STORMWATER REPORT

APO ASSESSORS MAP 122, LOT 3
35 KEARSARGE STREET REDEVELOPMENT
35 KEARSARGE STREET
NEW BEDFORD, MASSACHUSETTS

Applicant:

CRUZ DEVELOPMENT CORPORATION
1 JOHN ELIOT SQUARE
ROXBURY, MASSACHUSETTS 02119

Prepared By:

SITEC – A PART OF CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
449 FAUNCE CORNER ROAD
DARTMOUTH, MASSACHUSETTS 02747

CEC Project 304-430

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SITEC
Part of Civil & Environmental Consultants, Inc.

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1.0 PROJECT NARRATIVE

1.1 INTRODUCTION

On behalf of Cruz Development Corporation (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 and the City of New Bedford Stormwater Management Program. The applicant is seeking approval from the City of New Bedford for Site Plan Review for the redevelopment at 35 Kearsarge Street.

The Applicant is proposing to redevelop a 0.74-acre parcel of land located at 35 Kearsarge Street, known as "APO Assessors Map 112 Lot 3", in New Bedford, Massachusetts (the "Site") in order to construct a three (3) story multi-family residential development including thirty-four (34) apartment style units. The development will contain a paved parking lot, subsurface infiltration chambers, as well as associated landscape, grading and utility infrastructure improvements (the "Project").

1.2 EXISTING CONDITIONS

Under existing conditions, the 0.74-acre parcel of land is comprised of a paved parking lot and an abandoned school building, along with a small landscaped area. The Site is bound to the east by Kearsarge Street, to the north by Ingraham Street, to the west by St. Joseph & St. Therese Parish Church, and to the south by Duncan Street. The existing Site is approximately 96% impervious and is located in the Residence A zoning district. Existing topography within the site ranges from elevation 106 feet (NAVD88) at the northwesterly corner of the Site with the majority of the site sloping towards the southern property boundary at approximate low elevation of 103 feet (NAVD88). See Site Plans contained within Appendix C for more information. The stormwater runoff from the Site flows overland and untreated into the right of way of Duncan Street and Ingraham Street, conveyed towards drop inlet manholes at the respective intersections with Kearsarge Street.

1.2.1 FLOOD ZONE

The Site is not contained within any regulatory floodplains as shown on the Federal Emergency (FEMA) Flood Insurance Rate Map (FIRM) for the City of New Bedford, Map #25005C0391G, effective July 16, 2014. Refer to Figure 1 for the FEMA Flood Insurance Rate Map (FIRM) Firmette.

1.2.2 GEOTECHNICAL CONDITIONS

According to the Natural Resources Conservation Service (NRCS) Web Soil Survey, the Site is classified as Urban Land (#602). Additional limited subsurface investigations were performed by River Hawk Environmental, LLC on April 21, 2020 during a Phase 1 Environmental Site Assessment. Based on this report, groundwater elevations were determined at MW-1 through MW-4 to be the following:

MW-1
104.89' (Rim Elevation) - 9.60' (Depth to Water) = Groundwater Elevation = 95.29'

MW2
104.27' (Rim Elevation) – 9.61' (Depth to Water) = Groundwater Elevation = 94.66'

MW3
103.85' (Rim Elevation) – 9.16' (Depth to Water) = Groundwater Elevation = 94.69'

MW4
103.87' (Rim Elevation) – 7.88' (Depth to Water) = Groundwater Elevation = 95.49'

Groundwater elevation was conservatively assumed to be 95.49 feet for the southern half of the Site and 95.29 feet for the northern half of the Site (NAVD88) for design purposes. Based on the review of the NRCS Web Soil Report and information included in the limited subsurface investigations, Hydrologic Soil Group (HSG) A with an infiltration rate of 1.02 inches per hour was utilized in the hydrologic analysis. Refer to Appendix A for the NRCS Soil Information and Report by River Hawk Environmental, LLC.

1.3 PROPOSED PROJECT

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 and the City of New Bedford Stormwater Management Program. As previously noted, the project includes the construction of a three (3) story multi-family residential development with thirty-four (34) apartment style units. The development will contain a paved parking lot, subsurface infiltration chambers, as well as associated landscape, grading and utility infrastructure improvements.

In the proposed condition, approximately 89% of the Site will be impervious consisting primarily of building roof areas along with pavement areas and will have a net increase of approximately 2458 sf of pervious area when compared to existing conditions. The remainder of the Site will consist of landscaped areas along the perimeter of the Site and along the building frontage at facing

the proposed parking lot. The overall drainage patterns on the Site will be maintained in the proposed condition. The clean runoff from the roof areas within the site are currently conveyed through roof drains to subsurface grates within the boiler room of the existing building. The condition of these drainage elements will be assessed prior to construction, and will be maintained throughout the construction of the redevelopment. The majority of the runoff on the Site will be split to the north and south of the parking lot to the proposed trench drain grates located at the proposed entrances to Duncan and Ingraham Street. These trench drains will capture and convey flow from the parking lot and surrounding area through a single 12-inch HDPE pipe to a Stormceptor STC-900 and then through an additional 12-inch HDPE pipe to two separate systems of SC-740 StormTech Subsurface Stormwater Infiltration Chambers. The rest of the Site will remain under an untreated and overland flow condition. The proposed stormwater design will effectively capture and recharge stormwater runoff from the redeveloped parking area, and eliminate runoff to Ingraham Street and Duncan Street for the 2-year and 10-year storm events.

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 and 10-year, Type III storm events (3.4 and 4.8 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 geotechnical investigation, Hydrologic Soil Group (HSG) A was used 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 condition 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 (6) 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 based on the topographic field survey performed in 2021. Brief descriptions of the existing conditions and proposed conditions drainage areas are as follows:

- **Existing Conditions:** The Site is composed of six (6) drainage areas, with stormwater runoff flowing to four (4) design points which have been identified as Kearsarge Street (Design Point A), Existing Floor Drains – School (Design Point B), Duncan Street (Design Point C) and Ingraham Street (Design Point D). Refer to Figure HYD-EX for the existing conditions drainage areas. A detailed breakdown of the existing conditions drainage area is shown in Table 3.1 below:

TABLE 3.1
EXISTING CONDITIONS

Drainage Area	Discharge Location	Design Point	Area (ac.)	Curve Number	Time of Concentration (minutes)
A1-EX	Kearsarge St.	A	0.018	98	6.0
B1-EX	Existing Floor Drains - School	B	0.330	98	6.0
C1-EX	Duncan St.	C	0.329	95	6.0
C-OFF			0.075	98	6.0
D1-EX	Ingraham St.	D	0.055	98	6.0
D-OFF			0.006	98	6.0

- **Proposed Conditions:** The Site is composed of four (4) drainage areas and the stormwater runoff will flow to the four (4) design points which have been identified as Kearsarge Street (Design Point A), Existing Floor Drains – School (Design Point B), Duncan Street (Design Point C), and Ingraham Street (Design Point D. Refer to Figure HYD-PR for the proposed conditions drainage area. A detailed breakdown of the proposed conditions drainage areas is shown in Table 3.2 below:

TABLE 3.2
POST-DEVELOPMENT CONDITIONS

Drainage Area	Discharge Location	Design Point	Area (ac.)	Curve Number	Time of Concentration (minutes)
A1-PR	Kearsarge St.	A	0.018	98	6.0
B1-PR	Existing Floor Drains - School	B	0.326	98	6.0
C1-PR	Duncan St.	C	0.242	82	6.0
C-OFF			0.065	98	6.0
D1-PR	Ingraham St.	D	0.150	88	6.0
D-OFF			0.012	98	6.0

3.3 RESULTS OF ANALYSIS

A stormwater analysis was performed for the 24-hour 2-year and 10-year storm events in order to determine that there will be no increase in stormwater runoff discharge off-site once the proposed construction is complete and the stormwater control structures are in place. Detailed calculations are attached in Appendix B. The points of compliance for existing and post-development conditions are Kearsarge Street (Design Point A), Existing Floor Drains – School (Design Point B), Duncan Street (Design Point C), and Ingraham Street (Design Point D). A summary of the peak stormwater runoff is provided below.

TABLE 3.3
PROJECT STORMWATER RUNOFF RATES

	Peak Runoff Rate (cfs)			
	2-Year	2-Year	10-Year	10-Year
	Existing	Proposed	Existing	Proposed
A	0.08	0.08	0.12	0.12
B	1.55	1.53	2.19	2.17
C	1.82	0.00	2.62	0.00
D	0.28	0.00	0.40	0.00

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 B.

3.3.1 Hydrology

The calculations, provided in Appendix B, demonstrate that the proposed drainage infrastructure is capable of conveying the 2-year and 10-year storm events.

4.0 STORMWATER CONTROL SYSTEM DESIGN CRITERIA

4.1 MASSDEP STORMWATER MANAGEMENT POLICY

Stormwater discharges from the proposed Project have been reviewed for conformance with 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 (10) performance standards to control stormwater quantity and quality. These standards establish the level of required controls that can be achieved with site planning, structural and non-structural controls, and other best management practices (BMPs). 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 B.

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. The proposed project maintains 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. Stormwater modeling methodology is discussed in detail in Section 3.0. The model output is provided as Appendix B. 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 as proposed results in a net decrease of impervious area. Per Standard 3 of the Stormwater Management Standards, infiltration measures should be introduced to minimize loss of annual recharge to groundwater from the increase of net impervious area. The project will result in the reduction of approximately 2,287 square feet (sf) of impervious area. In accordance with the stormwater standards, 0.60-inches of recharge must be provided for the increase in impervious areas on the Site for HSG A soils. Due to the lack of increase in impervious area, 0 cubic feet (cf) of groundwater recharge is required for the Site in the proposed condition. 3,983 cf of storage is provided by the infiltration chamber systems, below the overflow outlet, providing significantly more recharge than the requirement. Proposed infiltration chambers have been incorporated into the project design in order to provide additional stormwater recharge. Supporting calculations are provided in Appendix B.

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 methods of stormwater management to reduce TSS generation including the use of water quality units as is consistent with the Policy. The estimated TSS removal rate from the proposed BMPs is calculated to meet the requirement. Supporting calculations can be found in Appendix B.

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 does not discharge from areas with higher potential pollutant loads.

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 does not discharge to critical areas.

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 has been designed improve existing site conditions and to comply with the Stormwater Management Standards.

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 hay bales and silt fence, which will be installed down-gradient of the proposed work area within the Site. A comprehensive Sediment and Erosion Control plan is included in Section 5.0 of this report.

Standard 9

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

A comprehensive Operations and Maintenance Plan (O&M) 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 known illicit discharges at the Site and all construction will be performed without illicit discharges. See attached Illicit Discharge Compliance Statement included within Appendix B.

5.0 CONSTRUCTION PERIOD POLLUTION PREVENTION AND SEDIMENTATION AND EROSION CONTROL PLAN

5.1 INTRODUCTION

The greatest potential for sediment generation will occur during construction. An extensive erosion and sedimentation program is proposed and will be diligently implemented 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.

Responsible Party for Plan Compliance:

Cruz Companies
1 John Eliot Square
Roxbury, Massachusetts 02119
Dan Cruz
Contact: (617) 445-6901 x221

Emergency Contact Information:

Civil & Environmental Consultants, Inc. – (774) 501-2176

5.2 CONSTRUCTION PHASE EROSION CONTROL MEASURES

The adjacent properties 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. Silt sacks will be installed in down gradient catch basins and a temporary stabilized construction exit will be constructed. 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 landward of coastal beach 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. Wooden stakes, measuring 2" x 2", 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. Silt sacks will be installed in down gradient catch basins in order to capture sediment prior to stormwater entering the municipal drainage systems.

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 an experienced Construction Monitor will inspect 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. 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:
    - Any permit conditions/approvals,
    - All inspection reports, and
    - Any spill reports.

Table 5.1 - Construction BMPs Maintenance Log

Project Name: 35 Kearsarge Street Redevelopment
Project Location: 35 Kearsarge Street, New Bedford, MA 02745
Project Number: 304-430

Date: 7/9/2021
Calculated By: TWR
Checked By: DNA

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	To be monitored as needed			Paved areas within the active construction site can be swept on a regular basis to remove larger sediment particles from construction activities. Pavement areas adjacent to the Site will be swept if dirt and debris is tracked from the active construction site.			
Catch Basin Inlet Protection (Silt Sack Sediment Trap)	Inspect at least once every 7 calendar days or once every 14 calendar days and within 24 hours of the occurrence of storm event of 0.25 inches or greater.			Inspect for proper operation. If clogged, remove accumulated sediment and properly dispose of to maintain the capacity of the catch basin.			
Erosion Control Barrier (Straw Bales and Silt Fence)	Inspect at least once every 7 calendar days or once every 14 calendar days and within 24 hours of the occurrence of storm event of 0.25 inches or greater.			Inspect for deterioration or failure. Remove sediment when buildup exceeds 6 inches or half the barrier height. The underside of straw bales should be kept in close contact with the earth and reset as necessary.			
Stabilized Construction Exit	Inspect at least once every 7 calendar days or once every 14 calendar days and within 24 hours of the occurrence of storm event of 0.25 inches or greater.			The exit shall be maintained in a condition that will prevent tracking of sediment onto public rights-of-way. The contractor shall sweep or wash pavement at exits which have experienced mud-tracking onto the pavement or traveled way. When wheel washing is required, it shall be done on an area stabilized with aggregate that drains into an approved sediment trapping device. When the construction exit becomes ineffective, the stone shall be removed along with the collected soil material and redistributed on-site in a stable manner. The exit should then be reconstructed. All sediment shall be prevented from entering storm drains, ditches, or waterways.			

Stormwater Supervisor Contact Information: _____

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:

Cruz Companies
1 John Eliot Square
Roxbury, Massachusetts 02119
Dan Cruz
Contact: (617) 445-6901 x221

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

Emergency Contact Information:

Civil & Environmental Consultants, Inc. – (774) 501-2176

Estimated O&M Budget:

It is estimated that an annual budget of $2,000-$4,000 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 5.3. Components to be inspected include the infiltration chambers, Stormceptor unit, and the trench drain. Each will be inspected for sediment buildup, color, and structural damage. The results of each inspection will be entered into an inspection log. Refer to Table 5.1 for the inspection log form.

6.3 MAINTENANCE PLAN

The Responsible Party will incorporate 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 5.1. The program will include the following maintenance activities:

Trench Drain

- All trench drains shall be inspected a minimum of at least four times per year.
- Any structural damage or other indication of malfunction will be reported to the site manager and repaired as necessary.
- During colder periods, the trench drain grates must be kept free of snow and ice.
- During warmer periods, the trench drain grates must be kept free of leaves, litter, sand, and debris.

Water Quality Structure

- 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.

S**ubsurface Infiltration System**

- See the attached Manufacturer's instructions on operation and maintenance requirements and methodology.
- Perform routine inspections on a monthly basis for the first three months after installation. Then, at a minimum, the treatment structure is to be inspected twice annually and the infiltrating structure is to be inspected annually.
- The subsurface infiltration system will be inspected twice during for the first year and annually thereafter by removing the manhole/access port covers and determining the thickness of sediment that has accumulated.
- If sediment is more than two inches deep, it must be suspended via flushing with clean water and removed using a vactor truck.
- Emergency overflow pipes will be examined at least once each year and verified that no blockage has occurred.

6.4 LONG TERM POLLUTION PREVENTION MAINTENANCE

The Responsible Party will 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 annually 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

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 City's official.

Table 6.1 - Stormwater Operations and Maintenance Log

Project Name: 35 Kearsarge Street Redevelopment
Project Location: 35 Kearsarge Street, New Bedford, MA 02745
Project Number: 304-430

Date: 7/9/2021
Calculated By: TWR
Checked By: DNA

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 (STC-900)	Inspect twice per year or as required by the manufacturer.			At a minimum, inspections should be performed twice per year (e.g. spring and fall). Frequency shall be increased in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected. The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. Visual inspections should ascertain that the system components are in working order and that there are no blockages in the inlet and seperation screen.			
Trench Drain	Inspect four times per year			Clean four times per year, in the spring and fall, or whenever sediment buildup exceeds two (2) feet in depth. Remove trash and deposits. During cleanings, confirm the drain is free of clogs, and is functional. Reinstall or replace as needed. Take care not to damage the structure while cleaning.			
Subsurface Infiltration System	Inspect monthly for the first three months. Then, at a minimum, the treatment structure is to be inspected twice annually and the infiltrating structure is to be inspected annually as required by the manufacturer.			Remove sediment once per year or when buildup exceeds two (2) inches in depth.			

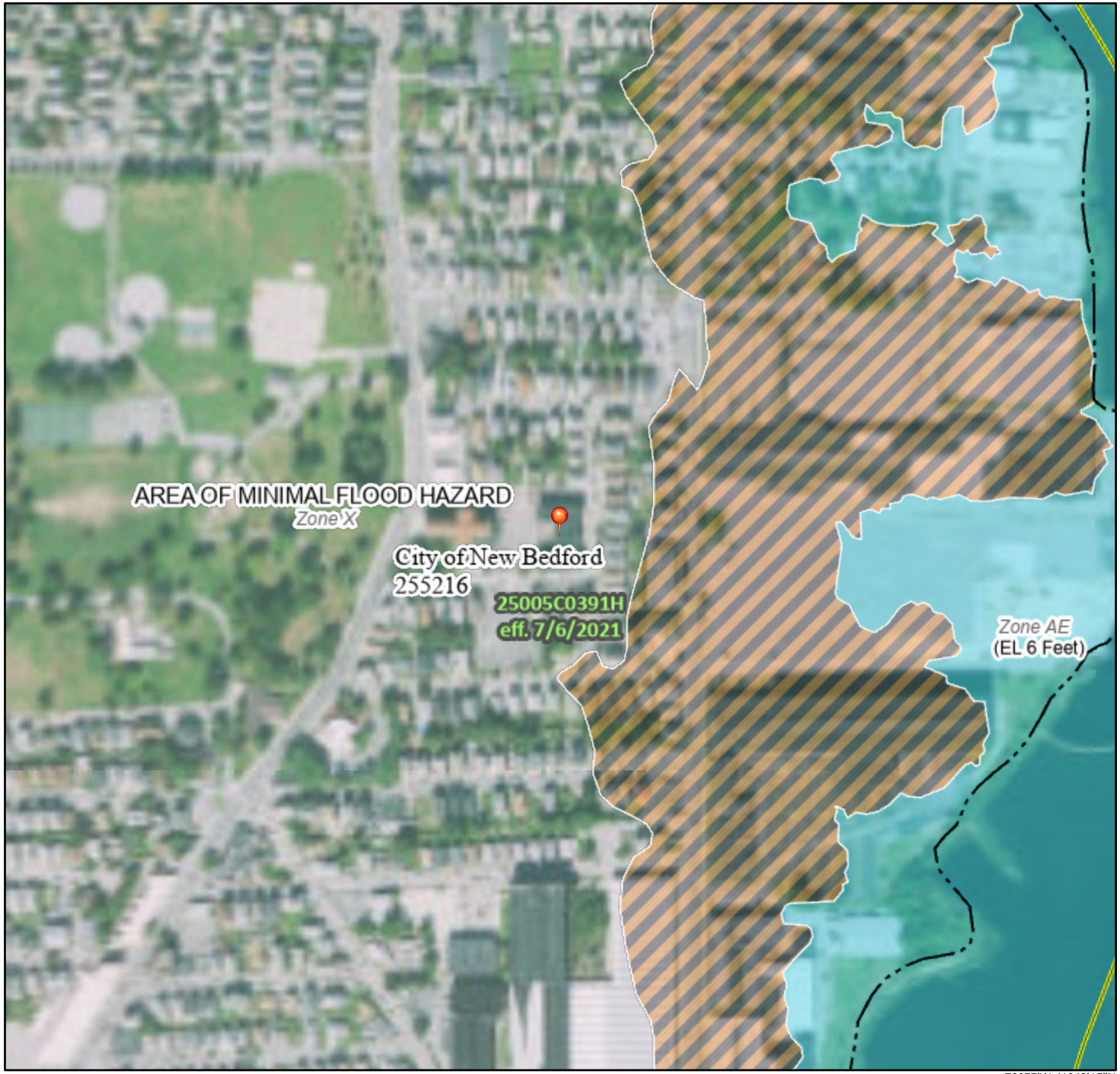
Stormwater Supervisor Contact Information: _____

FIGURES

National Flood Hazard Layer FIRMette

FEMA

70°55'37"W 41°40'42"N



70°55'W 41°40'15"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

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 7/9/2021 at 3:18 PM 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

INGRAHAM STREET
(PUBLIC – 50' WIDE)

APPROXIMATE LOCATION EXISTING 30" SURFACE DRAIN

D.I. MH 3
RIM=100.59
D.I. ELEV=99.87
4.6' TO BOT. STRUCTURE
NO VISIBLE PIPES

N 00°24'30" E 50.12'

S 88°02'30" E 405.23'

6.18'

OVERHANG

189.05'

D

D-OFF

D1-EX

STEPS

N 01°49'14" E 124.07'

EXISTING CHURCH

104.57

D.I. MH 2
RIM=100.75
D.I. ELEV=100.01
INV OUT=98.20 (12" CLAY)

108.03

107.19

RAISED ROOF

(2) 4' WIDE GRATES
INV=108.05

A1-PR

STEPS

107.27

C1-EX

STEPS

STEPS

B

EXISTING SCHOOL #35

103.37

105.61

C-OFF

159.84'

S 00°24'30" W

B1-PR

EXISTING GARAGE

EXISTING RECTORY #51

104.85

N 02°26'13" W 51.99'

103.77

D.I. MH 1
RIM=99.70
D.I. ELEV=99.20
6' TO BOT. STRUCTURE
NO VISIBLE PIPES

A

STEPS

N 87°05'00" E 480.50'

189.78'

OVERHANG

KEARSARGE STREET
(PUBLIC – 50' WIDE–1910 LAYOUT)

DMH 2
RIM=100.19
INV A=91.84
INV B=91.94
INV C=95.44

EXISTING 30" SURFACE DRAIN

APPROXIMATE LOCATION
EXISTING 10" SURFACE DRAIN

DMH 1
RIM=99.68
INV A=90.53
INV B=90.43
INV C=

DUNCAN STREET
(PUBLIC – 50' WIDE–1917 LAYOUT–PB15 PG51)

C

SCALE IN FEET
0 30 60

A — EXISTING DESIGN POINT

A1–EX — EXISTING SUBCATCHMENT AREA

A–P — EXISTING POND/DETENTION AREA

EXISTING SUBCATCHMENT BOUNDARY

EXISTING TIME OF CONCENTRATION PATH

EXISTING VEGETATED AREA

EXISTING PAVED AREA

EXISTING ROOF AREA

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

CRUZ COMPANIES, INC.
ASSESSORS MAP 112, LOT 3
35 KEARSARGE STREET
NEW BEDFORD, MASSACHUSETTS

EXISTING CONDITIONS
DRAINAGE AREA MAP

DRAWN BY:	TWR	CHECKED BY:	DNA	APPROVED BY:	SDG
DATE:	JULY 2021	DWG SCALE:	1" = 30'	PROJECT NO:	304-430

FIGURE NO.: **HYD-EX**

NORTH

INGRAHAM STREET
(PUBLIC – 50' WIDE)

PROPOSED 8"X22' TRENCH DRAIN
RIM=103.75 (TOP GRATE)
INV. OUT=98.30 (STC–900)
(SEE DETAIL ON SHEET C801)

6.18'

APPROXIMATE LOCATION EXISTING 30" SURFACE DRAIN

D.I. MH 3
RIM=100.59
D.I. ELEV=99.87
4.6' TO BOT. STRUCTURE
NO VISIBLE PIPES

D

5 LF 12"
HDPE @2.0%

OVERHANG

PROPOSED INFILTRATION CHAMBERS (2)
STORMTECH SC–740 (4X5)
BOT. STONE=97.50
BOT. CHAMBER=98.00
TOP CHAMBER=100.50
TOP STONE=101.00
GW=95.29
(SEE DETAIL ON SHEET C801)

D.I. MH 2
RIM=100.75
D.I. ELEV=100.01
INV OUT=98.20 (12" CLAY)

PROPOSED STORMCEPTOR STC–900
RIM=103.80
INV. IN=98.20
INV. OUT=98.10
(SEE DETAIL ON SHEET C801)

D1–P

D–OFF

D1–PR

ISOLATOR ROW

TSW=104.7
BSW=104.2

105.1

(2) 4' WIDE GRATES
INV=108.05

A1–PR

STEPS

B

FFE=100.48

PROPOSED
THRESH ELEV=105.3

PARCEL 2
A PORTION OF MAP 122 LOT 3
32,010 SQ. FT.

104.5
104.3
104.3
104.3
104.1

TSW=104.7
BSW=104.3

TSW=104.6
BSW=104.1

104.2

105.2

C–OFF

C1–P

PROPOSED
34 UNIT
APARTMENT
BUILDING

B1–PR

PROPOSED INFILTRATION CHAMBERS (1)
STORMTECH SC–740 (4X7)
BOT. STONE=97.50
BOT. CHAMBER=98.00
TOP CHAMBER=100.50
TOP STONE=101.00
GW=95.49
(SEE DETAIL ON SHEET C801)

D.I. MH 1
RIM=99.70
D.I. ELEV=99.20
6' TO BOT. STRUCTURE
NO VISIBLE PIPES

C1–PR

A

EXISTING
CHURCH

EXISTING
RECTORY
#51

ISOLATOR ROW

OVERHANG

PROPOSED STORMCEPTOR STC–900
RIM=103.55
INV. IN=98.20
INV. OUT=98.10
(SEE DETAIL ON SHEET C801)

5 LF 12"
HDPE @2.0%

C

PROPOSED 8"X22' TRENCH DRAIN
RIM=103.50 (TOP GRATE)
INV. OUT=98.30 (STC–900)
(SEE DETAIL ON SHEET C801)

KEARSARGE STREET
(PUBLIC – 50' WIDE–1910 LAYOUT)

DMH 2
RIM=100.19
INV A=91.84
INV B=91.94
INV C=95.44

EXISTING 30"
SURFACE DRAIN

APPROXIMATE LOCATION
EXISTING 10" SURFACE DRAIN

DMH 1
RIM=99.68
INV A=90.53
INV B=90.43
INV C=

DUNCAN STREET
(PUBLIC – 50' WIDE–1917 LAYOUT–PB15 PG51)

SCALE IN FEET
0 30 60

A	PROPOSED DESIGN POINT
A1–PR	PROPOSED SUBCATCHMENT AREA
A–P	PROPOSED POND/DETENTION AREA
	PROPOSED SUBCATCHMENT BOUNDARY
	PROPOSED TIME OF CONCENTRATION PATH
	PROPOSED VEGETATED AREA
	PROPOSED PAVED AREA
	PROPOSED ROOF AREA

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CRUZ COMPANIES, INC.
ASSESSORS MAP 112, LOT 3
35 KEARSARGE STREET
NEW BEDFORD, MASSACHUSETTS

PROPOSED CONDITIONS
DRAINAGE AREA MAP

DRAWN BY:	TWR	CHECKED BY:	DNA	APPROVED BY:	SDG
DATE:	JULY 2021	DWG SCALE:	1" = 30'	PROJECT NO:	304-430

FIGURE NO.: **HYD-PR**

APPENDIX A

GEOTECHNICAL INFORMATION

NRCS Soil Resource Report
River Hawk Environmental Phase 1 ESA 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 Bristol County, Massachusetts, Southern Part

July 9, 2021

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

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

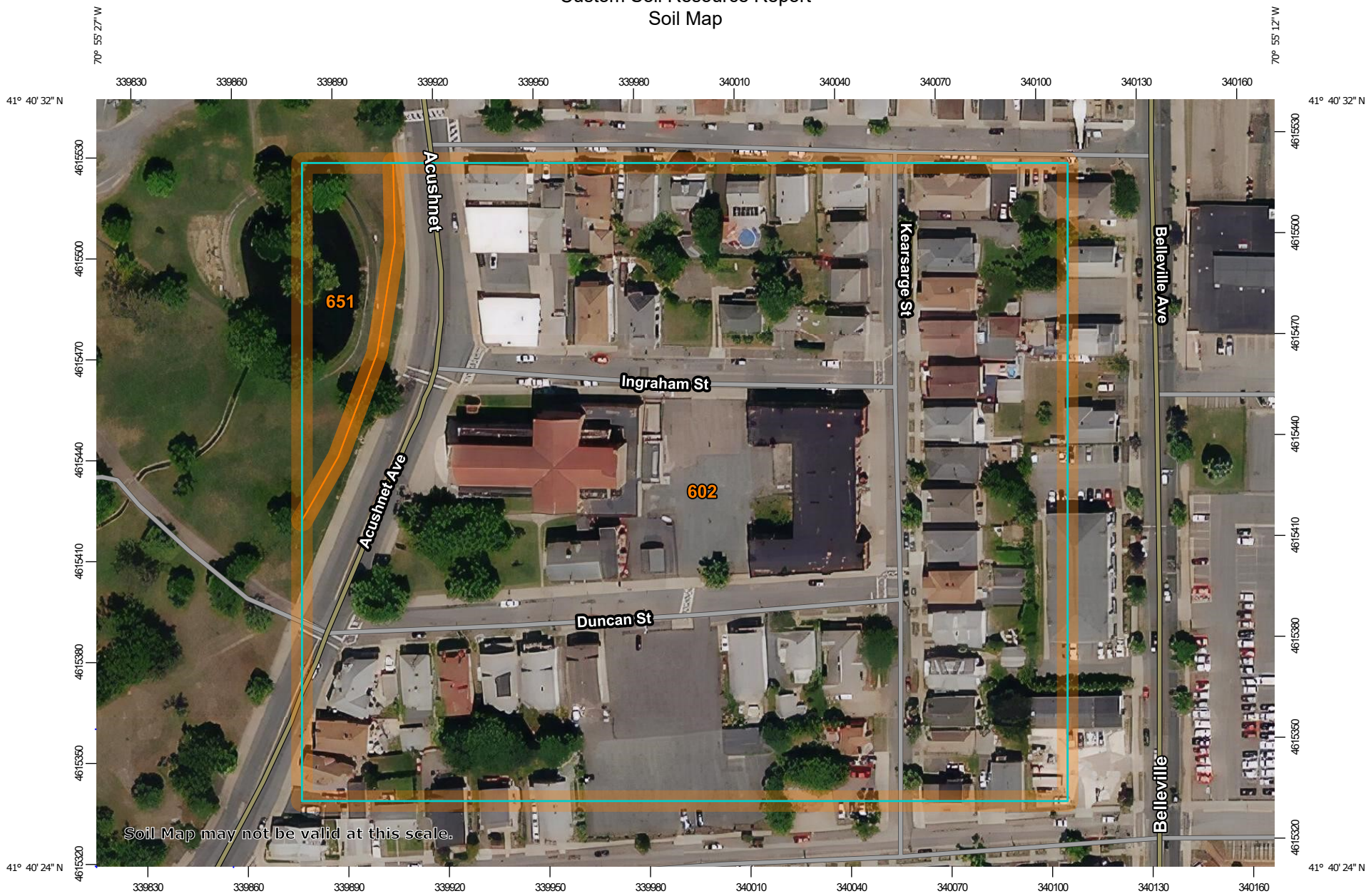
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

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: 1:1,610 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

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 1:20,000.

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: Bristol County, Massachusetts, Southern Part
Survey Area Data: Version 14, Jun 9, 2020

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

Date(s) aerial images were photographed: Dec 31, 2009—Jul 3, 2017

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
602	Urban land	10.2	95.2%
651	Udorthents, smoothed	0.5	4.8%
Totals for Area of Interest		**10.8**	**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.

Bristol County, Massachusetts, Southern Part

602—Urban land

Map Unit Setting
National map unit symbol: v5ry
Frost-free period: 120 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition
Urban land: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting
Parent material: Excavated and filled land

Minor Components

Udorthents
Percent of map unit: 15 percent
Hydric soil rating: Unranked

651—Udorthents, smoothed

Map Unit Setting
National map unit symbol: v5rw
Elevation: 0 to 3,000 feet
Mean annual precipitation: 45 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, smoothed, and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents, Smoothed

Setting
Parent material: Made land over loose sandy and gravelly glaciofluvial deposits and/or firm coarse-loamy basal till derived from granite and gneiss

Typical profile
H1 - 0 to 6 inches: variable
H2 - 6 to 60 inches: variable

Properties and qualities
Slope: 0 to 15 percent

Depth to restrictive feature: More than 80 inches
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to very high (0.06 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Hydric soil rating: Unranked

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PHASE I ENVIRONMENTAL SITE ASSESSMENT &
LIMITED SUBSURFACE INVESTIGATION REPORT

Commercial Property
35 Kearsarge Street
New Bedford, MA 02745

PREPARED FOR:

Cruz Companies, Inc.
1 John Elliot Square
Roxbury, MA 02119

PREPARED BY:

River Hawk Environmental, LLC
2183 Ocean Street
Marshfield, MA 02050

April 21, 2020

PHASE I ENVIRONMENTAL SITE ASSESSMENT &
LIMITED SUBSURFACE INVESTIGATION REPORT

Commercial Property
35 Kearsarge Street
New Bedford, MA 02745

PREPARED BY:

River Hawk Environmental, LLC
2183 Ocean Street
Marshfield, MA 02050

April 21, 2020

Reviewed and Approved:

William P. Kenney, LSP — Date:
Lead Environmental Investigator & Principal in Charge

Robert S. Rego, P.E., LSP — Date:
Technical Review & Principal

By signing the above, we declare that, to the best of our professional knowledge and belief, we meet the definition of Environmental Professional as defined in 40 CMR 312.10 and we have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the Subject Property. We have developed and preformed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR 312.

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1.0 EXECUTIVE SUMMARY

River Hawk Environmental, LLC (RHE) has been retained by Cruz Companies, Inc. to conduct a Phase I Environmental Site Assessment (Phase I ESA) & Limited Subsurface Investigation (LSI) of the property referred to as 35 Kearsarge Street in New Bedford, MA (Subject Property). In conducting this assessment, RHE followed standards set forth in American Society for Testing and Materials (ASTM) Policy E1527-13. This assessment has revealed the following findings:

- The Subject Property is an approximate 32,010 parcel (Map 112, Lot 3, Parcel 2) located northwest of the intersection of Kearsarge Street and Duncan Street in New Bedford, MA.

- The Subject Property is improved with a multi-story commercial building (Site Building), with an adjacent utility room (Boiler Room), and a bituminous concrete (i.e., pavement) parking lot. The Site Building is currently vacant. A basement with a poured concrete floor is present below the Site Building. The Boiler Room is a slab-on-grade design.

- Four (4) aboveground storage tanks (ASTs) are present in the Boiler Room. The ASTs are reportedly used for the storage of No. 2 fuel oil for heating purposes. One (1) steel 55-gallon drum, of unknown contents, is present in the Boiler Room. No releases from the ASTs or drums were observed during RHE's inspection; however, the presence of ASTs and a drum, with no secondary containment is a Recognized Environmental Condition (REC).

- A pad-mounted electrical switchgear is located southwest of the Site Building. According to the utility company (Eversource), the switchgear is owned by the utility company and does not contain cooling oil.

- Review of historic aerial photographs and records revealed that the Site Building was used as a school between at least the late 1800s and 2010s.

- The Subject Property is not specifically listed on any ASTM-specified State Regulatory databases.

- Several State and/or Federal-listed release sites are located within ½-mile of the Subject Property; however, upon further evaluation of the off-site release sites, only one off-site release [51 Duncan Street - MassDEP Release Tracking Number 4-20109] was identified to be a concern relative to the Subject Property. An off-site release of petroleum hydrocarbons at 51 Duncan Street was identified during the removal of two (2) underground storage tanks (USTs) in 2007. Assessment and remediation activities were conducted, and a Class A-2 Response Action Outcome Statement (Permanent Solution Statement) for RTN 4-20109 was submitted to the MassDEP in 2007. A Revised Class A-2 RAO was submitted to the MassDEP in 2010. A review of the Revised Class A-2 RAO revealed that petroleum hydrocarbon impact associated with RTN 4-20109 extends onto the northern portion of the Subject Property. The presence of a portion of a MassDEP-

listed release site at the Subject Property is a Historic Recognized Environmental Condition (HREC).

- In order to evaluate subsurface conditions relative to the REC and HREC listed above, RHE performed an LSI in April 2020. The LSI included the advancement of eight (8) soil borings, installation of four (4) monitoring wells, and installation of three (3) soil vapor pins throughout the Subject Property. Soil and groundwater samples were collected and submitted for potential contaminants of concern (EPH, VPH, and/or VOCs). One (1) soil vapor sample was submitted for a potential contaminant of concern (APH). The results of laboratory analysis conducted on soil, groundwater, and soil vapor samples did not reveal the presence of any tested analytes at concentrations greater than the Massachusetts Contingency Plan (MCP) Reportable Concentrations, MCP Method 1 Risk Characterization Standards, and/or threshold values set forth in relevant MassDEP Policies.

RHE recommends the removal of the four (4) ASTs and drum in the Boiler Room. Otherwise, no confirmed RECs which require further action were identified in connection with the Subject Property. Therefore, further investigation is not warranted at this time.

2.0 INTRODUCTION

River Hawk Environmental, LLC (RHE) has been retained by Cruz Companies, Inc. to conduct a Phase I Environmental Site Assessment (Phase I ESA) & Limited Subsurface Investigation (LSI) of the property referred to as 35 Kearsarge Street in New Bedford, MA (Subject Property). In conducting this assessment, RHE followed standards set forth in American Society for Testing and Materials (ASTM) Policy E1527-13.

2.1 Purpose

The primary purpose of this assessment was to identify potential recognized environmental conditions (RECs) in connection with the Subject Property. ASTM defines RECs as the presence or likely presence of any hazardous substances or petroleum products in, on, or at the Subject Property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment.

2.2 Scope of Services

In accordance with the above-referenced agreement, RHE performed a visual reconnaissance of the Subject Property, noted use of adjacent properties, conducted historical and regulatory records research, and collected soil and groundwater samples from soil borings and monitoring wells and soil vapor and indoor air samples for laboratory analysis. The following provides a more detailed description of the scope of services:

- Visual inspection of the Subject Property grounds to identify the potential for release(s) of oil and/or hazardous material (OHM);
- Visual inspection of the Subject Property for indications of the presence or absence of polychlorinated biphenyls (PCBs) (e.g. electrical transformers and/or hydraulic elevators);
- Visual inspection and categorization of the use of properties which abut the Subject Property for potential off-site sources of OHM contamination;
- Review of local records related to historical ownership, usage, and development of the Subject Property. This also included interviewing local environmental authorities to identify complaints, violations, citations, or inspections related to the Subject Property;
- Interview with the present and prospective owners of the Subject Property (if applicable);
- Review of published Federal regulatory records related to activities at the Subject Property, and to potential off-site sources of OHM contamination. Federal records reviewed included the following:

  - National Priorities List (NPL);
  - Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS);
  - Resource Conservation and Recovery Act (RCRA); and
  - Emergency Response Notification System (ERNS).

- Review of readily available Massachusetts Department of Environmental Protection (MassDEP) records and publications for environmental activities at the Subject Property and potential off-site sources of OHM contamination. State records reviewed included the following:
  - MassDEP Reportable Release Lookup Database;
  - MassDEP Registered Underground Storage Tanks (USTs) Database; and
  - MassDEP Registered State Solid Waste Facilities.

- Review of readily available historic documents related to the Subject Property, to assess for potential sources of OHM contamination;

- Review of readily available historic references such as topographic maps, aerial photographs, Sanborn Fire Insurance Maps, previous environmental studies, and/or ownership records associated with the Subject Property and adjoining properties, to evaluate present and historical development/facilities;

- Review of readily available plans and documents relative to construction materials utilized at the Subject Property and any historical renovation activities;

- Review of an Environmental Radius Report (ERR);

- Advancement of eight (8) soil borings, installation of four (4) monitoring wells, installation of three (3) soil vapor pins, and field screening and/or laboratory analysis of soil groundwater, and soil vapor samples;

- Evaluation of soil, groundwater, and soil vapor data relative to standards set forth in the Massachusetts Contingency Plan (MCP) and relevant MassDEP Policies; and

- Preparation of this report.

This report has been prepared in accordance with the Limitations presented in Appendix A.

2.3 Significant Assumptions and Data Gaps

No significant assumptions were made in the preparation of this Phase I ESA.

3.0 GENERAL SITE INFORMATION

The following subsections provide information regarding the location, setting, and history of the Subject Property. The location and pertinent details associated with the Subject Property are graphically depicted in Figures 1 through 3. Photographs of the Subject Property and pertinent characteristics are included in Appendix B.

3.1 Site Location and Current Ownership

Address: 35 Kearsarge Street
New Bedford, MA

Assessor's Info: Map 112, Lot 3 (Parcel 2)

MassDEP GIS Coordinates: 41.674552, 70.921698W

Current Owner: The Roman Catholic Bishop of Fall River, a Corporation Sole
51 Duncan Street
New Bedford, MA 02745

3.2 Description and Current Use of Subject Property

The Subject Property is an approximate 32,010 square foot parcel located northwest of the intersection of Kearsarge Street and Duncan Street in an area of New Bedford, MA used for residential and commercial purposes. The Subject Property is currently improved with a multi-story commercial building (Site Building), and adjacent utility room (Boiler Room), and a bituminous concrete (i.e., pavement) parking lot. The Site Building is currently vacant. A basement with a poured concrete floor is present below the Site Building. The Boiler Room is a slab-on-grade design.

Utilities:
The Site Building is serviced by connections to municipal water and sewer utilities, underground electric, and overhead communications utilities. A pad-mounted electrical switchgear is located southwest of the Site Building. According to the electric utility company (Eversource), Eversource owns the switch, and the switch does not contain cooling oil. A hot water heating system is located in the Boiler Room adjacent to the Site Building.

Storage Tanks:
Four (4) ASTs are located in the Boiler Room adjacent to the Site Building. The ASTs are/were used to store heating oil. Additional description of ASTs is included in section 6.2.

Drainage:
No catch basins were observed on the Subject Property. Stormwater runoff from the Subject

Property appears to be received by catch basins within Ingraham Street, Duncan Street, and Kearsarge Street.

Floor drains are present within the Site Building and Boiler Room. The floor drain in the boiler room appears to be a leaching system. Conditions in the vicinity of the floor drain were evaluated as part of the LSI.

3.3 Historic Use of the Subject Property

Based on an evaluation of Topographic Maps, Aerial Photographs, Sanborn Maps, City Directories, local agency records, and state agency records, the following is a summary of the chronology of the known usage and development of the Subject Property:

Topographic Maps:
RHE reviewed USGS Topographic Maps from 1888, 1893, 1918, 1936, 1941, 1943, 1948, 1964, 1979, 1985, and 2012 (Appendix C). Review of historic topographic maps revealed that the Subject Property is located in an area of New Bedford that has been developed since at least 1888. Review of historic topographic maps did not reveal any specific RECs in connection with the Subject Property.

Aerial Photographs:
RHE reviewed aerial photographs from 1952, 1961, 1970, 1980, 1985, 1992, 1995, 2008, 2012, and 2016 (Appendix D). Review of aerial photographs revealed that the Subject Property has been developed since at least 1952; however, did not reveal any specific RECs in connection with the Subject Property. Prior to 1992, a separate rectangular building was present on the southwestern portion of the Subject Property. Review of aerial photographs did not reveal any specific RECs in connection with the Subject Property.

Sanborn Maps:
RHE reviewed fire insurance maps (Sanborn Maps) from 1924, 1950, 1990, 1992, 1993, and 1995 (Appendix E). The Site Building is shown on Sanborn Maps from 1925, 1950, 1990, 1992, 1993, and 1995. A review of the Sanborn Maps from 1924, 1950, 1990, 1992, 1993, and 1995 revealed the presence of an aboveground storage tank (AST) in a boiler room west of the Site Building. The southwestern portion of the Subject Property is shown as improved with a separate rectangular building on the 1924 and 1950 Sanborn Maps. The historic presence of an AST at the Subject Property was a potential REC that was further evaluated during the LSI process.

City Directories:
RHE reviewed City Directories from 1939, 1943, 1947, 1959, 1965, 1992, 1995, 2000, 2005, 2010, and 2014 (Appendix F). Review of City Directories revealed that St. Joseph School was listed at 35 Kearsarge Street in 1992, 1995, 2000, 2005, and 2010.

Additional Local Agency Records:
During the course of research, officials of the New Bedford Health and Environmental Services Department, Assessor's Office, Inspectional Services Department, Department of Public Infrastructure, Planning Department, Historical Commission, Clerk's Office, and Fire Department were asked if they knew of any environmental concerns at or in the vicinity of the Subject Property. Records were obtained from the Assessor's Office and Fire Department. The following relevant information was recovered during the review of town office filings:

Health and Environmental Services Department Office:
RHE personnel contacted the New Bedford Health Department Office on February 19, 2020. The Health Department did not provide RHE with any information that would assist in the identification of RECs.

Assessor's Office:
RHE personnel visited the New Bedford Assessor's Office on February 21, 2020. The Assessor's Office provided RHE with a copy of the most recent field card for the Subject Property. A copy of the field card is included in Appendix I.

Based on review of the assessor's field card, the Subject Property is owned by the Roman Catholic Bishop of Fall River, a Corporation Sole.

Planning Department Office:
RHE personnel visited the New Bedford Planning Department on February 21, 2020. The Planning Department did not provide RHE with any information that would assist in the identification of RECs.

Historical Commission Office:
RHE personnel submitted a written inquiry to review records maintained by the New Bedford Historical Commission on February 19, 2020. The Historical Commission did not provide RHE with any information that would assist in the identification of RECs.

Inspectional Services Department Office:
RHE personnel visited the New Bedford Building Department on February 21, 2020. The Building Department did not provide RHE with any information that would assist in the identification of RECs.

Public Infrastructure Department Office:
RHE personnel visited the New Bedford Public Works Department on February 21, 2020. The Public Works Department did not provide RHE with any records that would assist in the identification of RECs.

Clerk's Office:
RHE submitted a written inquiry to review records maintained by the New Bedford Clerk's

Office on February 19, 2019. The Clerk's Office did not provide RHE with any records that would assist in the identification of RECs.

Fire Prevention Office:
RHE personnel visited the New Bedford Fire Prevention Office on February 21, 2020. The clerk of the Fire Prevention Office provided RHE with the following information:

- A permit for the removal of one (1) 10,000-gallon UST located at 35 Kearsarge Street was issued on February 20, 2007. The UST Removal Permit did not include assessment data. Conditions in the vicinity of the former UST were evaluated during the LSI process; and

- An incident report associated with a fire in the Boiler Room of the boiling referred to as 35 Kearsarge Street, dated January 10, 2003. The incident report indicated the presence of pooled oil around the base of the boiler. RHE did not observe evidence of oil staining in the Boiler Room. The potential for subsurface impact under the Boiler Room was evaluated during the LSI.

Records provided by New Bedford Fire Department are included in Appendix I.

MassDEP UST and Reportable Release Database Research:
RHE conducted a review of the MassDEP's UST Facility Database and Waste Site & Reportable Releases Data Portal on February 19, 2020. Based on review of the MassDEP's UST Facility Database and Waste Site & Reportable Releases Data Portal, the Subject Property is not identified as a state listed UST Facility. St. Joseph's Parish (51 Duncan Street) was identified as MassDEP Release Tracking Number (RTN) 4-20109. The presence of a MassDEP release site at the westerly-abutting property was an HREC that was further evaluated during the LSI process. Refer to section 5.7.2.1 for a summary of RTN 4-20109.

3.4 Current Use of Abutting Properties

The Subject Property is located in an area of New Bedford used for commercial and residential purposes. The following is a brief description of the current uses of abutting properties:

North: Residential and Roadway Layout (Ingraham Street);

East: Residential and Roadway Layout (Kearsarge Street);

South: Residential and Roadway Layout (Duncan Street);

West: Residential and Commercial (Church).

3.5 Historic Use of Abutting Properties

Based on a review of historic Topographic Maps, Historic Aerial Photographs, Sanborn Maps, City Directories, and records maintained by the MassDEP, the following is a description of the known historic uses of abutting properties:

Topographic Maps:
RHE reviewed USGS Topographic Maps from 1888, 1893, 1918, 1936, 1941, 1943, 1948, 1964, 1979, 1985, and 2012 (Appendix C). Review of historic topographic maps revealed that the Subject Property is located in an area of New Bedford that has been developed since at least 1888. Review of historic topographic maps did not reveal any specific RECs in connection with the Subject Property.

Aerial Photographs:
RHE reviewed aerial photographs from 1952, 1961, 1970, 1980, 1985, 1992, 1995, 2008, 2012, and 2016 (Appendix D). Review of aerial photographs revealed that the Subject Property has been developed since at least 1952; however, did not reveal any specific RECs in connection with the Subject Property.

Sanborn Maps:
RHE reviewed fire insurance maps (Sanborn Maps) from 1924, 1950, 1990, 1992, 1993, and 1995 (Appendix E). A review of the Sanborn Map from 1924 revealed the presence of a UST on the westerly-abutting property. The historic presence of an UST at the westerly-abutting property was a potential REC that was further evaluated during the LSI process.

City Directories:
RHE reviewed City Directories from 1939, 1943, 1947, 1959, 1965, 1992, 1995, 2000, 2005, 2010, and 2014 (Appendix F). Review of City Directories did not reveal any specific RECs in connection with the Subject Property.

MassDEP Reportable Release and UST Databases:
RHE reviewed the MassDEP's UST Facility Database and Waste Site & Reportable Releases Data Portal on February 19, 2020. The westerly-abutting property (St. Joseph's Parish - 51 Duncan Street) is a listed MassDEP release site (RTN 4-20109). The presence of a MassDEP-listed release site at the westerly-abutting property was further evaluated during the LSI process.

3.6 General Hydrogeological Attributes

The following is a summary of the relevant general hydrogeological attributes associated with the Subject Property:

Topography:
Topography at the Subject Property is generally flat, with gentle slope down to the east.

Local Geology:
Soil at the Subject Property consists of dense sand with silt and gravel. Bedrock was not encountered during the LSI.

Groundwater Characteristics:
The depth to groundwater at the Subject Property, as evaluated in April 2020, ranged from 7.88 to 9.61 feet below grade. The apparent groundwater flow direction within the monitoring well network was easterly.

3.7 Potential Environmental Receptors

The following is a summary of potential environmental receptors associated with the Subject Property:

Water Supply & Groundwater Use:
The Subject Property is not located within a current or potential MassDEP-approved drinking water resource area (Interim Wellhead Protection Areas, Zone A Areas, Medium Yield Aquifer, or High Yield Aquifer). No private drinking water wells were identified at the Subject Property and abutting properties.

Wetlands & Surface Water:
Based upon a review of the MassGIS Environmental Plan (Figure 3) and field reconnaissance, no wetlands or surface water bodies are present within 100-feet of the Subject Property.

Environmental Receptors:
The Subject Property is not located in an NHESP estimated habitat of rare wildlife or Area of Critical Environmental Concern (ACEC).

4.0 CURRENT OWNER PROVIDED INFORMATION

The ASTM Standard for a Phase I ESA requires an assessment of the information and knowledge that the current owner and/or site manager possesses relative to the Subject Property. Information in the following subsections was obtained from an interview questionnaire completed by Mr. Paul Brooks, Director of Facilities & Real Estate for The Roman Catholic Bishop of Fall River, A Corporation Sole (the Owner of the Subject Property), on February 19, 2020.

4.1 Title Records

RHE was not provided with title records for the Subject Property.

4.2 Environmental Impairment and/or Releases of OHM

Mr. Brooks did not provide RHE with information that would assist RHE in identifying RECs associated with the Subject Property.

4.3 Specialized Knowledge

Mr. Brooks did not provide any specialized knowledge regarding the Subject Property that would assist RHE in identifying RECs associated with the Subject Property.

4.4 Commonly Known or Reasonably Ascertainable Knowledge

Mr. Brooks did not provide any commonly known or reasonably ascertainable knowledge that would assist RHE in identifying RECs associated with the Subject Property.

4.5 Previous Environmental Reports

Mr. Brooks did not provide RHE with any reports regarding previous environmental assessments of the Subject Property.

5.0 RECORDS REVIEW OF THE SITE AND ADJACENT PROPERTIES

Past land uses were reviewed to identify historical practices or conditions at or in the vicinity of the Subject Property which may have impacted the environmental quality of the Subject Property. This was accomplished via review of Historic Aerial Photographs; review of Sanborn Maps; review of historic USGS Topographic Maps; review of City Directories; and review of environmental records maintained by the Federal, State, and Local agencies.

5.1 Topographic Maps

RHE reviewed USGS Topographic Maps as part of this investigation (Appendix C). Additional information regarding RHE's evaluation of topographic maps is included in Sections 3.3 and 3.5.

5.2 Aerial Photographs

RHE reviewed aerial photographs as part of this investigation (Appendix D). Additional information regarding RHE's evaluation of aerial photographs is included in Sections 3.3 and 3.5.

5.3 Sanborn Fire Insurance Atlases

RHE reviewed Sanborn Fire Insurance Atlases (Sanborn Maps) as part of this investigation (Appendix E). Additional information regarding RHE's evaluation of Sanborn Maps is included in Sections 3.3 and 3.5.

5.4 City Directories

RHE reviewed City Directories as part of this investigation (Appendix F). Additional information regarding RHE's evaluation of city directories is included in Sections 3.3 and 3.5.

5.5 Registry of Deeds Information

Records at the Bristol County Registry of Deeds were not reviewed during this assessment.

5.6 Environmental Liens and Activity and Use Limitations

In accordance with the requirements of 310 CMR 40.0000, records associated with Activity and Use Limitations (AULs) in Massachusetts must be filed with the MassDEP. Based on a review of the MassDEP Release Site Lookup Database, no AULs have been recorded for the Subject Property.

5.7 Federal and State Record Review

RHE procured and reviewed an environmental radius report (ERR) from Environmental Data Resources, Inc. (EDR). A copy of the ERR is included in Appendix H. A review of databases and files

from Federal, State, and Local environmental regulatory agencies was conducted to identify use, generation, storage, treatment or disposal of hazardous materials and chemicals, or release incidents of such materials which may impact the Subject Property, relative to ASTM-specified search radii.

5.7.1 Federal Regulatory Records

A complete listing of the federal regulatory sources reviewed is provided in the ERR. Federal records reviewed include: National Priority List Sites (NPL), Comprehensive Environmental Response, Compensation, and Liability Information System facilities (CERCLIS), and Resource Conservation and Recovery Act Hazardous Waste Generators (RCRA Generators) within ASTM-specified search radii. The following subsections provide additional information regarding the Subject Property and nearby facilities.

5.7.1.1 Federal NPL List

The NPL database, also known as the Superfund List, is a subset of CERCLIS and identifies sites that are ranked as high priority for remedial action under the Federal Superfund Act. The Subject Property was not identified on the NPL database.

The Acushnet Estuary NPL site is located approximately 0.223-miles southeast of the Subject Property. The Acushnet Estuary is listed on the NPL database due to the presence of Polychlorinated Biphenyls (PCBs), Volatile Organic Compounds (VOCs), and metals in surface water, groundwater, soil, and sediment. Due to the distance and topographical relationship to the Subject Property (downgradient) to the Acushnet Estuary, it is the opinion of RHE that it is unlikely that impacts from Acushnet Estuary NPL site have impacted the Subject Property.

5.7.1.2 Federal CERCLIS List

CERCLIS contains data regarding potentially hazardous waste sites that have been reported to the US EPA by states, municipalities, private companies, and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). CERCLIS contains sites that are included in the NPL database, as well as sites which are in the screening and assessment phase for possible inclusion on the NPL. Neither the Subject Property, nor any properties within ½-mile of the Subject Property, with the exception of the Acushnet Estuary site listed in section 5.7.1.1, were identified on the CERCLIS List.

5.7.1.3 Federal RCRA Generators

Hazardous waste generators tracked under the Resource Conservation and Recovery Act (RCRA) are classified as either Large Quantity Generators (LQGs), Small Quantity Generators (SQGs), Very Small Quantity Generators (VSQGs), or Conditionally Exempt Small Quantity Generators (CESQGs). Neither the Subject Property, nor the abutting properties, were identified as RCRA-listed

hazardous waste generators.

5.7.1.4 Federal Brownfields Sites

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. The Assessment, Cleanup, and Redevelopment Exchange System (ACRES) is an online database for Brownfields Grantees to electronically submit data directly to the USEPA. The Subject Property was not identified as a Brownfields site. Several properties within a ½-mile radius of the Subject Property were identified as Brownfields sites; however, review of the location of off-site Brownfields sites revealed that the off-site releases are located either downgradient or crossgradient to the Subject Property, and are therefore not a concern to this investigation.

5.7.1.5 Federal Emergency Response Notification System (ERNS)

ERNS is a national database used to collect information regarding reported releases of OHM. The database contains information from spill reports submitted to Federal agencies, including the US EPA, the US Coast guard, the National Response Center, and the US DOT. A review of this database was conducted in order to determine whether any spills or incidents involving releases of OHM have occurred at the Subject Property. The Subject Property was not identified on the ERNS database.

5.7.1.6 Federal Registry Service (FRS)

FRS is a database managed by the US EPA, which identifies facilities, sites, or places subject to environmental regulations or of environmental interest. The database provides information regarding environmental activities that may impact air, water, and land in the United States. It is usually a cross-reference to other sources/database that contain more detail. The Subject Property was not identified on the FRS database.

5.7.2 State Regulatory Records

State regulatory records reviewed include: state-registered underground storage tank (UST) facilities, state-listed leaking underground storage tanks (LUST), state-listed leaking above ground storage tanks (LAST), state-permitted solid waste facilities/landfill sites (SWF/LS), and state-listed hazardous waste sites (SHWS) within the ASTM-specified search radii. A review of State records revealed that several properties in the vicinity of the Subject Property are identified on one or more of the regulatory sources reviewed. The following subsections provide additional information regarding these off-site facilities.

5.7.2.1 State Hazardous Waste Sites and Leaking Underground Storage Tanks

Several MassDEP-listed release sites, LAST, and/or LUST facilities were identified within ½-mile of

the Subject Property. Several of these listed off-site releases are not considered to be a concern to this investigation for one of the following reasons:

- Permanent Solution Statements (PSS) have been submitted to the MassDEP for several of the MassDEP release sites within ½-mile of the Subject Property. Submission of a PSS report to the MassDEP indicates that these off-site releases are considered to be adequately delineated and pose No Significant Risk to human health and environmental receptors; and/or

- Several of the MassDEP sites within ½-mile of the Subject Property are located either hydraulically crossgradient or downgradient of the Subject Property. Therefore, impact from these off-site releases is not likely to flow towards the Subject Property.

For the purpose of this Phase I ESA, the following off-site releases were evaluated further:

St. Joseph's Parish - 51 Duncan Street
(westerly abutting property):
The property located immediately west of the Subject Property (51 Duncan Street) is a listed MassDEP release site (MassDEP RTN 4-20109). A release of petroleum products was identified during the removal of two (2) USTs at 51 Duncan Street in 2007. Assessment and remediation activities were conducted, and a Class A-2 Response Action Outcome Statement (Permanent Solution Statement) for RTN 4-20109 was submitted to the MassDEP in 2007. Submission of the Permanent Solution Statement indicates that a Licensed Site Professional (LSP) rendered an opinion that stated that the release was sufficiently delineated and residual impact poses No Significant Risk to human health or environmental receptors. The MassDEP conducted an audit of regulatory reports submitted for RTN 4-20109 and issued a Notice of Noncompliance (NON) on April 8, 2010. A Revised Class A-2 RAO was submitted to the MassDEP in 2010. A copy of the Revised Class A-2 RAO is included in Appendix J.

Based on a review of documentation included in the 2007 RAO and 2010 Revised RAO, impact and cleanup activities associated with RTN 4-20109 extended onto the Subject Property. The confirmed presence of contaminants on the Subject Property is considered an HREC. Conditions associated with this HREC were further evaluated during the LSI.

Aerovox Facility - 744 Bellevue Avenue
(300-feet east-northeast):
Releases of chlorinated VOCs, PCBs, petroleum, and heavy metals were identified at the Aerovox Facility between 1981 and 2018. The Aerovox property (located approximately 300-feet east-northeast of the Subject Property) was historically used for electrical component manufacturing. According to the MassDEP, hazardous materials were disposed of and released at or from the Aerovox property as a result of historical manufacturing operations between 1938 and 2001. MassDEP has issued multiple RTNs to track environmental response actions associated with the Aerovox property (RTNs 4-601, 4-11186, 4-21348, and 4-25459). Based on information included

in reports that have been submitted to the MassDEP, the limits of the disposal site(s) associated with Aerovox terminates approximately 350-feet east of the Subject Property, and it is unlikely that the released OHM associated with the Aerovox facility have impacted the Subject Property. Therefore, this off-site release is not considered a REC in connection with the Subject Property.

5.7.2.2 State Underground Storage Tank Facilities

Neither the Subject Property, nor any abutting properties, were listed on the MassDEP's UST System facility database.

5.7.2.3 State Landfills

No MassDEP-approved landfill facilities are known to be located within 1-mile of the Subject Property.

5.7.2.4 Institutional Controls

Based on a review of the MassDEP's Waste Site & Reportable Releases Data Portal, no AULs associated with the Subject Property have been submitted to the MassDEP.

5.8 Tribal Records

Based on a review of the Environmental Database Report, no records of Tribal facilities that were hazardous waste sites, landfills, LUST, LAST, registered storage tank sites, institutional control sites, voluntary cleanup sites, or Brownfield sites are located within the specified ASTM-specified search radii of the Subject Property.

5.9 Local Records

RHE inquired with the New Bedford Health and Environmental Services Department, Assessor's Office, Inspectional Services Department, Department of Public Infrastructure, Planning Department, Historical Commission, Clerk's Office, and Fire Department to find records pertaining to OHM storage, releases, and/or violations associated with the Subject Property. Refer to Section 3.3 for additional information obtained from Local Agencies. Information obtained from Local Agencies is included in Appendix I.

6.0 SUBJECT PROPERTY RECONNAISSANCE

RHE representative, Jarod Cournoyer, conducted reconnaissance of the Subject Property (site inspection) on February 21, 2020 and April 1, 2020. The site inspections consisted of an inspection of the Subject Property grounds and Site Building, and visual reconnaissance of neighboring properties from curbside. Prior to the site inspection, readily available resources such as site plans, historic aerial photographs, USGS topographic maps, flood insurance rate maps, and regulatory records were reviewed. A description of the Subject Property is included in Section 3.2. Photographs taken during the site inspection are included in Appendix B.

6.1 Improvements and Site Use

The Subject Property is currently improved with the Site Building, Boiler Room, and a bituminous concrete (i.e., pavement) parking lot. The Site Building is currently vacant. A basement with a poured concrete floor is present below the Site Building. Additional description of the Site Building is included in section 3.2.

6.2 Storage Tanks

Four (4) ASTs were observed in the Boiler Room. The ASTs were reportedly used for the storage of No. 2 fuel oil. No secondary containment structures were observed under ASTs. The presence of ASTs without secondary containment at the Subject Property is a REC. RHE recommends removing the ASTs in accordance with Local, State, and Federal regulations.

6.3 Drums

One (1) steel 55-gallon drum was observed in the Boiler Room during the site inspection. No labels were identified on the drum. No secondary containment structures were observed under the drum. The presence of a drum with no secondary containment is a REC. RHE recommends removal of the drum in accordance with Local, State, and Federal regulations.

6.4 Floor Drains

Several floor drains were identified in the Site Building: One (1) in the central basement room of the Site Building; and one (1) in the south-central portion of the Boiler Room adjacent to the Site Building. The floor drain in the Boiler Room appears to be a leaching system, which was a potential REC that was further evaluated during the LSI process.

6.5 Catch Basins

Catch basins were not observed on the Subject Property.

6.6 Electrical Transformers

No transformers were observed at the Subject Property. A pad-mounted electrical switchgear is located southwest of the Site Building. According to the electric utility company (Eversource), Eversource owns the switchgear, and the switchgear does not contain cooling oil.

6.7 Fill Material and/or Stockpiles

No soil stockpiles were observed on the Subject Property during the site inspection.

6.8 Building Materials

Two buildings (the Site Building and Boiler Room) are present at the Subject Property. RHE did not inspect the building at the Subject Property for asbestos-containing materials (ACMs), lead-based paint (LBP), or other hazardous building materials. RHE recommends conducting ACM, LBP, and hazardous building material surveys prior to any renovation or demolition projects.

6.9 Neighboring Properties

Curbside field reconnaissance of the neighboring properties did not reveal indicators of current illegal dumping of OHM or overt indications of surface impacts on adjacent properties.

7.0 INTERVIEWS

This section presents the results of interviews with those knowledgeable about the Subject Property.

7.1 Interview With the Current Owner

Mr. Paul Brooks, Director of Facilities & Real Estate for The Roman Catholic Bishop of Fall River, A Corporation Sole (the Owner of the Subject Property), completed an environmental questionnaire form as part of this investigation. Mr. Brooks did not provide RHE with information regarding the Subject Property that would assist RHE in identifying RECs associated with the Subject Property.

7.2 Interview With Prospective Purchaser

Mr. Daniel Cruz, Senior Vice President of Cruz Companies, Inc. (the Prospective Purchaser of the Subject Property), completed an environmental questionnaire form as part of this investigation. Mr. Cruz did not provide RHE with information regarding the Subject Property that would assist RHE in identifying RECs associated with the Subject Property.

7.3 Interviews With Local Government Officials

In the course of research, officials of the New Bedford Health and Environmental Services Department, Assessor's Office, Inspectional Services Department, Department of Public Infrastructure, Planning Department, Historical Commission, Clerk's Office, and Fire Department were asked if they knew of any environmental concerns at or in the vicinity of the Subject Property. No town officials provided RHE personnel with evidence of any specific releases of OHM at the Subject Property. Personnel from the Fire Department provided RHE with records indicative of OHM storage at the Subject Property. Refer to section 3.3 for a summary of records obtained from local government officials.

7.4 Interviews With Others

No additional interviews were conducted as part of this Phase I ESA.

8.0 LIMITED SUBSURFACE INVESTIGATION

RHE conducted a limited subsurface investigation (LSI) at the Subject Property between April 1, 2020 and April 6, 2020. The locations of soil borings, monitoring wells, and soil vapor pins are displayed on Figure 2, and the results of field screening and laboratory analysis conducted on soil, groundwater, and soil vapor samples are summarized on Tables 1, 2, 3, and 4. The following subsections include a summary of sample collection protocol, results of field screening and laboratory analysis, and an evaluation of results in comparison to regulatory standards.

8.1 Scope of Work

The LSI conducted at the Subject Property consisted of the following:

- Advancement of eight (8) soil borings;
- Installation of four (4) monitoring wells;
- Installation of three (3) soil vapor pins;
- Field screening soil and soil vapor samples for total organic volatiles (TOVs);
- Survey and gauging of monitoring wells;
- Preparation of groundwater contours;
- Collection and laboratory analysis of four (4) soil samples;
- Collection and laboratory analysis of groundwater samples from four (4) monitoring wells;
- Collection and laboratory analysis of a soil vapor sample from one (1) soil vapor pin; and
- Evaluation of soil, groundwater, and soil vapor data in comparison to regulatory standards.

8.2 Rationale for Sampling Locations

The following is the rationale for the selection of soil boring/monitoring well locations:

SB-1: Evaluate potential impacts from off-site release at 51 Duncan Street.

SB-2: Evaluate potential impacts from off-site release at 51 Duncan Street.

SB-3/MW-1: Evaluate potential impacts from off-site release at 51 Duncan Street.

SB-4/MW-2: Evaluate potential impacts from off-site release at 51 Duncan Street.

SB-5: Evaluate potential impacts from off-site release at 51 Duncan Street.

SB-6/MW-3: Evaluate potential impacts from off-site release(s) and/or the former UST adjacent to the Boiler Room at the Subject Property.

SB-7: Evaluate potential impacts from off-site release(s) and/or the former UST adjacent to the Boiler Room at the Subject Property.

SB-8/MW-4: Evaluate potential impacts from off-site release(s) and/or the former UST adjacent to the Boiler Room.

Soil Vapor Pins: Evaluate the potential for volatile organic vapor build-up under the basement floor of the Site Building and Boiler Room.

8.3 Soil Boring Advancements

RHE directed NE Geotechnical, Inc., of Jamestown, RI, during the advancement of eight (8) soil borings (SB-1 through SB-8) on April 1, 2020. Soil borings were advanced using a Geoprobe® 6620DT drill rig and hand auger. Soil samples were classified in the field for physical characteristics. Soil samples were also screened for total organic volatile (TOV) content using a RAELite organic volatile meter (OVM) calibrated with 100 ppmv isobutylene span gas and equipped with a 10.6 eV lamp. Refer to the boring logs (Appendix L) for soil classifications and field screening results.

Four (4) soil samples [SB-1 (10'-15'), SB-3 (10'-15'), SB-4 (10'-15'), and SB-6 (10'-15')] were submitted to ESS Laboratory, of Cranston, RI, for laboratory analysis of Extractable Petroleum Hydrocarbon (EPH) target analytes and fractional range constituents and Volatile Petroleum Hydrocarbon (VPH) target analytes and fractional range constituents in accordance with MassDEP-approved analytical methodology. Results of field screening and laboratory analyses conducted on soil samples collected on April 1, 2020 have been summarized and are provided in Table 1 and Table 2, respectively. The full laboratory analytical report is provided in Appendix K.

8.4 Monitoring Well Installation & Development

Soil borings SB-3, SB-4, SB-6, and SB-8 were completed as monitoring wells MW-1, MW-2, MW-3, and MW-4, respectively. Monitoring wells were constructed with one-inch diameter polyvinyl chloride (PVC) piping. Refer to the Boring Logs (Appendix J) for monitoring well as-built specifications.

RHE personnel developed monitoring wells MW-1, MW-2, MW-3, and MW-4 on April 1, 2020 using a peristaltic pump and dedicated polyethylene tubing. Each monitoring well was purged until visible turbidity in the purge water had subsided.

8.5 Monitoring Well Surveying & Groundwater Contouring

RHE personnel used an optical level surveying method to establish the vertical locations of monitoring wells MW-1, MW-2, MW-3, and MW-4 on April 1, 2020. Refer to Table 3 for a summary of monitoring well elevations (relative to an arbitrary benchmark elevation of 100.00 for monitoring well MW-1). Monitoring well elevations and gauging data collected on April 6, 2020 were used to create groundwater contours. Refer to Figure 2 for groundwater contours.

8.6 Monitoring Well Gauging

RHE personnel gauged the depth to groundwater within monitoring wells MW-1, MW-2, MW-3, and MW-4 on April 6, 2020. Monitoring well gauging was conducted with an electronic interface probe (EIP), which was capable of determining the depth to groundwater and presence/absence of non-aqueous phase liquid. The results of monitoring well gauging are included in Table 3.

8.7 Groundwater Sample Collection

Monitoring wells MW-1, MW-2, MW-3, and MW-4 were purged using a peristaltic pump on April 6, 2020. After approximately 30-minutes of purging at 300 to 500 milliliters per minute, groundwater samples were collected from each well in pre-cleaned and pre-preserved laboratory-supplied containers. Groundwater samples from each monitoring well were submitted to ESS Laboratory for analysis of EPH target analytes and fractional range constituents, VPH target analytes and fractional range constituents, and/or VOCs. Summarized field data and laboratory analytical results are included in Table 3, and the complete laboratory analytical report is included in Appendix K.

8.8 Soil Vapor Sample Collection

RHE personnel installed two (2) soil vapor pins® (SVP-1 and SVP-3) in the concrete basement slab of the Site Building and one (1) soil vapor pin® (SVP-2) in the concrete slab of the Boiler Room on April 1, 2020. The locations of soil vapor pints are shown on Figure 2. The soil vapor pins were installed by drilling a hole through the concrete basement slab using a hammer drill. The inlet of the soil vapor pin was set just below the surface of the concrete floor slab, and the soil vapor pin was sealed using a silicone sleeve.

RHE personnel screened soil vapor at SVP-1, SVP-2, and SVP-3 for TOVs using a RAELite OVM, equipped with a 10.6 eV lamp and calibrated with 100 ppmv isobutylene span gas, on April 1, 2020.

A soil vapor sample was collected from soil vapor pin SVP-1 at the conclusion of soil vapor screening activities. The soil vapor sample was collected using a laboratory-supplied 6-liter summa canister using a pressure gauge provided by the laboratory. The soil vapor sample was submitted to Contest Laboratories, of East Longmeadow, MA, for analysis of Air- Phase Petroleum Hydrocarbons (APH) in accordance with MassDEP-approved analytical methodology.

8.9 Data Evaluation

The following is a summary of soil, groundwater, and soil vapor collected during this LSI:

Evaluation of Soil Data:

The results of soil screening and laboratory analytical data collected during LSI activities are summarized in Tables 1 and 2, respectively. Soil sample locations are displayed on Figure 2. The

following is a summary of the findings of soil assessment data:

Physical Characteristics:
Soil within the Disposal Site is predominantly sand with lesser amounts of silt and gravel. Bedrock was not encountered during subsurface exploration activities.

Field Screening Results:
Field screening of soil samples collected from soil borings revealed the presence of TOV levels ranging between 0.1 to 78.9 parts per million by volume (ppmv). The soil sample that displayed the highest TOV levels [SB-3 (10'-15')] was submitted for confirmatory laboratory analysis.

Laboratory Analytical Data:
Based on an evaluation of laboratory analyses conducted on the soil samples collected on April 1, 2020, none of the analyzed constituents were detected at concentrations greater than the MCP RCS-1 Reportable Concentrations and/or MCP Method 1 S-1 Soil Standards.

Evaluation of Groundwater Data:
The following is an evaluation of groundwater assessment data collected during this LSI:

Monitoring Well Gauging Data:
The depth to groundwater on April 6, 2020 ranged from 7.88 feet below grade (MW-4) to 9.61 feet below grade (MW-2). Apparent groundwater flow within the monitoring well network is down to the east.

Laboratory Analysis Results:
An evaluation of the results of laboratory analyses conducted on groundwater samples collected from monitoring wells MW-1, MW-2, MW-3, and MW-4 did not reveal the presence of EPH, VPH, or VOC constituents at concentrations greater than the MCP RCGW-2 Reportable Concentrations and/or MCP Method 1 GW-2 and GW-3 Groundwater Standards.

Evaluation of Soil Vapor Data:
The following is an evaluation of soil vapor data collected during this LSI:

Field Screening Results:
Field screening of soil vapor did not reveal the presence of TOVs above the instrument detection limit (i.e., non-detect).

Laboratory Analytical Data:
Based on an evaluation of laboratory analysis conducted on the soil vapor sample collected from soil vapor pin SVP-1 on April 1, 2020, none of the analyzed constituents were detected at concentrations greater than the MassDEP's Established Residential Sub-Slab

Soil Vapor Screening Values set forth in the MassDEP's Vapor Intrusion Guidance Document (MassDEP Policy #WSC-16-435).

9.0 FINDINGS & CONCLUSIONS

River Hawk Environmental, LLC (RHE) has been retained by Cruz Companies, Inc. to conduct a Phase I Environmental Site Assessment (Phase I ESA) & Limited Subsurface Investigation (LSI) of the property referred to as 35 Kearsarge Street in New Bedford, MA (Subject Property). In conducting this assessment, RHE followed standards set forth in American Society for Testing and Materials (ASTM) Policy E1527-13. This assessment has revealed the following findings:

- The Subject Property is an approximate 32,010 parcel (Map 112, Lot 3, Parcel 2) located northwest of the intersection of Kearsarge Street and Duncan Street in New Bedford, MA.

- The Subject Property is improved with a multi-story commercial building (Site Building), with an adjacent utility room (Boiler Room), and a bituminous concrete (i.e., pavement) parking lot. The Site Building is currently vacant. A basement with a poured concrete floor is present below the Site Building. The Boiler Room is a slab-on-grade design.

- Four (4) aboveground storage tanks (ASTs) are present in the Boiler Room. The ASTs are reportedly used for the storage of No. 2 fuel oil for heating purposes. One (1) steel 55-gallon drum, of unknown contents, is present in the Boiler Room. No releases from the ASTs or drums were observed during RHE's inspection; however, the presence of ASTs and a drum, with no secondary containment is a Recognized Environmental Condition (REC).

- A pad-mounted electrical switchgear is located southwest of the Site Building. According to the utility company (Eversource), the switchgear is owned by the utility company and does not contain cooling oil.

- Review of historic aerial photographs and records revealed that the Site Building was used as a school between at least the late 1800s and 2010s.

- The Subject Property is not specifically listed on any ASTM-specified State Regulatory databases.

- Several State and/or Federal-listed release sites are located within ½-mile of the Subject Property; however, upon further evaluation of the off-site release sites, only one off-site release [51 Duncan Street - MassDEP Release Tracking Number 4-20109] was identified to be a concern relative to the Subject Property. An off-site release of petroleum hydrocarbons at 51 Duncan Street was identified during the removal of two (2) underground storage tanks (USTs) in 2007. Assessment and remediation activities were conducted, and a Class A-2 Response Action Outcome Statement (Permanent Solution Statement) for RTN 4-20109 was submitted to the MassDEP in 2007. A Revised Class A-2 RAO was submitted to the MassDEP in 2010. A review of the Revised Class A-2 RAO revealed that petroleum hydrocarbon impact associated with RTN 4-20109 extends onto the northern portion of the Subject Property. The presence of a portion of a MassDEP-

listed release site at the Subject Property is a Historic Recognized Environmental Condition (HREC).

- In order to evaluate subsurface conditions relative to the REC and HREC listed above, RHE performed an LSI in April 2020. The LSI included the advancement of eight (8) soil borings, installation of four (4) monitoring wells, and installation of three (3) soil vapor pins throughout the Subject Property. Soil and groundwater samples were collected and submitted for potential contaminants of concern (EPH, VPH, and/or VOCs). One (1) soil vapor sample was submitted for a potential contaminant of concern (APH). The results of laboratory analysis conducted on soil, groundwater, and soil vapor samples did not reveal the presence of any tested analytes at concentrations greater than the Massachusetts Contingency Plan (MCP) Reportable Concentrations, MCP Method 1 Risk Characterization Standards, and/or threshold values set forth in relevant MassDEP Policies.

RHE recommends the removal of the four (4) ASTs and drum in the Boiler Room. Otherwise, no confirmed RECs which require further action were identified in connection with the Subject Property. Therefore, further investigation is not warranted at this time.

10.0 LIST OF REFERENCES

The following is a list of references reviewed during this investigation:

- United States Geological Survey Topographic Maps from 1888, 1893, 1918, 1936, 1941, 1943, 1948, 1964, 1979, 1985, and 2012 (February 2020).
- Aerial Photographs from 1952, 1961, 1970, 1980, 1985, 1992, 1995, 2008, 2012, and 2016 (February 2020).
- City Directories from 1939, 1943, 1947, 1959, 1965, 1992, 1995, 2000, 2005, 2010, and 2014 (February 2020).
- Historic Fire Insurance Maps from 1924, 1950, 1990, 1992, 1993, and 1995 (February 2020).
- Environmental Database Map Report (February 2020).
- Massachusetts Department of Environmental Protection Phase 1 Site Assessment Map (February 2020).
- Massachusetts Department of Environmental Protection Waste Site & Reportable Releases Data Portal (February 2020).
- Massachusetts Department of Environmental Protection Underground Storage Tank Database (February 2020).
- American Society for Testing and Materials (ASTM) *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, ASTM Designation E1527-13* (2013).
- New Bedford Assessor's Office (February 2020).
- New Bedford Inspectional Services Department (February 2020).
- New Bedford City Clerk (February 2020).
- New Bedford Fire Department (February 2020).
- New Bedford Health and Environmental Services Department (February 2020).
- New Bedford Planning Department (February 2020).

- New Bedford Historical Commission (February 2020).
- New Bedford Department of Public Infrastructure (February 2020).
- *Class A-2 Response Action Outcome Statement - 51 Duncan Street: RTN 4-20109* (Southcoast Environmental, Inc., 2007).
- *Revised Class A-2 Response Action Outcome Statement - 51 Duncan Street: RTN 4-20109* (Lord Associates, Inc., 2010).
- Laboratory Work Order Number 20D0092 - 35 Kearsarge Street: Soil (ESS Laboratory, April 2020).
- Laboratory Work Order Number 20D0143 - 35 Kearsarge Street: Groundwater (ESS Laboratory, April 2020).
- Laboratory Work Order Number 20D0098 - 35 Kearsarge Street: Soil Vapor (Con-Test Analytical Laboratory, April 2020).
- Massachusetts Department of Environmental Protection, *Massachusetts Contingency Plan, 310 CMR 40.0000* (June 2014).
- Massachusetts Department of Environmental Protection, *Vapor Intrusion Guidance: Site Assessment, Mitigation and Closure, Policy #WSC-16-435* (October 2016).

FIGURES

River Hawk ENVIRONMENTAL

CIVIL & ENVIRONMENTAL ENGINEERING

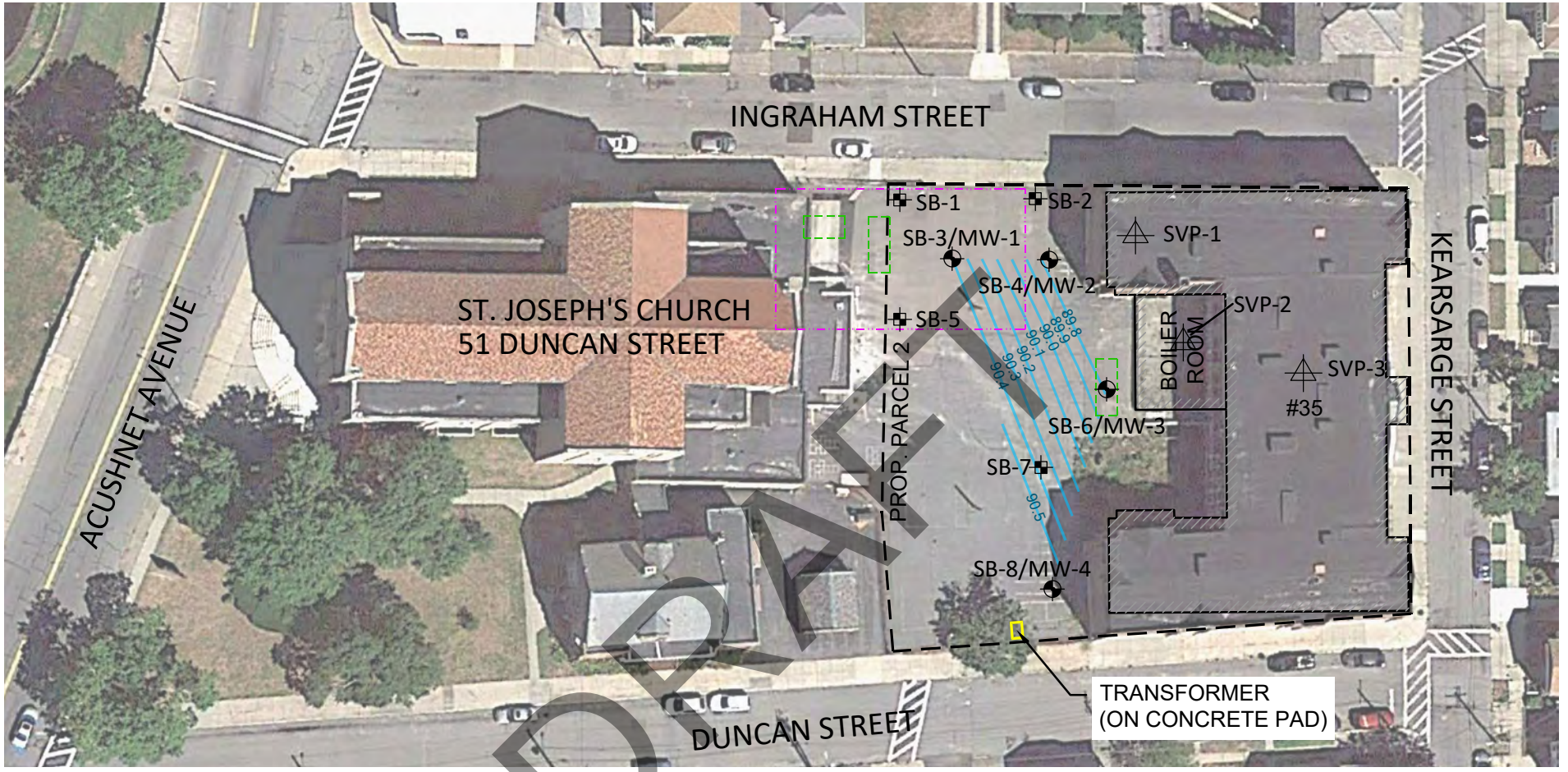
2183 OCEAN STREET
MARSHFIELD, MA 02050

TEL: 781-536-4639
www.RiverHawkLLC.com

DRAWING TITLE	FIGURE 1 - SITE LOCATION PLAN
PROJECT	35 KEARSARGE STREET NEW BEDRFORD, MA
CLIENT	CRUZ PROPERTIES BOSTON, MA

APPROX. SCALE:	DATE:	DRAWN BY:	SF
NTS	APR. 1, 2020	CHECKED BY:	WPK

N



LEGEND

- SUBJECT PROPERTY LIMITS
- APPROX. LIMITS OF RTN 4-20109
- FORMER UNDERGROUND STORAGE TANK LOCATION
- SOIL BORING
- MONITORING WELL
- SOIL VAPOR PROBE
- GROUNDWATER CONTOUR (12.3)

NOTES: 1.) FEATURES SHOWN ON THIS FIGURE ARE APPROXIMATE, AND ARE NOT THE RESULT OF A FIELD SURVEY.

2.) RELEASE LIMITS AND UST LOCATIONS SHOWN ARE BASED OFF PLAN ENTITLED "FIGURE 2: RELEASE AREA PLAN, 51 DUNCAN STREET NEW BEDFORD, MA", BY LORD ASSOCIATES, INC. DATED JUNE 2010.

0 30 60 120

SCALE APPROX. 1" = 60'

River Hawk ENVIRONMENTAL
CIVIL & ENVIRONMENTAL ENGINEERING
2183 OCEAN STREET
MARSHFIELD, MA 02050
TEL: 781-536-4639
www.RiverHawkLLC.com

DRAWING TITLE	FIGURE 2 - SITE PLAN
PROJECT	35 KEARSARGE STREET NEW BEDRFORD, MA
CLIENT	CRUZ PROPERTIES BOSTON, MA
APPROX. SCALE:	AS SHOWN
DATE:	APR. 1, 2020
DRAWN BY:	PJK
CHECKED BY:	WPK

MassDEP - Bureau of Waste Site Cleanup

Phase 1 Site Assessment Map: 500 feet & 0.5 Mile Radii

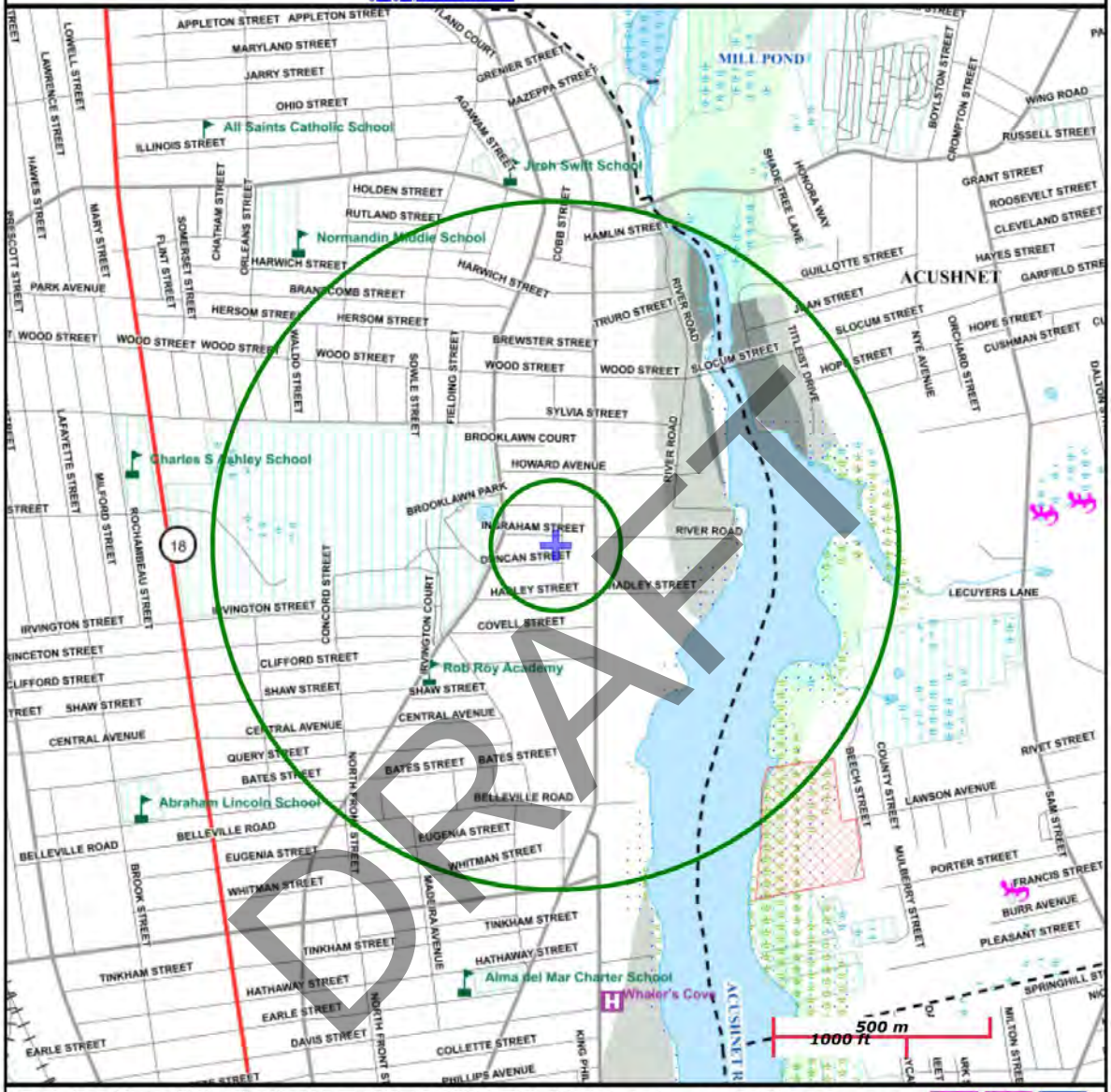
Site Information:

35 KEARSAGE STREET NEW BEDFORD, MA

NAD83 UTM Meters:
4615436mN , 340039mE (Zone: 19)
February 21, 2020

The information shown is the best available at the date of printing. However, it may be incomplete. The responsible party and LSP are ultimately responsible for ascertaining the true conditions surrounding the site. Metadata for data layers shown on this map can be found at: https://www.mass.gov/orgs/massgis-bureau-of-geographic-information

MassDEP
Commonwealth of Massachusetts
Department of Environmental Protection



River Hawk ENVIRONMENTAL
CIVIL & ENVIRONMENTAL ENGINEERING
2183 OCEAN ST.
MARSHFIELD, MA 02050
TEL: 508-523-1007
www.RiverHawkLLC.com

DRAWING TITLE
FIGURE 3 - MASS GIS ENVIRONMENTAL PLAN

PROJECT
35 KEARSARGE STREET
NEW BEDRFORD, MA

CLIENT
CRUZ PROPERTIES
BOSTON, MA

APPROX. SCALE:	DATE:	DRAWN BY: SF
NTS	APR. 1, 2020	CHECKED BY: WPK

N

TABLES

TABLE 1
Soil Sample Screening Summary
(April 1, 2020)

35 Kearsarge Street
New Bedford, MA

Sample Location	Date	Feet Below Grade	TOVs (ppmv)
SB-1	4/1/2020	0-5'	0.1
		5'-10'	0.0
		10'-15'	0.1
SB-2	4/1/2020	0-5'	0.0
		5'-10'	0.0
		10'-15'	0.1
SB-3	4/1/2020	0-5'	0.0
		5'-10'	0.0
		10'-15'	78.9
		15'-17.5'	23.0
SB-4	4/1/2020	0-5'	0.0
		5'-10'	0.2
		10'-15'	0.1
SB-5	4/1/2020	0-5'	0.0
		5'-10'	0.0
		10'-15'	0.0
SB-6	4/1/2020	0-5'	1.2
		5'-10'	0.0
		10'-15'	0.0
SB-7	4/1/2020	0-5'	0.2
		5'-6'	0.1
SB-8	4/1/2020	0-5'	0.2
		5'-10'	0.1
		10'-15'	0.1

Notes:
1: Soil sample screening conducted with an OVM calibrated with 100 ppmv isobutylene span gas.
2: TOVs - Total Organic Volatiles.
3: ppmv - Parts per million by volume.
4: Yellow - highlighted cells indicate that soil sample was submitted for laboratory analysis.

RIVER HAWK ENVIRONMENTAL, LLC

Generated by JRC (04/06/2020)
QA by BK (04/16/2020)

TABLE 2
Soil Analytical Summary
(April 1, 2020)

35 Kearsarge Street
New Bedford, MA

Analyte	Units	MCP RCS-1 Reportable Concentrations	MCP Method 1 Soil Standards				SOIL SAMPLE IDENTIFICATION			
			S-1/GW-2	S-1/GW-3	S-2/GW-2	S-2/GW-3	SB-1 (10'-15') S-1/S-2 4/1/2020	SB-3 (10'-15') S-1/S-2 4/1/2020	SB-4 (10'-15') S-1/S-2 4/1/2020	SB-6 (10'-15') S-1/S-2 4/1/2020
Extractable Petroleum Hydrocarbons (MassDEP EPH Method)										
C_9-C_{18} Aliphatic Hydrocarbons	mg/kg	1,000	1,000	1,000	3,000	3,000	<16.0	**589**	<17.1	<16.6
C_{19}-C_{36} Aliphatic Hydrocarbons	mg/kg	3,000	3,000	3,000	5,000	5,000	**58.6**	**516**	<17.1	**16.8**
C_{11}-C_{22} Aromatic Hydrocarbons	mg/kg	1,000	1,000	1,000	3,000	3,000	**28.1**	**545**	**25.2**	<16.6
2-Methylnaphthalene	mg/kg	1	80	300	80	500	<0.21	<0.21	<0.23	<0.22
Acenaphthene	mg/kg	4	1,000	1,000	3,000	3,000	<0.43	<0.42	<0.46	<0.44
Acenaphthylene	mg/kg	1	600	10	600	10	<0.21	<0.21	<0.23	<0.22
Anthracene	mg/kg	1,000	1,000	1,000	3,000	3,000	<0.43	<0.42	<0.46	<0.44
Benzo(a)anthracene	mg/kg	7	7	7	40	40	<0.43	<0.42	<0.46	<0.44
Benzo(a)pyrene	mg/kg	2	2	2	7	7	<0.43	<0.42	<0.46	<0.44
Benzo(b)fluoranthene	mg/kg	7	7	7	400	400	<0.43	<0.42	<0.46	<0.44
Benzo(g,h,i)perylene	mg/kg	1,000	1,000	1,000	3,000	3,000	<0.43	<0.42	<0.46	<0.44
Benzo(k)fluoranthene	mg/kg	70	70	70	400	400	<0.43	<0.42	<0.46	<0.44
Chrysene	mg/kg	70	70	70	400	400	<0.43	<0.42	<0.46	<0.44
Dibenzo(a,h)Anthracene	mg/kg	0.7	0.7	0.7	4	4	<0.21	<0.21	<0.23	<0.22
Fluoranthene	mg/kg	1,000	1,000	1,000	3,000	3,000	<0.43	<0.42	<0.46	<0.44
Fluorene	mg/kg	1,000	1,000	1,000	3,000	3,000	<0.43	**0.54**	<0.46	<0.44
Indeno(1,2,3-cd)Pyrene	mg/kg	7	7	7	40	40	<0.43	<0.42	<0.46	<0.44
Naphthalene	mg/kg	4	20	500	20	1,000	<0.43	<0.42	<0.46	<0.44
Phenanthrene	mg/kg	10	500	500	1,000	1,000	<0.43	<0.42	<0.46	<0.44
Pyrene	mg/kg	1,000	1,000	1,000	80	80	<0.43	**0.72**	<0.46	<0.44
Volatile Petroleum Hydrocarbons (MassDEP VPH Method)										
C_5-C_8 Aliphatic Hydrocarbons	mg/kg dry	100	100	100	500	500	<8.00	**8.7**	<8.65	<7.72
C_9-C_{12} Aliphatic Hydrocarbons	mg/kg dry	1,000	1,000	1,000	3,000	3,000	<15.9	**87.2**	<17.2	<15.4
C_9-C_{10} Aromatic Hydrocarbons	mg/kg dry	100	100	100	500	500	<7.65	**67.9**	<8.28	<7.39
Benzene	mg/kg dry	2	40	40	200	200	<0.15	<0.15	<0.17	<0.15
Ethylbenzene	mg/kg dry	40	500	500	1,000	1,000	<0.15	<0.15	<0.17	<0.15
Methyl tert Butyl Ether	mg/kg dry	0.1	100	100	100	500	<0.04	<0.04	<0.04	<0.04
Naphthalene	mg/kg dry	1,000	20	500	20	1,000	<0.15	**0.5**	<0.17	<0.15
Toluene	mg/kg dry	30	500	500	1,000	1,000	<0.15	<0.15	<0.17	<0.15
Xylenes	mg/kg dry	100	100	500	100	1,000	<0.46	<0.45	<0.50	<0.45

Notes: 1.) MCP: Massachusetts Contingency Plan, promulgated 6/20/2014.

TABLE 3
Groundwater Analytical Summary
(April 6, 2020)

35 Kearsarge Street
New Bedford, MA

Analyte	Units	MCP RCGW-2 Reportable Concentrations	MCP Method 1 Groundwater Standards		SAMPLE IDENTIFICATION / DATE SAMPLED / RESULTS			
			GW-2	GW-3	MW-1	MW-2	MW-3	MW-4
					4/6/2020	4/6/2020	4/6/2020	4/6/2020
Extractable Petroleum Hydrocarbons (MassDEP EPH Method)								
C_9-C_{18} Aliphatic Hydrocarbons	ug/L	5,000	5,000	50,000	**214**	<94	<95	<96
C_{19}-C_{36} Aliphatic Hydrocarbons	ug/L	50,000	N/A	50,000	**182**	**129**	<95	<96
C_{11}-C_{22} Aromatic Hydrocarbons	ug/L	5,000	50,000	5,000	**208**	<94.3	<95.2	<96.2
2-Methylnaphthalene	ug/L	2,000	2,000	20,000	<4.7	<4.7	<4.8	<4.8
Acenaphthene	ug/L	10,000	N/A	10,000	<4.7	<4.7	<4.8	<4.8
Acenaphthylene	ug/L	40	10,000	40	<4.7	<4.7	<4.8	<4.8
Anthracene	ug/L	30	N/A	30	<4.7	<4.7	<4.8	<4.8
Benzo(a)anthracene	ug/L	1,000	N/A	1,000	<4.7	<4.7	<4.8	<4.8
Benzo(a)pyrene	ug/L	500	N/A	500	<9.4	<9.4	<9.5	<9.6
Benzo(b)fluoranthene	ug/L	400	N/A	400	<4.7	<4.7	<4.8	<4.8
Benzo(g,h,i)perylene	ug/L	20	N/A	20	<9.4	<9.4	<9.5	<9.6
Benzo(k)fluoranthene	ug/L	100	N/A	100	<9.4	<9.4	<9.5	<9.6
Chrysene	ug/L	70	N/A	70	<9.4	<9.4	<9.5	<9.6
Dibenzo(a,h)Anthracene	ug/L	40	N/A	40	<4.7	<4.7	<4.8	<4.8
Fluoranthene	ug/L	200	N/A	200	<9.4	<9.4	<9.5	<9.6
Fluorene	ug/L	40	N/A	40	<4.7	<4.7	<4.8	<4.8
Indeno(1,2,3-cd)Pyrene	ug/L	100	N/A	100	<4.7	<4.7	<4.8	<4.8
Naphthalene	ug/L	700	700	20,000	<9.4	<9.4	<9.5	<9.6
Phenanthrene	ug/L	10,000	N/A	10,000	<4.7	<4.7	<4.8	<4.8
Pyrene	ug/L	20	N/A	20	<4.7	<4.7	<4.8	<4.8
Volatile Petroleum Hydrocarbons (MassDEP VPH Method)								
C_5-C_8 Aliphatic Hydrocarbons	ug/L	3,000	3,000	50,000	<158	<158	<158	<158
C_9-C_{12} Aliphatic Hydrocarbons	ug/L	5,000	5,000	50,000	<270	<270	<270	<270
C_9-C_{10} Aromatic Hydrocarbons	ug/L	4,000	4,000	50,000	<100	<100	<100	<100
Benzene	ug/L	1,000	1,000	10,000	<1.5	<1.5	<1.5	<1.5
Ethylbenzene	ug/L	5,000	20,000	5,000	<5	<5	<5	<5
Methyl tert Butyl Ether	ug/L	5,000	50,000	50,000	<1.5	<1.5	<1.5	<1.5
Naphthalene	ug/L	700	700	20,000	<5	<5	<5	<5
Toluene	ug/L	40,000	50,000	40,000	<5	<5	<5	<5
Xylenes (mixed isomers)	ug/L	3,000	3,000	5,000	<15	<15	<15	<15
Volatile Organic Compounds - US EPA Method 8260B (Detected Analytes Only)								
Chloromethane	ug/L	10,000	NS	NS	----	----	----	**11.4**
Monitoring Well Gauging Parameters								
Top of Casing Elevation (RIR)	feet	NS	NS	NS	100.00	99.36	98.98	98.48
Depth to Groundwater	feet	NS	NS	NS	9.60	9.61	9.20	7.88
Depth to Non-Aqueous Phase Liquid	feet	NS	NS	NS	----	----	----	----
Depth to Bottom	feet	NS	NS	NS	15.11	14.77	12.93	12.77
Groundwater Elevation	feet	NS	NS	NS	90.40	89.75	89.78	90.60

Notes: 1.) MCP: Massachusetts Contingency Plan, promulgated 6/20/2014.

Data Entry by JRC (04/13/2020)
QA by BK (04/16/2020)

TABLE 4
Soil Vapor Screening and Analytical Summary
(April 1, 2020)

35 Kearsarge Street
New Bedford, MA

ANALYTES	UNITS	Residential Sub-Slab Soil Vapor Screening Values (MassDEP, 2016)	SVP-1	SVP-2	SVP-3
			35 Kearsarge Street	35 Kearsarge Street	35 Kearsarge Street
			4/1/2020	4/1/2020	4/1/2020
SOIL VAPOR SCREENING (RAE LITE OVM)					
Total Organic Volatiles	ppmv	NS	0.0	0.0	0.0
AIR-PHASE PETROLEUM HYDROCARBONS (MassDEP APH Method)					
C_5-C_8 Aliphatic Hydrocarbons	ug/m^3	4,100	**300**	----	----
C_9-C_{12} Aliphatic Hydrocarbons	ug/m^3	4,800	**860**	----	----
C_9-C_{10} Aromatic Hydrocarbons	ug/m^3	700	<10	----	----
1,3-Butadiene	ug/m^3	NS	<0.44	----	----
Benzene	ug/m^3	160	<0.64	----	----
Ethylbenzene	ug/m^3	520	<0.87	----	----
Methyl tertiary Butyl Ether (MtBE)	ug/m^3	2,700	<0.72	----	----
Naphthalene	ug/m^3	42	<1	----	----
Toluene	ug/m^3	3,800	**2.3**	----	----
Xylenes (mixed isomers)	ug/m^3	1,400	**2.5**	----	----

Notes:
1. ---- - Not analyzed.
2. ug/m^3 - micrograms per cubic meter.
3. Soil gas screening conducted with a MultiRAE OVM calibrated with 100 ppmv isobutylene span gas.
4. Sub-slab soil vapor screening values are based on information included in Appendix II of the MassDEP Vapor Intrusion Guidance (MassDEP, 2016).
5. NS - No Standard.

APPENDIX A

Limitations and Qualifications

LIMITATIONS

This site assessment was performed in accordance with generally accepted practices of other qualified environmental professionals undertaking similar studies at the same time and in the same geographical area, and the same degree of care and skill was conducted as is generally exercised by other consultants under similar circumstances and conditions. The scope of work for this project was developed to provide assurances for Cruz Companies, Inc. The findings and conclusions must be considered not as scientific or engineering certainties, but rather as professional opinion concerning the significance of the limited data gathered during the course of the environmental site assessment in accordance with the specific scope of services. No other warranty, expressed or implied, is made. Specifically, RHE does not and cannot represent that the Subject Property contains no oil, hazardous material, or other latent condition beyond that observed during this site assessment.

This assessment and report have been prepared on behalf of and for the benefit of Cruz Companies, Inc. solely for use in an environmental assessment of the Subject Property. If any third parties wish to rely on any of such material then such third parties must obtain the written consent of RHE in order to do so, such consent not to be unreasonably withheld. The report and other materials resulting from RHE's efforts on this project are not intended or represented to be suitable for reuse by Cruz Companies, Inc. beyond a period of 180 days, or on extensions or modifications of this project beyond environmental due diligence and associated follow-up.

The lender, seller, buyer, or other parties that might become involved with the Subject Property might develop additional opinions or information regarding the presence or absence of RECs at the Subject Property. Such additional opinions or information might not fully support the opinions provided in this environmental assessment report. In the event that such additional opinions or information is developed, we recommend retaining RHE to review this material so that we have the opportunity to evaluate and modify, as necessary, the opinions provided in this environmental assessment report.

It should be noted that all environmental assessments are inherently limited in the sense that conclusions are drawn and recommendations developed from information obtained from limited research and site evaluation. Except as specifically noted in this report, subsurface conditions were not field investigated as part of this study and may differ from the conditions implied by the surficial observations. Additionally, the passage of time may result in a change in the environmental characteristics at this Subject Property and surrounding properties. This report does not warrant against future operations or conditions, nor does this warrant operations or conditions present of a type or at a location not investigated. This report is not a regulatory compliance audit.

It must be noted that no investigation can absolutely rule out the existence of any oil and/or hazardous materials at a given property. This assessment has been based upon research of prior site history, observable conditions, and interview of those knowledgeable of the site history. Existing hazardous materials and contaminants may not have been detected using these methods. At this time, the results of this Phase I ESA suggest that it is unlikely that *potential recognized environmental conditions exist* at the Subject Property. If a higher degree of confidence is required, subsurface testing will be required.

QUALIFICATIONS

River Hawk Environmental, LLC is a full service engineering design and environmental consulting firm specializing in providing environmental assessment services to a wide range of municipal, commercial, institutional, and private clients throughout northeastern United States. The company owners, Mr. Robert Rego and Mr. William Kenney are both Licensed Site Professionals (LSPs) with significant experience with environmental assessment and remediation oversight. Mr. Rego is also a Registered Professional Engineer. RHE's professional team includes design and environmental engineers, geologists, environmental scientists, wetlands specialists, land surveyors, and project administrators who have expertise in solving the full range of engineering design and environmental problems that are being encountered by lending institutions, municipalities, industrial and commercial entities.

Staff members of RHE provide value to clients with their vast knowledge of environmental assessment standards and environmental regulations, extensive experience conducting assessments and field investigation programs, strong working relationships with regulatory agencies, and an eager approach to complete projects in an efficient cost effective manner. RHE has completed hundreds of environmental assessments regarding the presence of recognized environmental conditions on a property in accordance with ASTM environmental assessment standards. The following sections provide a brief overview of the experience of the key RHE team members who performed this assessment:

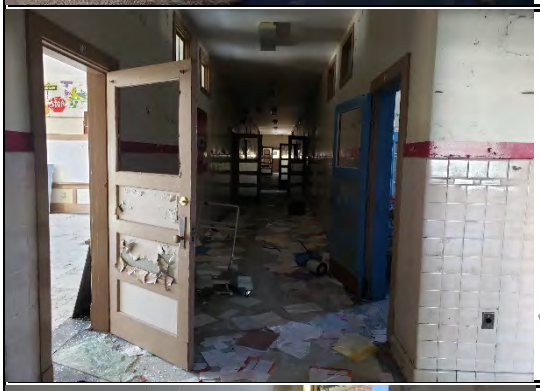
Technical Review and Research & Principal In Charge - **Robert S. Rego, P.E., LSP** is an environmental engineer with over 25 years of diversified experience in the environmental field. He has conducted a vast number of environmental assessments for lending institutions, municipal, commercial, and private clients and is fully versed in the requirements of the ASTM Environmental Assessment Standards. Mr. Rego is also fully knowledgeable of other environmental regulations and has extensive experience in environmental permitting, the collection and assessment of environmental data, and in preparing detailed technical reports. Mr. Rego is the project Quality Assurance and Quality Control director, thereby assuring that all of the work conducted meets appropriate industry standards and RHE's rigorous requirements. Mr. Rego maintains overall responsibility for assessment and regulation-related decisions.

Lead Environmental Investigator - **William P. Kenney, LSP** is a senior geologist and LSP with more than 13 years of practical experience with environmental assessments and subsurface investigations. He has conducted a vast number of environmental assessments for lending institutions, municipal, commercial, and private clients and is fully versed in the requirements of the ASTM Environmental Assessment Standards. Mr. Kenney is also knowledgeable of other environmental regulations and permitting, and routinely organizes and implements projects which require the collection and assessment of environmental data and preparation of detailed technical reports.

APPENDIX B

Photographic Documentation

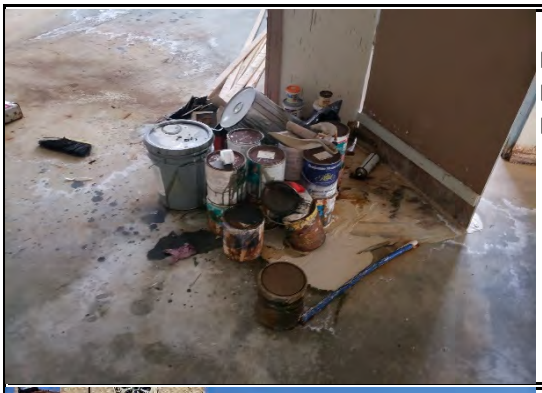
Photographic Documentation
35 Kearsarge Street
New Bedford, MA

	**Project:** 35 Kearsarge Street **Date:** February 21, 2020 **Description:** Photograph of the entrance to the Commercial Building. View facing northwest.
	**Project:** 35 Kearsarge Street **Date:** February 21, 2020 **Description:** Photograph of the interior of the Commercial Building. View of second floor hallway layout and miscellaneous debris.
	**Project:** 35 Kearsarge Street **Date:** February 21, 2020 **Description:** Photograph of the interior of the Commercial Building. View of second floor classroom.
	**Project:** 35 Kearsarge Street **Date:** February 21, 2020 **Description:** Photograph of the interior of the Commercial Building. Floor drain in the concrete floor of the basement.

Photographic Documentation
35 Kearsarge Street
New Bedford, MA

	**Project:** 35 Kearsarge Street **Date:** February 21, 2020 **Description:** Photograph of the Boiler Room.
	**Project:** 35 Kearsarge Street **Date:** February 21, 2020 **Description:** Photograph of the Boiler Room. Floor drain in the concrete floor.
	**Project:** 35 Kearsarge Street **Date:** February 21, 2020 **Description:** Photograph of the Boiler Room. Fuel gauges on ASTs.
	**Project:** 35 Kearsarge Street **Date:** February 21, 2020 **Description:** Photograph of the Boiler Room. Steel 55-gallon drum.

Photographic Documentation
35 Kearsarge Street
New Bedford, MA

	**Project:** 35 Kearsarge Street **Date:** February 21, 2020 **Description:** Photograph of the interior of the Commercial Building. Storage of miscellaneous paints and cleaners in the basement.
	**Project:** 35 Kearsarge Street **Date:** February 21, 2020 **Description:** Photograph of the asphalt paved parking lot and the western abutting St. Joseph Parish building. View facing west.
	**Project:** 35 Kearsarge Street **Date:** February 21, 2020 **Description:** Photograph of the exterior of the Boiler Room. View facing east.
	**Project:** 35 Kearsarge Street **Date:** February 21, 2020 **Description:** Photograph of pad-mounted transformer at the Subject Property. View facing south.

Photographic Documentation
35 Kearsarge Street
New Bedford, MA

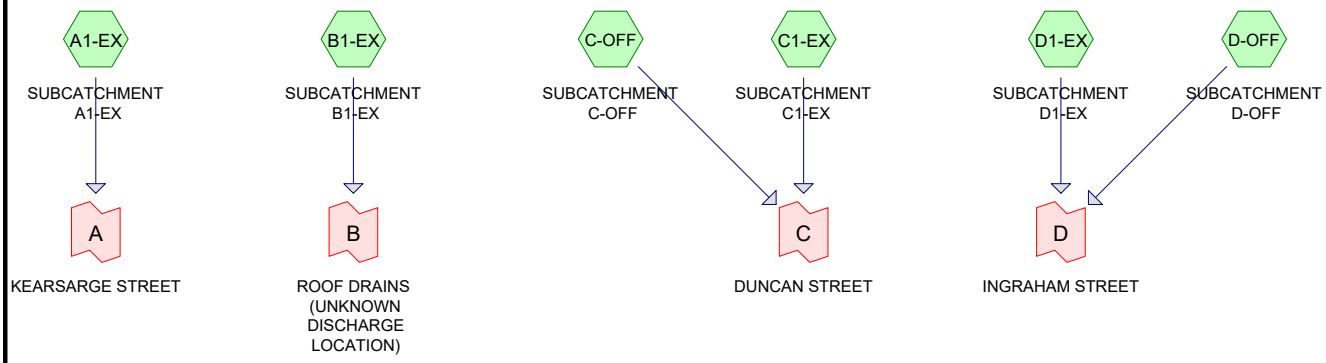
	**Project:** 35 Kearsarge Street **Date:** April 1, 2020 **Description:** Photograph during the development of monitoring well MW-1.
	**Project:** 35 Kearsarge Street **Date:** April 1, 2020 **Description:** Photograph of monitoring well MW-4.
	**Project:** 35 Kearsarge Street **Date:** April 1, 2020 **Description:** Photograph of soil vapor sampling location SVP-2.
	**Project:** 35 Kearsarge Street **Date:** April 6, 2020 **Description:** Photograph during sampling of monitoring well MW-3.

APPENDIX B

SUPPORTING CALCULATIONS

HydroCAD Drainage Analysis
TSS Calculations
Recharge Calculations
Pipe Capacity Analysis
Manufactures O&M Procedures
Illicit Discharge Compliance Statement

HydroCAD Drainage Analysis



Subcat Reach Pond Link

Routing Diagram for 304430-HYD-PRE - 10YR
Prepared by CEC, Inc., Printed 7/15/2021

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year, 24-Hour	Type II 24-hr		Default	24.00	1	3.40	2
2	10-Year, 24-Hour	Type II 24-hr		Default	24.00	1	4.80	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.035	68	<50% Grass cover, Poor, HSG A (C1-EX)
0.344	98	Paved parking, HSG A (C-OFF, C1-EX, D-OFF)
0.352	98	Roofs, HSG A (B1-EX, C1-EX)
0.022	98	Unconnected pavement, HSG A (A1-EX, B1-EX)
0.060	98	Unconnected roofs, HSG A (C-OFF, D1-EX)
0.813	**97**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.813	HSG A	A1-EX, B1-EX, C-OFF, C1-EX, D-OFF, D1-EX
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
0.813		**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
0.035	0.000	0.000	0.000	0.000	0.035	<50% Grass cover, Poor	C1-EX
0.344	0.000	0.000	0.000	0.000	0.344	Paved parking	C-OFF, C1-EX, D-OFF
0.352	0.000	0.000	0.000	0.000	0.352	Roofs	B1-EX, C1-EX
0.022	0.000	0.000	0.000	0.000	0.022	Unconnected pavement	A1-EX, B1-EX
0.060	0.000	0.000	0.000	0.000	0.060	Unconnected roofs	C-OFF, D1-EX
0.813	**0.000**	**0.000**	**0.000**	**0.000**	**0.813**	**TOTAL AREA**	

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentA1-EX: SUBCATCHMENT Runoff Area=763 sf 100.00% Impervious Runoff Depth>2.93"
Tc=6.0 min CN=98 Runoff=0.08 cfs 0.004 af

SubcatchmentB1-EX: SUBCATCHMENT Runoff Area=14,393 sf 100.00% Impervious Runoff Depth>2.93"
Tc=6.0 min CN=98 Runoff=1.55 cfs 0.081 af

SubcatchmentC-OFF: SUBCATCHMENT Runoff Area=3,269 sf 100.00% Impervious Runoff Depth>2.93"
Tc=6.0 min CN=98 Runoff=0.35 cfs 0.018 af

SubcatchmentC1-EX: SUBCATCHMENT Runoff Area=14,320 sf 89.27% Impervious Runoff Depth>2.66"
Tc=6.0 min CN=95 Runoff=1.47 cfs 0.073 af

SubcatchmentD-OFF: SUBCATCHMENT Runoff Area=267 sf 100.00% Impervious Runoff Depth>2.93"
Tc=6.0 min CN=98 Runoff=0.03 cfs 0.001 af

SubcatchmentD1-EX: SUBCATCHMENT Runoff Area=2,383 sf 100.00% Impervious Runoff Depth>2.93"
Tc=6.0 min CN=98 Runoff=0.26 cfs 0.013 af

Link A: KEARSARGESTREET Inflow=0.08 cfs 0.004 af
Primary=0.08 cfs 0.004 af

Link B: ROOF DRAINS (UNKNOWN DISCHARGE LOCATION) Inflow=1.55 cfs 0.081 af
Primary=1.55 cfs 0.081 af

Link C: DUNCAN STREET Inflow=1.82 cfs 0.091 af
Primary=1.82 cfs 0.091 af

Link D: INGRAHAMSTREET Inflow=0.28 cfs 0.015 af
Primary=0.28 cfs 0.015 af

Total Runoff Area = 0.813 ac Runoff Volume = 0.191 af Average Runoff Depth = 2.82"
4.34% Pervious = 0.035 ac 95.66% Impervious = 0.777 ac

Summary for Subcatchment A1-EX: SUBCATCHMENT A1-EX

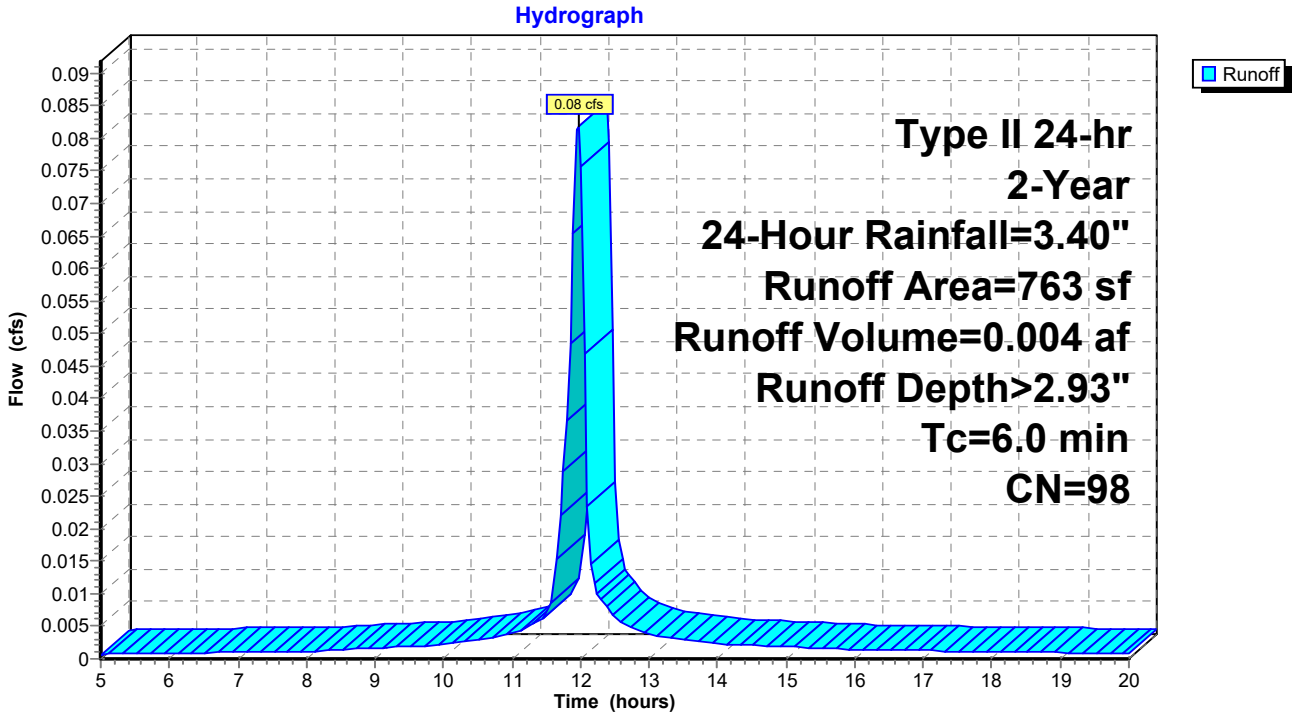
Runoff = 0.08 cfs @ 11.96 hrs, Volume= 0.004 af, Depth> 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year, 24-Hour Rainfall=3.40"

Area (sf)	CN	Description
763	98	Unconnected pavement, HSG A
763		100.00% Impervious Area
763		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment A1-EX: SUBCATCHMENT A1-EX



Summary for Subcatchment B1-EX: SUBCATCHMENT B1-EX

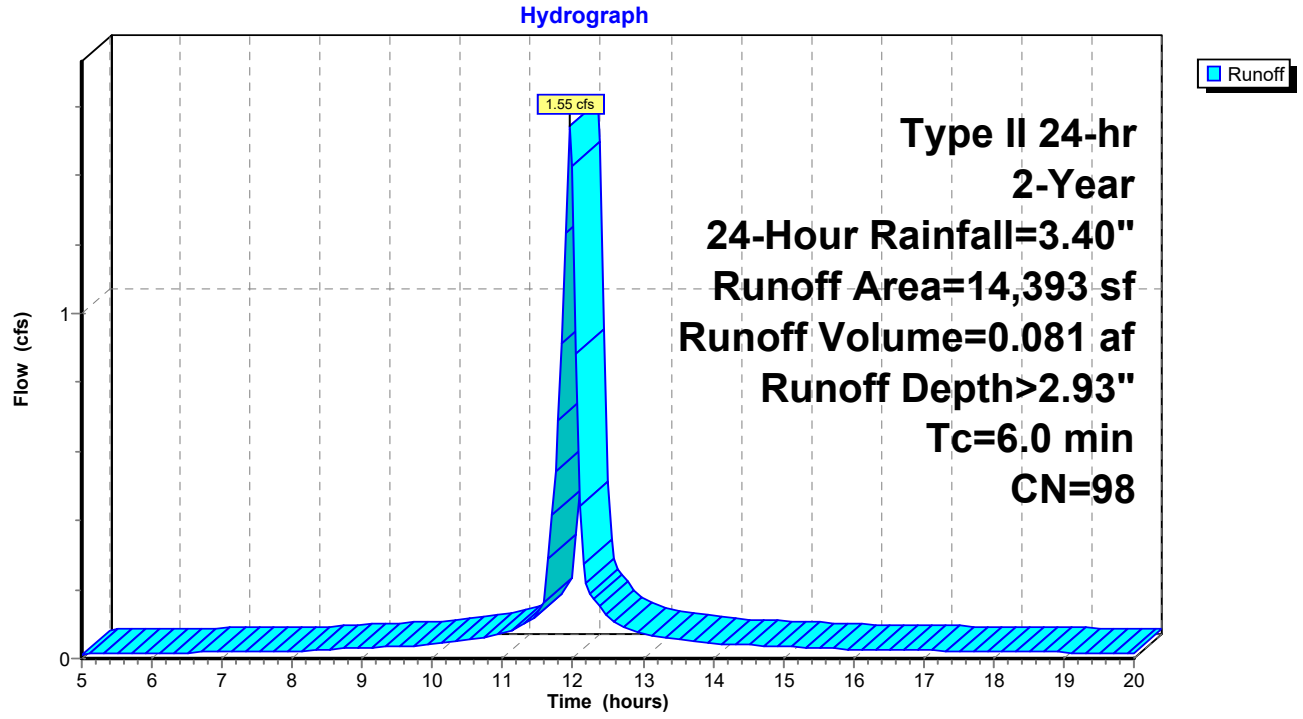
Runoff = 1.55 cfs @ 11.96 hrs, Volume= 0.081 af, Depth> 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year, 24-Hour Rainfall=3.40"

Area (sf)	CN	Description
14,206	98	Roofs, HSG A
187	98	Unconnected pavement, HSG A
14,393	98	Weighted Average
14,393		100.00% Impervious Area
187		1.30% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment B1-EX: SUBCATCHMENT B1-EX



Summary for Subcatchment C-OFF: SUBCATCHMENT C-OFF

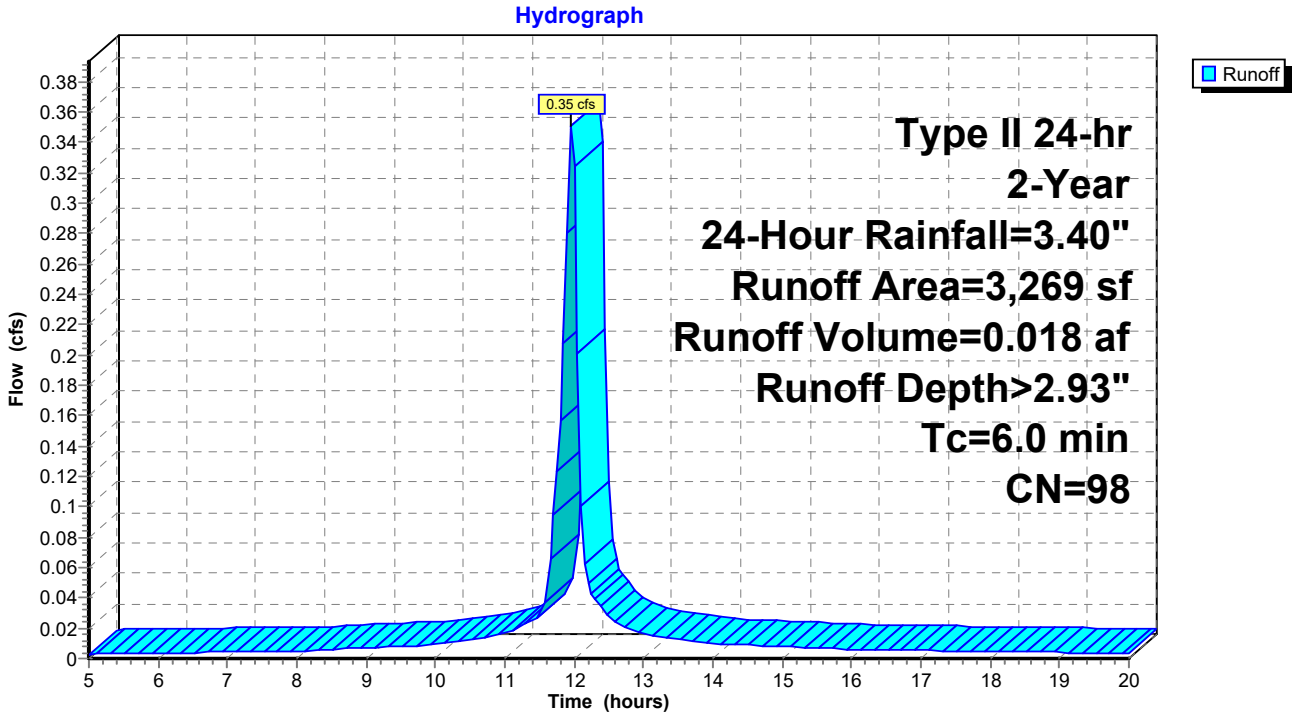
Runoff = 0.35 cfs @ 11.96 hrs, Volume= 0.018 af, Depth> 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year, 24-Hour Rainfall=3.40"

Area (sf)	CN	Description
3,046	98	Paved parking, HSG A
223	98	Unconnected roofs, HSG A
3,269	98	Weighted Average
3,269		100.00% Impervious Area
223		6.82% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment C-OFF: SUBCATCHMENT C-OFF



Summary for Subcatchment C1-EX: SUBCATCHMENT C1-EX

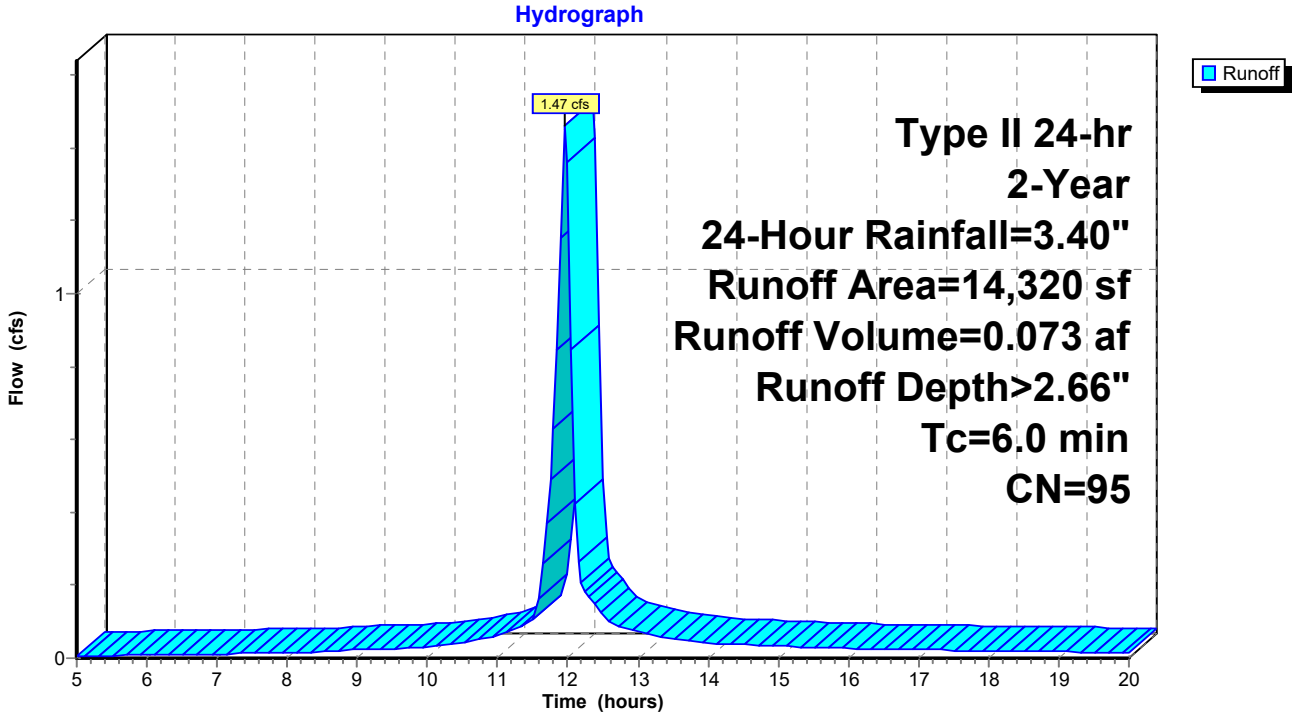
Runoff = 1.47 cfs @ 11.96 hrs, Volume= 0.073 af, Depth> 2.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year, 24-Hour Rainfall=3.40"

Area (sf)	CN	Description
1,536	68	<50% Grass cover, Poor, HSG A
11,667	98	Paved parking, HSG A
1,117	98	Roofs, HSG A
14,320	95	Weighted Average
1,536		10.73% Pervious Area
12,784		89.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment C1-EX: SUBCATCHMENT C1-EX



Summary for Subcatchment D-OFF: SUBCATCHMENT D-OFF

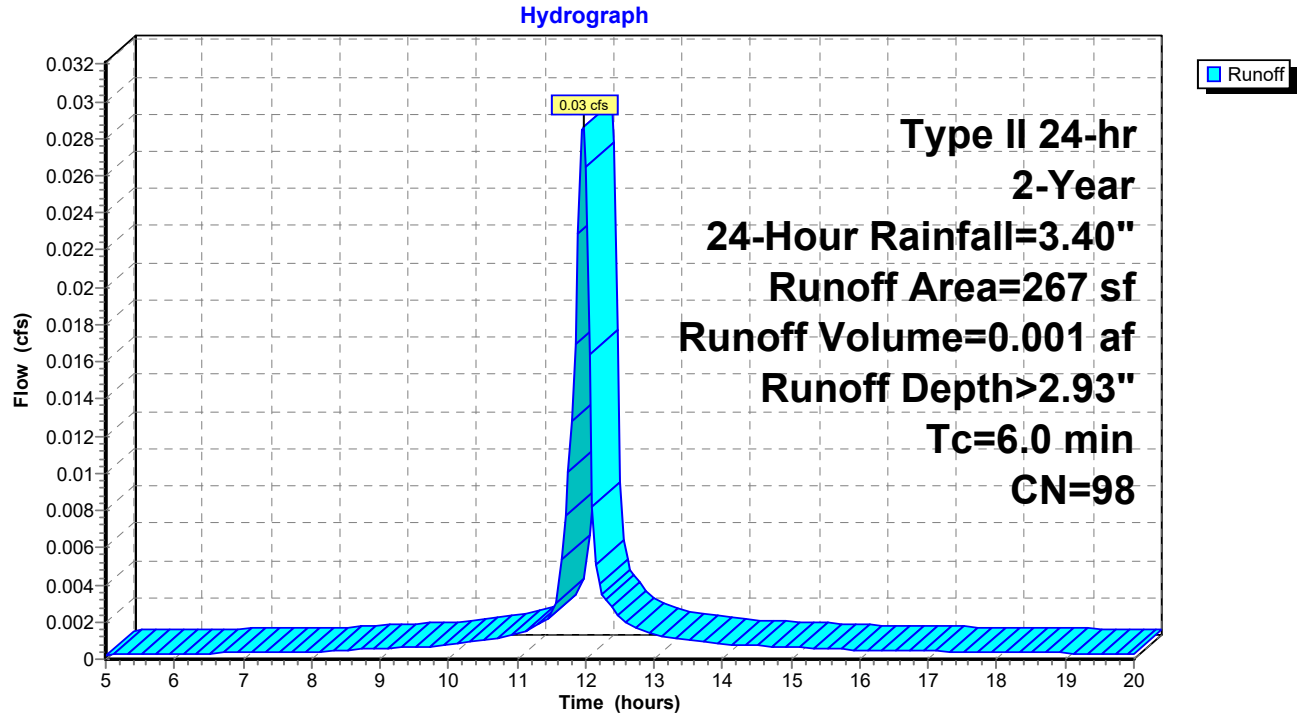
Runoff = 0.03 cfs @ 11.96 hrs, Volume= 0.001 af, Depth> 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year, 24-Hour Rainfall=3.40"

Area (sf)	CN	Description
267	98	Paved parking, HSG A
267		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment D-OFF: SUBCATCHMENT D-OFF



Summary for Subcatchment D1-EX: SUBCATCHMENT D1-EX

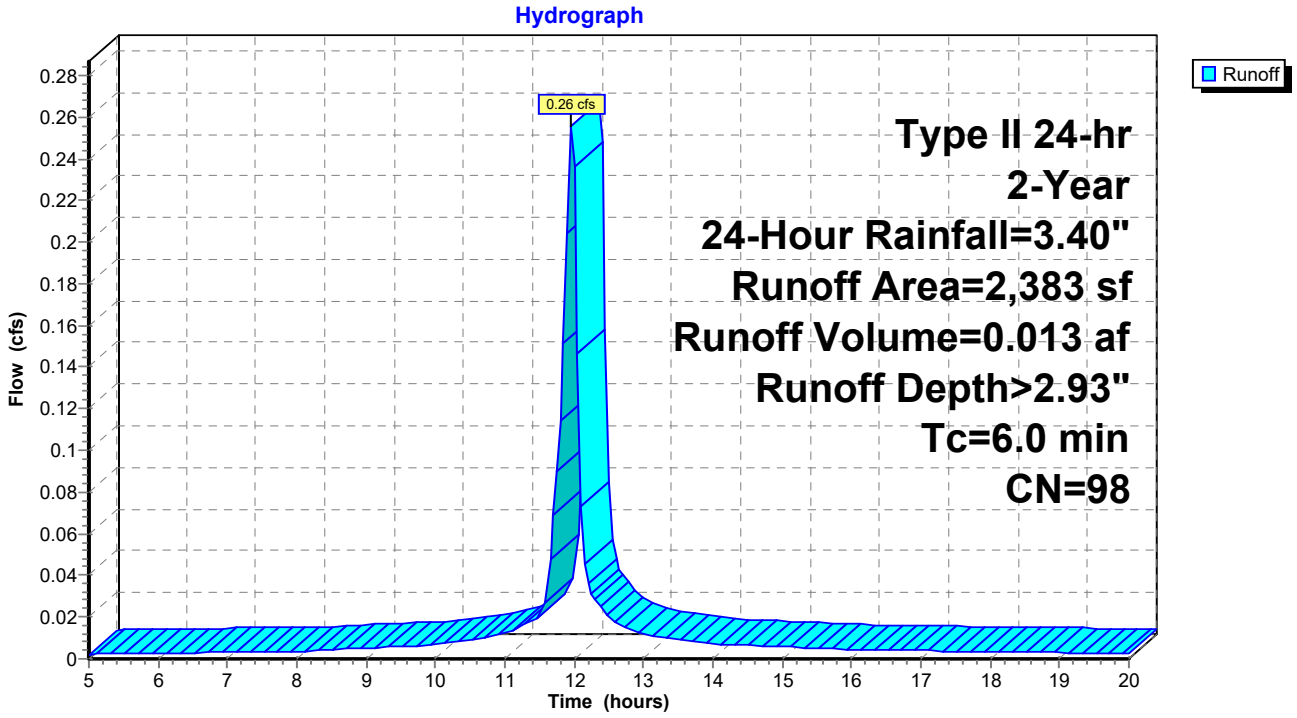
Runoff = 0.26 cfs @ 11.96 hrs, Volume= 0.013 af, Depth> 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year, 24-Hour Rainfall=3.40"

Area (sf)	CN	Description
2,383	98	Unconnected roofs, HSG A
2,383		100.00% Impervious Area
2,383		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment D1-EX: SUBCATCHMENT D1-EX

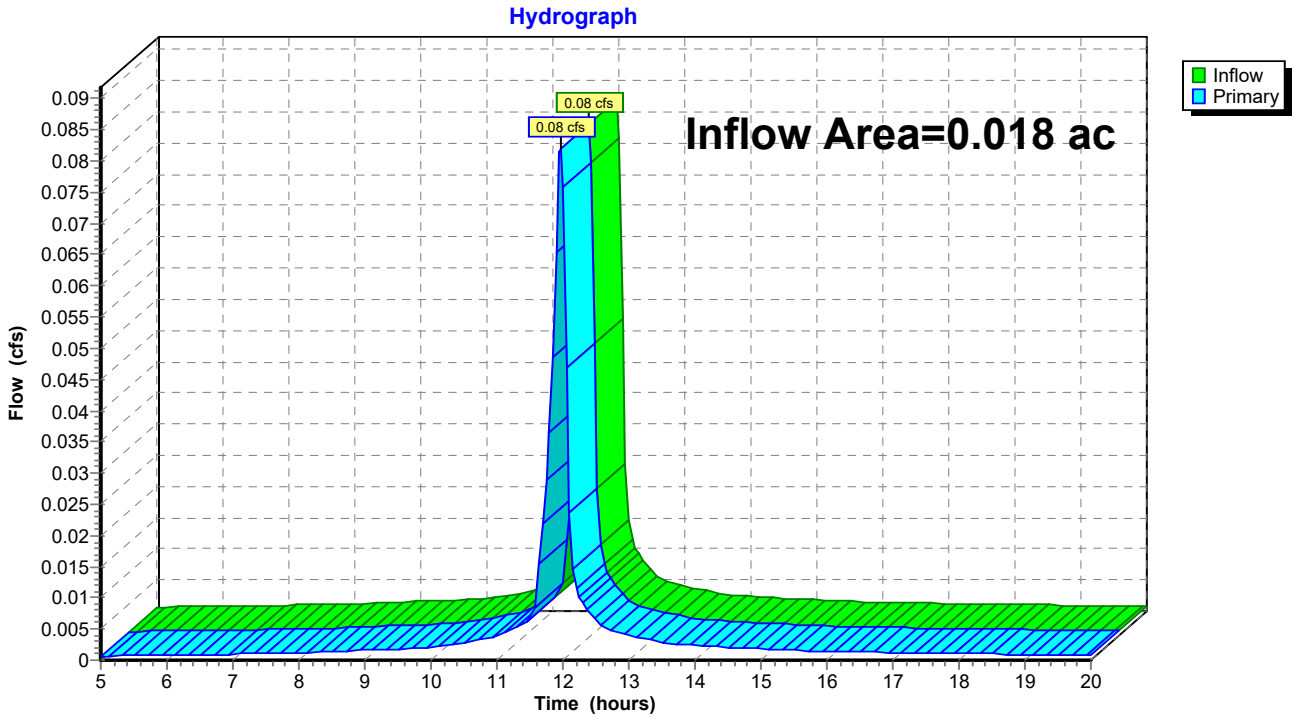


Summary for Link A: KEARSARGE STREET

Inflow Area = 0.018 ac,100.00% Impervious, Inflow Depth > 2.93" for 2-Year, 24-Hour event
Inflow = 0.08 cfs @ 11.96 hrs, Volume= 0.004 af
Primary = 0.08 cfs @ 11.96 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link A: KEARSARGE STREET

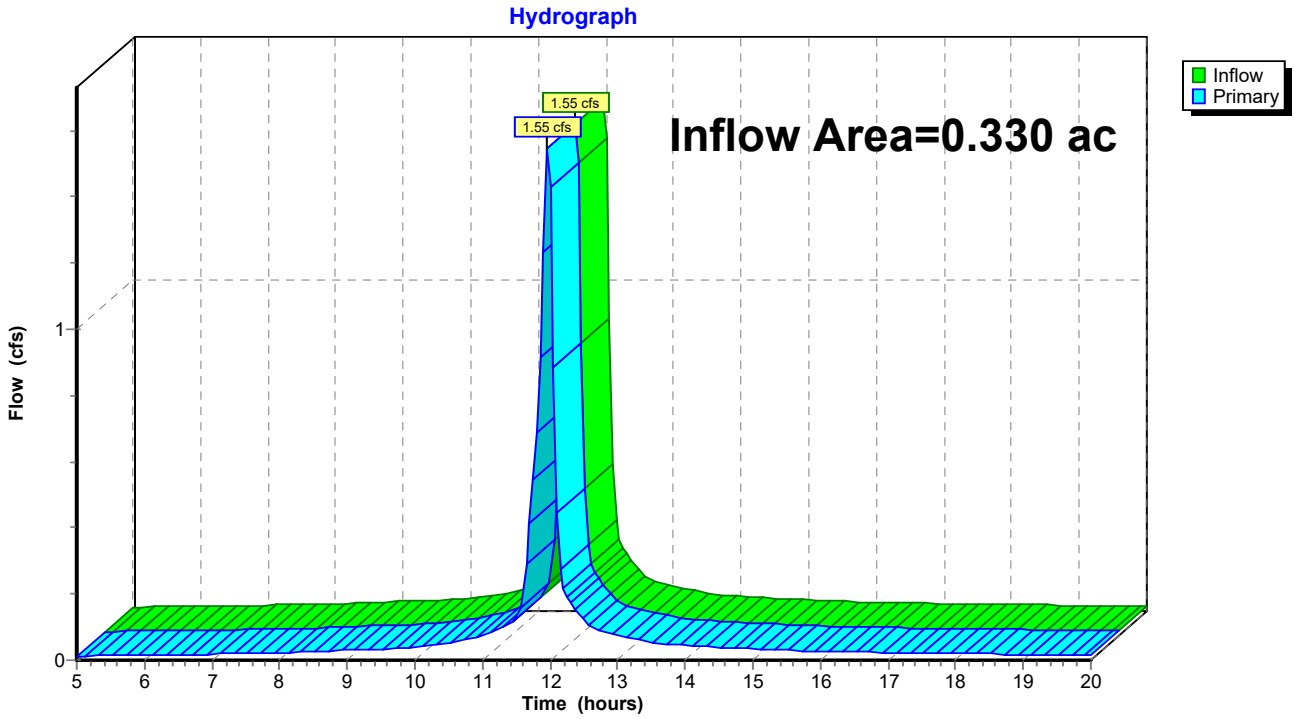


Summary for Link B: ROOF DRAINS (UNKNOWN DISCHARGE LOCATION)

Inflow Area = 0.330 ac,100.00% Impervious, Inflow Depth > 2.93" for 2-Year, 24-Hour event
Inflow = 1.55 cfs @ 11.96 hrs, Volume= 0.081 af
Primary = 1.55 cfs @ 11.96 hrs, Volume= 0.081 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link B: ROOF DRAINS (UNKNOWN DISCHARGE LOCATION)

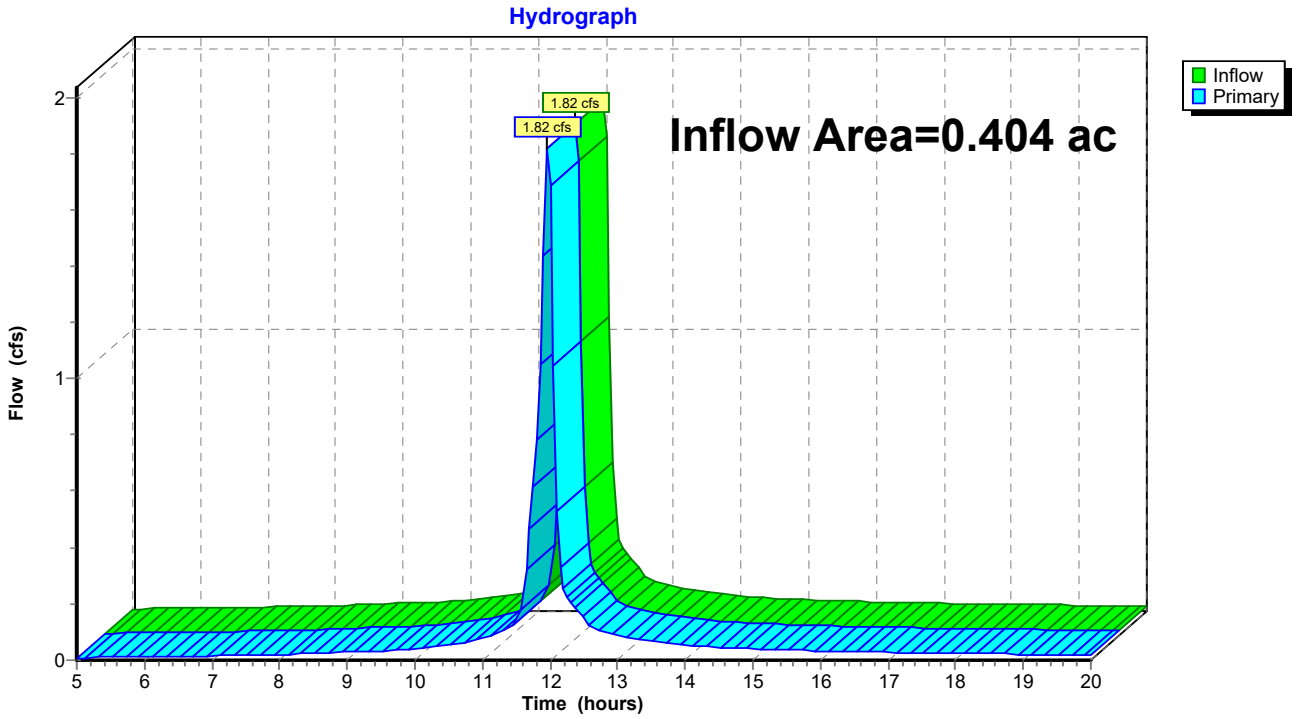


Summary for Link C: DUNCAN STREET

Inflow Area = 0.404 ac, 91.27% Impervious, Inflow Depth > 2.71" for 2-Year, 24-Hour event
Inflow = 1.82 cfs @ 11.96 hrs, Volume= 0.091 af
Primary = 1.82 cfs @ 11.96 hrs, Volume= 0.091 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link C: DUNCAN STREET

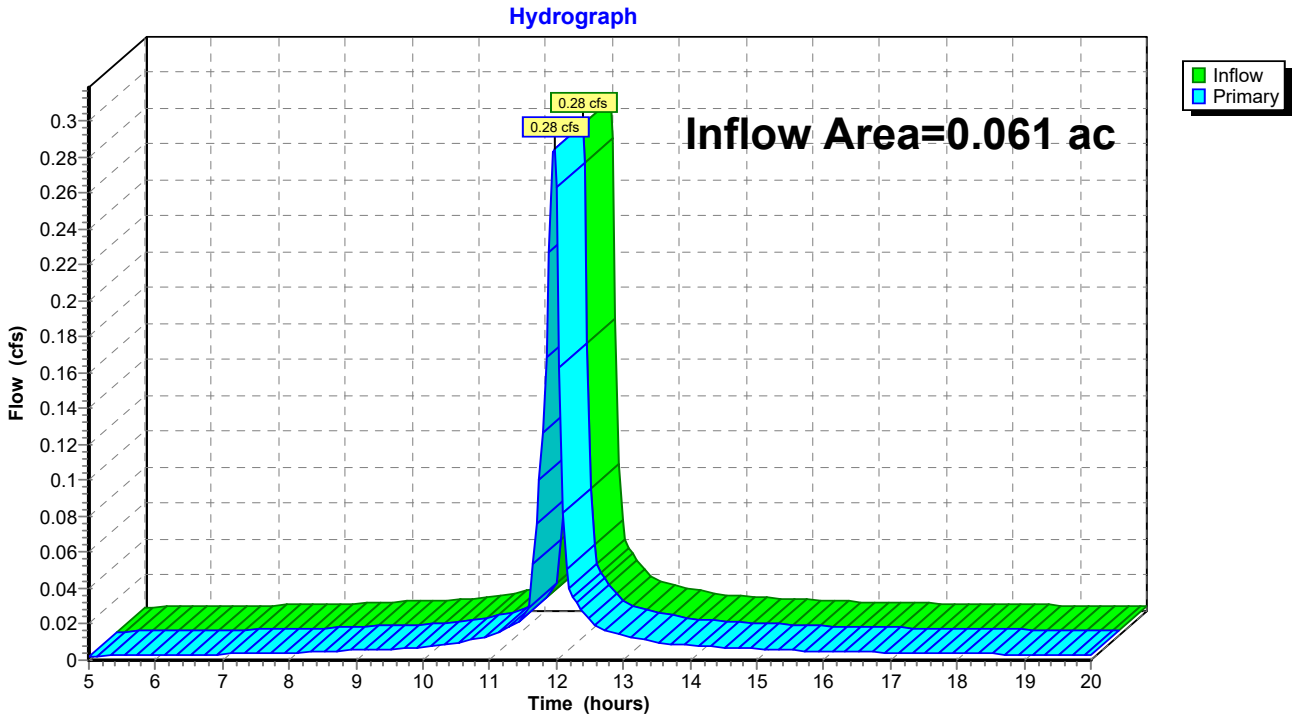


Summary for Link D: INGRAHAM STREET

Inflow Area = 0.061 ac,100.00% Impervious, Inflow Depth > 2.93" for 2-Year, 24-Hour event
Inflow = 0.28 cfs @ 11.96 hrs, Volume= 0.015 af
Primary = 0.28 cfs @ 11.96 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link D: INGRAHAM STREET



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentA1-EX: SUBCATCHMENT Runoff Area=763 sf 100.00% Impervious Runoff Depth>4.19"
Tc=6.0 min CN=98 Runoff=0.12 cfs 0.006 af

SubcatchmentB1-EX: SUBCATCHMENT Runoff Area=14,393 sf 100.00% Impervious Runoff Depth>4.19"
Tc=6.0 min CN=98 Runoff=2.19 cfs 0.115 af

SubcatchmentC-OFF: SUBCATCHMENT Runoff Area=3,269 sf 100.00% Impervious Runoff Depth>4.19"
Tc=6.0 min CN=98 Runoff=0.50 cfs 0.026 af

SubcatchmentC1-EX: SUBCATCHMENT Runoff Area=14,320 sf 89.27% Impervious Runoff Depth>3.94"
Tc=6.0 min CN=95 Runoff=2.12 cfs 0.108 af

SubcatchmentD-OFF: SUBCATCHMENT Runoff Area=267 sf 100.00% Impervious Runoff Depth>4.19"
Tc=6.0 min CN=98 Runoff=0.04 cfs 0.002 af

SubcatchmentD1-EX: SUBCATCHMENT Runoff Area=2,383 sf 100.00% Impervious Runoff Depth>4.19"
Tc=6.0 min CN=98 Runoff=0.36 cfs 0.019 af

Link A: KEARSARGESTREET Inflow=0.12 cfs 0.006 af
Primary=0.12 cfs 0.006 af

Link B: ROOF DRAINS (UNKNOWN DISCHARGE LOCATION) Inflow=2.19 cfs 0.115 af
Primary=2.19 cfs 0.115 af

Link C: DUNCAN STREET Inflow=2.62 cfs 0.134 af
Primary=2.62 cfs 0.134 af

Link D: INGRAHAMSTREET Inflow=0.40 cfs 0.021 af
Primary=0.40 cfs 0.021 af

Total Runoff Area = 0.813 ac Runoff Volume = 0.277 af Average Runoff Depth = 4.09"
4.34% Pervious = 0.035 ac 95.66% Impervious = 0.777 ac

Summary for Subcatchment A1-EX: SUBCATCHMENT A1-EX

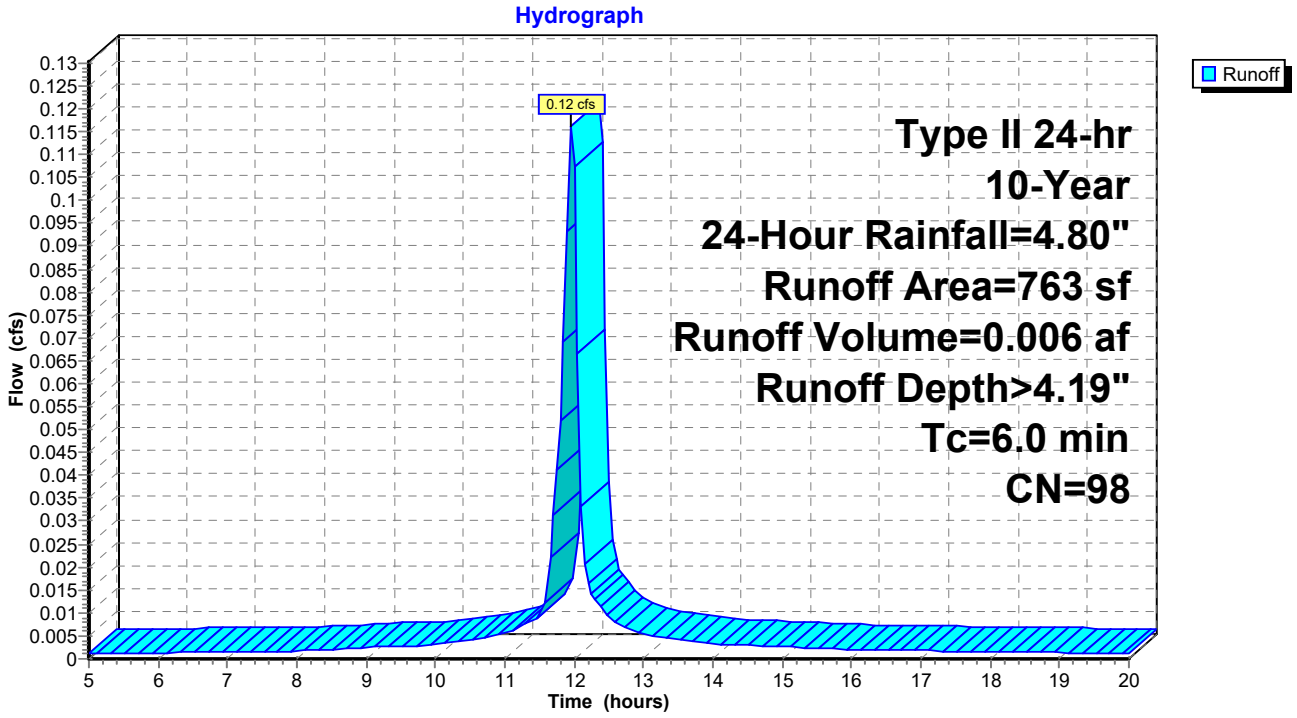
Runoff = 0.12 cfs @ 11.96 hrs, Volume= 0.006 af, Depth> 4.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year, 24-Hour Rainfall=4.80"

Area (sf)	CN	Description
763	98	Unconnected pavement, HSG A
763		100.00% Impervious Area
763		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment A1-EX: SUBCATCHMENT A1-EX



Summary for Subcatchment B1-EX: SUBCATCHMENT B1-EX

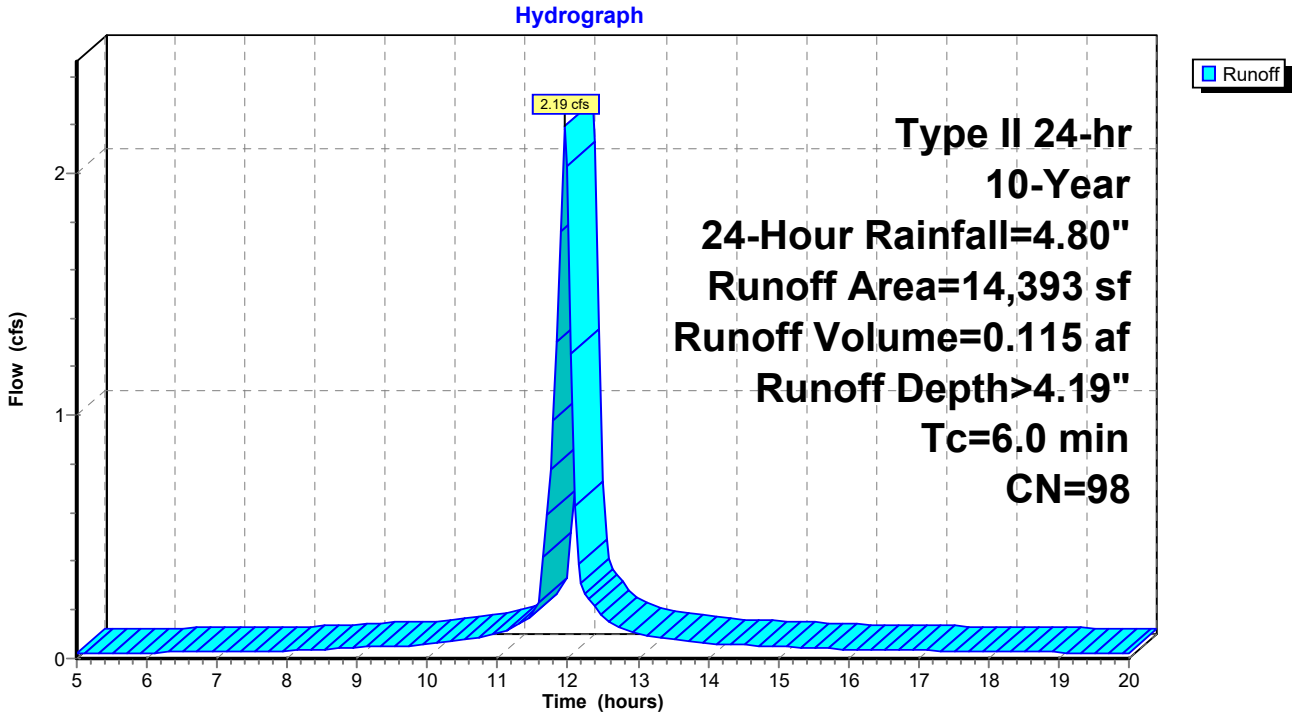
Runoff = 2.19 cfs @ 11.96 hrs, Volume= 0.115 af, Depth> 4.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year, 24-Hour Rainfall=4.80"

Area (sf)	CN	Description
14,206	98	Roofs, HSG A
187	98	Unconnected pavement, HSG A
14,393	98	Weighted Average
14,393		100.00% Impervious Area
187		1.30% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment B1-EX: SUBCATCHMENT B1-EX



Summary for Subcatchment C-OFF: SUBCATCHMENT C-OFF

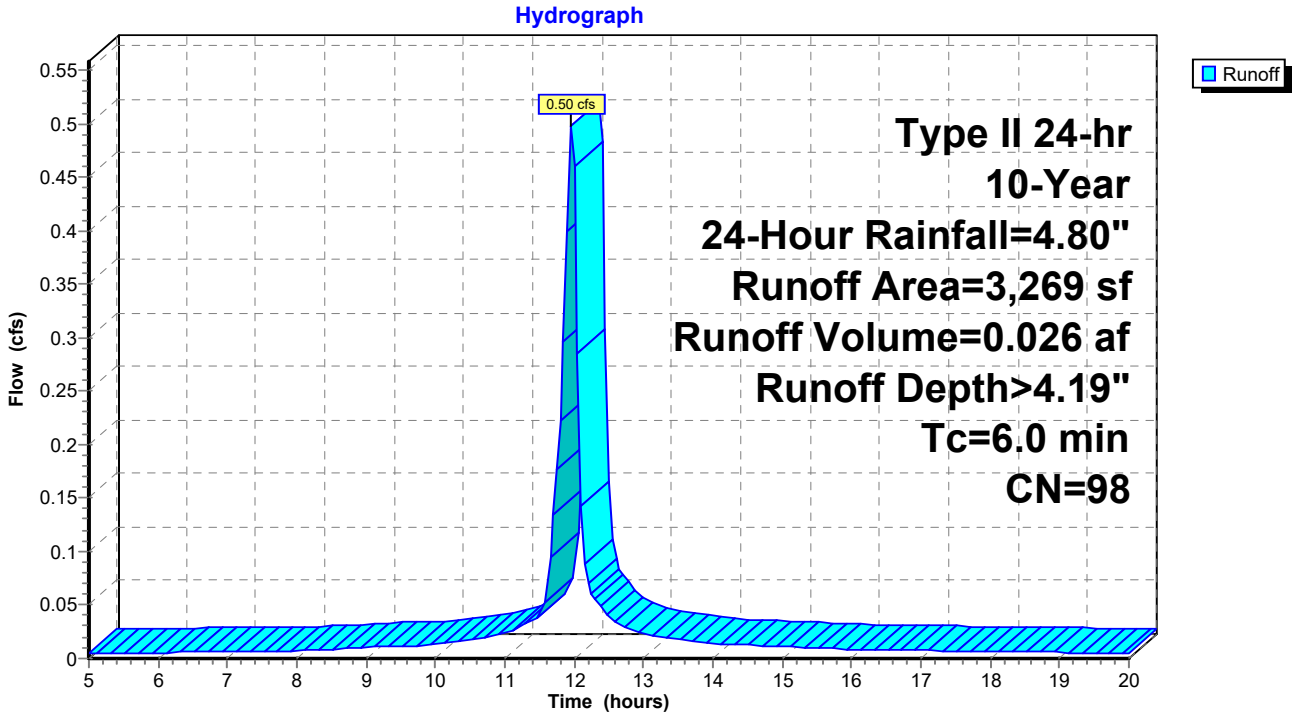
Runoff = 0.50 cfs @ 11.96 hrs, Volume= 0.026 af, Depth> 4.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year, 24-Hour Rainfall=4.80"

Area (sf)	CN	Description
3,046	98	Paved parking, HSG A
223	98	Unconnected roofs, HSG A
3,269	98	Weighted Average
3,269		100.00% Impervious Area
223		6.82% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment C-OFF: SUBCATCHMENT C-OFF



Summary for Subcatchment C1-EX: SUBCATCHMENT C1-EX

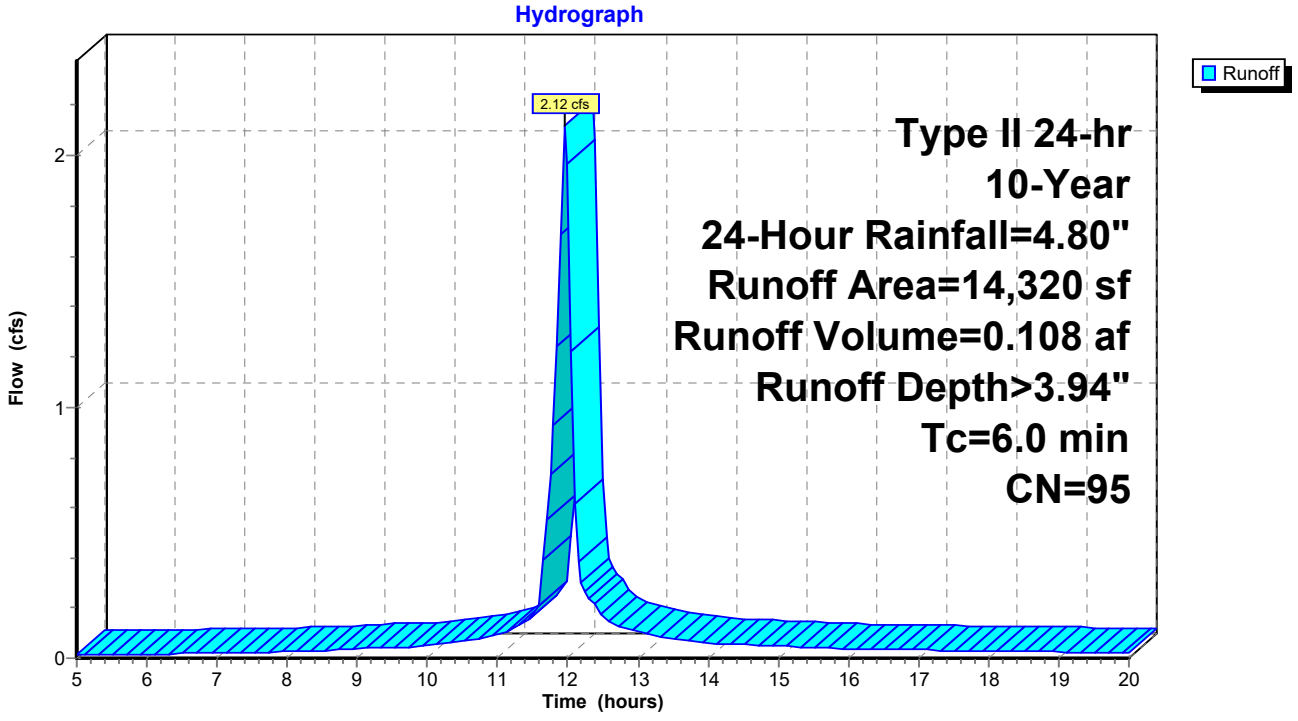
Runoff = 2.12 cfs @ 11.96 hrs, Volume= 0.108 af, Depth> 3.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year, 24-Hour Rainfall=4.80"

Area (sf)	CN	Description
1,536	68	<50% Grass cover, Poor, HSG A
11,667	98	Paved parking, HSG A
1,117	98	Roofs, HSG A
14,320	95	Weighted Average
1,536		10.73% Pervious Area
12,784		89.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment C1-EX: SUBCATCHMENT C1-EX



Summary for Subcatchment D-OFF: SUBCATCHMENT D-OFF

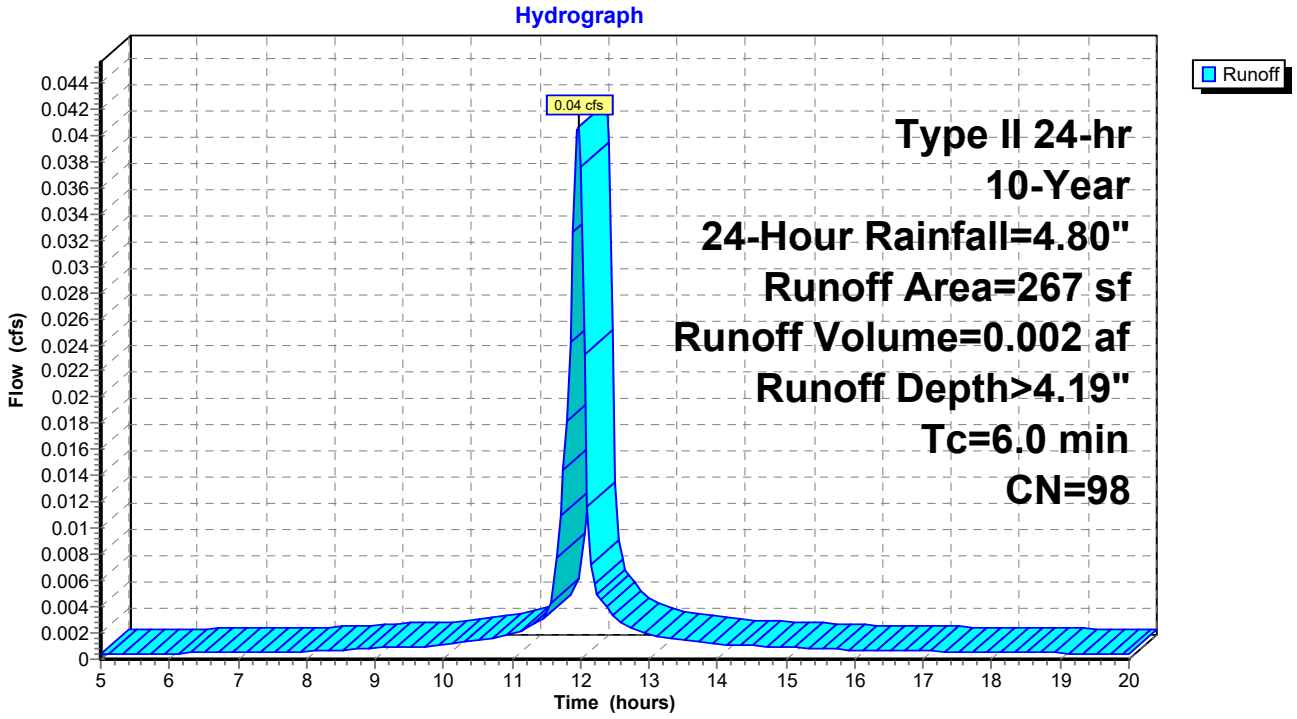
Runoff = 0.04 cfs @ 11.96 hrs, Volume= 0.002 af, Depth> 4.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year, 24-Hour Rainfall=4.80"

Area (sf)	CN	Description
267	98	Paved parking, HSG A
267		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment D-OFF: SUBCATCHMENT D-OFF



Summary for Subcatchment D1-EX: SUBCATCHMENT D1-EX

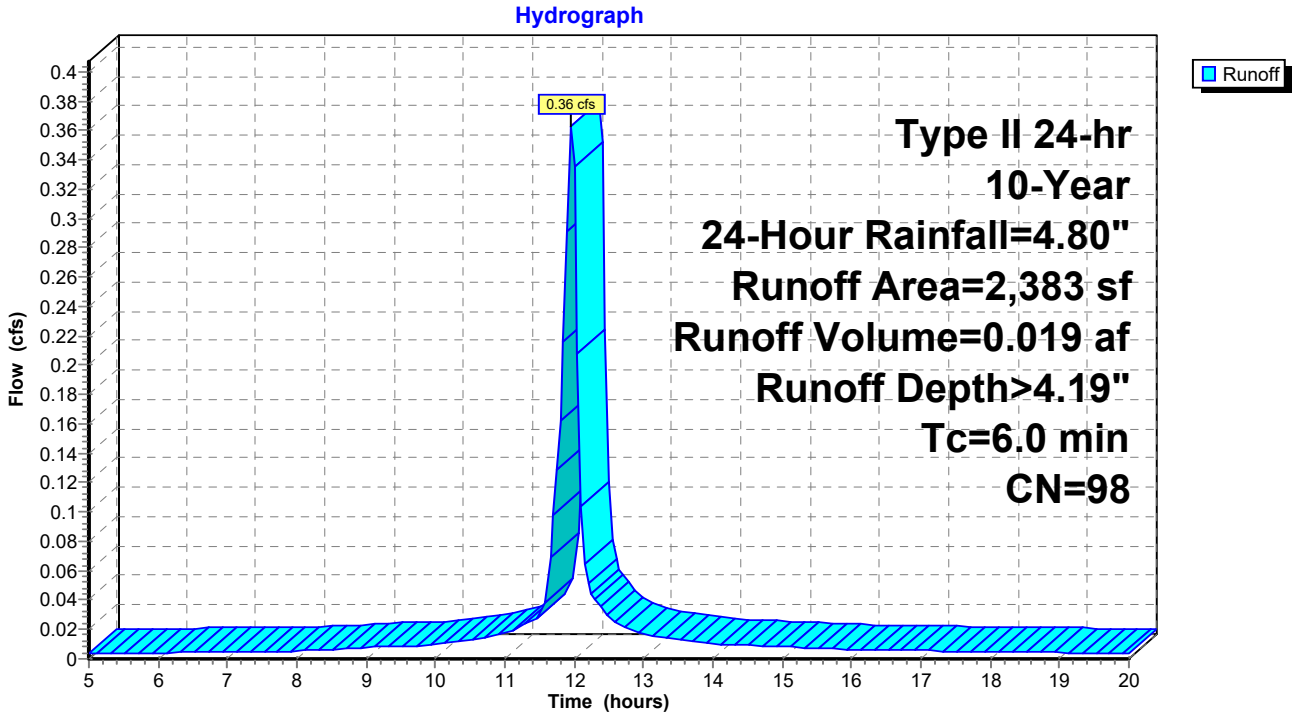
Runoff = 0.36 cfs @ 11.96 hrs, Volume= 0.019 af, Depth> 4.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year, 24-Hour Rainfall=4.80"

Area (sf)	CN	Description
2,383	98	Unconnected roofs, HSG A
2,383		100.00% Impervious Area
2,383		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment D1-EX: SUBCATCHMENT D1-EX

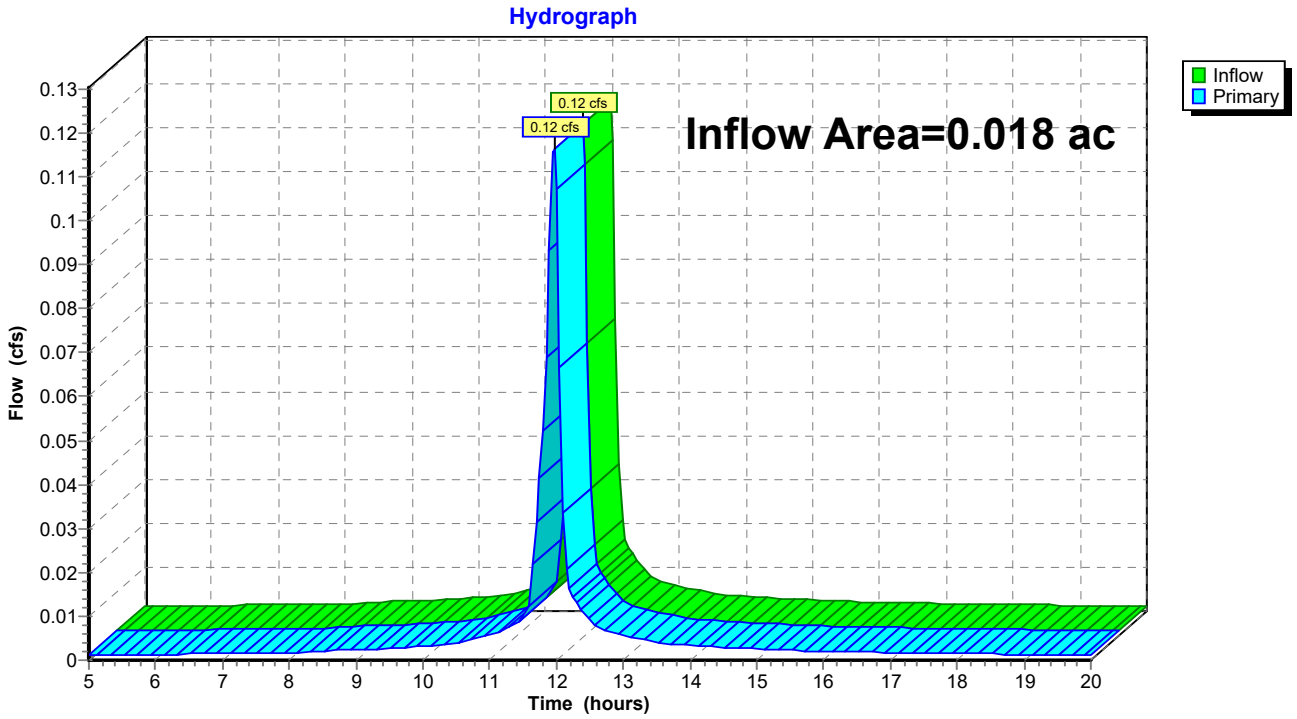


Summary for Link A: KEARSARGE STREET

Inflow Area = 0.018 ac,100.00% Impervious, Inflow Depth > 4.19" for 10-Year, 24-Hour event
Inflow = 0.12 cfs @ 11.96 hrs, Volume= 0.006 af
Primary = 0.12 cfs @ 11.96 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link A: KEARSARGE STREET

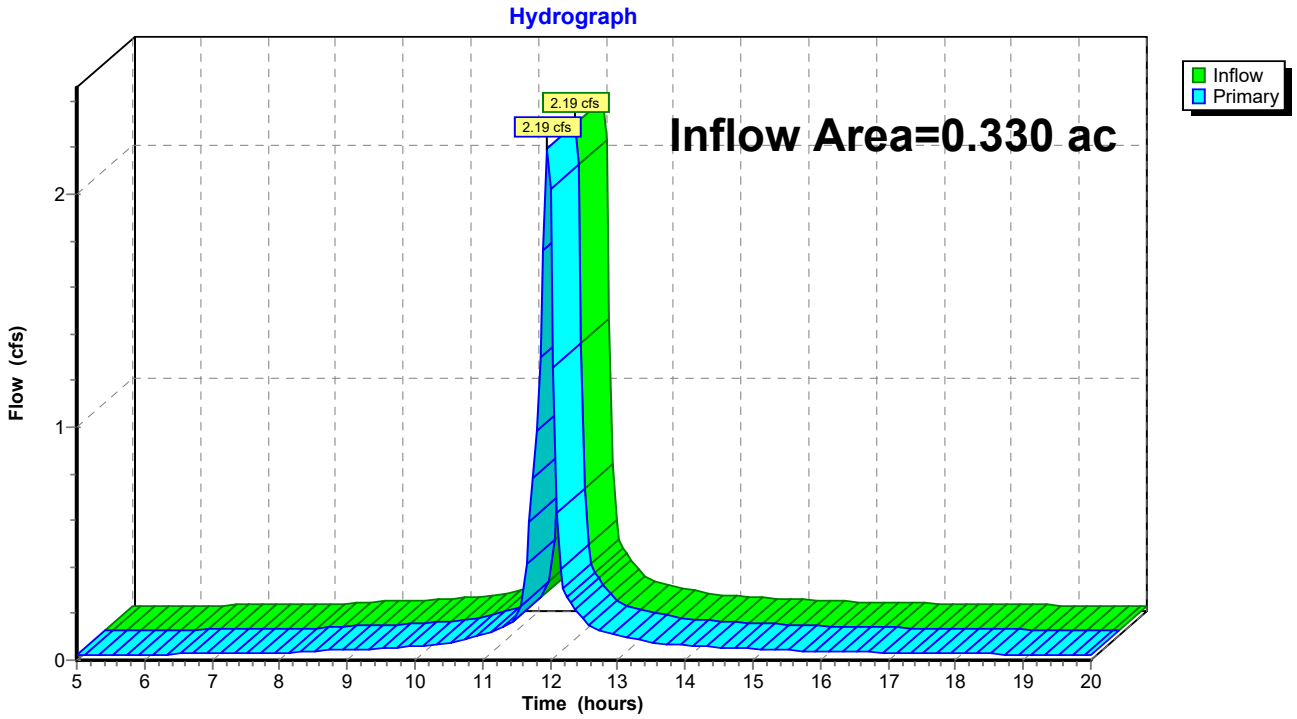


Summary for Link B: ROOF DRAINS (UNKNOWN DISCHARGE LOCATION)

Inflow Area = 0.330 ac,100.00% Impervious, Inflow Depth > 4.19" for 10-Year, 24-Hour event
Inflow = 2.19 cfs @ 11.96 hrs, Volume= 0.115 af
Primary = 2.19 cfs @ 11.96 hrs, Volume= 0.115 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link B: ROOF DRAINS (UNKNOWN DISCHARGE LOCATION)

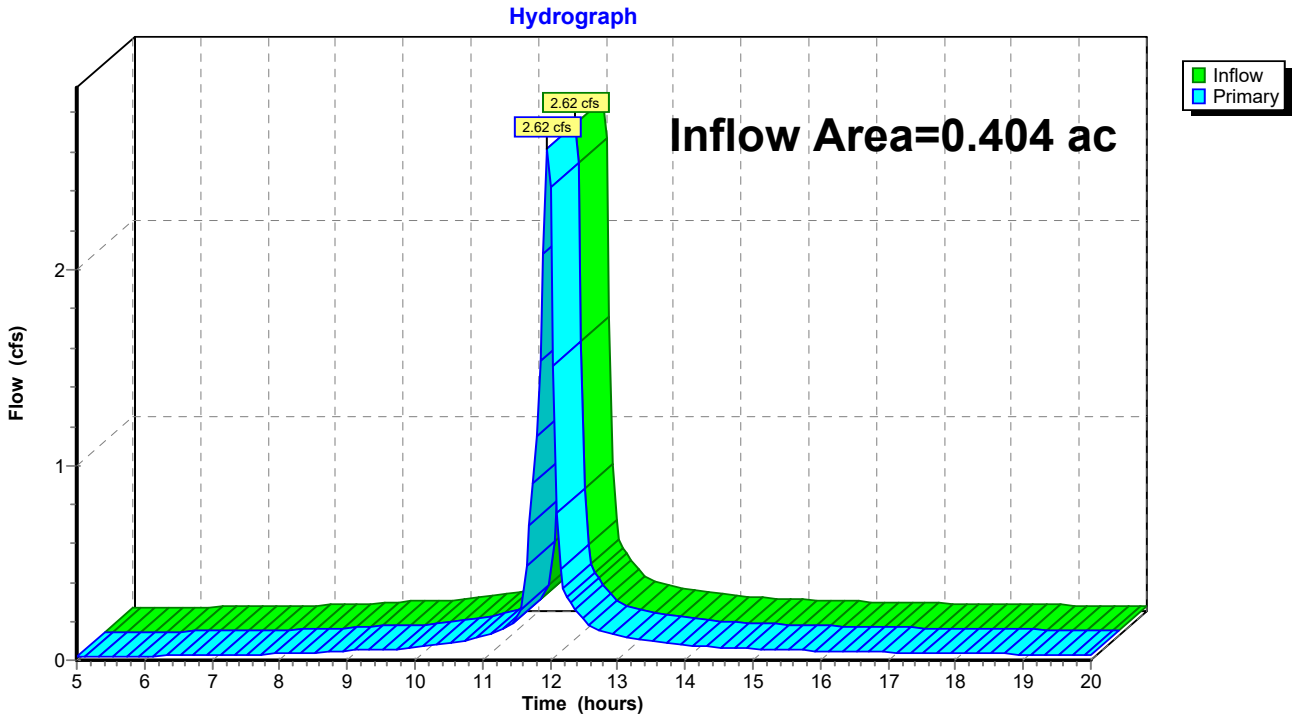


Summary for Link C: DUNCAN STREET

Inflow Area = 0.404 ac, 91.27% Impervious, Inflow Depth > 3.99" for 10-Year, 24-Hour event
Inflow = 2.62 cfs @ 11.96 hrs, Volume= 0.134 af
Primary = 2.62 cfs @ 11.96 hrs, Volume= 0.134 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link C: DUNCAN STREET

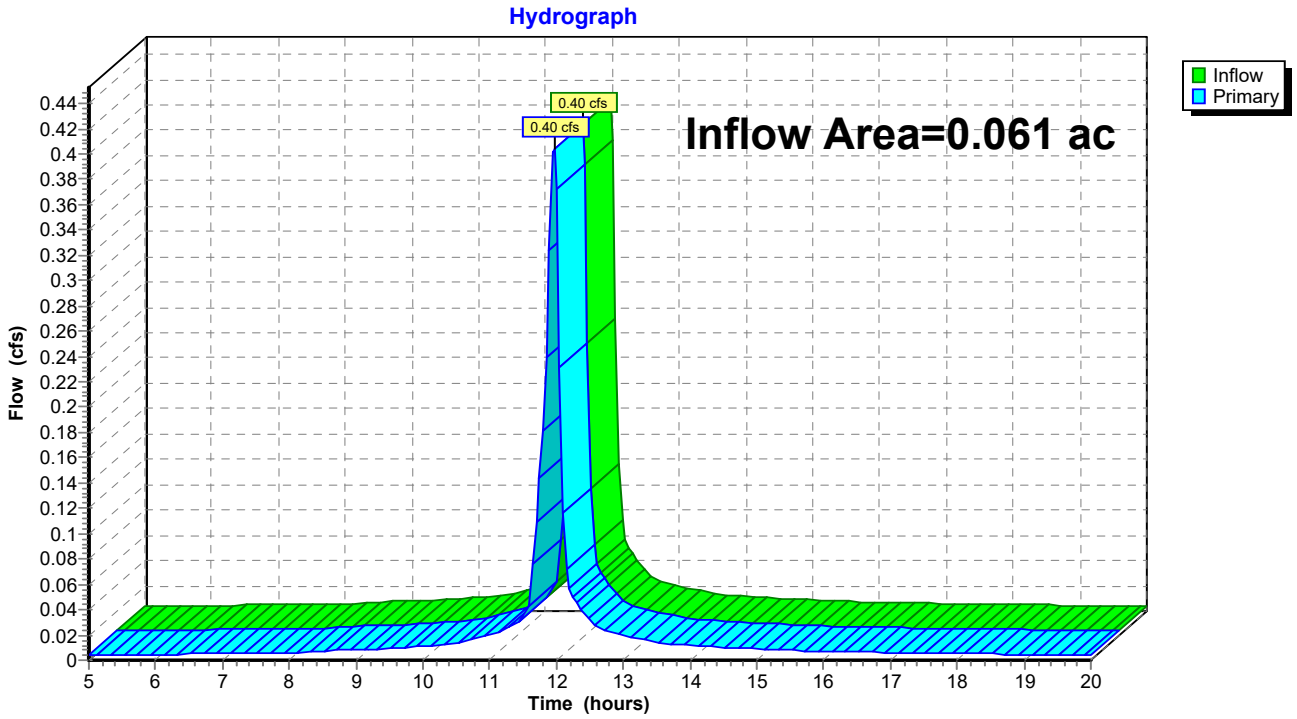


Summary for Link D: INGRAHAM STREET

Inflow Area = 0.061 ac,100.00% Impervious, Inflow Depth > 4.19" for 10-Year, 24-Hour event
Inflow = 0.40 cfs @ 11.96 hrs, Volume= 0.021 af
Primary = 0.40 cfs @ 11.96 hrs, Volume= 0.021 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link D: INGRAHAM STREET



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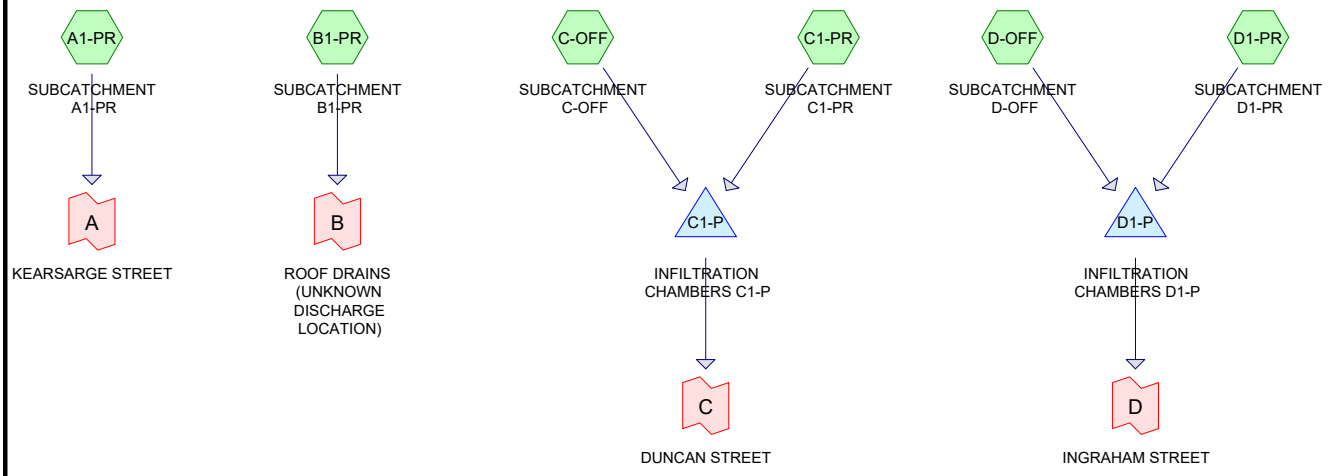
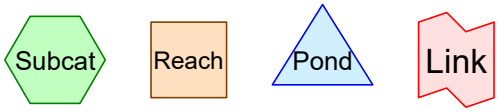




Routing Diagram for 304430-HYD-POST-10YR
Prepared by CEC, Inc., Printed 7/15/2021

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year, 24-Hour	Type II 24-hr		Default	24.00	1	3.40	2
2	10-Year, 24-Hour	Type II 24-hr		Default	24.00	1	4.80	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.092	39	>75% Grass cover, Good, HSG A (C1-PR, D1-PR)
0.347	98	Paved parking, HSG A (C-OFF, C1-PR, D-OFF, D1-PR)
0.352	98	Roofs, HSG A (B1-PR, C-OFF, D1-PR)
0.018	98	Unconnected pavement, HSG A (A1-PR)
0.005	98	Unconnected roofs, HSG A (C1-PR)
0.813	**91**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.813	HSG A	A1-PR, B1-PR, C-OFF, C1-PR, D-OFF, D1-PR
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
0.813		**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
0.092	0.000	0.000	0.000	0.000	0.092	>75% Grass cover, Good	C1-PR, D1-PR
0.347	0.000	0.000	0.000	0.000	0.347	Paved parking	C-OFF, C1-PR, D-OFF, D1-PR
0.352	0.000	0.000	0.000	0.000	0.352	Roofs	B1-PR, C-OFF, D1-PR
0.018	0.000	0.000	0.000	0.000	0.018	Unconnected pavement	A1-PR
0.005	0.000	0.000	0.000	0.000	0.005	Unconnected roofs	C1-PR
0.813	**0.000**	**0.000**	**0.000**	**0.000**	**0.813**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	C1-P	98.00	103.50	10.0	-0.5500	0.013	0.0	1.0	0.0
2	D1-P	98.00	103.75	10.0	-0.5750	0.013	0.0	1.0	0.0

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentA1-PR: SUBCATCHMENT Runoff Area=763 sf 100.00% Impervious Runoff Depth>2.93"
Tc=6.0 min CN=98 Runoff=0.08 cfs 0.004 af

SubcatchmentB1-PR: SUBCATCHMENT Runoff Area=14,205 sf 100.00% Impervious Runoff Depth>2.93"
Tc=6.0 min CN=98 Runoff=1.53 cfs 0.080 af

SubcatchmentC-OFF: SUBCATCHMENT Runoff Area=2,859 sf 100.00% Impervious Runoff Depth>2.93"
Tc=6.0 min CN=98 Runoff=0.31 cfs 0.016 af

SubcatchmentC1-PR: SUBCATCHMENT Runoff Area=10,536 sf 73.06% Impervious Runoff Depth>1.57"
Tc=6.0 min CN=82 Runoff=0.71 cfs 0.032 af

SubcatchmentD-OFF: SUBCATCHMENT Runoff Area=522 sf 100.00% Impervious Runoff Depth>2.93"
Tc=6.0 min CN=98 Runoff=0.06 cfs 0.003 af

SubcatchmentD1-PR: SUBCATCHMENT Runoff Area=6,513 sf 82.24% Impervious Runoff Depth>2.03"
Tc=6.0 min CN=88 Runoff=0.55 cfs 0.025 af

Pond C1-P: INFILTRATIONCHAMBERS C1-P Peak Elev=99.21' Storage=1,246 cf Inflow=1.01 cfs 0.048 af
Discarded=0.03 cfs 0.022 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.022 af

Pond D1-P: INFILTRATIONCHAMBERS D1-P Peak Elev=98.87' Storage=704 cf Inflow=0.60 cfs 0.028 af
Discarded=0.02 cfs 0.016 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.016 af

Link A: KEARSARGESTREET Inflow=0.08 cfs 0.004 af
Primary=0.08 cfs 0.004 af

Link B: ROOF DRAINS (UNKNOWN DISCHARGE LOCATION) Inflow=1.53 cfs 0.080 af
Primary=1.53 cfs 0.080 af

Link C: DUNCAN STREET Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link D: INGRAHAMSTREET Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 0.813 ac Runoff Volume = 0.160 af Average Runoff Depth = 2.36"
11.29% Pervious = 0.092 ac 88.71% Impervious = 0.721 ac

Summary for Subcatchment A1-PR: SUBCATCHMENT A1-PR

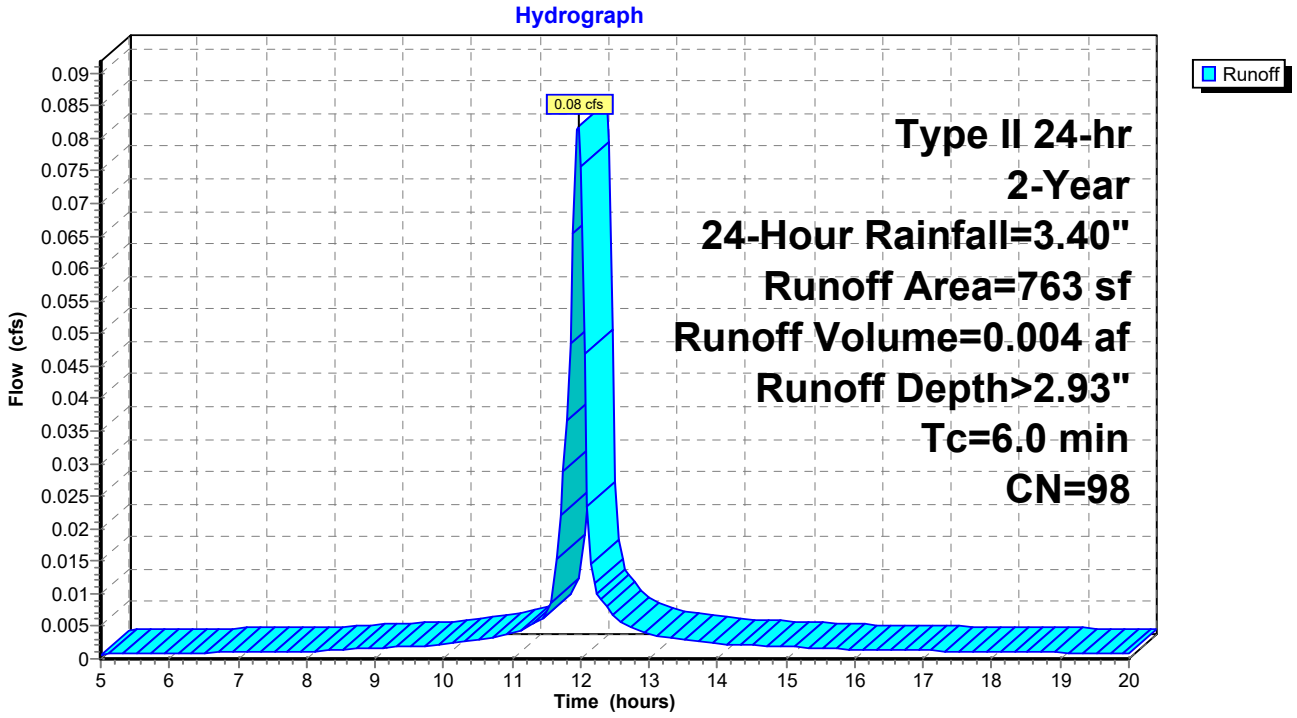
Runoff = 0.08 cfs @ 11.96 hrs, Volume= 0.004 af, Depth> 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year, 24-Hour Rainfall=3.40"

Area (sf)	CN	Description
763	98	Unconnected pavement, HSG A
763		100.00% Impervious Area
763		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment A1-PR: SUBCATCHMENT A1-PR



Summary for Subcatchment B1-PR: SUBCATCHMENT B1-PR

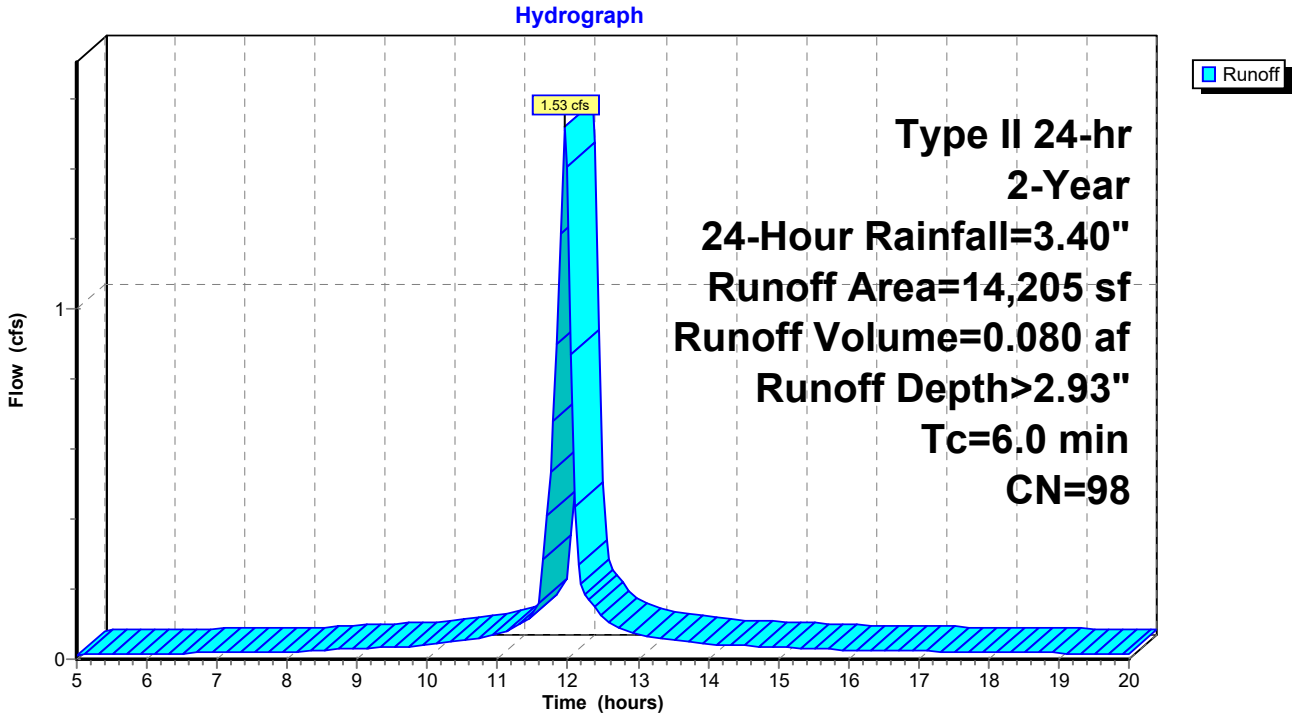
Runoff = 1.53 cfs @ 11.96 hrs, Volume= 0.080 af, Depth> 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year, 24-Hour Rainfall=3.40"

Area (sf)	CN	Description
14,205	98	Roofs, HSG A
14,205		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment B1-PR: SUBCATCHMENT B1-PR



Summary for Subcatchment C-OFF: SUBCATCHMENT C-OFF

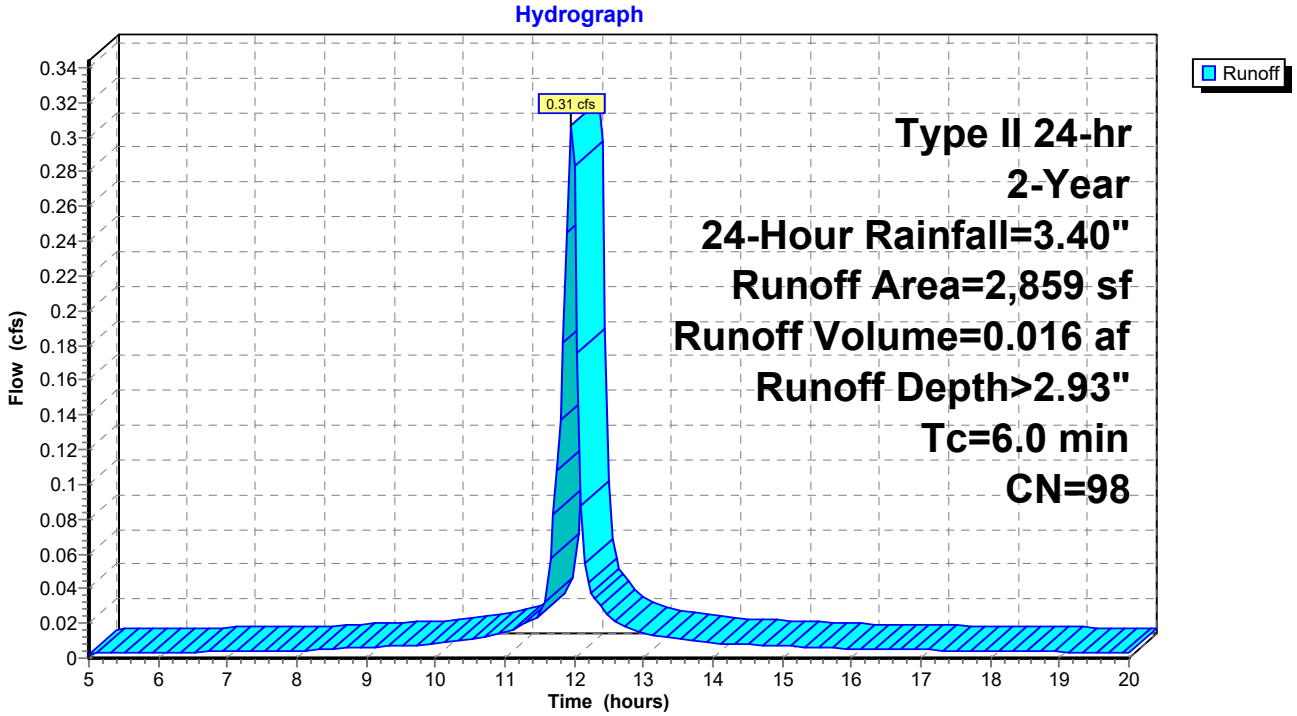
Runoff = 0.31 cfs @ 11.96 hrs, Volume= 0.016 af, Depth> 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year, 24-Hour Rainfall=3.40"

Area (sf)	CN	Description
2,636	98	Paved parking, HSG A
223	98	Roofs, HSG A
2,859	98	Weighted Average
2,859		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment C-OFF: SUBCATCHMENT C-OFF



Summary for Subcatchment C1-PR: SUBCATCHMENT C1-PR

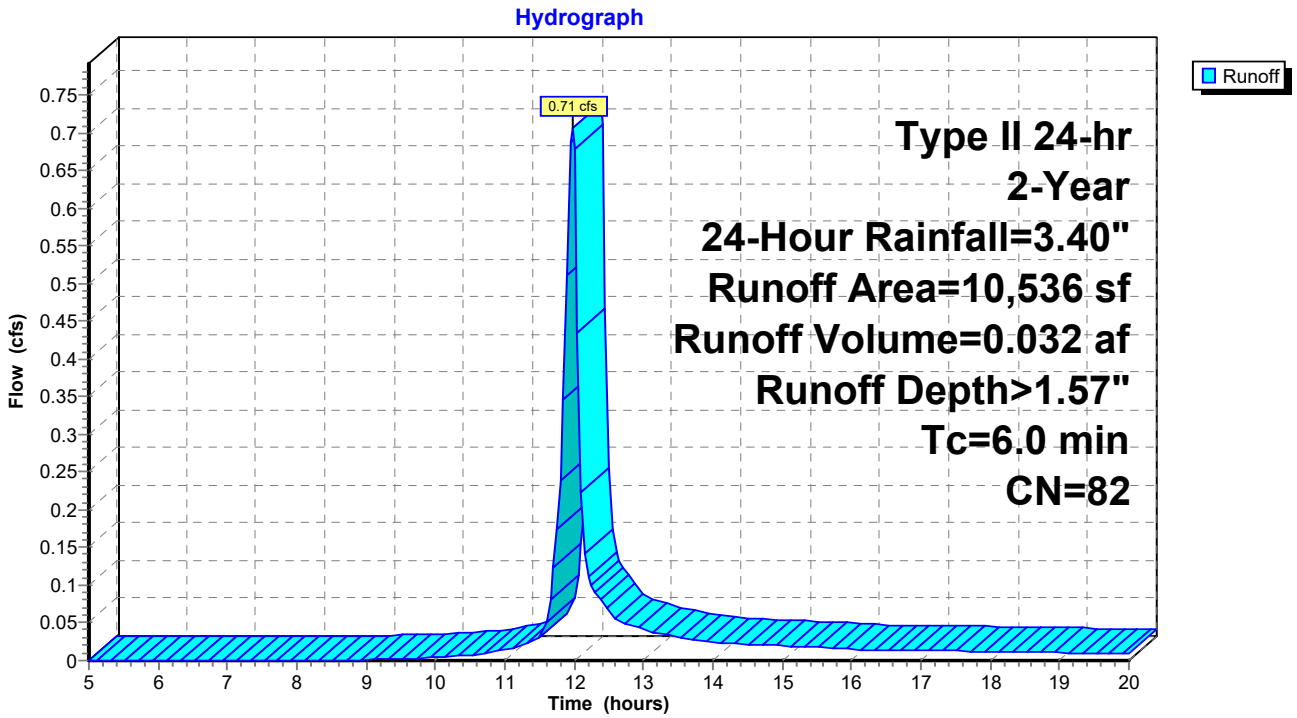
Runoff = 0.71 cfs @ 11.97 hrs, Volume= 0.032 af, Depth> 1.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year, 24-Hour Rainfall=3.40"

Area (sf)	CN	Description
7,497	98	Paved parking, HSG A
2,838	39	>75% Grass cover, Good, HSG A
201	98	Unconnected roofs, HSG A
10,536	82	Weighted Average
2,838		26.94% Pervious Area
7,698		73.06% Impervious Area
201		2.61% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment C1-PR: SUBCATCHMENT C1-PR



Summary for Subcatchment D-OFF: SUBCATCHMENT D-OFF

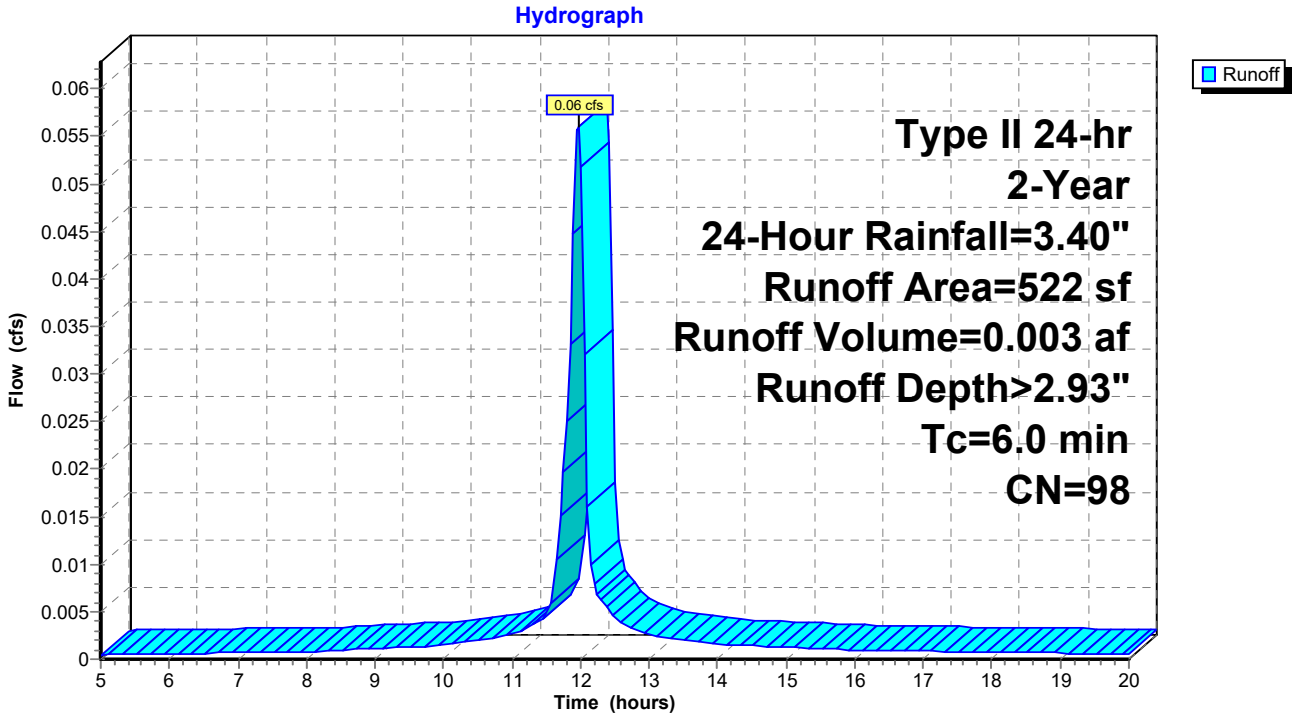
Runoff = 0.06 cfs @ 11.96 hrs, Volume= 0.003 af, Depth> 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year, 24-Hour Rainfall=3.40"

Area (sf)	CN	Description
522	98	Paved parking, HSG A
522		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment D-OFF: SUBCATCHMENT D-OFF



Summary for Subcatchment D1-PR: SUBCATCHMENT D1-PR

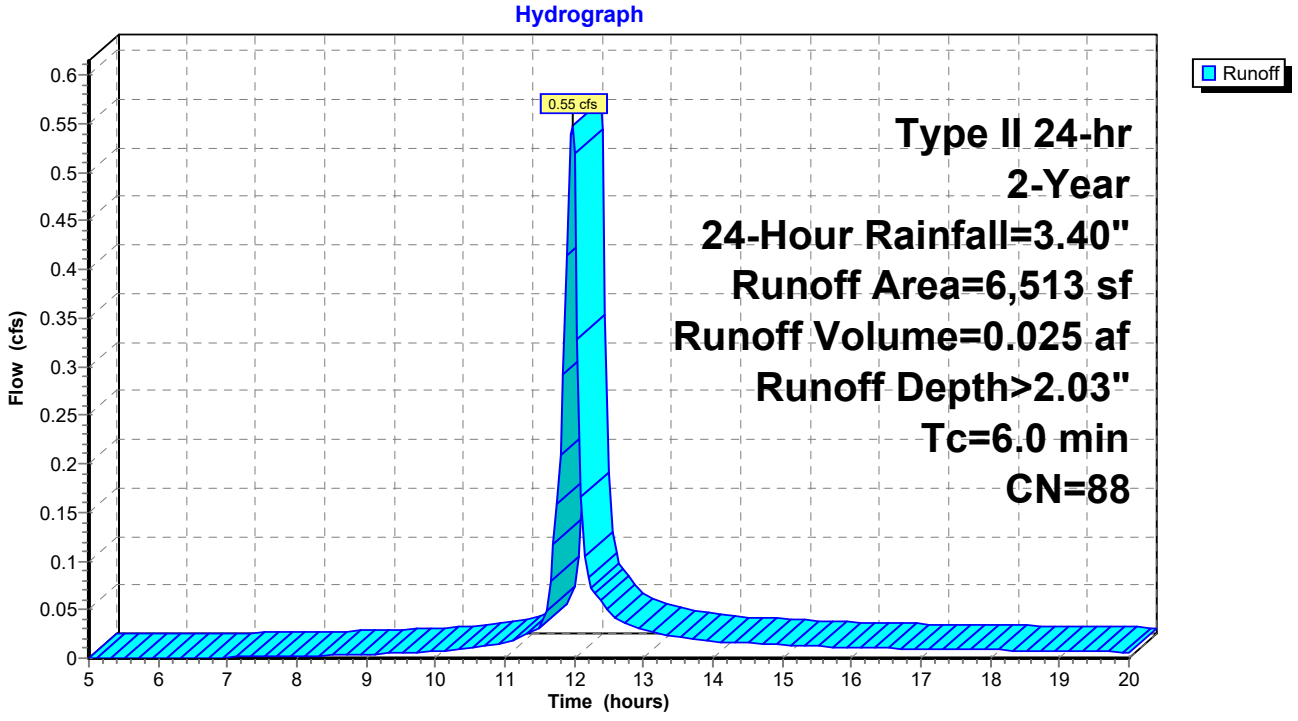
Runoff = 0.55 cfs @ 11.97 hrs, Volume= 0.025 af, Depth> 2.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year, 24-Hour Rainfall=3.40"

Area (sf)	CN	Description
4,439	98	Paved parking, HSG A
1,157	39	>75% Grass cover, Good, HSG A
917	98	Roofs, HSG A
6,513	88	Weighted Average
1,157		17.76% Pervious Area
5,356		82.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment D1-PR: SUBCATCHMENT D1-PR



Summary for Pond C1-P: INFILTRATION CHAMBERS C1-P

Inflow Area = 0.308 ac, 78.81% Impervious, Inflow Depth > 1.86" for 2-Year, 24-Hour event
Inflow = 1.01 cfs @ 11.97 hrs, Volume= 0.048 af
Outflow = 0.03 cfs @ 11.15 hrs, Volume= 0.022 af, Atten= 97%, Lag= 0.0 min
Discarded = 0.03 cfs @ 11.15 hrs, Volume= 0.022 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 99.21' @ 15.13 hrs Surf.Area= 1,096 sf Storage= 1,246 cf

Plug-Flow detention time= 193.9 min calculated for 0.022 af (47% of inflow)
Center-of-Mass det. time= 108.7 min (878.0 - 769.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	97.50'	1,020 cf	**20.50'W x 53.46'L x 3.50'H Field A** 3,836 cf Overall - 1,286 cf Embedded = 2,549 cf x 40.0% Voids
#2A	98.00'	1,286 cf	**ADS_StormTech SC-740 +Cap** x 28 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 28 Chambers in 4 Rows
		2,306 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	97.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	103.50'	**1.0" Round Culvert** L= 10.0' Ke= 0.500 Inlet / Outlet Invert= 98.00' / 103.50' S= -0.5500 '/' Cc= 0.900 n= 0.013, Flow Area= 0.01 sf

Discarded OutFlow Max=0.03 cfs @ 11.15 hrs HW=97.56' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=97.50' (Free Discharge)
↑**2=Culvert** (Controls 0.00 cfs)

Pond C1-P: INFILTRATION CHAMBERS C1-P - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

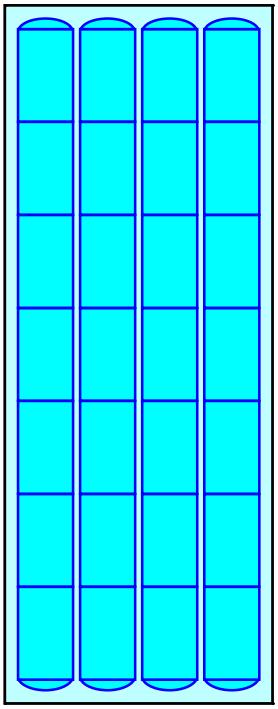
7 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 51.46' Row Length +12.0" End Stone x 2 = 53.46' Base Length
4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

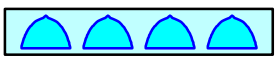
28 Chambers x 45.9 cf = 1,286.3 cf Chamber Storage

3,835.5 cf Field - 1,286.3 cf Chambers = 2,549.2 cf Stone x 40.0% Voids = 1,019.7 cf Stone Storage

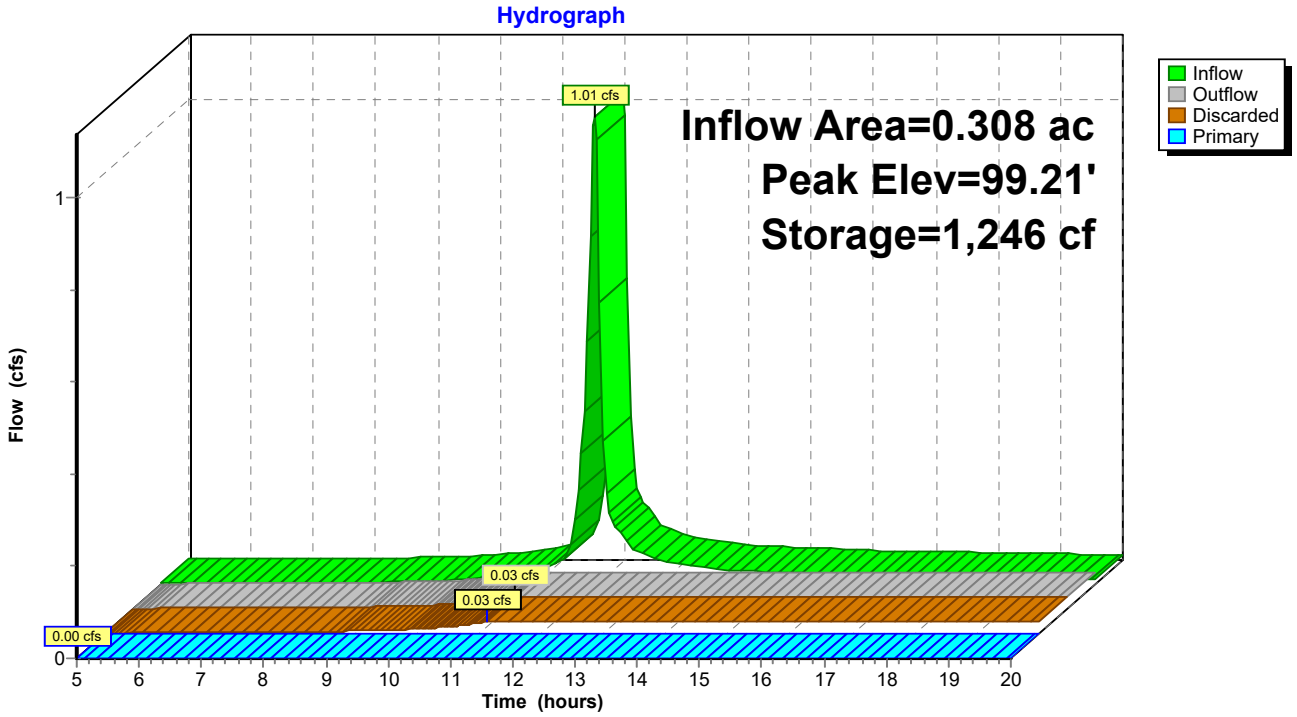
Chamber Storage + Stone Storage = 2,306.0 cf = 0.053 af
Overall Storage Efficiency = 60.1%
Overall System Size = 53.46' x 20.50' x 3.50'

28 Chambers
142.1 cy Field
94.4 cy Stone





Pond C1-P: INFILTRATION CHAMBERS C1-P



Summary for Pond D1-P: INFILTRATION CHAMBERS D1-P

Inflow Area = 0.162 ac, 83.55% Impervious, Inflow Depth > 2.09" for 2-Year, 24-Hour event
Inflow = 0.60 cfs @ 11.97 hrs, Volume= 0.028 af
Outflow = 0.02 cfs @ 11.25 hrs, Volume= 0.016 af, Atten= 97%, Lag= 0.0 min
Discarded = 0.02 cfs @ 11.25 hrs, Volume= 0.016 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 98.87' @ 14.01 hrs Surf.Area= 804 sf Storage= 704 cf

Plug-Flow detention time= 197.7 min calculated for 0.016 af (56% of inflow)
Center-of-Mass det. time= 122.9 min (890.5 - 767.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	97.50'	758 cf	**20.50'W x 39.22'L x 3.50'H Field A** 2,814 cf Overall - 919 cf Embedded = 1,895 cf x 40.0% Voids
#2A	98.00'	919 cf	**ADS_StormTech SC-740 +Cap** x 20 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 20 Chambers in 4 Rows
		1,677 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	97.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	103.75'	**1.0" Round Culvert** L= 10.0' Ke= 0.500 Inlet / Outlet Invert= 98.00' / 103.75' S= -0.5750 '/' Cc= 0.900 n= 0.013, Flow Area= 0.01 sf

Discarded OutFlow Max=0.02 cfs @ 11.25 hrs HW=97.56' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=97.50' (Free Discharge)
↑—**2=Culvert** (Controls 0.00 cfs)

Pond D1-P: INFILTRATION CHAMBERS D1-P - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

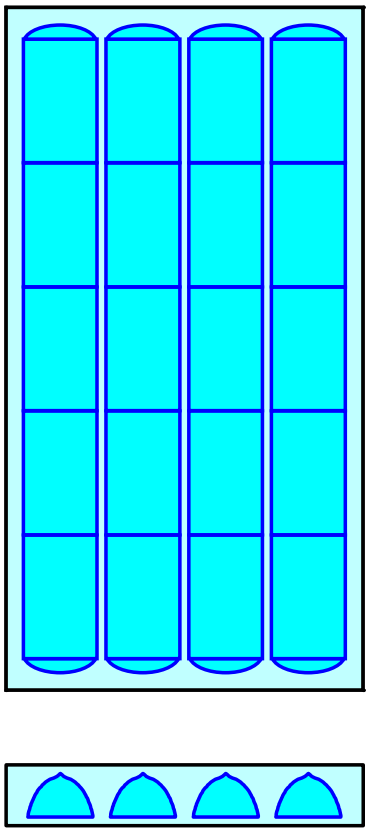
5 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 37.22' Row Length +12.0" End Stone x 2 = 39.22' Base Length
4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

20 Chambers x 45.9 cf = 918.8 cf Chamber Storage

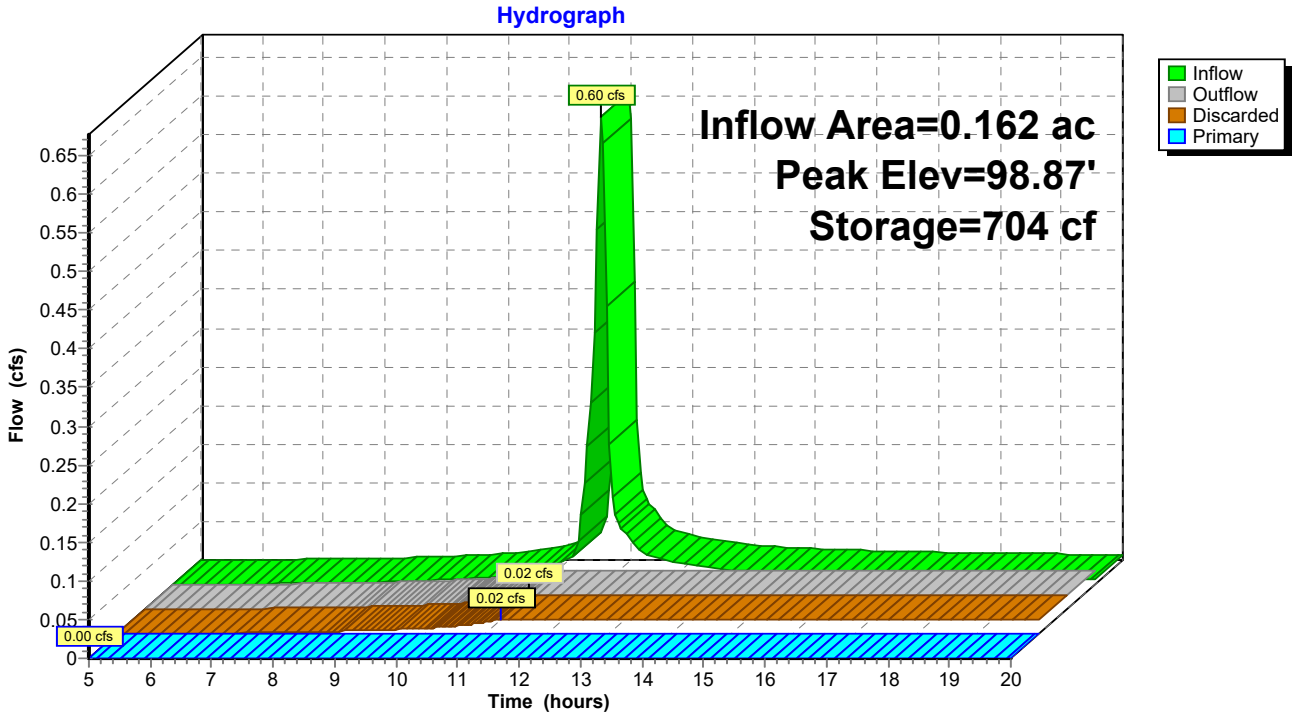
2,813.8 cf Field - 918.8 cf Chambers = 1,895.0 cf Stone x 40.0% Voids = 758.0 cf Stone Storage

Chamber Storage + Stone Storage = 1,676.8 cf = 0.038 af
Overall Storage Efficiency = 59.6%
Overall System Size = 39.22' x 20.50' x 3.50'

20 Chambers
104.2 cy Field
70.2 cy Stone



Pond D1-P: INFILTRATION CHAMBERS D1-P

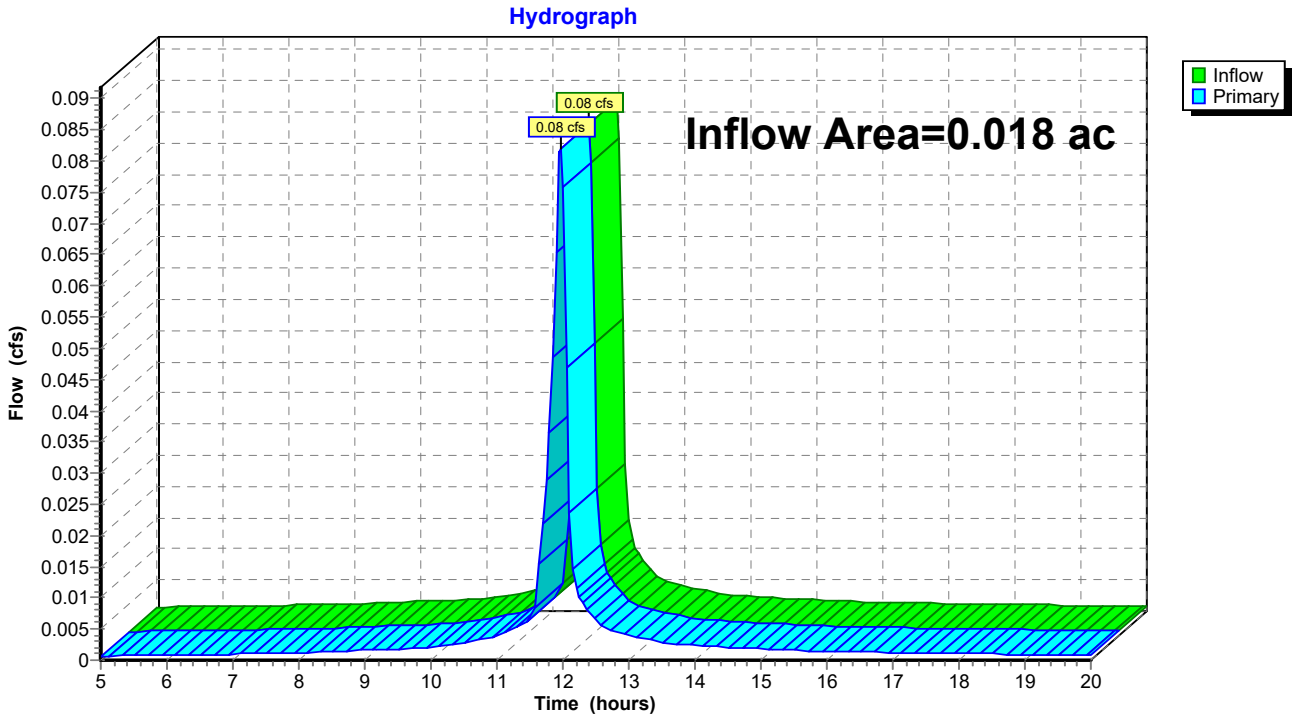


Summary for Link A: KEARSARGE STREET

Inflow Area = 0.018 ac,100.00% Impervious, Inflow Depth > 2.93" for 2-Year, 24-Hour event
Inflow = 0.08 cfs @ 11.96 hrs, Volume= 0.004 af
Primary = 0.08 cfs @ 11.96 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link A: KEARSARGE STREET

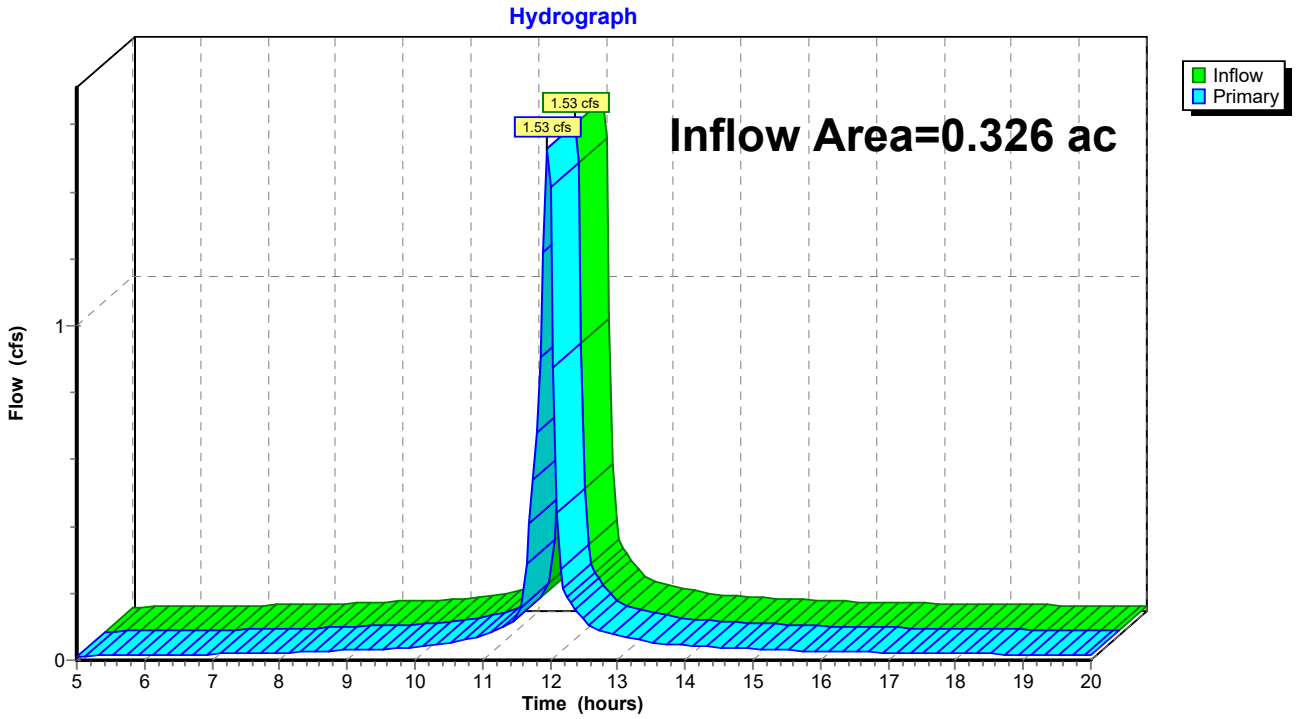


Summary for Link B: ROOF DRAINS (UNKNOWN DISCHARGE LOCATION)

Inflow Area = 0.326 ac,100.00% Impervious, Inflow Depth > 2.93" for 2-Year, 24-Hour event
Inflow = 1.53 cfs @ 11.96 hrs, Volume= 0.080 af
Primary = 1.53 cfs @ 11.96 hrs, Volume= 0.080 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link B: ROOF DRAINS (UNKNOWN DISCHARGE LOCATION)

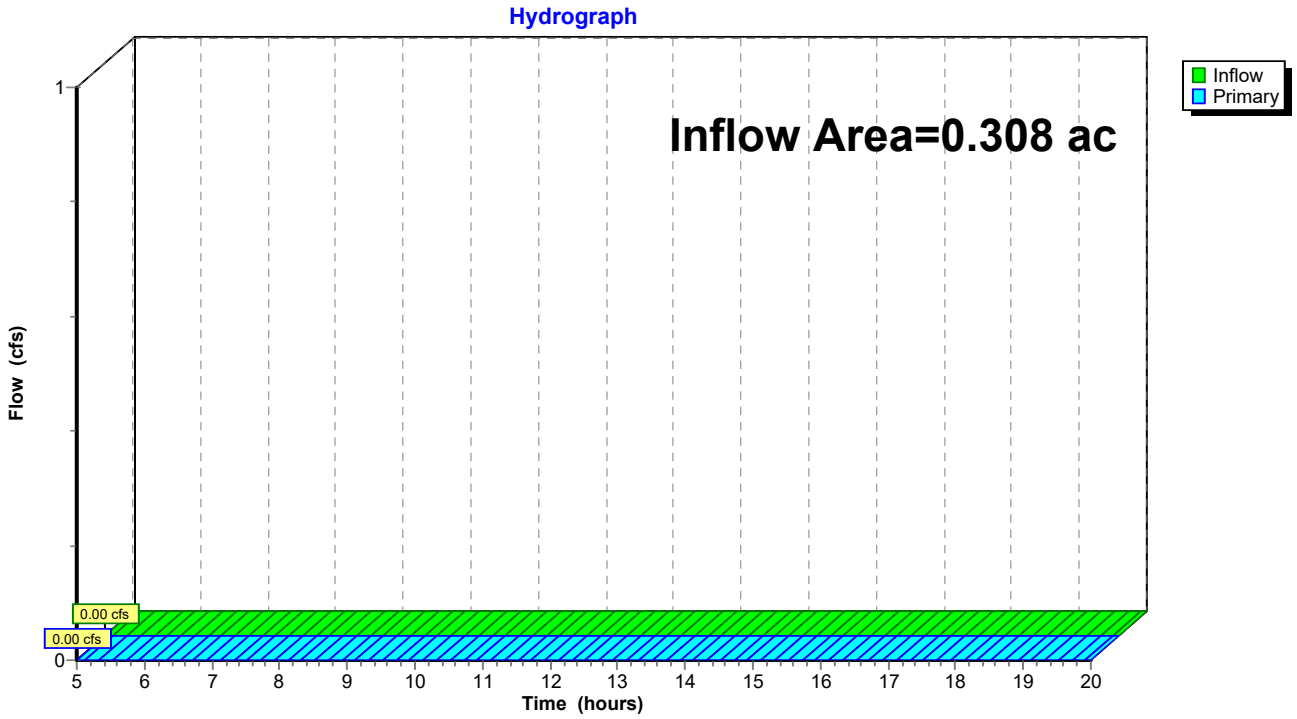


Summary for Link C: DUNCAN STREET

Inflow Area = 0.308 ac, 78.81% Impervious, Inflow Depth = 0.00" for 2-Year, 24-Hour event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link C: DUNCAN STREET

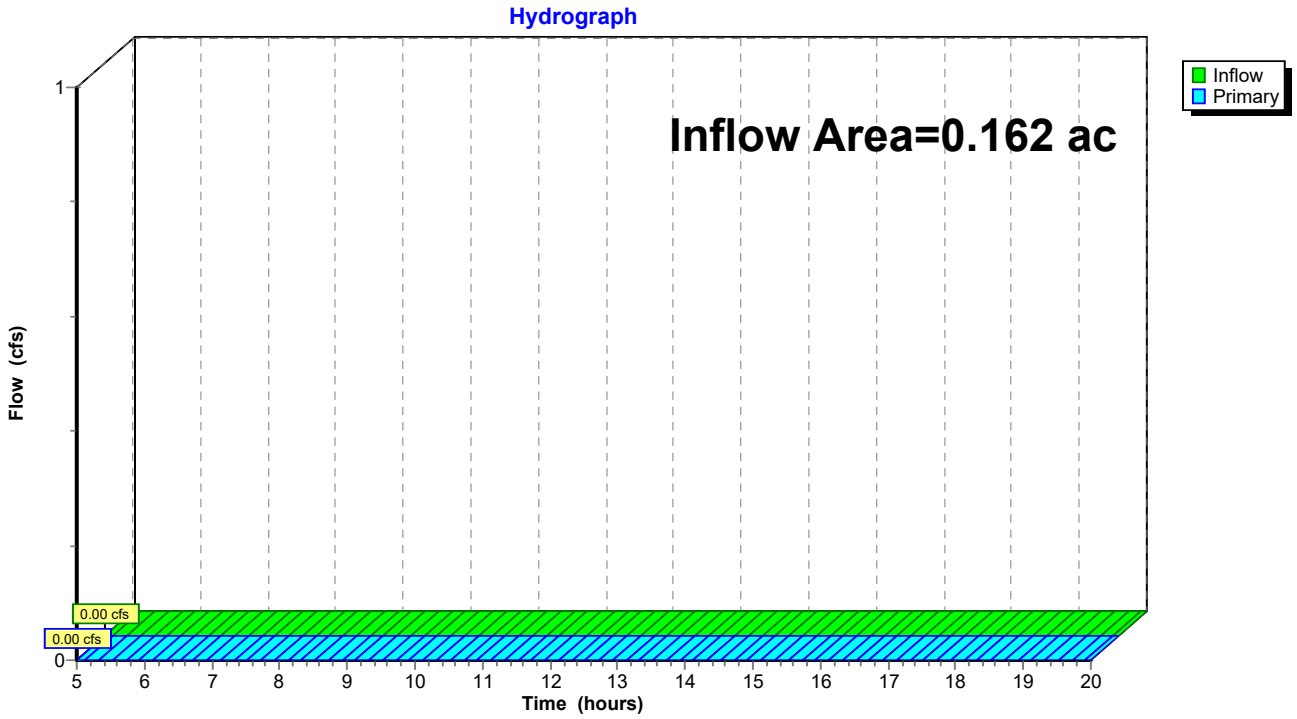


Summary for Link D: INGRAHAM STREET

Inflow Area = 0.162 ac, 83.55% Impervious, Inflow Depth = 0.00" for 2-Year, 24-Hour event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link D: INGRAHAM STREET



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentA1-PR: SUBCATCHMENT Runoff Area=763 sf 100.00% Impervious Runoff Depth>4.19"
Tc=6.0 min CN=98 Runoff=0.12 cfs 0.006 af

SubcatchmentB1-PR: SUBCATCHMENT Runoff Area=14,205 sf 100.00% Impervious Runoff Depth>4.19"
Tc=6.0 min CN=98 Runoff=2.17 cfs 0.114 af

SubcatchmentC-OFF: SUBCATCHMENT Runoff Area=2,859 sf 100.00% Impervious Runoff Depth>4.19"
Tc=6.0 min CN=98 Runoff=0.44 cfs 0.023 af

SubcatchmentC1-PR: SUBCATCHMENT Runoff Area=10,536 sf 73.06% Impervious Runoff Depth>2.69"
Tc=6.0 min CN=82 Runoff=1.19 cfs 0.054 af

SubcatchmentD-OFF: SUBCATCHMENT Runoff Area=522 sf 100.00% Impervious Runoff Depth>4.19"
Tc=6.0 min CN=98 Runoff=0.08 cfs 0.004 af

SubcatchmentD1-PR: SUBCATCHMENT Runoff Area=6,513 sf 82.24% Impervious Runoff Depth>3.26"
Tc=6.0 min CN=88 Runoff=0.86 cfs 0.041 af

Pond C1-P: INFILTRATIONCHAMBERS C1-P Peak Elev=103.58' Storage=2,306 cf Inflow=1.63 cfs 0.077 af
Discarded=0.03 cfs 0.025 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.025 af

Pond D1-P: INFILTRATIONCHAMBERS D1-P Peak Elev=99.86' Storage=1,251 cf Inflow=0.94 cfs 0.045 af
Discarded=0.02 cfs 0.018 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.018 af

Link A: KEARSARGESTREET Inflow=0.12 cfs 0.006 af
Primary=0.12 cfs 0.006 af

Link B: ROOF DRAINS (UNKNOWN DISCHARGE LOCATION) Inflow=2.17 cfs 0.114 af
Primary=2.17 cfs 0.114 af

Link C: DUNCAN STREET Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link D: INGRAHAMSTREET Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 0.813 ac Runoff Volume = 0.242 af Average Runoff Depth = 3.57"
11.29% Pervious = 0.092 ac 88.71% Impervious = 0.721 ac

Summary for Subcatchment A1-PR: SUBCATCHMENT A1-PR

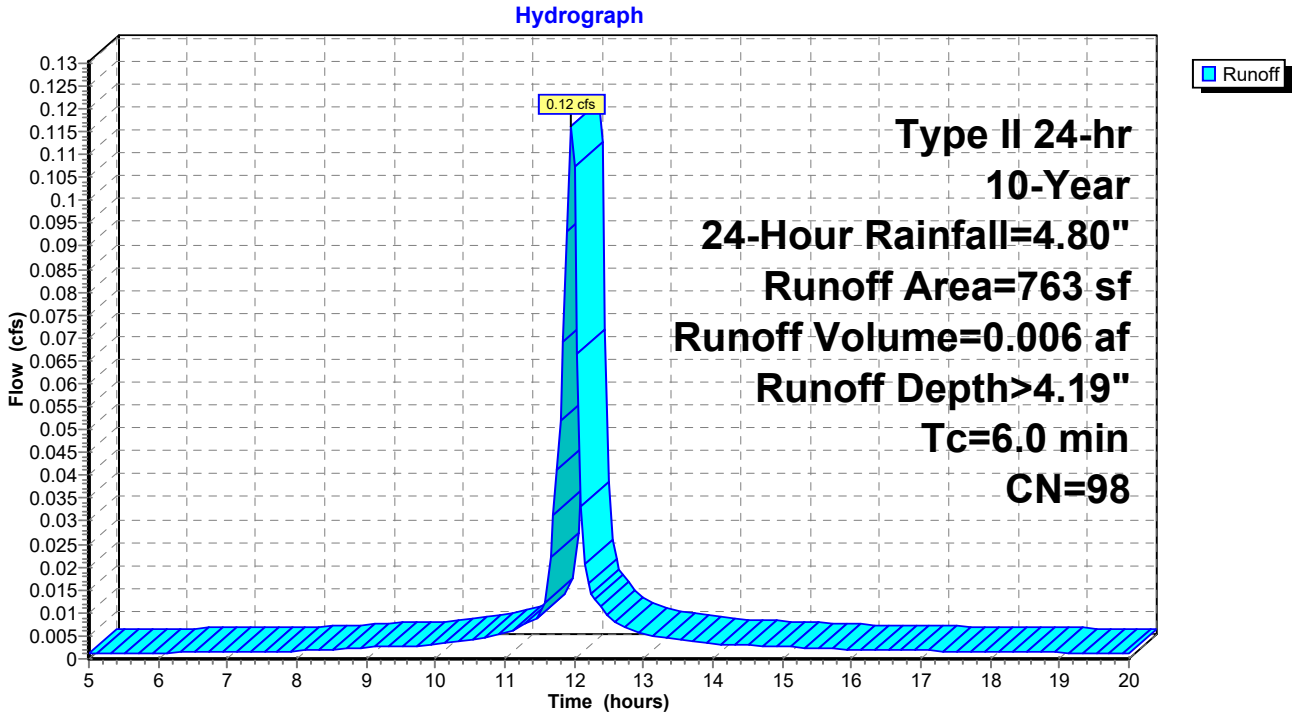
Runoff = 0.12 cfs @ 11.96 hrs, Volume= 0.006 af, Depth> 4.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year, 24-Hour Rainfall=4.80"

Area (sf)	CN	Description
763	98	Unconnected pavement, HSG A
763		100.00% Impervious Area
763		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment A1-PR: SUBCATCHMENT A1-PR



Summary for Subcatchment B1-PR: SUBCATCHMENT B1-PR

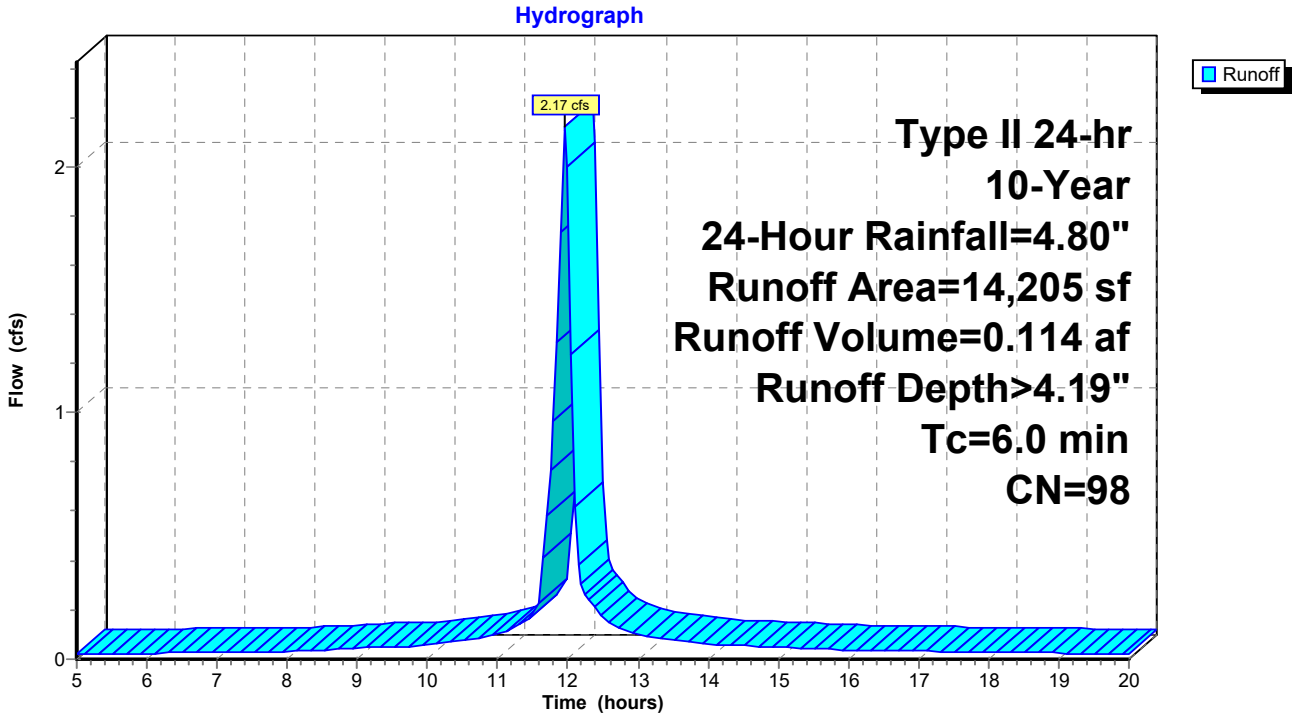
Runoff = 2.17 cfs @ 11.96 hrs, Volume= 0.114 af, Depth> 4.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year, 24-Hour Rainfall=4.80"

Area (sf)	CN	Description
14,205	98	Roofs, HSG A
14,205		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment B1-PR: SUBCATCHMENT B1-PR



Summary for Subcatchment C-OFF: SUBCATCHMENT C-OFF

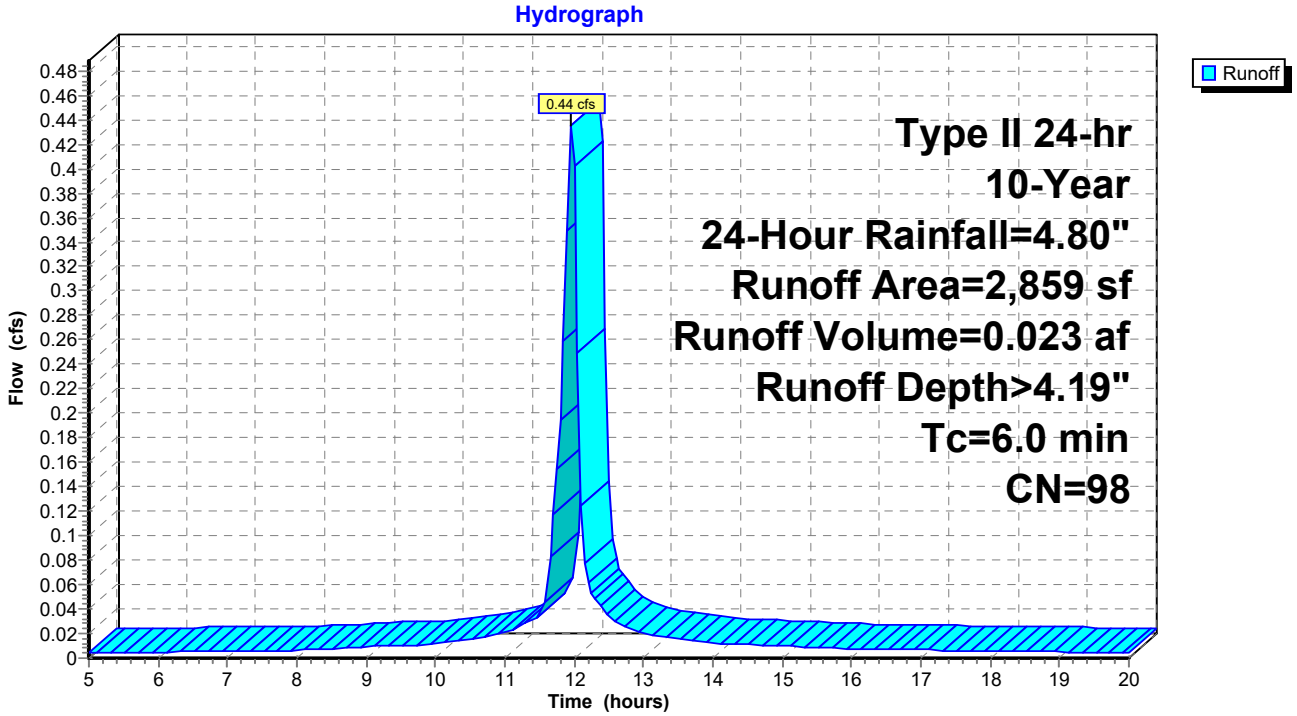
Runoff = 0.44 cfs @ 11.96 hrs, Volume= 0.023 af, Depth> 4.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year, 24-Hour Rainfall=4.80"

Area (sf)	CN	Description
2,636	98	Paved parking, HSG A
223	98	Roofs, HSG A
2,859	98	Weighted Average
2,859		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment C-OFF: SUBCATCHMENT C-OFF



Summary for Subcatchment C1-PR: SUBCATCHMENT C1-PR

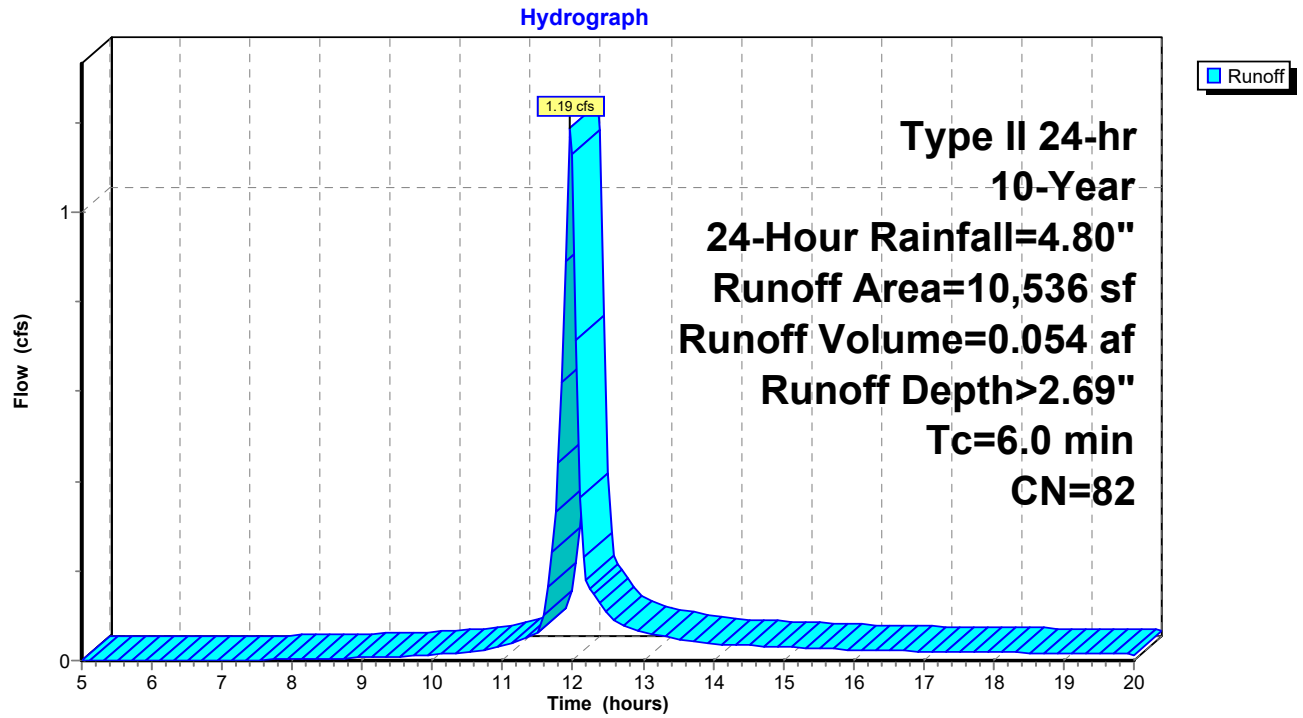
Runoff = 1.19 cfs @ 11.97 hrs, Volume= 0.054 af, Depth> 2.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year, 24-Hour Rainfall=4.80"

Area (sf)	CN	Description
7,497	98	Paved parking, HSG A
2,838	39	>75% Grass cover, Good, HSG A
201	98	Unconnected roofs, HSG A
10,536	82	Weighted Average
2,838		26.94% Pervious Area
7,698		73.06% Impervious Area
201		2.61% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment C1-PR: SUBCATCHMENT C1-PR



Summary for Subcatchment D-OFF: SUBCATCHMENT D-OFF

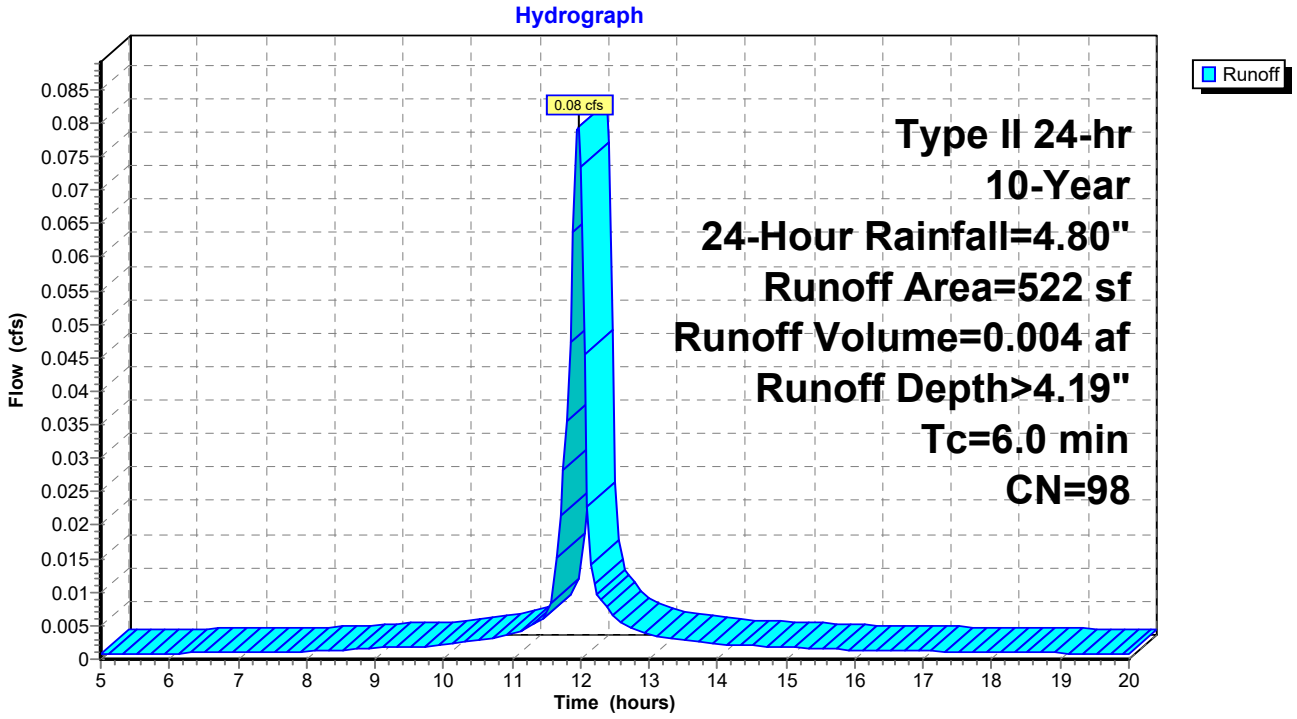
Runoff = 0.08 cfs @ 11.96 hrs, Volume= 0.004 af, Depth> 4.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year, 24-Hour Rainfall=4.80"

Area (sf)	CN	Description
522	98	Paved parking, HSG A
522		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment D-OFF: SUBCATCHMENT D-OFF



Summary for Subcatchment D1-PR: SUBCATCHMENT D1-PR

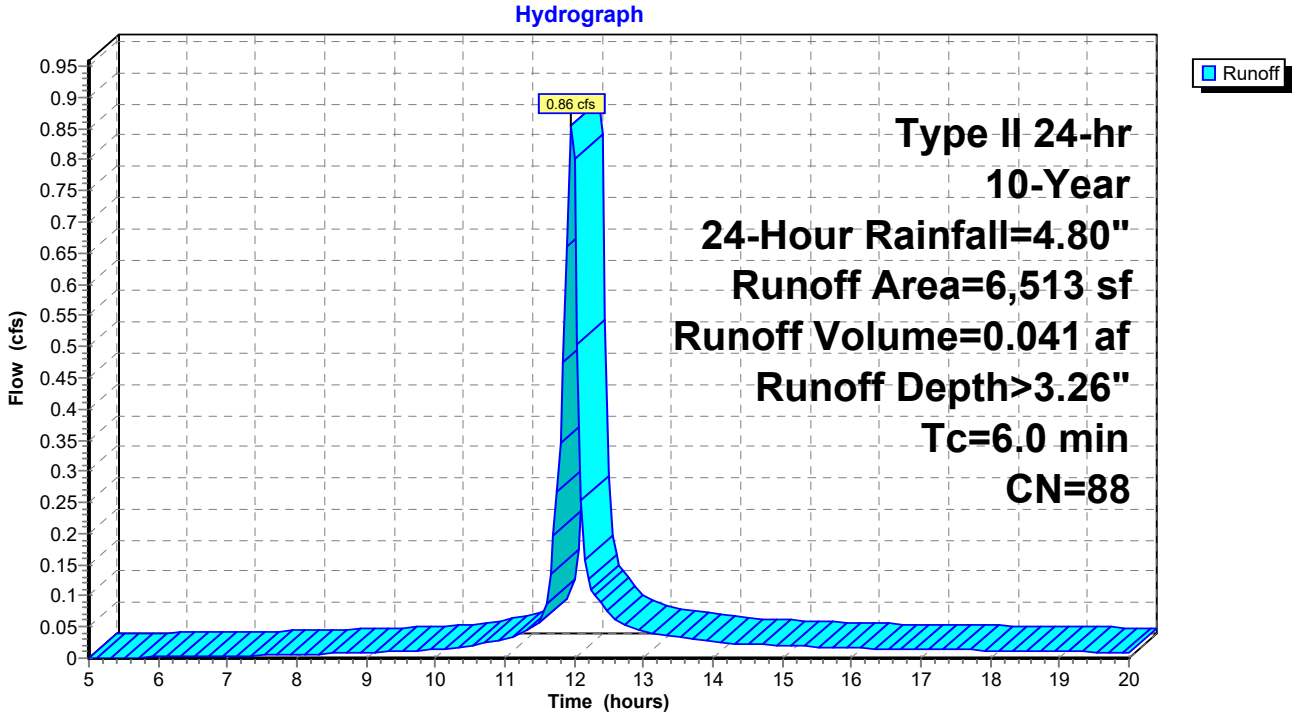
Runoff = 0.86 cfs @ 11.97 hrs, Volume= 0.041 af, Depth> 3.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year, 24-Hour Rainfall=4.80"

Area (sf)	CN	Description
4,439	98	Paved parking, HSG A
1,157	39	>75% Grass cover, Good, HSG A
917	98	Roofs, HSG A
6,513	88	Weighted Average
1,157		17.76% Pervious Area
5,356		82.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

Subcatchment D1-PR: SUBCATCHMENT D1-PR



Summary for Pond C1-P: INFILTRATION CHAMBERS C1-P

Inflow Area = 0.308 ac, 78.81% Impervious, Inflow Depth > 3.01" for 10-Year, 24-Hour event
Inflow = 1.63 cfs @ 11.97 hrs, Volume= 0.077 af
Outflow = 0.03 cfs @ 16.61 hrs, Volume= 0.025 af, Atten= 98%, Lag= 278.5 min
Discarded = 0.03 cfs @ 10.35 hrs, Volume= 0.025 af
Primary = 0.00 cfs @ 16.61 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 103.58' @ 16.60 hrs Surf.Area= 1,096 sf Storage= 2,306 cf

Plug-Flow detention time= 183.7 min calculated for 0.025 af (32% of inflow)
Center-of-Mass det. time= 82.3 min (844.7 - 762.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	97.50'	1,020 cf	**20.50'W x 53.46'L x 3.50'H Field A** 3,836 cf Overall - 1,286 cf Embedded = 2,549 cf x 40.0% Voids
#2A	98.00'	1,286 cf	**ADS_StormTech SC-740 +Cap** x 28 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 28 Chambers in 4 Rows
		2,306 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	97.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	103.50'	**1.0" Round Culvert** L= 10.0' Ke= 0.500 Inlet / Outlet Invert= 98.00' / 103.50' S= -0.5500 '/' Cc= 0.900 n= 0.013, Flow Area= 0.01 sf

Discarded OutFlow Max=0.03 cfs @ 10.35 hrs HW=97.56' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 16.61 hrs HW=103.58' (Free Discharge)
↑—**2=Culvert** (Outlet Controls 0.00 cfs @ 0.70 fps)

Pond C1-P: INFILTRATION CHAMBERS C1-P - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

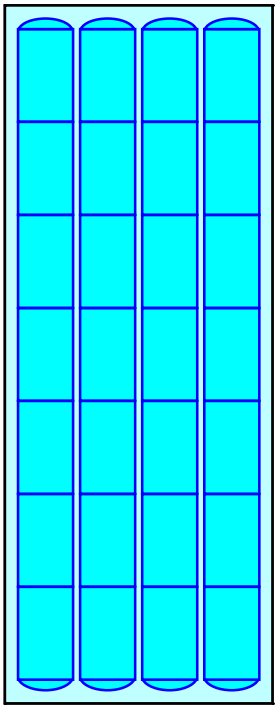
7 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 51.46' Row Length +12.0" End Stone x 2 = 53.46' Base Length
4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

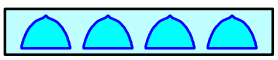
28 Chambers x 45.9 cf = 1,286.3 cf Chamber Storage

3,835.5 cf Field - 1,286.3 cf Chambers = 2,549.2 cf Stone x 40.0% Voids = 1,019.7 cf Stone Storage

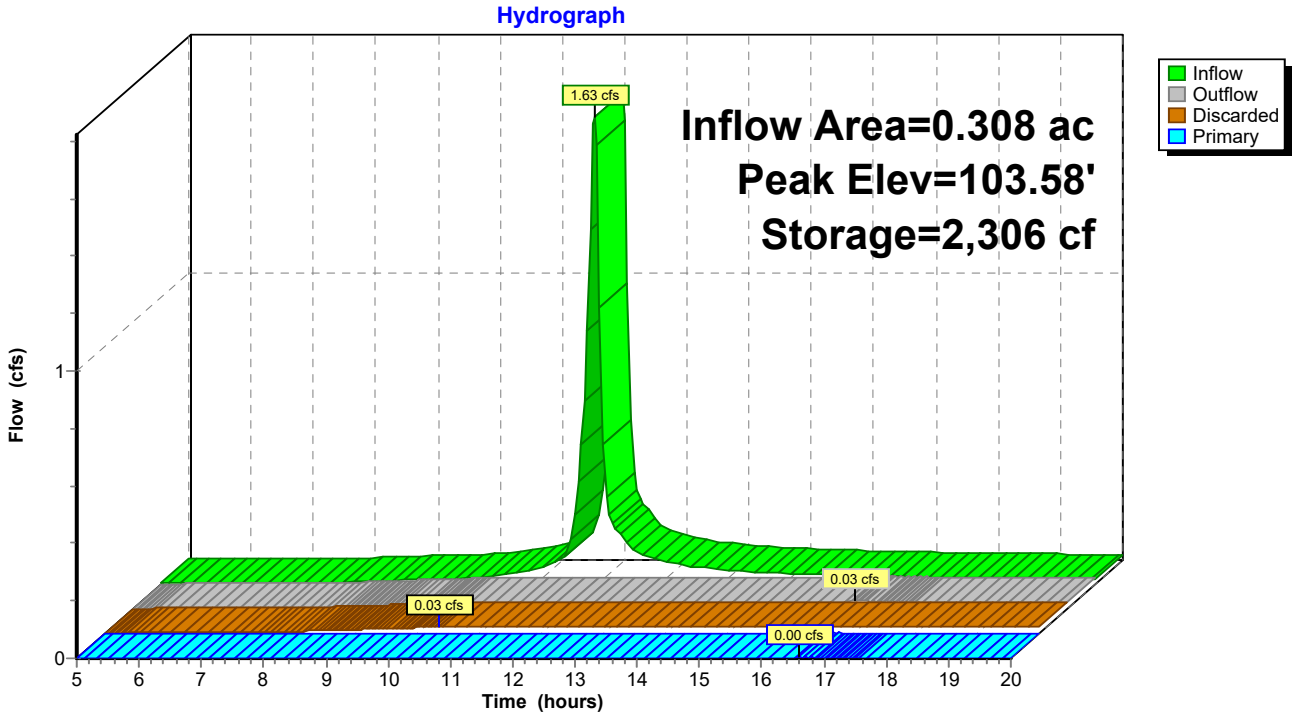
Chamber Storage + Stone Storage = 2,306.0 cf = 0.053 af
Overall Storage Efficiency = 60.1%
Overall System Size = 53.46' x 20.50' x 3.50'

28 Chambers
142.1 cy Field
94.4 cy Stone





Pond C1-P: INFILTRATION CHAMBERS C1-P



Summary for Pond D1-P: INFILTRATION CHAMBERS D1-P

Inflow Area = 0.162 ac, 83.55% Impervious, Inflow Depth > 3.33" for 10-Year, 24-Hour event
Inflow = 0.94 cfs @ 11.97 hrs, Volume= 0.045 af
Outflow = 0.02 cfs @ 10.50 hrs, Volume= 0.018 af, Atten= 98%, Lag= 0.0 min
Discarded = 0.02 cfs @ 10.50 hrs, Volume= 0.018 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 99.86' @ 15.68 hrs Surf.Area= 804 sf Storage= 1,251 cf

Plug-Flow detention time= 185.2 min calculated for 0.018 af (40% of inflow)
Center-of-Mass det. time= 94.0 min (851.8 - 757.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	97.50'	758 cf	**20.50'W x 39.22'L x 3.50'H Field A** 2,814 cf Overall - 919 cf Embedded = 1,895 cf x 40.0% Voids
#2A	98.00'	919 cf	**ADS_StormTech SC-740 +Cap** x 20 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 20 Chambers in 4 Rows
		1,677 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	97.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	103.75'	**1.0" Round Culvert** L= 10.0' Ke= 0.500 Inlet / Outlet Invert= 98.00' / 103.75' S= -0.5750 '/' Cc= 0.900 n= 0.013, Flow Area= 0.01 sf

Discarded OutFlow Max=0.02 cfs @ 10.50 hrs HW=97.56' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=97.50' (Free Discharge)
↑—**2=Culvert** (Controls 0.00 cfs)

Pond D1-P: INFILTRATION CHAMBERS D1-P - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

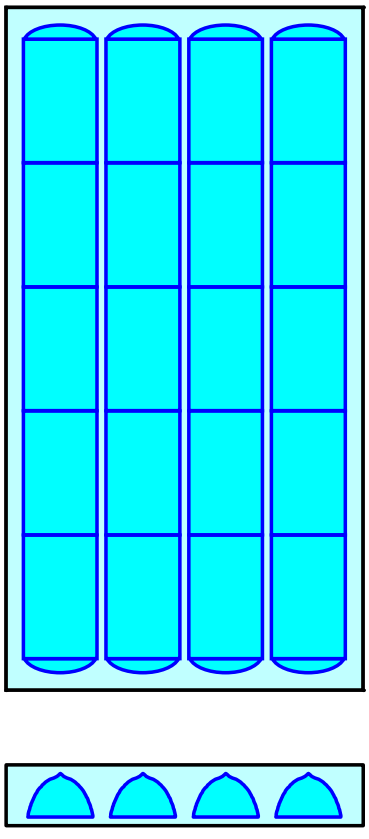
5 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 37.22' Row Length +12.0" End Stone x 2 = 39.22' Base Length
4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

20 Chambers x 45.9 cf = 918.8 cf Chamber Storage

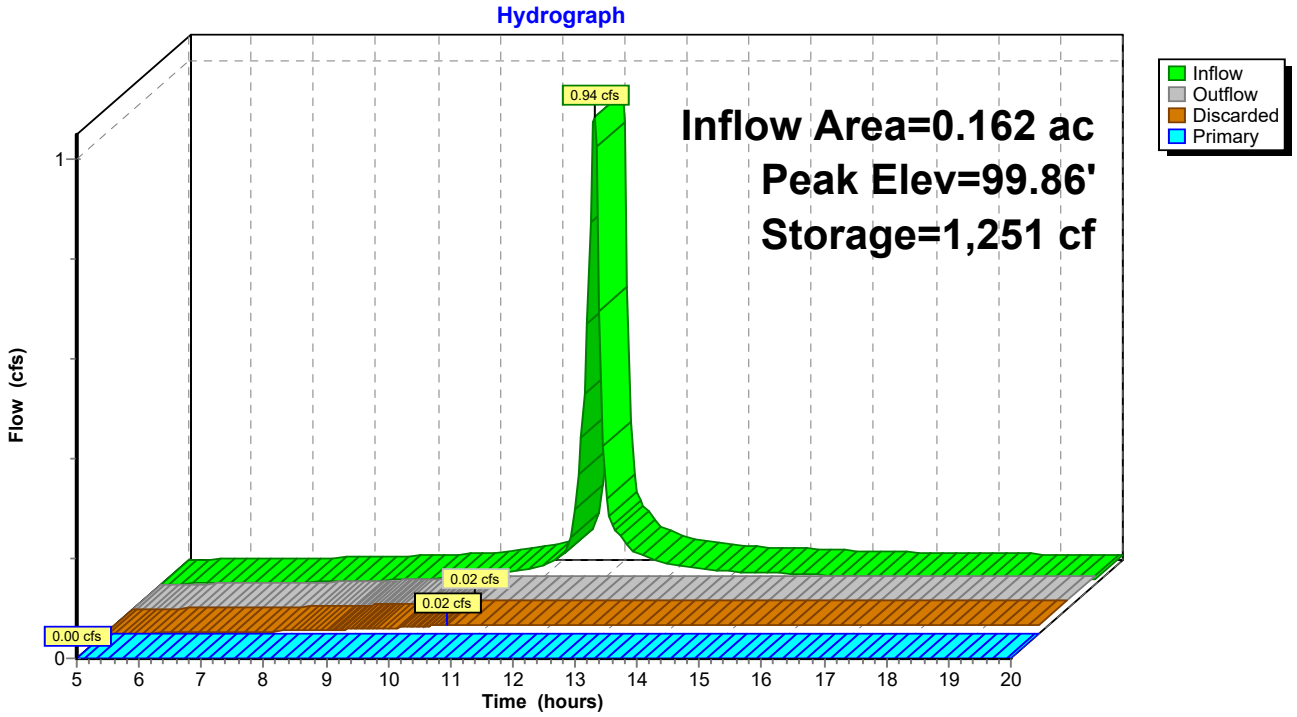
2,813.8 cf Field - 918.8 cf Chambers = 1,895.0 cf Stone x 40.0% Voids = 758.0 cf Stone Storage

Chamber Storage + Stone Storage = 1,676.8 cf = 0.038 af
Overall Storage Efficiency = 59.6%
Overall System Size = 39.22' x 20.50' x 3.50'

20 Chambers
104.2 cy Field
70.2 cy Stone



Pond D1-P: INFILTRATION CHAMBERS D1-P

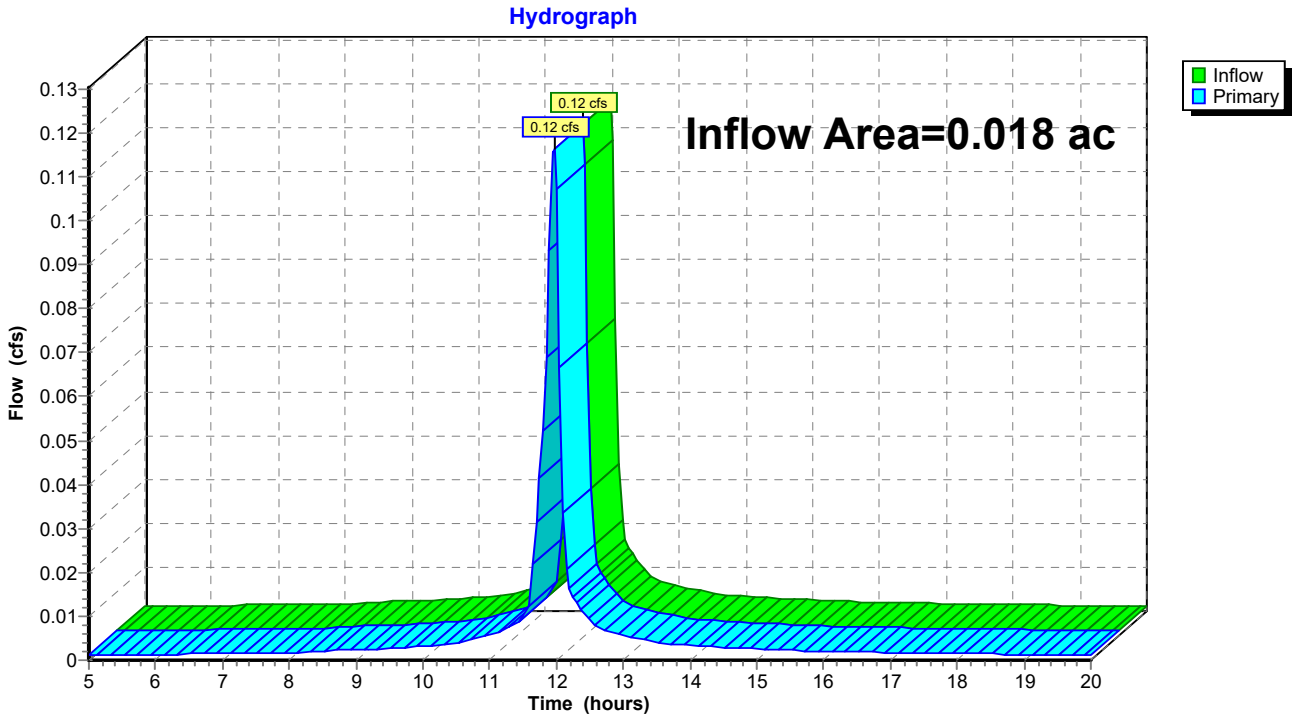


Summary for Link A: KEARSARGE STREET

Inflow Area = 0.018 ac,100.00% Impervious, Inflow Depth > 4.19" for 10-Year, 24-Hour event
Inflow = 0.12 cfs @ 11.96 hrs, Volume= 0.006 af
Primary = 0.12 cfs @ 11.96 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link A: KEARSARGE STREET

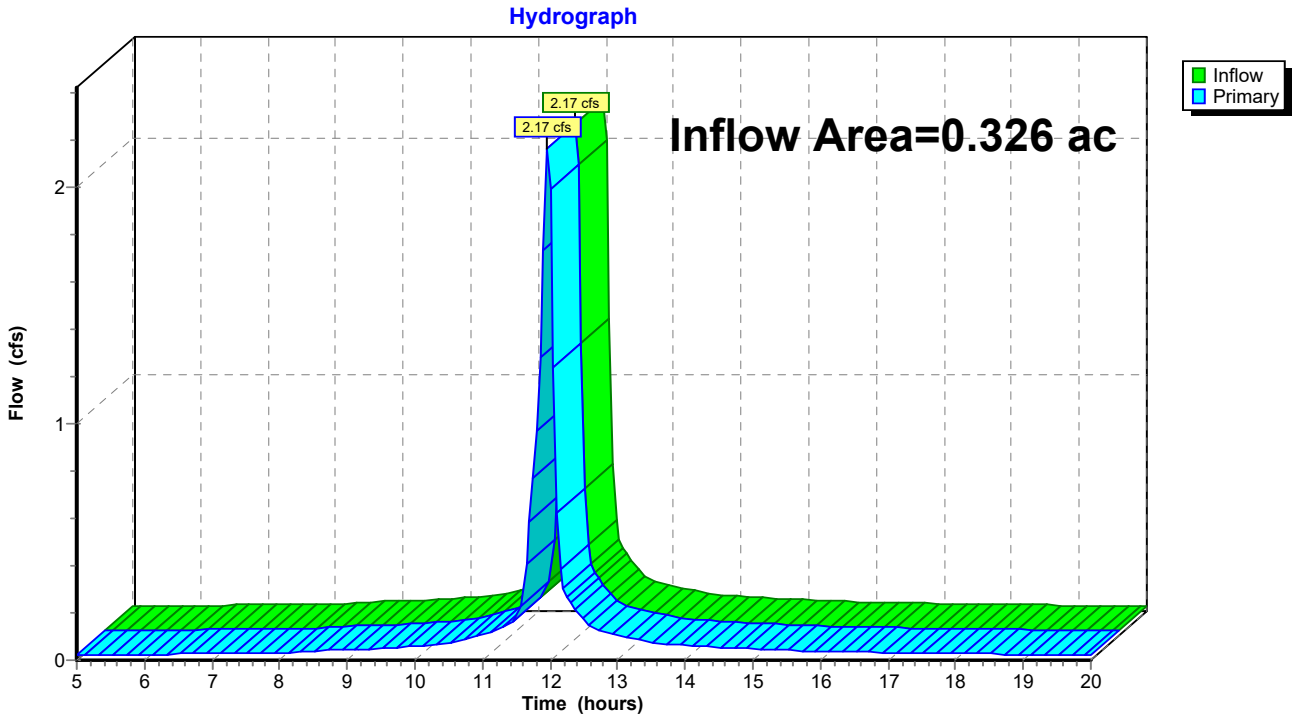


Summary for Link B: ROOF DRAINS (UNKNOWN DISCHARGE LOCATION)

Inflow Area = 0.326 ac,100.00% Impervious, Inflow Depth > 4.19" for 10-Year, 24-Hour event
Inflow = 2.17 cfs @ 11.96 hrs, Volume= 0.114 af
Primary = 2.17 cfs @ 11.96 hrs, Volume= 0.114 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link B: ROOF DRAINS (UNKNOWN DISCHARGE LOCATION)

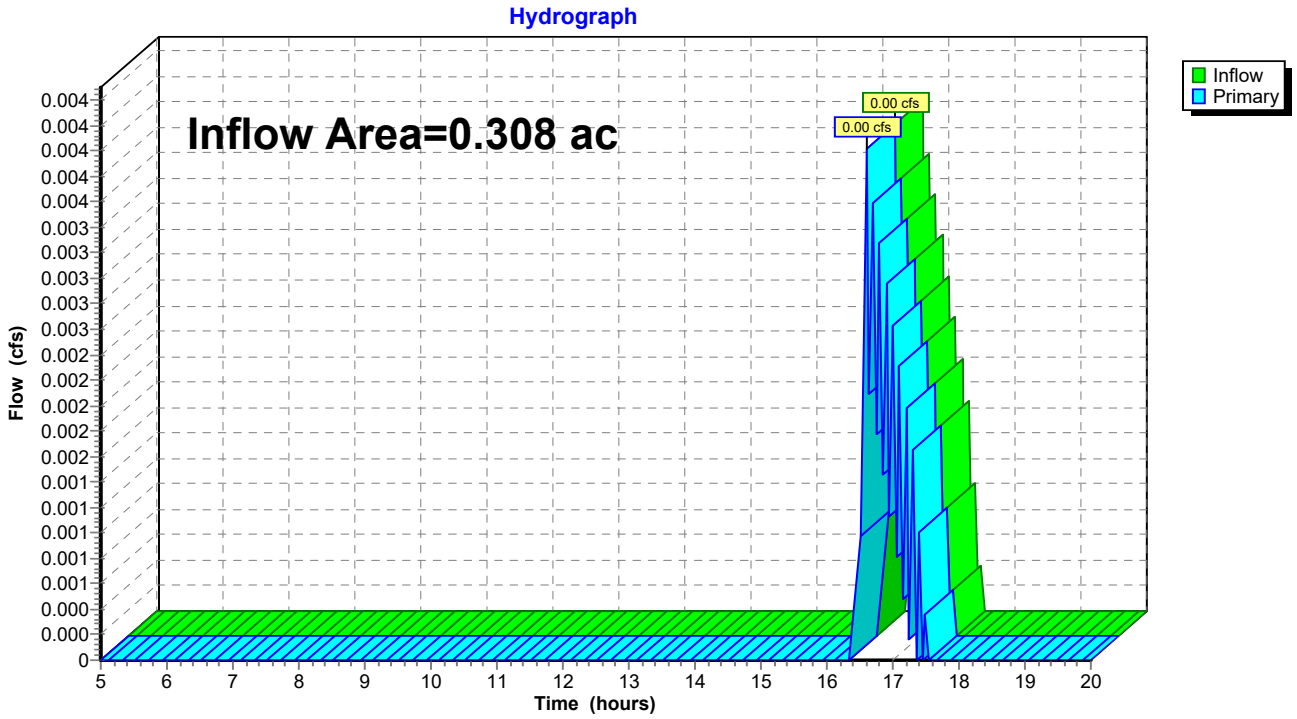


Summary for Link C: DUNCAN STREET

Inflow Area = 0.308 ac, 78.81% Impervious, Inflow Depth = 0.01" for 10-Year, 24-Hour event
Inflow = 0.00 cfs @ 16.61 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 16.61 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link C: DUNCAN STREET

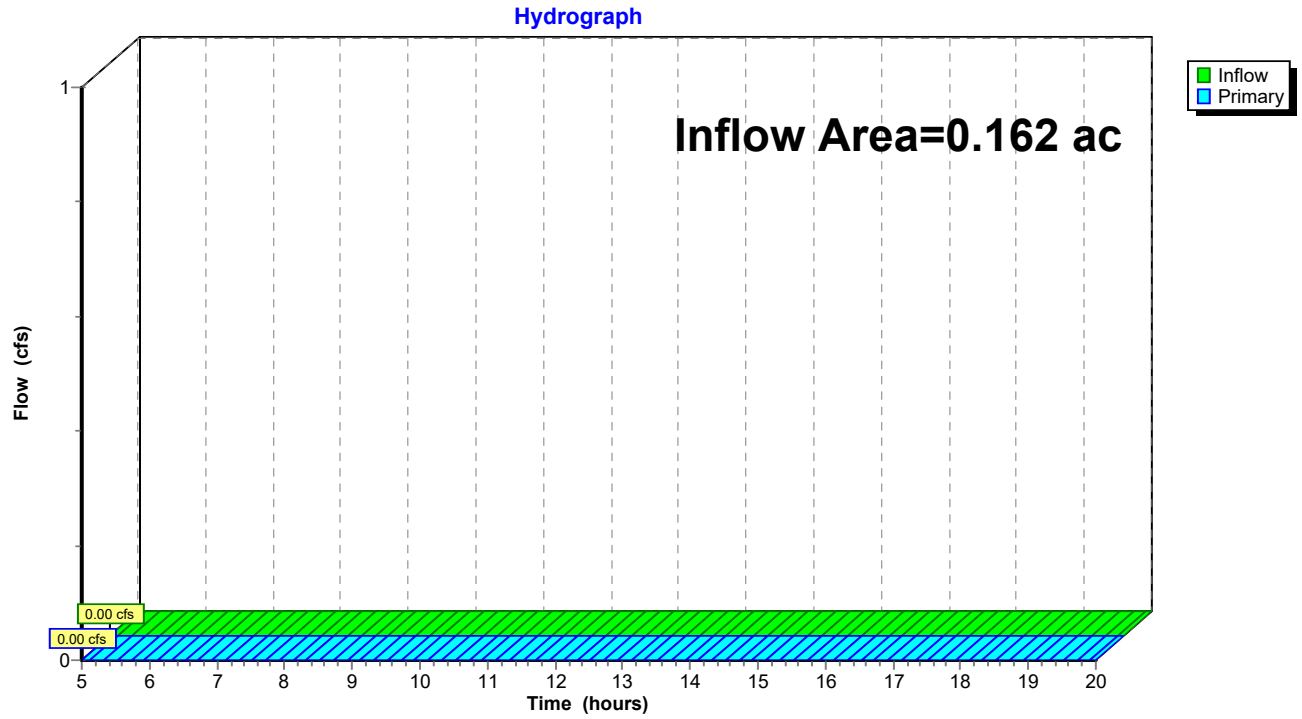


Summary for Link D: INGRAHAM STREET

Inflow Area = 0.162 ac, 83.55% Impervious, Inflow Depth = 0.00" for 10-Year, 24-Hour event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link D: INGRAHAM STREET



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TSS Calculations

INSTRUCTIONS:

Version 1, Automated: Mar. 4, 2008

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Location: 35 Kearsarge Street, New Bedford, MA

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 - 0%	0.00	1.00	0.00	1.00
Proprietary Treatment Practice	0.80	1.00	0.80	0.20
Subsurface Infiltration Structure	0.80	0.20	0.16	0.04
	0.00	0.04	0.00	0.04
	0.00	0.04	0.00	0.04

Total TSS Removal = 96%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 35 Kearsarge Street

Prepared By: TWR

Date: 7/9/2021

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

Water Quality Volume Flow Rate Calculations

Project Name:	35 Kearsarge Street Redevelopment	Date:	7/15/2021
Project Location:	35 Kearsarge Street, New Bedford, MA	Calculated By:	TWR
Project Number:	304-430	Checked By:	SDG

Structure Name:	STC 900 (1)	Description:	Proposed Parking Site Runoff	
Subcatchment:	C1-PR, C-OFF	Total Drainage Area:	13,416	sq ft
			0.31	ac
		Total Impervious Area:	10,573	sq ft
			0.24	ac
		Runoff Depth to be Treated:	1.0	inches

Required Water Quality Volume:	**0.020**	**ac ft**
	882	**cf**

Note: This does not include roof areas that are not subject to the Water Quality Volume Calculations

FLOW RATE CONVERSION

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

Where:

Q = flow rate associated with the **1**-inch 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
5 minute =	0.083	hours
qu (**1**-inch) =	**774**	csm/in

Calculation:

qu=	**774**	
A=	0.24	ac
WQV=	1.0	in

Required Water Quality Flow Rate:	**0.29**	**cfs**

STORMCEPTOR STC 900 will provide 80% TSS Removal Efficiency for flows up to 0.89 cfs

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

* 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

Water Quality Volume Flow Rate Calculations

Project Name:	35 Kearsarge Street Redevelopment	Date:	7/15/2021
Project Location:	35 Kearsarge Street, New Bedford, MA	Calculated By:	TWR
Project Number:	304-430	Checked By:	SDG

Structure Name: STC 900 (2)

Description: Proposed Parking Site Runoff

Subcatchment: D1-PR, D-OFF

Total Drainage Area:	7,057	sq ft
	0.16	ac
Total Impervious Area:	5,896	sq ft
	0.14	ac
Runoff Depth to be Treated:	1.0	inches

Required Water Quality Volume:	**0.011**	**ac ft**
	492	**cf**

Note: This does not include roof areas that are not subject to the Water Quality Volume Calculations

FLOW RATE CONVERSION

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

Where:

Q = flow rate associated with the **1**-inch 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
5 minute =	0.083	hours
qu (**1**-inch) =	**774**	csm/in

Calculation:

qu=	**774**	
A=	0.14	ac
WQV=	1.0	in

Required Water Quality Flow Rate:	**0.16**	**cfs**

STORMCEPTOR STC 900 will provide 80% TSS Removal Efficiency for flows up to 0.89 cfs

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

* 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

Recharge Calculations

Groundwater Recharge Calculations

Project Name: 35 Kearsarge Street Redevelopment
Project Location: 35 Kearsarge Street, New Bedford, MA 02745
Project Number: 304-430

Date: 7/15/2021
Calculated By: TWR
Checked By: DNA

OVERALL SITE RECHARGE

Existing Conditions Impervious Area

Hydraulic Soil Group	Area (sq ft)	Area (acres)	Recharge Depth (in)	Volume (cu ft)
A	30,308	0.70	0.60	1,515
B	0	0.00	0.35	0
C	0	0.00	0.25	0
D	0	0.00	0.10	0
TOTAL	**30,308**	**0.70**		**1,515**

Proposed Conditions Impervious Area

Hydraulic Soil Group	Area (sq ft)	Area (acres)	Recharge Depth (in)	Volume (cu ft)
A	28,021	0.64	0.60	1,401
B	0	0.00	0.35	0
C	0	0.00	0.25	0
D	0	0.00	0.10	0
TOTAL	**28,021**	**0.64**		**1,401.1**

Net Required Recharge Volume: -114 cu ft

Capture Area Adjustment

* Impervious Area to Recharge Facility: 0.30 ac
Total Site Impervious Area: 0.64 ac
** Impervious Ratio: 2.15

* (includes portions of the pavement)

** (Total Site Impervious / Impervious Area to Recharge Facility)

Adjusted Required Recharge Volume: -246 cu ft

Provided Recharge Volume

Subcatchment C1-PR, C-OFF	2,306	cf	*Infiltration Chamber - C1-P*
Subcatchment D1-PR, D-OFF	1,677	cf	*Infiltration Chamber - D1-P*
TOTAL	3,983	cf	

Total Provided Recharge Volume: 3,983 cu ft

Groundwater Recharge Calculations

Project Name:	35 Kearsarge Street Redevelopment	Date:	7/15/2021
Project Location:	35 Kearsarge Street, New Bedford, MA 02745	Calculated By:	TWR
Project Number:	304-430	Checked By:	DNA
			2 of 3

Stormwater BMP: Subcatchment C1-PR, C-OFF Description: Infiltration Chambers - C1-P

Provided Recharge Volume

Bottom of Stone:	98.00	ft	
Overflow Outlet Elevation:	103.55	ft	
*** Volume Provided:	2306	cu ft	*** (See attached HydroCAD output)

Total Provided Recharge Volume:	**2,306**	**cu ft**

72-hour Drawdown Calculation

Provided Recharge Volume:	2,306	cu ft	
Saturated Hydraulic Conductivity:	1.02	in / hr	(Rawls Rate for Sandy Loam (HSG A) was used)
Bottom Area:	1,096	sq ft	
Drawdown Time:	**24.8**	**hours**	

Groundwater Recharge Calculations

Project Name:	35 Kearsarge Street Redevelopment	Date:	7/15/2021
Project Location:	35 Kearsarge Street, New Bedford, MA 02745	Calculated By:	TWR
Project Number:	304-430	Checked By:	DNA
			3 of 3

Stormwater BMP: Subcatchment D1-PR, D-OFF Description: Infiltration Chambers - D1-P

Provided Recharge Volume

Bottom of Stone:	98.00	ft	
Overflow Outlet Elevation:	103.75	ft	
*** Volume Provided:	1677	cu ft	*** (See attached HydroCAD output)

Total Provided Recharge Volume:	**1,677**	**cu ft**

72-hour Drawdown Calculation

Provided Recharge Volume:	1,677	cu ft	
Saturated Hydraulic Conductivity:	1.02	in / hr	(Rawls Rate for Sandy Loam (HSG A) was used)
Bottom Area:	804	sq ft	
Drawdown Time:	**24.5**	**hours**	

Stage-Area-Storage for Pond C1-P: INFILTRATION CHAMBERS C1-P (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
100.62	1,096	2,139
100.63	1,096	2,144
100.64	1,096	2,148
100.65	1,096	2,153
100.66	1,096	2,157
100.67	1,096	2,161
100.68	1,096	2,166
100.69	1,096	2,170
100.70	1,096	2,174
100.71	1,096	2,179
100.72	1,096	2,183
100.73	1,096	2,188
100.74	1,096	2,192
100.75	1,096	2,196
100.76	1,096	2,201
100.77	1,096	2,205
100.78	1,096	2,210
100.79	1,096	2,214
100.80	1,096	2,218
100.81	1,096	2,223
100.82	1,096	2,227
100.83	1,096	2,231
100.84	1,096	2,236
100.85	1,096	2,240
100.86	1,096	2,245
100.87	1,096	2,249
100.88	1,096	2,253
100.89	1,096	2,258
100.90	1,096	2,262
100.91	1,096	2,267
100.92	1,096	2,271
100.93	1,096	2,275
100.94	1,096	2,280
100.95	1,096	2,284
100.96	1,096	2,288
100.97	1,096	2,293
100.98	1,096	2,297
100.99	1,096	2,302
101.00	1,096	**2,306**
101.01	1,096	2,306
101.02	1,096	2,306
101.03	1,096	2,306
101.04	1,096	2,306
101.05	1,096	2,306
101.06	1,096	2,306
101.07	1,096	2,306
101.08	1,096	2,306
101.09	1,096	2,306
101.10	1,096	2,306
101.11	1,096	2,306
101.12	1,096	2,306
101.13	1,096	2,306

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
101.14	1,096	2,306
101.15	1,096	2,306
101.16	1,096	2,306
101.17	1,096	2,306
101.18	1,096	2,306
101.19	1,096	2,306
101.20	1,096	2,306
101.21	1,096	2,306
101.22	1,096	2,306
101.23	1,096	2,306
101.24	1,096	2,306
101.25	1,096	2,306
101.26	1,096	2,306
101.27	1,096	2,306
101.28	1,096	2,306
101.29	1,096	2,306
101.30	1,096	2,306
101.31	1,096	2,306
101.32	1,096	2,306
101.33	1,096	2,306
101.34	1,096	2,306
101.35	1,096	2,306
101.36	1,096	2,306
101.37	1,096	2,306
101.38	1,096	2,306
101.39	1,096	2,306
101.40	1,096	2,306
101.41	1,096	2,306
101.42	1,096	2,306
101.43	1,096	2,306
101.44	1,096	2,306
101.45	1,096	2,306
101.46	1,096	2,306
101.4		2,306
101.4		2,306
101.4		2,306
101.5		2,306
101.51	1,096	2,306
101.52	1,096	2,306
101.53	1,096	2,306
101.54	1,096	2,306
101.55	1,096	2,306
101.56	1,096	2,306
101.57	1,096	2,306
101.58	1,096	2,306
101.59	1,096	2,306
101.60	1,096	2,306
101.61	1,096	2,306
101.62	1,096	2,306
101.63	1,096	2,306
101.64	1,096	2,306
101.65	1,096	2,306

STORAGE VOLUME BELOW TOP OF CHAMBERS.

Stage-Area-Storage for Pond D1-P: INFILTRATION CHAMBERS D1-P (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
100.62	804	1,555
100.63	804	1,558
100.64	804	1,561
100.65	804	1,564
100.66	804	1,567
100.67	804	1,571
100.68	804	1,574
100.69	804	1,577
100.70	804	1,580
100.71	804	1,584
100.72	804	1,587
100.73	804	1,590
100.74	804	1,593
100.75	804	1,596
100.76	804	1,600
100.77	804	1,603
100.78	804	1,606
100.79	804	1,609
100.80	804	1,612
100.81	804	1,616
100.82	804	1,619
100.83	804	1,622
100.84	804	1,625
100.85	804	1,629
100.86	804	1,632
100.87	804	1,635
100.88	804	1,638
100.89	804	1,641
100.90	804	1,645
100.91	804	1,648
100.92	804	1,651
100.93	804	1,654
100.94	804	1,658
100.95	804	1,661
100.96	804	1,664
100.97	804	1,667
100.98	804	1,670
100.99	804	1,674
101.00	804	**1,677**
101.01	804	1,677
101.02	804	1,677
101.03	804	1,677
101.04	804	1,677
101.05	804	1,677
101.06	804	1,677
101.07	804	1,677
101.08	804	1,677
101.09	804	1,677
101.10	804	1,677
101.11	804	1,677
101.12	804	1,677
101.13	804	1,677
101.14	804	1,677
101.15	804	1,677
101.16	804	1,677
101.17	804	1,677
101.18	804	1,677
101.19	804	1,677
101.20	804	1,677
101.21	804	1,677
101.22	804	1,677
101.23	804	1,677
101.24	804	1,677
101.25	804	1,677
101.26	804	1,677
101.27	804	1,677
101.28	804	1,677
101.29	804	1,677
101.30	804	1,677
101.31	804	1,677
101.32	804	1,677
101.33	804	1,677
101.34	804	1,677
101.35	804	1,677
101.36	804	1,677
101.37	804	1,677
101.38	804	1,677
101.39	804	1,677
101.40	804	1,677
101.41	804	1,677
101.42	804	1,677
101.43	804	1,677
101.44	804	1,677
101.45	804	1,677
101.46	804	1,677
101.4	804	1,677
101.4	804	1,677
101.4	804	1,677
101.5	804	1,677
101.51	804	1,677
101.52	804	1,677
101.53	804	1,677
101.54	804	1,677
101.55	804	1,677
101.56	804	1,677
101.57	804	1,677
101.58	804	1,677
101.59	804	1,677
101.60	804	1,677
101.61	804	1,677
101.62	804	1,677
101.63	804	1,677
101.64	804	1,677
101.65	804	1,677

STORAGE VOLUME BELOW TOP OF CHAMBERS.

Pipe Capacity Analysis

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Jul 7 2021

12-INCH HDPE PIPE FLOW CAPACITY ANALYSIS - 10 YR (35 KEARSARGE STREET)

Circular

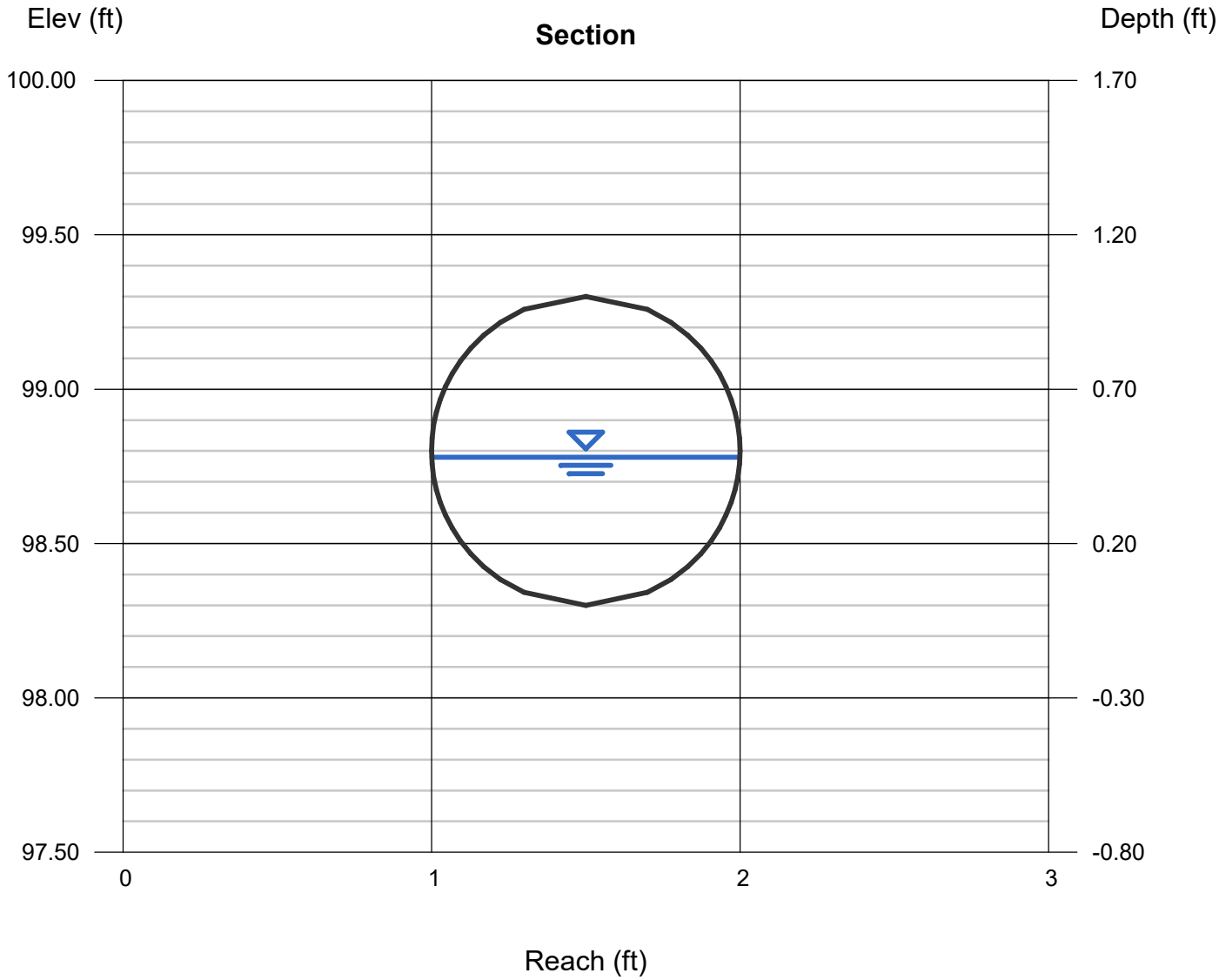
Diameter (ft)	= 1.00
Invert Elev (ft)	= 98.30
Slope (%)	= 2.00
N-Value	= 0.012

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.55

Highlighted

Depth (ft)	= 0.48
Q (cfs)	= 2.550
Area (sqft)	= 0.37
Velocity (ft/s)	= 6.80
Wetted Perim (ft)	= 1.53
Crit Depth, Yc (ft)	= 0.69
Top Width (ft)	= 1.00
EGL (ft)	= 1.20



Manufacturer's O&M Procedures

CONTECH®
ENGINEERED SOLUTIONS

Hydrodynamic Separation
Southern New England

The experts you need to solve your stormwater challenges

Contech is the leader in stormwater solutions, helping engineers, contractors and owners with infrastructure and land development projects throughout North America.

With our responsive team of stormwater experts, local regulatory expertise and flexible solutions, Contech is the trusted partner you can count on for stormwater management solutions.

Your Contech Team

STORMWATER CONSULTANT

It's my job to recommend the best solution to meet permitting requirements.

STORMWATER DESIGN ENGINEER

I work with consultants to design the best approved solution to meet your project's needs.

REGULATORY MANAGER

I understand the local stormwater regulations and what solutions will be approved.

SALES ENGINEER

I make sure our solutions meet the needs of the contractor during construction.

Contech is your partner in stormwater management solutions

Removing Pollutants using Hydrodynamic Separation

Utilize high-performance hydrodynamic separation to effectively remove finer sediment, oil and grease, and floating and sinking debris.

HDS systems play a vital role in protecting our waterways by removing high levels of sediment, trash, debris, and hydrocarbons from stormwater runoff.

Frequently used as end-of-pipe solutions, they are also used to provide stormwater quality treatment in places where space is limited.

HDS systems capture and retain a variety of stormwater pollutants and are very easy to maintain. These two key benefits have resulted in new uses for HDS technologies, such as pretreating detention, Low Impact Development, and green infrastructure practices, as well as other land-based stormwater treatment systems.

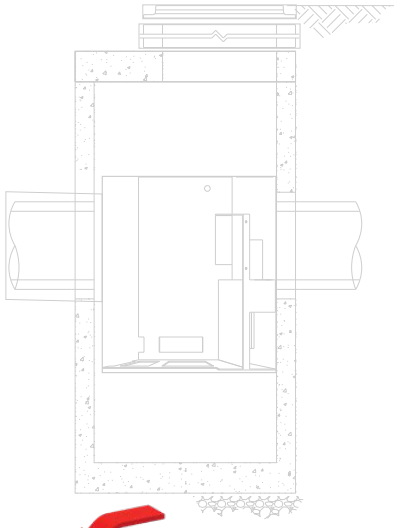
CASCADE separator™

CDS®

Vortechs®

Stormceptor® STC

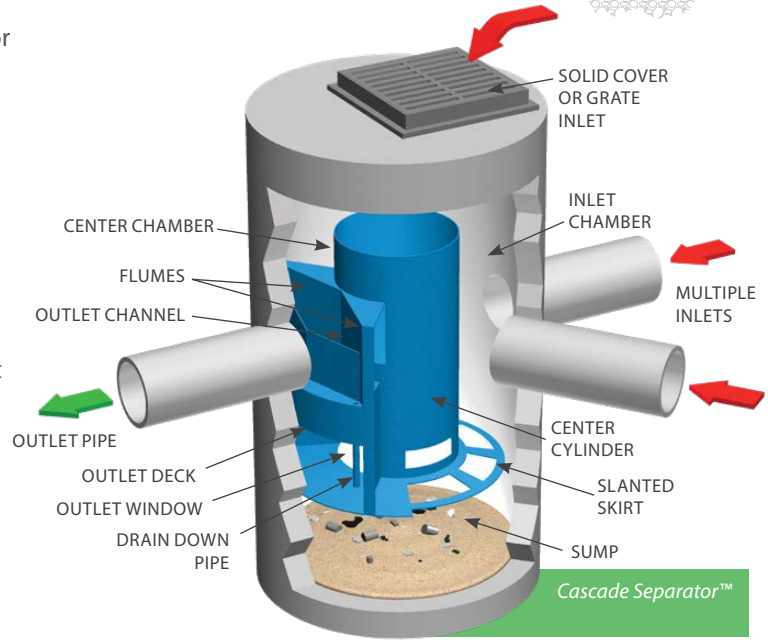
The Cascade Separator™ System



Advanced Sediment Capture Technology ...

The Cascade Separator™ is the newest innovation in stormwater treatment from Contech. The Cascade Separator was developed by Contech's stormwater experts using advanced modeling tools and Contech's industry leading stormwater laboratory.

This innovative hydrodynamic separator excels at sediment capture and retention while also removing hydrocarbons, trash, and debris from stormwater runoff. What makes the Cascade Separator unique is the use of opposing vortices that enhance particle settling and a unique skirt design that allows for sediment transport into the sump while reducing turbulence and resuspension of previously captured material. These two factors allow the Cascade Separator to treat high flow rates in a small footprint, resulting in an efficient and economical solution for any site.



FEATURE	BENEFIT
Unique skirt design & opposing vortices	Superior TSS removal; reduced system size and costs
Inlet area accepts wide range of inlet pipe angles	Design and installation flexibility
Accepts multiple inlet pipes	Eliminates the need for separate junction structure
Grate inlet option	Eliminates the need for a separate grate inlet structure
Internal bypass	Eliminates the need for a separate bypass structure
Clear access to sump and stored pollutants	Fast, easy maintenance

Learn More:
www.ContechES.com/cascade

SELECT CASCADE APPROVALS

- New Jersey Department of Environmental Protection Certification (NJDEP)

CASCADE MAINTENANCE

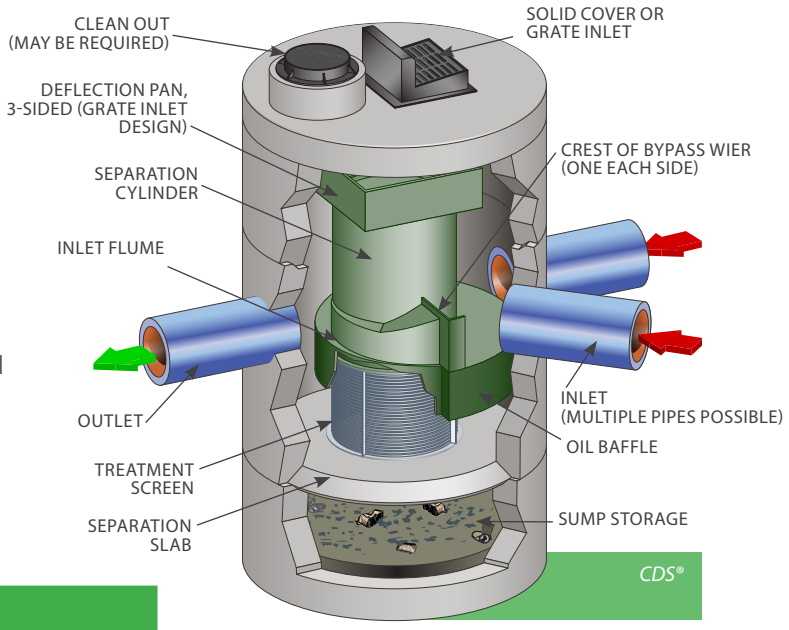
Cascade provides unobstructed access to stored pollutants, making it easy to maintain using a vacuum truck, with no requirement to enter the unit.

The CDS® System

Superior TSS and Trash Removal ...

The CDS is a hybrid technology that uses a combination of swirl concentration and indirect screening to separate and trap sediment, trash, debris, and hydrocarbons from stormwater runoff.

At the heart of the CDS system is a unique screening technology used to capture and retain sediment. The screen face is louvered so that it is smooth in the downstream direction. The effect created is called "Continuous Deflective Separation." The power of the incoming flow is harnessed to continually shear debris off the screen and to direct trash and sediment toward the center of the separation cylinder. This results in a screen that is self-cleaning and provides 100% removal of floatables and neutrally buoyant material debris 2.4 mm or larger, without blinding.



FEATURE	BENEFIT
Unique flow path and isolated storage sump	Excellent TSS capture and retention
Captures and retains 100% of floatables and neutrally buoyant debris 2.4 MM or larger	Superior trash removal
Self-cleaning screen	Ease of maintenance
Inline, offline, multiple inlet pipes, grate inlet, and drop inlet configurations available	Design flexibility
Internal bypass	Eliminates the need for additional structures
Clear access to sump and stored pollutants	Fast, easy maintenance

Learn More:
www.ContechES.com/cds

SELECT CDS APPROVALS

- Washington Department of Ecology (GULD) – Pretreatment
- New Jersey Department of Environmental Protection Certification (NJDEP)
- Canadian Environmental Technology Verification (ETV)
- MASTEP
- Connecticut DOT

The CDS system has been accepted and used extensively in all New England states for over 20 years with thousands of installations.

The Vortechs® System

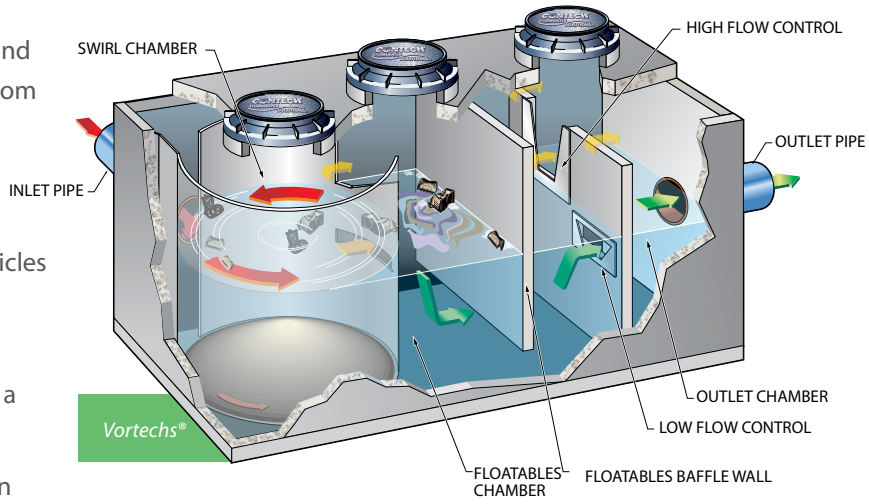
Stormwater Treatment in a Shallow Footprint ....

Vortechs combines swirl concentration and flow controls into a single treatment unit that captures and retains trash, debris, sediment, and hydrocarbons from stormwater runoff.

The Vortechs system's large swirl chamber and flow controls work together to create a low energy environment, ideal for capturing and retaining particles down to 50 microns.

Vortechs is the ideal solution for sites with high groundwater, bedrock, utility conflicts, or sites with a large volume runoff.

The Vortechs System is approved by the Washington Department of Ecology (GULD) - Pretreatment.



Learn More:
www.ContechES.com/vortechs

SELECT VORTECHS APPROVALS

- Washington Department of Ecology (GULD) – Pretreatment
- MASTEP
- Connecticut DOT

FEATURE	BENEFIT
Large swirl chamber	Fine particle removal down to 50 microns
Shallow profile – Typical depth below pipe invert is only 3 feet.	Can be used on sites with high groundwater, bedrock, or utility conflicts
Unobstructed access to stored pollutants	Fast, easy maintenance

The Vortechs System was developed in New England and has been used extensively in the region for over 20 years.

The ideal solution for sites with high groundwater

Stormceptor® STC

Stormceptor STC is the recognized leader in stormwater treatment, offering a range of versatile treatment systems that effectively remove pollutants from stormwater and snowmelt runoff. Stormceptor is flexibly designed to protect waterways from hazardous material spills and stormwater pollution, including suspended sediment, free oils, and other pollutants that attach to particles, no matter how fierce the storm.

Stormceptor's scour prevention technology ensures pollutants are captured and contained during all rainfall events.

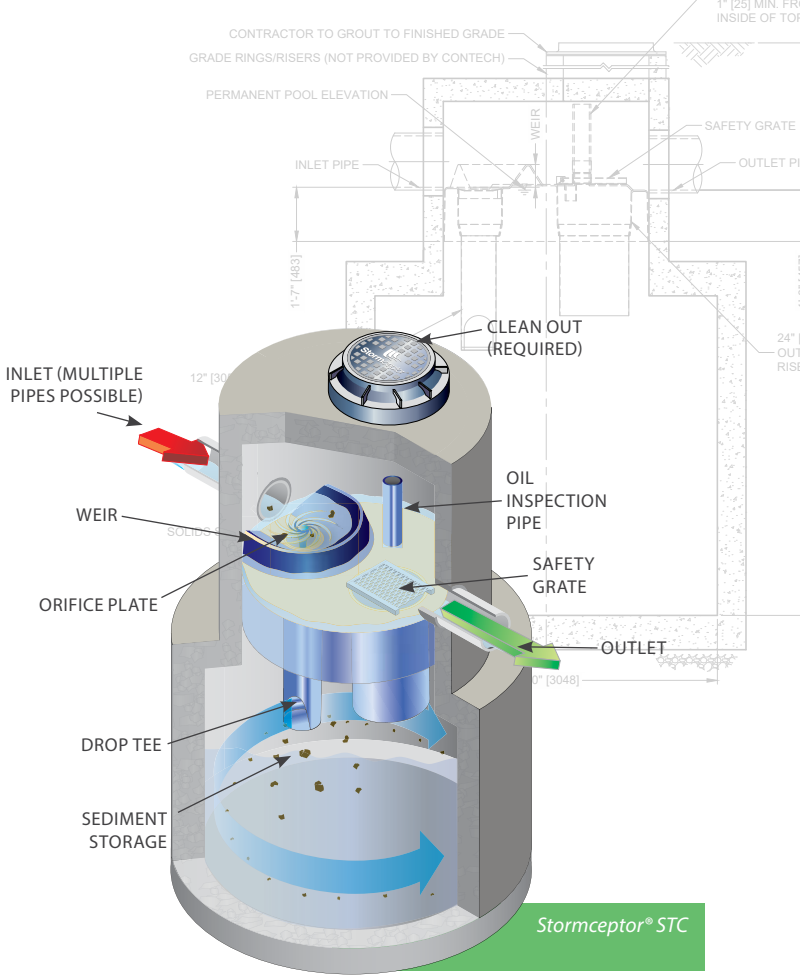
Ideal uses

- Sediment (TSS) removal
- Spill control
- Debris and small floatables capture
- Pretreatment for filtration, detention/retention systems, ponds, wetlands, Low Impact Development (LID), green infrastructure, and water-sensitive urban design

Proven performance

With more than 20 years of industry experience, Stormceptor has been performance tested and verified by some of the most stringent technology evaluation programs in North America.

- NJCAT
- Washington Ecology to Washington Department of Ecology (GULD) – Pretreatment
- EN858 Class 2



Learn More:
www.ContechES.com/stormceptor

FEATURE	BENEFIT
Patented scour prevention technology	Superior pollutant removal and retention
Can take the place of a conventional junction or inlet structure	Eliminates the need for additional structures
Minimal drop between inlet and outlet	Site flexibility
Multiple inlets can connect to a single unit	Design flexibility
3rd party tested and verified performance (Sediment & Oil)	Eliminates the need for a separate bypass structure

With over 40,000 units operating worldwide, Stormceptor performs and protects every day, in every storm.

Product Flow Rates

CASCADE

Model	Treatment Rate (cfs)	Sediment Capacity[1] (CF)
CS-4	2.00	19
CS-5	3.50	29
CS-6	5.60	42
CS-8	12.00	75
CS-10	18.00	118

CDS

Model	Treatment Rate[2] (cfs)	Sediment Capacity[1] (CF)
1515-3	1.00	14
2015-4	1.40	25
2015-5	1.40	39
2015-6	1.40	57
2020-5	2.20	39
2020-6	2.20	57
2025-5	3.20	39
2025-6	3.20	57
3020-6	3.90	57
3025-6	5.00	57
3030-6	5.70	57
3035-6	6.50	57
4030-8	7.50	151
4040-8	9.50	151

VORTECHS

Model	Treatment Rate (cfs)	Sediment Capacity[3] (CF)
1000	1.60	16
2000	2.80	32
3000	4.50	49
4000	6.00	65
5000	8.50	86
7000	11.00	108
9000	14.00	130
11000	17.5	151
16000	25	192

STORMCEPTOR STC

Model	Treatment Rate (cfs)	Sediment Capacity[1] (CF)
STC 450i	0.40	46
STC 900	0.89	89
STC 2400	1.58	205
STC 4800	2.47	543
STC 7200	3.56	839
STC 11000	4.94	1086
STC 16000	7.12	1677

1 Additional sediment storage capacity available – Check with your local representative for information.

2 Treatment Capacity is based on laboratory testing using OK-110 (average D50 particle size of approximately 100 microns) and a 2400 micron screen.

3 Maintenance recommended when sediment depth has accumulated to within 12-18 inches of the dry weather water surface elevation.

STORMWATER SOLUTIONS

PIPE SOLUTIONS

STRUCTURES SOLUTIONS

CONTECH® ENGINEERED SOLUTIONS

Get social with us:

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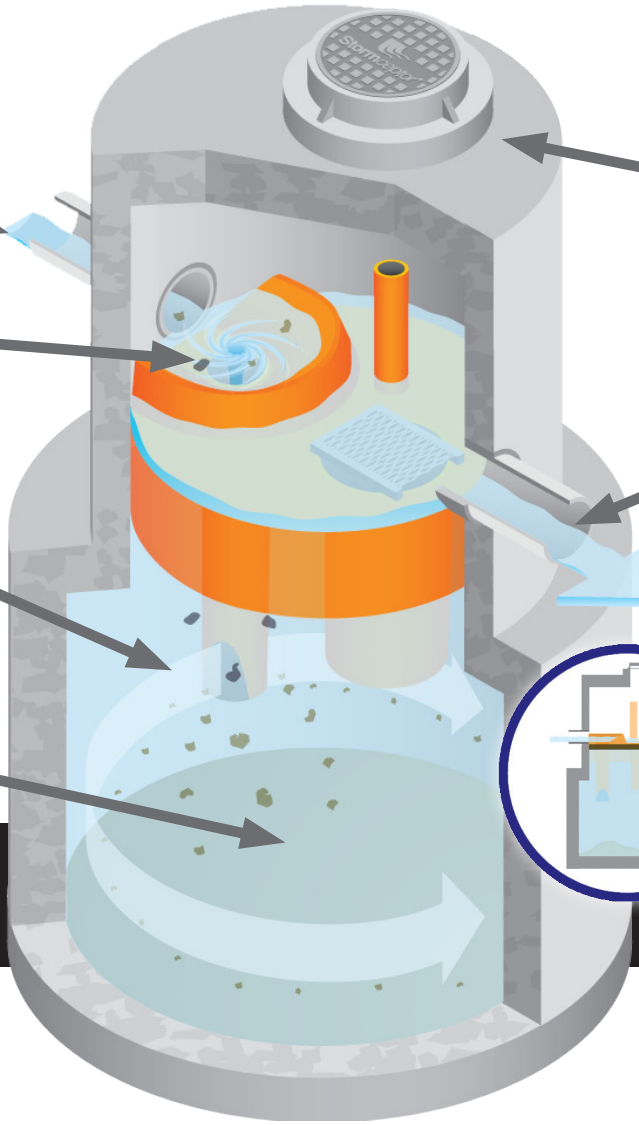
Stormceptor®

Stormwater Treatment Made Simple!

TSS & Oil Removal ■ *Scour Prevention* ■ *Small Footprint*



Design Flexibility

Proven Performance

Environmentally Engineered Stormwater Solutions...
that exceed your client's needs!

www.rinkerstormceptor.com
Phone: (413) 562-3647

Rinker MATERIALS™

Stormceptor® STC

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.

Rinker MATERIALS™
www.rinkerstormceptor.com
Manufacturing Plant: Westfield, MA
Phone: (413) 562-3647
11-22-13-R13-802 MDEP

Stormceptor®
www.stormceptor.com

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

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UNIVERSITY OF MASSACHUSETTS
AT AMHERST
Water Resources Research Center
Blaisdell House, UMass
310 Hicks Way
Amherst, MA 01003

Massachusetts Stormwater Evaluation Project

(413) 545-5532
(413) 545-2304 FAX
www.mastep.net

MASTEP Technology Review

Technology Name: Stormceptor

Studies Reviewed: Final NJCAT Technology Verification Stormceptor STC900 September 2004; Coventry University Study, 1996; Technology Assessment, University of Massachusetts, 1997; SeaTac Stormceptor Performance report 2001; SWAMP report Ontario 2004; Phoenix Group Edmonton report 1995; Stormceptor 1200 Field Evaluation report 2004; Applied Hydrology Associates Denver report 2003; Rinker Materials Como Park St. Paul MN report 2002; VA DOT / UVA "Testing of Ultra-Urban Stormwater Best Management Practices" report 2001.
Hydrodynamic Separator Sediment Retention Testing, Mohseni, 2010.

Date: September 17, 2013

Reviewer: Jerry Schoen

Rating: 2

Brief rationale for rating: This rating is primarily based on the 2005 NJCAT Technology Verification study. In general, this was a well-conducted test, which in large part followed NJDEP test guidelines for laboratory studies, which MASTEP considers as the laboratory equivalent of TARP field protocols. Issues of concern: the study measured suspended sediment concentration (SSC) rather than total suspended solids (TSS). 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. The test was conducted with higher influent sediment concentrations than is preferred, but results were fairly consistent across all ranges studied. The particle size distribution also appears to be slightly higher than the target test range. There are additional field studies that in general support the results obtained in this laboratory studies. These studies do not satisfy TARP protocols, but they do not contradict results obtained in the NJCAT study.

TARP Requirements Not Met*:

- Measurements in TSS.
- Influent sediment concentration is 100 – 300 mg/l: actual was 153-460.
- No documentation of a Quality Assurance Project Plan
- Third party studies are preferred. This was conducted by Stormceptor personnel, with sample analyses conducted by an external laboratory.

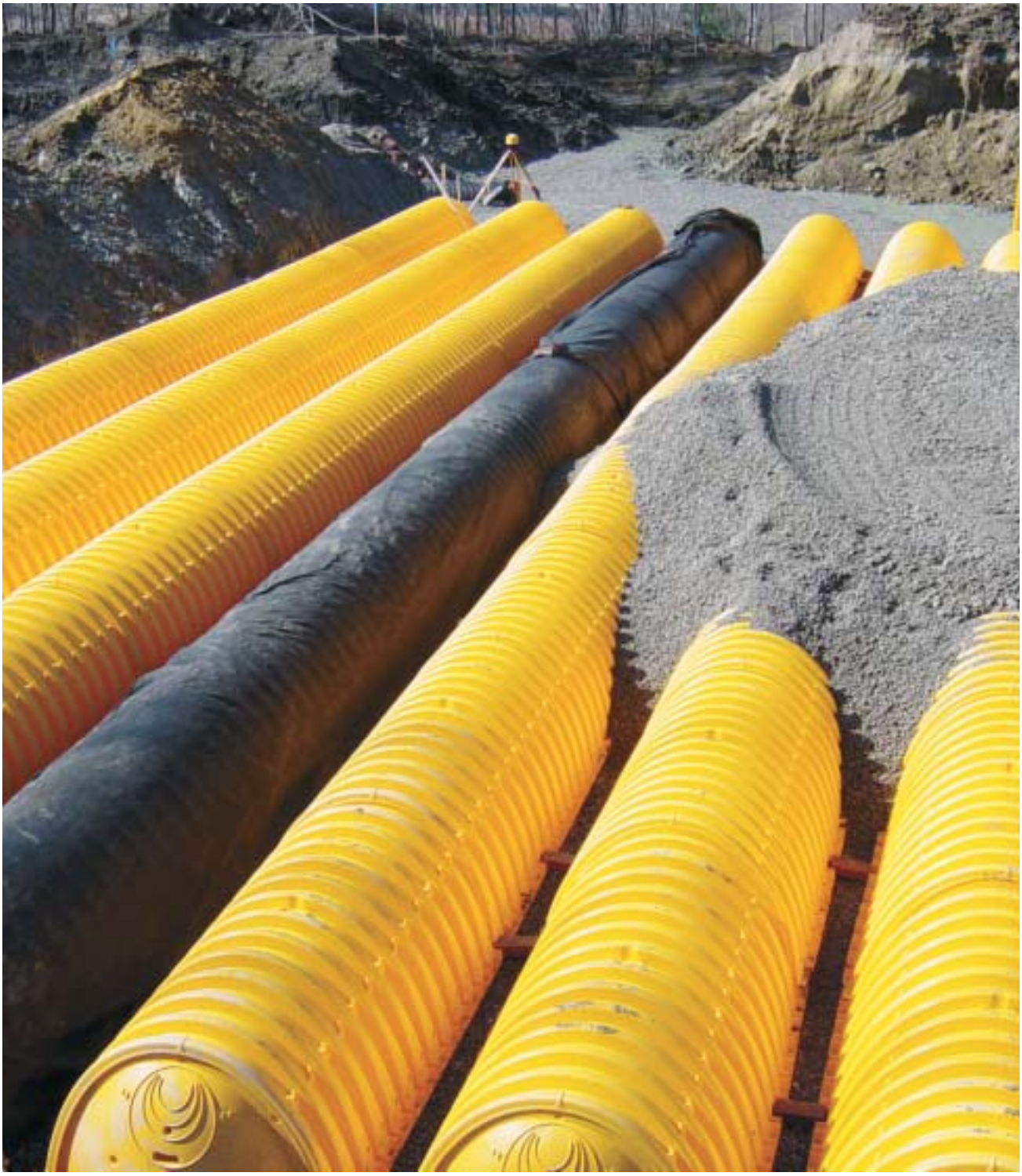
Other Comments:
* The 2010 Mohseni study evaluates the susceptibility of the Stormceptor to scouring, or washout of collected sediments. Report concluded that the unit does not scour at high flows as long as sediment depth does not exceed maintenance level.

* Criteria also based on NJDEP laboratory testing guidelines.

StormTech®

Detention • Retention • Recharge

Subsurface Stormwater Management℠



Isolator™ Row O&M Manual

StormTech® Chamber System for Stormwater Management

1.0 The Isolator™ Row

1.1 INTRODUCTION

An important component of any Stormwater Pollution Prevention Plan is inspection and maintenance. The StormTech Isolator Row is a patent pending technique to inexpensively enhance Total Suspended Solids (TSS) removal and provide easy access for inspection and maintenance.

Looking down the Isolator Row from the manhole opening, woven geotextile is shown between the chamber and stone base.

1.2 THE ISOLATOR™ ROW

The Isolator Row is a row of StormTech chambers, either SC-740 or SC-310 models, that is surrounded with filter fabric and connected to a closely located manhole for easy access. The fabric-wrapped chambers provide for settling and filtration of sediment as storm water rises in the Isolator Row and ultimately passes through the filter fabric. The open bottom chambers and perforated sidewalls allow storm water to flow both vertically and horizontally out of the chambers. Sediments are captured in the Isolator Row protecting the storage areas of the adjacent stone and chambers from sediment accumulation.

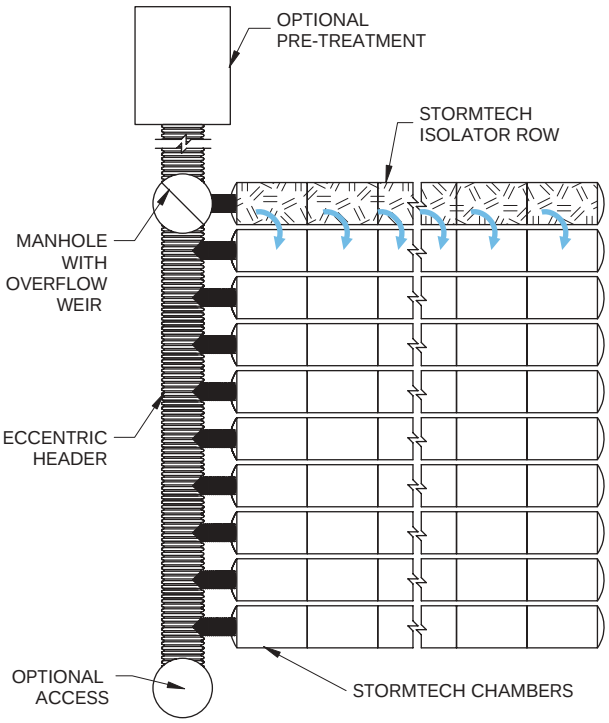
Two different fabrics are used for the Isolator Row. A woven geotextile fabric is placed between the stone and the Isolator Row chambers. The tough geotextile provides a media for storm water filtration and provides a durable surface for maintenance operations. It is also designed to prevent scour of the underlying stone and remain intact during high pressure jetting. A non-woven fabric is placed over the chambers to provide a filter media for flows passing through the perforations in the sidewall of the chamber.

The Isolator Row is typically designed to capture the "first flush" and offers the versatility to be sized on a volume basis or flow rate basis. An upstream manhole not only provides access to the Isolator Row but typically includes a high flow weir such that storm water flowrates or volumes that exceed the capacity of the Isolator Row overtop the over flow weir and discharge through a manifold to the other chambers.

The Isolator Row may also be part of a treatment train. By treating storm water prior to entry into the chamber system, the service life can be extended and pollutants such as hydrocarbons can be captured. Pre-treatment best management practices can be as simple as deep sump catch basins, oil-water separators or can be innovative storm water treatment devices. The design of the treatment train and selection of pretreatment devices by the design engineer is often driven by regulatory requirements. Whether pretreatment is used or not, the Isolator Row is recommended by StormTech as an effective means to minimize maintenance requirements and maintenance costs.

Note: See the StormTech Design Manual for detailed information on designing inlets for a StormTech system, including the Isolator Row.

StormTech Isolator Row with Overflow Spillway
(not to scale)



2.0 Isolator Row Inspection/Maintenance

2.1 INSPECTION

The frequency of Inspection and Maintenance varies by location. A routine inspection schedule needs to be established for each individual location based upon site specific variables. The type of land use (i.e. industrial, commercial residential), anticipated pollutant load, percent imperviousness, climate, etc. all play a critical role in determining the actual frequency of inspection and maintenance practices.

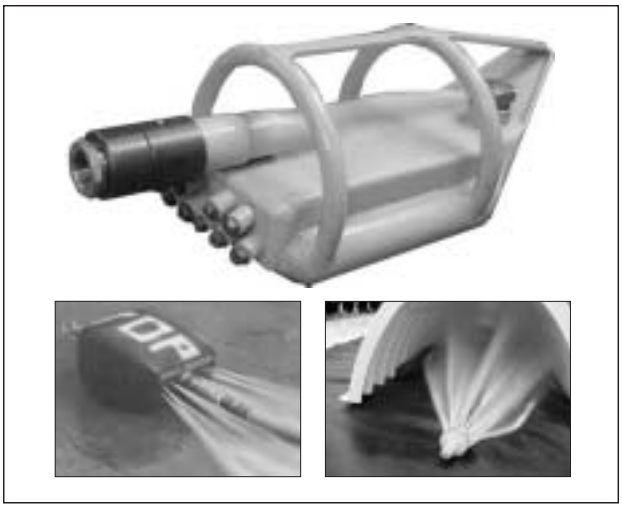
At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row should be inspected every 6 months for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

The Isolator Row incorporates a combination of standard manhole(s) and strategically located inspection ports (as needed). The inspection ports allow for easy access to the system from the surface, eliminating the need to perform a confined space entry for inspection purposes.

If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3 inches throughout the length of the Isolator Row, clean-out should be performed.

2.2 MAINTENANCE

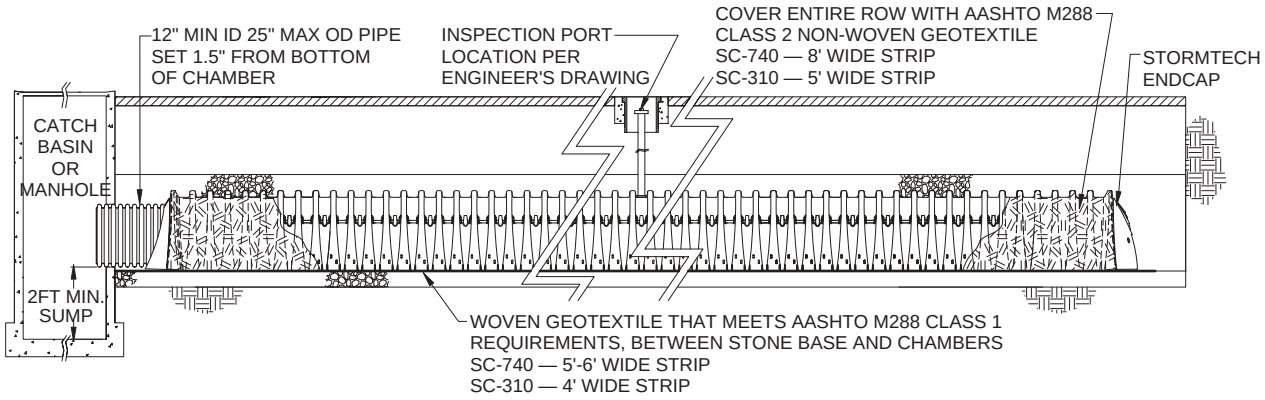
The Isolator Row was designed to reduce the cost of periodic maintenance. By “isolating” sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entries.



Examples of culvert cleaning nozzles appropriate for Isolator Row maintenance. (These are not StormTech products.)

Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45” are best. Most JetVac reels have 400 feet of hose allowing maintenance of an Isolator Row up to 50 chambers long. **The JetVac process shall only be performed on StormTech Isolator Rows that have AASHTO class 1 woven geotextile (as specified by StormTech) over their angular base stone.**

StormTech Isolator Row (not to scale)



3.0 Isolator Row Step By Step Maintenance Procedures

Step 1) Inspect Isolator Row for sediment

A) Inspection ports (if present)

i. Remove lid from floor box frame

ii. Remove cap from inspection riser

iii. Using a flashlight and stadia rod, measure depth of sediment and record results on maintenance log.

iv. If sediment is at, or above, 3 inch depth proceed to Step 2. If not proceed to step 3.

B) All Isolator Rows

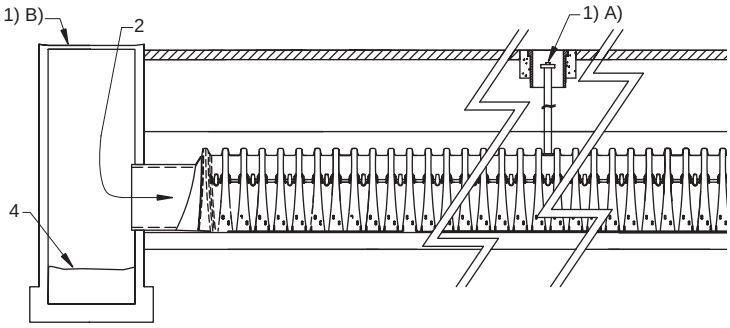
i. Remove cover from manhole at upstream end of Isolator Row

ii. Using a flashlight, inspect down Isolator Row through outlet pipe

1. Mirrors on poles or cameras may be used to avoid a confined space entry
2. Follow OSHA regulations for confined space entry if entering manhole

iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches) proceed to Step 2. If not proceed to Step 3.

StormTech Isolator Row (not to scale)



Step 2) Clean out Isolator Row using the JetVac process

A) A fixed culvert cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable

B) Apply multiple passes of JetVac until backflush water is clean

C) Vacuum manhole sump as required

Step 3) Replace all caps, lids and covers, record observations and actions

Step 4) Inspect & clean catch basins and manholes upstream of the StormTech system

Sample Maintenance Log

Date	Stadia Rod Readings		Sediment Depth (1) - (2)	Observations/Actions	Inspector
	Fixed point to chamber bottom (1)	Fixed point to top of sediment (2)			
3/15/01	6.3 ft.	none		New installation. Fixed point is CI frame at grade	djm
9/24/01		6.2	0.1 ft.	Some grit felt	sm
6/20/03		5.8	0.5 ft.	Mucky feel, debris visible in manhole and in Isolator row, maintenance due	rv
7/7/03	6.3 ft.		0	System jetted and vacuumed	djm

StormTech®

Detention • Retention • Recharge

Subsurface Stormwater Management℠

20 Beaver Road, Suite 104 | Wethersfield | Connecticut | 06109

860.529.8188 | 888.892.2694 | fax 866.328.8401 | www.stormtech.com

UNIVERSITY OF MASSACHUSETTS
AT AMHERST
Water Resources Research Center
Blaisdell House, UMass
310 Hicks Way
Amherst, MA 01003

MASTEP Technology Review

Massachusetts Stormwater Evaluation Project
(413) 545-5532
(413) 545-2304 FAX
www.mastep.net

Technology Name: Isolator Row

Studies Reviewed: Christensen, Andrew and Vince Neary. Hydraulic Performance and Sediment Trap Efficiency for the StormTech SC-740 Isolator Row. Tennessee Technological University, February 2005.

Neary, Vincent, PhD. Performance Evaluation of Sediment Removal Efficiency Stormtech Isolator Row. Tennessee Tech University. October 20, 2006.

New Jersey Corporation for Advanced Technology. NJCAT Verification of the StormTech Isolator Row. August 2007.

University of New Hampshire Stormwater Center. Final Report on Field Verification Testing of the Stormtech Isolator Row Treatment Unit. Submitted to StormTech LLC June 2008.

University of New Hampshire Stormwater Center. Performance Evaluation Report on of the Stormtech Isolator Row Treatment Unit. September 2010

Date: January 14, 2012

Reviewers: Sarah Titus, updated by Jerry Schoen

Rating: 2

Brief rationale for rating:
The Isolator Row was tested in the field by the UNH Stormwater Center and in the lab by Tennessee Tech University. Field testing monitored 23 events over two years, sampling 13.2" rainfall or about 27% of the annual average. This study was done under a QAPP that was designed to substantially meet TARP and TAPE requirements.

Lab testing examined sediment removal for three different influent mixes; the SIL-CO-SIL 106, SIL-CO-SIL 250 and the OK-110 silica. Across all influent mixes, 21 test runs were done and 14 flow rates were tested at average influent concentrations from 164-424mg/l. NJCAT was able to use the runs to extrapolate the data to calculate weighted removal efficiencies for 25, 50, 75, 100 and 125% of treatment operating rate. Claims for each influent mix were verified by NJCAT. While all of these studies met many requirements necessary for TARP there was no scour testing, statistical analysis or QC data presented for any study. The laboratory studies did not use a certified lab and the one micron filter sock at the outlet was only partially effective at trapping the finer particles from the flow stream. This led to increasing influent and effluent SSC values as the detention time went up during the course of each test run. Removal rates for earlier samples were higher than later samples in the same run.

Requirements not met:
- No discussion of QC test results.
- Sampled <50% of average annual rainfall and less than minimum 13" required total in the field
- No discussion of scour testing

Other comments:
Field study:
- d50 influent particle size 44 microns.
- Effective TSS, SSC, Zinc, total phosphorus, total petroleum hydrocarbon reported throughout study period.
- Zinc and TP removal efficiency improved over the course of the study, presumably due to build of an organic filter cake on system's fabric. However, this buildup may also lead to increased incidence of bypass in larger storms. This may be a consideration for maintenance planning.
- Negative removal rates for dissolved inorganic nitrogen, suggesting this system is not effective at treating dissolved nitrogen.

Lab study:
- Particle size distributions: OK 110 d50=110, SIL CO SIL 106 d50=22, SIL CO SIL 250= 45 microns. In the field the d50 was measured as 0.038mm.
- Flow rates tested in the lab at treatment flow rates from 0.1-1.2cfs. SIL CO SIL 106 was tested at 3.2gpm/ft2 and SIL CO SIL 250 was tested at 3.2 (0.4cfs) and 1.7gpm/ft2 (0.21cfs). The OK 110 was tested at hydraulic loading rates of 4.8 and 8.1 gpm/ft2.

- Average influent SSC for the SIL CO SIL 106 test runs 270mg/L. The average influent SSC was 211 and 424mg/L for the SIL CO SIL 250 influent at 3.2 and 1.7gpm respectively. The OK 110 tests calculated influent SSC ranged from 140-230mg/L with an average of 183.18. Field testing measured influent TSS at a mean 58mg/l.

Illicit Discharge Compliance Statement

ILLICIT DISCHARGE COMPLIANCE STATEMENT

I VERIFY THAT NO ILLICIT DISCHARGES EXIST FROM THE 35 KEARSARGE STREET REDEVELOPMENT. THROUGH THE IMPLEMENTATION OF THE *CONSTRUCTION PERIOD POLLUTION PREVENTION AND SEDIMENTATION AND EROSION CONTROL PLAN* AS WELL AS THE *OPERATION AND MAINTENANCE PLAN*, MEASURES ARE SET FORTH TO PREVENT ILLICIT DISCHARGES FROM ENTERING THE STORMWATER MANAGEMENT DRAINAGE SYSTEM.

SIGNATURE	**PRINT NAME**	**DATE**

TITLE	**COMPANY**

SIGNATURE	**PRINT NAME**	**DATE**

TITLE	**COMPANY**

NOTE: THIS CERTIFICATION MUST BE SIGNED BEFORE STORMWATER IS CONVEYED TO THE PROPOSED STORMWATER DRAINAGE SYSTEM IN ACCORDANCE WITH STANDARD 10 OF THE MASSACHUSETTS STORMWATER MANAGEMENT STANDARDS.

APPENDIX C

SITE PLANS

35 KEARSARGE STREET
MULTI-FAMILY REDEVELOPMENT

35 KEARSARGE STREET, NEW BEDFORD, MASSACHUSETTS, 02745

SITE PLAN REVIEW
AUGUST 2021

VICINITY MAP
SCALE: 1"=2000'

DRAWING INDEX

SHEET NUMBER	DRAWING NUMBER	SHEET TITLE
CIVIL ENGINEERING PLANS		
1	C000	COVER SHEET
2	C100	EXISTING CONDITIONS PLAN
3	C200	LAYOUT AND MATERIALS PLAN
4	C500	GRADING, DRAINAGE AND UTILITIES PLAN
5	C700	LIGHTING AND LANDSCAPING PLAN
6	C800	DETAIL SHEET 1
7	C801	DETAIL SHEET 2

SITE MAP
SCALE: 1"=60'

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: (508) 998-2125
CONTACT: DANIEL AGUIAR

OWNER:
ROMAN CATHOLIC BISHOP
OF FALL RIVER
P.O. BOX 2577
FALL RIVER, MA 02722

ARCHITECT:
MICHAEL WASHINGTON ARCHITECTS, INC.
1208 VFW PARKWAY, SUITE 201
WEST ROXBURY, MA 02132
PH: (617) 390-5515
CONTACT: BENJAMIN LEE

APPLICANT:
CRUZ DEVELOPMENT CORPORATION
1 JOHN ELIOT SQUARE
ROXBURY, MA 02119
PH: (617) 445-6901
CONTACT: DAN CRUZ

SITE DATA

ADDRESS:	35 KEARSARGE STREET NEW BEDFORD, MA 02745
PARCEL I.D.:	A PORTION OF ASSESSORS MAP 112, LOT 3 (PARCEL 2 ON ANR PLANS ENDORSED ON 11-24-20)
TOTAL AREA:	±32,010 SF
ZONING DISTRICT:	RESIDENCE A

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

COMMONWEALTH OF MASSACHUSETTS
STEVEN D. GIOIOSA
CIVIL
NO. 32165
REGISTERED PROFESSIONAL ENGINEER

REVISION RECORD

NO	DATE	DESCRIPTION

SITEC
Part of Civil & Environmental Consultants, Inc.
449 Faunce Corner Road · Dartmouth, MA 02747
Ph: 508.998.2125 · Fax: 508.998.7554
www.cecinc.com

CRUZ DEVELOPMENT CORPORATION
APO ASSESSORS MAP 112, LOT 3
35 KEARSARGE STREET
NEW BEDFORD, MASSACHUSETTS

COVER SHEET

DATE:	AUGUST, 2021
DWG SCALE:	AS SHOWN
PROJECT NO:	313-229.CV01
DRAWN BY:	T.ROSBOROUGH
CHECKED BY:	D.AGUIAR
APPROVED BY:	S.GIOIOSA

DRAWING NO.:
C000
SHEET 1 OF 7

Z:\New Bedford\15-6167 Diocese of Fall River Kearsarge Street\CAD\CIVIL\35X30-C001-C000 Cover Sheet.dwg[LAYOUT1] LS(8/10/2021 - trasborough) - LP: 8/10/2021 3:48 PM

SITE LOCUS MAP

SCALE: 1" = 2000'

SCALE IN FEET
0 2000 4000

RESIDENTIAL A (RA) ZONING DISTRICT	
REGULATION	REQUIREMENT
MIN. LOT AREA	8,000 SQ. FT.
LOT FRONTAGE	75 FT.
FRONT SETBACK	20 FT.
SIDE SETBACK	10 FT. ON ONE SIDE, 12 FT. ON THE OTHER
REAR SETBACK	30 FT.
MAX. LOT COVERAGE	30%; 40% ON CORNER LOTS

NOTES:

1. EXISTING CONDITIONS INFORMATION WAS COMPILED FROM AN ON THE GROUND SURVEY PERFORMED BY CIVIL & ENVIRONMENTAL CONSULTANTS, INC. ON MAY 19 AND 21, 2021.
2. ELEVATIONS ARE REFERENCE TO NAVD 1988 DATUM.
3. THE SITE IS NOT LOCATED WITHIN A SPECIAL FLOOD HAZARD AREA ZONE AS DETERMINED FROM THE CITY OF NEW BEDFORD FEDERAL EMERGENCY MANAGEMENT AGENCY FLOOD INSURANCE RATE MAP NUMBER 25005C0391G (EFFECTIVE DATE: JULY 16, 2014).
4. EXISTING UTILITY LINES SHOWN ON THIS PLAN ARE FROM AVAILABLE INFORMATION AND ARE APPROXIMATE LOCATIONS. THERE MAY BE EXISTING LINES OTHER THAN THOSE INDICATED. CIVIL & ENVIRONMENTAL CONSULTANTS, INC. ASSUMES NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED OR INACCURATELY SHOWN. BEFORE PLANNING FUTURE CONNECTIONS, THE PROPER PUBLIC UTILITY ENGINEERING DEPARTMENT SHOULD BE CONSULTED.
5. THIS PLAN AND ANY ACCOMPANYING CERTIFICATIONS DO NOT CONSTITUTE A CERTIFICATION OF TITLE TO THE PROPERTY DISPLAYED HEREON. THE OWNER'S OF LOCUS AND ABUTTING PROPERTIES ARE SHOWN ACCORDING TO CURRENT TOWN ASSESSORS RECORDS.
6. LIMITED SUBSURFACE INVESTIGATIONS WERE PERFORMED BY RIVER HAWK ENVIRONMENTAL, LLC ON APRIL 21, 2020 DURING A PHASE 1 ENVIRONMENTAL SITE ASSESSMENT. BASED ON THE REVIEW OF THE NRCS WEB SOIL REPORT AND BORING INFORMATION INCLUDED IN THE LIMITED SUBSURFACE INVESTIGATIONS, HYDROLOGIC SOIL GROUP (HSG) A WITH AN INFILTRATION RATE OF 1.02 INCHES PER HOUR WAS ASSUMED FOR THE SITE.

LEGEND:

- EXISTING SUBJECT PROPERTY LINE
- 100 EXISTING INDEX (MAJOR) CONTOUR
- 99 EXISTING INTERMEDIATE (MINOR) CONTOUR
- EXISTING CHAIN LINK FENCE LINE
- EXISTING CURB
- EXISTING EDGE OF PAVEMENT
- EXISTING STRUCTURE
- ST EXISTING STORM PIPE
- W EXISTING WATER LINE
- SAN EXISTING SANITARY SEWER LINE
- G EXISTING GAS LINE
- OH-E EXISTING OVERHEAD WIRE
- UG-E EXISTING UNGERGROUND ELECTRIC LINE
- WG EXISTING WATER GATE VALVE
- EXISTING FIRE HYDRANT
- EXISTING WATER SHUT OFF
- GG EXISTING GAS GATE
- EXISTING GAS SHUT OFF
- D EXISTING DRAIN MANHOLE
- EXISTING UTILITY POLE
- EXISTING SIGN
- EXISTING DECIDUOUS TREE
- EXISTING MONITORING WELL
- BIT BITUMINOUS
- CLF CHAIN LINK FENCE
- CONC CONCRETE
- DW DRIVEWAY
- GP GATE POST
- SW SIDEWALK
- VGC VERTICAL GRANITE CURB
- STONE BOUND
- TRAVERSE POINT

OWNER:

ROMAN CATHOLIC BISHOP OF FALL RIVER
P.O. BOX 2577
FALL RIVER, MA 02722

APPLICANT:

CRUZ DEVELOPMENT CORPORATION
1 JOHN ELIOT SQUARE
ROXBURY, MA 02119

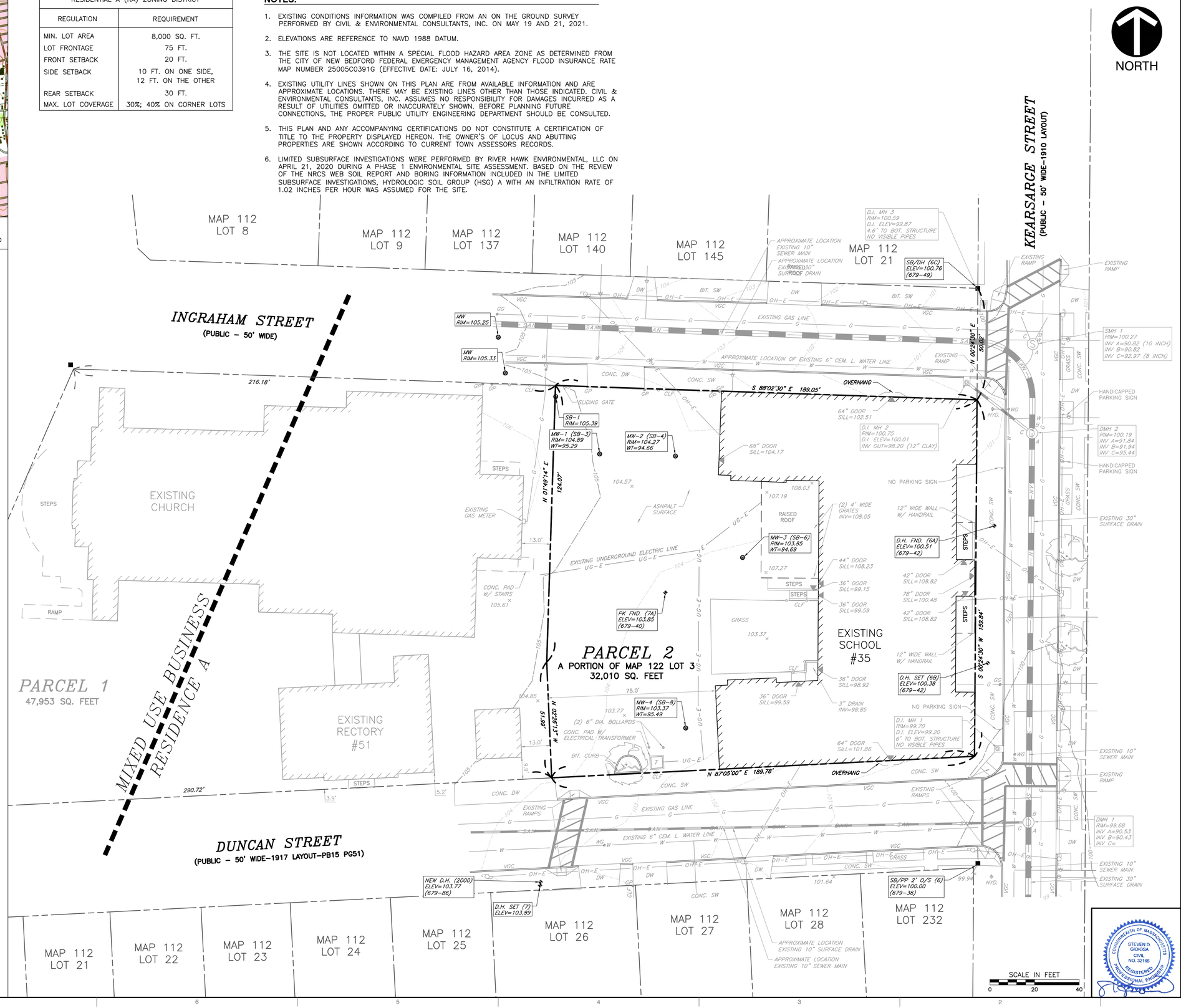
TITLE REFERENCE:
DEED BOOK: 336 PAGE: 500
DEED BOOK: 334 PAGE: 107

PLAN REFERENCE:
PLAN BOOK 2 PAGE 24
PLAN BOOK 6 PAGE 12
PLAN BOOK 3 PAGE 70
PLAN BOOK 5 PAGE 68
PLAN BOOK 14 PAGE 9
PLAN BOOK 15 PAGE 77
PLAN BOOK 16 PAGE 51
PLAN BOOK 24 PAGE 79
PLAN BOOK 24 PAGE 82

ACUSHNET AVENUE CITY LAYOUT 1899
ACUSHNET AVE/DUNCAN STREET ALTERATION CITY LAYOUT #5635, 1924

SITE LOCATION:
35 KEARSARGE STREET
NEW BEDFORD, MASSACHUSETTS

ASSESSORS REFERENCE:
APO MAP 112, LOT 3



REVISION RECORD		
NO	DATE	DESCRIPTION

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www.cecinc.com

CRUZ DEVELOPMENT CORPORATION
APO ASSESSORS MAP 112, LOT 3
35 KEARSARGE STREET
NEW BEDFORD, MASSACHUSETTS

EXISTING CONDITIONS PLAN

DATE:	AUGUST, 2021
DWG SCALE:	1" = 20'
PROJECT NO.	313-229.SV01
DRAWN BY:	T.ROSBOROUGH
CHECKED BY:	THARDMAN
APPROVED BY:	S.GIOIOSA

COMMONWEALTH OF MASSACHUSETTS
STEVEN D. GIOIOSA
CIVIL
NO. 32165
REGISTERED PROFESSIONAL ENGINEER

DRAWING NO.:
C100
SHEET 2 OF 7

Z:\New Bedford\13-6167 Diocese of Fall River Kearsarge Street\CADD\Xref\NB-13-6167-EXISTING CONDITIONS PLAN.dwg[EC-PLAN] LS(8/11/2021 - trosborough) - LP: 8/11/2021 6:20 AM

SITE LOCUS MAP

SCALE: 1" = 2000'

SCALE IN FEET
0 2000 4000

RESIDENTIAL A (RA) ZONING DISTRICT	
REGULATION	REQUIREMENT
MIN. LOT AREA	8,000 SQ. FT.
LOT FRONTAGE	75 FT.
FRONT SETBACK	20 FT.
SIDE SETBACK	10 FT. ON ONE SIDE, 12 FT. ON THE OTHER
REAR SETBACK	30 FT.
MAX. LOT COVERAGE	30%; 40% ON CORNER LOTS

PARKING TABLE		
REGULATION	REQUIREMENT	PROPOSED
MIN. PARKING SPACES	2 SPACES/UNIT = 68	35
MIN. ADA SPACES	2	2
MIN. LOADING	1	0

NOTES:

1. ADA REQUIREMENT IS 2 SPACES FOR 26 TO 50 PROVIDED PARKING SPACES PER SECTION 208.2 OF THE AMERICANS WITH DISABILITIES ACT.
2. PER SECTION 208.2.4 OF THE AMERICAN WITH DISABILITIES ACT, FOR EVERY SIX OR FRACTION OF SIX PARKING SPACES REQUIRED BY 208.2 TO COMPLY WITH 502, AT LEAST ONE SHALL BE A VAN PARKING SPACE COMPLYING WITH 502.

NOTES:

1. EXISTING CONDITIONS INFORMATION WAS COMPILED FROM AN ON THE GROUND SURVEY PERFORMED BY CIVIL & ENVIRONMENTAL CONSULTANTS, INC. ON MAY 19 AND 21, 2021.
2. ELEVATIONS ARE REFERENCE TO NAVD 1988 DATUM.
3. THE SITE IS NOT LOCATED WITHIN A SPECIAL FLOOD HAZARD AREA ZONE AS DETERMINED FROM THE CITY OF NEW BEDFORD FEDERAL EMERGENCY MANAGEMENT AGENCY FLOOD INSURANCE RATE MAP NUMBER 25005C0391G (EFFECTIVE DATE: JULY 16, 2014).
4. EXISTING UTILITY LINES SHOWN ON THIS PLAN ARE FROM AVAILABLE INFORMATION AND ARE APPROXIMATE LOCATIONS. THERE MAY BE EXISTING LINES OTHER THAN THOSE INDICATED. CIVIL & ENVIRONMENTAL CONSULTANTS, INC. ASSUMES NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED OR INACCURATELY SHOWN. BEFORE PLANNING FUTURE CONNECTIONS, THE PROPER PUBLIC UTILITY ENGINEERING DEPARTMENT SHOULD BE CONSULTED.
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6. DIRECT ACCESS TO TRASH DISPOSAL AREA FOR GARBAGE PICKUP IS NOT PROPOSED. TRASH DUMPSTERS WILL BE WHEELED OUT INTO PARKING LOT FOR GARBAGE TRUCK PICKUP.
7. SITE LIGHTING IS PRELIMINARY AND IS SHOWN FOR REFERENCE. FINAL LOCATIONS, FIXTURES, HEIGHTS AND APPURTENANCES TO BE COORDINATED WITH SITE LIGHTING CONSULTANT.

LEGEND:

- EXISTING SUBJECT PROPERTY LINE
- EXISTING CHAIN LINK FENCE LINE
- EXISTING CURB
- EXISTING EDGE OF PAVEMENT
- EXISTING STRUCTURE
- EXISTING SIGN
- EXISTING DECIDUOUS TREE
- PROPOSED CURB
- PROPOSED SIGN
- PROPOSED STRIPING
- PROPOSED SINGLE LIGHT POLE
- BIT — BITUMINOUS
- CLF — CHAIN LINK FENCE
- CONC — CONCRETE
- DW — DRIVEWAY
- GP — GATE POST
- SW — SIDEWALK
- VGC — VERTICAL GRANITE CURB
- STONE BOUND
- TRAVERSE POINT

SIGN CHART

SITE	M.U.T.C.D. Code	Height	Width
STOP	R1-1	30"	30"
RESERVED PARKING	R7-8	18"	12"
VAN ACCESSIBLE	R7-8a	6"	12"

OWNER:

ROMAN CATHOLIC BISHOP OF FALL RIVER
P.O. BOX 2577
FALL RIVER, MA 02722

APPLICANT:

CRUZ DEVELOPMENT CORPORATION
1 JOHN ELIOT SQUARE
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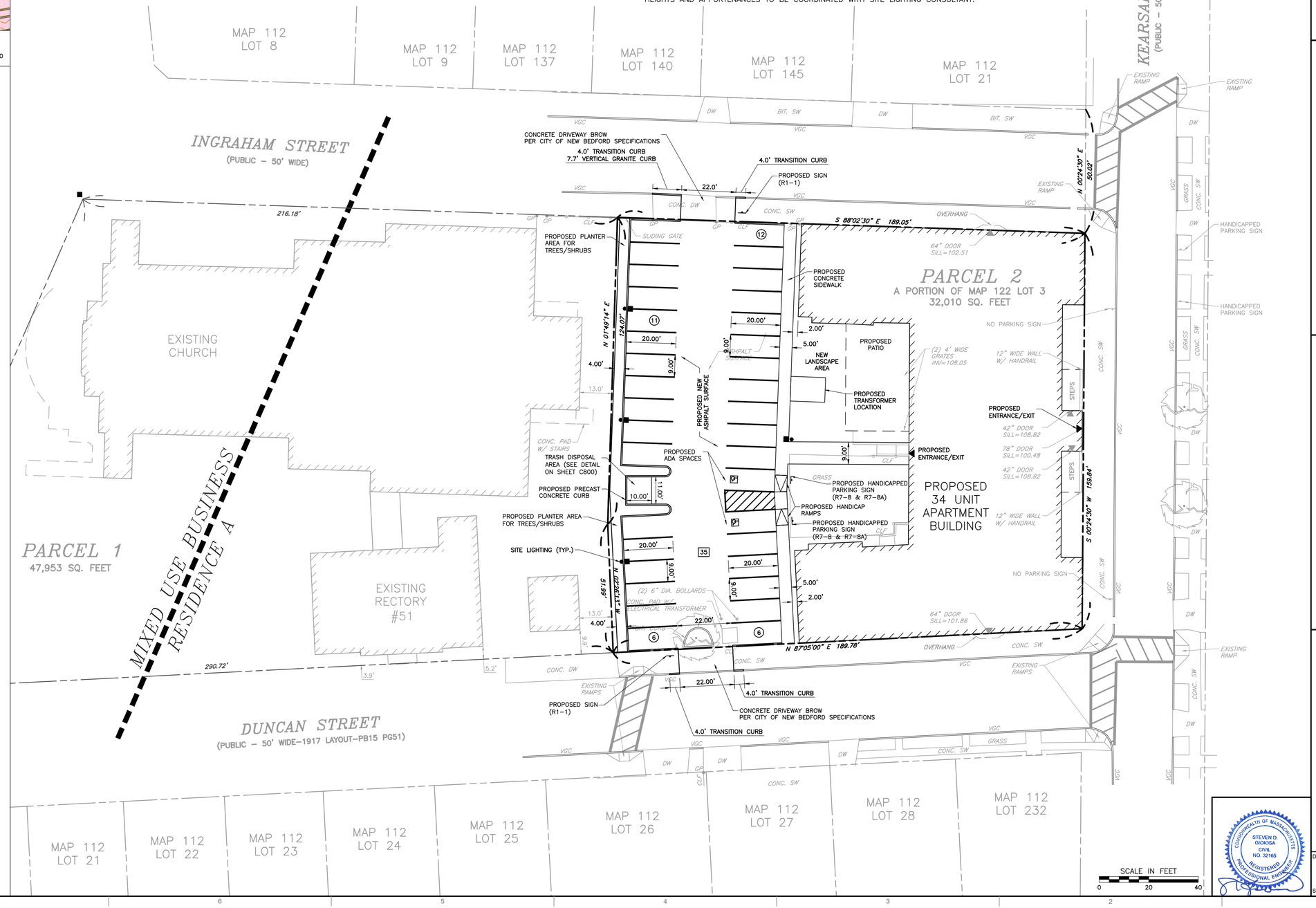
ACUSHNET AVENUE CITY LAYOUT 1899
ACUSHNET AVE/DUNCAN STREET ALTERATION
CITY LAYOUT #5635, 1924

SITE LOCATION:
35 KEARSARGE STREET
NEW BEDFORD, MASSACHUSETTS

ASSESSORS REFERENCE:
APO MAP 112, LOT 3



REVISION RECORD

NO	DATE	DESCRIPTION

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CRUZ DEVELOPMENT CORPORATION
APO ASSESSORS MAP 112, LOT 3
35 KEARSARGE STREET
NEW BEDFORD, MASSACHUSETTS

LAYOUT & MATERIALS PLAN

DATE:	AUGUST, 2021
DRAWN BY:	T.ROSBOROUGH
DWG SCALE:	1"=20'
CHECKED BY:	D.AGUIAR
PROJECT NO:	313-229.CV01
APPROVED BY:	S.GIOIOSA

COMMONWEALTH OF MASSACHUSETTS
STEVEN D. GIOIOSA
CIVIL
NO. 32165
REGISTERED PROFESSIONAL ENGINEER

DRAWING NO.:
C200
SHEET 3 OF 7

Z:\New Bedford\15-8167 Diocese of Fall River Kearsarge Street\400\CIVIL\30430-CV01-C200 Layout Plan.dwg[C200] LS:8/11/2021 - trosborough - LP: 8/11/2021 5:40 AM

SITE LOCUS MAP

SCALE: 1" = 2000'

SCALE IN FEET: 0 2000 4000

LEGEND:

- EXISTING SUBJECT PROPERTY LINE
- EXISTING CHAIN LINK FENCE LINE
- EXISTING CURB
- EXISTING EDGE OF PAVEMENT
- EXISTING STRUCTURE
- EXISTING DECIDUOUS TREE
- PROPOSED CURB
- PROPOSED STRIPING
- PROPOSED SINGLE LIGHT POLE
- 380 PROPOSED INDEX (MAJOR) CONTOUR
- 381 PROPOSED INTERMEDIATE (MINOR) CONTOUR
- 595.68 PROPOSED SPOT ELEVATION
- TSW=101.0 / BSW=100.0 TOP OF SIDEWALK ELEVATION / BOTTOM OF SIDEWALK ELEVATION
- SAN PROPOSED SANITARY SEWER
- PROPOSED BACKFLOW PREVENTOR
- W PROPOSED WATER LINE
- PROPOSED WATER GATE VALVE
- UG-E PROPOSED UNDERGROUND ELECTRIC
- PROPOSED STORMCEPTOR STC-900
- PROPOSED STORM DRAIN
- PROPOSED TRENCH DRAIN

GENERAL NOTES:

1. EXISTING CONDITIONS INFORMATION WAS COMPILED FROM AN ON THE GROUND SURVEY PERFORMED BY CIVIL & ENVIRONMENTAL CONSULTANTS, INC. ON MAY 19 AND 21, 2021.
2. ELEVATIONS ARE REFERENCE TO NAVD 1988 DATUM.
3. THE SITE IS NOT LOCATED WITHIN A SPECIAL FLOOD HAZARD AREA ZONE AS DETERMINED FROM THE TOWN OF NEW BEDFORD FEDERAL EMERGENCY MANAGEMENT AGENCY FLOOD INSURANCE RATE MAP NUMBER 25005C0391G (EFFECTIVE DATE: JULY 16, 2014).
4. EXISTING UTILITY LINES SHOWN ON THIS PLAN ARE FROM AVAILABLE INFORMATION AND ARE APPROXIMATE LOCATIONS. THERE MAY BE EXISTING LINES OTHER THAN THOSE INDICATED. CIVIL & ENVIRONMENTAL CONSULTANTS, INC. ASSUMES NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED OR INACCURATELY SHOWN. BEFORE PLANNING FUTURE CONNECTIONS, THE PROPER PUBLIC UTILITY ENGINEERING DEPARTMENT SHOULD BE CONSULTED.
5. THIS PLAN AND ANY ACCOMPANYING CERTIFICATIONS DO NOT CONSTITUTE A CERTIFICATION OF TITLE TO THE PROPERTY DISPLAYED HEREON. THE OWNER'S OF LOCUS AND ABUTTING PROPERTIES ARE SHOWN ACCORDING TO CURRENT TOWN ASSESSORS RECORDS.
6. SITE LIGHTING IS PRELIMINARY AND IS SHOWN FOR REFERENCE. FINAL LOCATIONS, FIXTURES, HEIGHTS AND APPURTENANCES TO BE COORDINATED WITH SITE LIGHTING CONSULTANT.
7. THE CONTRACTOR SHALL CALL DIGSAFE AT 1-888-344-7233 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.
8. ALL CONSTRUCTION SHALL COMPLY WITH THE CITY OF NEW BEDFORD PLANNING BOARD, DEPARTMENT OF PUBLIC INFRASTRUCTURE RULES AND REGULATIONS.
9. SIZES AND LOCATIONS OF PROPOSED UTILITY SERVICES ARE PRELIMINARY ONLY AND SHALL BE COORDINATED WITH MEP ENGINEER PRIOR TO FINAL DESIGN.
10. EXISTING SANITARY SEWER, STORM DRAIN, AND WATER MAIN LOCATION AND SIZE BASED ON HISTORIC RECORD INFORMATION, PROVIDED BY THE CITY OF NEW BEDFORD DEPARTMENT OF PUBLIC INFRASTRUCTURE.
11. THE PATCHING OF INGRAHAM STREET SHALL BE IN CONFORMANCE WITH THE SPECIFICATIONS OF THE CITY OF NEW BEDFORD OPENING PROCEDURES.
12. MAGNETIC TRACE TAPE SHALL BE PLACED OVER BOTH WATER AND SEWER SERVICE CONNECTIONS.
13. ALL WATER AND SEWER WORK SHALL BE PERFORMED ACCORDING TO THE STANDARD SPECIFICATIONS OF CONSTRUCTION FOR THE CITY OF NEW BEDFORD.
14. ONLY NEW MATERIALS SHALL BE INCORPORATED IN THE WORK. ALL MATERIALS SHALL BE SUBJECT TO THE INSPECTION AND APPROVAL OF THE SUPERINTENDENT. THE CONTRACTOR SHALL SUBMIT TO THE SUPERINTENDENT DATA RELATING TO MATERIALS PROPOSED TO BE FURNISHED FOR THE WORK. SUCH DATA SHALL BE IN SUFFICIENT DETAIL TO IDENTIFY THE PARTICULAR PRODUCT AND TO FORM AN OPINION AS TO ITS CONFORMITY TO THE SPECIFICATIONS. THE CONTRACTOR SHALL SUBMIT DATA AND SAMPLES EARLY ENOUGH TO PERMIT CONSTRUCTION AND APPROVAL BEFORE MATERIALS ARE NECESSARY FOR INCORPORATION IN THE WORK.
15. BUILDING CONNECTIONS SHALL BE BEDDED IN 3/4 INCH CRUSHED STONE TO AT LEAST ONE-HALF THE PIPE DIAMETER.
16. THE SANITARY SEWER AND WATER SERVICE SHALL BE LAID IN SEPERATE TRENCHES AT LEAST 10 FEET APART.
17. AN 18" VERTICAL SEPARATION IS REQUIRED BETWEEN SEWER AND WATER MAINS. WHERE THIS IS NOT POSSIBLE DUE TO SITE CONDITIONS, THE CONSTRUCTION OF THE SEWER MAINS AT WATER LINE CROSSINGS SHALL BE PERFORMED IN ACCORDANCE WITH THE PROVISIONS SET FORTH IN NEIWPCC'S TR-16, DATED 1998.
18. ALL SEWER IS TO BE INSTALLED IN COMPLIANCE WITH THE RULES AND REGULATIONS SPECIFIED BY THE SOMERSET SEWER COMMISSION.

SEWAGE AND WATER GENERATION:

1. ESTIMATED SEWER GENERATION FOR RESIDENTIAL USE = 110 GPD/UNIT
   37 BEDROOMS X 110 GPD/UNIT = 4070 GPD SEWER DISCHARGE
2. ESTIMATED WATER GENERATION IS BASED ON APPLYING A 10% INCREASE TO THE CALCULATED SEWAGE DISCHARGE.
   4070 GPD (SEWER DISCHARGE) X 110% = 4477 GPD WATER DEMAND

OWNER:

ROMAN CATHOLIC BISHOP OF FALL RIVER
P.O. BOX 2577
FALL RIVER, MA 02722

APPLICANT:

CRUZ DEVELOPMENT CORPORATION
1 JOHN ELIOT SQUARE
ROXBURY, MA 02119

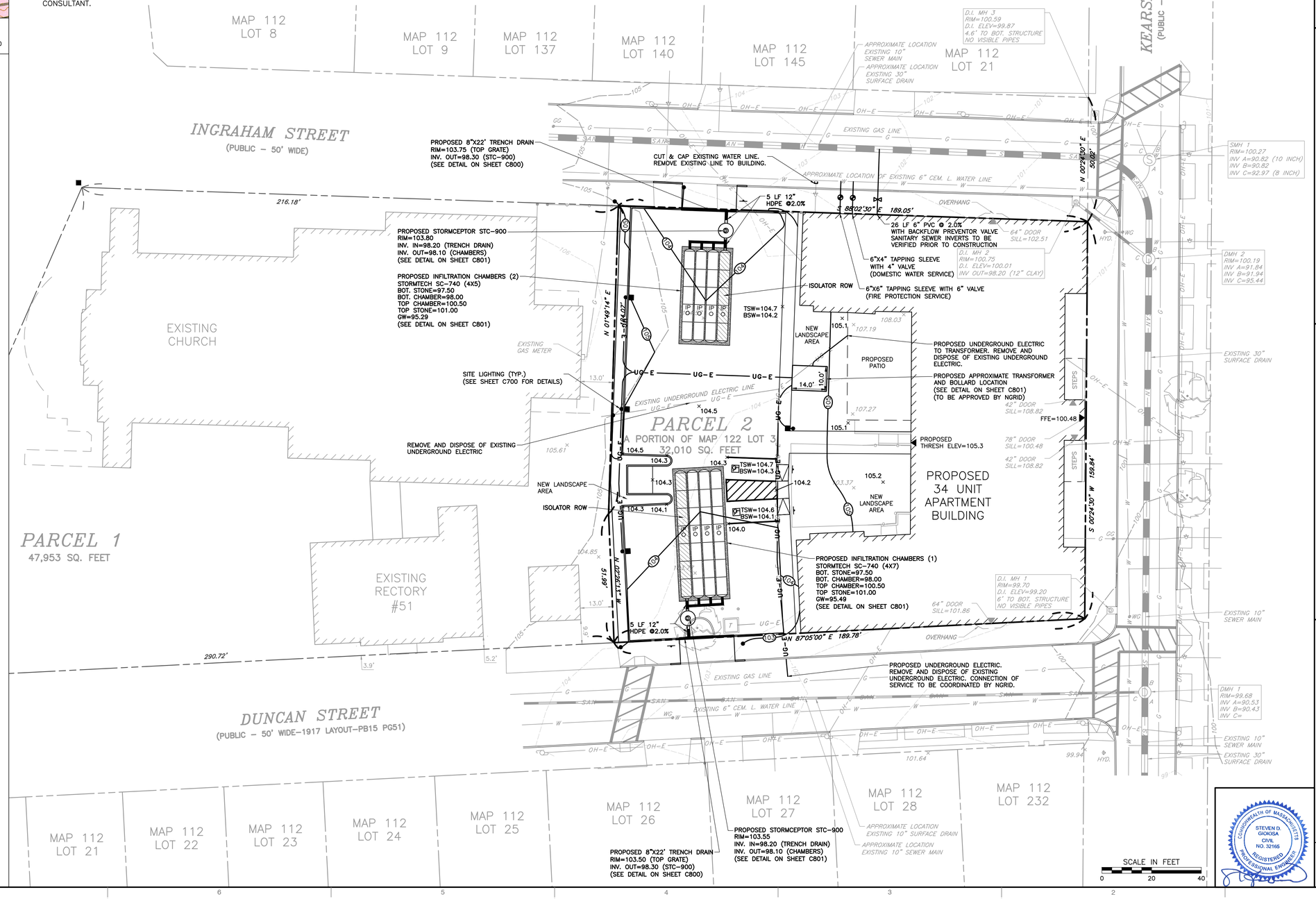
TITLE REFERENCE:
DEED BOOK: 336 PAGE: 500
DEED BOOK: 334 PAGE: 107

PLAN REFERENCE:
PLAN BOOK 2 PAGE 24
PLAN BOOK 6 PAGE 12
PLAN BOOK 3 PAGE 70
PLAN BOOK 5 PAGE 68
PLAN BOOK 14 PAGE 9
PLAN BOOK 15 PAGE 77
PLAN BOOK 16 PAGE 51
PLAN BOOK 24 PAGE 79
PLAN BOOK 24 PAGE 82

ACUSHNET AVENUE CITY LAYOUT 1899
ACUSHNET AVE/DUNCAN STREET ALTERATION
CITY LAYOUT #5635, 1924

SITE LOCATION:
35 KEARSARGE STREET
NEW BEDFORD, MASSACHUSETTS

ASSESSORS REFERENCE:
APO MAP 112, LOT 3



COMMONWEALTH OF MASSACHUSETTS
STEVEN D. GIOIOSA
CIVIL
NO. 32165
REGISTERED PROFESSIONAL ENGINEER

REVISION RECORD

NO	DATE	DESCRIPTION

SITEC
Part of Civil & Environmental Consultants, Inc.
449 Faunce Corner Road · Dartmouth, MA 02747
Ph: 508.998.2125 · Fax: 508.998.7554
www.cecinc.com

CRUZ DEVELOPMENT CORPORATION
APO ASSESSORS MAP 112, LOT 3
35 KEARSARGE STREET
NEW BEDFORD, MASSACHUSETTS

GRADING, DRAINAGE AND UTILITIES PLAN

DATE:	AUGUST, 2021
DRAWN BY:	T.ROSBOROUGH
DWG SCALE:	1" = 20'
CHECKED BY:	D.AGUIAR
PROJECT NO:	313-229.CV01
APPROVED BY:	S.GIOIOSA

DRAWING NO.: C500
SHEET 4 OF 7

Z:\New Bedford\13-8167 Diocese of Fall River Kearsarge Street\CAD\CIVIL\30x42\c-C501-C500 Utility Plan.dwg[C500] LS:(8/11/2021 - Trasborough) - LP: 8/11/2021 8:51 AM

SITE LOCUS MAP

SCALE: 1" = 2000'

SCALE IN FEET
0 2000 4000

PLANT LIST			
IG	23	ILEX GLABRA 'COMPACTA'	2 GALLON CONTAINER
		COMPACT INKBERRY	
JC	8	JUNIPERUS CH. PFITZERIANA 'COMPACTA'	2 GALLON CONTAINER
		COMPACT PFITZER JUNIPER	

LIGHTING NOTES:

1. POLE LIGHTS: BEGA MANUFACTURING MODEL # 77 911 (SINGLE) (15' POLE HEIGHT)

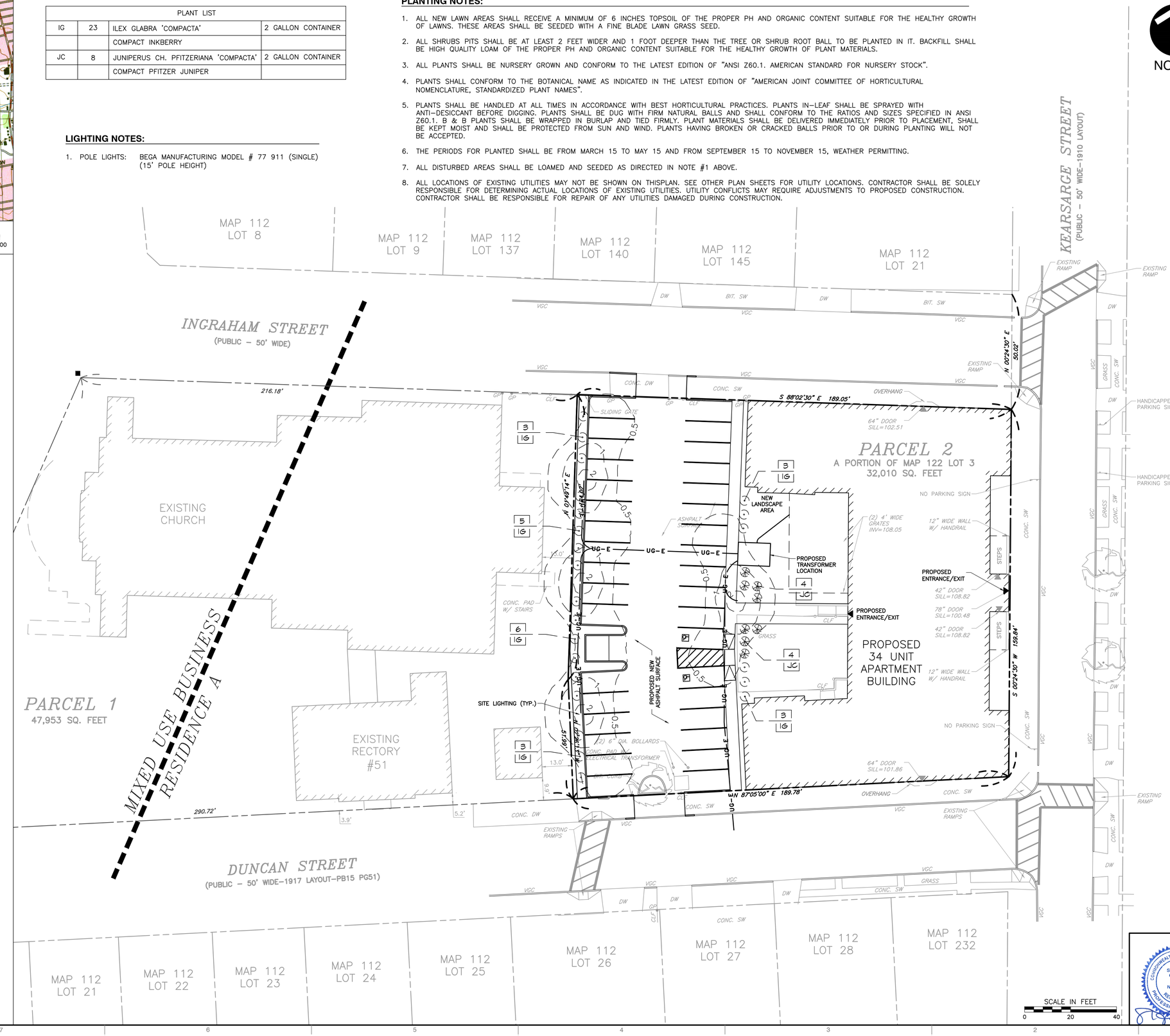
PLANTING NOTES:

1. ALL NEW LAWN AREAS SHALL RECEIVE A MINIMUM OF 6 INCHES TOPSOIL OF THE PROPER PH AND ORGANIC CONTENT SUITABLE FOR THE HEALTHY GROWTH OF LAWNS. THESE AREAS SHALL BE SEEDED WITH A FINE BLADE LAWN GRASS SEED.
2. ALL SHRUBS PITS SHALL BE AT LEAST 2 FEET WIDER AND 1 FOOT DEEPER THAN THE TREE OR SHRUB ROOT BALL TO BE PLANTED IN IT. BACKFILL SHALL BE HIGH QUALITY LOAM OF THE PROPER PH AND ORGANIC CONTENT SUITABLE FOR THE HEALTHY GROWTH OF PLANT MATERIALS.
3. ALL PLANTS SHALL BE NURSERY GROWN AND CONFORM TO THE LATEST EDITION OF "ANSI Z60.1. AMERICAN STANDARD FOR NURSERY STOCK".
4. PLANTS SHALL CONFORM TO THE BOTANICAL NAME AS INDICATED IN THE LATEST EDITION OF "AMERICAN JOINT COMMITTEE OF HORTICULTURAL NOMENCLATURE, STANDARDIZED PLANT NAMES".
5. PLANTS SHALL BE HANDLED AT ALL TIMES IN ACCORDANCE WITH BEST HORTICULTURAL PRACTICES. PLANTS IN-LEAF SHALL BE SPRAYED WITH ANTI-DESICCANT BEFORE DIGGING. PLANTS SHALL BE DUG WITH FIRM NATURAL BALLS AND SHALL CONFORM TO THE RATIOS AND SIZES SPECIFIED IN ANSI Z60.1. B & B PLANTS SHALL BE WRAPPED IN BURLAP AND TIED FIRMLY. PLANT MATERIALS SHALL BE DELIVERED IMMEDIATELY PRIOR TO PLACEMENT, SHALL BE KEPT MOIST AND SHALL BE PROTECTED FROM SUN AND WIND. PLANTS HAVING BROKEN OR CRACKED BALLS PRIOR TO OR DURING PLANTING WILL NOT BE ACCEPTED.
6. THE PERIODS FOR PLANTED SHALL BE FROM MARCH 15 TO MAY 15 AND FROM SEPTEMBER 15 TO NOVEMBER 15, WEATHER PERMITTING.
7. ALL DISTURBED AREAS SHALL BE LOAMED AND SEEDED AS DIRECTED IN NOTE #1 ABOVE.
8. ALL LOCATIONS OF EXISTING UTILITIES MAY NOT BE SHOWN ON THISPLAN. SEE OTHER PLAN SHEETS FOR UTILITY LOCATIONS. CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR DETERMINING ACTUAL LOCATIONS OF EXISTING UTILITIES. UTILITY CONFLICTS MAY REQUIRE ADJUSTMENTS TO PROPOSED CONSTRUCTION. CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR OF ANY UTILITIES DAMAGED DURING CONSTRUCTION.

LEGEND:

- EXISTING SUBJECT PROPERTY LINE
- EXISTING CHAIN LINK FENCE LINE
- EXISTING CURB
- EXISTING EDGE OF PAVEMENT
- EXISTING STRUCTURE
- EXISTING DECIDUOUS TREE
- PROPOSED CURB
- PROPOSED STRIPING
- PROPOSED SINGLE LIGHT POLE
- 2 PROPOSED FOOTCANDLES
- PROPOSED COMPACT INKBERRY (IG)
- PROPOSED COMPACT PFITZER JUNIPER (JC)
- UG-E PROPOSED UNDERGROUND ELECTRIC
- BIT BITUMINOUS
- CLF CHAIN LINK FENCE
- CONC CONCRETE
- DW DRIVEWAY
- GP GATE POST
- SW SIDEWALK
- VGC VERTICAL GRANITE CURB

SHRUB PLANTING
NOT TO SCALE



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APO MAP 112, LOT 3

STEVEN D. GIOIOSA
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COMMONWEALTH OF MASSACHUSETTS

REVISION RECORD

NO	DATE	DESCRIPTION

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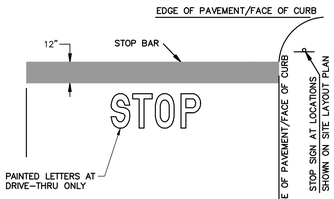
CRUZ DEVELOPMENT CORPORATION
APO ASSESSORS MAP 112, LOT 3
35 KEARSARGE STREET
NEW BEDFORD, MASSACHUSETTS

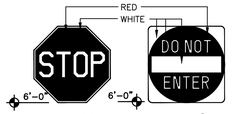
LIGHTING AND LANDSCAPING PLAN

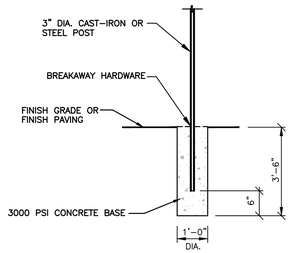
DATE:	AUGUST, 2021
DWG SCALE:	1"=20'
PROJECT NO:	313-229.CV01
DRAWN BY:	T.ROSBOROUGH
CHECKED BY:	D.AGUIAR
APPROVED BY:	S.GIOIOSA

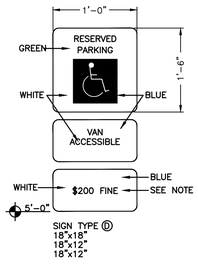
DRAWING NO.:
C700
SHEET 5 OF 7

Z:\New Bedford\15-6167 Diocese of Fall River Kearsarge Street\CAD\Civil\30435-CV01-C700 Lighting and Landscaping Plan.dwg(C700) LS(8/11/2021 - trosborough) - LP: 8/11/2021 8:50 AM





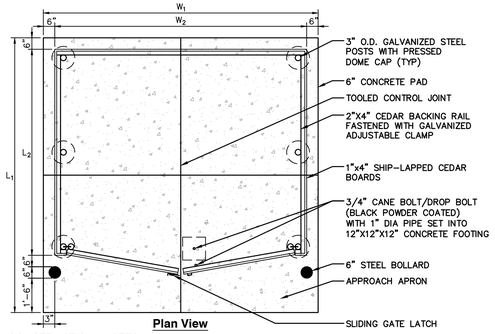




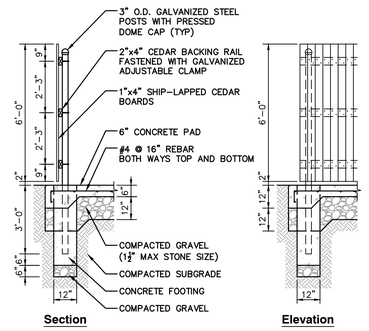
CONSTRUCTION NOTES:

1. SET POSTS IN CONCRETE TO A MINIMUM DEPTH OF 36". SIGN PANELS SHALL BE 0.100 ALUMINUM WITH RAISED OR SILKSCREEN COPY.
2. FOR POST MOUNTING, USE NON-CORROSIVE 3/8" 2. MACHINE BOLTS W/ WASHERS, 2 PER SIGN; OR IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
3. FOR WALL MOUNTING, USE NON-CORROSIVE 3/8" LAG BOLTS W/ LEAD EXPANSION SHIELD, 4 PER SIGN.
4. ALL TRAFFIC CONTROL SIGNS, SIGN POSTS, AND SIGN HARDWARE SHALL SATISFY THE REQUIREMENTS OF MASS DOT STANDARD SPECIFICATIONS
5. ALL ACCESSIBLE PARKING SIGNAGE IS TO BE INSTALLED WITH THE BOTTOM EDGE OF THE LOWEST SIGN AT LEAST 60" ABOVE FINISHED GRADE.
6. FINE AMOUNT SHALL BE DISPLAYED IN ACCORDANCE WITH LOCAL LAW. THE AMOUNT SHOWN HEREON IS REPRESENTATIVE ONLY. COORDINATE POSTING OF FINE AMOUNT WITH LOCAL LAW ENFORCEMENT AGENCY.
7. STOP BAR MUST BE PAINTED WHITE

1/800 **SIGNS**
N.T.S.



Plan View



Section Elevation

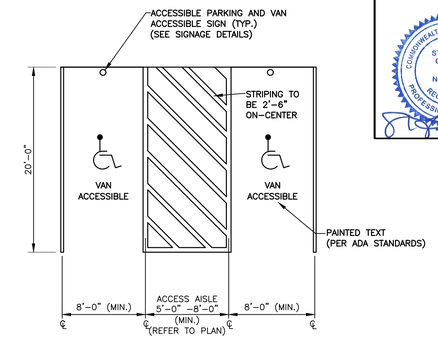
CONSTRUCTION NOTES

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.

Table of Dimensions

DUMPSTER DESIGNATION	L_1	L_2	W_1	W_2
DUMPSTER 1	12'-0"	10'-0"	11'-0"	10'-0"

2/800 **DUMPSTER PAD WITH ENCLOSURE**
N.T.S.

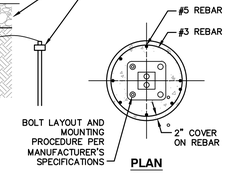


CONSTRUCTION NOTES:

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

3/800 **ACCESSIBLE PARKING STALL MARKING DETAIL**
N.T.S.

SECTION



PLAN

CONSTRUCTION NOTES

1. LIGHT POLE FOUNDATION DESIGN IS SUBJECT TO CHANGE BASED ON FINAL POLE HEIGHT AND FIXTURE SELECTION AND GEOTECHNICAL SITE INVESTIGATIONS.
2. LIGHT POLE FOUNDATION TO BE PRECAST CONCRETE, MINIMUM 4,000 PSI. UNDERGROUND CONDUIT SHALL BE SCHEDULE 40 PVC.
3. HEIGHT (H) OF FOUNDATION ABOVE FINISHED GRADE TO BE 6 INCHES IN LANDSCAPED AREAS, 30 INCHES IN VEHICULAR AREAS, AND FLUSH IN SIDEWALKS.

4/800 **LIGHTPOLE FOUNDATION DETAIL**
N.T.S.

CONSTRUCTION NOTES

1. CEMENT CONCRETE SHALL BE 4,000 PSI-TYPE II.
2. PROVIDE EXPANSION JOINTS AT A MINIMUM 30 FEET ON-CENTER WITH PRE-FORMED EXPANSION JOINT FILLER AND SEALER.
3. PROVIDE TOOLED CONTROL JOINTS AT A MINIMUM SIX (6) FEET ON-CENTER.
4. PROVIDE BROOM FINISH IN DIRECTION PERPENDICULAR TO CURB.
5. 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).
6. 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.
7. 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.
8. FOR ACCESSIBLE ROUTES, A MINIMUM CLEARANCE OF THREE (3) FEET SHALL BE MAINTAINED AT ANY PERMANENT OBSTACLE; HYDRANTS, UTILITY POLES, SIGN POSTS, ETC.

5/800 **CONCRETE WALK-CURB**
N.T.S.

Expansion Joint Detail

Expansion Joint Detail Section View

CONSTRUCTION NOTES

1. TRENCH DRAIN SHALL BE HEAVY DUTY TYPE DESIGNED FOR HS-20 LOADING.
2. CONCRETE SHALL BE COMPRESSIVE STRENGTH 4000 PSI, TYPE II CEMENT.
3. TRENCH DRAIN GRATE SHALL MEET AMERICANS WITH DISABILITY ACT (ADA) REGULATIONS WHEN PLACES IN ACCESSIBLE ROUTES.
4. METHOD OF INSTALLATION SHALL BE AS PER MANUFACTURER'S RECOMMENDATIONS

6/800 **TRENCH DRAIN**
N.T.S.

CONSTRUCTION NOTES

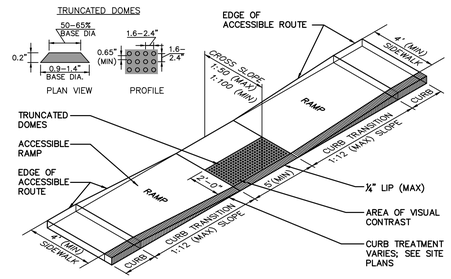
1. WHERE UTILITY TRENCHES ARE CONSTRUCTED THROUGH DETENTION BASIN BERMS OR OTHER SUCH SPECIAL SECTIONS, PLACE TRENCH BACKFILL WITH MATERIALS SIMILAR TO THE SPECIAL SECTION REQUIREMENTS.
2. USE METALLIC TRACING/WARNING TAPE OVER ALL PIPES.
3. FOR HIGH DENSITY POLYETHYLENE (HDPE) PIPE, DIMENSION IS 24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

7/800 **UTILITY TRENCH**
N.T.S.

NOTES:

REFER TO STRUCTURAL PLANS FOR MODIFICATIONS TO BOLLARD EMBEDMENT OR ATTACHMENT ABOVE GARAGE SLAB.

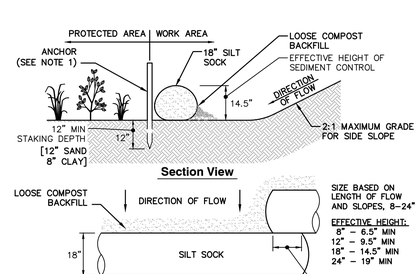
8/800 **BOLLARD**
N.T.S.



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.

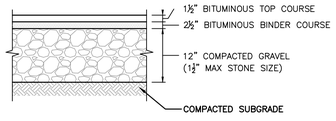
11/800 **ACCESSIBLE CURB RAMP (TYPE "A")**
N.T.S.



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.

12/800 **SILT SOCK EROSION CONTROL BARRIER**
N.T.S.

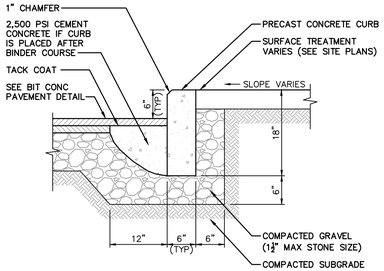


STANDARD DUTY FLEXIBLE PAVEMENT

CONSTRUCTION NOTES

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

9/800 **BITUMINOUS CONCRETE PAVEMENT**
N.T.S.



10/800 **PRECAST CONCRETE CURB**
N.T.S.

REVISION RECORD

NO	DATE	DESCRIPTION

SITEC
Part of Civil & Environmental Consultants, Inc.
449 Faunce Corner Road · Dartmouth, MA 02747
Ph: 508.998.2125 · Fax: 508.998.7554
www.ceciinc.com

CRUZ DEVELOPMENT CORPORATION
APO ASSESSORS MAP 112, LOT 3
35 KEARSARGE STREET
NEW BEDFORD, MASSACHUSETTS

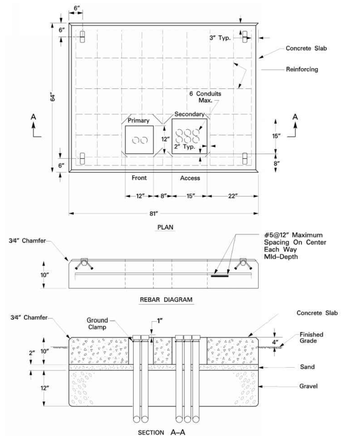
CONSTRUCTION DETAILS

DATE:	AUGUST, 2021
DWG SCALE:	AS SHOWN
PROJECT NO:	313-229.CV01
DRAWN BY:	T.ROSBOROUGH
CHECKED BY:	D.AGUIAR
APPROVED BY:	S.GIOIOSA

DRAWING NO.: C800
SHEET 6 OF 7

Z:\New Bedford\15-6167 Diocese of Fall River, Kearsarge Street\0400\CIVIL\30443-CV01-C800 Detail Sheets.dwg(C800) LS:(8/10/2021 - tosborough) - LP: 8/10/2021 6:38 PM

Figure 27.0-1 15kV Transformer Pad 75- 500kVA 44-113 (ref-44-113/UF8A)



CONSTRUCTION NOTES

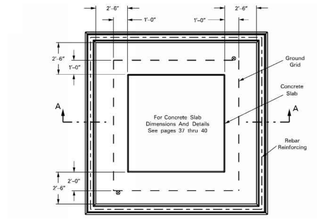
1. DETAIL SHOWN FOR REFERENCE ONLY. REFER TO LATEST EDITION OF NATIONAL GRID SPECIFICATIONS FOR LATEST AUTHORIZED VERSION.
2. CONTRACTOR TO REVIEW NATIONAL GRID STANDARDS AND SHALL INSTALL ALL ELECTRIC EQUIPMENT IN ACCORDANCE WITH NATIONAL GRID STANDARDS AND DETAILS. AUTHORIZATION FROM NATIONAL GRID IS REQUIRED PRIOR TO CONSTRUCTION.

1 801 CONCRETE PAD - TRANSFORMER

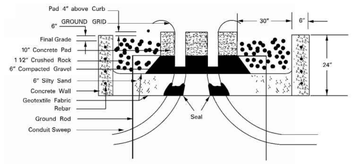
N.T.S.

National Grid / Supplement to Specifications for Electrical Installations / ESB 759B July 2010

Containment Area Plan View



Typical Cross Section of Containment Pad A-A



CONSTRUCTION NOTES

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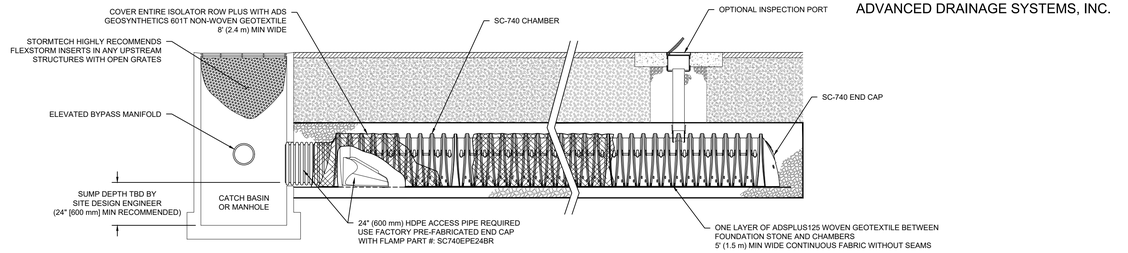
2. CONTRACTOR TO REVIEW NATIONAL GRID STANDARDS AND SHALL INSTALL ALL ELECTRIC EQUIPMENT IN ACCORDANCE WITH NATIONAL GRID STANDARDS AND DETAILS. AUTHORIZATION FROM NATIONAL GRID IS REQUIRED PRIOR TO CONSTRUCTION.

2 801 TYPICAL OIL CONTAINMENT - TRANSFORMER

N.T.S.



SC-740 ISOLATOR ROW PLUS DETAIL

NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

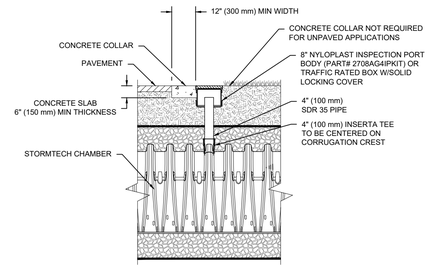
STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



NOTE:
INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION CREST.

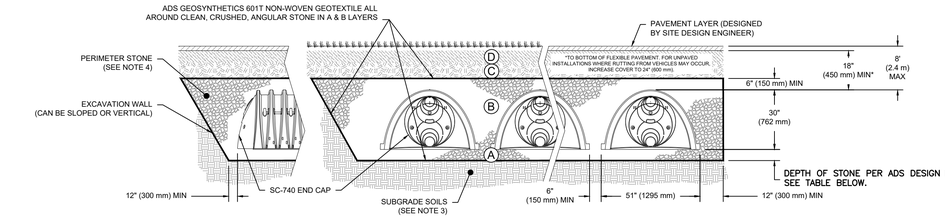
4" PVC INSPECTION PORT DETAIL (SC SERIES CHAMBER)

NTS

ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



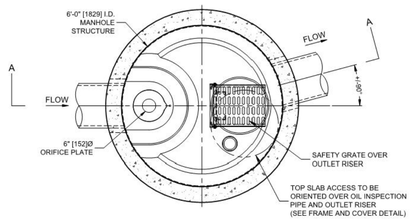
	INFILTRATION CHAMBER SYSTEM (1) INFORMATION	INFILTRATION CHAMBER SYSTEM (2) INFORMATION
	ELEV.	ELEV.
BOTTOM OF STONE	97.50	97.50
BOTTOM OF CHAMBER	98.00	98.00
TOP OF STONE	101.00	101.00
TOP OF CHAMBER	100.50	100.50
ASSUMED GW ELEV	95.49	95.29

NOTES:

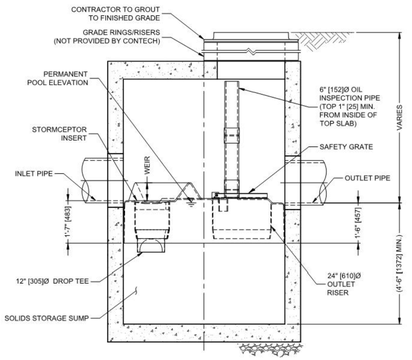
1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 550 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
6. SOIL CONDITIONS IN THE PROPOSED CHAMBER LOCATIONS SHALL BE REVIEWED BY A LICENSED SOIL EVALUATOR PRIOR TO INSTALLATION. UNSUITABLE UNDERLYING MATERIAL SHALL BE REMOVED AND REPLACED AS REQUIRED.

4 801 STORMTECH SC-740 TYPICAL DETAIL

N.T.S.



PLAN VIEW
TOP SLAB NOT SHOWN



SECTION A-A

Stormceptor®
FOR PATENT INFORMATION, GO TO www.ContechES.com/SP

FRAME AND COVER
(MAY VARY)
NOT TO SCALE

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

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

3 801 WATER QUALITY UNIT (900)

N.T.S.

ADS®
ADVANCED DRAINAGE SYSTEMS, INC.

REVISION RECORD

NO	DATE	DESCRIPTION

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PROJECT NO:			313-229.CV01
APPROVED BY:			S.GIOIOSA

COMMONWEALTH OF MASSACHUSETTS
STEVEN D. GIOIOSA
CIVIL
NO. 32165
REGISTERED PROFESSIONAL ENGINEER

DRAWING NO.:
C801
SHEET 7 OF 7

Z:\New Bedford\15-6167 Dioceses of Fall River Kearsarge Street\CAD\CV01\30435-CV01-C800 Detail Sheets.dwg[2021] LS(8/10/2021 - trosborough) - LP: 8/10/2021 6:49 PM