE OR STORE EQUIPMENT, NOR HANDLE OR STORE MATERIALS WITHIN THE DRIP LINES OF THE TREES SHOWN TO REMAIN.
4. PROTECTION OF EXISTING TREES AND VEGETATION: PROTECT EXISTING TREES AND OTHER VEGETATION INDICATED TO REMAIN IN PLACE AGAINST UNNECESSARY CUTTING, BREAKING OR SKINNING OF ROOTS, SKINNING OR BRUISING OF BARK, SMOTHERING OF TREES BY STOCKPILING CONSTRUCTION MATERIALS OR EXCAVATED MATERIALS WITHIN DRIP LINE, EXCESS FOOT OR VEHICULAR TRAFFIC, OR PARKING OF VEHICLES WITHIN DRIP LINE. PROVIDE TEMPORARY GUARDS TO PROTECT TREES AND VEGETATION TO BE LEFT STANDING.
5. ALL DEMOLITION WASTE AND CONSTRUCTION DEBRIS SHALL BECOME THE PROPERTY OF THE CONTRACTOR UNLESS OTHERWISE DESIGNATED AND SHALL BE REMOVED BY THE CONTRACTOR AND DISPOSED OF OFFSITE IN A STATE APPROVED WASTE SITE AND IN ACCORDANCE WITH ALL LOCAL AND STATE CODES AND PERMIT REQUIREMENTS. TAKE CARE TO PROTECT UTILITIES THAT ARE TO REMAIN. REPAIR DAMAGE ACCORDING TO THE APPROPRIATE UTILITY COMPANY STANDARDS AND AT THE CONTRACTOR'S EXPENSE.
6. ALL UTILITY DISCONNECTION, REMOVAL, RELOCATION, CUTTING, CAPPING AND/OR ABANDONMENT SHALL BE COORDINATED WITH THE APPROPRIATE UTILITY COMPANY / AGENCY.
7. THE BURNING OF CLEARED MATERIAL AND DEBRIS SHALL NOT BE ALLOWED UNLESS CONTRACTOR OBTAINS PRIOR WRITTEN AUTHORIZATION FROM THE LOCAL AUTHORITIES.
8. EROSION & SEDIMENT CONTROL MEASURES AROUND AREAS OF DEMOLITION SHALL BE PROPERLY INSTALLED AND FUNCTION PROPERLY PRIOR TO INITIALIZATION OF DEMOLITION ACTIVITIES.
9. IF ASBESTOS OR HAZARDOUS MATERIALS ARE FOUND ON SITE, SUCH MATERIALS SHALL BE REMOVED BY A LICENSED HAZARDOUS MATERIALS CONTRACTOR. CONTRACTOR SHALL NOTIFY OWNER IMMEDIATELY IF HAZARDOUS MATERIALS ARE ENCOUNTERED.
10. CONTRACTOR SHALL ADHERE TO ALL LOCAL, STATE, FEDERAL AND OSHA REGULATIONS DURING ALL DEMOLITION ACTIVITIES.
11. CONTRACTOR SHALL PROTECT ALL CORNER PINS, MONUMENTS, PROPERTY CORNERS AND BENCHMARKS DURING DEMOLITION ACTIVITIES. IF DISTURBED, CONTRACTOR SHALL HAVE DISTURBED ITEMS RESET BY A LICENSED SURVEYOR AT NO ADDITIONAL COST TO THE OWNER.
12. CONTRACTOR SHALL PROTECT ALL EXISTING UTILITIES, STRUCTURES, AND FEATURES TO REMAIN. ANY ITEMS TO REMAIN THAT HAVE BEEN DISTURBED OR DAMAGED AS A RESULT OF CONSTRUCTION SHALL BE REPAIRED OR REPLACED BY THE CONTRACTOR AT CONTRACTOR'S EXPENSE.
13. CONTRACTOR SHALL PROVIDE AND MAINTAIN TRAFFIC CONTROL MEASURES IN ACCORDANCE WITH STATE DEPARTMENT OF TRANSPORTATION REGULATIONS AND AS REQUIRED BY LOCAL AGENCIES WHEN WORKING IN AND/OR ALONG STREETS, ROADS, HIGHWAYS, ETC.. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN APPROVAL AND COORDINATE WITH LOCAL AND/OR STATE AGENCIES REGARDING THE NEED, EXTENT AND LIMITATIONS ASSOCIATED WITH INSTALLING AND MAINTAINING TRAFFIC CONTROL MEASURES.
14. PROVIDE NEAT, STRAIGHT, FULL DEPTH, SAW CUTS OF EXISTING PAVEMENT WHERE INDICATED ALONG LIMITS OF PAVEMENT DEMOLITION.
15. ALL UTILITY AND STRUCTURE REMOVAL, RELOCATION, CUTTING, CAPPING AND/OR ABANDONMENT SHALL BE COORDINATED AND PROPERLY DOCUMENTED BY A CERTIFIED PROFESSIONAL, WHEN APPLICABLE, WITH THE APPROPRIATE UTILITY COMPANY, MUNICIPALITY AND/OR AGENCY. DEMOLITION OF REGULATED ITEMS MAY INCLUDE, BUT ARE NOT LIMITED TO WELLS, ASBESTOS, UNDER GROUND STORAGE TANKS, SEPTIC TANKS AND ELECTRIC TRANSFORMERS. DEMOLITION CONTRACTOR SHALL REFER TO ANY ENVIRONMENTAL STUDIES FOR DEMOLITION RECOMMENDATIONS AND GUIDANCE. AVAILABLE ENVIRONMENTAL STUDIES MAY INCLUDE, BUT ARE NOT LIMITED TO PHASE I ESA, PHASE II, WETLAND AND STREAM DELINEATION AND ASBESTOS SURVEY. ALL APPLICABLE ENVIRONMENTAL STUDIES SHALL BE MADE AVAILABLE UPON REQUEST.
16. ALL PAVEMENT, BASE COURSES, SIDEWALKS, CURBS, BUILDINGS, FOUNDATIONS, ETC., WITHIN THE AREA TO BE DEMOLISHED SHALL BE REMOVED TO FULL DEPTH. EXISTING BASE COURSE MATERIALS MAY BE WORKED INTO THE NEW PAVEMENT OR BUILDING SUBGRADE IF THE GRADATION, CONSISTENCY, COMPACTION, SUBGRADE CONDITION, ETC., ARE IN ACCORDANCE WITH THE SPECIFICATIONS AND RECOMMENDATIONS OF THE REPORT OF GEOTECHNICAL INVESTIGATION. BASE COURSE MATERIALS SHALL NOT BE WORKED INTO THE SUBGRADE AREAS TO RECEIVE LANDSCAPING.
17. THE CONTRACTOR SHALL USE SUITABLE METHODS TO CONTROL DUST AND DIRT CAUSED BY THE DEMOLITION ACTIVITIES.

LAYOUT NOTES

1. THE CONTRACTOR SHALL CHECK EXISTING GRADES, DIMENSIONS, AND INVERTS IN THE FIELD AND REPORT ANY DISCREPANCIES TO THE OWNER'S REPRESENTATIVE PRIOR TO BEGINNING WORK.
2. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION OF ALL EXISTING UTILITIES, INCLUDING IRRIGATION LINES. TAKE CARE TO PROTECT UTILITIES THAT ARE TO REMAIN. RELOCATE EXISTING UTILITIES AS INDICATED, OR AS NECESSARY FOR CONSTRUCTION.
3. PROVIDE A SMOOTH TRANSITION BETWEEN EXISTING PAVEMENT AND NEW PAVEMENT. FIELD ADJUSTMENT OF FINAL GRADES MAY BE NECESSARY. INSTALL ALL UTILITIES, INCLUDING IRRIGATION SLEEVING, PRIOR TO INSTALLATION OF PAVED SURFACES.
4. THE CONTRACTOR SHALL PROTECT ALL TREES TO REMAIN IN ACCORDANCE WITH THE SPECIFICATIONS.
5. ALL DAMAGE TO EXISTING PAVEMENT TO REMAIN, WHICH RESULTS FROM THE CONTRACTOR'S OPERATIONS SHALL BE REPLACED WITH LIKE MATERIALS AT THE CONTRACTOR'S EXPENSE.
6. SITE DIMENSIONS SHOWN ARE TO THE FACE OF CURB, OR EDGE OF PAVEMENT UNLESS OTHERWISE NOTED.
7. COORDINATES ARE FOR BUILDING COLUMNS, EXTERIOR BUILDING WALL, CENTER OF DRIVEWAYS, CENTER OF SANITARY SEWER MANHOLES, AND CENTER OF STRUCTURE PLACED SIX INCHES INSIDE FACE OF CURB FOR DRAIN INLETS, UNLESS OTHERWISE NOTED.
8. CONTRACTOR SHALL MAINTAIN ONE SET OF AS-BUILT / RECORD DRAWINGS ON-SITE DURING CONSTRUCTION FOR DISTRIBUTION TO THE OWNER AND/OR OWNER'S REPRESENTATIVE UPON COMPLETION.
9. REFER TO THE ARCHITECTURAL, PLUMBING & ELECTRICAL DRAWINGS FOR EXACT DIMENSIONS AND LOCATIONS OF UTILITY SERVICE ENTRY LOCATIONS AND PRECISE BUILDING DIMENSIONS.
10. THIS SITE LAYOUT IS SPECIFIC TO THE APPROVALS NECESSARY FOR THE CONSTRUCTION IN ACCORDANCE WITH THE TOWN OF HULL. NO CHANGES TO THE SITE LAYOUT ARE ALLOWED WITHOUT THE WRITTEN APPROVAL OF THE ENGINEER. CHANGES MADE TO THE SITE LAYOUT WITHOUT APPROVAL IS SOLELY THE RESPONSIBILITY OF THE CONTRACTOR. CHANGES INCLUDE BUT ARE NOT LIMITED TO, INCREASED IMPERVIOUS PAVEMENT, ADDITION / DELETION OF PARKING SPACES, MOVEMENT OF CURB LINES, CHANGES TO DRAINAGE STRUCTURES AND PATTERNS, LANDSCAPING, ETC.

GRADING NOTES

1. ALL PROPOSED GRADES SHOWN ARE FINAL GRADES, TOP OF GROUND LEVEL, OR TOP OF PAVEMENT, OR GRATE ELEVATION AT THE DRAWDOWN POINT, UNLESS INDICATED OTHERWISE.
2. REFER TO AND FOLLOW THE RECOMMENDATIONS OF THE GEOTECHNICAL REPORT PREPARED FOR THIS PROJECT (AS APPLICABLE).
3. ALL FILL UNDER PAVEMENT SHALL BE COMPACTED TO THE GEOTECHNICAL ENGINEER'S RECOMMENDATIONS.
4. ALL ELEVATIONS SHOWN ARE FINISHED GRADE ELEVATIONS.
5. CONTRACTOR SHALL STRICTLY ADHERE TO THE EROSION & SEDIMENT CONTROL PLAN PREPARED FOR THIS PROJECT.
6. EARTHWORK SHALL INCLUDE CLEARING AND GRUBBING, STRIPPING AND STOCKPILING TOPSOIL, MASS GRADING, EXCAVATION, FILLING, UNDER CUT AND REPLACEMENT, IF REQUIRED, AND COMPACTION.
7. CONTRACTOR TO REFILL UNDERCUT AREAS WITH SUITABLE MATERIAL AND COMPACT AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.
8. PLACE TOPSOIL OVER THE SUBGRADE OF UNPAVED, DISTURBED AREAS TO A DEPTH INDICATED ON THE LANDSCAPE PLANS (6 INCHES MINIMUM).
9. PAVEMENT SLOPES ACROSS ACCESSIBLE PARKING STALLS AND ADJOINING ACCESS AISLES SHALL BE MAXIMUM 2% AND SHALL CONFORM TO THE LATEST REGULATIONS OF THE AMERICANS WITH DISABILITIES ACT.
10. ALL SLOPES IN NON-PAVED AREAS SHALL BE 3:1 (HORIZONTAL:VERTICAL) MAXIMUM UNLESS NOTED OTHERWISE.
11. ALL AREAS NOT PAVED SHALL BE STABILIZED IN ACCORDANCE WITH THE EROSION & SEDIMENT CONTROL PLAN, UNLESS NOTED OTHERWISE.
12. COMPACTED FILLS ARE TO BE MADE TO A MINIMUM OF THREE FEET ABOVE THE CROWN OF ANY PROPOSED SEWER PRIOR TO CUTTING OF TRENCHES FOR PLACEMENT OF SAID SEWERS. ALL FILLS SHALL BE CONTROLLED, COMPACTED, AND INSPECTED BY AN APPROVED TESTING LABORATORY.
13. ALL EXCESS SOIL MATERIALS SHALL BECOME THE PROPERTY OF THE CONTRACTOR UNLESS OTHERWISE DESIGNATED SHALL BE REMOVED BY THE CONTRACTOR AND DISPOSED OF OFFSITE AT NO ADDITIONAL COST TO THE OWNER IN ACCORDANCE WITH ALL LOCAL AND STATE CODES AND PERMIT REQUIREMENTS.
14. THE CONTRACTOR IS RESPONSIBLE FOR BALANCING THE SITE EARTHWORK BY IMPORTING OR EXPORTING AS NECESSARY TO ACHIEVE DESIGN GRADES AND SPECIFICATIONS.

STORM DRAINAGE NOTES

1. DISTANCES SHOWN ON PIPING ARE HORIZONTAL DISTANCES FROM CENTER OF STRUCTURE TO CENTER OF STRUCTURE, UNLESS OTHERWISE NOTED.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH THE INSTALLATION, INSPECTION, TESTING AND FINAL ACCEPTANCE OF ALL NEW STORMWATER MANAGEMENT FACILITIES CONSTRUCTION. CONTRACTOR SHALL COORDINATE WITH ALL APPLICABLE REGULATING AGENCIES CONCERNING INSTALLATION, INSPECTION AND APPROVAL OF THE STORM DRAINAGE SYSTEM CONSTRUCTION.
3. ALL STORMWATER MANAGEMENT FACILITIES, INCLUDING COLLECTION AND CONVEYANCE STRUCTURES SHALL BE INSTALLED IN ACCORDANCE WITH ALL APPLICABLE LOCAL AND STATE CODES AND REGULATIONS.
4. FOR EXACT LOCATION OF DOWN SPOUTS & ROOF DRAINS, CONTRACTOR IS TO COORDINATE WITH ARCHITECTURAL AND PLUMBING DRAWINGS.
5. ALL PROPOSED STORM SEWERS, SURFACE OR OTHER DRAINAGE FACILITIES WITHIN THE PROPERTY ARE TO BE PRIVATE AND MAINTAINED BY THE OWNER.
6. THE CONTRACTOR IS TO CONSTRUCT CURBS, CATCH BASINS, DOWNSPOUTS, PIPING AND CONNECTION ETC. AS REQUIRED TO CONVEY THE ROOF AND PAVED SURFACE DRAINAGE TO THE SUBSURFACE STORMWATER CHAMBERS, BIORETENTION AND DETENTION BASINS.
7. ALL CATCH BASINS AND MANHOLES WITH A DEPTH GREATER THAN 4' SHALL BE PROVIDED WITH STEPS. STEPS SHALL MEET THE REQUIREMENTS OF MASSACHUSETTS DEPARTMENT OF TRANSPORTATION SPECIFICATIONS.
8. STORM SEWER PIPE LABELED "STM" OR "HDPE" SHALL BE HIGH DENSITY POLYETHYLENE (HDPE). STORM SEWER PIPE LABELED "RCP" SHALL BE REINFORCED CONCRETE PIPE. ALL STORM IS TO BE INSTALLED PER MASSDOT SPECIFICAITONS.
9. STORM SEWER IS TO BE BEDDED WITH CLEAN GRANULAR MATERIAL-AGGREGATES NOT TO BE LARGER THAN 3/4" AND NOT SMALLER THAN NO. 8 SIEVE, FREE OF SILT AND FINES, AASHTO M43 SIZE #67, 7 OR 8. BEDDING TO BE MINIMUM OF 6" BELOW & 12" ABOVE THE PIPE.

UTILITY NOTES

1. ALL PROPOSED UTILITY LINES AND EXTENSIONS ARE TO BE CONSTRUCTED IN ACCORDANCE WITH THE PRIVATE UTILITY COMPANY SPECIFICATIONS. CONTRACTOR SHALL COORDINATE UTILITY DISCONNECTIONS WITH THE APPROPRIATE AGENCY.
2. PROVIDE FIRE DEPARTMENT CONNECTION WITH 30 DEGREE TURN DOWN PER LOCAL FIRE DEPARTMENT REQUIREMENTS. UNDERGROUND PIPING SERVING REMOTE FIRE DEPARTMENT CONNECTION SHALL BE DUCTILE IRON PIPING WITH RUBBER-GASKET PUSH-ON JOINTS. ABOVE GROUND PIPING AT LOCATION OF FIRE DEPARTMENT CONNECTION SHALL BE GALVANIZED, PROVIDE FLANGE ABOVE GRADE AT TRANSITION. PROVIDE CONCRETE THRUST BLOCKING AT ALL CHANGES OF DIRECTION AND MOUNT FIRE DEPARTMENT CONNECTION PIPING IN A 12 INCHES X 12 INCHES CONCRETE PAD 4 INCHES THICK. PROVIDE BALL DRIP VALVE AT BASE OF VERTICAL PIPING SERVING FIRE DEPARTMENT CONNECTION AND SURROUND WITH PEA GRAVEL.
3. THE CONTRACTOR IS PARTICULARLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF THE EXISTING UTILITIES SHOWN HEREON IS BASED ON TOPOGRAPHIC SURVEYS AND RECORD DRAWINGS. THE CONTRACTOR SHALL NOT RELY UPON THIS INFORMATION AS BEING EXACT OR COMPLETE. SHOULD UNCHARTED UTILITIES BE ENCOUNTERED DURING EXCAVATION OPERATIONS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER AS SOON AS POSSIBLE FOR INSTRUCTIONS. THE CONTRACTOR SHALL CALL THE APPROPRIATE UTILITY COMPANY AT LEAST 48 HOURS PRIOR TO ANY EXCAVATION AND REQUEST FIELD VERIFICATION OF UTILITY LOCATIONS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO RELOCATE EXISTING UTILITIES CONFLICTING WITH IMPROVEMENTS SHOWN HEREON IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL REGULATIONS GOVERNING SUCH OPERATIONS.
4. THE CONTRACTOR SHALL OBTAIN ALL REQUIRED PERMITS PRIOR TO COMMENCEMENT OF CONSTRUCTION.
5. MAINTAIN MINIMUM 10-FOOT HORIZONTAL AND 18-INCH MINIMUM VERTICAL SEPARATION BETWEEN SANITARY SEWER, STORM SEWER AND WATER SUPPLY LINE, UNLESS OTHERWISE INDICATED.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE SEQUENCING OF CONSTRUCTION FOR ALL UTILITY LINES SO THAT WATER LINES, GAS LINES, AND UNDERGROUND ELECTRIC DO NOT CONFLICT WITH SANITARY SEWERS OR STORM SEWERS. INSTALL UTILITIES PRIOR TO PAVEMENT CONSTRUCTION.
7. ALL TRENCH SPOILS SHALL BECOME THE PROPERTY OF THE CONTRACTOR UNLESS OTHERWISE DESIGNATED SHALL BE REMOVED BY THE CONTRACTOR AND DISPOSED OF OFFSITE AT NO ADDITIONAL COST TO THE OWNER IN ACCORDANCE WITH ALL LOCAL AND STATE CODES AND PERMIT REQUIREMENTS.
8. SANITARY SEWER SHALL BE PVC-SDR 35 PER ASTM D-3034 OR APPROVED EQUAL (CONFORMING TO TOWN OF HULL WATER & SEWER DEPARTMENT RULES AND REGULATIONS) INSTALLED AT A MINIMUM SLOPE OF ONE PERCENT (1.00%) UNLESS OTHERWISE NOTED SANITARY SERVICE SHALL BE INSTALLED AT A MINIMUM DEPTH OF FOUR FEET (4') UNLESS OTHERWISE NOTED. A MINIMUM OF 18" CLEARANCE SHALL BE MAINTAINED AT ALL WATERLINE & STORM SEWER CROSSINGS. SANITARY SERVICE JOINTS ALL CONFORM TO ASTM D-3212.
9. SANITARY SEWER IS TO BE BEDDED WITH CLEAN GRANULAR MATERIAL-AGGREGATES NOT TO BE LARGER THAN 3/4" AND NOT SMALLER THAN NO. 8 SIEVE, FREE OF SILT AND FINES, AASHTO M43 SIZE #67, 7 OR 8. BEDDING TO BE MINIMUM OF 6" BELOW & 12" ABOVE THE PIPE.
10. DISTANCES SHOWN FOR BOTH SANITARY AND STORM SEWER PIPES ARE MEASURED FROM CENTER OF STRUCTURE, CONTRACTOR RESPONSIBLE FOR ACTUAL FIELD CUT LENGTH. COORDINATES FOR STORM & SANITARY STRUCTURES ARE SHOWN TO THE CENTER STRUCTURE. UNLESS OTHERWISE NOTED.
11. ROOF DRAINS, FOUNDATION DRAINS AND ALL OTHER CLEAR WATER CONNECTIONS TO THE SANITARY SEWER SYSTEMS ARE PROHIBITED.
12. ADJUST ALL EXISTING UTILITY SURFACE FEATURES INCLUDING BUT NOT LIMITED TO CASTINGS, VALVE BOXES, PEDESTALS, CLEANOUTS, ETC. TO MATCH PROPOSED FINISHED GRADES, UNLESS OTHERWISE INDICATED.
13. THE CONTRACTOR SHALL PROVIDE RECORD DRAWINGS OF ALL IMPROVEMENTS. INCLUDE AT LEAST TWO DIMENSIONS TO EACH VALVE AND MANHOLE FROM KNOWN SITE FEATURES. DRAWINGS SHALL INCLUDE HORIZONTAL AND VERTICAL INFORMATION ON ALL NEW UTILITIES AS WELL AS EXISTING UTILITIES ENCOUNTERED.
14. ALL WATERLINE CROSSINGS SHALL MAINTAIN A VERTICAL SEPARATION OF 18" MINIMUM. SANITARY SEWER SHALL BE LOCATED 18" BELOW WATERMAIN AT ALL CROSSINGS. WATERMAIN SHALL BE LOCATED A MINIMUM OF 10' HORIZONTALLY FROM ANY SANITARY SEWER OR STORM SEWER. ALL MEASUREMENTS SHALL BE TAKEN FROM OUTSIDE OF SEWER PIPE TO THE OUTSIDE OF WATERMAIN PIPE. ONE FULL LENGTH OF WATERMAIN PIPE SHALL BE LOCATED AT ALL CROSSINGS TO ENABLE BOTH JOINTS TO BE LOCATED AS FAR FROM SEWER AS POSSIBLE.
15. ALL WATER SERVICE PIPE SIZES 3" THRU 12" SHALL BE DUCTILE IRON PIPE CLASS 52 PIPE PER LOCAL JURISDICTION, FROM WATERMAIN THRU METER SETTING(S) INCLUDING THE METER BYPASS.
16. ALL WATER SERVICE PIPE, 2 INCHES AND SMALLER, SHALL BE K SOFT COPPER FROM WATERMAIN THRU CURB STOP; K SOFT COPPER OR APPROVED EQUAL.
17. WATERLINE IS TO BE BEDDED WITH CLEAN GRANULAR MATERIAL-AGGREGATES NOT TO BE LARGER THAN 3/4" AND NOT SMALLER THAN NO. 8 SIEVE, FREE OF SILT AND FINES, AASHTO M43 SIZE #67, 7 OR 8. BEDDING TO BE MINIMUM OF 6" BELOW & 12" ABOVE THE PIPE

REVISION RECORD

NO	DATE	DESCRIPTION

Civil & Environmental Consultants, Inc.
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www.cecinc.com

PARAGON BOARDWALK
NANTASKET BEACH
HULL, MASSACHUSETTS
NANTASKET DUNE HOLDINGS, LLC.

GENERAL NOTES

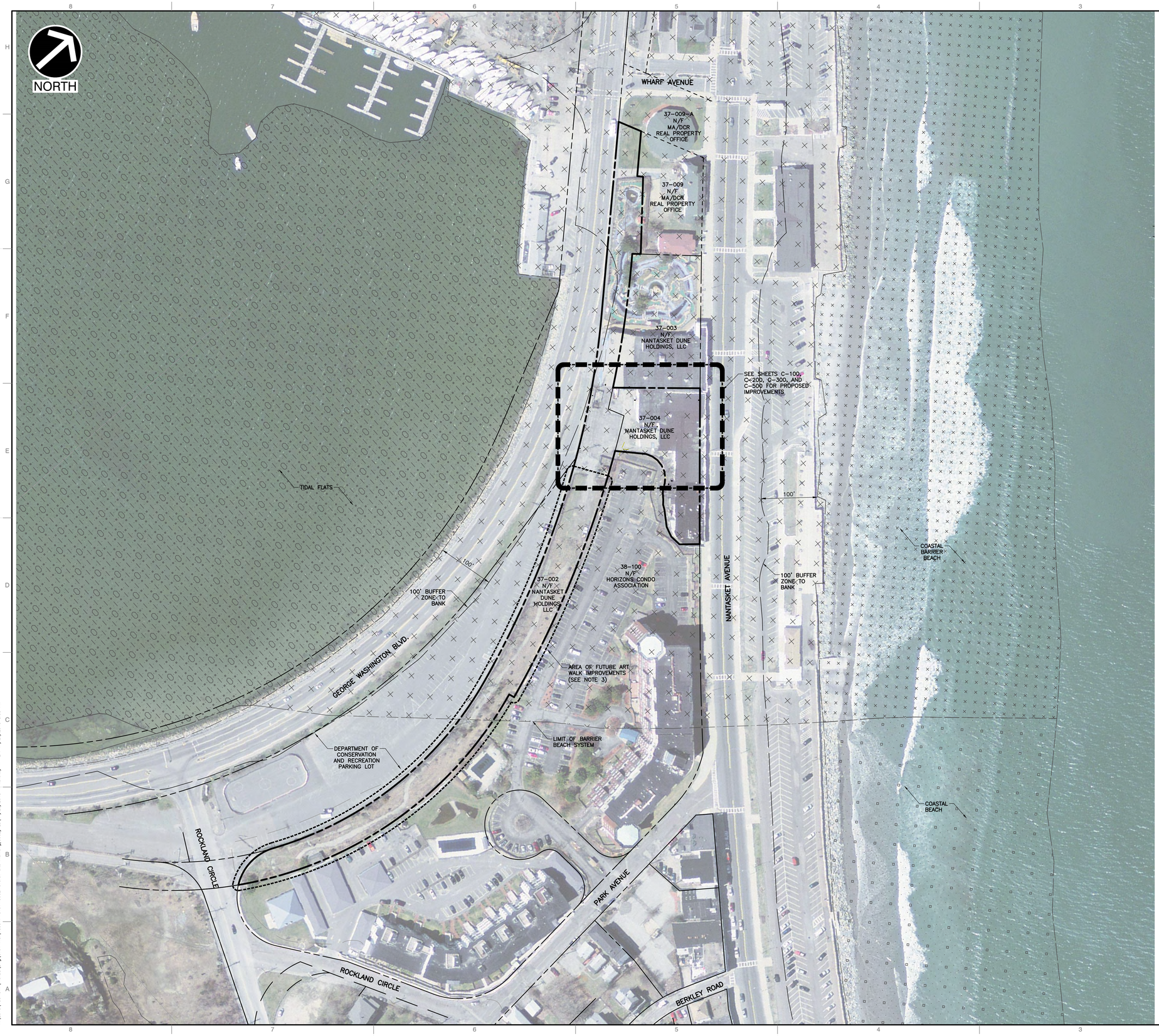
DATE:	NOVEMBER 20, 2018	DRAWN BY: KFH
DWG SCALE:	AS SHOWN	CHECKED BY: KPS
PROJECT NO:		185-317
APPROVED BY:		KPS

COMMONWEALTH OF MASSACHUSETTS
KARLIS SKULTE
CIVIL
No. 47703
REGISTERED PROFESSIONAL ENGINEER
11/20/2018

DRAWING NO.: C001

SHEET 2 OF 9

P:\2018\185-317\-DWG\Dwg\CIVIL\185317-CIVIL-NOTES.dwg(NOTES) LS(11/19/2018 - kskulte) - LP: 11/20/2018 8:56 AM



NOTES

1. TOPOGRAPHIC AND BOUNDARY SURVEY WAS PERFORMED BY NANTASKET SURVEY ENGINEERING, LLC, ON NOVEMBER 2, 2017 AND IS DEPICTED ON AN EXISTING CONDITIONS PLAN ENTITLED "EXISTING CONDITIONS PLAN" DATED JANUARY 10, 2018.
2. ORTHOGRAPHIC AERIAL IMAGERY, ADDITIONAL TAX PARCEL DATA, AND WETLAND RESOURCE AREAS ARE BASED ON GIS DATA OBTAINED FROM THE BUREAU OF GEOGRAPHIC INFORMATION (MASSGIS), COMMONWEALTH OF MASSACHUSETTS, EXECUTIVE OFFICE OF TECHNOLOGY AND SECURITY SERVICES.
3. FUTURE ART-WALK IMPROVEMENTS ARE DEPICTED FOR REFERENCE ONLY. ADDITIONAL DETAILS ARE TO BE PROVIDED UNDER A SEPARATE SUBMISSION FOR REVIEW BY THE HULL CONSERVATION COMMISSION.
4. REFER TO SHEET C001 FOR ADDITIONAL NOTES.

LEGEND

- PROPERTY LINE
- ADJACENT PROPERTY LINE
- EXISTING BARRIER BEACH
- EXISTING TIDAL FLAT
- EXISTING COASTAL BARRIER BEACH
- EXISTING COASTAL BEACH
- 100' BUFFER ZONE TO REGULATED RESOURCE AREA

SCALE IN FEET
0 80 160

REVISION RECORD

NO	DATE	DESCRIPTION

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PARAGON BOARDWALK
NANTASKET BEACH
HULL, MASSACHUSETTS
NANTASKET DUNE HOLDINGS, LLC.

SITE VICINITY PLAN

DATE:	NOVEMBER 20, 2018
DRAWN BY:	KFH
CHECKED BY:	KPS
DWG SCALE:	
PROJECT NO:	185-317
APPROVED BY:	

COMMONWEALTH OF MASSACHUSETTS
KARLIS SKULTE
CIVIL
No. 47708
REGISTERED PROFESSIONAL ENGINEER
11/20/2018

DRAWING NO.: C002

SHEET 3 OF 9

P:\2018\185-317\-CAD\Dwg\C001-100\185317-C001-C002-Overall Site Plan.dwg[C002] LS(11/20/2018 - kskulte) - LP: 11/20/2018 8:58 PM

NORTH

GEORGE WASHINGTON BLVD. (PUBLIC)

NOTES

1. TOPOGRAPHIC AND BOUNDARY SURVEY WAS PERFORMED BY NANTASKET SURVEY ENGINEERING, LLC, ON NOVEMBER 2, 2017 AND IS DEPICTED ON AN EXISTING CONDITIONS PLAN ENTITLED "EXISTING CONDITIONS PLAN" DATED JANUARY 10, 2018. THE INFORMATION DEPICTED WAS SUPPLEMENTED WITH RECORD INFORMATION AND OBSERVATIONS FROM FIELD INVESTIGATION PERFORMED BY CEC IN NOVEMBER 2018.
2. LOCATION OF SUBSURFACE UTILITIES IS BASED ON AVAILABLE RECORD INFORMATION AND SURFACE FEATURES AND SHOULD BE CONSIDERED APPROXIMATE. LOCATIONS TO BE VERIFIED BY THE CONTRACTOR IN THE FIELD PRIOR TO CONSTRUCTION.
3. REFER TO SHEET C001 FOR ADDITIONAL NOTES.

LEGEND

- EXISTING PROPERTY LINE
- EXISTING EASEMENT
- EXISTING ADJACENT PROPERTY LINE
- EXISTING INDEX (MAJOR) CONTOUR
- EXISTING INTERMEDIATE (MINOR) CONTOUR
- EXISTING SPOT ELEVATION
- EXISTING FENCE LINE
- EXISTING STRUCTURE
- EXISTING DRAINAGE PIPE
- EXISTING DRAINAGE MANHOLE
- EXISTING DRAINAGE CATCH BASIN
- EXISTING WATER LINE
- EXISTING WATER LINE
- EXISTING SANITARY SEWER LINE
- EXISTING SANITARY SEWER MANHOLE
- EXISTING GAS LINE
- EXISTING GAS VALVE
- EXISTING OVERHEAD WIRE
- EXISTING UNDETERMINED MANHOLE
- STRUCTURE TO BE REMOVED
- LINEAR OBJECT TO BE REMOVED

37-003
N/F
NANTASKET DUNE HOLDINGS, LLC.

Zone AE Elev.=10'
Mass GIS
FEMA 100 Flood
Zone

EXISTING STAIRS TO BE RECONSTRUCTED

5' PASSAGEWAY EASEMENT

EXISTING CONCRETE PAD TO BE DEMOLISHED

100' BUFFER ZONE TO BANK

CONFIRM IF EXISTING DRAINAGE LINES ARE ACTIVE AND MAINTAIN AS APPROPRIATE

EXISTING SEWER MANHOLE
RIM=9.3'
INV. IN (6" PVC)=3.3'

EXISTING RECORD SEWER SERVICES

EXISTING DRAINAGE LINE (OUTLET UNKNOWN)

EXISTING DRAINAGE MANHOLE
RIM=10.0'
INV. IN (8" PC)=4.0'
INV. OUT (10" PC)=4.6

EXISTING CB TO BE REPLACED WITH DRAINAGE MANHOLE

EX. CB
RIM=8.5
INV. IN (8" CLAY)=5.6
INV. IN (6" PVC)=6.1
INV. OUT (12" CONC)=5.5

INSTALL SILT SACK IN CATCH BASIN

EXISTING RECORD SEWER MANHOLE
RIM=9.7'
INV. IN (6" PVC)=5.5'
INV. IN (4" PVC)=5.5'
INV. IN (6" PVC)=5.4'
INV. OUT (6" PVC)=5.4'

EXISTING ABANDONED DRAINAGE MANHOLE AND PIPING TO BE REMOVED

MAINTAIN EXISTING SEWER SERVICES

EXISTING UTILITY POLE AND WIRING TO BE REMOVED

EXISTING BUILDING TO REMAIN (INTERIOR RENOVATIONS AND ENVELOPE AND WALL WORK PROPOSED)

REPAIR SHARED BUILDING WALL & WATERPROOF AS NEEDED (COORDINATE WITH ARCHITECT)

EXISTING FIRE DEPARTMENT CONNECTION

SIDEWALK TO BE SUPPORTED AS REQUIRED DURING DEMOLITION

NO WORK TO BE PERFORMED WITHIN NANTASKET AVENUE

37-002
N/F
NANTASKET DUNE HOLDINGS, LLC

EXISTING BUILDING TO BE DEMOLISHED

37-004
N/F
NANTASKET DUNE HOLDINGS, LLC

REMOVE EXISTING PAVEMENT

DISCONNECT AND REMOVE EXISTING OVERHEAD WIRES

EXISTING ABANDONED DRAINAGE MANHOLE AND PIPING TO BE REMOVED

EXISTING SEWER SERVICE TO BE ABANDONED (CONFIRM WITH OWNER/DPW PRIOR TO WORK)

EXISTING UTILITY POLE (TYP.)

EXISTING FENCE TO BE REMOVED

STABILIZED CONSTRUCTION ENTRANCE

SAW CUT EXISTING PAVEMENT AND JOIN AT PROPERTY LINE

EXISTING RECORD UTILITY POLE AND WIRING TO BE REMOVED

INSTALL SILT SOCK EROSION CONTROL BARRIER

38-100
N/F
HORIZONS CONDO ASSOCIATION

DEMOLISH CONCRETE PAD

CONFIRM EXISTING MANHOLE AND REMOVE IF NO ACTIVE STRUCTURES

EXISTING UTILITY POLE AND WIRING TO BE REMOVED

SAW CUT EXISTING CONCRETE

EXISTING TRASH ENCLOSURE

SILT SOCK

REPAIR SHARED BUILDING WALL & WATERPROOF AS NEEDED (COORDINATE WITH ARCHITECT)

EXISTING BUILDING TO REMAIN (BUILDING ENVELOPE & WALL WORK REQUIRED)

MAINTAIN EXISTING GAS SERVICE

MAINTAIN EXISTING WATER SERVICE

EXISTING WATER SERVICE

EXISTING DRAINAGE MANHOLE (RIM=12.7')

EXISTING CATCH BASIN (RIM=12.2')

EXISTING CATCH BASIN (RIM=12.3')

NANTASKET AVE. (PUBLIC)

SCALE IN FEET
0 10 20

REVISION RECORD		
NO	DATE	DESCRIPTION

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PARAGON BOARDWALK
NANTASKET BEACH
HULL, MASSACHUSETTS
NANTASKET DUNE HOLDINGS, LLC.

DEMOLITION PLAN

DATE:	NOVEMBER 20, 2018
DWG SCALE:	
PROJECT NO.:	
DRAWN BY:	KPH
CHECKED BY:	KPS
	185-317
APPROVED BY:	

COMMONWEALTH OF MASSACHUSETTS
KARLIS SKULTE
CIVIL
No. 47703
REGISTERED PROFESSIONAL ENGINEER
11/20/2018

DRAWING NO.:
C100
SHEET 4 OF 9

P:\2018\185-317\-CAD\Dwg\C101-NOI\185317-CV01-C200-C500-Site Plans.dwg[C100] LS(11/20/2018 - sskulte) - LP: 11/20/2018 9:08 PM

NORTH

GEORGE WASHINGTON BLVD. (PUBLIC)

ABBREVIATIONS

TBD	TO BE DETERMINED
TYP.	TYPICAL
BCC	BITUMINOUS CONCRETE CURB
LA	LANDSCAPE AREA

NOTES

1. TOPOGRAPHIC AND BOUNDARY SURVEY WAS PERFORMED BY NANTASKET SURVEY ENGINEERING, LLC, ON NOVEMBER 2, 2017 AND IS DEPICTED ON AN EXISTING CONDITIONS PLAN ENTITLED "EXISTING CONDITIONS PLAN" DATED JANUARY 10, 2018. THE INFORMATION DEPICTED WAS SUPPLEMENTED WITH RECORD INFORMATION AND OBSERVATIONS FROM FIELD INVESTIGATION PERFORMED BY CEC IN NOVEMBER 2018.
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3. FUTURE ART-WALK IMPROVEMENTS ARE DEPICTED FOR REFERENCE ONLY. ADDITIONAL DETAILS ARE TO BE PROVIDED UNDER A SEPARATE SUBMISSION FOR REVIEW BY THE HULL CONSERVATION COMMISSION.
4. REFER TO SHEET C001 FOR ADDITIONAL NOTES.

LEGEND

- EXISTING PROPERTY LINE
- EXISTING EASEMENT
- EXISTING ADJACENT PROPERTY LINE
- EXISTING INDEX (MAJOR) CONTOUR
- EXISTING INTERMEDIATE (MINOR) CONTOUR
- EXISTING SPOT ELEVATION
- EXISTING FENCE LINE
- EXISTING STRUCTURE
- EXISTING DRAINAGE PIPE
- EXISTING DRAINAGE MANHOLE
- EXISTING DRAINAGE CATCH BASIN
- EXISTING WATER LINE
- EXISTING WATER LINE
- EXISTING SANITARY SEWER LINE
- EXISTING SANITARY SEWER MANHOLE
- EXISTING GAS LINE
- EXISTING GAS VALVE
- EXISTING OVERHEAD WIRE
- EXISTING UNDETERMINED MANHOLE
- PROPOSED CURB & GUTTER
- PROPOSED ASPHALT WALK
- PROPOSED DECKING
- PROPOSED BUILDING
- PROPOSED BALCONY
- PROPOSED STRIPING
- PROPOSED SUBJECT PROPERTY BOUNDARY
- PROPOSED FENCE
- PROPOSED LANDSCAPE WALL
- BUILDING ENTRANCE
- LOADING DOCK ENTRANCE

37-003
N/F
NANTASKET DUNE
HOLDINGS, LLC.

EXISTING BUILDING TO REMAIN

NEW BUILDING CONNECTION (REFER TO ARCHITECTURAL PLANS)

N41°33'51"E
155.26'

5' PASSAGEWAY EASEMENT

EXISTING STAIRS TO BE RECONSTRUCTED

PROPOSED STAIRWAY

LOADING AREA

LOADING AREA

10' (TYP.)

30' (TYP.)

100' BUFFER ZONE TO BANK

TRASH ENCLOSURE (2) 6-YARD DUMPSTERS ON CONCRETE PAD

TRASH

TRASH

RAMP

EXISTING BUILDING TO REMAIN (INTERIOR RENOVATIONS AND ENVELOPE AND WALL WORK PROPOSED)

10' FRONT YARD SETBACK

MATCH EXISTING GRADE AT PROPERTY LINE

N64°02'39"E
30.49'

PROPOSED PRIVACY FENCE
EDGE OF PAVEMENT

60.0'

TBD RETAIL IN TEMPORARY STRUCTURE

6.0'

DECOMPOSED GRANITE FILL

SECURITY FENCE/GATE

8.0'

48" BLACK VINYL COATED CHAIN LINK SECURITY FENCE/GATE

ADA ACCESSIBLE SIGN

20.0'

45.8'

PROPOSED DECKING SET ON GRAVEL FILL (MATERIAL TBD)

GALVANIZED STEEL STAIR (TYP.) (REFER TO ARCHITECTURAL PLANS)

PROPOSED 6' PRIVACY FENCE

49.0'

12.4'

PROPOSED BALCONY ABOVE

PROPOSED BALCONY SUPPORT COLUMN (TYP.)

UP

UP

4.3'

CONCRETE SIDEWALK

37-002
N/F
NANTASKET DUNE
HOLDINGS, LLC.

9'

VAN

20'

9'

ACCESSIBLE CURB RAMP

LANDSCAPE WALL AT EDGE OF STAIRS FLUSH WITH DG SURFACE

PROPOSED WOOD FRAMED SEATING TO MATCH DECKING MATERIAL

GRASS

DECOMPOSED GRANITE FILL

40.0'

FOOD AND BEVERAGE SERVICE TBD IN TEMPORARY CONTAINER

8'

SAND MULTI-USE COURT (VOLLEYBALL COURT SHOWN FOR REFERENCE)

37-004
N/F
NANTASKET DUNE
HOLDINGS, LLC.

65.7'

10.0'

20.0'

10.0'

FOOD AND BEVERAGE SERVICE TBD IN TEMPORARY CONTAINER

68.7'

111.3'

NANTASKET AVE. (PUBLIC)

10' FRONT YARD SETBACK

24'

20' (TYP.)

9' (TYP.)

12' REAR YARD SETBACK

12' REAR YARD SETBACK

ASPHALT SIDEWALK

5.0'

7.7'

N46°55'35"E
55.52'

LANDSCAPE WALL ALONG FRONTAGE FLUSH WITH CONCRETE SURFACE

EXISTING CROSSWALK

8.0'

8.0'

ASPHALT SIDEWALK

PROPOSED 48" CHAIN LINK FENCING

N62°23'45"E
11.90'

N27°36'15"E
11.47'

48" BLACK VINYL COATED CHAIN LINK SECURITY FENCE/GATE

MATCH EXISTING GRADE AT PROPERTY LINE

EXISTING PAVED WALK

PROPOSED FENCING

S37°36'15"W
11.60'

S73°53'35"E
11.53'

20.0'

TBD RETAIL IN TEMPORARY STRUCTURE

TBD RETAIL IN TEMPORARY STRUCTURE

8.0'

CONSTRUCT OPENINGS IN FOUNDATIONS TO ALLOW WATER TO PASS BENEATH STORAGE CONTAINERS

KID'S ACTIVITY ZONE

DECOMPOSED GRANITE FILL

TEMPORARY STRUCTURE USE TBD

DECOMPOSED GRANITE FILL

PHOTOBOOTH

TEMPORARY STRUCTURE USE TBD

EXISTING HANDICAP PARKING SPACE

28.1'

FUTURE PEDESTRIAN CONNECTION (SEE NOTE 3)

38-100
N/F
HORIZONS CONDO ASSOCIATION

EXISTING WOOD FENCE

S54°30'06"E
11.42'

10.1'

50.2'

S43°30'06"E
10.28'

S41°17'40"E
11.28'

FUTURE PEDESTRIAN CONNECTION (SEE NOTE 3)

FUTURE ART-WALK EXHIBITS (SEE NOTE 3)

EXISTING BUILDING TO REMAIN (BUILDING ENVELOPE & WALL WORK REQUIRED)

SCALE IN FEET
0 10 20

COMMONWEALTH OF MASSACHUSETTS
KARLIS SKULTE
CIVIL
No. 47705
REGISTERED PROFESSIONAL ENGINEER
11/20/2018

REVISION RECORD

NO	DATE	DESCRIPTION

Civil & Environmental Consultants, Inc.
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www.cecinc.com

PARAGON BOARDWALK
NANTASKET BEACH
HULL, MASSACHUSETTS
NANTASKET DUNE HOLDINGS, LLC.

LAYOUT AND MATERIALS PLAN

DATE:	NOVEMBER 20, 2018
DWG SCALE:	
PROJECT NO:	
DRAWN BY:	KPH
CHECKED BY:	KPS
	185-317
APPROVED BY:	

DRAWING NO.: C200

SHEET 5 OF 9

P:\2018\185-317\-CAD\Dwg\Civil-WGS\185317-CV01-C200-C500-Site Plans.dwg[C200] LS(11/20/2018 - sskulte) - LP: 11/21/2018 8:04 AM

NORTH

GEORGE WASHINGTON BLVD. (PUBLIC)

ABBREVIATIONS

TBD	TO BE DETERMINED
TYP.	TYPICAL
BCC	BITUMINOUS CONCRETE CURB
LA	LANDSCAPE AREA
WQU	WATER QUALITY UNIT
DMH	DRAINAGE MANHOLE
HDPE	HIGH DENSITY POLYETHYLENE
PVC	POLYVINYL CHLORINATED PIPE
EX.	EXISTING
INV.	INVERT
TOW	TOP OF WALL
BOW	BOTTOM OF WALL
TC	TOP OF CURB
BC	BOTTOM OF CURB

NOTES

1. TOPOGRAPHIC AND BOUNDARY SURVEY WAS PERFORMED BY NANTASKET SURVEY ENGINEERING, LLC, ON NOVEMBER 2, 2017 AND IS DEPICTED ON AN EXISTING CONDITIONS PLAN ENTITLED "EXISTING CONDITIONS PLAN" DATED JANUARY 10, 2018. THE INFORMATION DEPICTED WAS SUPPLEMENTED WITH RECORD INFORMATION AND OBSERVATIONS FROM FIELD INVESTIGATION PERFORMED BY CEC IN NOVEMBER 2018. CONTOURS AS DEPICTED ON THIS PLAN ARE BASED ON LIMITED TOPOGRAPHIC INFORMATION AND MAY NOT REPRESENT A COMPLETE DEPICTION OF EXISTING GRADES WITHIN AND AROUND THE PROJECT AREA.
2. LOCATION OF SUBSURFACE UTILITIES IS BASED ON AVAILABLE RECORD INFORMATION AND SURFACE FEATURES AND SHOULD BE CONSIDERED APPROXIMATE. LOCATIONS TO BE VERIFIED BY THE CONTRACTOR IN THE FIELD PRIOR TO CONSTRUCTION.
3. FUTURE ART–WALK IMPROVEMENTS ARE DEPICTED FOR REFERENCE ONLY. ADDITIONAL DETAILS ARE TO BE PROVIDED UNDER A SEPARATE SUBMISSION FOR REVIEW BY THE HULL CONSERVATION COMMISSION.
4. REFER TO SHEET C001 FOR ADDITIONAL NOTES.

LEGEND

- EXISTING PROPERTY LINE
- EXISTING EASEMENT
- EXISTING ADJACENT PROPERTY LINE
- 385 EXISTING INDEX (MAJOR) CONTOUR
- 384 EXISTING INTERMEDIATE (MINOR) CONTOUR
- ×10.2 EXISTING SPOT ELEVATION
- EXISTING FENCE LINE
- EXISTING STRUCTURE
- ST EXISTING DRAINAGE PIPE
- EXISTING DRAINAGE MANHOLE
- EXISTING DRAINAGE CATCH BASIN
- W EXISTING WATER LINE
- WG EXISTING WATER LINE
- SAN EXISTING SANITARY SEWER LINE
- S EXISTING SANITARY SEWER MANHOLE
- G EXISTING GAS LINE
- G EXISTING GAS VALVE
- OH–E EXISTING OVERHEAD WIRE
- MH EXISTING UNDETERMINED MANHOLE
- PROPOSED LIMITS OF DISTURBANCE
- 10 PROPOSED INDEX (MAJOR) CONTOUR
- 9 PROPOSED INTERMEDIATE (MINOR) CONTOUR
- 2.00% PROPOSED SLOPE LABEL
- 13.15 PROPOSED SPOT ELEVATION
- TOW:13.00 BOW:11.00 TOP OF WALL ELEVATION / BOTTOM OF WALL ELEVATION
- TC:11.50 BC:11.00 TOP OF CURB ELEVATION / BOTTOM OF CURB ELEVATION
- ST PROPOSED STORM PIPE
- PROPOSED WATER QUALITY UNIT
- ST PROPOSED STORM MANHOLE
- PROPOSED LIMITS OF DISTURBANCE
- FS PROPOSED FILTER SOCK
- PROPOSED INLET PROTECTION
- PROPOSED CONSTRUCTION EXIT

EXISTING BUILDING TO REMAIN

NEW BUILDING CONNECTION (REFER TO ARCHITECTURAL PLANS)

5' PASSAGEWAY EASEMENT

MATCH EXISTING GRADE AT FACE OF BUILDING

CLEANOUT INV.=6.6

100' BUFFER ZONE TO BANK

PROPOSED DOWNSPOUT DRAIN LINES

6" HDPE @ 2.0%

REPLACE EXISTING DOWNSPOUTS

TRASH

TRASH

CONFIRM IF EXISTING DRAINAGE LINES ARE ACTIVE AND MAINTAIN AS APPROPRIATE

MATCH EXISTING GRADE AT PROPERTY LINE

EXISTING BUILDING TO REMAIN (INTERIOR RENOVATIONS AND ENVELOPE AND WALL WORK PROPOSED)

TBD RETAIL IN TEMPORARY STRUCTURE

DECOMPOSED GRANITE FILL

13.45 TOW 12.0 BOW

EXISTING DRAINAGE LINE (OUTLET UNKNOWN)

10" RCP

8" RCP

EXISTING DRAINAGE MANHOLE RIM=10.7 INV. IN (8" PC)=6.3 INV. OUT (10" PC)=6.6

9.7 TC 9.2 BC

DMH–A2 RIM=8.5' INV. IN=5.6 (WQU–A1) INV. IN=5.6 (ROOFDRAIN) INV. IN=5.6 (UNDERDRAIN) INV. IN=5.6 (8" CLAY) INV. IN=6.1 (6" PVC) INV. OUT=5.5

8" HDPE @ 2.0%

EX. CB RIM=8.5 INV. IN (8" CLAY)=5.6 INV. IN (6" PVC)=6.1 INV. OUT (12" CONC)=5.5

9.3 TC 8.8 BC

12.8 TOW 10.6 BOW

PROPOSED DECKING SET ON GRAVEL FILL (MATERIAL TBD)

INSTALL SILT SACK IN CATCH BASIN

(450i) WQU–A1 RIM=8.5 INV. OUT=5.7

PROPOSED CLEANOUT INV.=6.0

INV.=8.1 8" HDPE @ 2.0%

CLEANOUT INV.=8.6

CLEANOUT INV.=8.7

LANDSCAPE WALL AT EDGE OF STAIRS FLUSH WITH DG SURFACE

GRASS

DECOMPOSED GRANITE FILL

6" PERF. HDPE @ 2.0%

6" PERF. HDPE @ 2.0%

FOOD AND BEVERAGE SERVICE TBD IN TEMPORARY CONTAINER

FOOD AND BEVERAGE SERVICE TBD IN TEMPORARY CONTAINER

PROPOSED PERF. HDPE UNDERDRAIN WRAPPED IN GEOTEXTILE

CLEANOUT INV.=9.0

CLEANOUT INV.=9.5

LANDSCAPE WALL ALONG FRONTAGE FLUSH WITH CONCRETE SURFACE

9.65 TC 9.15 BC

12.8 TOW 10.6 BOW

MATCH EXISTING GRADE AT PROPERTY LINE

10.0 TC 9.5 BC

STABILIZED CONSTRUCTION ENTRANCE

10.25 TC 9.75 BC

10.25 TC 9.75 BC

BCC

SILT SOCK

FUTURE ART–WALK EXHIBITS (SEE NOTE 3)

Chain Link Fence

Sidewalk

INSTALL SILT SOCK EROSION CONTROL BARRIER

PROPOSED 48" CHAIN LINK FENCING

TOW=11.3 BOW=9.0

EXISTING PAVED WALK

TOW=12.0 BOW=10.2

FUTURE PEDESTRIAN CONNECTION (SEE NOTE 3)

EXISTING WOOD FENCE

FUTURE PEDESTRIAN CONNECTION (SEE NOTE 3)

Wood Fence

Rubrail

TOW=13.1 BOW=12.0

TBD RETAIL IN TEMPORARY STRUCTURE

TBD RETAIL IN TEMPORARY STRUCTURE

CONSTRUCT OPENINGS IN FOUNDATIONS TO ALLOW WATER TO PASS BENEATH STORAGE CONTAINERS

DECOMPOSED GRANITE FILL

DECOMPOSED GRANITE FILL

PHOTOBOOTH

TEMPORARY STRUCTURE USE TBD

TEMPORARY STRUCTURE USE TBD

13.45 TOW 12.0 BOW

EXISTING BUILDING TO REMAIN (BUILDING ENVELOPE & WALL WORK REQUIRED)

NANTASKET AVENUE (PUBLIC)

EXISTING DRAINAGE MANHOLE (RIM=12.7')

EXISTING CATCH BASIN (RIM=12.2')

EXISTING CATCH BASIN (RIM=12.2')

SCALE IN FEET

0 10 20

COMMONWEALTH OF MASSACHUSETTS
KARLIS SKULTE
CIVIL
No. 47768
REGISTERED PROFESSIONAL ENGINEER
11/20/2018

REVISION RECORD

NO	DATE	DESCRIPTION

Civil & Environmental Consultants, Inc.
31 Bellows Road · Raynham, MA 02767
Ph: 774.501.2176 · 866.312.2024 · Fax: 774.501.2669
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PARAGON BOARDWALK
NANTASKET BEACH
HULL, MASSACHUSETTS
NANTASKET DUNE HOLDINGS, LLC.

GRADING, DRAINAGE AND EROSION CONTROL PLAN

DATE:	NOVEMBER 20, 2018
DRAWN BY:	KFH
CHECKED BY:	KPS
DWG SCALE:	
PROJECT NO:	185-317
APPROVED BY:	

DRAWING NO.: C300

SHEET 6 OF 9

P:\2018\185-317\-CAD\Dwg\CIVIL\185317-CIVIL-C200-C500-Site Plans.dwg(C300) LS(11/20/2018 - ksaulte) - LA: 11/20/2018 8:59 PM

NORTH

GEORGE WASHINGTON BLVD. (PUBLIC)

NOTES

1. TOPOGRAPHIC AND BOUNDARY SURVEY WAS PERFORMED BY NANTASKET SURVEY ENGINEERING, LLC, ON NOVEMBER 2, 2017 AND IS DEPICTED ON AN EXISTING CONDITIONS PLAN ENTITLED "EXISTING CONDITIONS PLAN" DATED JANUARY 10, 2018. THE INFORMATION DEPICTED WAS SUPPLEMENTED WITH RECORD INFORMATION AND OBSERVATIONS FROM FIELD INVESTIGATION PERFORMED BY CEC IN NOVEMBER 2018.
2. LOCATION OF SUBSURFACE UTILITIES IS BASED ON AVAILABLE RECORD INFORMATION AND SURFACE FEATURES AND SHOULD BE CONSIDERED APPROXIMATE. LOCATIONS TO BE VERIFIED BY THE CONTRACTOR IN THE FIELD PRIOR TO CONSTRUCTION. INVERT ELEVATIONS ARE BASED ON FIELD OBSERVATIONS PERFORMED BY CEC AND SHOULD BE CONSIDERED APPROXIMATE.
3. FUTURE ART-WALK IMPROVEMENTS ARE DEPICTED FOR REFERENCE ONLY. ADDITIONAL DETAILS ARE TO BE PROVIDED UNDER A SEPARATE SUBMISSION FOR REVIEW BY THE HULL CONSERVATION COMMISSION.
4. REFER TO SHEET C001 FOR ADDITIONAL NOTES.
5. ELECTRIC/TELECOMMUNICATIONS AND NATURAL GAS SERVICES TO BE COORDINATED WITH THE UTILITY PROVIDERS.
6. ALL FLOOR AND WALL PENETRATIONS FOR PLUMBING, MECHANICAL AND ELECTRICAL SYSTEMS BELOWS FEMA BASE FLOOD ELEVATIONS SHALL BE MADE WATERTIGHT TO PREVENT FLOODWATER SEEPAGES THROUGH SPACES BETWEEN PENETRATIONS AND WALL CONSTRUCTION MATERIALS.
7. NO WORK IS TO BE PERFORMED WITHIN NANTASKET AVENUE.

LEGEND

- EXISTING PROPERTY LINE
- EXISTING EASEMENT
- EXISTING ADJACENT PROPERTY LINE
- EXISTING INDEX (MAJOR) CONTOUR
- EXISTING INTERMEDIATE (MINOR) CONTOUR
- EXISTING SPOT ELEVATION
- EXISTING FENCE LINE
- EXISTING STRUCTURE
- EXISTING DRAINAGE PIPE
- EXISTING DRAINAGE MANHOLE
- EXISTING DRAINAGE CATCH BASIN
- EXISTING WATER LINE
- EXISTING WATER LINE
- EXISTING SANITARY SEWER LINE
- EXISTING SANITARY SEWER MANHOLE
- EXISTING GAS LINE
- EXISTING GAS VALVE
- EXISTING OVERHEAD WIRE
- EXISTING UNDETERMINED MANHOLE
- PROPOSED STORM PIPE
- PROPOSED WATER QUALITY UNIT
- PROPOSED STORM MANHOLE
- PROPOSED SANITARY SEWER
- PROPOSED SANITARY MANHOLE
- PROPOSED CLEANOUT
- PROPOSED WATER LINE
- PROPOSED UNDERGROUND ELECTRIC
- PROPOSED GAS LINE
- PROPOSED COMMUNICATION LINES

EXISTING BUILDING TO REMAIN

RESTORE EXISTING TELECOM. CONNECTION (TYP.)

NEW BUILDING CONNECTION (REFER TO ARCHITECTURAL PLANS)

RESTORE EXISTING ELECTRIC CONNECTION (TYP.)

CONNECT TO EXISTING ELECTRIC SERVICE & INSTALL RISER (TO BE COORDINATED WITH PROVIDER)

5' PASSAGEWAY EASEMENT

100' BUFFER ZONE TO BANK

PROPOSED UNDERGROUND ELECTRIC

CLEANOUT INV.=6.6

PROPOSED DOWNSPOUT DRAIN LINES

6" HDPE @ 2.0%

REPLACE EXISTING DOWNSPOUTS

TRASH

TRASH

CONFIRM IF EXISTING DRAINAGE LINES ARE ACTIVE AND MAINTAIN AS APPROPRIATE

EXISTING BUILDING TO REMAIN (INTERIOR RENOVATIONS AND ENVELOPE AND WALL WORK PROPOSED)

EXISTING SEWER MANHOLE RIM=9.3' INV. IN (6" PVC)=3.3'

EXISTING RECORD SEWER SERVICES

4" PVC

6" PVC

8" HDPE @ 2.0%

10" RCP

EXISTING DRAINAGE LINE (OUTLET UNKNOWN)

8" RCP

8" PVC

TBD RETAIL IN TEMPORARY STRUCTURE

DECOMPOSED GRANITE FILL

EXISTING FIRE DEPARTMENT CONNECTION

INSTALL NEW FIRE PROTECTION SERVICE (SIZE TO MATCH EXISTING)

DMH-A2
RIM=8.5'
INV. IN=5.6 (WQU-A1)
INV. IN=5.6 (ROOFDRAIN)
INV. IN=5.6 (UNDERDRAIN)
INV. IN=5.6 (8" CLAY)
INV. IN=6.1 (6" PVC)
INV. OUT=5.5

INSTALL BACKFLOW PREVENTION VALVE

EXISTING RECORD SEWER MANHOLE RIM=9.7'
INV. IN (6" PVC)=5.5'
INV. IN (4" PVC)=5.5'
INV. IN (6" PVC)=5.4'
INV. OUT (6" PVC)=5.4'

CONNECT TO EXISTING SEWER SERVICE

MAINTAIN EXISTING SEWER SERVICES

RESTORE EXISTING ELECTRIC/TELECOM. CONNECTION (TYP.)

PROPOSED DECKING SET ON GRAVEL FILL (MATERIAL TBD)

INV.=8.6
CLEANOUT INV.=8.7

INV.=8.1 8" HDPE @ 2.0%

6" PVC @ 2.0%

PROPOSED SEWER SERVICE

INSTALL SILT SACK IN CATCH BASIN

(450i) WQU-A1
RIM=8.5
INV. OUT=5.7

PROPOSED CLEANOUT INV.=6.0

LANDSCAPE WALL AT EDGE OF STAIRS FLUSH WITH DG SURFACE

GRASS

DECOMPOSED GRANITE FILL

6" PERF. HDPE @ 2.0%

PROPOSED PERF. HDPE UNDERDRAIN WRAPPED IN GEOTEXTILE

CLEANOUT INV.=9.0

CLEANOUT INV.=9.5

FOOD AND BEVERAGE SERVICE TBD IN TEMPORARY CONTAINER

FOOD AND BEVERAGE SERVICE TBD IN TEMPORARY CONTAINER

EXTEND EXISTING GAS SERVICE

MAINTAIN EXISTING GAS SERVICE

EXTEND EXISTING WATER SERVICE

MAINTAIN EXISTING WATER SERVICE

EXISTING WATER SERVICE

PROPOSED UNDERGROUND TELECOM.

EXISTING UTILITY POLE (TYP.)

PROPOSED 48" CHAIN LINK FENCING

EXISTING PAVED WALK

FUTURE PEDESTRIAN CONNECTION (SEE NOTE 3)

EXISTING WOOD FENCE

TBD RETAIL IN TEMPORARY STRUCTURE

TBD RETAIL IN TEMPORARY STRUCTURE

TEMPORARY STRUCTURE USE TBD

DECOMPOSED GRANITE FILL

DECOMPOSED GRANITE FILL

PHOTOBOOTH

TEMPORARY STRUCTURE USE TBD

RECONNECT TO EXISTING FIRE PROTECTION SERVICE (SIZE TO MATCH EXISTING)

RESTORE EXISTING ELECTRIC/TELECOM. CONNECTION TO BUILDINGS AND TENANTS TO REMAIN (TYP.)

EXISTING BUILDING TO REMAIN (BUILDING ENVELOPE & WALL WORK REQUIRED)

FUTURE PEDESTRIAN CONNECTION (SEE NOTE 3)

FUTURE ART-WALK EXHIBITS (SEE NOTE 3)

SILT SOCK

Chain Link Fence

Wood Fence

Picket Wall

Sidewalk

EXISTING DRAINAGE MANHOLE (RIM=12.7')

EXISTING CATCH BASIN (RIM=12.2')

EXISTING CATCH BASIN (RIM=12.2')

NANTASKET AVE. (PUBLIC)

SCALE IN FEET
0 10 20

COMMONWEALTH OF MASSACHUSETTS
KARLIS SKULTE
CIVIL
No. 47703
REGISTERED PROFESSIONAL ENGINEER
11/20/2018

REVISION RECORD

NO	DATE	DESCRIPTION

CEC
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www.cecinc.com

PARAGON BOARDWALK
NANTASKET BEACH
HULL, MASSACHUSETTS
NANTASKET DUNE HOLDINGS, LLC.

UTILITY PLAN

DATE:	NOVEMBER 20, 2018
DWG SCALE:	
PROJECT NO:	185-317
DRAWN BY:	KFH
CHECKED BY:	KPS
APPROVED BY:	

DRAWING NO.: C500

SHEET 7 OF 9

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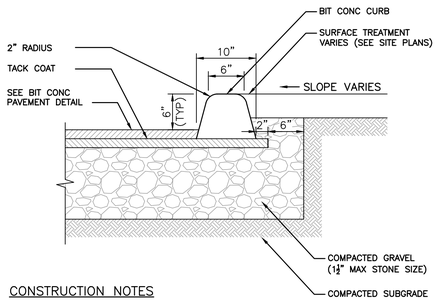
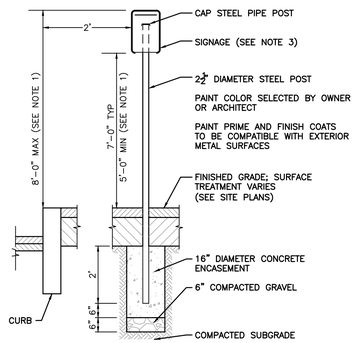


CONSTRUCTION NOTES

1. ALL CURBING TO BE MACHINE EXTRUDED.

BITUMINOUS CONCRETE CURB

N.T.S.

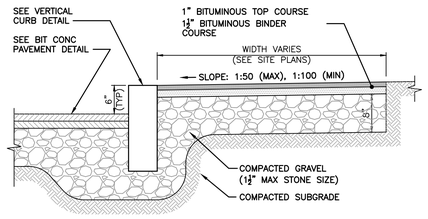


CONSTRUCTION NOTES

1. FOR ACCESSIBLE SIGNAGE, DIMENSION SHALL CONFORM TO THE REQUIREMENTS SET FORTH IN THE THE MASSACHUSETTS ARCHITECTURAL ACCESS BOARD (AAB) RULES AND REGULATIONS (521 CMR).
2. SIGNS AND POSTS SHALL BE PER TOWN OF HULL STANDARDS IF THE STANDARDS DIFFER FROM THE DETAIL DEPICTED HEREON.
3. SIGNAGE SHALL CONFORM TO THE REQUIREMENTS SET FORTH IN THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (M.U.T.C.D.).

SIGN POST

N.T.S.

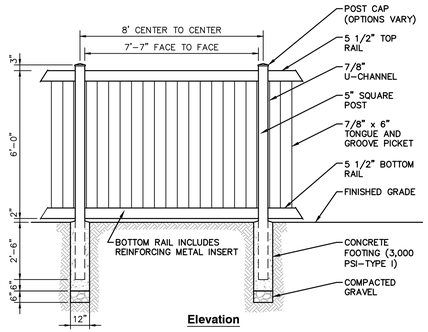


CONSTRUCTION NOTES

1. FOR ACCESSIBLE ROUTES, SIDEWALKS SHALL CONFORM TO THE REQUIREMENTS SET FORTH IN THE AMERICANS WITH DISABILITIES ACT (ADA) STANDARDS FOR ACCESSIBLE DESIGN AND THE MASSACHUSETTS ARCHITECTURAL ACCESS BOARD (AAB) RULES AND REGULATIONS (521 CMR).
2. FOR ACCESSIBLE ROUTES, THE RUNNING SLOPE OF WALKING SURFACES SHALL NOT BE GREATER THAN 1:20. THE CROSS SLOPE OF WALKING SURFACES SHALL NOT BE GREATER THAN 1:50 OR LESS THAN 1:100.
3. FOR ACCESSIBLE ROUTES, WHERE THE SIDEWALK IS LESS THAN FIVE (5) FEET IN WIDTH, EXCLUDING CURBING, A 5' X 5' PASSING AREA SHALL BE PROVIDED AT INTERVALS NOT TO EXCEED 200 FEET.
4. FOR ACCESSIBLE ROUTES, A MINIMUM CLEARANCE OF THREE (3) FEET SHALL BE MAINTAINED AT ANY PERMANENT OBSTACLE; HYDRANTS, UTILITY POLES, SIGN POSTS, ETC.

BITUMINOUS CONCRETE SIDEWALK

N.T.S.



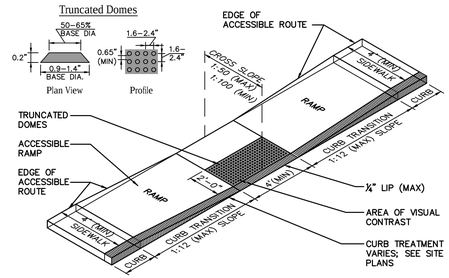
Elevation

CONSTRUCTION NOTES

1. FENCE TO BE INSTALLED PER MANUFACTURERS RECOMMENDATIONS.
2. POSTS SHALL MAINTAIN A MINIMUM DEPTH OF 2'-6" IN GROUND AND SHALL NOT BE RACKED TO ACCOMMODATE CHANGES IN GRADE.
3. LINE OF FENCE TOP AND BOTTOM SHALL BE INSTALLED STRAIGHT AND TRUE. POSTS AND PICKETS SHALL BE INSTALLED PARALLEL AND PLUMB. RAILS SHALL BE INSTALLED PARALLEL TO GROUND SURFACE AND EACH OTHER.

6' VINYL PRIVACY FENCE

N.T.S.

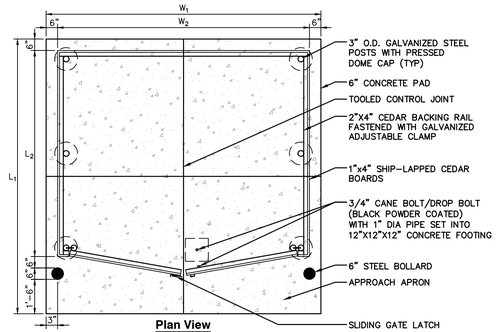


CONSTRUCTION NOTES

1. CURB RAMPS SHALL CONFORM TO THE REQUIREMENTS SET FORTH IN THE AMERICANS WITH DISABILITIES ACT (ADA) STANDARDS FOR ACCESSIBLE DESIGN AND THE MASSACHUSETTS ARCHITECTURAL ACCESS BOARD (AAB) RULES AND REGULATIONS (521 CMR).
2. THE RUNNING SLOPE OF CURB RAMPS SHALL NOT BE GREATER THAN 1:12. THE RUNNING SLOPE OF WALKING SURFACES SHALL NOT BE GREATER THAN 1:20. THE CROSS SLOPE OF CURB RAMPS AND WALKING SURFACES SHALL NOT BE GREATER THAN 1:50 OR LESS THAN 1:100.
3. LANDINGS SHALL BE PROVIDED AT THE TOPS OF CURB RAMPS. THE LANDING CLEAR LENGTH SHALL BE 36 INCHES (3 FEET) MINIMUM. THE LANDING CLEAR WIDTH SHALL BE AT LEAST AS WIDE AS THE CURB RAMP, EXCLUDING FLARED SIDES, LEADING TO THE LANDING.
4. COUNTER SLOPES OF ADJOINING SURFACES IMMEDIATELY ADJACENT TO THE CURB RAMP SHALL NOT BE STEEPER THAN 1:20.
5. DETECTABLE WARNINGS SHALL CONTRAST VISUALLY WITH ADJACENT WALKING SURFACES AND BE INSTALLED PERPENDICULAR TO THE ACCESSIBLE ROUTE.

ACCESSIBLE CURB RAMP (TYPE "A")

N.T.S.



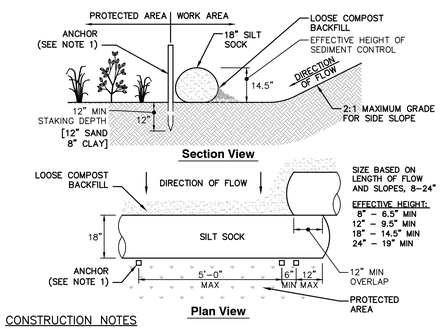
Plan View

CONSTRUCTION NOTES

1. CEMENT CONCRETE SHALL BE 4,000 PSI-TYPE II.
2. PROVIDE TOOLED CONTROL JOINTS AT A MINIMUM SIX (6) FEET ON-CENTER AND EQUALLY SPACED OVER THE LENGTH AND WIDTH OF THE PAD.
3. ALL WOODEN FENCING MATERIAL SHALL BE NORTHERN WHITE CEDAR, INSTALLED TO THE DIMENSIONS SHOWN ON THE DRAWING.
4. POSTS SHALL MAINTAIN A DEPTH OF 3'-0" IN GROUND AND SHALL NOT BE RACKED TO ACCOMMODATE CHANGES IN GRADE.
5. LINE OF FENCE TOP AND BOTTOM SHALL BE INSTALLED STRAIGHT AND TRUE. POSTS AND PICKETS SHALL BE INSTALLED PARALLEL AND PLUMB. RAILS SHALL BE INSTALLED PARALLEL TO GROUND SURFACE AND EACH OTHER.

DUMPSTER PAD WITH ENCLOSURE

N.T.S.

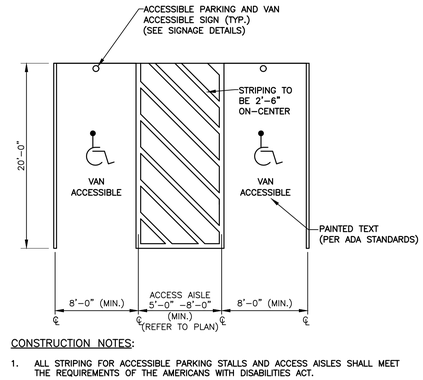


CONSTRUCTION NOTES

1. ANCHOR TO BE A 2" X 2" X 36" HARD WOOD STAKE, OR APPROVED EQUAL.
2. COMPOST FOR SILT SOCK FILL MATERIAL TO BE PROVIDED BY THE MANUFACTURER IN CONJUNCTION WITH THE ENGINEER TO PROVIDE THE REQUIRED REMOVAL OF SEDIMENT OR OTHER POLLUTANTS FROM RUNOFF.
3. COMPOST MATERIAL SHALL BE DISPERSED ON SITE, AS DETERMINED BY THE LOCAL CONSERVATION AGENT OR THE DESIGN ENGINEER.
4. SILT SOCK SHALL BE INSPECTED PER LOCAL AND STATE REQUIREMENTS. REPAIR OR REPLACEMENT SHALL BE PERFORMED PROMPTLY, AS NEEDED.
5. METHOD OF INSTALLATION SHALL BE AS PER MANUFACTURER'S RECOMMENDATIONS.

SILT SOCK EROSION CONTROL BARRIER

N.T.S.



CONSTRUCTION NOTES:

1. ALL STRIPING FOR ACCESSIBLE PARKING STALLS AND ACCESS AISLES SHALL MEET THE REQUIREMENTS OF THE AMERICANS WITH DISABILITIES ACT.
2. ALL STRIPING FOR STANDARD PARKING SPACES TO BE 4" WIDE PAINTED STRIPES.
3. SEE SHEET LAYOUT PLAN FOR ACCESSIBLE STALL LOCATIONS
4. ALL PARKING STALLS AND CROSSHATCH PAINT STRIPING SHALL BE COLOR WHITE.
5. ACCESS ISLE MUST BE 5'-0" (MIN.) FOR NON-VAN ACCESSIBLE STALLS

ACCESSIBLE PARKING STALL MARKING DETAIL 209

N.T.S.

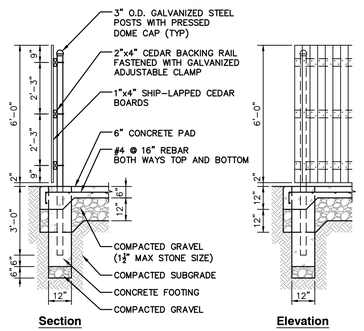
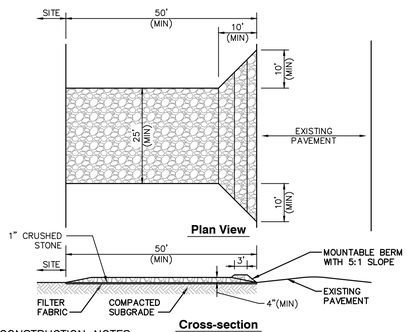


Table of Dimensions

DUMPSTER DESIGNATION	L_1	L_2	W_1	W_2
DUMPSTER 1	13'-0"	10'-0"	21'-0"	20'-0"



CONSTRUCTION NOTES

1. ENTRANCE WIDTH SHALL BE A TWENTY-FIVE (25) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS.
2. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH SHALL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY. PERIODIC INSPECTION AND MAINTENANCE SHALL BE PROVIDED AS NEEDED.
3. STABILIZED CONSTRUCTION ENTRANCE SHALL BE REMOVED PRIOR TO FINAL FINISHED MATERIALS BEING INSTALLED.

STABILIZED CONSTRUCTION EXIT

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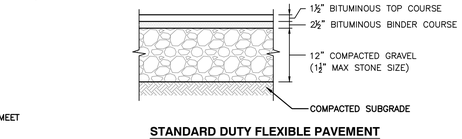


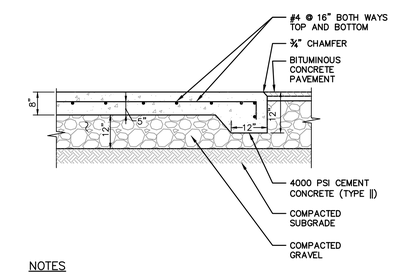
STANDARD DUTY FLEXIBLE PAVEMENT

CONSTRUCTION NOTES

1. PAVEMENT SECTIONS ARE SUBJECT TO CHANGE AND WILL BE BASED ON THE RESULTS OF FURTHER GEOTECHNICAL INVESTIGATIONS.

BITUMINOUS CONCRETE PAVEMENT

N.T.S.

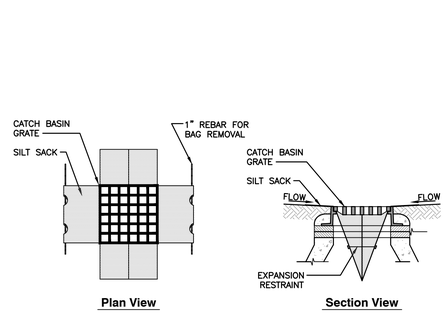


NOTES

1. SIZE OF LOADING DOCK PAD TO BE AS INDICATED ON PLANS.
2. CONSTRUCTION JOINTS SHALL BE SPACED NO MORE THAN 40 FEET ON CENTER AND SHALL BE EQUALLY SPACED OVER THE LENGTH AND WIDTH OF THE PAD.

LOADING DOCK PAD

N.T.S.

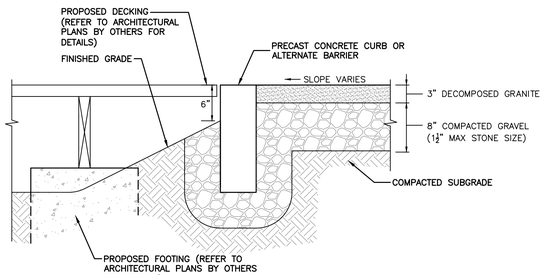


CONSTRUCTION NOTES

1. INSTALL SILT SACKS IN ALL CATCH BASINS WHERE INDICATED ON THE SITE PLANS BEFORE COMMENCING WORK OR IN PAVED AREAS AFTER THE BINDER COURSE IS PLACED AND EROSION CONTROL BARRIERS HAVE BEEN REMOVED.
2. GRATE TO BE PLACED OVER SILT SACK.
3. SILT SACKS SHALL BE INSPECTED PERIODICALLY AND AFTER ALL STORM EVENTS. CLEANING OR REPLACEMENT SHALL BE PERFORMED AS NEEDED. MAINTAIN SILT UNTIL UPSTREAM AREAS HAVE BEEN PERMANENTLY STABILIZED.

SILT SACK INLET PROTECTION

N.T.S.



NOTES

1. WALKWAY SECTION AND RELATIONSHIP TO ADJACENT DECKING IS PRELIMINARY AND SUBJECT TO CHANGE AND WILL BE BASED ON THE RESULTS OF FURTHER COORDINATION WITH LANDSCAPE ARCHITECT AND ARCHITECT.

DECOMPOSED GRANITE WALKWAY SECTION

N.T.S.

REVISION RECORD

NO	DATE	DESCRIPTION

Civil & Environmental Consultants, Inc.
31 Bellows Road · Raynham, MA 02767
Ph: 774.501.2176 · 866.312.2024 · Fax: 774.501.2669
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PARAGON BOARDWALK
NANTASKET BEACH
HULL, MASSACHUSETTS
NANTASKET DUNE HOLDINGS, LLC.

SITE DETAILS

DATE:	NOVEMBER 20, 2018
DRAWN BY:	CCR
CHECKED BY:	KPS
DWG SCALE:	AS SHOWN
PROJECT NO:	185-317
APPROVED BY:	KPS

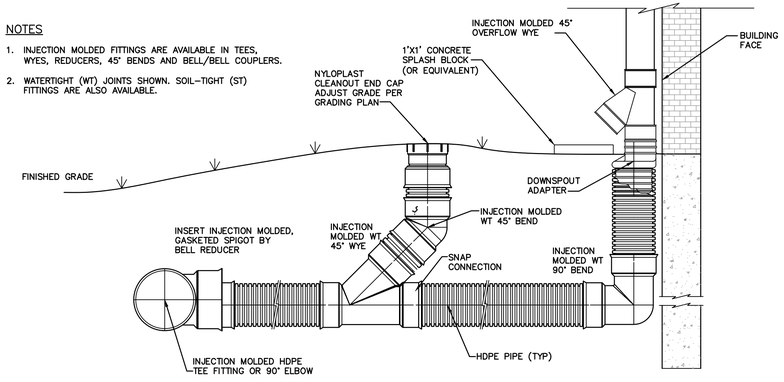
COMMONWEALTH OF MASSACHUSETTS
KARLIS SKULTE
CIVIL
No. 47703
REGISTERED PROFESSIONAL ENGINEER
11/20/2018

DRAWING NO.:
C800
SHEET 8 OF 9

P:\2018\185-317\-CAD\Dwg\C101-HOT\185317-C101-C800-DETAILS.dwg[C800] LS(11/21/2018 - issued) - LP: 11/21/2018 7:47 AM

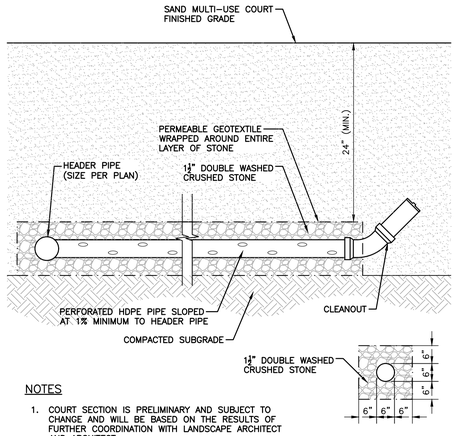
NOTES

1. INJECTION MOLDED FITTINGS ARE AVAILABLE IN TEES, WYES, REDUCERS, 45° BENDS AND BELL/BELL COUPLERS.
2. WATERTIGHT (WT) JOINTS SHOWN. SOIL–TIGHT (ST) FITTINGS ARE ALSO AVAILABLE.



ROOF DRAIN LEADER

N.T.S.

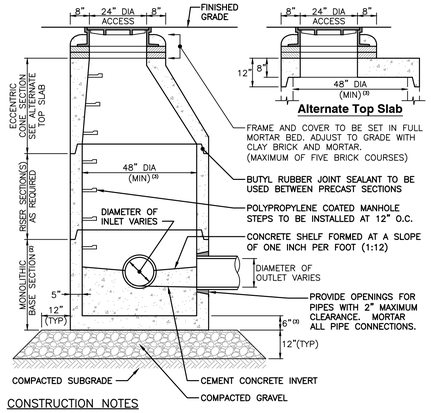


NOTES

1. COURT SECTION IS PRELIMINARY AND SUBJECT TO CHANGE AND WILL BE BASED ON THE RESULTS OF FURTHER COORDINATION WITH LANDSCAPE ARCHITECT AND ARCHITECT.

MULTI-USE COURT UNDERDRAIN

N.T.S.



CONSTRUCTION NOTES

1. STRUCTURE TO BE PRECAST CONCRETE, MINIMUM 4,000 PSI. ALL SECTIONS TO BE DESIGNED TO MEET OR EXCEED HS–20 LOADING.
2. BASE TO BE SINGLE POUR MONOLITHIC SECTION.
3. 60" (5'–0") INSIDE DIAMETER FOR ALL MANHOLE DEPTHS GREATER THAN 20 FEET. 6" MINIMUM WALL THICKNESS AND 8" MINIMUM BASE THICKNESS FOR 5'–0" DIAMETER PRECAST MANHOLE.

DRAIN MANHOLE

N.T.S.

CONSTRUCTION NOTES

1. CEMENT CONCRETE SHALL BE 4,000 PSI–TYPE II.

CLEANOUT (PAVEMENT)

N.T.S.

CONSTRUCTION NOTES

1. WHERE UTILITY TRENCHES ARE CONSTRUCTED THROUGH DETENTION BASIN BERMS OR OTHER SUCH SPECIAL SECTIONS, PLACE TRENCH BACKFILL WITH MATERIALS SIMILAR TO THE SPECIAL SECTION REQUIREMENTS.
2. USE METALLIC TRACING/WARNING TAPE OVER ALL PIPES.
3. FOR HIGH DENSITY POLYETHYLENE (HDPE) PIPE, DIMENSION IS 24 INCHES.

UTILITY TRENCH

N.T.S.

Rinker MATERIALS — Concrete Pipe Divisio

STC 450i Precast Concrete Stormceptor
(450 U.S. Gallon Capacity)

Notes:
1. The Use Of Flexible Connection is Recommended at The Inlet and Outlet Where Applicable.
2. The Cover Should be Positioned Over The Inlet Drop Pipe and The Oil Port.
3. The Stormceptor System is protected by one or more of the following U.S. Patents: #4985148, #5498331, #5725760, #5753115, #5849181, #6068765, #6371690.
4. Contact a Concrete Pipe Division representative for further details not listed on this drawing.

WATER QUALITY UNIT (450i)

N.T.S.

REVISION RECORD

NO	DATE	DESCRIPTION

CEC
Civil & Environmental Consultants, Inc.
31 Bellows Road · Raynham, MA 02767
Ph: 774.501.2176 · 866.312.2024 · Fax: 774.501.2669
www.cecinc.com

PARAGON BOARDWALK
NANTASKET BEACH
HULL, MASSACHUSETTS
NANTASKET DUNE HOLDINGS, LLC.

SITE DETAILS

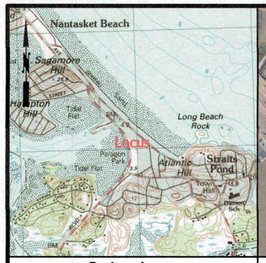
DATE:	NOVEMBER 20, 2018	DRAWN BY:	CCR
DWG SCALE:	AS SHOWN	CHECKED BY:	KPS
PROJECT NO:			185-317
APPROVED BY:			KPS

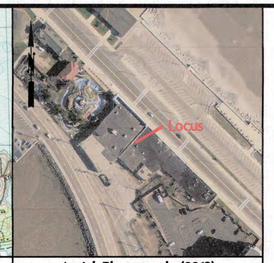
COMMONWEALTH OF MASSACHUSETTS
KARLIS SKULTE CIVIL No.47705 REGISTERED PROFESSIONAL ENGINEER
11/20/2018

DRAWING NO.: C801

SHEET 9 OF 9

P:\2018\185-317\--CAD\Dwg\C801-WQ1\185317-C801--DBD-DETAILS.dwg[2801] LS(11/20/2018 - khampton) - LP: 11/20/2018 8:11 PM





Source: MassGIS

LEGEND

⊡ CB/LP	CONCRETE BOUND W/ LEAD PLUG
⊡ MHB	MASSACHUSETTS HIGHWAY BOUND
N/F	NOW OR FORMERLY
(REC)	FROM RECORD PLANS
——D——	DRAIN LINE
——S——	SEWER LINE
——G——	GAS LINE
——W——	WATER LINE
——OHW——	OVERHEAD WIRES
——10——	CONTOUR
10X5	SPOT GRADE
⊞ CBN	CATCH BASIN
VGC	VERTICAL GRANITE CURB
☼LP	LIGHT POLE
-o- UP	UTILITY POLE
⊲	GUY POLE
WG	WATER GATE
(D)	DRAIN MANHOLE
(S)	SEWER MANHOLE
(T)	TELEPHONE MANHOLE
(M)	MANHOLE
GG	GAS GATE
⊙	SIGN
○	BOLLARD
EOP	EDGE OF PAVEMENT
FFE	FIRST FLOOR ELEVATION

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EXISTING FOOTPRINT = 20,346 SQ. FT.
EXISTING LOT COVERAGE = 83.1%

PURPOSE

THE PURPOSE OF THIS PLAN IS TO SHOW THE EXISTING SITE CONDITIONS BASED ON FIELD MEASUREMENTS TAKEN ON NOVEMBER 2, 2017.

ZONING

SITE IS ZONED COMMERCIAL RECREATION B

	ZONING BYLAW	37–002 EXISTING	37–003 EXISTING	37–004 EXISTING
MIN LOT AREA:	10,000 SQ.FT.	84,253 SQ.FT.	32,457 SQ.FT.	24,470 SQ.FT.
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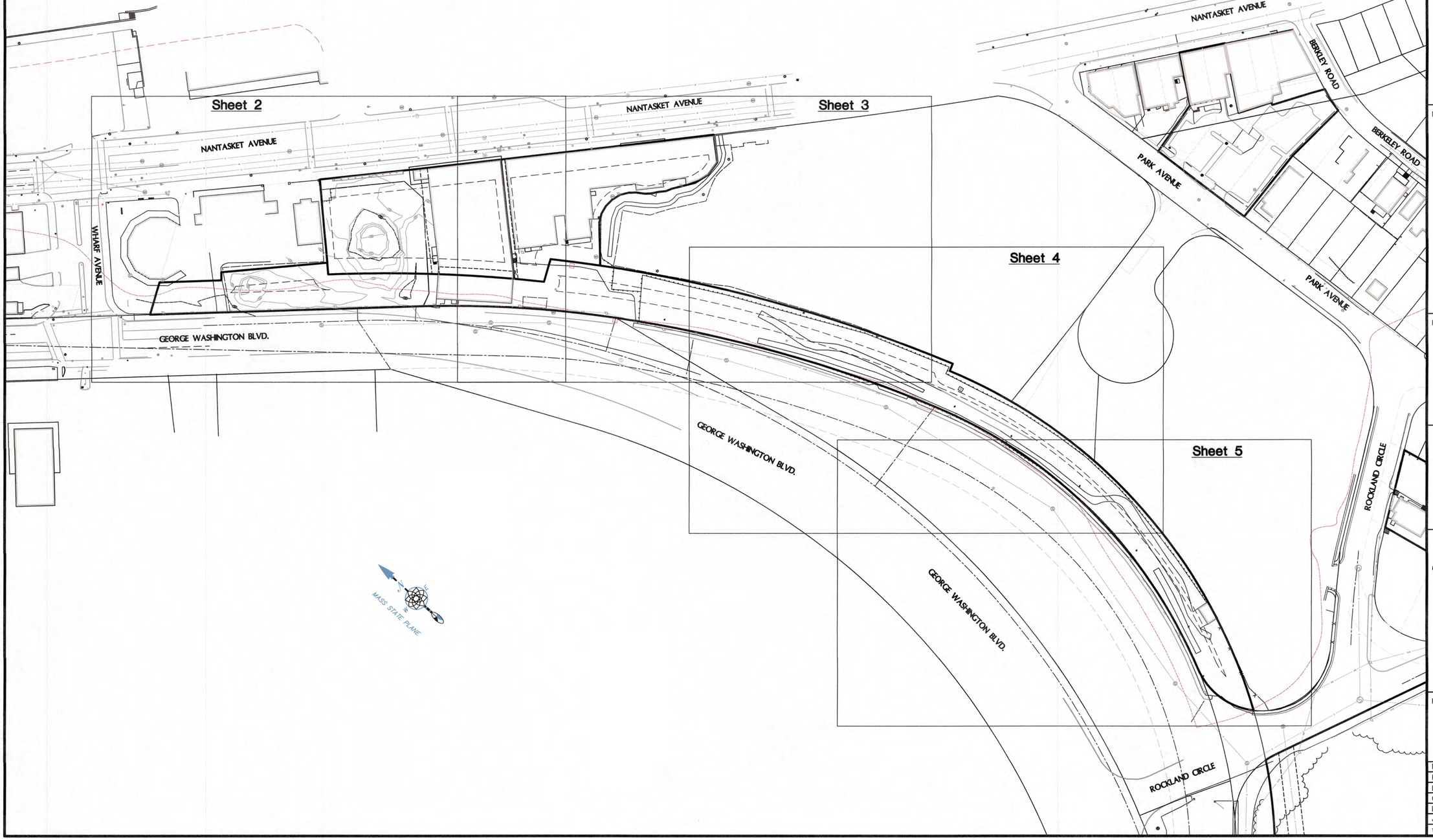
FRONT SETBACK:	25 FT.	5.1 FT.	4.6 FT. OVER	1.2 FT. OVER
SIDE SETBACK:	10 FT.	360.1 FT.	0.4 FT. OVER	1.7 FT. OVER
REAR SETBACK:	20 FT.	1.4 FT. OVER	32.0 FT. OVER	17.9 FT.
MAX. % LOT COVERAGE:	30%	4.2%	44.6%	83.1%
MAX. HEIGHT:	40 FT.	N/A	N/A	N/A



Project Address

179–197 Nantasket Ave.

Hull Massachusetts

Drawing Title

EXISTING CONDITIONS PLAN KEY SHEET

Prepared For

Josh Kleinman
Foxrock Properties
1245 Hancock Street
Quincy, MA 02169

COMMONWEALTH OF MASSACHUSETTS
REGISTERED
DAVID
G.
RAY
No. 35412
PROFESSIONAL
LAND SURVEYOR

1-10-18

David G. Ray #35412

Nantasket Survey Engineering, LLC
46 Edgewater Road, Hull, MA 02045
(781) 773–1701 (781) 773–1702 (fax)
www.nantasketsurvey.com

Scale: 1"=60'

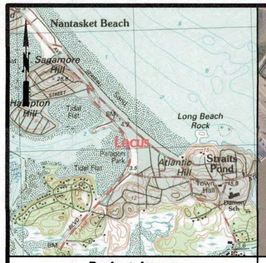
0 30 60 120 150 FEET

Revisions

Date	1–10–2018
Proj. Mgr.	DGR
Design	N/A
Check	DGR
Drawn	AMS/DGR
Job #	1–2121

Drawing 1 of 5

1–2121 179–197 Nantasket Avenue Hull.DWG



Project Locus
Scale: 1" = 2000 Feet ±

Aerial Photograph (2013)
Scale: 1" = 200 Feet ±

Source: MassGIS

LEGEND

⊡ CB/LP	CONCRETE BOUND W/ LEAD PLUG	☼LP	LIGHT POLE
⊡ MHB	MASSACHUSETTS HIGHWAY BOUND	-☼- UP	UTILITY POLE
N/F	NOW OR FORMERLY	◆	GUY POLE
(REC)	FROM RECORD PLANS	Ⓦ	WATER GATE
——D——	DRAIN LINE	Ⓓ	DRAIN MANHOLE
——S——	SEWER LINE	Ⓢ	SEWER MANHOLE
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——OHW——	OVERHEAD WIRES	Ⓖ	GAS GATE
——10——	CONTOUR	⊶	SIGN
10X5	SPOT GRADE	○	BOLLARD
⊞ CBN	CATCH BASIN	EOP	EDGE OF PAVEMENT
VGC	VERTICAL GRANITE CURB	FFE	FIRST FLOOR ELEVATION

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MAX. HEIGHT:	40 FT.	N/A	N/A	N/A

PURPOSE

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MASS STATE PLANE

NANTASKET AVENUE

WHARF AVENUE

GEORGE WASHINGTON BLVD.

Project Address

179–197 Nantasket Ave.

Hull Massachusetts

Drawing Title

EXISTING CONDITIONS PLAN

Prepared For

Josh Kleinman
Foxrock Properties
1245 Hancock Street
Quincy, MA 02169

COMMONWEALTH OF MASSACHUSETTS REGISTERED DAVID G. RAY No. 35412 PROFESSIONAL LAND SURVEYOR
1-10-18
David G. Ray #35412

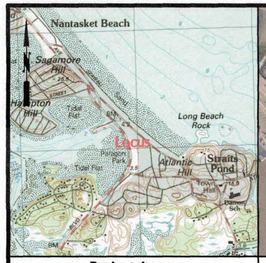
Nantasket Survey Engineering, LLC
46 Edgewater Road, Hull, MA 02045
(781) 773–1701 (781) 773–1702 (fax)
www.nantasketsurvey.com

Scale: 1"=20'
0 10 20 40 50 FEET

Revisions

Date	1–10–2018	Drawing	
Proj. Mgr.	DGR		2
Design	N/A		
Check	DGR		
Drawn	AMS/DGR		
Job #	1–2121	of 5	

1–2121 179–197 Nantasket Avenue Hull.DWG



Project Locus
Scale: 1" = 2000 Feet ±

Aerial Photograph (2013)
Scale: 1" = 200 Feet ±

Source: MassGIS

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—10—	CONTOUR
10x5	SPOT GRADE
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☼LP	LIGHT POLE
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MAX. HEIGHT:	40 FT.	N/A	N/A	N/A

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NANTASKET AVENUE

37–004 N/F IMPERIAL REALTY CO., INC.

#193 Nantasket Ave.
Footprint Area= 14,226 sq.ft.
Lot Area= 32,457 sq.ft.

#189 Nantasket Ave.
Footprint Area= 20,282 sq.ft.
Lot Area= 27,470 sq.ft.

37–003 N/F 197 NANTASKET AVENUE REALTY TRUST

38–100 N/F HORIZONS CONDO ASSOCIATION

37–002 N/F IMPERIAL REALTY CO., INC.
LOT AREA= 84,253 SQ.FT.

Footprint Area= 3,159 sq.ft.

SETBACKS (TYPICAL)

5' PASSAGEWAY

9.5' PASSAGEWAY

Bulk Head

Concrete Pad

Paved Walk

Wood Fence

Ramp

Concrete Landing

Chain Link Fence

Post and Rail Fence

Sidewalk

Root Overhang

Overhang Area= 64 sq.ft.

Mass GIS FEMA Flood Zone AO Depth 3' Zone AE Elev.=10'

MASS STATE PLANE

Project Address

179–197 Nantasket Ave.

Hull Massachusetts

Drawing Title

EXISTING CONDITIONS PLAN

Prepared For

Josh Kleinman
Foxrock Properties
1245 Hancock Street
Quincy, MA 02169

COMMONWEALTH OF MASSACHUSETTS REGISTERED DAVID G. RAY No. 35412 PROFESSIONAL LAND SURVEYOR

1–10–18

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Scale: 1"=20'
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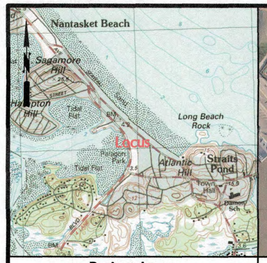
Revisions

Date	1–10–2018	Drawing	3
Proj. Mgr.	DGR		
Design	N/A		
Check	DGR		
Drawn	AMS/DGR		
Job #	1–2121	of 5	

1–2121 179–197 Nantasket Avenue Hull.DWG



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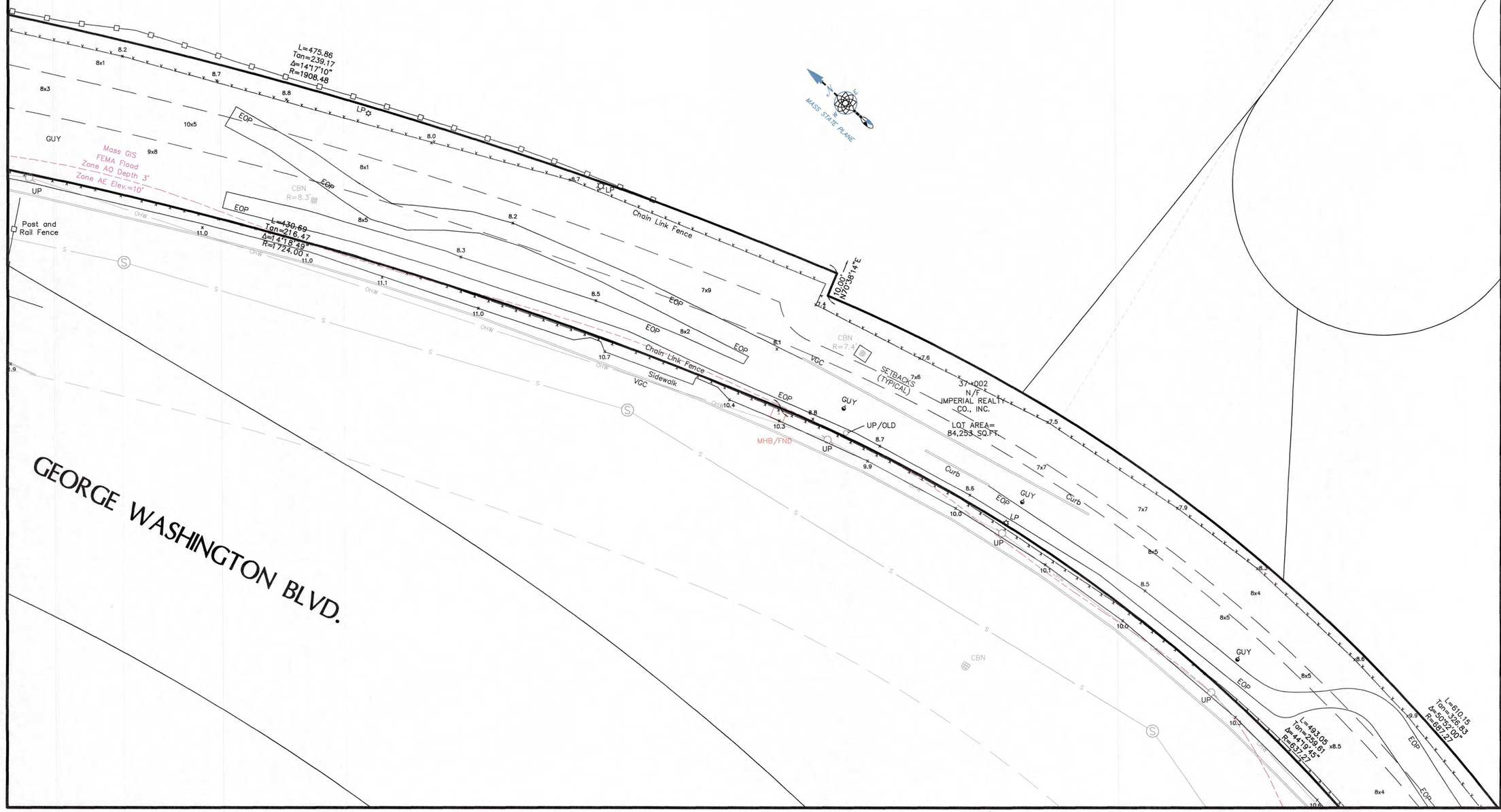

Project Address

179–197 Nantasket Ave.

Hull Massachusetts

Drawing Title

EXISTING CONDITIONS PLAN

Prepared For

Josh Kleinman
Foxrock Properties
1245 Hancock Street
Quincy, MA 02169

COMMONWEALTH OF MASSACHUSETTS
REGISTERED
DAVID
G.
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No. 35412
PROFESSIONAL
LAND SURVEYOR

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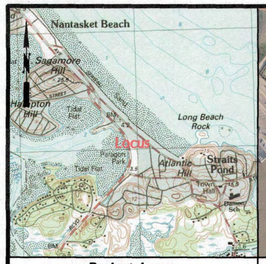
0 10 20 40 50 FEET

Revisions

Date	1–10–2018	Drawing	
Proj. Mgr.	DGR		4
Design	N/A		
Check	DGR		
Drawn	AMS/DGR		
Job #	1–2121	of 5	

1–2121 179–197 Nantasket Avenue Hull.DWG



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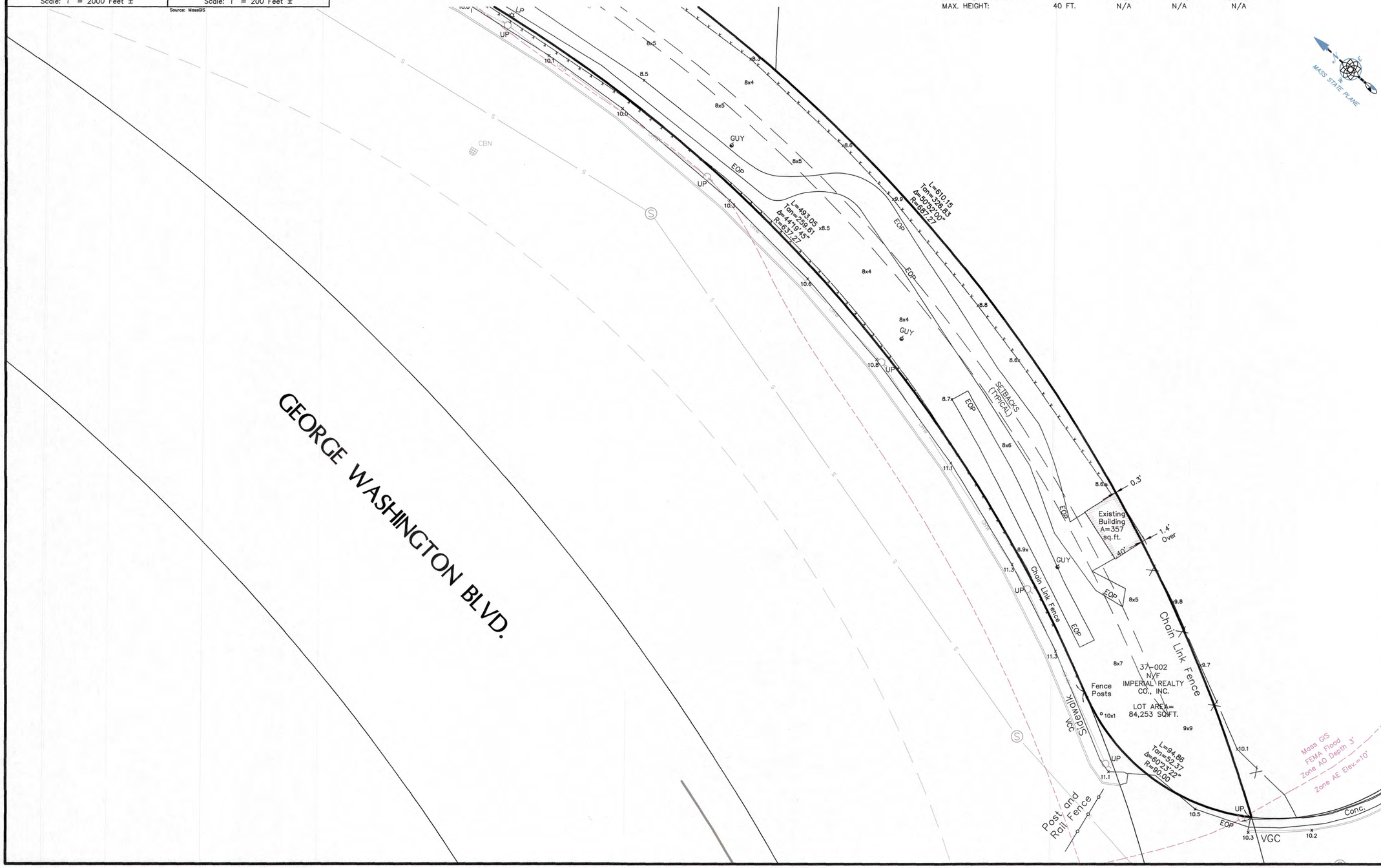
ZONING

SITE IS ZONED COMMERCIAL RECREATION B

	ZONING BYLAW	37–002 EXISTING	37–003 EXISTING	37–004 EXISTING
MIN LOT AREA:	10,000 SQ.FT.	84,253 SQ.FT.	32,457 SQ.FT.	24,470 SQ.FT.
MIN FRONTAGE:	100 FT.	1,623.40 FT.	234.77 FT.	277.89 FT.
FRONT SETBACK:	25 FT.	5.1 FT.	4.6 FT. OVER	1.2 FT. OVER
SIDE SETBACK:	10 FT.	360.1 FT.	0.4 FT. OVER	1.7 FT. OVER
REAR SETBACK:	20 FT.	1.4 FT. OVER	32.0 FT. OVER	17.9 FT.
MAX. % LOT COVERAGE:	30%	4.2%	44.6%	83.1%
MAX. HEIGHT:	40 FT.	N/A	N/A	N/A

PURPOSE

THE PURPOSE OF THIS PLAN IS TO SHOW THE EXISTING SITE CONDITIONS BASED ON FIELD MEASUREMENTS TAKEN ON NOVEMBER 2, 2017.



Project Address

179–197 Nantasket Ave.

Hull Massachusetts

Drawing Title

EXISTING CONDITIONS PLAN

Prepared For

Josh Kleinman
Foxrock Properties
1245 Hancock Street
Quincy, MA 02169

COMMONWEALTH OF MASSACHUSETTS
REGISTERED
DAVID G. RAY
No. 35412
PROFESSIONAL LAND SURVEYOR

David G. Ray #35412

Nantasket Survey Engineering, LLC
46 Edgewater Road, Hull, MA 02045
(781) 773–1701 (781) 773–1702 (fax)
www.nantasketsurvey.com

Scale: 1"=20'

0 10 20 40 50 FEET

Revisions

Date	1–10–2018
Proj. Mgr.	DGR
Design	N/A
Check	DGR
Drawn	AMS/DGR
Job #	1–2121

Drawing 5 of 5

1–2121 179–197 Nantasket Avenue Hull.DWG

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PARAGON BOARDWALK

project

197 NANTASKET AVE,
HULL, MA 02045

CAD FILE: *197 NANTASKET AVE-A101-CP.VWX*

client

CLIENT
ADDRESS
CITY, STATE ZIP

contractor

HAYNES GROUP INC.,
385 WEST STREET
WEST BRIDGEWATER, MA 02379

structural

STRUCTURAL ENGINEER
ADDRESS
CITY, STATE ZIP

MEP

MEP ENGINEER
ADDRESS
CITY, STATE ZIP

issue / revisions

MARK	DATE	DESCRIPTION
	11.21.18	PROGRESS SET

stamp

date

11.21.18

phase

north

sheet title

PROPOSED EXTERIOR RENDERINGS

DRAWN / CHECKED

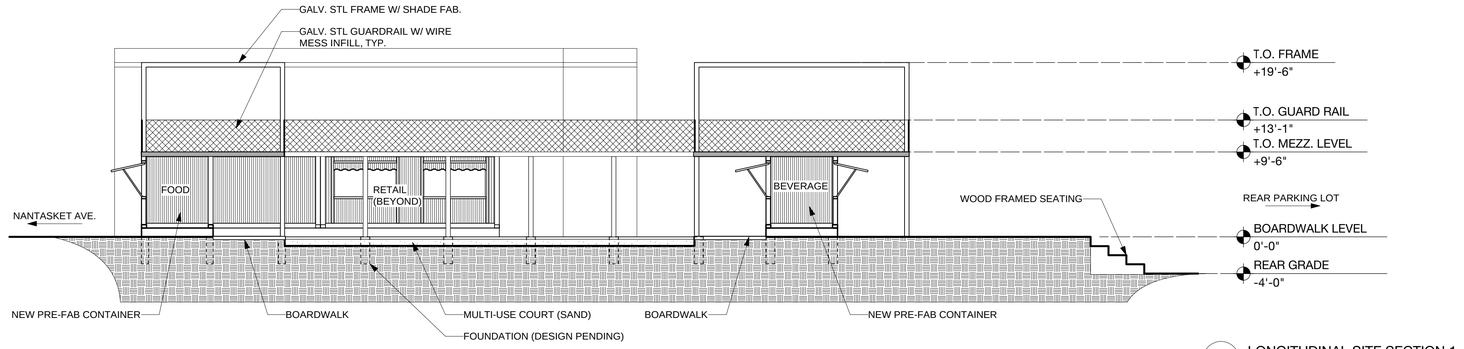
sheet number

A.010

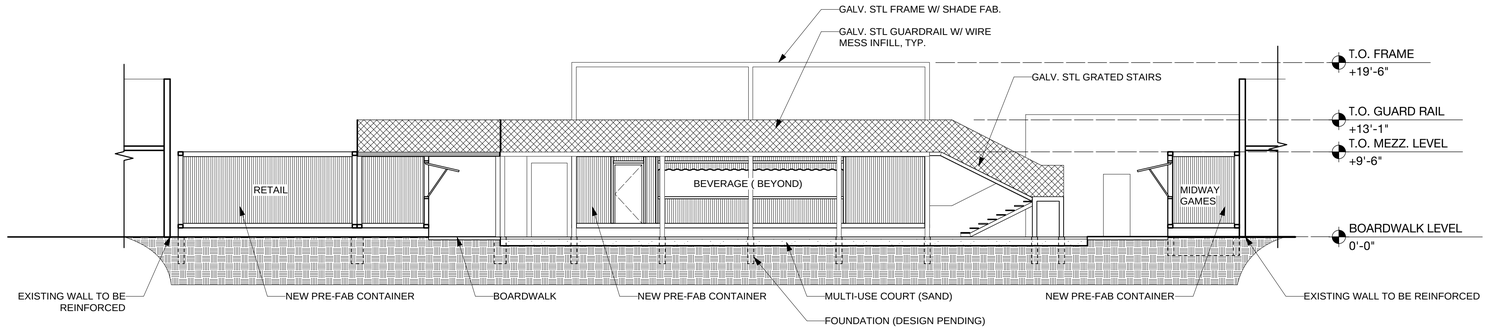
scale

AS NOTED

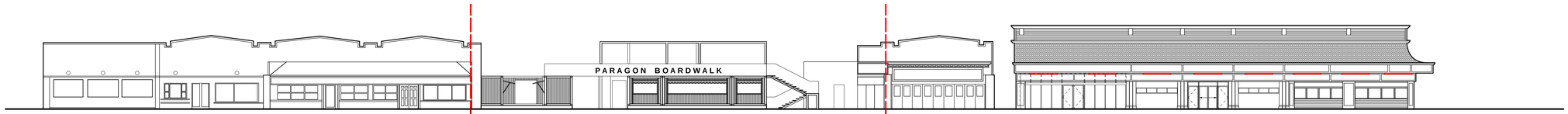
PROGRESS SET



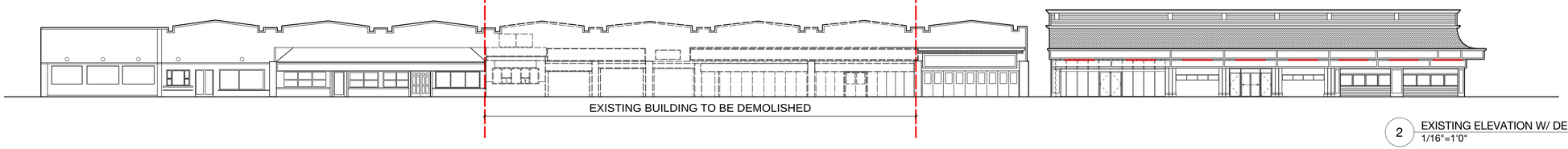
5 LONGITUDINAL SITE SECTION 1
1/8"=1'0"



4 CROSS SITE SECTION 1
1/8"=1'0"



3 PROPOSED ELEVATION
1/16"=1'0"



2 EXISTING ELEVATION W/ DEMO WALLS
1/16"=1'0"

1 EXISTING ELEVATION

PROGRESS SET

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PARAGON BOARDWALK

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issue / revisions

MARK	DATE	DESCRIPTION
	11.21.18	PROGRESS SET

stamp

date
11.21.18

phase

north

sheet title
EXTERIOR ELEVATIONS & SITE SECTIONS

DRAWN / CHECKED

sheet number
A.601

scale
AS NOTED