Notice of Intent

DPW Fueling Facility
Sudbury, MA

March 2019

Prepared for:
Town of Sudbury

Submitted to:
Sudbury Conservation Commission

Weston & Sampson
Five Centennial Drive
Peabody, MA 01960-7985
www.westonandsampson.com
Tel: 978-532-1900
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Weston & Sampson SM

5 Centennial Drive, Peabody, MA 01960 (HQ)
Tel: 978.532.1900

Sudbury – DPW Fueling Facility
WSE Project No. 2180684.A

March 18, 2019

Sudbury Conservation Commission
275 Old Lancaster Road
Sudbury, MA 01776

Re: NOI Filing
DPW Fueling Facility
275 Old Lancaster Road

Dear Members of the Commission:

On behalf of the Town of Sudbury, Weston & Sampson Engineers, Inc. is hereby enclosing one (1) hardcopy of the Notice of Intent submittal (including plans) and one electronic copy to fulfill the requirements of the Massachusetts Wetlands Protection Act, M.G.L. Chapter 131, Section 40 submittal requirements and the Town of Sudbury submittal requirements. This submittal is a formal Notice of Intent for the new DPW Fueling Facility at 275 Old Lancaster Road.

As part of the filing, we have attached the following:

Appendix A: Project Description
Appendix B: Alternatives Analysis
Appendix C: Stormwater Report
Appendix D: Project Maps
Appendix E: Contract Specifications
Appendix F: Abutters List / Notice to Abutters
Appendix G: Wetlands Memorandum

If you have any questions regarding this submittal, please contact me at (978) 532-1900.

Very truly yours,

WESTON & SAMPSON

Mel Higgins, PWS
Senior Environmental Scientist

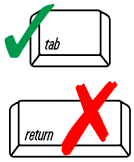
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
MassDEP File Number
Document Transaction Number
Sudbury
City/Town

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



Note: Before completing this form consult your local Conservation Commission regarding any municipal bylaw or ordinance.

A. General Information

1. Project Location (**Note:** electronic filers will click on button to locate project site):

275 Old Lancaster Road — a. Street Address
Sudbury — b. City/Town
01776 — c. Zip Code

Latitude and Longitude:
42deg22'27.05"N — d. Latitude
71deg25'30.79"W — e. Longitude
H08 — f. Assessors Map/Plat Number
0049 — g. Parcel /Lot Number

2. Applicant:

Daniel — a. First Name
Nason — b. Last Name
Sudbury DPW — c. Organization
275 Old Lancaster Road — d. Street Address
Sudbury — e. City/Town
MA — f. State
01776 — g. Zip Code
978.440.5490 — h. Phone Number
i. Fax Number
nasond@sudbury.ma.us — j. Email Address

3. Property owner (required if different from applicant): ☐ Check if more than one owner

a. First Name
b. Last Name
c. Organization
d. Street Address
e. City/Town
f. State
g. Zip Code
h. Phone Number
i. Fax Number
j. Email address

4. Representative (if any):

Mel — a. First Name
Higgins — b. Last Name
Weston & Sampson Engineers — c. Company
5 Centennial Drive — d. Street Address
Peabody — e. City/Town
MA — f. State
01960 — g. Zip Code
(978)-532-1900 x2332 — h. Phone Number
i. Fax Number
higginsm@wseinc.com — j. Email address

5. Total WPA Fee Paid (from NOI Wetland Fee Transmittal Form):

exempt — a. Total Fee Paid
b. State Fee Paid
c. City/Town Fee Paid

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A. General Information (continued)

6. General Project Description:

Updating Fueling site and DPW facility (See Appendix A for additional information)

7a. Project Type Checklist: (Limited Project Types see Section A. 7b.)

1. ☐ Single Family Home
2. ☐ Residential Subdivision
3. ☐ Commercial/Industrial
4. ☐ Dock/Pier
5. ☐ Utilities
6. ☐ Coastal engineering Structure
7. ☐ Agriculture (e.g., cranberries, forestry)
8. ☐ Transportation
9. ☒ Other

7b. Is any portion of the proposed activity eligible to be treated as a limited project (including Ecological Restoration Limited Project) subject to 310 CMR 10.24 (coastal) or 310 CMR 10.53 (inland)?

1. ☐ Yes ☒ No

If yes, describe which limited project applies to this project. (See 310 CMR 10.24 and 10.53 for a complete list and description of limited project types)

2. Limited Project Type

If the proposed activity is eligible to be treated as an Ecological Restoration Limited Project (310 CMR10.24(8), 310 CMR 10.53(4)), complete and attach Appendix A: Ecological Restoration Limited Project Checklist and Signed Certification.

8. Property recorded at the Registry of Deeds for:

a. County	b. Certificate # (if registered land)
Middlesex	
c. Book	**d. Page Number**
7431	153

B. Buffer Zone & Resource Area Impacts (temporary & permanent)

1. ☐ Buffer Zone Only – Check if the project is located only in the Buffer Zone of a Bordering Vegetated Wetland, Inland Bank, or Coastal Resource Area.
2. ☒ Inland Resource Areas (see 310 CMR 10.54-10.58; if not applicable, go to Section B.3, Coastal Resource Areas).

Check all that apply below. Attach narrative and any supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

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B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

For all projects affecting other Resource Areas, please attach a narrative explaining how the resource area was delineated.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Bank	1. linear feet	2. linear feet
b. ☐ Bordering Vegetated Wetland	1. square feet	2. square feet
c. ☐ Land Under Waterbodies and Waterways	1. square feet 3. cubic yards dredged	2. square feet

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
d. ☐ Bordering Land Subject to Flooding	1. square feet 3. cubic feet of flood storage lost	2. square feet 4. cubic feet replaced
e. ☐ Isolated Land Subject to Flooding	1. square feet 2. cubic feet of flood storage lost	3. cubic feet replaced
f. ☒ Riverfront Area	Hop Brook 1. Name of Waterway (if available) - **specify coastal or inland**	

2. Width of Riverfront Area (check one):

☐ 25 ft. - Designated Densely Developed Areas only

☐ 100 ft. - New agricultural projects only

☒ 200 ft. - All other projects

3. Total area of Riverfront Area on the site of the proposed project: 200,000 square feet

4. Proposed alteration of the Riverfront Area:

a. total square feet	b. square feet within 100 ft.	c. square feet between 100 ft. and 200 ft.
32,393	18,851	13,542

5. Has an alternatives analysis been done and is it attached to this NOI? ☒ Yes ☐ No

6. Was the lot where the activity is proposed created prior to August 1, 1996? ☒ Yes ☐ No

3. ☐ Coastal Resource Areas: (See 310 CMR 10.25-10.35)

Note: for coastal riverfront areas, please complete **Section B.2.f**. above.

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B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

Check all that apply below. Attach narrative and supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Designated Port Areas	Indicate size under Land Under the Ocean, below	
b. ☐ Land Under the Ocean	1. square feet 2. cubic yards dredged	
c. ☐ Barrier Beach	Indicate size under Coastal Beaches and/or Coastal Dunes below	
d. ☐ Coastal Beaches	1. square feet	2. cubic yards beach nourishment
e. ☐ Coastal Dunes	1. square feet	2. cubic yards dune nourishment

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
f. ☐ Coastal Banks	1. linear feet	
g. ☐ Rocky Intertidal Shores	1. square feet	
h. ☐ Salt Marshes	1. square feet	2. sq ft restoration, rehab., creation
i. ☐ Land Under Salt Ponds	1. square feet 2. cubic yards dredged	
j. ☐ Land Containing Shellfish	1. square feet	
k. ☐ Fish Runs	Indicate size under Coastal Banks, inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above 1. cubic yards dredged	
l. ☐ Land Subject to Coastal Storm Flowage	1. square feet	

4. ☐ Restoration/Enhancement

If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.2.b or B.3.h above, please enter the additional amount here.

a. square feet of BVW

b. square feet of Salt Marsh

5. ☐ Project Involves Stream Crossings

a. number of new stream crossings

b. number of replacement stream crossings

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C. Other Applicable Standards and Requirements

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section C and complete Appendix A: Ecological Restoration Limited Project Checklists – Required Actions (310 CMR 10.11).

Streamlined Massachusetts Endangered Species Act/Wetlands Protection Act Review

1. Is any portion of the proposed project located in **Estimated Habitat of Rare Wildlife** as indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetland Wildlife published by the Natural Heritage and Endangered Species Program (NHESP)? To view habitat maps, see the *Massachusetts Natural Heritage Atlas* or go to http://maps.massgis.state.ma.us/PRI_EST_HAB/viewer.htm.

   a. ☐ Yes ☒ No

   If yes, include proof of mailing or hand delivery of NOI to:

   Natural Heritage and Endangered Species Program
   Division of Fisheries and Wildlife
   1 Rabbit Hill Road
   Westborough, MA 01581

   2019
   b. Date of map

   If *yes*, the project is also subject to Massachusetts Endangered Species Act (MESA) review (321 CMR 10.18). To qualify for a streamlined, 30-day, MESA/Wetlands Protection Act review, please complete Section C.1.c, and include requested materials with this Notice of Intent (NOI); *OR* complete Section C.2.f, if applicable. *If MESA supplemental information is not included with the NOI, by completing Section 1 of this form, the NHESP will require a separate MESA filing which may take up to 90 days to review (unless noted exceptions in Section 2 apply, see below).*

   c. Submit Supplemental Information for Endangered Species Review*

      1. ☐ Percentage/acreage of property to be altered:

         (a) within wetland Resource Area _____ percentage/acreage

         (b) outside Resource Area _____ percentage/acreage

      2. ☐ Assessor's Map or right-of-way plan of site

2. ☐ Project plans for entire project site, including wetland resource areas and areas outside of wetlands jurisdiction, showing existing and proposed conditions, existing and proposed tree/vegetation clearing line, and clearly demarcated limits of work **

   (a) ☐ Project description (including description of impacts outside of wetland resource area & buffer zone)

   (b) ☐ Photographs representative of the site

* Some projects **not** in Estimated Habitat may be located in Priority Habitat, and require NHESP review (see http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/regulatory-review/). Priority Habitat includes habitat for state-listed plants and strictly upland species not protected by the Wetlands Protection Act.

** MESA projects may not be segmented (321 CMR 10.16). The applicant must disclose full development plans even if such plans are not required as part of the Notice of Intent process.

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C. Other Applicable Standards and Requirements (cont'd)

(c) ☐ MESA filing fee (fee information available at http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/mesa/mesa_fee_schedule.htm). Make check payable to "Commonwealth of Massachusetts - NHESP" and ***mail to NHESP*** at above address

*Projects altering **10 or more acres** of land, also submit:*

(d) ☐ Vegetation cover type map of site

(e) ☐ Project plans showing Priority & Estimated Habitat boundaries

(f) OR Check One of the Following

1. ☐ Project is exempt from MESA review.
Attach applicant letter indicating which MESA exemption applies. (See 321 CMR 10.14, http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/mesa/mesa_exemptions.htm; the NOI must still be sent to NHESP if the project is within estimated habitat pursuant to 310 CMR 10.37 and 10.59.)

2. ☐ Separate MESA review ongoing.
a. NHESP Tracking # _____ b. Date submitted to NHESP _____

3. ☐ Separate MESA review completed.
Include copy of NHESP "no Take" determination or valid Conservation & Management Permit with approved plan.

3. For coastal projects only, is any portion of the proposed project located below the mean high water line or in a fish run?

a. ☒ Not applicable – project is in inland resource area only b. ☐ Yes ☐ No

If yes, include proof of mailing, hand delivery, or electronic delivery of NOI to either:

South Shore - Cohasset to Rhode Island border, and the Cape & Islands:

Division of Marine Fisheries -
Southeast Marine Fisheries Station
Attn: Environmental Reviewer
836 South Rodney French Blvd.
New Bedford, MA 02744
Email: DMF.EnvReview-South@state.ma.us

North Shore - Hull to New Hampshire border:

Division of Marine Fisheries -
North Shore Office
Attn: Environmental Reviewer
30 Emerson Avenue
Gloucester, MA 01930
Email: DMF.EnvReview-North@state.ma.us

Also if yes, the project may require a Chapter 91 license. For coastal towns in the Northeast Region, please contact MassDEP's Boston Office. For coastal towns in the Southeast Region, please contact MassDEP's Southeast Regional Office.

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C. Other Applicable Standards and Requirements (cont'd)

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

4. Is any portion of the proposed project within an Area of Critical Environmental Concern (ACEC)?

   a. ☐ Yes ☒ No If yes, provide name of ACEC (see instructions to WPA Form 3 or MassDEP Website for ACEC locations). **Note:** electronic filers click on Website.

   b. ACEC

5. Is any portion of the proposed project within an area designated as an Outstanding Resource Water (ORW) as designated in the Massachusetts Surface Water Quality Standards, 314 CMR 4.00?

   a. ☐ Yes ☒ No

6. Is any portion of the site subject to a Wetlands Restriction Order under the Inland Wetlands Restriction Act (M.G.L. c. 131, § 40A) or the Coastal Wetlands Restriction Act (M.G.L. c. 130, § 105)?

   a. ☐ Yes ☒ No

7. Is this project subject to provisions of the MassDEP Stormwater Management Standards?

   a. ☒ Yes. Attach a copy of the Stormwater Report as required by the Stormwater Management Standards per 310 CMR 10.05(6)(k)-(q) and check if:

      1. ☐ Applying for Low Impact Development (LID) site design credits (as described in Stormwater Management Handbook Vol. 2, Chapter 3)

      2. ☒ A portion of the site constitutes redevelopment

      3. ☐ Proprietary BMPs are included in the Stormwater Management System.

   b. ☐ No. Check why the project is exempt:

      1. ☐ Single-family house

      2. ☐ Emergency road repair

      3. ☐ Small Residential Subdivision (less than or equal to 4 single-family houses or less than or equal to 4 units in multi-family housing project) with no discharge to Critical Areas.

D. Additional Information

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section D and complete Appendix A: Ecological Restoration Notice of Intent – Minimum Required Documents (310 CMR 10.12).

Applicants must include the following with this Notice of Intent (NOI). See instructions for details.

Online Users: Attach the document transaction number (provided on your receipt page) for any of the following information you submit to the Department.

1. ☒ USGS or other map of the area (along with a narrative description, if necessary) containing sufficient information for the Conservation Commission and the Department to locate the site. (Electronic filers may omit this item.)

2. ☒ Plans identifying the location of proposed activities (including activities proposed to serve as a Bordering Vegetated Wetland [BVW] replication area or other mitigating measure) relative to the boundaries of each affected resource area.

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D. Additional Information (cont'd)

3. ☒ Identify the method for BVW and other resource area boundary delineations (MassDEP BVW Field Data Form(s), Determination of Applicability, Order of Resource Area Delineation, etc.), and attach documentation of the methodology.

4. ☒ List the titles and dates for all plans and other materials submitted with this NOI.

Sudbury DPW Fuel System
a. Plan Title

Weston & Sampson Engineers
b. Prepared By

James Fair, PE
c. Signed and Stamped by

d. Final Revision Date

1" = 30'
e. Scale

f. Additional Plan or Document Title

g. Date

5. ☐ If there is more than one property owner, please attach a list of these property owners not listed on this form.

6. ☐ Attach proof of mailing for Natural Heritage and Endangered Species Program, if needed.

7. ☐ Attach proof of mailing for Massachusetts Division of Marine Fisheries, if needed.

8. ☐ Attach NOI Wetland Fee Transmittal Form

9. ☒ Attach Stormwater Report, if needed.

E. Fees

1. ☒ Fee Exempt: No filing fee shall be assessed for projects of any city, town, county, or district of the Commonwealth, federally recognized Indian tribe housing authority, municipal housing authority, or the Massachusetts Bay Transportation Authority.

Applicants must submit the following information (in addition to pages 1 and 2 of the NOI Wetland Fee Transmittal Form) to confirm fee payment:

2. Municipal Check Number

3. Check date

4. State Check Number

5. Check date

6. Payor name on check: First Name

7. Payor name on check: Last Name

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F. Signatures and Submittal Requirements

I hereby certify under the penalties of perjury that the foregoing Notice of Intent and accompanying plans, documents, and supporting data are true and complete to the best of my knowledge. I understand that the Conservation Commission will place notification of this Notice in a local newspaper at the expense of the applicant in accordance with the wetlands regulations, 310 CMR 10.05(5)(a).

I further certify under penalties of perjury that all abutters were notified of this application, pursuant to the requirements of M.G.L. c. 131, § 40. Notice must be made by Certificate of Mailing or in writing by hand delivery or certified mail (return receipt requested) to all abutters within 100 feet of the property line of the project location.

1. Signature of Applicant

2. Date: 3/13/19

3. Signature of Property Owner (if different)

4. Date

Mel

5. Signature of Representative (if any)

6. Date: 3/13/19

For Conservation Commission:
Two copies of the completed Notice of Intent (Form 3), including supporting plans and documents, two copies of the NOI Wetland Fee Transmittal Form, and the city/town fee payment, to the Conservation Commission by certified mail or hand delivery.

For MassDEP:
One copy of the completed Notice of Intent (Form 3), including supporting plans and documents, one copy of the NOI Wetland Fee Transmittal Form, and a **copy** of the state fee payment to the MassDEP Regional Office (see Instructions) by certified mail or hand delivery.

Other:
If the applicant has checked the "yes" box in any part of Section C, Item 3, above, refer to that section and the Instructions for additional submittal requirements.

The original and copies must be sent simultaneously. Failure by the applicant to send copies in a timely manner may result in dismissal of the Notice of Intent.

APPENDIX A

PROJECT DESCRIPTION

Background

The Sudbury DPW has proposed to replace their existing fuel system at their Department of Public Works Facility. The existing fuel system was installed in the early 90's and consists of a concrete fuel island with two dispensers covered with a canopy. The removal of the underground storage tanks (USTs) will eliminate the potential for unknown leakage of fuel into the surrounding soil and groundwater and provide the site with an improved, up-to-date and safer fueling system at the site.

Site Description

The parcel at 275 Old Lancaster Road is mostly comprised of already altered area and includes Sudbury's existing Department of Public Works Facility. The property is surrounded predominantly by wooded area. There are small wetland areas bordering the southern and western edges of the property. In addition, there are perennial streams/coldwater fisheries near the north, west and southwest limits of the site.

Scope of Work

The existing fueling station on the site includes two underground storage tanks (USTs) totaling 16,000 gallons in below ground fuel storage. Additionally, the process of removing these tanks will be performed in accordance with MassDEP requirements and allow for cleanup of any contamination that may have occurred during their 26-year service period. Constructing aboveground storage tanks (ASTs) in their place will allow for simple and immediate detection of leaks, though leakage is extremely unlikely due to their durable, double-walled steel construction. The ASTs will be Underwriter Laboratory (UL) 2085 listed in accordance with National Fire Protection Agency (NFPA) requirements and will be rated for ballistic impact. The tanks will be 2-hour fire rated protected tanks that will be continuously monitored by a leak detection system. The aboveground configuration of the proposed fuel system also allows for simple visual inspection where the existing UST system does not. The proposed fuel system will be located approximately 240 feet to the north of the existing fuel system.

The tanks will be protected from vehicle impact using steel guardrails and/or bollards and will also be equipped with continuous electronic leak detection sensors that will report to a staffed location on-site.

Though we are proposing 2,451 sq. ft. of pavement to be added adjacent to the proposed fuel island, we include a pavement reduction section north of the fuel island to bring the net addition of impervious area to 1,385 sq. ft. Stormwater from the entire fuel island and pavement addition will be routed through stormwater treatment best management practice (BMP) systems. In addition, stormwater from paved portions of the site beyond the fuel island area, including the salt shed loading area, will also be treated. The stormwater BMPs will include a hooded deep-sump catch basin, oil water separator, sediment forebay, and a stormwater basin. Stormwater will be routed to the catch basin/stormwater treatment system utilizing site grading and the use of a cape-cod asphalt berm. Additional details are provided in the attached plans and Stormwater Report included in Appendix C.

Environmental Considerations

Work within the 200-foot riverfront area will be within already degraded/altered area. An estimated 32,393 square feet of the limit of wok will be within the 200-foot riverfront area associated with Hop Brook (located to the west of the project) and an unnamed perennial feeder stream to Hop Brook (located to the north of the project). This area excludes the stormwater basin on the western side of the site which should not be counted as riverfront area impact per the Massachusetts Wetlands Protection Act. These two perennial streams are considered coldwater fisheries which are protected by local bylaws. The coldwater fisheries protection area is considered the riparian area (200 feet from the bank) of both the perennial streams. Trees are of great importance within the coldwater fisheries area as the act to provide shade which keeps water temperatures down.

No trees will be removed as part of this project, while a total of ten (10) trees (Wichita Blue trees) will be added to the site. Work within the riverfront area/coldwater fisheries protection area will be within already altered area (pavement) except for a net increase of 1,385 square feet of impervious area being added to the northern part of the parcel. The area where pavement will be added is already disturbed and is currently used to store pipe. The change in impervious area includes a removal of 1,066 sf and addition of 2,451 sf in the same general, northern area, resulting in a net increase of 1,385 sf of impervious area within the 200' riverfront area. The new impervious area will be asphalt extending in a westerly direction from the proposed fueling station exit and will act as additional driving area so that the vehicles are not exiting the fueling station on the existing, already altered area.

To improve the riverfront area / coldwater fisheries protection area, Weston & Sampson has included plantings of native species outside the northern edge of the pavement. These plantings will be confined to the available area between the pavement and the existing tree line. They include a mix of trees and shrubs. Plant species were chosen to maximize ecological value and to respond to the conditions of the site. Salt tolerance, resistance to deer browsing, and habitat creation were prioritized characteristics, and all species selected are native to northeastern United States. The planting plan includes a variety of native species to promote biodiversity and provide a beneficial addition to the existing ecology of the site. The trees located adjacent to the proposed fuel island canopy were also selected to help provide additional visual screening from the adjacent property.

Additional improvements in the riverfront area include improved stormwater treatment. The northern part of the site currently sheet flows from impervious area towards the perennial stream/coldwater fishery without treatment. Under the proposed conditions, stormwater from this area will be directed towards a catch basin where it will be treated before being discharged. Thus, improved water quality within the stream is to be expected.

Meeting Performance Standards within Previously Developed Riverfront Area

The following standards for work within previously developed riverfront areas are provided, below, with an explanation on how the project will meet these standards.

(a) At a minimum, proposed work shall result in an improvement over existing conditions of the capacity of the riverfront area to protect the interests identified in M.G.L. c. 131 § 40. When a lot is previously developed but no portion of the riverfront area is degraded, the requirements of 310 CMR 10.58(4) shall be met.

CONFORMANCE: Work will be within already altered riverfront area. Improvements to the area will be the introduction of plantings which includes a mix of trees and shrubs. Plant species were chosen to maximize ecological value and to respond to the conditions of the site. Salt tolerance, resistance to deer browsing, and habitat creation were prioritized characteristics, and all species selected are native to northeastern United States.

Additional improvements include improved stormwater management within the riverfront area. Currently, stormwater from impervious area sheetflows overland, eventually reaching the perennial streams. The proposed project will guide stormwater into catch basins that will treat the stormwater before it reaches the streams.

Finally, the new, proposed fueling station will be an improvement over the old fueling station. Both the old and proposed fueling stations are in the riverfront area, however the proposed station will be designed to be safer than the existing, out dated system as explained, above. This proposed station will provide an added level of protection to the riverfront area from fuel leakage, etc. that does not currently exist at the site.

(b) Stormwater management is provided according to standards established by the Department.

CONFORMANCE: Please see Appendix C for the project stormwater report that explains how the project conforms to the ten (10) performance standards.

(c) Within 200-foot riverfront areas, proposed work shall not be located closer to the river than existing conditions or 100 feet, whichever is less, or not closer than existing conditions within 25 foot riverfront areas, except in accordance with 310 CMR 10.58(5)(f) or (g).

CONFORMANCE: In the northern area, the existing work will all be within already altered area, thus the work will not be encroaching any closer to the perennial stream to the north than already exists. While the project extends further west towards the stream, this is work for a stormwater basin, which should not be considered as riverfront impact area per the wetlands protection act.

(d) Proposed work, including expansion of existing structures, shall be located outside the riverfront area or toward the riverfront area boundary and away from the river, except in accordance with 310 CMR 10.58(5)(f) or (g).

CONFORMANCE: The proposed fueling station will be within the 200-foot riverfront area. However, this will be located within already altered area. As noted above, the fuel system

will be an improvement to the riverfront area by providing an added level of protection to the riverfront area from fuel leakage, etc. that does not currently exist at the site.

Additional improvements to the area will be the introduction of plantings which includes a mix of trees and shrubs. Plant species were chosen to maximize ecological value and to respond to the conditions of the site. Salt tolerance, resistance to deer browsing, and habitat creation were prioritized characteristics, and all species selected are native to northeastern United States.

(e) The area of proposed work shall not exceed the amount of degraded area, provided that the proposed work may alter up to 10% if the degraded area is less than 10% of the riverfront area, except in accordance with 310 CMR 10.58(5)(f) or (g).

CONFORMANCE: The area of proposed work will not exceed the amount of degraded area. As mentioned above, work will only occur within existing, already altered area.

(f) When an applicant proposes restoration on-site of degraded riverfront area, alteration may be allowed notwithstanding the criteria of 310 CMR 10.58(5)(c), (d), and (e) at a ratio in square feet of at least 1:1 of restored area to area of alteration not conforming to the criteria. Areas immediately along the river shall be selected for restoration. Alteration not conforming to the criteria shall begin at the riverfront area boundary. Restoration shall include:
1. removal of all debris, but retaining any trees or other mature vegetation;
2. grading to a topography which reduces runoff and increases infiltration;
3. coverage by topsoil at a depth consistent with natural conditions at the site; and
4. seeding and planting with an erosion control seed mixture, followed by plantings of herbaceous and woody species appropriate to the site;

CONFORMANCE: While all work will occur in already degraded riverfront area, no additional alteration within the riverfront area will occur. However, in an effort to improve the riverfront area, an estimated 2,989 square feet of riverfront area will be provided with new loam and seed, and new plantings to the north of the fuel island will include a mix of trees and shrubs. Plant species were chosen to maximize ecological value and to respond to the conditions of the site. These plantings will be provided at the outer-most degraded area (closest to the perennial stream).

Additionally, topography at the site will be designed, and cape cod berm placed, to guide stormwater to the catch basin, which will reduce untreated runoff from the site and provide treated stormwater before entering the stream.

(g) When an applicant proposes mitigation either on-site or in the riverfront area within the same general area of the river basin, alteration may be allowed notwithstanding the criteria of 310 CMR 10.58(5)(c), (d), or (e) at a ratio in square feet of at least 2:1 of mitigation area to area of alteration not conforming to the criteria or an equivalent level of environmental protection where square footage is not a relevant measure. Alteration not conforming to the criteria shall begin at the riverfront area boundary. Mitigation may include off-site restoration of riverfront areas, conservation restrictions under M.G.L. c. 184, §§ 31 through 33 to preserve undisturbed riverfront areas that could be otherwise altered under 310 CMR

10.00, the purchase of development rights within the riverfront area, the restoration of bordering vegetated wetland, projects to remedy an existing adverse impact on the interests identified in M.G.L. c. 131, § 40 for which the applicant is not legally responsible, or similar activities undertaken voluntarily by the applicant which will support a determination by the issuing authority of no significant adverse impact. Preference shall be given to potential mitigation projects, if any, identified in a River Basin Plan approved by the Secretary.

CONFORMANCE: Not applicable. Improvements will occur based on (f), above.

(h) The issuing authority shall include a continuing condition in the Certificate of Compliance for projects under 310 CMR 10.58(5)(f) or (g) prohibiting further alteration within the restoration or mitigation area, except as may be required to maintain the area in its restored or mitigated condition. Prior to requesting the issuance of the Certificate of Compliance, the applicant shall demonstrate the restoration or mitigation has been successfully completed for at least two growing seasons.

CONFORMANCE: The new plantings area will be monitored for two growing seasons to ensure successful establishment of new vegetation.

\\wse03.local\WSE\Projects\MA\Sudbury MA\DPW Fueling Facility\NOI\Appendix A - Project Description\PROJECT DESCRIPTION.doc

APPENDIX B

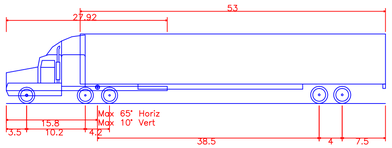
ALTERNATIVES ANALYSIS

During the early design stages of this project, several locations for the proposed fuel island were considered. These alternatives are shown in the Alternatives Analysis plan attached. Alternate No. 1 shows the fuel island on the southern side of the DPW site where there is existing material storage. Among other materials, the DPW stores catch basin cleanings and street sweepings in this area. These are MassDEP regulated materials that the DPW stores on-site before sending to the proper facilities. If the proposed fuel island was put in this location, the DPW would need to shift material stockpiles toward the unnamed stream to the north to make up for this lost area. Moving these materials to the north is not feasible as it would impede the salt shed loading operations and would move the storage of regulated materials closer to the stream.

Alternate No. 2 shows the fuel island to the north of the existing vehicle storage garage. This location would impede and conflict with traffic from the vehicle storage garage and would result in an un-safe working environment. In addition, a retaining wall would be needed due to site grading, which would significantly increase the project cost. The fuel island's proximity to the septic system for the building and tight tank for the vehicle wash system were also areas of concern.

The existing fuel island location was not considered to be a viable alternative for the proposed fueling facility because the location currently impedes traffic flow and DPW operations. Additionally, this location would directly conflict with the proposed DPW facility buildout established in the Town's 2017 DPW Feasibility Study. The proposed building footprint is shown in the Alternatives Analysis plan along with the proposed uses for area of the building. Establishing a new fueling facility within the proposed building footprint would severely limit the layout options for the Town in the future.

The optimal location for the fueling facility is shown on the northwest side of the site. This location allows for easy vehicle access and a natural traffic flow through the DPW site. The location would allow for the DPW to keep material stockpiles away from the stream/cold water fishery. With this location, a cape cod berm would be added along the northwestern edge of pavement. The berm would direct stormwater, previously surface flowing untreated into the stream/cold water fishery, into MassDEP approved stormwater BMPs which would provide treatment and groundwater recharge. The infiltration basin associated with the proposed location would treat roughly 0.70 acres of impervious area drainage that currently goes untreated on-site. This area includes the paved area surrounding the fuel island, the western half of the salt shed roof, and the driveway to the west of the salt shed. Although the fuel tanks would be closer to the stream/cold water fishery, there are numerous protections against pollution entering these waters. The fuel tanks would be protected by guardrail and/or bollards on all sides to prevent any chance of vehicle impact. The tanks are double walled, UL 2085, 2-hour fire rated protected tanks that would be continuously monitored for leaks. In the highly unlikely event of a leak, the cape cod berm would not allow for direct surface flow into the adjacent stream and would direct the flow to the oil water separator. This location also provides the benefit of removing a significant amount existing pavement north of the fuel island and replacing it with plantings of native species.



WB–55 – Interstate Semi–Trailer

Overall Length	65.800ft
Overall Width	8.500ft
Overall Body Height	12.052ft
Min Body Ground Clearance	1.334ft
Max Track Width	8.500ft
Lock–to–lock time	6.00s
Curb to Curb Turning Radius	45.000ft

LIMIT OF PAVEMENT

PAVEMENT TO BE REMOVED (1066 SQ FT) AND APPROXIMATE AREA OF NATIVE PLANTING/RESTORATION

UNNAMED BROOK TOP OF BANK

ELEV. 139' FEMA 100–YEAR FLOOD HAZARD AREA

PREFERRED ALTERNATIVE FOR NEW FUELING FACILITY LOCATION. SEE DRAWING EQ–1 FOR MORE DETAILS

NET IMPERVIOUS AREA ADDED = 1385 SQ FT

CAPE COD BERM

PAVEMENT TO BE ADDED (2451 SQ FT)

ALTERNATE NO. 2 FUELING FACILITY LOCATION

TYPICAL DPW TRUCK VEHICLE PATH (SU–30)

VEHICLE MAINTENANCE 7,500 SF

WASH BAY 1,680 SF

VEHICLE STORAGE 22,400 SF

SHOPS 5,000 SF

EMPLOYEE FAC 3,200 SF

EXISTING OFFICES TO REMAIN

CANOPY 4,200 SF

EXISTING FUEL ISLAND

FUTURE DPW EXPANSION

EXISTING SALT SHED

HOP BROOK

TYPICAL SALT DELIVERY TRUCK VEHICLE PATH (WB–55) BACK SALT SHED ENTRANCE

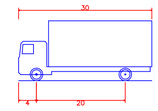
ALTERNATE NO. 1 FUELING FACILITY LOCATION

69.23'

DISTANCE TO STORAGE BINS

WETLAND LEGEND

TOB = TOP OF BANK
MAHW = MEAN ANNUAL HIGH WATER
BVW = BORDERING VEGETATIVE WETLAND



SU–30 – Single Unit Truck

Overall Length	30.000ft
Overall Width	8.000ft
Overall Body Height	13.500ft
Min Body Ground Clearance	1.167ft
Track Width	8.000ft
Lock–to–lock time	5.00s
Max Steering Angle (Virtual)	31.80°

0 30 60 100

SCALE: 1" = 30'

FOR PERMIT REVIEW ONLY
MARCH 6, 2019

P:\MA\Sudbury MA\DPW Fueling Facility\CAD (2016)\concept plan\alternatives analysis.dwg

Weston & Sampson
Weston & Sampson Engineers, Inc.
Five Centennial Drive, Peabody, MA 01960
978.532.1900 800.SAMPSON
www.westonandsampson.com

No.	Date	Description	Dr. By	Ck. By	App. By
A		PRELIMINARY			

REGISTERED PROFESSIONAL ENGINEER

DATE

SUDBURY DEPARTMENT OF PUBLIC WORKS
SUDBURY, MA

SUDBURY DPW FUEL SYSTEM

ALTERNATIVE ANALYSIS PLAN

CADD NO.	SCALE: 1"	CONTRACT: -	JOB NO. 2180684	DR. BY NCH	DSN. BY JRF
				CHK. BY JRF	APP. BY JRF

AA-1

FILE NO.

SHEET OF

APPENDIX C

Stormwater Management Plan

Sudbury DPW Fueling Facility
275 Old Lancaster Rd
Sudbury, MA

Planning Board
Sudbury, Massachusetts

Sudbury DPW Fueling Facility

Submitted for Notice of Intent

March 2019
JOB NO: 2180684

Weston & Sampson.
5 Centennial Drive
Peabody, MA 01960
www.westonandsampson.com
Tel: 978-977-0110

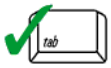
Table of Contents

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

Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

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

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

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

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

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

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

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

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature

3/6/19
Signature and Date

Checklist

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

☐ New development

☒ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

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

☐ No disturbance to any Wetland Resource Areas

☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☒ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

☐ Use of "country drainage" versus curb and gutter conveyance and pipe

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☐ Grass Channel

☐ Green Roof

☒ Other (describe): Infiltration basin

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth

☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

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

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

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

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

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

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

☐ Static ☒ Simple Dynamic ☐ Dynamic Field[1]

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

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

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

Standard 4: Water Quality

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

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

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

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

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

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

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

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

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

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

☐ All exposure has been eliminated.

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

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

Standard 6: Critical Areas

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

Standard 9: Operation and Maintenance Plan

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

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

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

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

Standard 10: Prohibition of Illicit Discharges

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

☒ An Illicit Discharge Compliance Statement is attached;

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

Stormwater Report Narrative

Project Name: Sudbury DPW Fueling Facility

Project Address: 275 Old Lancaster Rd, Sudbury, MA

Application Prepared by:

Firm: Weston & Sampson, Inc.

Registered PE: James Fair, PE

Introduction

This Stormwater Management Report is prepared to support the replacement of the DPW's existing underground storage tank (UST) fuel system with a new aboveground storage tank (AST) fuel system. The project site will be located on the property currently occupied by the Sudbury DPW at 275 Old Lancaster Rd and identified on the Accessors Map as property H08-0049.

The Sudbury DPW has proposed to replace their existing UST fuel system with an AST fuel system due to its age. The project will also allow for easier environmental compliance due to all components of the fuel system being brought above grade. The proposed location of the AST fuel system is approximately 90 feet to the north of the existing salt shed.

The Sudbury DPW property is in the RES-A (Residential) zone and is bordered to the east by Sudbury Water District land, to the north and west by private residences, and to the south by Hop Brook. The proposed work area (the Site) is located on the northeastern part of the property and encompasses approximately 0.44 acres or 2.7% of the property. The remainder of the property is occupied by DPW vehicle storage and maintenance buildings, Town offices, material storage, a salt shed, and the existing fueling facility.

Proposed work will include the removal of USTs at the existing fuel island, constructing a new fueling pad and tank pad for the ASTs, constructing a new canopy, saw cutting into existing pavement for regrading, adding new pavement, removing existing sections of unnecessary pavement, constructing an infiltration basin and other stormwater BMPs, and planting native plant species.

As detailed herein, this Stormwater Management Report

- Demonstrates compliance with the Massachusetts Department of Environmental Protection (DEP) Stormwater Management Standards;

- Demonstrates compliance with the Town of Sudbury Article V (F) Stormwater Management Regulations;
- Details construction-phase erosion and sedimentation controls, inspection requirements and maintenance requirements to protect downstream receiving waters; and,
- Presents a detailed long-term operation and maintenance plan for the stormwater management system and the site.

Existing Drainage Conditions

The existing conditions in the project area of the site consists of approximately 9,200 square feet pavement surrounded by grassed and wooded areas. Significant portions of the surrounding grassed area are covered by DPW supply storage. Topography on the site generally slopes to the northwest toward the stream and wetland. Drainage from pavement on the site currently sheet flows toward the stream and wetland without any treatment.

Based on the existing drainage pattern – two drainage areas were delineated, shown graphically in Appendix 2.

Drainage Area 1S includes the northern portion of the Site. This area includes a large area of existing pavement along with a grassed area that is currently used for concrete structure storage. The stormwater runoff from this area flows overland toward the grassed storage area and then directly to the northwest toward the nearby stream/wetland (Design Point 3P). This stream is a tributary to Hop Brook and is classified as a cold water fishery.

Drainage Area 2S includes the paved driveway west of the salt shed as well as a large portion of the salt shed roof. The stormwater runoff from this area flows overland until ultimately discharging to the nearby stream/wetland (Design Point 3P).

Proposed Drainage Conditions

Although a significant portion of pavement will be removed north of the proposed fuel island, there will be a net increase of impervious area due to the pavement added to the west of the fuel island. To mitigate the increase in runoff from the Site, a new infiltration basin is proposed, which will reduce the proposed peak flows and volumes and allow for ground water recharge. The stormwater runoff from the fuel island project area will be routed through a deep sump hooded catch basin, oil-grit separator, and sediment forebay for the required pretreatment and TSS removal prior to infiltration, and it will finally discharge into the proposed infiltration basin to allow groundwater recharge and attenuation of peak flows. The overflow spillway of the infiltration basin will direct water toward stream/wetland to the northwest during high intensity storm events.

Similar to the existing conditions, the runoff from the Site will contribute to a design point in the stream/wetland area (Design Point 5P).

Stormwater Design

Weston & Sampson used HydroCAD computer software to model the stormwater runoff for 1-inch, 2-year, 10-year, 25-year, and 100-year 24-hour storm events. The rainfall amounts for the 2, 10, 25, 100 year storms are based on the Northeast Regional Climate Center "Atlas of Precipitation Extremes for the Northeastern United Sates and Southeastern Canada" and were as follows: 3.2 inches – 2-year, 4.8 inches – 10 year, 6.0 inches – 25 year, 8.6 inches – 100 year. In order to properly simulate the existing and proposed stormwater conditions, specific data was obtained and/or considered, including topography, site layout, soil composition, and groundwater.

Soil information was obtained from the Natural Resources Conservation Service (NRCS) Middlesex County Web Soil Survey. The soil survey identified the soil types within project area as Freetown Much (Hydrologic Soil Group B/D) and Windsor Loamy Sand (Hydrologic Soil Group A). The soil map and description are included in Appendix 1.

In addition to review of the soil survey, test pits were completed throughout the site in January 2019 to explore the subsurface conditions, including the seasonal high groundwater elevation. Generally, the test pits confirm the presence of sandy soils throughout project site and indicated seasonal high groundwater ranging from approximately 60 inches to 90 inches below ground surface. The proposed infiltration basin location corresponds to test pits that had an 80-inch depth to seasonal high groundwater. The bottom of the basin is located 4 feet above the seasonal high groundwater. The test pit logs and a sieve analysis are included in Appendix 1. Based on the reviewed soil surveys, observed test pits, and sieve analysis, a Rawl's rate of 8.27 inches per hour was used for the design of infiltration basin.

Best Management Practices (BMPs) and Low Impact Development (LID) Measures

Low Impact Development (LID) Measures will be incorporated, where possible, into this project. A large portion of the proposed project will be constructed within the envelope of the previous development which will result in a lesser increase in impervious area. Furthermore, a significant portion of existing pavement will also be removed north of the proposed fuel island. Plantings of native species will also be included as part of this project where space allows within the project area. The proposed changes to the site will provide sediment and oil removal, peak rate attenuation, and groundwater recharge where there was previously none. The BMPs used in this project are described hereon.

Deep Sump Hooded Catch Basins

The catch basin at the Site is to be constructed with a sump (minimum 4-feet) and oil/debris traps to prevent the discharge of sediments and floating contaminants.

Oil-Grit Separator

The oil-grit separator at the Site is to be constructed in accordance with DEP guidelines to trap sediments and floating contaminants.

Infiltration Basin

The infiltration basin will allow for exfiltration of runoff from the system to the groundwater and will provide peak rate attenuation with its storage volume.

Regulatory Compliance

This project was design in compliance with Massachusetts Department of Environmental Protection (DEP) – Strormwater Management Standards.

Standard 1: No New Untreated Discharges or Erosion to Wetlands

This project has been designed to comply with Standard 1. The proposed project will create no new untreated discharges. The proposed project was designed to improve existing conditions by catching all water within the drainage area using curbing and directing it toward DEP approved stormwater BMPs. Under existing conditions, runoff is free to sheet flow directly toward the wetland without any treatment. As part of the proposed project, surface runoff from paved areas will be collected in a deep sump hooded catch basin and directed to an oil-grit separator and sediment forebay prior to treatment in the infiltration basin. The infiltration basin has a riprap spillway with a level spreader to dissipate the energy of water discharging toward the wetland.

Standard 2: Peak Rate Attenuation

Post construction peak runoff rates or total volume of runoff will not increase for the 2, 10, 25, and 100-year storms. Supporting documentation is included with this report. A summary table is provided to illustrate that post-construction peak discharge rates and volumes will nearly significantly reduce pre-construction rates and volumes. To ensure that the work incorporates the performance standards recommended in the DEP's Stormwater Management Policy, necessary erosion and sedimentation control measures will be utilized during construction. These measures will include compost filter tubes and catch basin sediment controls, as needed.

Standard 3: Recharge

The impervious area within the proposed project limits will increase at the completion of construction, but with the designed improvements, recharge will be provided in the infiltration basin. The recharge volume provided under post-development conditions is greater than the recharge volume required by DEP's Stormwater Management Standards. The recharge requirement calculation is included in this report and illustrates compliance with the current DEP Stormwater policy.

Standard 4: Water Quality

The project has been designed to comply with Standard 4. The proposed stormwater management system implements a treatment train of BMPs that has been designed to provide 80% TSS removal of strormwater runoff from all proposed impervious surfaces as well as 44%

pretreatment prior to infiltration BMPs. Computations and supporting information are included in Appendix 3.

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

The proposed fuel island is being considered as a LUHPPL. All of the stormwater that run across this area is being collected and treated through a series of approved BMPs listed for use in treating run-off from a LUHPPL. The BMPs include a deep sump hooded catch basin, an oil-grit separator, and a sediment forebay prior to recharge in the infiltration basin.

Standard 6: Critical Areas

The Project will discharge treated stromwater to a critical area and therefore has been designed with suitable BMPs sized to treat the one-inch Water Quality Volume. Proposed source controls and pollution prevention measures have been identified in the Operation and Maintenance Plan included in Appendix 4.

For computations and supporting information regarding the sizing of BMP's suitable for treatment of runoff near critical areas, see Appendix 3.

Standard 7: Redevelopments and Other Projects Subject to the Standards Only to the Maximum Extent Practicable

Although the project can be classified as a redevelopment, this project exceeds the requirements for all of the above standards. For further discussion on how each standard is being exceeded, see the applicable paragraphs above.

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

A detailed Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan is included in Appendix 4. To ensure that the work incorporates the performance standards recommended in the DEP's Stormwater Management Policy, necessary erosion and sedimentation control measures will be utilized during construction. These measures will include compost filter tubes, a construction entrance and catch basin protection as depicted on the site plans.

Standard 9: Operation and Maintenance Plan

In compliance with Standard 9, a Post Construction Stormwater Operation and Maintenance (O&M) Plan has been developed for the project. The O&M Plan is included in Appendix 4.

Standard 10: Prohibition of Illicit Discharges

Illicit discharges will be prevented on the site through the use of spill/discharge prevention measures, along with good housekeeping and BMPs, and in accordance with the Long Term Pollution Prevention Plan and O&M plans. An Illicit Discharge Compliance Statement has been developed for this site and is included in Appendix 4.

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature

3/6/19

APPENDIX 1

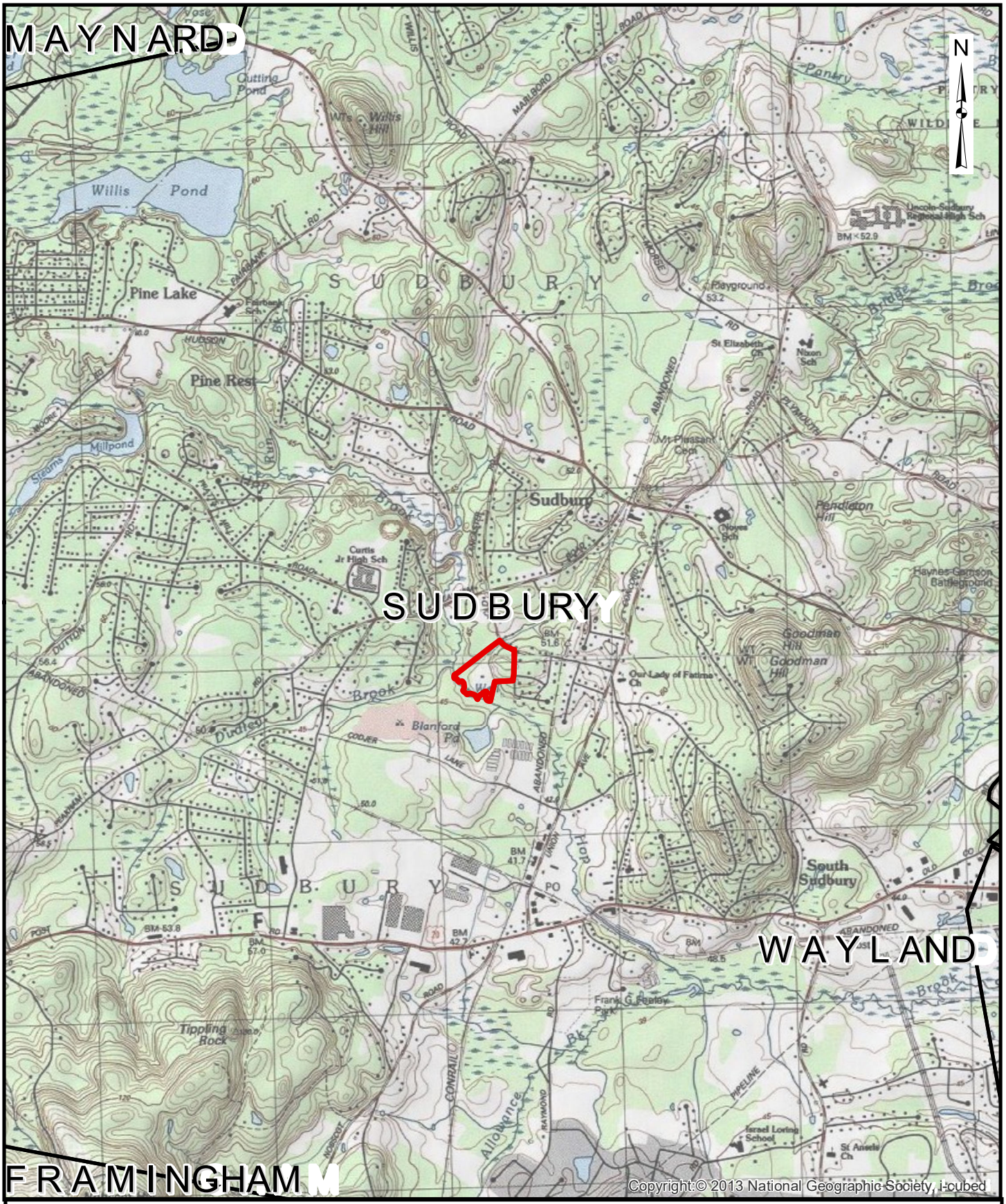


FIGURE 1
DPW Fueling Facility
Sudbury, Massachusetts

Locus Map

Work Area

2,400 0 2,400

Scale In Feet

Weston & Sampson

Path: \\wse03.local\WSE\Depts\Water\ERMAP\GIS - Constraints Mapping\Sudbury\DPW Fueling Facility\Figure 1 -locus.mxd User: GasparA Saved: 11/29/2018 10:38:21 AM Opened: 11/29/2018 10:38:40 AM

FIGURE 2
DPW Fueling Facility
Sudbury, Massachusetts

ENVIRONMENTAL RECEPTORS

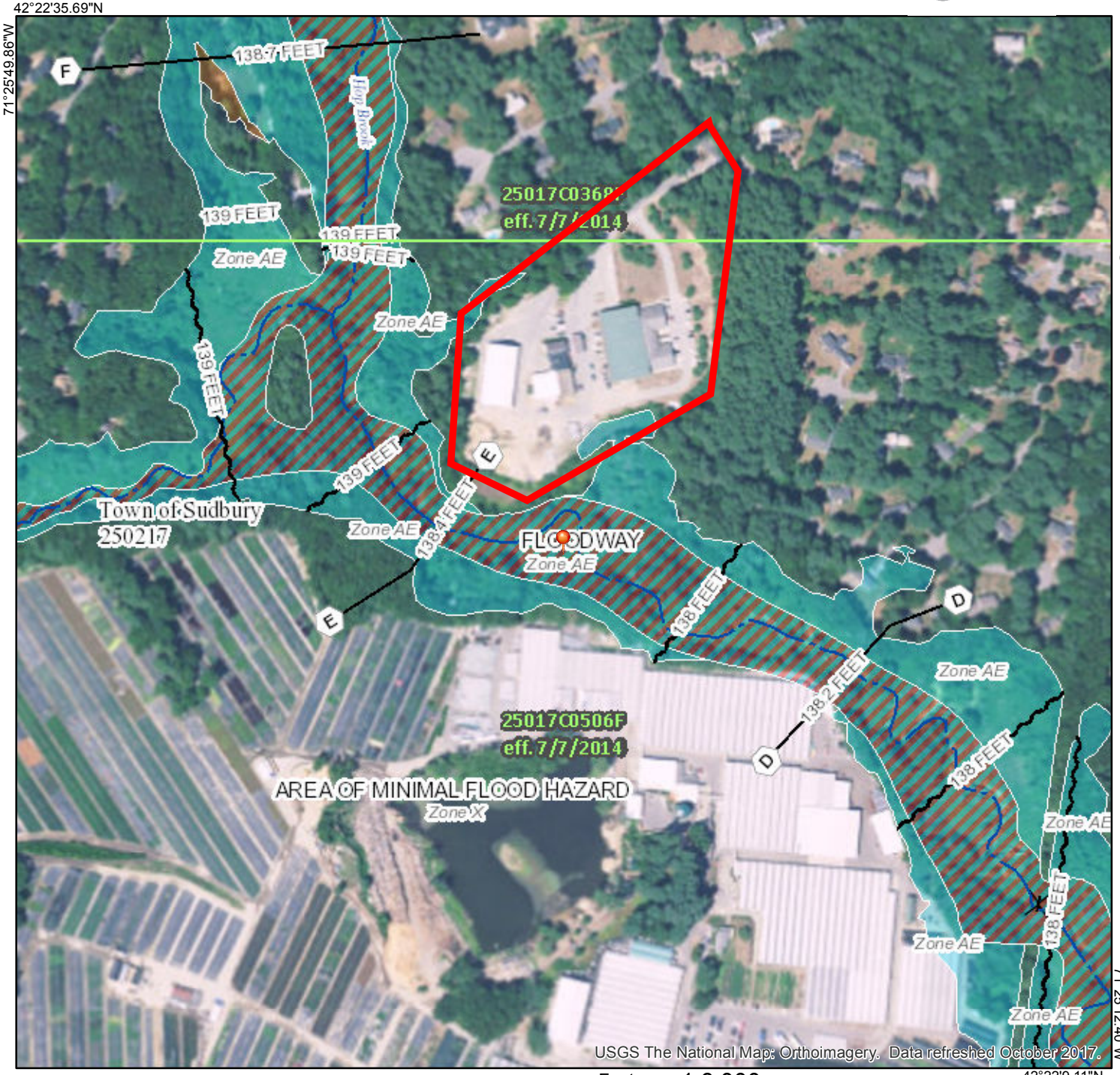
200 0 200
Scale In Feet

Weston & Sampson

Path: \\wse03.local\WSE\Depts\Water\ERMAP\GIS - Constraints Mapping\Sudbury\DPW Fueling Facility\Figure 1 - Env Receptor.mxd **User:** GasparA **Saved:** 11/29/2018 10:45:01 AM **Opened:** 11/29/2018 10:45:14 AM

National Flood Hazard Layer FIRMette

FEMA



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
- 513 — Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 11/20/2018 at 12:52:48 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.

85 Devonshire Street, 3rd Floor, Boston, MA 02109
Tel: 617.412.4480

MEMORANDUM

TO: Jamie Fair

FROM: Kyle Elmy

DATE: January 17, 2019

SUBJECT: Sudbury, MA DPW – Test pit results

Test pits were performed at 275 Old Lancaster Road Sudbury, MA on January 17, 2019. They were conducted to better understand the subsurface soil and drainage conditions, so that proper precautions could be accounted for during the construction of a new fueling facility. The following is a summary of the test pit explorations. Detailed test pit logs and photos are attached to this memorandum. The soil was evaluated by Kyle Elmy, of Weston & Sampson, a licensed soil evaluator, SE14274. Test pit 5 was witnessed by William Murphy, of Sudbury Health Department.

Five (5) test pits were performed on the site. The test pits were excavated as deep as possible with depths ranging from about 8 feet to 9.5 feet below ground surface (b.g.s.). Test pits were stopped when standing water was encountered, or the pit wall stability was at risk.

With respect to the site, test pit 3 was located to the north west of the existing salt shed, along the edge of the cleared property. Test pit 3 was primarily a loamy sand and sand structure, consistent with fine to coarse sand. Fill, a dark brown loamy sand (A), dark yellowish brown loamy sand (Bw), light yellowish brown medium sand (C1), black course sand (C2), and an olive yellow medium sand (C3) were all encountered at this location. The test pit was stopped at a depth of 103-in, due to due to standing water and the pit wall stability. It was also noted that there were redox features of 2% located at a depth of 60-inches. Layer C2 had a black unknown substance coating the course sand, it is unknown as to where this substance originated from. Samples were taken at a depth of 36-inches, 40-inches and 70-inches.

Test pit 3A was located to the south of test pit 3 on the west side of the salt shed, and had a loamy sand and sand structure, consistent with fine to medium sand. Fill, a dark brown loamy sand (A), yellowish brown loamy sand (Bw), brown medium sand (C1) and a grayish brown medium sand (C2) were all encountered at this location. The test pit was stopped at a depth of 96-inches, due to standing water and the pit wall stability. It was also noted that there were redox features of 2% located at a depth of 90-inches. Samples were taken at a depth of 48-inches.

Test pit 4 was located to the south of test pit 3A on the west side of the salt shed, and had a loamy sand and sand structure, consistent with fine to course sand. Fill, a dark brown loamy sand (A), yellowish brown loamy sand (Bw), a light yellowish brown coarse sand (C1), and an olive yellow medium sand (C2) were all encountered at this location. The test pit was stopped at a depth of 114-inches, due to standing water and the pit wall stability. It was also noted that there were redox features of 2% located at a depth of 80-inches. Samples were taken at a depth of 40-inches.

Test pit 5 was located to the south of test pit 4 on the west side of the salt shed, and had a loamy sand and sand structure, consistent with fine to medium sand. Fill, a dark brown loamy sand (A), yellowish brown loamy sand (Bw), and an olive yellow medium sand (C1) were all encountered at this location. The test pit was stopped at a depth of 102-inches, due to standing water and the pit wall stability. It was also noted that there were redox features of 2% located at a depth of 80-inches. Samples were taken at a depth of 36-inches.

Test pit 6 was located to the south of test pit 4 to the southwest of the salt shed, and had a loamy sand and sand structure, consistent with fine to medium sand. Fill, a dark brown loamy sand (A), yellowish brown loamy sand (Bw), and an olive yellow medium sand (C1) were all encountered at this location. The test pit was stopped at a depth of 105-inches, due to the pit wall stability. The pit walls began weeping at a depth of 100-inches b.g.s. It was also noted that there were redox features of 2% located at a depth of 76-inches. Samples were taken at a depth of 58-inches.

The USDA web soil survey indicates that at this site the following soils are present; 255A Windsor loamy sand with slopes ranging from 0 to 3 percent. USDA data estimates that 85% is Windsor, loamy sand, and similar soils, and 15% is minor components. The USGS surficial geologic map indicates that in this particular location fine deposits and floodplain alluvium are present. The test pit data gathered at 275 Old Lancaster road is consistent with the data recorded on the both the USDA and USGS websites. Please refer to the attached maps and test pit results for more information and soil layer ranges.

TEST PIT LOG

PROJECT NAME/NO.	275 Old Lancaster Rd. - 2180684			**TEST PIT NUMBER**	
LOCATION	Sudbury, MA			TP 3	
CLIENT	Sudbury DPW			GROUND SURFACE	
CONTRACTOR		FOREMAN:		ELEVATION	see plan
OBSERVED BY	K. Elmy	DATE	1/17/19	DEPTH TO GROUNDWATER BELOW	
CHECKED BY		DATE		SURFACE	103

DEPTH BELOW GROUND SURFACE (in.)	TEST PIT DIAGRAM AND SOIL DESCRIPTION
20"	Fill
24"	A - Dark brown loamy sand (10YR3/3)
32"	Bw - Dark yellowish brown loamy sand (10YR4/4)
42"	C1 - Light yellowish brown medium sand (2.5Y6/4)
52"	C2 - Black coarse sand (2.5Y2.5/1)
103"	C3 - Olive yellow medium sand (2.5Y6/6)
	- End of Exploration -

NOTES:

1. Redox features 2% at 60"
2. Sample taken at 36-inches, 48-inches and 70-inches
3. Standing water at 103-inches

TEST PIT NUMBER
TP 3

WESTON & SAMPSON ENGINEERS, INC.

C:\Users\elmyk\Desktop\Soil Evaluation Templates\275 Old Lancaster Rd. Sudbury\[Test pit logs-275 Old Landcaster Rd..xls]TP 3A pic

TEST PIT LOG

PROJECT NAME/NO.	275 Old Lancaster Rd. - 2180684			**TEST PIT NUMBER**	
LOCATION	Sudbury, MA			TP 3	
CLIENT	Sudbury DPW			GROUND SURFACE	
CONTRACTOR		FOREMAN:		ELEVATION	see plan
OBSERVED BY	K. Elmy	DATE	1/17/19	DEPTH TO GROUNDWATER BELOW	
CHECKED BY		DATE		SURFACE	103

DEPTH BELOW GROUND SURFACE (in.)	TEST PIT DIAGRAM AND SOIL DESCRIPTION

NOTES:

1. Redox features 2% at 60"
2. Sample taken at 36-inches, 48-inches and 70-inches
3. Standing water at 103-inches

TEST PIT NUMBER
TP 3

WESTON & SAMPSON ENGINEERS, INC.

TEST PIT LOG

PROJECT NAME/NO.	275 Old Lancaster Rd. - 2180684			**TEST PIT NUMBER**	
LOCATION	Sudbury, MA			TP 3A	
CLIENT	Sudbury DPW			GROUND SURFACE	
CONTRACTOR		FOREMAN:		ELEVATION	see plan
OBSERVED BY	K. Elmy	DATE	1/17/19	DEPTH TO GROUNDWATER BELOW	
CHECKED BY		DATE		SURFACE	96

DEPTH BELOW GROUND SURFACE (in.)	TEST PIT DIAGRAM AND SOIL DESCRIPTION
12"	Fill
14"	A - Dark brown loamy sand (10YR3/3)
24"	Bw - Yellowish brown loamy sand (10YR5/8)
32"	C1 - Brown medium sand (10YR5/3)
96"	C2 - Grayish brown medium sand (10YR5/2)
	- End of Exploration -

NOTES:

1. Redox features 2% at 90"
2. Sample taken at 48-inches
3. Standing water at 96-inches

TEST PIT NUMBER
TP 3A

WESTON & SAMPSON ENGINEERS, INC.

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TEST PIT LOG

PROJECT NAME/NO.	275 Old Lancaster Rd. - 2180684			**TEST PIT NUMBER**	
LOCATION	Sudbury, MA			TP 3A	
CLIENT	Sudbury DPW			GROUND SURFACE	
CONTRACTOR		FOREMAN:		ELEVATION	see plan
OBSERVED BY	K. Elmy	DATE	1/17/19	DEPTH TO GROUNDWATER BELOW	
CHECKED BY		DATE		SURFACE	96

DEPTH BELOW GROUND SURFACE (in.)	TEST PIT DIAGRAM AND SOIL DESCRIPTION

NOTES:

1. Redox features 2% at 90"
2. Sample taken at 48-inches
3. Standing water at 96-inches

TEST PIT NUMBER
TP 3A

WESTON & SAMPSON ENGINEERS, INC.

TEST PIT LOG

PROJECT NAME/NO.	275 Old Lancaster Rd. - 2180684			**TEST PIT NUMBER**	
LOCATION	Sudbury, MA			TP 4	
CLIENT	Sudbury DPW			GROUND SURFACE	
CONTRACTOR		FOREMAN:		ELEVATION	see plan
OBSERVED BY	K. Elmy	DATE	1/17/19	DEPTH TO GROUNDWATER BELOW	
CHECKED BY		DATE		SURFACE	114

DEPTH BELOW GROUND SURFACE (in.)	TEST PIT DIAGRAM AND SOIL DESCRIPTION
17"	Fill
20"	A - Dark brown loamy sand (10YR3/3)
30"	Bw - Yellowish brown loamy sand (10YR5/8)
56"	C1 - Light yellowish brown course sand (2.5Y6/4)
114"	C2 - Olive yellow medium sand (2.5Y6/6)
	- End of Exploration -

NOTES:

1. Redox features 2% at 80"
2. Sample taken at 40-inches
3. Standing water at 114-inches

TEST PIT NUMBER
TP 4

WESTON & SAMPSON ENGINEERS, INC.

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TEST PIT LOG

PROJECT NAME/NO.	275 Old Lancaster Rd. - 2180684			**TEST PIT NUMBER**	
LOCATION	Sudbury, MA			TP 4	
CLIENT	Sudbury DPW			GROUND SURFACE	
CONTRACTOR		FOREMAN:		ELEVATION	see plan
OBSERVED BY	K. Elmy	DATE	1/17/19	DEPTH TO GROUNDWATER BELOW	
CHECKED BY		DATE		SURFACE	114

DEPTH BELOW GROUND SURFACE (in.)	TEST PIT DIAGRAM AND SOIL DESCRIPTION

NOTES:

1. Redox features 2% at 80"
2. Sample taken at 40-inches
3. Standing water at 114-inches

TEST PIT NUMBER

TP 4

WESTON & SAMPSON ENGINEERS, INC.

TEST PIT LOG

PROJECT NAME/NO.	275 Old Lancaster Rd. - 2180684			**TEST PIT NUMBER**	
LOCATION	Sudbury, MA			TP 5	
CLIENT	Sudbury DPW			GROUND SURFACE	
CONTRACTOR		FOREMAN:		ELEVATION	see plan
OBSERVED BY	K. Elmy	DATE	1/17/19	DEPTH TO GROUNDWATER BELOW	
CHECKED BY		DATE		SURFACE	102

DEPTH BELOW GROUND SURFACE (in.)	TEST PIT DIAGRAM AND SOIL DESCRIPTION
18"	Fill
22"	A - Dark brown loamy sand (10YR3/3)
36"	Bw - Yellowish brown loamy sand (10YR5/8)
102"	C1 - Olive yellow medium sand (2.5Y6/6)
	- End of Exploration -

NOTES:

1. Redox features 2% at 80"
2. Sample taken at 36-inches
3. Standing water at 102-inches

TEST PIT NUMBER
TP 5

WESTON & SAMPSON ENGINEERS, INC.

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TEST PIT LOG

PROJECT NAME/NO.	275 Old Lancaster Rd. - 2180684			**TEST PIT NUMBER**	
LOCATION	Sudbury, MA			TP 5	
CLIENT	Sudbury DPW			GROUND SURFACE	
CONTRACTOR		FOREMAN:		ELEVATION	see plan
OBSERVED BY	K. Elmy	DATE	1/17/19	DEPTH TO GROUNDWATER BELOW	
CHECKED BY		DATE		SURFACE	102

DEPTH BELOW GROUND SURFACE (in.)	TEST PIT DIAGRAM AND SOIL DESCRIPTION

NOTES:

1. Redox features 2% at 80"
2. Sample taken at 36-inches
3. Standing water at 102-inches

TEST PIT NUMBER
TP 5

WESTON & SAMPSON ENGINEERS, INC.

TEST PIT LOG

PROJECT NAME/NO.	275 Old Lancaster Rd. - 2180684			**TEST PIT NUMBER**	
LOCATION	Sudbury, MA			TP 6	
CLIENT	Sudbury DPW			GROUND SURFACE	
CONTRACTOR		FOREMAN:		ELEVATION	see plan
OBSERVED BY	K. Elmy	DATE	1/17/19	DEPTH TO GROUNDWATER BELOW	
CHECKED BY		DATE		SURFACE	100

DEPTH BELOW GROUND SURFACE (in.)	TEST PIT DIAGRAM AND SOIL DESCRIPTION
24"	Fill - Roughly 1-FT of soil of soil mound was removed to allow measurements to be taken from normal grade
30"	A - Dark brown loamy sand (10YR3/3)
46"	Bw - Yellowish brown loamy sand (10YR5/8)
105"	C1 - Olive yellow medium sand (2.5Y6/6)
	- End of Exploration -

NOTES:

1. Redox features 2% at 76"
2. Sample taken at 58-inches
3. Standing water at 100-inches

TEST PIT NUMBER
TP 6

WESTON & SAMPSON ENGINEERS, INC.

TEST PIT LOG

PROJECT NAME/NO.	275 Old Lancaster Rd. - 2180684			**TEST PIT NUMBER**	
LOCATION	Sudbury, MA			TP 6	
CLIENT	Sudbury DPW			GROUND SURFACE	
CONTRACTOR		FOREMAN:		ELEVATION	see plan
OBSERVED BY	K. Elmy	DATE	1/17/19	DEPTH TO GROUNDWATER BELOW	
CHECKED BY		DATE		SURFACE	100

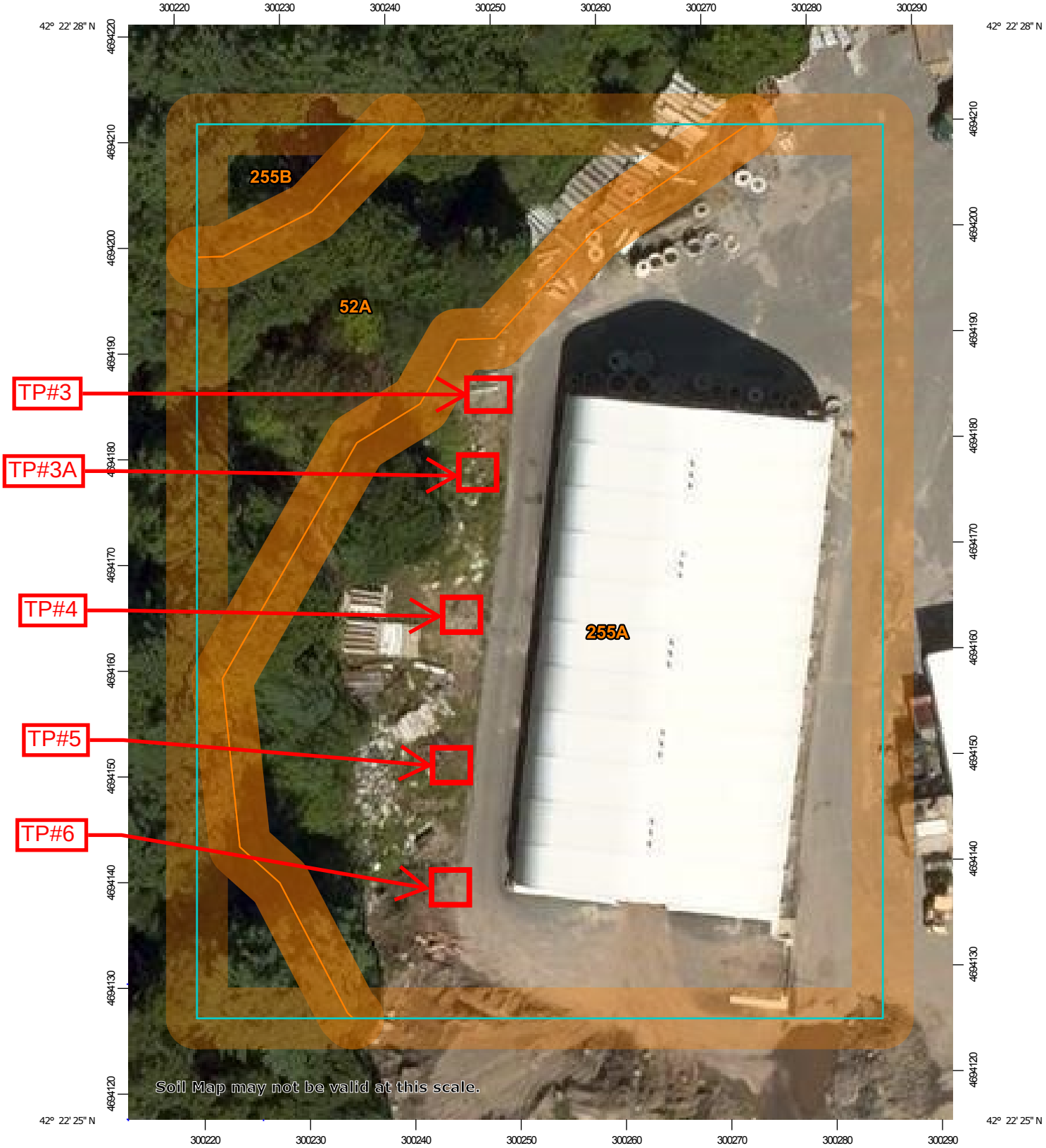
DEPTH BELOW GROUND SURFACE (in.)	TEST PIT DIAGRAM AND SOIL DESCRIPTION

NOTES:

1. Redox features 2% at 76"
2. Sample taken at 58-inches
3. Standing water at 100-inches

TEST PIT NUMBER
TP 6

WESTON & SAMPSON ENGINEERS, INC.



Map Scale: 1:505 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 5 10 20 30

Feet: 0 20 40 80 120

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 1:25,000.

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: Middlesex County, Massachusetts
Survey Area Data: Version 18, Sep 7, 2018

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

Date(s) aerial images were photographed: Sep 12, 2014—Sep 28, 2014

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

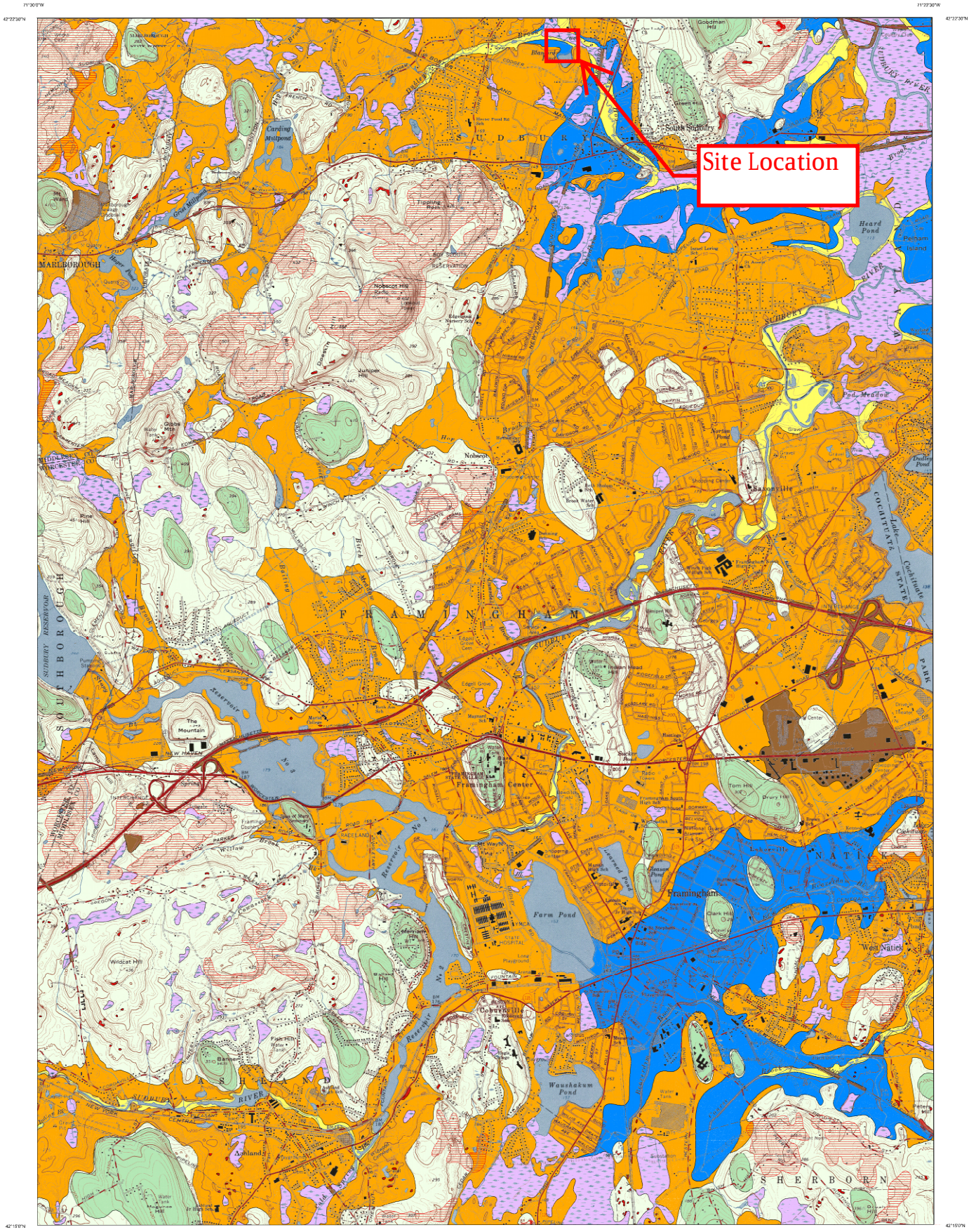
Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
52A	Freetown muck, 0 to 1 percent slopes	0.3	22.9%
255A	Windsor loamy sand, 0 to 3 percent slopes	1.0	74.4%
255B	Windsor loamy sand, 3 to 8 percent slopes	0.0	2.7%
Totals for Area of Interest		**1.4**	**100.0%**

FRAMINGHAM QUADRANGLE

Excerpted from: Surficial Geologic Map of the Clinton-Concord-Grafton-Medfield 12-Quadrangle Area in East Central Massachusetts
By Janet R. Stone and Byron D. Stone
Open-File Report 2006-1260A

Explanatory pamphlet accompanies map



SURFICIAL GEOLOGIC MAP OF THE CLINTON-CONCORD-GRAFTON-MEDFIELD 12-QUADRANGLE AREA IN EAST CENTRAL MASSACHUSETTS

Compiled by Janet R. Stone and Byron D. Stone

2006

DESCRIPTION OF MAP UNITS

POSTGLACIAL DEPOSITS

Artificial fill– Earth materials and manmade materials that have been artificially emplaced, primarily in highway and railroad embankments, and in dams; may also include landfills, urban development areas, and filled coastal wetlands.

Floodplain alluvium– Sand, gravel, silt, and some organic material, stratified and well sorted to poorly sorted, beneath the floodplains of modern streams. The texture of alluvium commonly varies over short distances both laterally and vertically, and generally is similar to the texture of adjacent glacial deposits. Along smaller streams, alluvium is commonly less than 5 ft thick. The most extensive deposit of alluvium on the map is along the Charles, Assabet, and Concord Rivers where the texture is predominantly sand, fine gravel, and silt, and total thickness is as much as 25 ft. Alluvium typically overlies thicker glacial stratified deposits.

Swamp deposits– Organic muck and peat that contain minor amounts of sand, silt, and clay, stratified and poorly sorted, in kettle depressions or poorly drained areas. Most swamp deposits are less than about 10 ft thick. Swamp deposits overlie glacial deposits or bedrock. They locally overlie glacial till even where they occur within thin glacial meltwater deposits.

GLACIAL STRATIFIED DEPOSITS

Sorted and stratified sediments composed of gravel, sand, silt, and clay (as defined in particle size diagram) deposited in layers by glacial meltwater. These sediments occur as four basic textural units– gravel deposits, sand and gravel deposits, sand deposits, and fine deposits. On this interim map, gravel, sand and gravel, and sand deposits are not differentiated and are shown as *Coarse Deposits* where they occur at land surface. *Fine Deposits* also are shown where they occur at land surface. **Textural changes occur both areally and vertically (fig. 2), however subsurface textural variations are not shown on this interim map.**

Coarse deposits include: *Gravel deposits* composed mainly of gravel-sized clasts; cobbles and boulders predominate; minor amounts of sand within gravel beds, and sand comprises few separate layers. Gravel layers generally are poorly sorted and bedding commonly is distorted and faulted due to postdepositional collapse related to melting of ice. *Sand and gravel deposits* composed of mixtures of gravel and sand within individual layers and as alternating layers. Sand and gravel layers generally range from 25 to 50 percent gravel particles and from 50 to 75 percent sand particles. Layers are well to poorly sorted; bedding may be distorted and faulted due to postdepositional collapse. *Sand deposits* composed mainly of very coarse to fine sand, commonly in well-sorted layers. Coarser layers may contain up to 25 percent gravel particles, generally granules and pebbles; finer layers may contain some very fine sand, silt, and clay.

Fine deposits include very fine sand, silt, and clay that occurs as well-sorted, thin layers of alternating silt and clay, or thicker layers of very fine sand and silt. Very fine sand commonly occurs at the surface and grades downward into rhythmically bedded silt and clay varves. Locally, this map unit may include areas underlain by fine sand.

GLACIAL TILL DEPOSITS

Thin till– Nonsorted, nonstratified matrix of sand, some silt, and little clay containing scattered gravel clasts and few large boulders; in areas where till is generally less than 10-15 ft thick and including areas of bedrock outcrop where till is absent. Predominantly upper till of the last glaciation; loose to moderately compact, generally sandy, commonly stony. Two facies are present in some places; a looser, coarser-grained ablation facies, melted out from supraglacial position; and an underlying more compact, finer-grained lodgement facies deposited subglacially. In general, both ablation and lodgement facies of upper till derived from fine-grained bedrock are finer grained, more compact, less stony and have fewer surface boulders than upper till derived from coarser grained crystalline rocks. Fine-grained bedrock sources include the red Mesozoic sedimentary rocks of the Connecticut River lowland, marble in the western river valleys, and fine-grained schists in upland areas.

Thick till– Nonsorted, nonstratified matrix of sand, some silt, and little clay containing scattered gravel clasts and few large boulders at the surface; in the shallow subsurface, compact, nonsorted matrix of silt, very fine sand, and some clay containing scattered small gravel clasts in areas where till is greater than 10-15 ft thick, chiefly in drumlin landforms in which till thickness commonly exceeds 100 ft (maximum recorded thickness is 230 ft). Although upper till is the surface deposit, the lower till constitutes the bulk of the material in these areas. Lower till is moderately to very compact, and is commonly finer-grained and less stony than upper till. An oxidized zone, the lower part of a soil profile formed during a period of interglacial weathering, is generally present in the upper part of the lower till. This zone commonly shows closely spaced joints that are stained with iron and manganese oxides.

BEDROCK AREAS

Bedrock outcrops and areas of abundant outcrop or shallow bedrock– Solid color shows extent of individual bedrock outcrops; line pattern indicates areas of shallow bedrock or areas where small outcrops are too numerous to map individually; in areas of shallow bedrock, surficial materials are less than 5 ft thick.

SOURCES OF DATA

See explanatory pamphlet for references

Clinton Quadrangle
Map units were reproduced from Koteff, 1966. Glacial Stratified Deposits in this quadrangle include deposits of glacial Lakes Nashua, Assabet, and Leominster, and other smaller valley deposits. Fine-grained glacial stratified deposits at land surface include glacial Lake Nashua lake-bottom deposits (unit Qnbb of Koteff, 1966). Areas of thick till shown on this map were inferred from photographic image and topographic analysis and drumlin symbols shown by Koteff (1966).

Hudson and Maynard Quadrangles
Map units were reproduced from Hansen (1956). Glacial Stratified Deposits in this quadrangle include various glacial lake and stream deposits. Fine-grained glacial stratified deposits at land surface include lake-bottom deposits of glacial Lake Sudbury (parts of unit Qsg of Hansen, 1956); this unit has been extended beneath adjacent water bodies and postglacial deposits on this map. Drumlin till unit was reproduced from the published map; other areas of thick till were inferred from photographic image and topographic analysis.

Concord Quadrangle
Map units were reproduced from Koteff (1964). Glacial Stratified Deposits in this quadrangle include deposits of glacial lakes Sudbury and Concord, and other smaller valley deposits. Fine-grained glacial stratified deposits at land surface include lake-bottom deposits of glacial Lakes Sudbury and Concord (unit Qlsb and Qlcb of Koteff, 1964); these units have been extended beneath adjacent water bodies and postglacial deposits on this map. Thick till areas shown on this map were inferred from photographic image and topographic analysis and drumlin symbols shown by Koteff (1964).

Shrewsbury Quadrangle
Map units were reproduced from Shaw (1969). Glacial Stratified Deposits in this quadrangle include deposits of glacial Lakes Assabet and Nashua, and other smaller valley deposits. Thick till areas shown on this map were inferred from photographic image and topographic analysis and drumlin symbols shown by Shaw (1969).

Marlborough Quadrangle
Stone, B.D., 1982, Unpublished field maps
Hildreth, C.T., and Stone, B.D., 2004, Surficial geologic map of the Marlborough Quadrangle, unpublished data.

Framingham Quadrangle
Map units were reproduced from Nelson (1974). Glacial Stratified Deposits in this quadrangle include deposits of glacial Lakes Charles and Sudbury, and other smaller valley deposits. Fine-grained glacial stratified deposits at land surface include lake-bottom deposits of glacial Lakes Sudbury and Charles (unit Qlsb and Qlcb of Nelson, 1974); these units have been extended beneath adjacent water bodies and postglacial deposits on this map. Some contacts between till and glacial stratified deposits have been modified from Nelson (1974). Thick till areas shown on this map were inferred from photographic image and topographic analysis and drumlin symbols shown by Nelson (1974).

Natick Quadrangle
Map units were reproduced from Nelson (1974). Glacial Stratified Deposits in this quadrangle include deposits of glacial Lakes Charles and Sudbury, and other smaller valley deposits. Fine-grained glacial stratified deposits at land surface include lake-bottom deposits of glacial lake Sudbury (unit Qlsb of Nelson, 1974); this unit has been extended beneath adjacent water bodies and postglacial deposits on this map. Thick till areas shown on this map were inferred from photographic image and topographic analysis and drumlin symbols shown by Nelson (1974).

Grafton Quadrangle
Haselton, G.M., and Fontaine, E., 1982, Unpublished field maps
Distribution of bedrock outcrops from Walsh, G.W., 2005, Bedrock Geologic Map of the Grafton quadrangle, unpublished data.

Milford Quadrangle
Haselton, G.M., and Fontaine, E., 1982, Unpublished field map

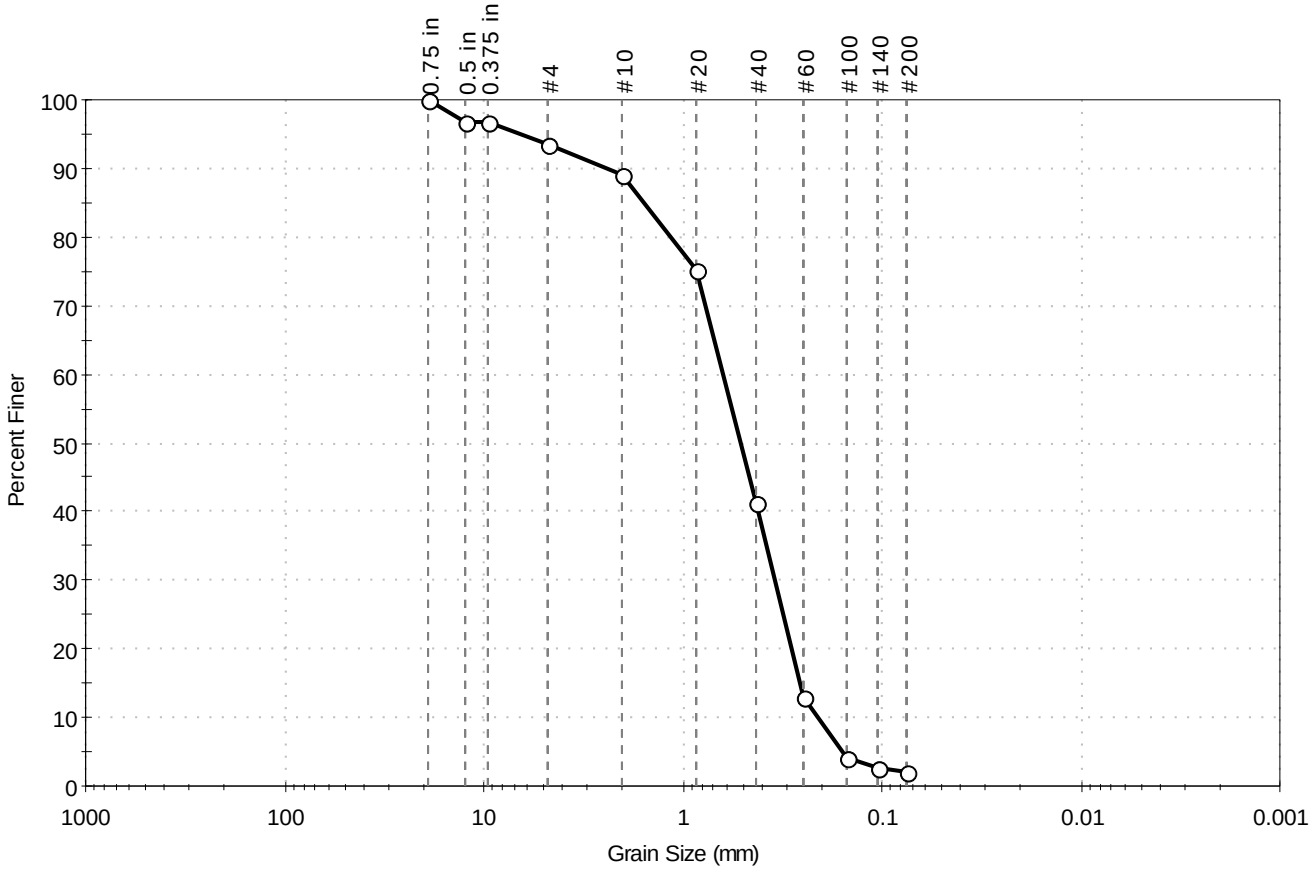
Holliston Quadrangle
Map units were reproduced from Volckman (1975). Glacial Stratified Deposits in this quadrangle include deposits of glacial Lake Medfield, and other smaller valley deposits. Fine-grained glacial stratified deposits at land surface include lake-bottom deposits of glacial Lake Medfield (unit Qm2 of Volckman, 1975); this unit has been extended beneath adjacent water bodies and postglacial deposits on this map. Thick till areas shown on this map were inferred from photographic image and topographic analysis and drumlin symbols shown by Volckman (1975).

Medfield Quadrangle
Map units were reproduced from Volckman (1975). Glacial Stratified Deposits in this quadrangle include deposits of glacial Lake Medfield, and other smaller valley deposits. Thick till areas shown on this map were inferred from photographic image and topographic analysis and drumlin symbols shown by Volckman (1975).

GeoTesting EXPRESS

Client:	Weston & Sampson Engineers				
Project:	Sudbury DPW				
Location:	Sudbury, MA			Project No:	GTX-309434
Boring ID:	---	Sample Type:	bag	Tested By:	ckg
Sample ID:	TP4	Test Date:	01/22/19	Checked By:	emm
Depth :	40-in	Test Id:	489956		
Test Comment:	---				
Visual Description:	Moist, yellowish brown sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D6913/D7928



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	6.6	91.2	2.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	97		
0.375 in	9.50	97		
#4	4.75	93		
#10	2.00	89		
#20	0.85	75		
#40	0.42	41		
#60	0.25	13		
#100	0.15	4		
#140	0.11	3		
#200	0.075	2.2		

Coefficients

D_{85} = 1.5481 mm
D_{30} = 0.3440 mm
D_{60} = 0.6223 mm
D_{15} = 0.2592 mm
D_{50} = 0.5080 mm
D_{10} = 0.2094 mm
C_u = 2.972
C_c = 0.908

Classification

ASTM: Poorly graded SAND (SP)

AASHTO: Stone Fragments, Gravel and Sand (A-1-b (1))

Sample / Test Description

Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

With gravel portion removed:
91.2 sand + 2.2 clay/silt = 93.4
91.2/93.4 = **97.6% sand**
2.2/93.4 = **2.4% clay/silt**

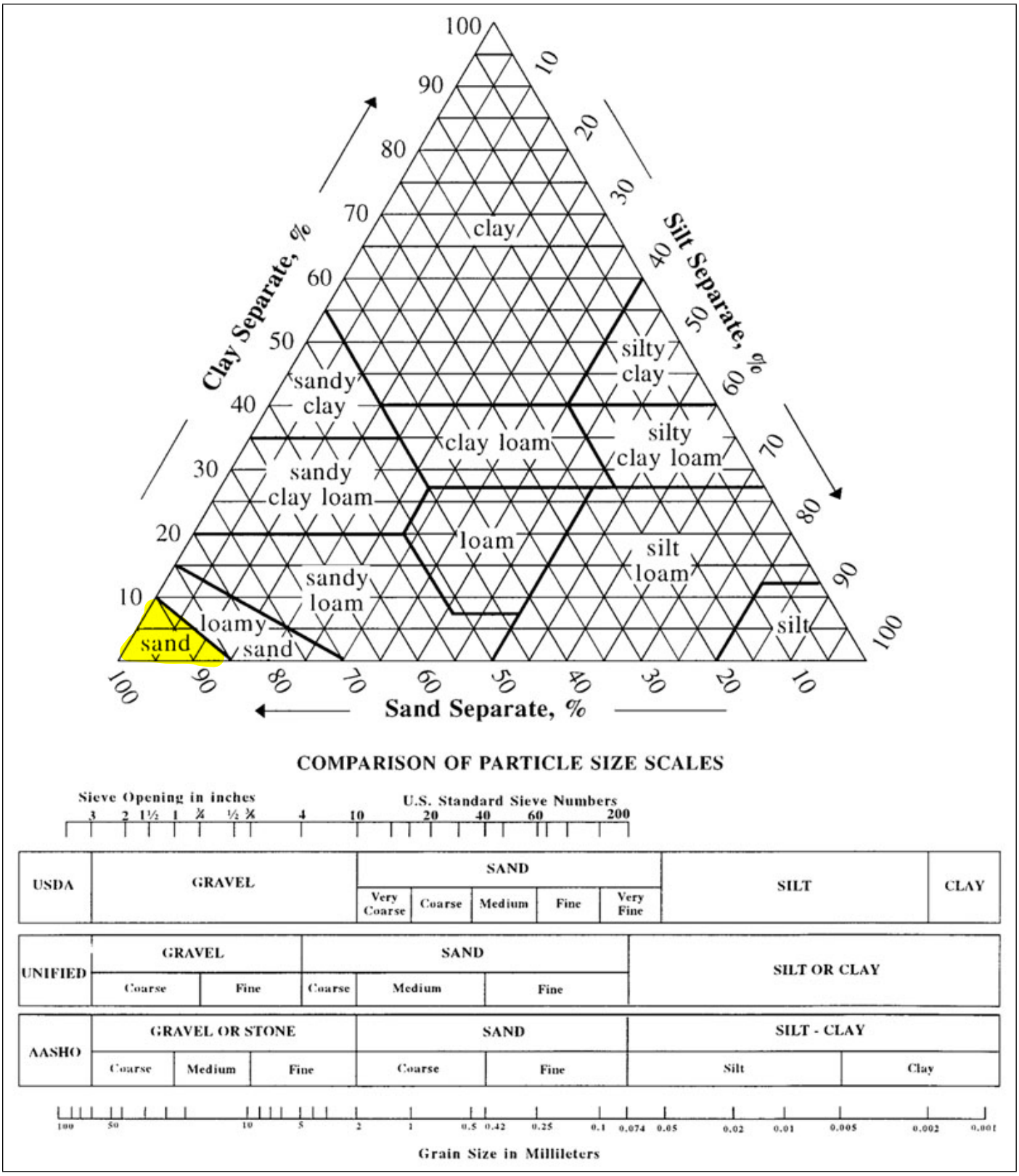


Figure 2.3.2: USDA, NRCS, 2007 National Soil Survey Handbook, Part 618, Exhibit 8, http://soils.usda.gov/technical/handbook/contents/part618ex.html#ex8

United States Department of Agriculture

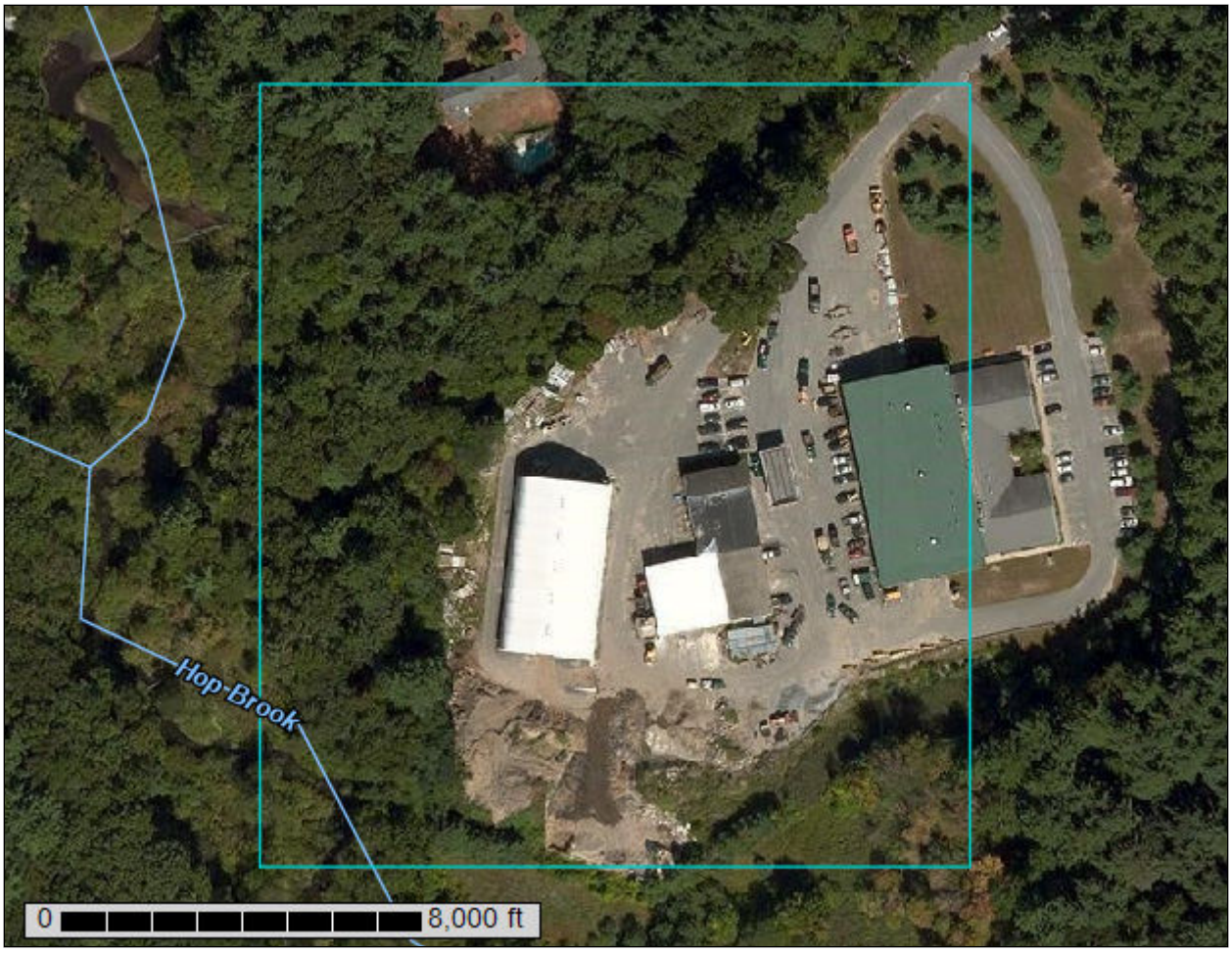
NRCS

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 Middlesex County, Massachusetts

Sudbury DPW Fuel System



January 23, 2019

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.

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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.

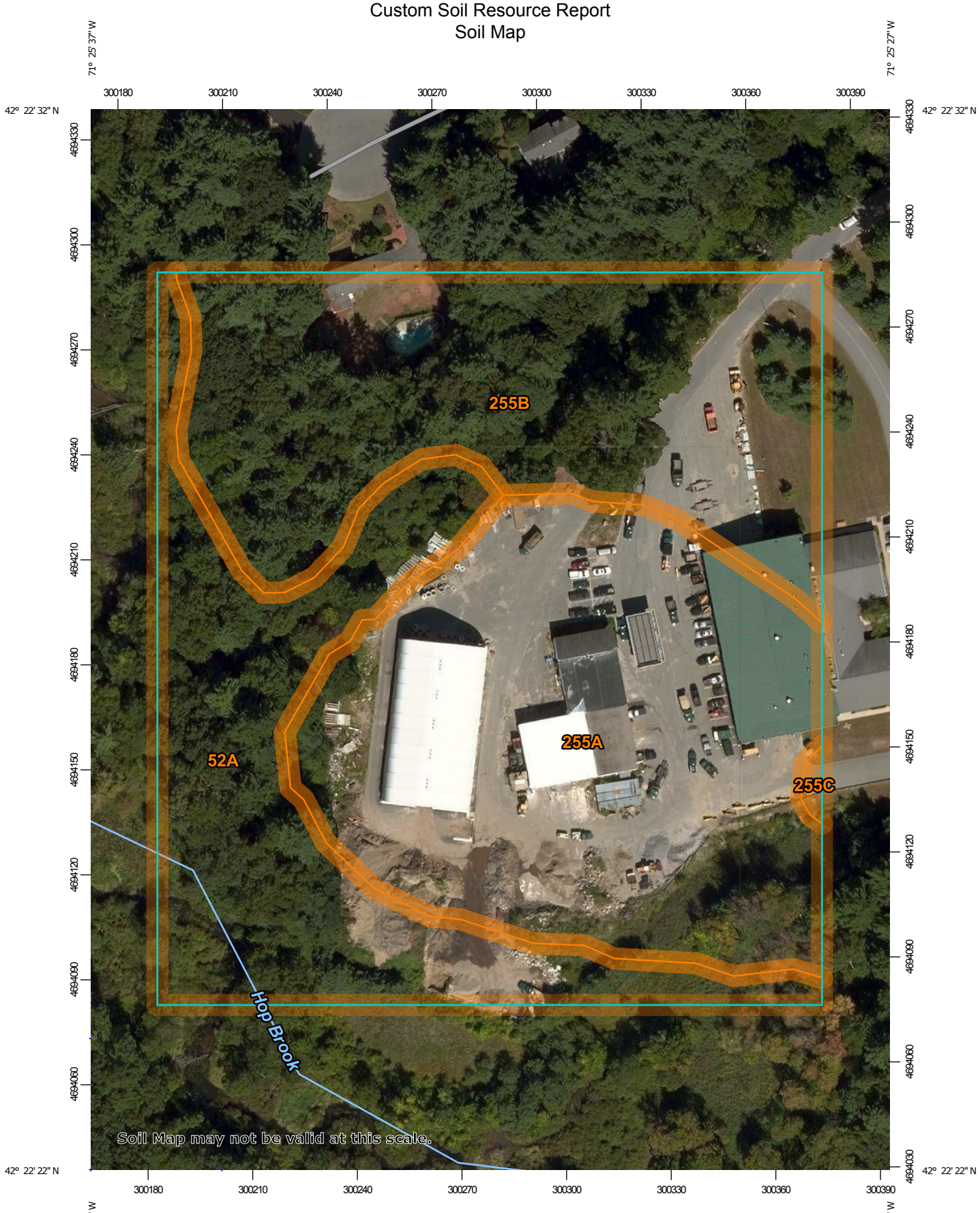
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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: 1:1,480 if printed on A portrait (8.5" x 11") 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 1:25,000.

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: Middlesex County, Massachusetts
Survey Area Data: Version 18, Sep 7, 2018

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

Date(s) aerial images were photographed: Sep 12, 2014—Sep 28, 2014

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
52A	Freetown muck, 0 to 1 percent slopes	2.6	26.4%
255A	Windsor loamy sand, 0 to 3 percent slopes	4.0	40.3%
255B	Windsor loamy sand, 3 to 8 percent slopes	3.3	33.0%
255C	Windsor loamy sand, 8 to 15 percent slopes	0.0	0.2%
Totals for Area of Interest		**9.9**	**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.

Middlesex County, Massachusetts

52A—Freetown muck, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2t2q9
Elevation: 0 to 1,110 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Freetown and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Freetown

Setting

Landform: Swamps, depressions, depressions, bogs, marshes, kettles
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Highly decomposed organic material

Typical profile

Oe - 0 to 2 inches: mucky peat
Oa - 2 to 79 inches: muck

Properties and qualities

Slope: 0 to 1 percent
Percent of area covered with surface fragments: 0.0 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Rare
Frequency of ponding: Frequent
Available water storage in profile: Very high (about 19.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Scarboro

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Base slope, tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Swansea

Percent of map unit: 5 percent
Landform: Bogs, kettles, depressions, depressions, marshes, swamps
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Whitman

Percent of map unit: 5 percent
Landform: Depressions, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

255A—Windsor loamy sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2svkg
Elevation: 0 to 990 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Windsor, loamy sand, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Windsor, Loamy Sand

Setting

Landform: Dunes, deltas, outwash terraces, outwash plains
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Loose sandy glaciofluvial deposits derived from granite and/or loose sandy glaciofluvial deposits derived from schist and/or loose sandy glaciofluvial deposits derived from gneiss

Typical profile

O - 0 to 1 inches: moderately decomposed plant material

A - 1 to 3 inches: loamy sand
Bw - 3 to 25 inches: loamy sand
C - 25 to 65 inches: sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 3.6 inches)

Interpretive groups

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

Minor Components

Deerfield, loamy sand

Percent of map unit: 10 percent
Landform: Deltas, outwash plains, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Hinckley, loamy sand

Percent of map unit: 5 percent
Landform: Outwash plains, eskers, kames, deltas
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

255B—Windsor loamy sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2svkf
Elevation: 0 to 1,210 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Windsor, loamy sand, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Windsor, Loamy Sand

Setting

Landform: Outwash terraces, deltas, outwash plains, dunes
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Loose sandy glaciofluvial deposits derived from granite and/or loose sandy glaciofluvial deposits derived from schist and/or loose sandy glaciofluvial deposits derived from gneiss

Typical profile

O - 0 to 1 inches: moderately decomposed plant material
A - 1 to 3 inches: loamy sand
Bw - 3 to 25 inches: loamy sand
C - 25 to 65 inches: sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 4.5 inches)

Interpretive groups

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

Minor Components

Hinckley, loamy sand

Percent of map unit: 10 percent
Landform: Outwash plains, eskers, kames, deltas
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Deerfield, loamy sand

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

255C—Windsor loamy sand, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2svkq
Elevation: 0 to 1,260 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Windsor and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Windsor

Setting

Landform: — error in exists on —
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, riser
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Loose sandy glaciofluvial deposits derived from granite and/or loose sandy glaciofluvial deposits derived from schist and/or loose sandy glaciofluvial deposits derived from gneiss

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
Ap - 1 to 11 inches: loamy sand
Bw - 11 to 31 inches: loamy sand
C - 31 to 65 inches: sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Hinckley

Percent of map unit: 10 percent
Landform: Outwash plains, eskers, kames, deltas
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest, head slope, nose slope, side slope, rise
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Deerfield

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

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APPENDIX 2

Sudbury DPW Fueling Facility
275 Old Lancaster Rd, Sudbury, MA

Pre-Development Conditions vs. Post-Development Conditions

Pre-Development Flows					
Output Subcatchment/Reach	1 inch storm 1.00 in Flow (cfs)	2 year storm 3.2 in Flow (cfs)	10 year storm 4.8 in Flow (cfs)	25 year storm 6.0 in Flow (cfs)	100 year storm 8.6 in Flow (cfs)
3P *Discharge to Wetland/Stream*	0.47	2.16	3.40	4.31	6.28

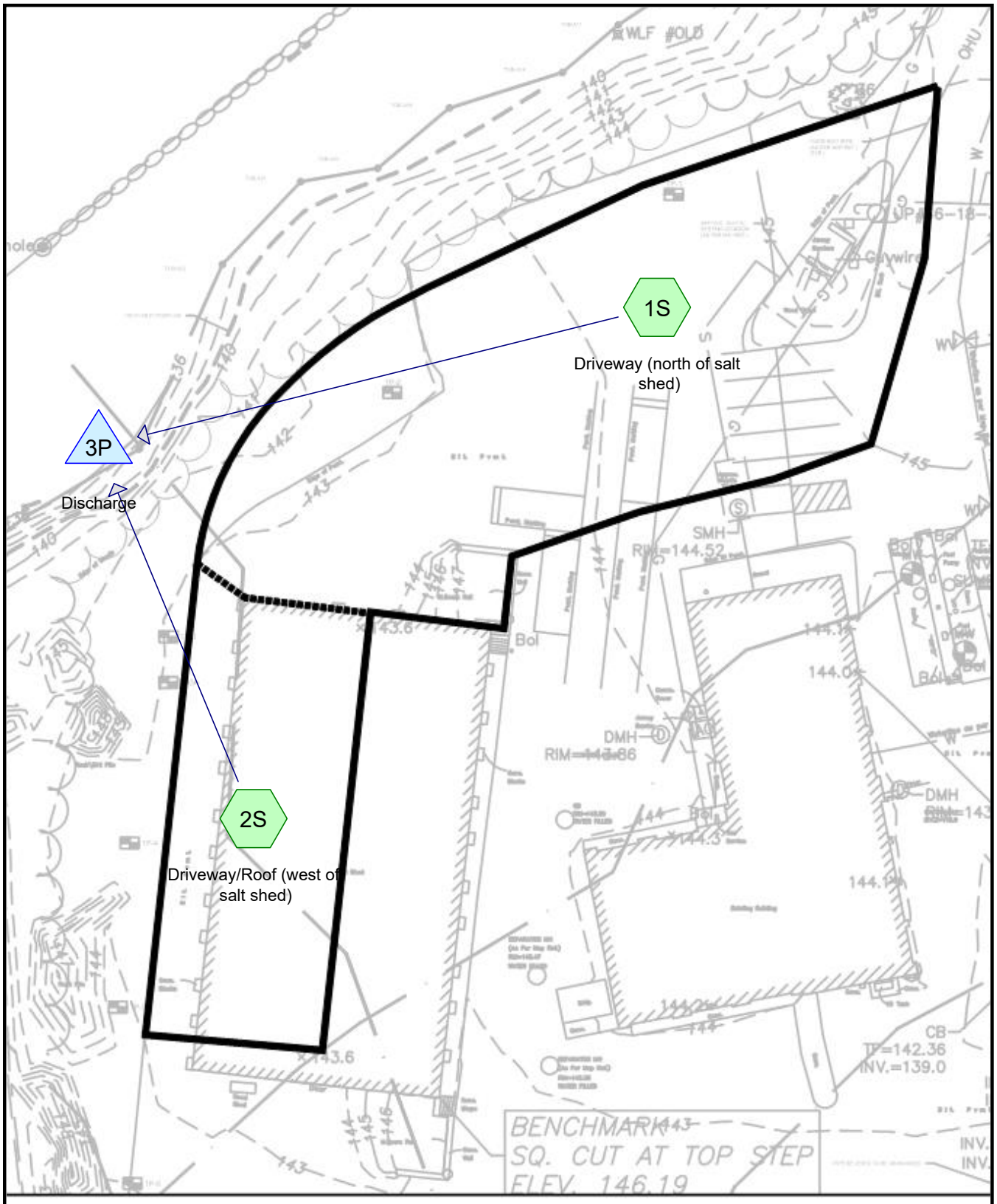
Post-Development Flows					
Output Subcatchment/Reach	1 inch storm 1.00 in Flow (cfs)	2 year storm 3.2 in Flow (cfs)	10 year storm 4.8 in Flow (cfs)	25 year storm 6.0 in Flow (cfs)	100 year storm 8.6 in Flow (cfs)
5P *Discharge to Wetland/Stream*	0.00	0.00	0.10	0.95	3.41

Sudbury DPW Fueling Facility
275 Old Lancaster Rd, Sudbury, MA

Pre-Development Conditions vs. Post-Development Conditions

Pre-Development Volumes					
Output Subcatchment/Reach	1 inch storm 1.00in Volume (cf)	2 year storm 3.2 in Volume (cf)	10 year storm 4.8 in Volume (cf)	25 year storm 6.0 in Volume (cf)	100 year storm 8.6 in Volume (cf)
3P *Discharge to Wetland/Stream*	1,438	6,868	11,030	14,179	21,038

Post-Development Volumes					
Output Subcatchment/Reach	1 inch storm 1.00in Volume (cf)	2 year storm 3.2 in Volume (cf)	10 year storm 4.8 in Volume (cf)	25 year storm 6.0 in Volume (cf)	100 year storm 8.6 in Volume (cf)
5P *Discharge to Wetland/Stream*	0	0	68	1,186	4,186



Subcat Reach Pond Link

Routing Diagram for Sudbury Fueling EX
Prepared by Weston & Sampson, Printed 3/4/2019

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
2,451	49	50-75% Grass cover, Fair, HSG A (1S)
2,506	98	Paved parking, HSG A (2S)
20,924	98	Paved roads w/curbs & sewers, HSG A (1S)
6,000	98	Unconnected roofs, HSG A (2S)
31,881	**94**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
31,881	HSG A	1S, 2S
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
31,881		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover
2,451	0	0	0	0	2,451	50-75% Grass cover, Fair
2,506	0	0	0	0	2,506	Paved parking
20,924	0	0	0	0	20,924	Paved roads w/curbs & sewers
6,000	0	0	0	0	6,000	Unconnected roofs
31,881	**0**	**0**	**0**	**0**	**31,881**	**TOTAL AREA**

Time span=0.00-72.00 hrs, dt=0.02 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Driveway (north of salt Runoff Area=23,375 sf 89.51% Impervious Runoff Depth=0.45"
Tc=5.0 min CN=93 Runoff=0.29 cfs 877 cf

Subcatchment2S: Driveway/Roof (west of Runoff Area=8,506 sf 100.00% Impervious Runoff Depth=0.79"
Tc=5.0 min CN=98 Runoff=0.18 cfs 561 cf

Pond 3P: Discharge Inflow=0.47 cfs 1,438 cf
Primary=0.47 cfs 1,438 cf

Total Runoff Area = 31,881 sf Runoff Volume = 1,438 cf Average Runoff Depth = 0.54"
7.69% Pervious = 2,451 sf 92.31% Impervious = 29,430 sf

Summary for Subcatchment 1S: Driveway (north of salt shed)

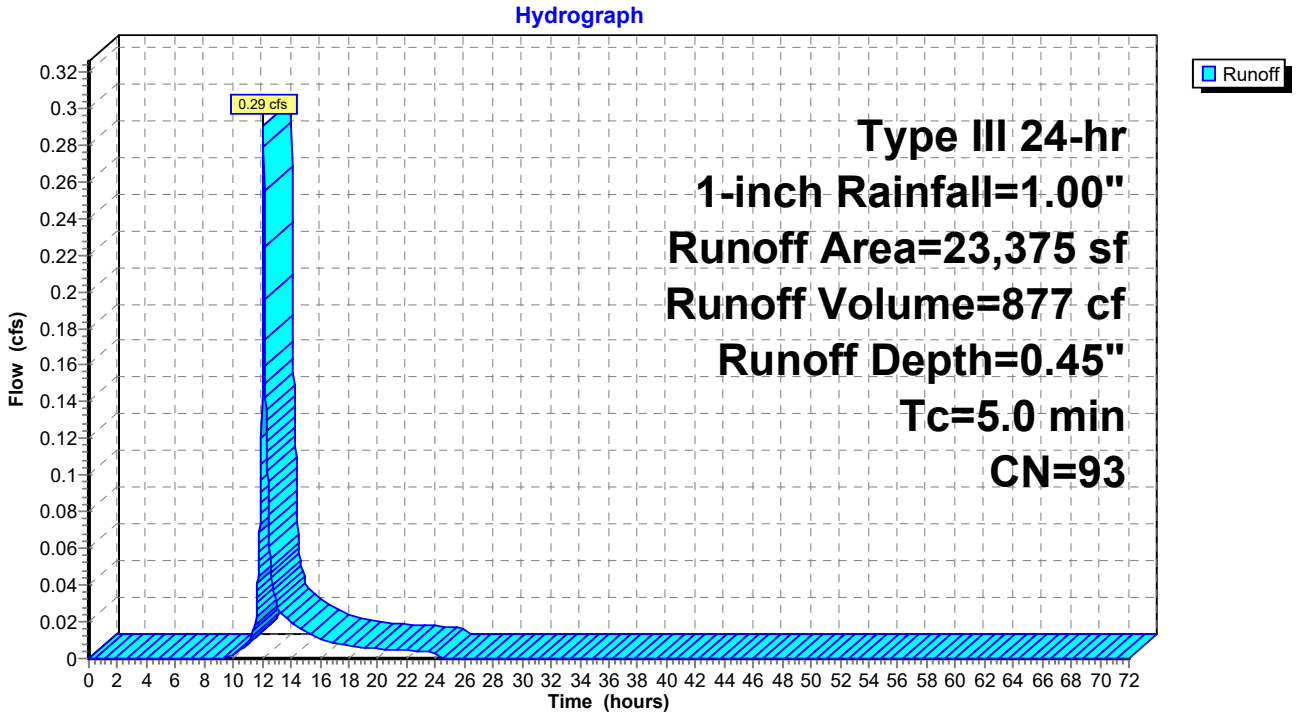
Runoff = 0.29 cfs @ 12.08 hrs, Volume= 877 cf, Depth= 0.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 1-inch Rainfall=1.00"

Area (sf)	CN	Description
2,451	49	50-75% Grass cover, Fair, HSG A
20,924	98	Paved roads w/curbs & sewers, HSG A
23,375	93	Weighted Average
2,451		10.49% Pervious Area
20,924		89.51% Impervious Area

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

Subcatchment 1S: Driveway (north of salt shed)



Summary for Subcatchment 2S: Driveway/Roof (west of salt shed)

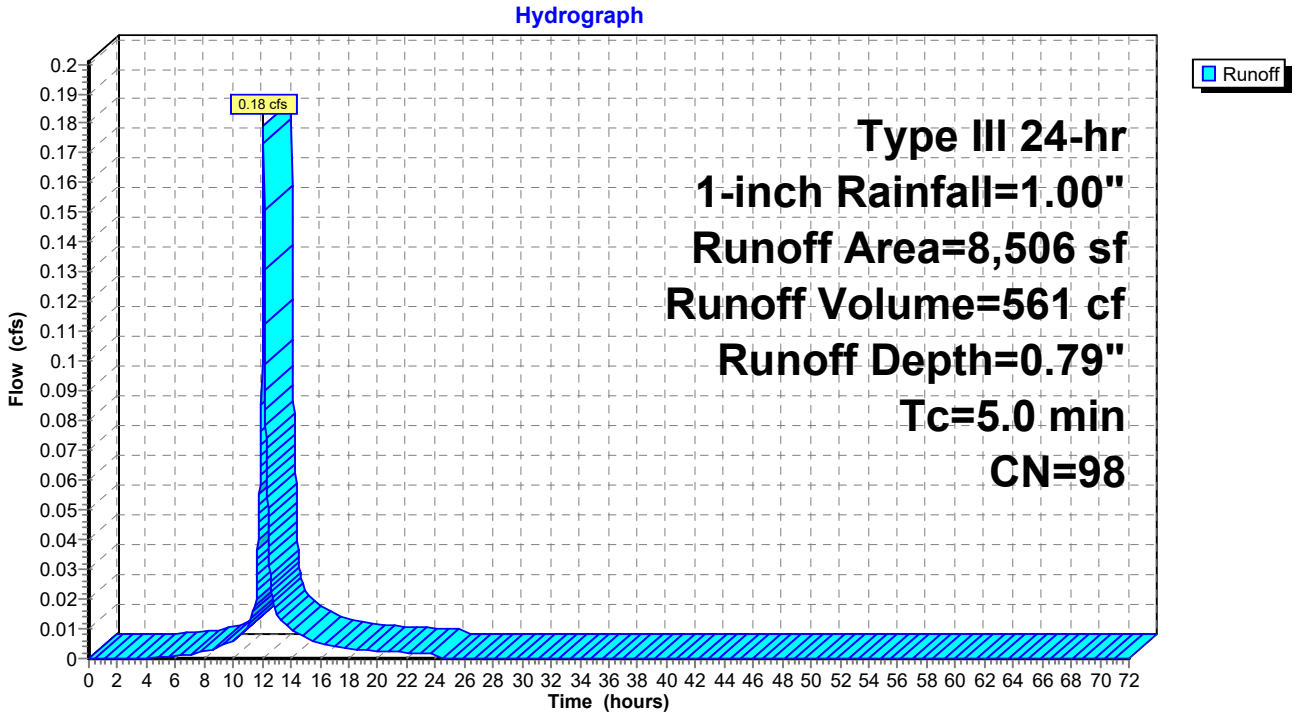
Runoff = 0.18 cfs @ 12.07 hrs, Volume= 561 cf, Depth= 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 1-inch Rainfall=1.00"

Area (sf)	CN	Description
2,506	98	Paved parking, HSG A
6,000	98	Unconnected roofs, HSG A
8,506	98	Weighted Average
8,506		100.00% Impervious Area
6,000		70.54% Unconnected

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

Subcatchment 2S: Driveway/Roof (west of salt shed)



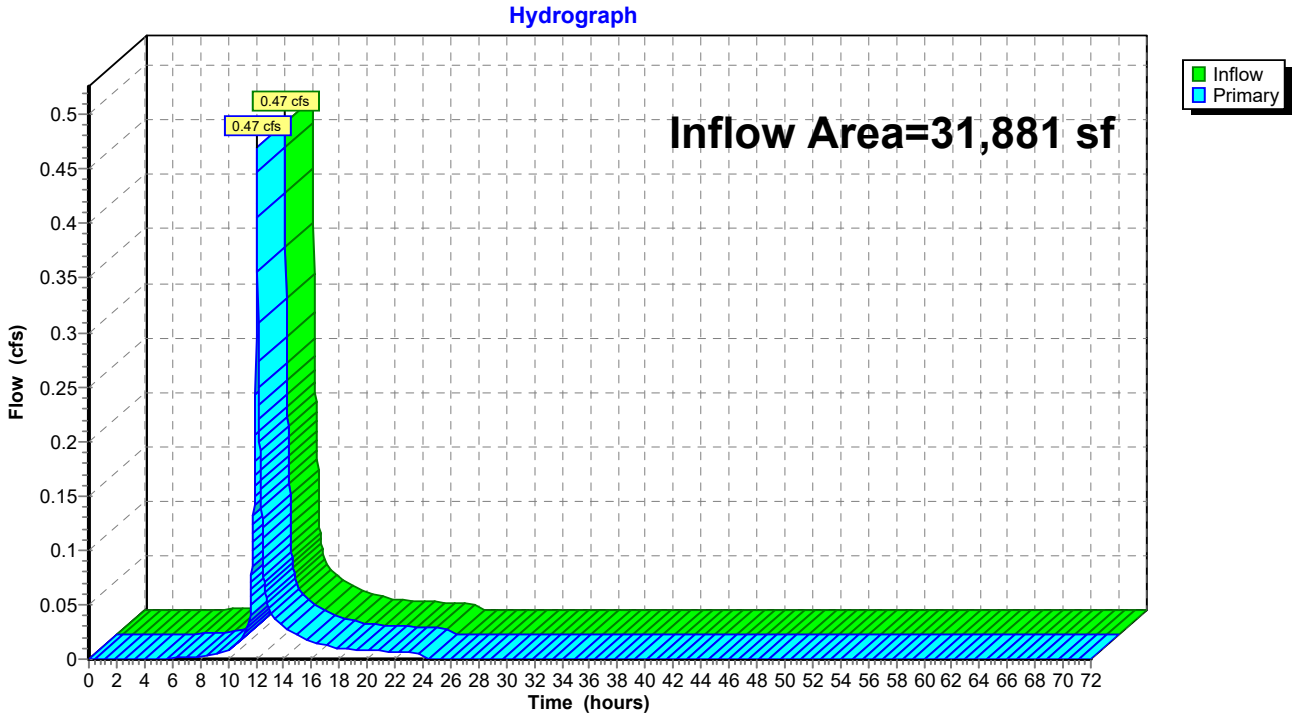
Summary for Pond 3P: Discharge

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 31,881 sf, 92.31% Impervious, Inflow Depth = 0.54" for 1-inch event
Inflow = 0.47 cfs @ 12.08 hrs, Volume= 1,438 cf
Primary = 0.47 cfs @ 12.08 hrs, Volume= 1,438 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs

Pond 3P: Discharge



Time span=0.00-72.00 hrs, dt=0.02 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Driveway (north of salt Runoff Area=23,375 sf 89.51% Impervious Runoff Depth=2.45"
Tc=5.0 min CN=93 Runoff=1.54 cfs 4,764 cf

Subcatchment2S: Driveway/Roof (west of Runoff Area=8,506 sf 100.00% Impervious Runoff Depth=2.97"
Tc=5.0 min CN=98 Runoff=0.63 cfs 2,103 cf

Pond 3P: Discharge Inflow=2.16 cfs 6,868 cf
Primary=2.16 cfs 6,868 cf

Total Runoff Area = 31,881 sf Runoff Volume = 6,868 cf Average Runoff Depth = 2.58"
7.69% Pervious = 2,451 sf 92.31% Impervious = 29,430 sf

Summary for Subcatchment 1S: Driveway (north of salt shed)

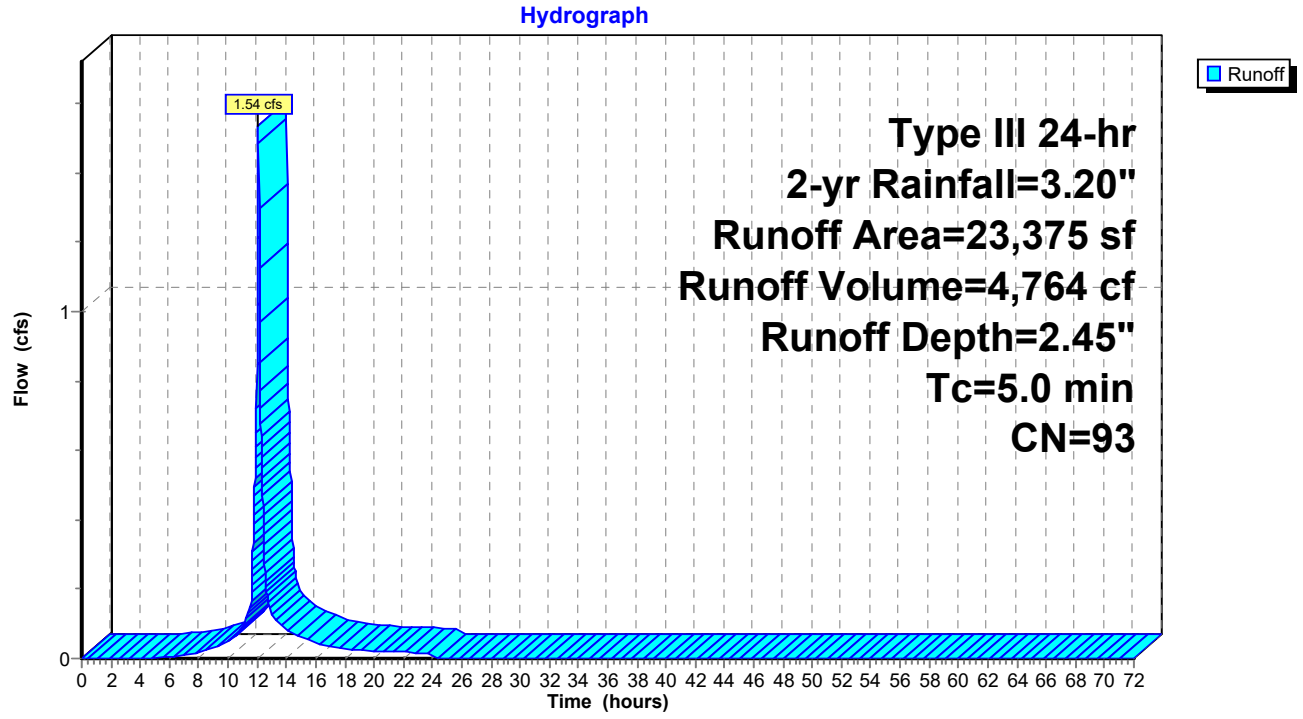
Runoff = 1.54 cfs @ 12.07 hrs, Volume= 4,764 cf, Depth= 2.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
2,451	49	50-75% Grass cover, Fair, HSG A
20,924	98	Paved roads w/curbs & sewers, HSG A
23,375	93	Weighted Average
2,451		10.49% Pervious Area
20,924		89.51% Impervious Area

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

Subcatchment 1S: Driveway (north of salt shed)



Summary for Subcatchment 2S: Driveway/Roof (west of salt shed)

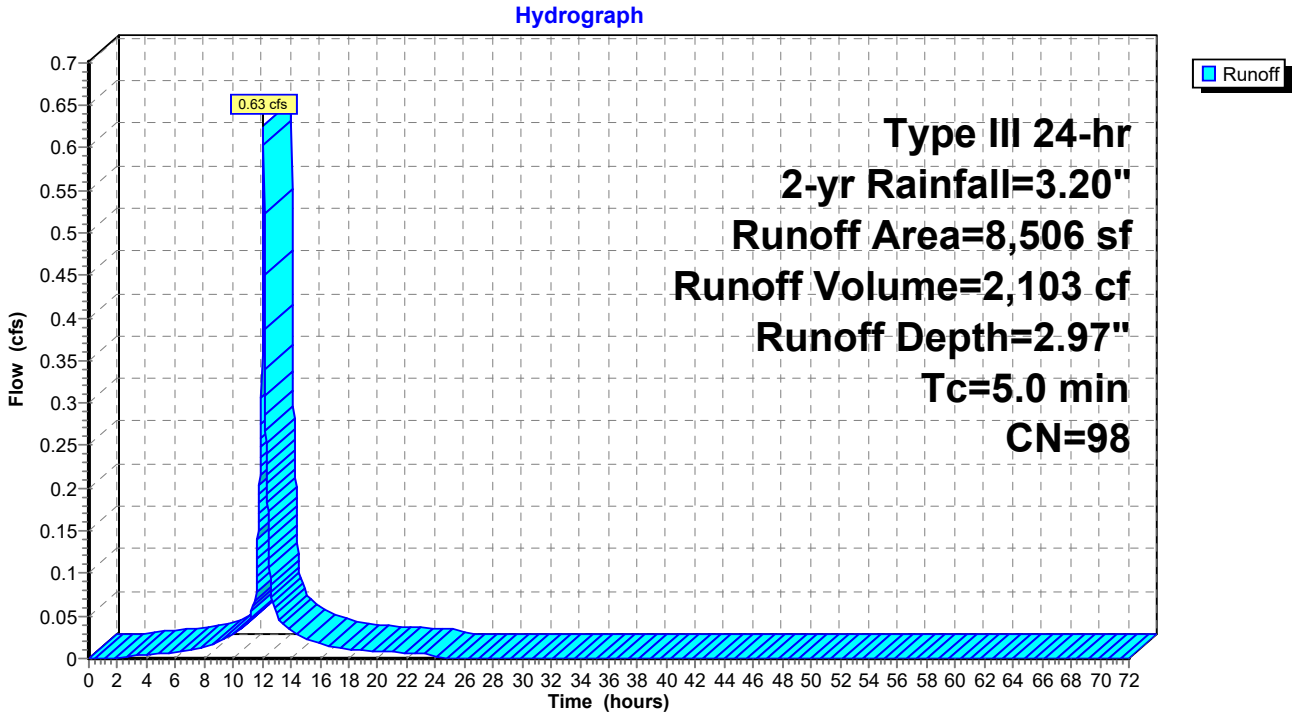
Runoff = 0.63 cfs @ 12.07 hrs, Volume= 2,103 cf, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
2,506	98	Paved parking, HSG A
6,000	98	Unconnected roofs, HSG A
8,506	98	Weighted Average
8,506		100.00% Impervious Area
6,000		70.54% Unconnected

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

Subcatchment 2S: Driveway/Roof (west of salt shed)



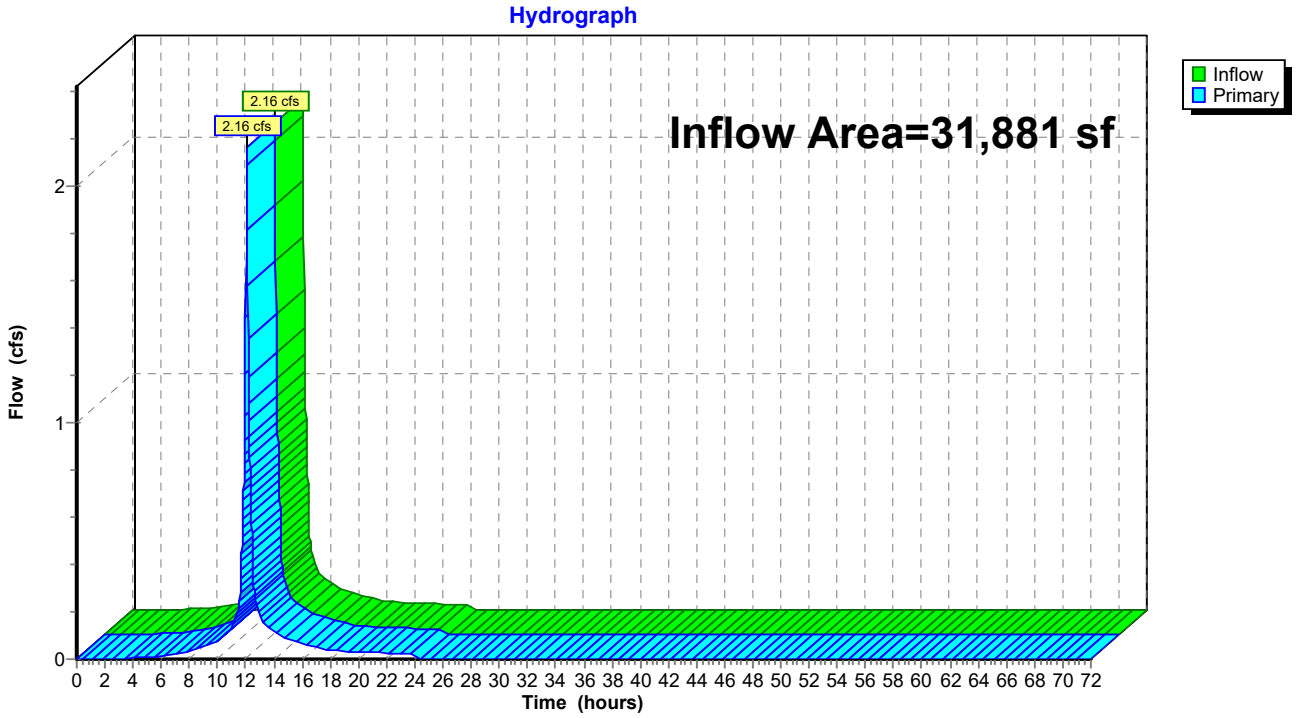
Summary for Pond 3P: Discharge

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 31,881 sf, 92.31% Impervious, Inflow Depth = 2.58" for 2-yr event
Inflow = 2.16 cfs @ 12.07 hrs, Volume= 6,868 cf
Primary = 2.16 cfs @ 12.07 hrs, Volume= 6,868 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs

Pond 3P: Discharge



Time span=0.00-72.00 hrs, dt=0.02 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Driveway (north of salt Runoff Area=23,375 sf 89.51% Impervious Runoff Depth=4.00"
Tc=5.0 min CN=93 Runoff=2.45 cfs 7,795 cf

Subcatchment2S: Driveway/Roof (west of Runoff Area=8,506 sf 100.00% Impervious Runoff Depth=4.56"
Tc=5.0 min CN=98 Runoff=0.95 cfs 3,235 cf

Pond 3P: Discharge Inflow=3.40 cfs 11,030 cf
Primary=3.40 cfs 11,030 cf

Total Runoff Area = 31,881 sf Runoff Volume = 11,030 cf Average Runoff Depth = 4.15"
7.69% Pervious = 2,451 sf 92.31% Impervious = 29,430 sf

Summary for Subcatchment 1S: Driveway (north of salt shed)

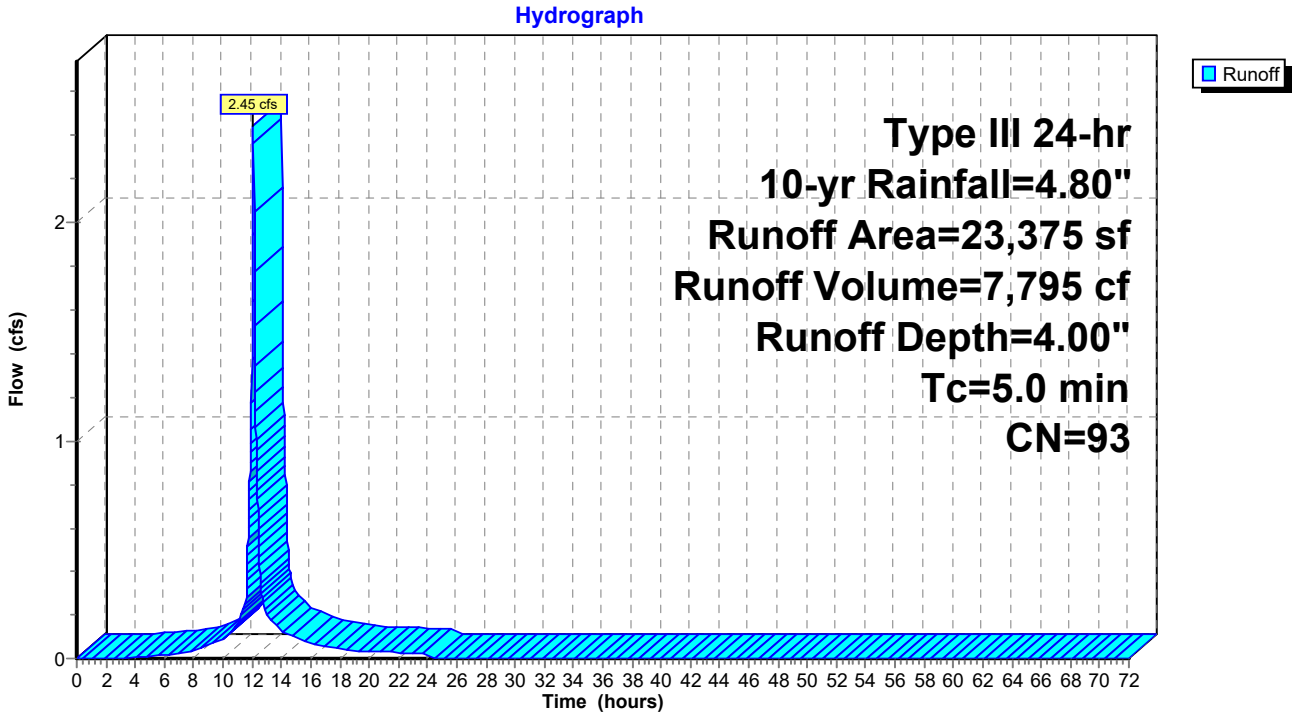
Runoff = 2.45 cfs @ 12.07 hrs, Volume= 7,795 cf, Depth= 4.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-yr Rainfall=4.80"

Area (sf)	CN	Description
2,451	49	50-75% Grass cover, Fair, HSG A
20,924	98	Paved roads w/curbs & sewers, HSG A
23,375	93	Weighted Average
2,451		10.49% Pervious Area
20,924		89.51% Impervious Area

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

Subcatchment 1S: Driveway (north of salt shed)



Summary for Subcatchment 2S: Driveway/Roof (west of salt shed)

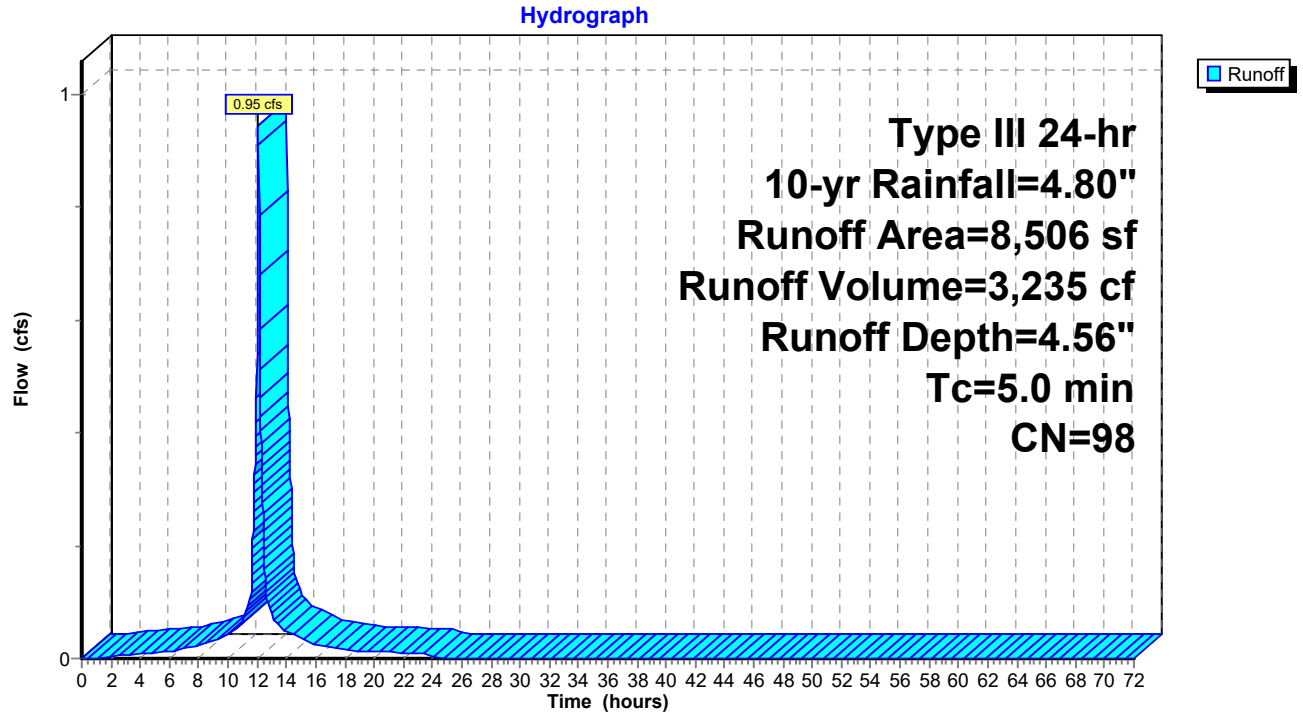
Runoff = 0.95 cfs @ 12.07 hrs, Volume= 3,235 cf, Depth= 4.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-yr Rainfall=4.80"

Area (sf)	CN	Description
2,506	98	Paved parking, HSG A
6,000	98	Unconnected roofs, HSG A
8,506	98	Weighted Average
8,506		100.00% Impervious Area
6,000		70.54% Unconnected

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

Subcatchment 2S: Driveway/Roof (west of salt shed)



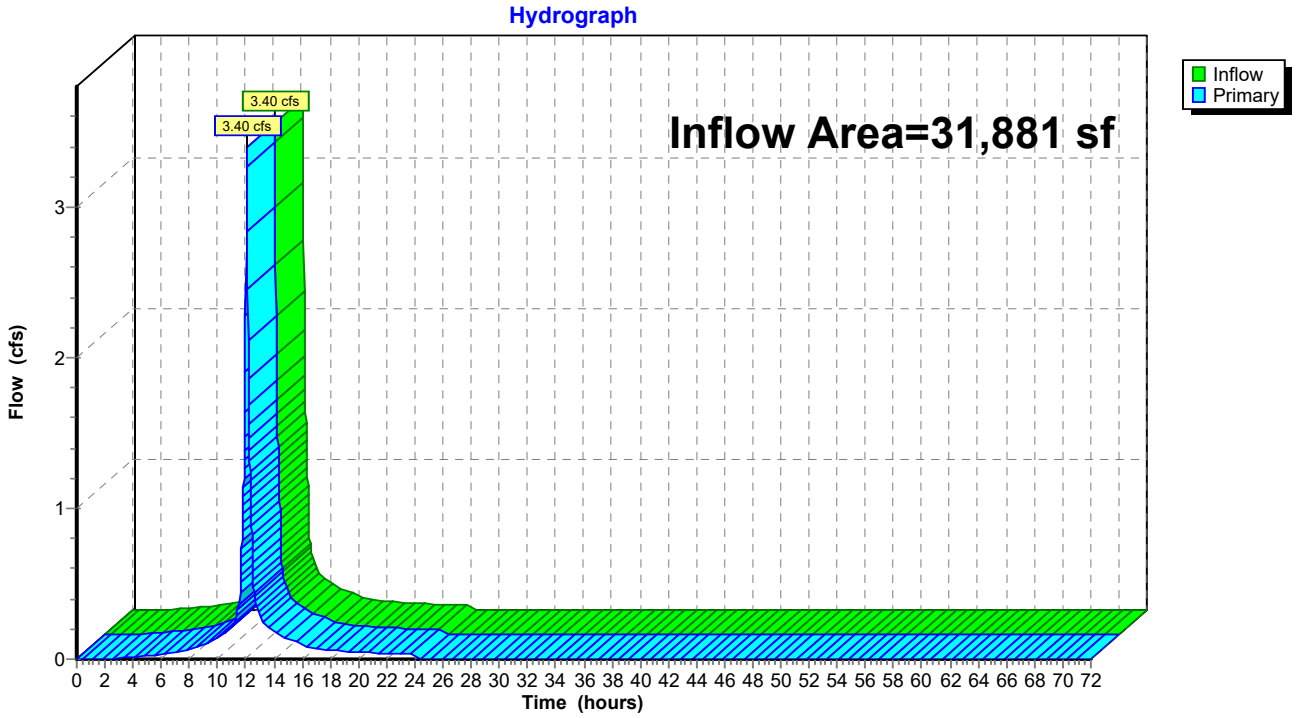
Summary for Pond 3P: Discharge

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 31,881 sf, 92.31% Impervious, Inflow Depth = 4.15" for 10-yr event
Inflow = 3.40 cfs @ 12.07 hrs, Volume= 11,030 cf
Primary = 3.40 cfs @ 12.07 hrs, Volume= 11,030 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs

Pond 3P: Discharge



Time span=0.00-72.00 hrs, dt=0.02 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Driveway (north of salt Runoff Area=23,375 sf 89.51% Impervious Runoff Depth=5.18"
Tc=5.0 min CN=93 Runoff=3.13 cfs 10,095 cf

Subcatchment2S: Driveway/Roof (west of Runoff Area=8,506 sf 100.00% Impervious Runoff Depth=5.76"
Tc=5.0 min CN=98 Runoff=1.19 cfs 4,084 cf

Pond 3P: Discharge Inflow=4.31 cfs 14,179 cf
Primary=4.31 cfs 14,179 cf

Total Runoff Area = 31,881 sf Runoff Volume = 14,179 cf Average Runoff Depth = 5.34"
7.69% Pervious = 2,451 sf 92.31% Impervious = 29,430 sf

Summary for Subcatchment 1S: Driveway (north of salt shed)

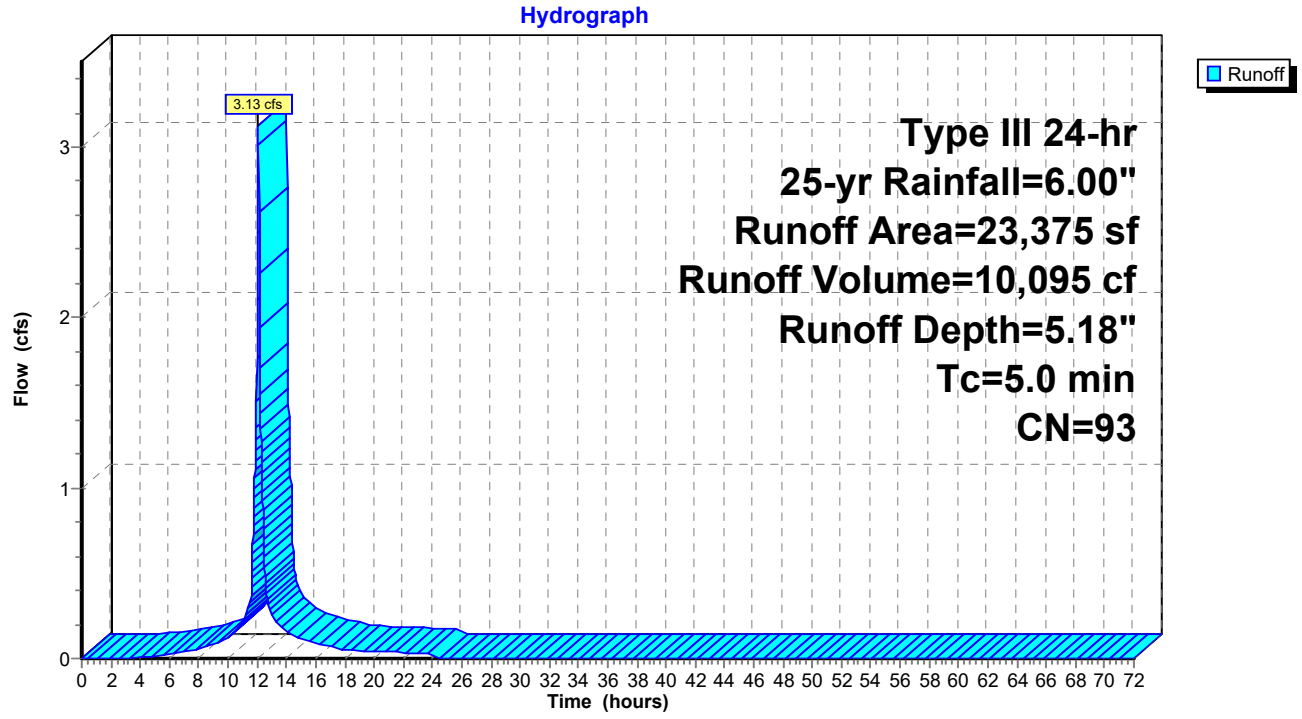
Runoff = 3.13 cfs @ 12.07 hrs, Volume= 10,095 cf, Depth= 5.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
2,451	49	50-75% Grass cover, Fair, HSG A
20,924	98	Paved roads w/curbs & sewers, HSG A
23,375	93	Weighted Average
2,451		10.49% Pervious Area
20,924		89.51% Impervious Area

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

Subcatchment 1S: Driveway (north of salt shed)



Summary for Subcatchment 2S: Driveway/Roof (west of salt shed)

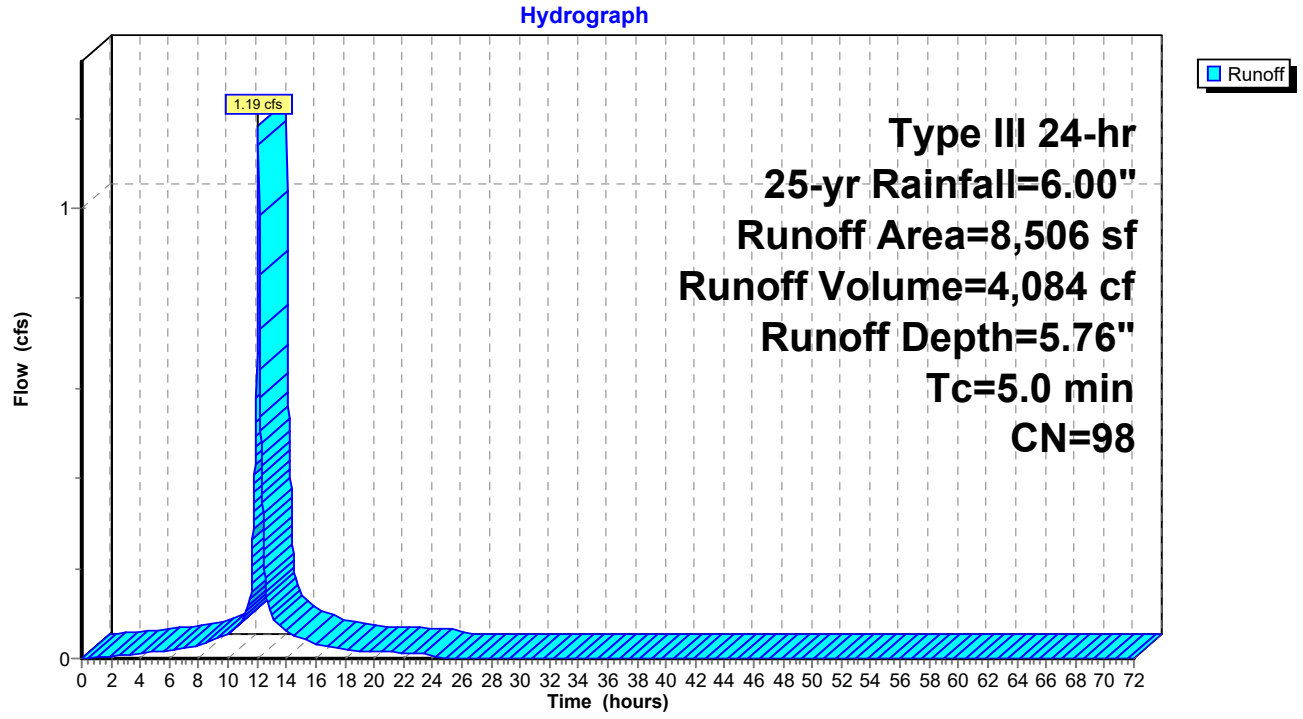
Runoff = 1.19 cfs @ 12.07 hrs, Volume= 4,084 cf, Depth= 5.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
2,506	98	Paved parking, HSG A
6,000	98	Unconnected roofs, HSG A
8,506	98	Weighted Average
8,506		100.00% Impervious Area
6,000		70.54% Unconnected

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

Subcatchment 2S: Driveway/Roof (west of salt shed)



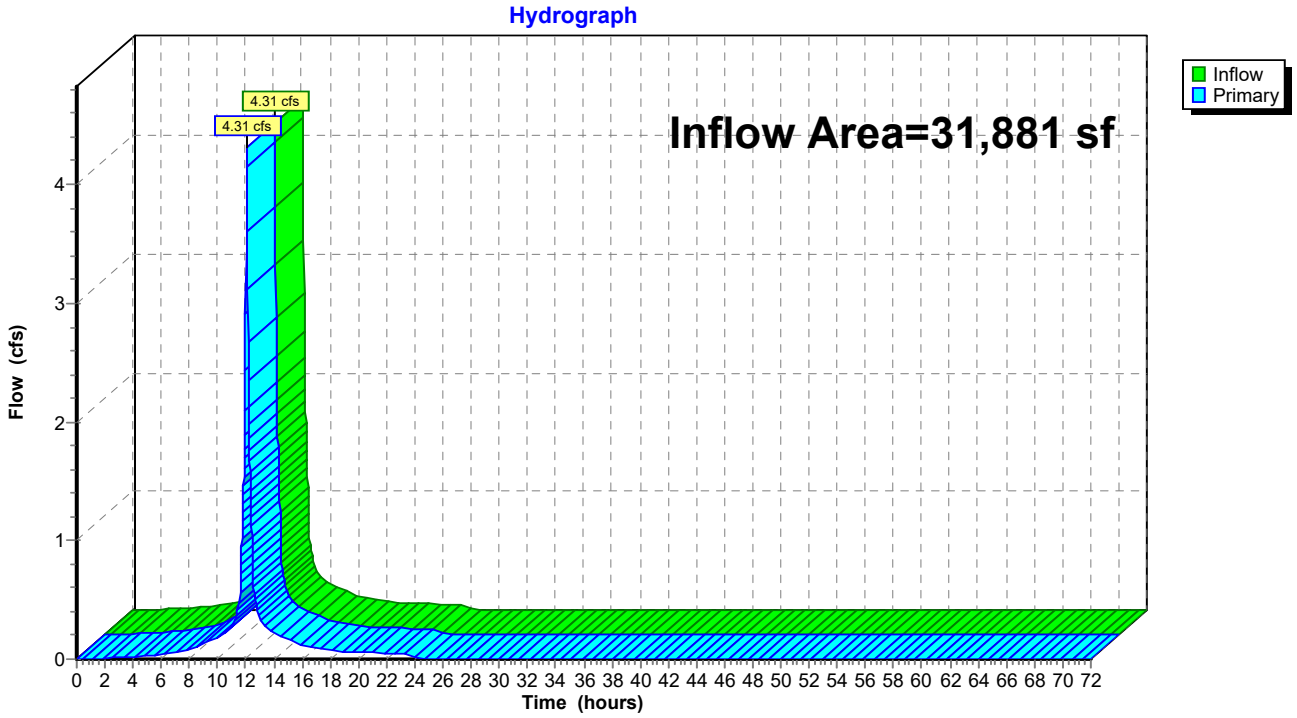
Summary for Pond 3P: Discharge

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 31,881 sf, 92.31% Impervious, Inflow Depth = 5.34" for 25-yr event
Inflow = 4.31 cfs @ 12.07 hrs, Volume= 14,179 cf
Primary = 4.31 cfs @ 12.07 hrs, Volume= 14,179 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs

Pond 3P: Discharge



Time span=0.00-72.00 hrs, dt=0.02 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Driveway (north of salt Runoff Area=23,375 sf 89.51% Impervious Runoff Depth=7.76"
Tc=5.0 min CN=93 Runoff=4.58 cfs 15,113 cf

Subcatchment2S: Driveway/Roof (west of Runoff Area=8,506 sf 100.00% Impervious Runoff Depth=8.36"
Tc=5.0 min CN=98 Runoff=1.70 cfs 5,926 cf

Pond 3P: Discharge Inflow=6.28 cfs 21,038 cf
Primary=6.28 cfs 21,038 cf

Total Runoff Area = 31,881 sf Runoff Volume = 21,038 cf Average Runoff Depth = 7.92"
7.69% Pervious = 2,451 sf 92.31% Impervious = 29,430 sf

Summary for Subcatchment 1S: Driveway (north of salt shed)

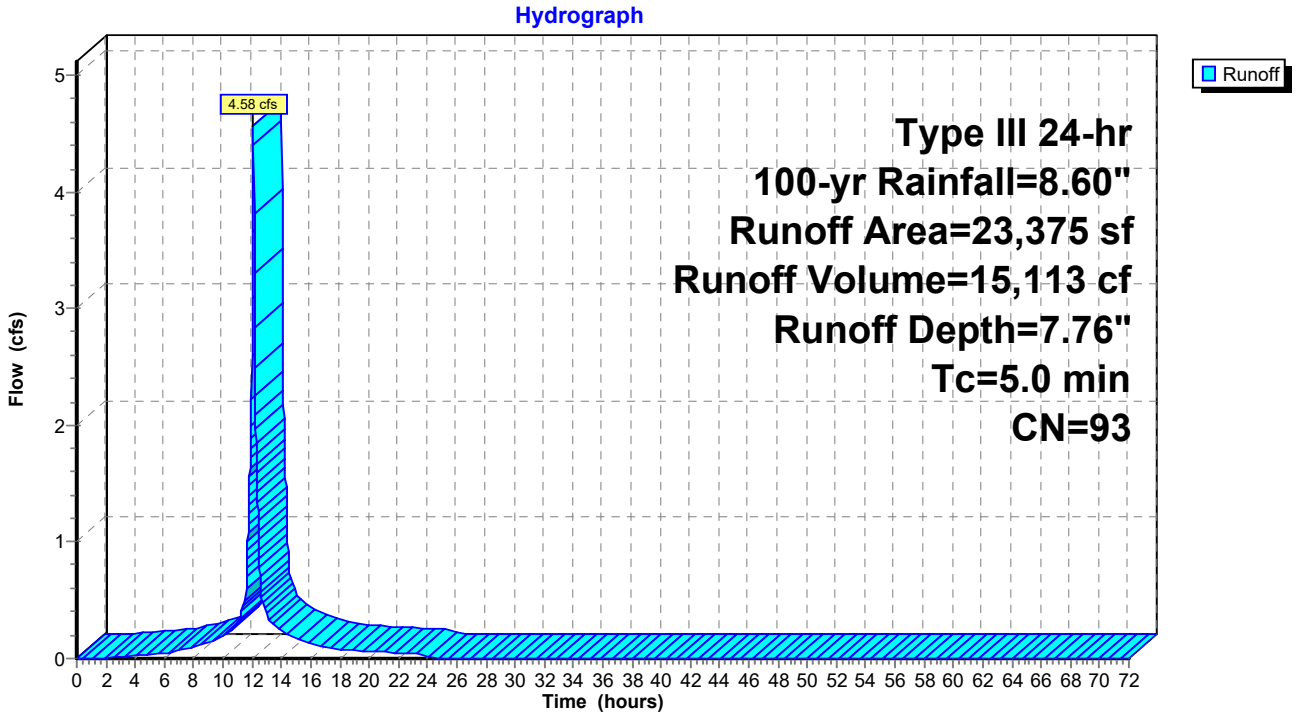
Runoff = 4.58 cfs @ 12.07 hrs, Volume= 15,113 cf, Depth= 7.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-yr Rainfall=8.60"

Area (sf)	CN	Description
2,451	49	50-75% Grass cover, Fair, HSG A
20,924	98	Paved roads w/curbs & sewers, HSG A
23,375	93	Weighted Average
2,451		10.49% Pervious Area
20,924		89.51% Impervious Area

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

Subcatchment 1S: Driveway (north of salt shed)



Summary for Subcatchment 2S: Driveway/Roof (west of salt shed)

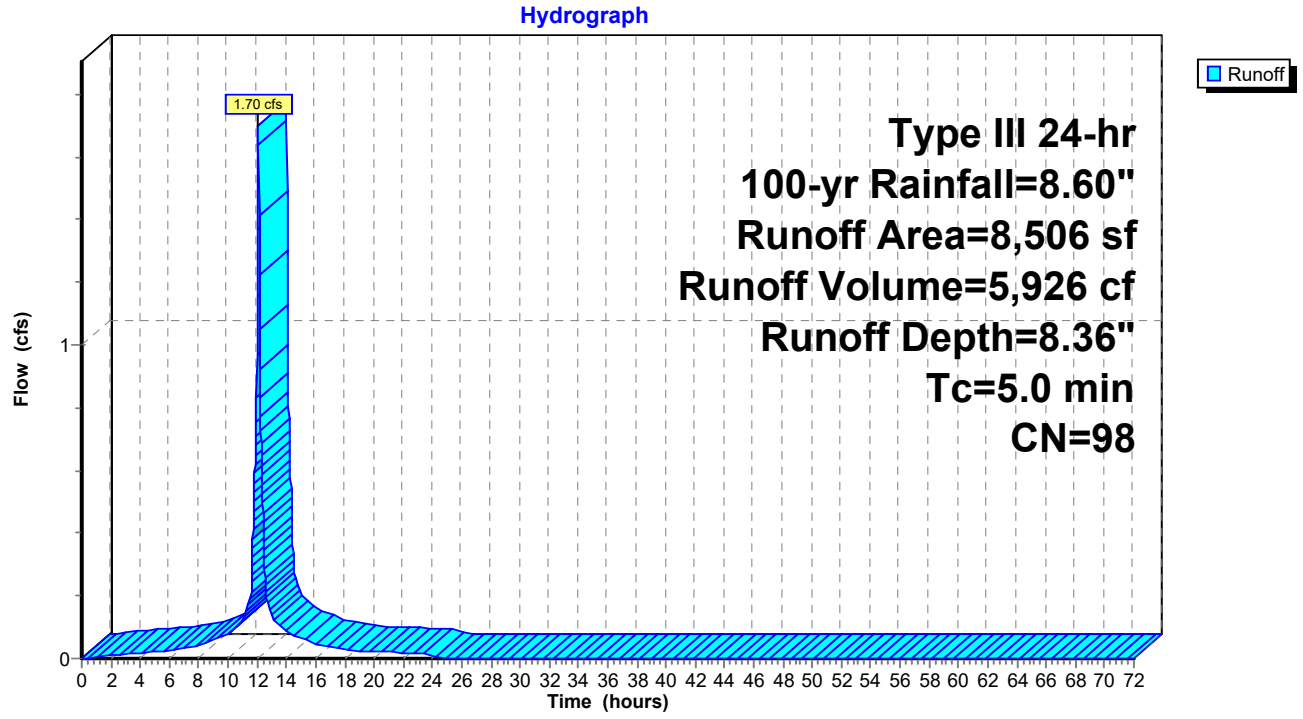
Runoff = 1.70 cfs @ 12.07 hrs, Volume= 5,926 cf, Depth= 8.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-yr Rainfall=8.60"

Area (sf)	CN	Description
2,506	98	Paved parking, HSG A
6,000	98	Unconnected roofs, HSG A
8,506	98	Weighted Average
8,506		100.00% Impervious Area
6,000		70.54% Unconnected

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

Subcatchment 2S: Driveway/Roof (west of salt shed)



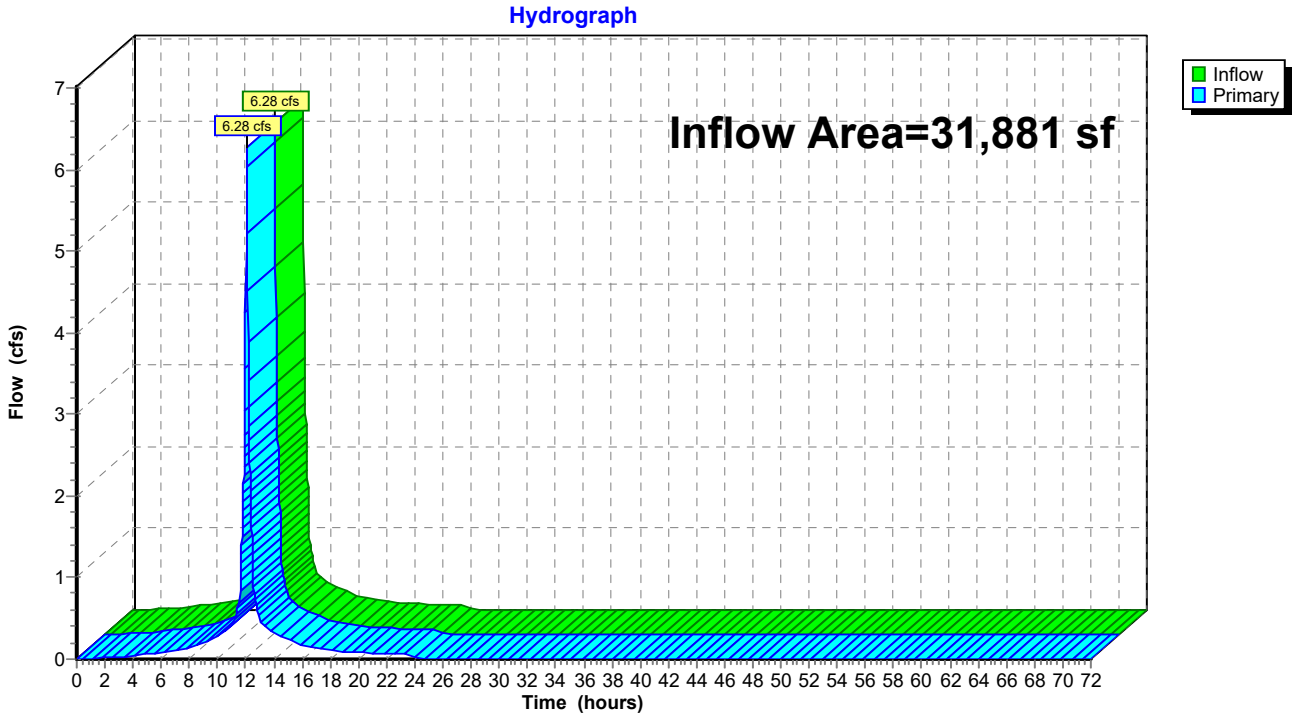
Summary for Pond 3P: Discharge

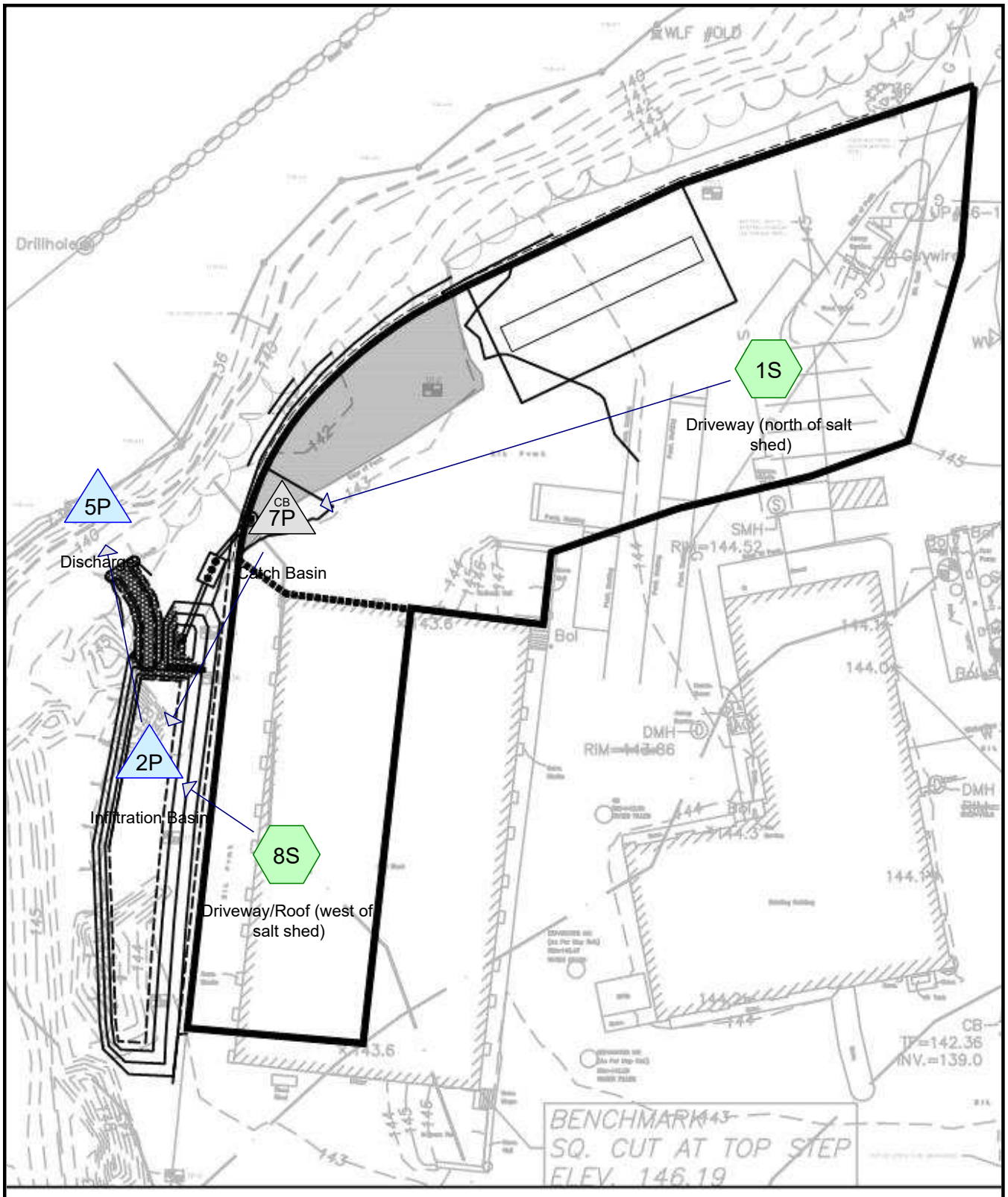
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 31,881 sf, 92.31% Impervious, Inflow Depth = 7.92" for 100-yr event
Inflow = 6.28 cfs @ 12.07 hrs, Volume= 21,038 cf
Primary = 6.28 cfs @ 12.07 hrs, Volume= 21,038 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs

Pond 3P: Discharge





Routing Diagram for Sudbury Fueling PR-v6
Prepared by Weston & Sampson, Printed 3/4/2019

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
2,506	98	Paved parking, HSG A (8S)
23,375	98	Paved roads w/curbs & sewers, HSG A (1S)
6,000	98	Unconnected roofs, HSG A (8S)
31,881	**98**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
31,881	HSG A	1S, 8S
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
31,881		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover
2,506	0	0	0	0	2,506	Paved parking
23,375	0	0	0	0	23,375	Paved roads w/curbs & sewers
6,000	0	0	0	0	6,000	Unconnected roofs
31,881	**0**	**0**	**0**	**0**	**31,881**	**TOTAL AREA**

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	7P	140.43	140.15	42.0	0.0067	0.013	14.0	0.0	0.0

Time span=0.00-72.00 hrs, dt=0.02 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Driveway (north of salt Runoff Area=23,375 sf 100.00% Impervious Runoff Depth=0.79"
Tc=5.0 min CN=98 Runoff=0.49 cfs 1,541 cf

Subcatchment8S: Driveway/Roof (west of Runoff Area=8,506 sf 100.00% Impervious Runoff Depth=0.79"
Tc=5.0 min CN=98 Runoff=0.18 cfs 561 cf

Pond 2P: Inflitration Basin Peak Elev=140.42' Storage=164 cf Inflow=0.67 cfs 2,101 cf
Discarded=0.35 cfs 2,101 cf Primary=0.00 cfs 0 cf Outflow=0.35 cfs 2,101 cf

Pond 5P: Discharge Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Pond 7P: Catch Basin Peak Elev=140.80' Inflow=0.49 cfs 1,541 cf
14.0" Round Culvert n=0.013 L=42.0' S=0.0067 '/' Outflow=0.49 cfs 1,541 cf

Total Runoff Area = 31,881 sf Runoff Volume = 2,101 cf Average Runoff Depth = 0.79"
0.00% Pervious = 0 sf 100.00% Impervious = 31,881 sf

Summary for Subcatchment 1S: Driveway (north of salt shed)

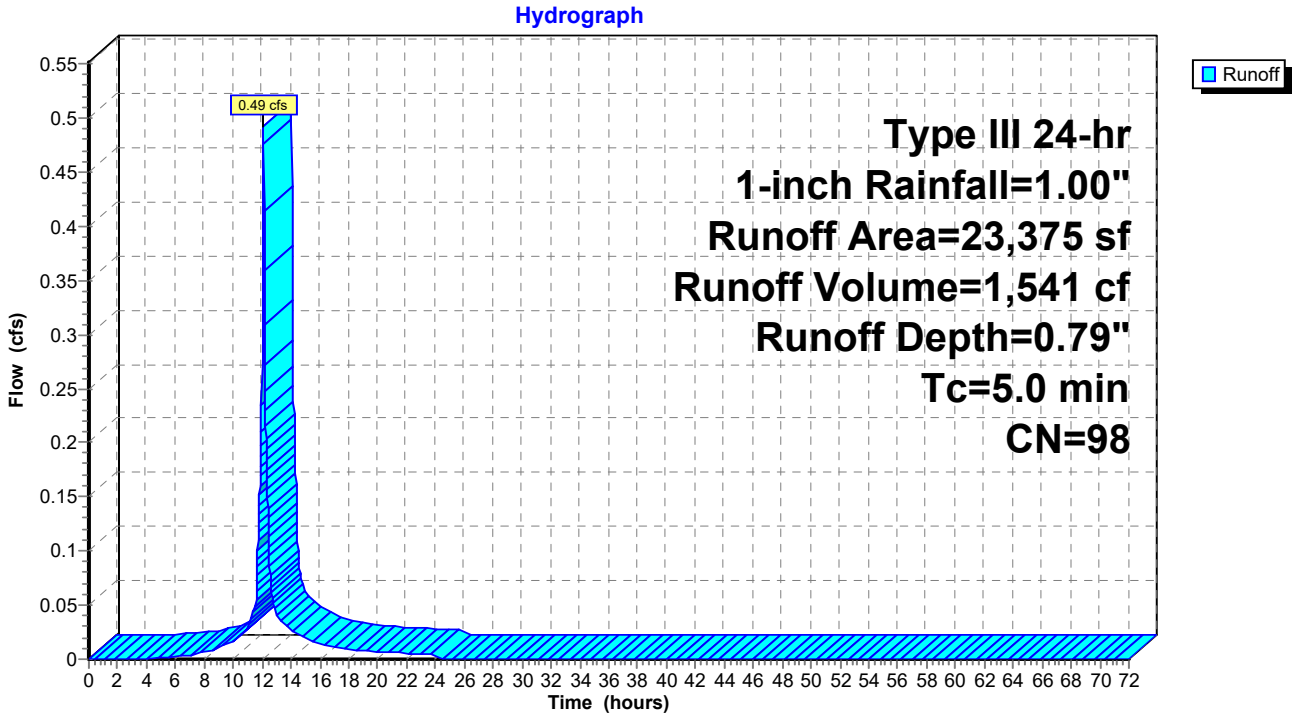
Runoff = 0.49 cfs @ 12.07 hrs, Volume= 1,541 cf, Depth= 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 1-inch Rainfall=1.00"

Area (sf)	CN	Description
23,375	98	Paved roads w/curbs & sewers, HSG A
23,375		100.00% Impervious Area

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

Subcatchment 1S: Driveway (north of salt shed)



Summary for Subcatchment 8S: Driveway/Roof (west of salt shed)

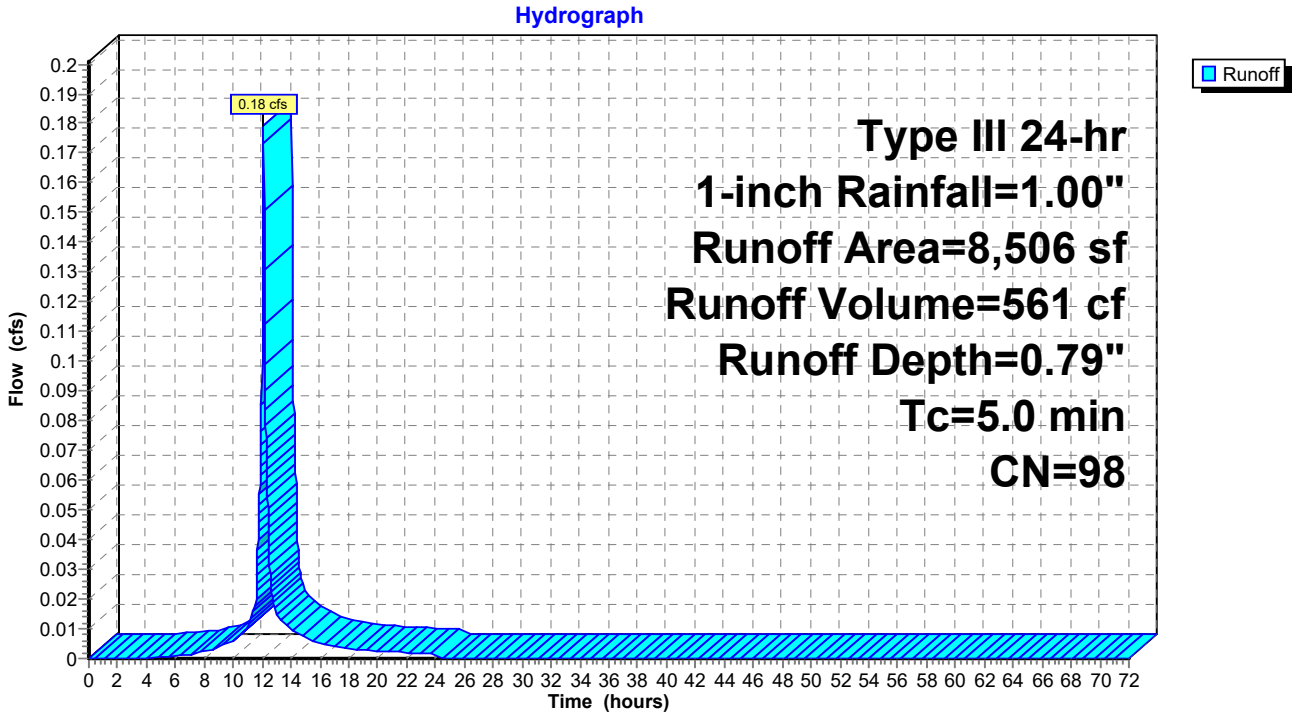
Runoff = 0.18 cfs @ 12.07 hrs, Volume= 561 cf, Depth= 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 1-inch Rainfall=1.00"

Area (sf)	CN	Description
2,506	98	Paved parking, HSG A
6,000	98	Unconnected roofs, HSG A
8,506	98	Weighted Average
8,506		100.00% Impervious Area
6,000		70.54% Unconnected

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

Subcatchment 8S: Driveway/Roof (west of salt shed)



Summary for Pond 2P: Inflitration Basin

Inflow Area = 31,881 sf,100.00% Impervious, Inflow Depth = 0.79" for 1-inch event
Inflow = 0.67 cfs @ 12.07 hrs, Volume= 2,101 cf
Outflow = 0.35 cfs @ 12.19 hrs, Volume= 2,101 cf, Atten= 48%, Lag= 7.4 min
Discarded = 0.35 cfs @ 12.19 hrs, Volume= 2,101 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Peak Elev= 140.42' @ 12.19 hrs Surf.Area= 1,777 sf Storage= 164 cf

Plug-Flow detention time= 2.2 min calculated for 2,101 cf (100% of inflow)
Center-of-Mass det. time= 2.2 min (789.2 - 786.9)

Volume	Invert	Avail.Storage	Storage Description
#1	140.33'	7,577 cf	**Infiltration Basin (Prismatic)** Listed below (Recalc)

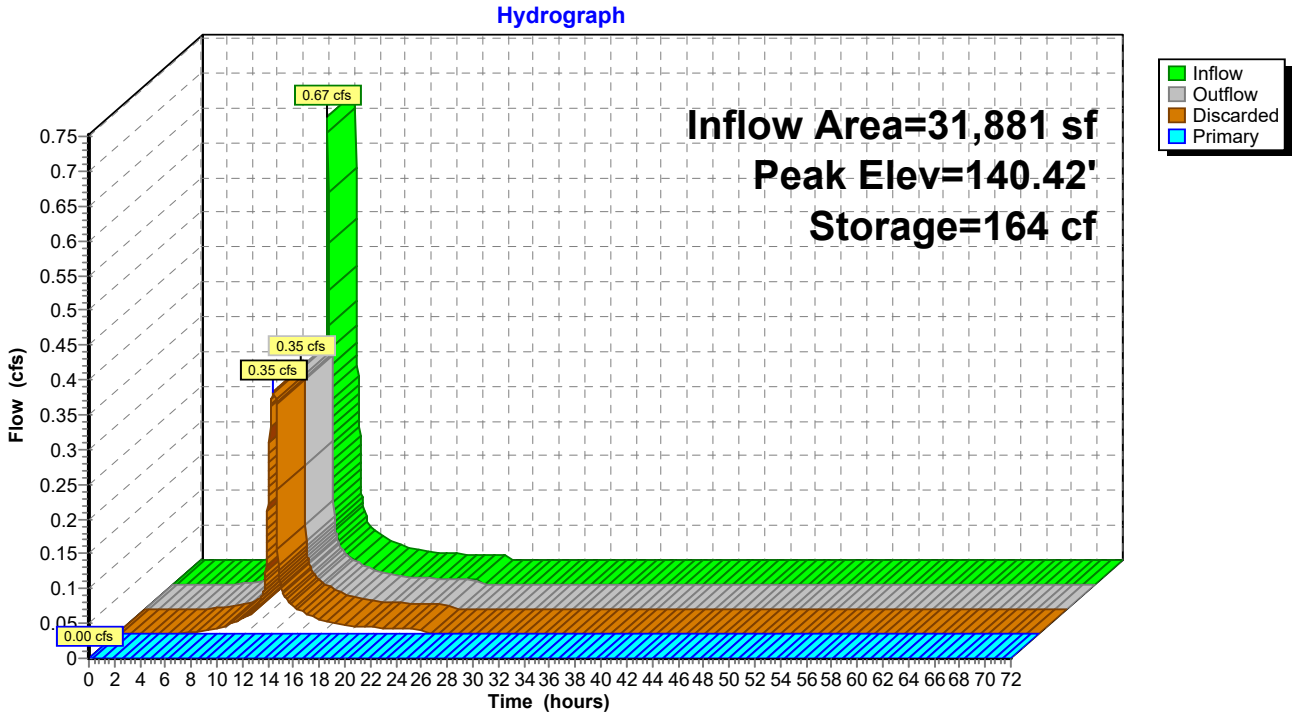
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
140.33	1,699	0	0
141.70	2,831	3,103	3,103
143.00	4,051	4,474	7,577

Device	Routing	Invert	Outlet Devices
#1	Discarded	140.33'	**8.270 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 136.33' Phase-In= 0.01'
#2	Primary	141.70'	**4.0' long x 36.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.35 cfs @ 12.19 hrs HW=140.42' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.35 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=140.33' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Inflitration Basin



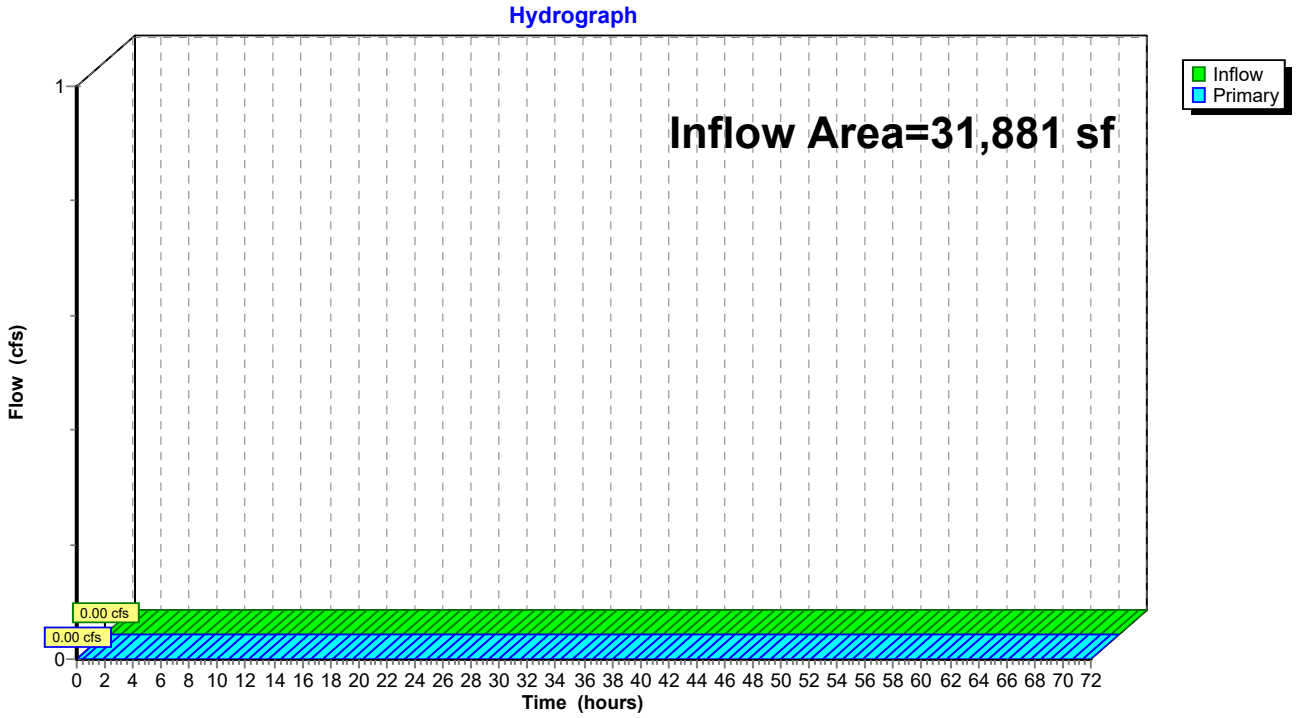
Summary for Pond 5P: Discharge

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 31,881 sf,100.00% Impervious, Inflow Depth = 0.00" for 1-inch event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs

Pond 5P: Discharge



Summary for Pond 7P: Catch Basin

[57] Hint: Peaked at 140.80' (Flood elevation advised)

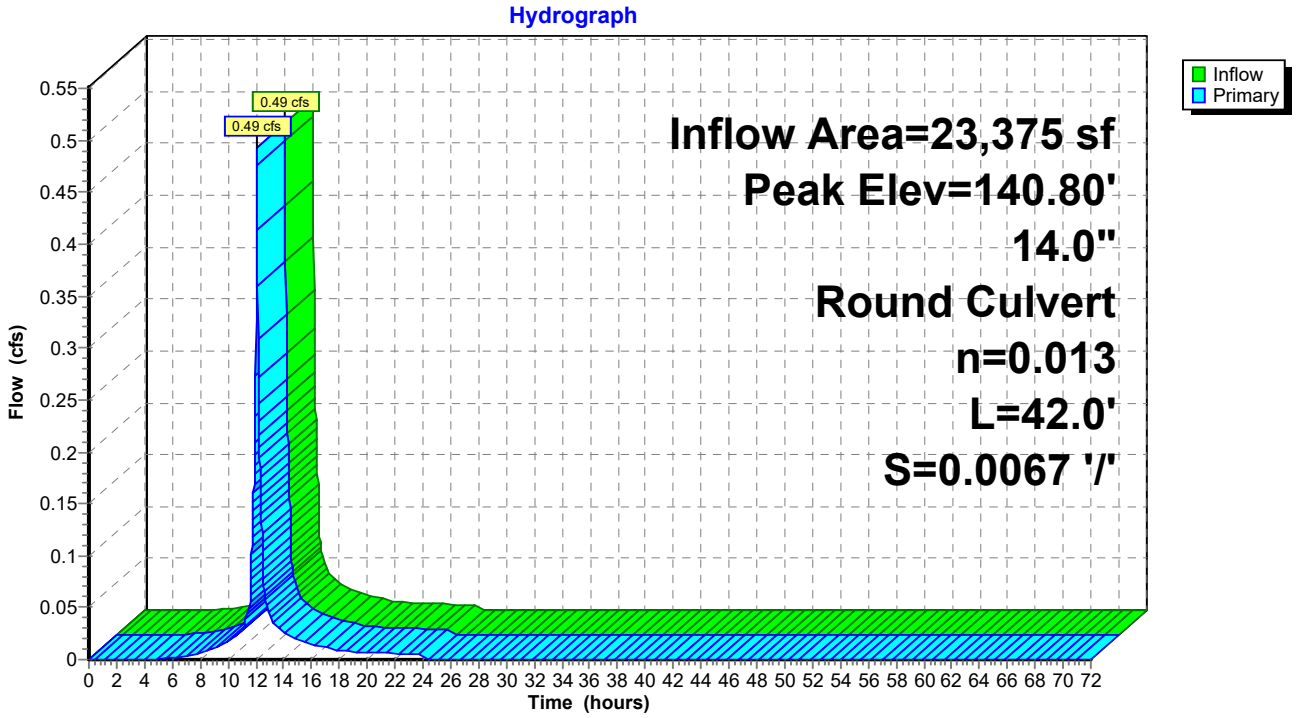
Inflow Area = 23,375 sf,100.00% Impervious, Inflow Depth = 0.79" for 1-inch event
Inflow = 0.49 cfs @ 12.07 hrs, Volume= 1,541 cf
Outflow = 0.49 cfs @ 12.07 hrs, Volume= 1,541 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.49 cfs @ 12.07 hrs, Volume= 1,541 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Peak Elev= 140.80' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	140.43'	**14.0" Round Culvert** L= 42.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 140.43' / 140.15' S= 0.0067 '/' Cc= 0.900 n= 0.013, Flow Area= 1.07 sf

Primary OutFlow Max=0.49 cfs @ 12.07 hrs HW=140.80' TW=140.38' (Dynamic Tailwater)
1=Culvert (Barrel Controls 0.49 cfs @ 2.51 fps)

Pond 7P: Catch Basin



Time span=0.00-72.00 hrs, dt=0.02 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Driveway (north of salt Runoff Area=23,375 sf 100.00% Impervious Runoff Depth=2.97"
Tc=5.0 min CN=98 Runoff=1.72 cfs 5,780 cf

Subcatchment8S: Driveway/Roof (west of Runoff Area=8,506 sf 100.00% Impervious Runoff Depth=2.97"
Tc=5.0 min CN=98 Runoff=0.63 cfs 2,103 cf

Pond 2P: Inflitration Basin Peak Elev=141.22' Storage=1,839 cf Inflow=2.35 cfs 7,884 cf
Discarded=0.55 cfs 7,884 cf Primary=0.00 cfs 0 cf Outflow=0.55 cfs 7,884 cf

Pond 5P: Discharge Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Pond 7P: Catch Basin Peak Elev=141.24' Inflow=1.72 cfs 5,780 cf
14.0" Round Culvert n=0.013 L=42.0' S=0.0067 '/' Outflow=1.72 cfs 5,780 cf

Total Runoff Area = 31,881 sf Runoff Volume = 7,884 cf Average Runoff Depth = 2.97"
0.00% Pervious = 0 sf 100.00% Impervious = 31,881 sf

Summary for Subcatchment 1S: Driveway (north of salt shed)

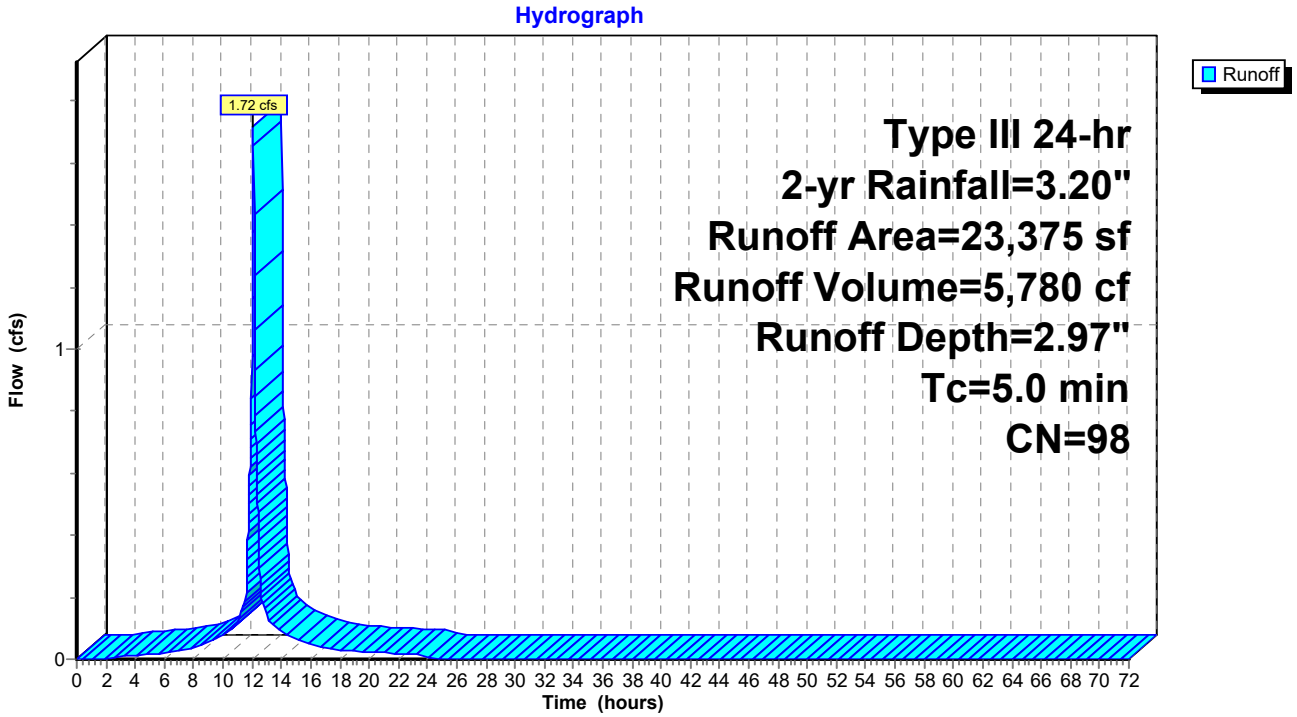
Runoff = 1.72 cfs @ 12.07 hrs, Volume= 5,780 cf, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
23,375	98	Paved roads w/curbs & sewers, HSG A
23,375		100.00% Impervious Area

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

Subcatchment 1S: Driveway (north of salt shed)



Summary for Subcatchment 8S: Driveway/Roof (west of salt shed)

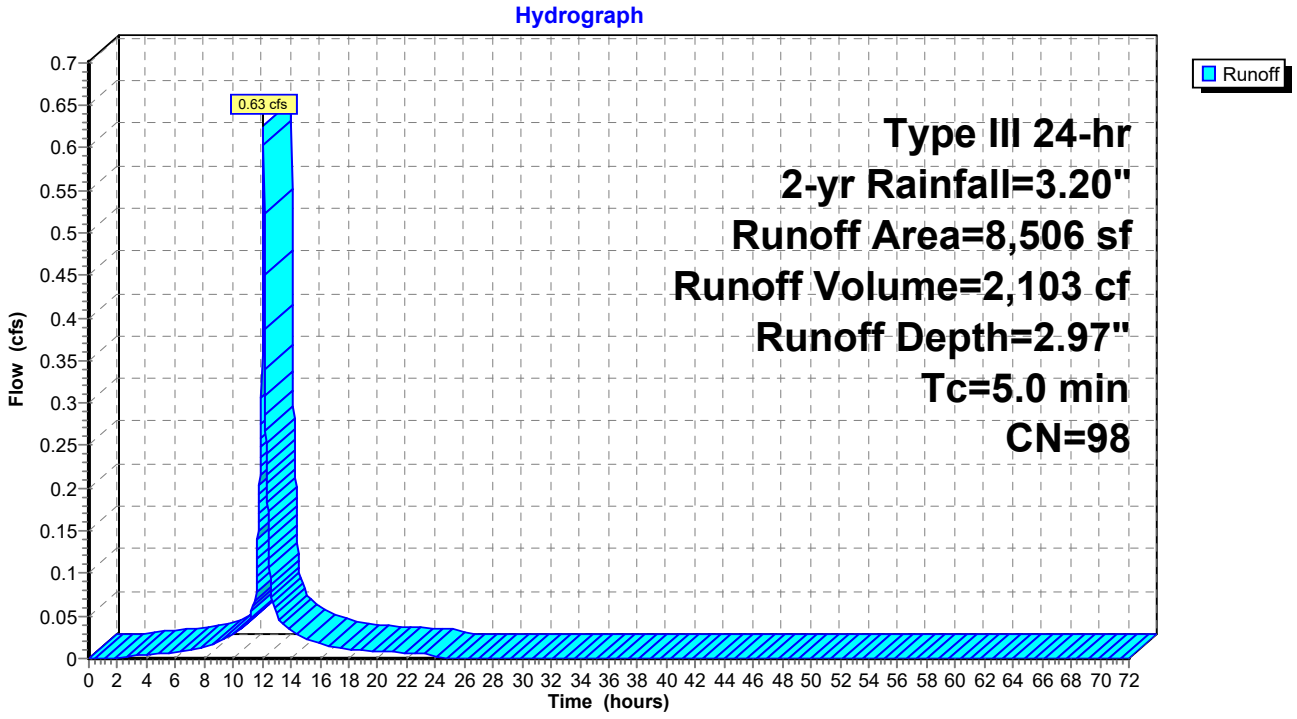
Runoff = 0.63 cfs @ 12.07 hrs, Volume= 2,103 cf, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
2,506	98	Paved parking, HSG A
6,000	98	Unconnected roofs, HSG A
8,506	98	Weighted Average
8,506		100.00% Impervious Area
6,000		70.54% Unconnected

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

Subcatchment 8S: Driveway/Roof (west of salt shed)



Summary for Pond 2P: Inflitration Basin

Inflow Area = 31,881 sf,100.00% Impervious, Inflow Depth = 2.97" for 2-yr event
Inflow = 2.35 cfs @ 12.07 hrs, Volume= 7,884 cf
Outflow = 0.55 cfs @ 12.44 hrs, Volume= 7,884 cf, Atten= 76%, Lag= 22.5 min
Discarded = 0.55 cfs @ 12.44 hrs, Volume= 7,884 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Peak Elev= 141.22' @ 12.44 hrs Surf.Area= 2,434 sf Storage= 1,839 cf

Plug-Flow detention time= 19.5 min calculated for 7,884 cf (100% of inflow)
Center-of-Mass det. time= 19.5 min (775.0 - 755.5)

Volume	Invert	Avail.Storage	Storage Description
#1	140.33'	7,577 cf	**Infiltration Basin (Prismatic)** Listed below (Recalc)

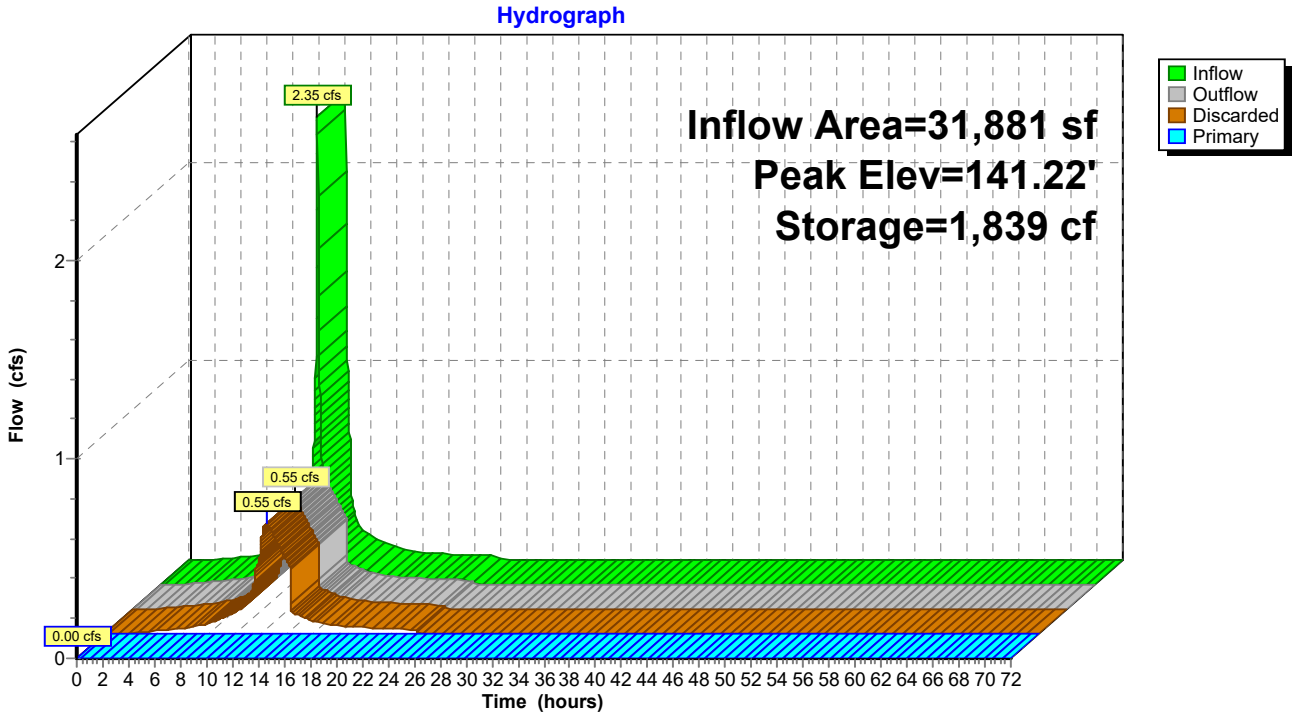
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
140.33	1,699	0	0
141.70	2,831	3,103	3,103
143.00	4,051	4,474	7,577

Device	Routing	Invert	Outlet Devices
#1	Discarded	140.33'	**8.270 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 136.33' Phase-In= 0.01'
#2	Primary	141.70'	**4.0' long x 36.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.55 cfs @ 12.44 hrs HW=141.22' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.55 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=140.33' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Inflitration Basin



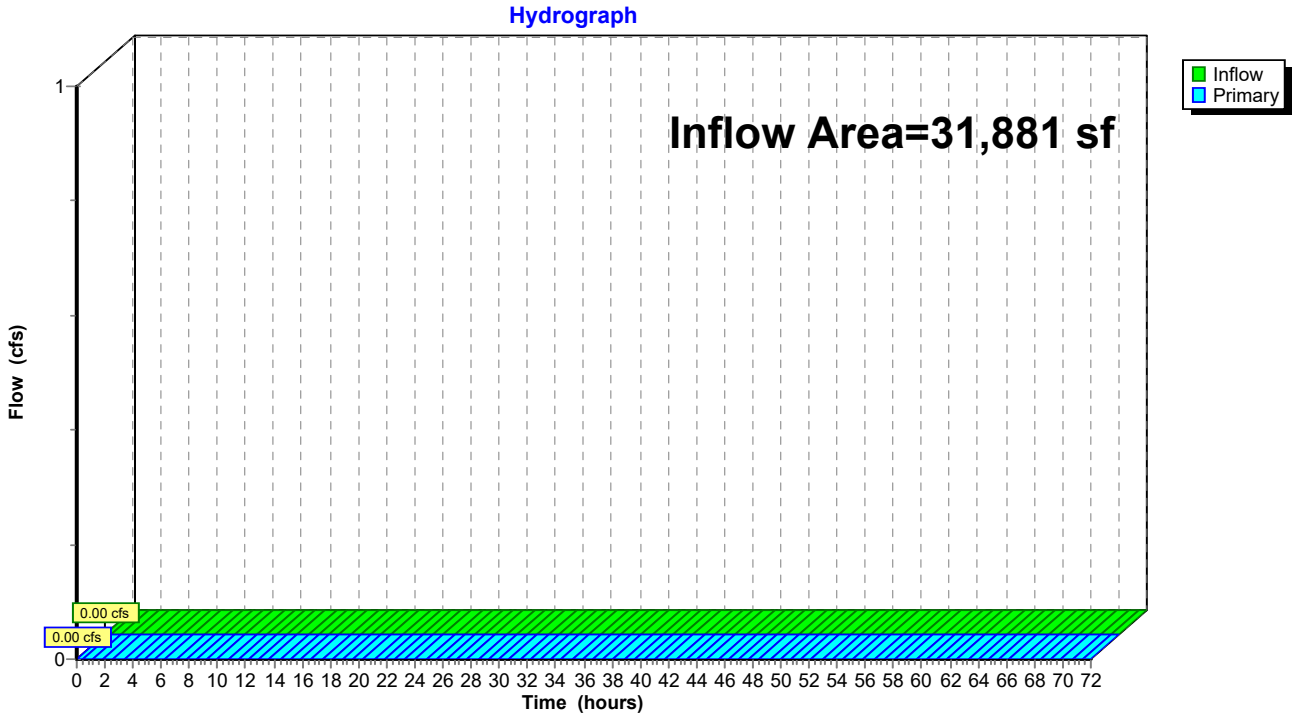
Summary for Pond 5P: Discharge

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 31,881 sf,100.00% Impervious, Inflow Depth = 0.00" for 2-yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs

Pond 5P: Discharge



Summary for Pond 7P: Catch Basin

[57] Hint: Peaked at 141.24' (Flood elevation advised)

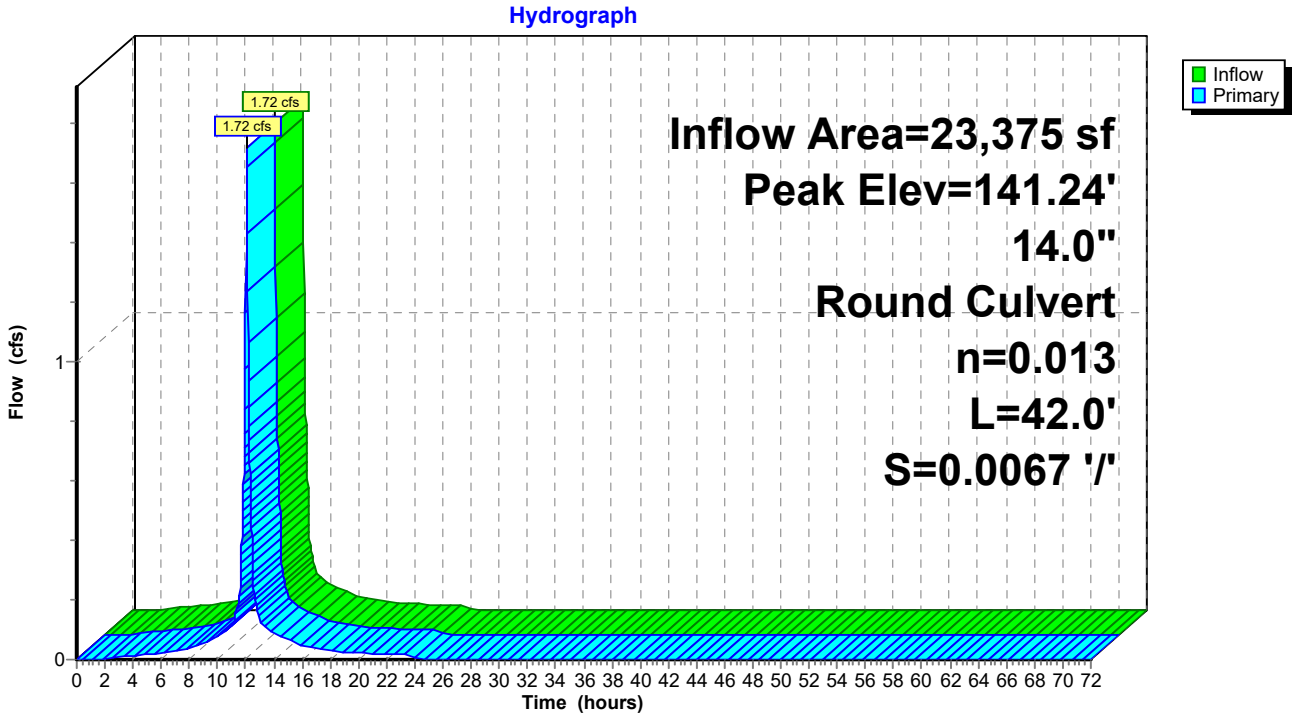
Inflow Area = 23,375 sf,100.00% Impervious, Inflow Depth = 2.97" for 2-yr event
Inflow = 1.72 cfs @ 12.07 hrs, Volume= 5,780 cf
Outflow = 1.72 cfs @ 12.07 hrs, Volume= 5,780 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.72 cfs @ 12.07 hrs, Volume= 5,780 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Peak Elev= 141.24' @ 12.41 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	140.43'	**14.0" Round Culvert** L= 42.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 140.43' / 140.15' S= 0.0067 '/' Cc= 0.900 n= 0.013, Flow Area= 1.07 sf

Primary OutFlow Max=1.57 cfs @ 12.07 hrs HW=141.21' TW=140.86' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 1.57 cfs @ 2.96 fps)

Pond 7P: Catch Basin



Time span=0.00-72.00 hrs, dt=0.02 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Driveway (north of salt Runoff Area=23,375 sf 100.00% Impervious Runoff Depth=4.56"
Tc=5.0 min CN=98 Runoff=2.60 cfs 8,889 cf

Subcatchment8S: Driveway/Roof (west of Runoff Area=8,506 sf 100.00% Impervious Runoff Depth=4.56"
Tc=5.0 min CN=98 Runoff=0.95 cfs 3,235 cf

Pond 2P: Inflitration Basin Peak Elev=141.75' Storage=3,234 cf Inflow=3.55 cfs 12,124 cf
Discarded=0.70 cfs 12,055 cf Primary=0.10 cfs 69 cf Outflow=0.81 cfs 12,124 cf

Pond 5P: Discharge Inflow=0.10 cfs 69 cf
Primary=0.10 cfs 69 cf

Pond 7P: Catch Basin Peak Elev=141.76' Inflow=2.60 cfs 8,889 cf
14.0" Round Culvert n=0.013 L=42.0' S=0.0067 '/' Outflow=2.60 cfs 8,889 cf

Total Runoff Area = 31,881 sf Runoff Volume = 12,124 cf Average Runoff Depth = 4.56"
0.00% Pervious = 0 sf 100.00% Impervious = 31,881 sf

Summary for Subcatchment 1S: Driveway (north of salt shed)

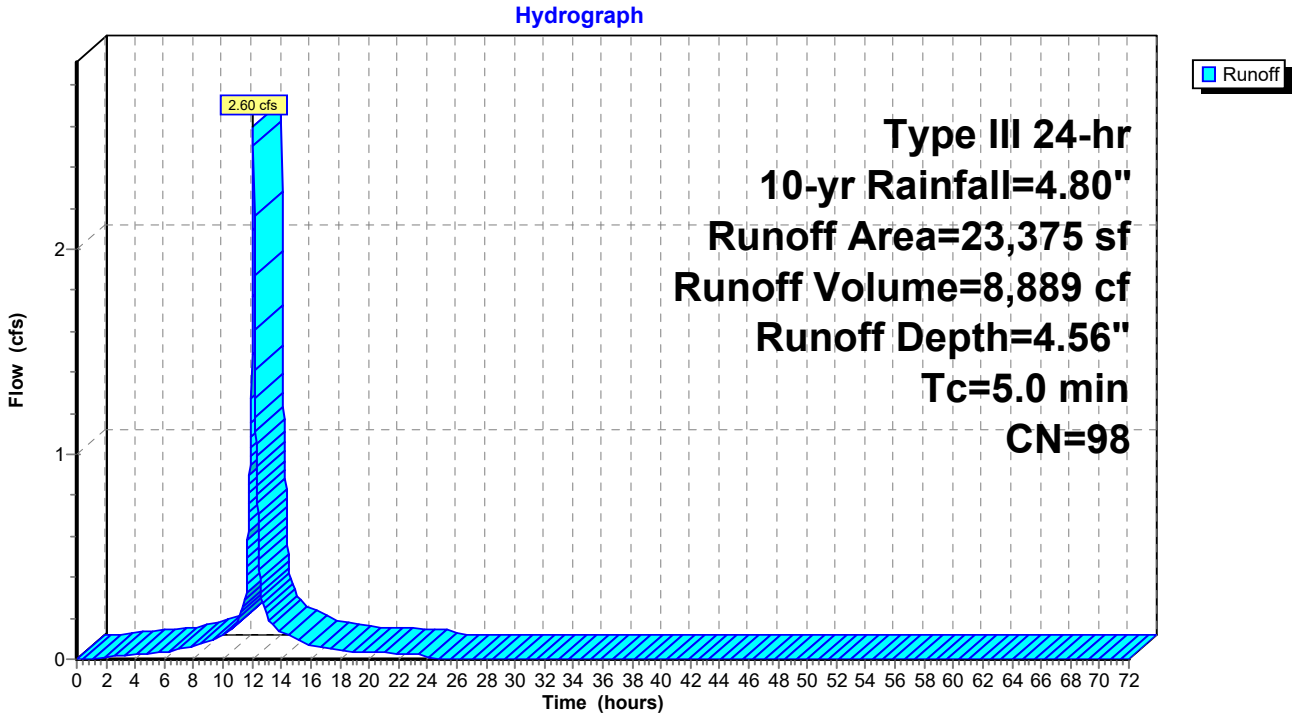
Runoff = 2.60 cfs @ 12.07 hrs, Volume= 8,889 cf, Depth= 4.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-yr Rainfall=4.80"

Area (sf)	CN	Description
23,375	98	Paved roads w/curbs & sewers, HSG A
23,375		100.00% Impervious Area

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

Subcatchment 1S: Driveway (north of salt shed)



Summary for Subcatchment 8S: Driveway/Roof (west of salt shed)

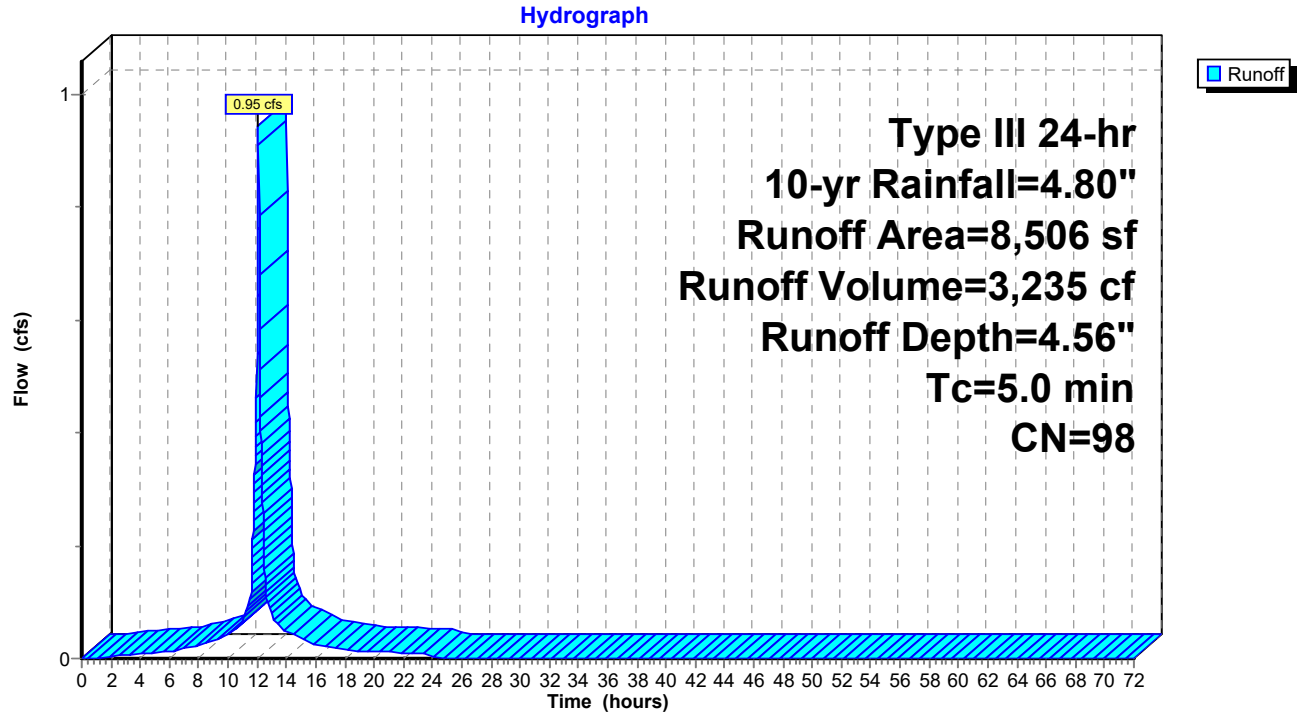
Runoff = 0.95 cfs @ 12.07 hrs, Volume= 3,235 cf, Depth= 4.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-yr Rainfall=4.80"

Area (sf)	CN	Description
2,506	98	Paved parking, HSG A
6,000	98	Unconnected roofs, HSG A
8,506	98	Weighted Average
8,506		100.00% Impervious Area
6,000		70.54% Unconnected

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

Subcatchment 8S: Driveway/Roof (west of salt shed)



Summary for Pond 2P: Inflitration Basin

Inflow Area = 31,881 sf,100.00% Impervious, Inflow Depth = 4.56" for 10-yr event
Inflow = 3.55 cfs @ 12.07 hrs, Volume= 12,124 cf
Outflow = 0.81 cfs @ 12.45 hrs, Volume= 12,124 cf, Atten= 77%, Lag= 23.0 min
Discarded = 0.70 cfs @ 12.45 hrs, Volume= 12,055 cf
Primary = 0.10 cfs @ 12.45 hrs, Volume= 69 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Peak Elev= 141.75' @ 12.45 hrs Surf.Area= 2,874 sf Storage= 3,234 cf

Plug-Flow detention time= 30.2 min calculated for 12,121 cf (100% of inflow)
Center-of-Mass det. time= 30.2 min (778.0 - 747.8)

Volume	Invert	Avail.Storage	Storage Description
#1	140.33'	7,577 cf	**Infiltration Basin (Prismatic)** Listed below (Recalc)

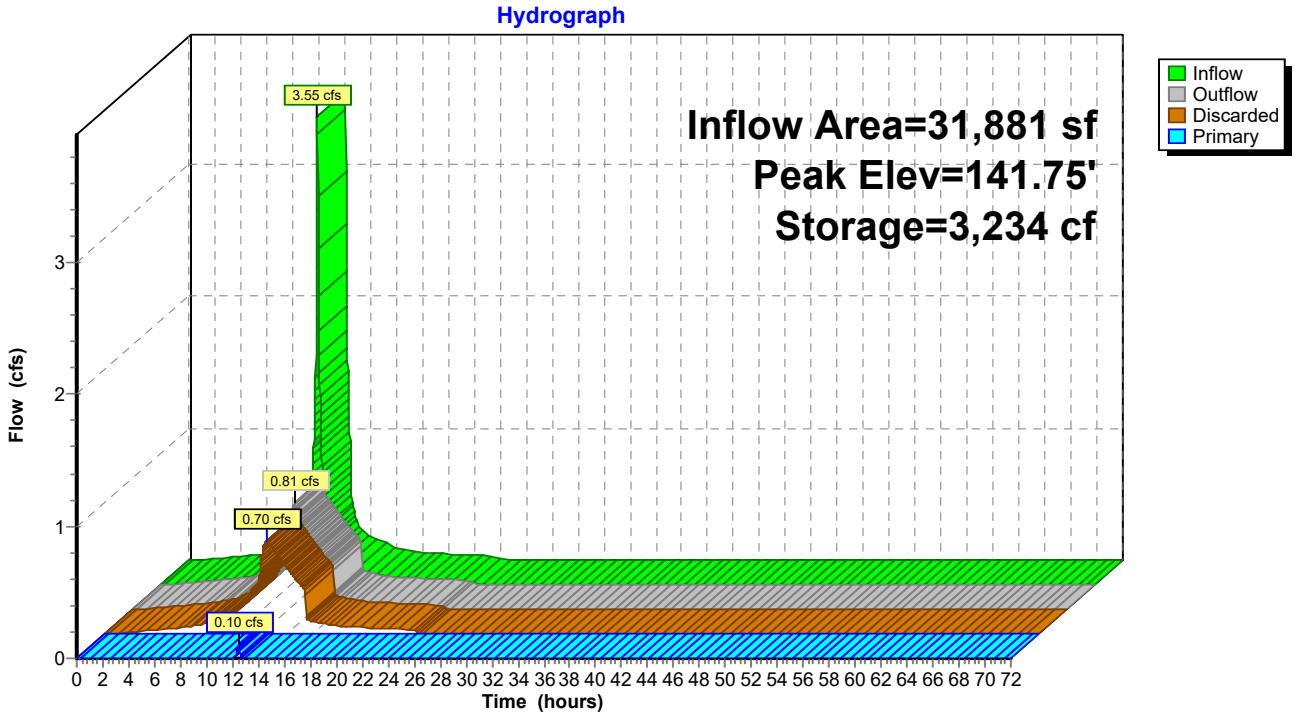
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
140.33	1,699	0	0
141.70	2,831	3,103	3,103
143.00	4,051	4,474	7,577

Device	Routing	Invert	Outlet Devices
#1	Discarded	140.33'	**8.270 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 136.33' Phase-In= 0.01'
#2	Primary	141.70'	**4.0' long x 36.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.70 cfs @ 12.45 hrs HW=141.75' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.70 cfs)

Primary OutFlow Max=0.10 cfs @ 12.45 hrs HW=141.75' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.10 cfs @ 0.57 fps)

Pond 2P: Inflitration Basin



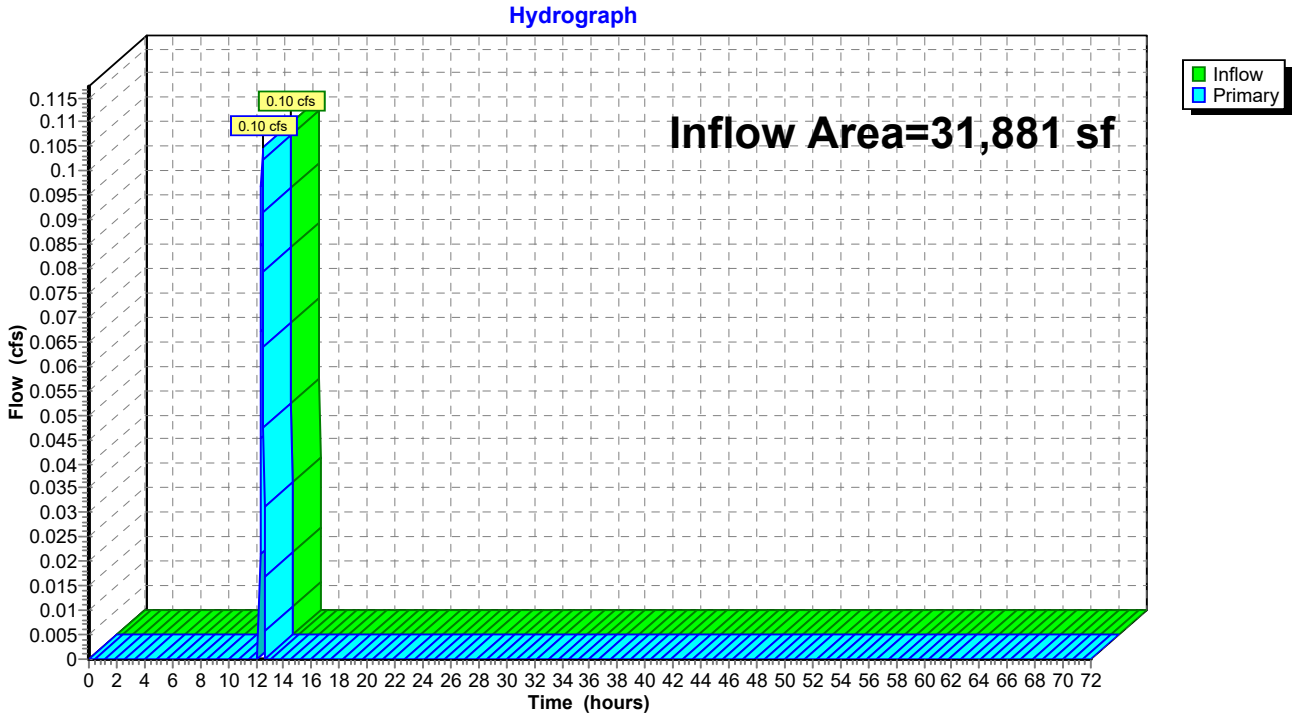
Summary for Pond 5P: Discharge

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 31,881 sf,100.00% Impervious, Inflow Depth = 0.03" for 10-yr event
Inflow = 0.10 cfs @ 12.45 hrs, Volume= 69 cf
Primary = 0.10 cfs @ 12.45 hrs, Volume= 69 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs

Pond 5P: Discharge



Summary for Pond 7P: Catch Basin

[57] Hint: Peaked at 141.76' (Flood elevation advised)

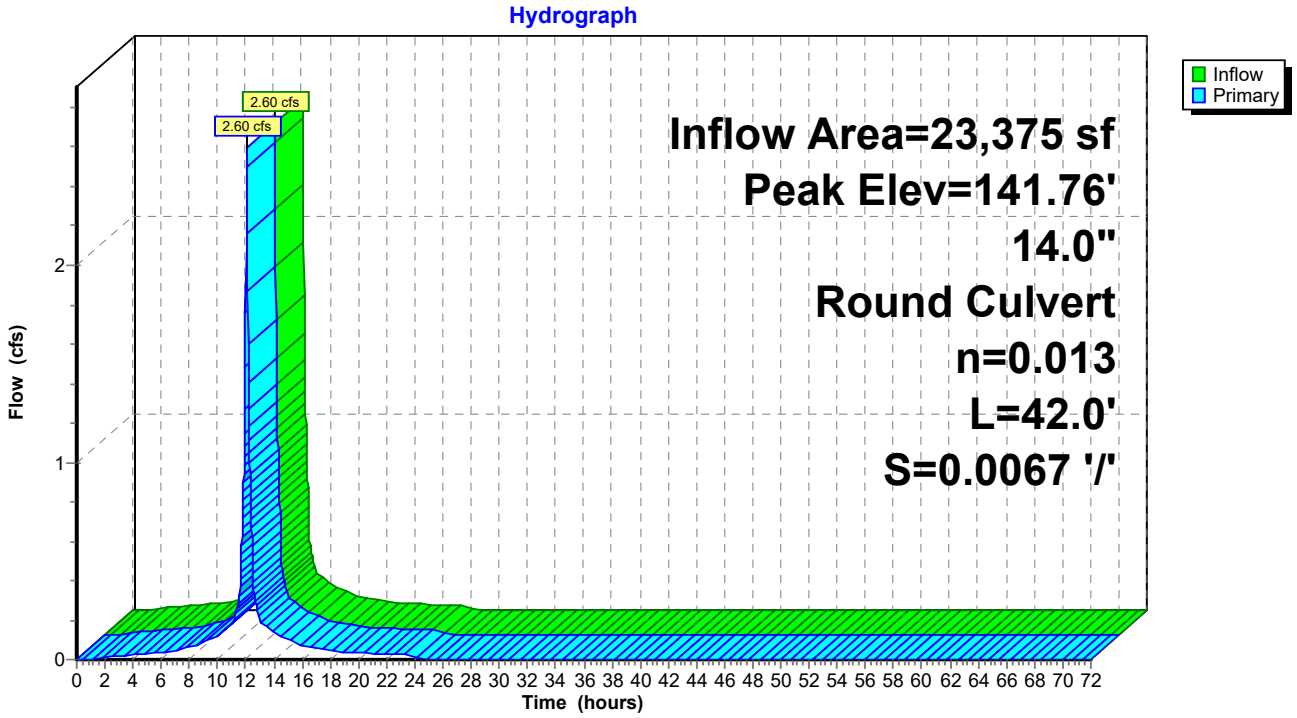
Inflow Area = 23,375 sf,100.00% Impervious, Inflow Depth = 4.56" for 10-yr event
Inflow = 2.60 cfs @ 12.07 hrs, Volume= 8,889 cf
Outflow = 2.60 cfs @ 12.07 hrs, Volume= 8,889 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.60 cfs @ 12.07 hrs, Volume= 8,889 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Peak Elev= 141.76' @ 12.45 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	140.43'	**14.0" Round Culvert** L= 42.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 140.43' / 140.15' S= 0.0067 '/' Cc= 0.900 n= 0.013, Flow Area= 1.07 sf

Primary OutFlow Max=2.27 cfs @ 12.07 hrs HW=141.51' TW=141.21' (Dynamic Tailwater)
1=Culvert (Outlet Controls 2.27 cfs @ 2.86 fps)

Pond 7P: Catch Basin



Time span=0.00-72.00 hrs, dt=0.02 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Driveway (north of salt Runoff Area=23,375 sf 100.00% Impervious Runoff Depth=5.76"
Tc=5.0 min CN=98 Runoff=3.26 cfs 11,224 cf

Subcatchment8S: Driveway/Roof (west of Runoff Area=8,506 sf 100.00% Impervious Runoff Depth=5.76"
Tc=5.0 min CN=98 Runoff=1.19 cfs 4,084 cf

Pond 2P: Inflitration Basin Peak Elev=141.90' Storage=3,685 cf Inflow=4.44 cfs 15,308 cf
Discarded=0.75 cfs 14,120 cf Primary=0.95 cfs 1,188 cf Outflow=1.70 cfs 15,308 cf

Pond 5P: Discharge Inflow=0.95 cfs 1,188 cf
Primary=0.95 cfs 1,188 cf

Pond 7P: Catch Basin Peak Elev=141.96' Inflow=3.26 cfs 11,224 cf
14.0" Round Culvert n=0.013 L=42.0' S=0.0067 '/' Outflow=3.26 cfs 11,224 cf

Total Runoff Area = 31,881 sf Runoff Volume = 15,308 cf Average Runoff Depth = 5.76"
0.00% Pervious = 0 sf 100.00% Impervious = 31,881 sf

Summary for Subcatchment 1S: Driveway (north of salt shed)

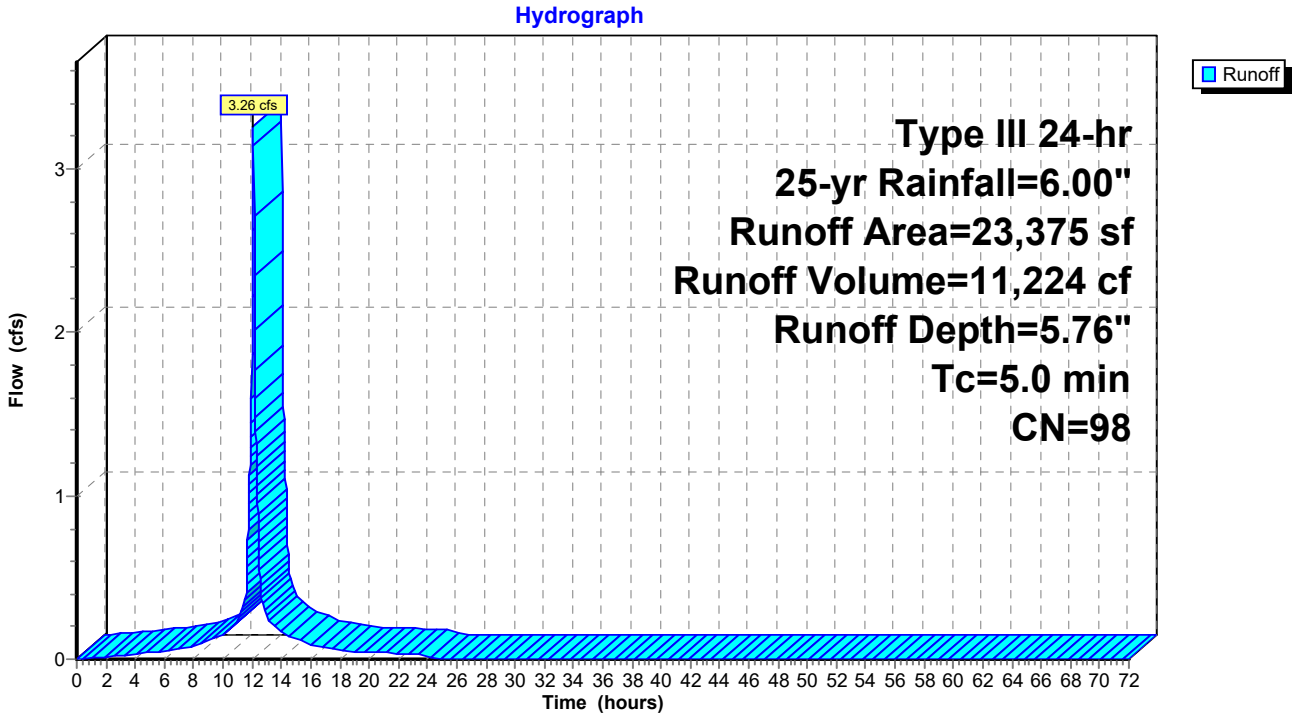
Runoff = 3.26 cfs @ 12.07 hrs, Volume= 11,224 cf, Depth= 5.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
23,375	98	Paved roads w/curbs & sewers, HSG A
23,375		100.00% Impervious Area

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

Subcatchment 1S: Driveway (north of salt shed)



Summary for Subcatchment 8S: Driveway/Roof (west of salt shed)

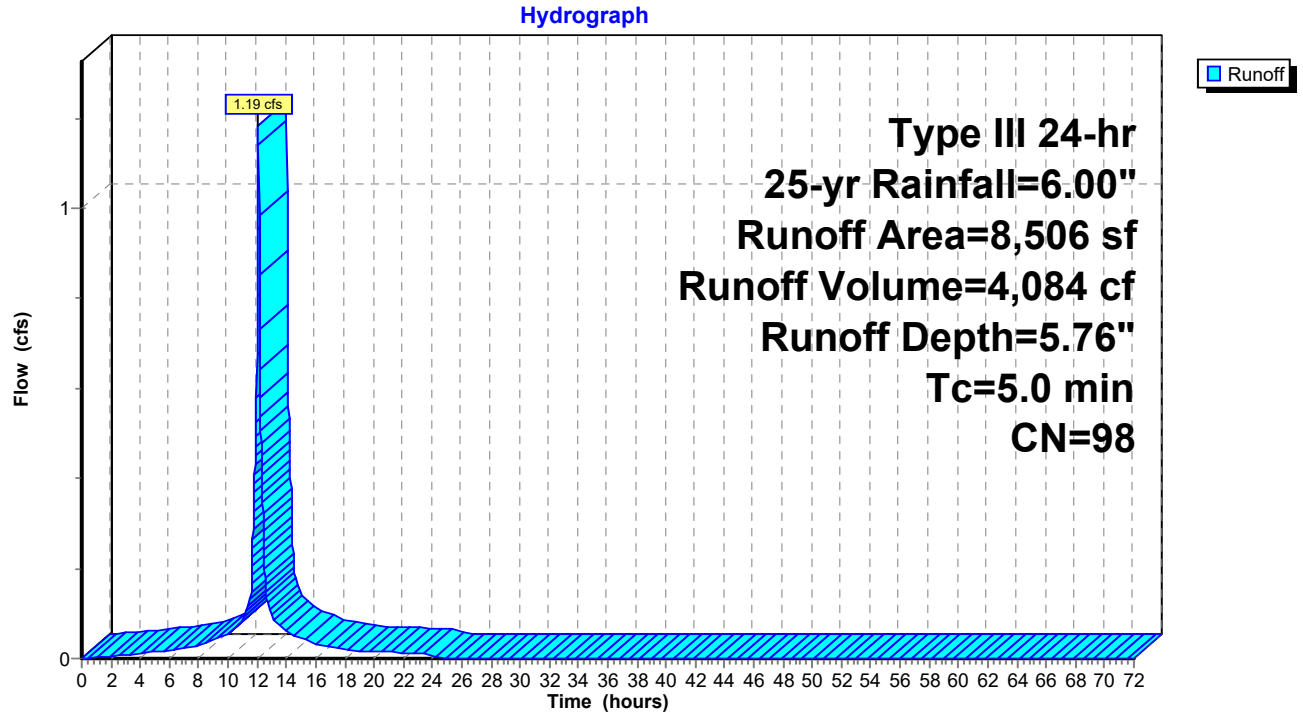
Runoff = 1.19 cfs @ 12.07 hrs, Volume= 4,084 cf, Depth= 5.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
2,506	98	Paved parking, HSG A
6,000	98	Unconnected roofs, HSG A
8,506	98	Weighted Average
8,506		100.00% Impervious Area
6,000		70.54% Unconnected

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

Subcatchment 8S: Driveway/Roof (west of salt shed)



Summary for Pond 2P: Inflitration Basin

Inflow Area = 31,881 sf,100.00% Impervious, Inflow Depth = 5.76" for 25-yr event
Inflow = 4.44 cfs @ 12.07 hrs, Volume= 15,308 cf
Outflow = 1.70 cfs @ 12.28 hrs, Volume= 15,308 cf, Atten= 62%, Lag= 12.6 min
Discarded = 0.75 cfs @ 12.28 hrs, Volume= 14,120 cf
Primary = 0.95 cfs @ 12.28 hrs, Volume= 1,188 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Peak Elev= 141.90' @ 12.28 hrs Surf.Area= 3,018 sf Storage= 3,685 cf

Plug-Flow detention time= 29.2 min calculated for 15,304 cf (100% of inflow)
Center-of-Mass det. time= 29.2 min (773.5 - 744.2)

Volume	Invert	Avail.Storage	Storage Description
#1	140.33'	7,577 cf	**Infiltration Basin (Prismatic)** Listed below (Recalc)

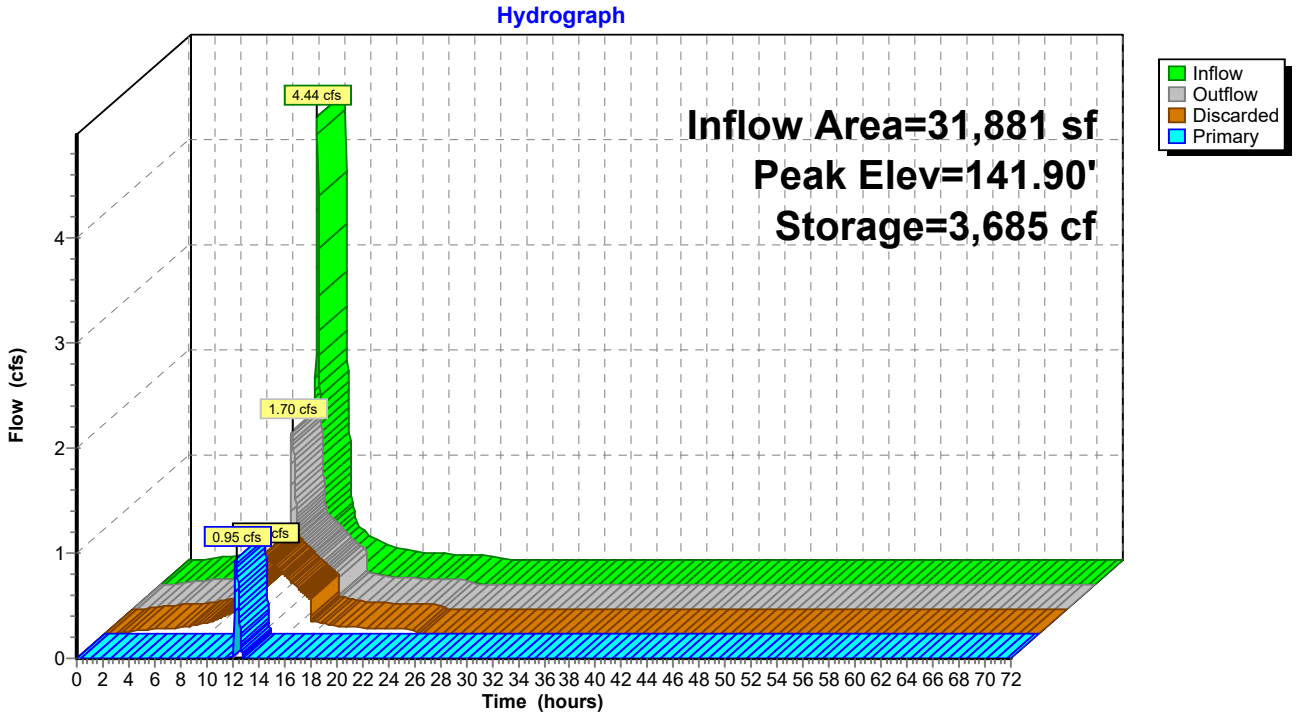
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
140.33	1,699	0	0
141.70	2,831	3,103	3,103
143.00	4,051	4,474	7,577

Device	Routing	Invert	Outlet Devices
#1	Discarded	140.33'	**8.270 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 136.33' Phase-In= 0.01'
#2	Primary	141.70'	**4.0' long x 36.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.75 cfs @ 12.28 hrs HW=141.90' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.75 cfs)

Primary OutFlow Max=0.95 cfs @ 12.28 hrs HW=141.90' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.95 cfs @ 1.20 fps)

Pond 2P: Inflitration Basin



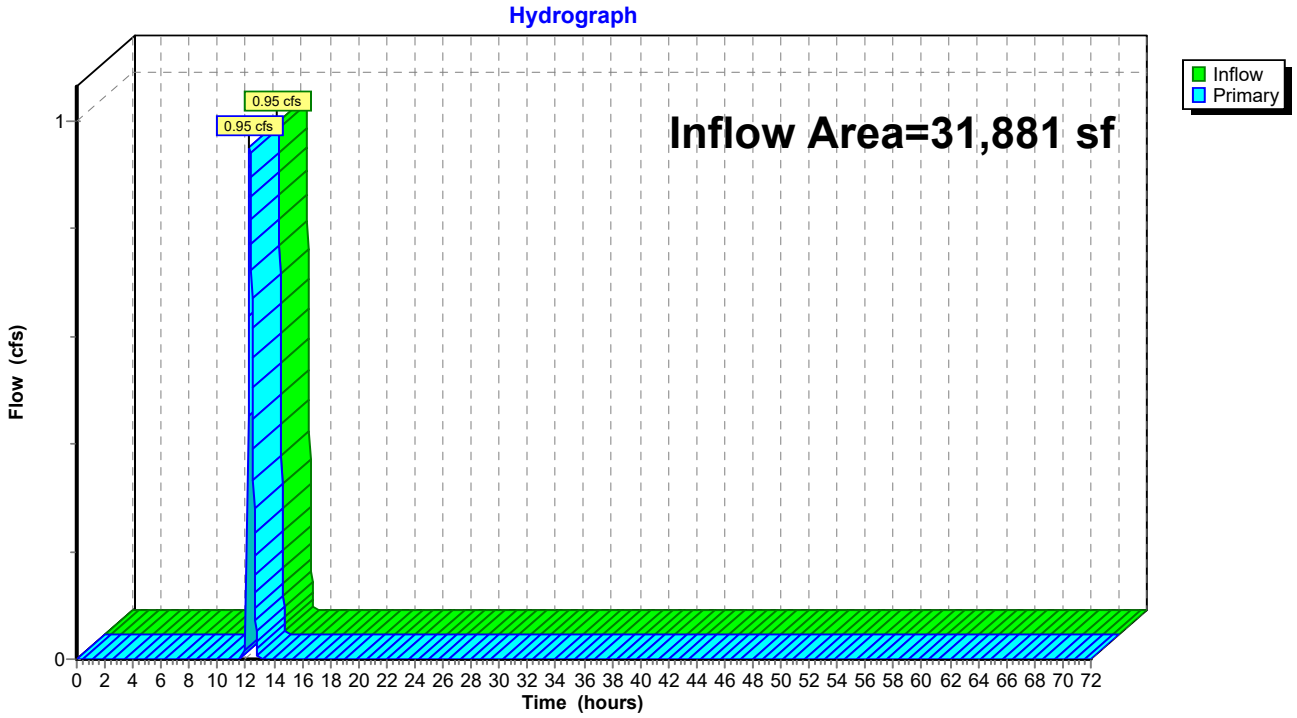
Summary for Pond 5P: Discharge

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 31,881 sf,100.00% Impervious, Inflow Depth = 0.45" for 25-yr event
Inflow = 0.95 cfs @ 12.28 hrs, Volume= 1,188 cf
Primary = 0.95 cfs @ 12.28 hrs, Volume= 1,188 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs

Pond 5P: Discharge



Summary for Pond 7P: Catch Basin

[57] Hint: Peaked at 141.96' (Flood elevation advised)

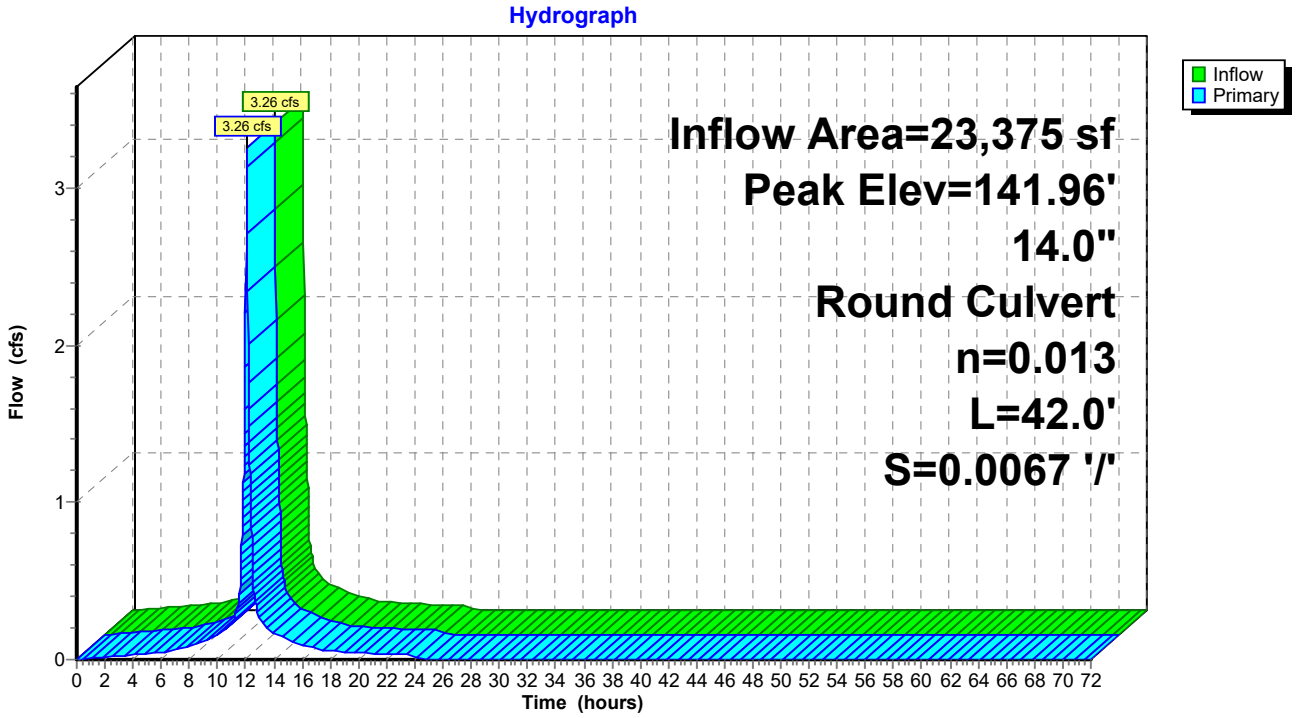
Inflow Area = 23,375 sf,100.00% Impervious, Inflow Depth = 5.76" for 25-yr event
Inflow = 3.26 cfs @ 12.07 hrs, Volume= 11,224 cf
Outflow = 3.26 cfs @ 12.07 hrs, Volume= 11,224 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.26 cfs @ 12.07 hrs, Volume= 11,224 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Peak Elev= 141.96' @ 12.25 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	140.43'	**14.0" Round Culvert** L= 42.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 140.43' / 140.15' S= 0.0067 '/' Cc= 0.900 n= 0.013, Flow Area= 1.07 sf

Primary OutFlow Max=2.82 cfs @ 12.07 hrs HW=141.78' TW=141.48' (Dynamic Tailwater)
1=Culvert (Inlet Controls 2.82 cfs @ 2.64 fps)

Pond 7P: Catch Basin



Time span=0.00-72.00 hrs, dt=0.02 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Driveway (north of salt Runoff Area=23,375 sf 100.00% Impervious Runoff Depth=8.36"
Tc=5.0 min CN=98 Runoff=4.68 cfs 16,284 cf

Subcatchment8S: Driveway/Roof (west of Runoff Area=8,506 sf 100.00% Impervious Runoff Depth=8.36"
Tc=5.0 min CN=98 Runoff=1.70 cfs 5,926 cf

Pond 2P: Inflitration Basin Peak Elev=142.16' Storage=4,516 cf Inflow=6.38 cfs 22,210 cf
Discarded=0.83 cfs 18,023 cf Primary=3.41 cfs 4,187 cf Outflow=4.24 cfs 22,210 cf

Pond 5P: Discharge Inflow=3.41 cfs 4,187 cf
Primary=3.41 cfs 4,187 cf

Pond 7P: Catch Basin Peak Elev=142.77' Inflow=4.68 cfs 16,284 cf
14.0" Round Culvert n=0.013 L=42.0' S=0.0067 '/' Outflow=4.68 cfs 16,284 cf

Total Runoff Area = 31,881 sf Runoff Volume = 22,210 cf Average Runoff Depth = 8.36"
0.00% Pervious = 0 sf 100.00% Impervious = 31,881 sf

Summary for Subcatchment 1S: Driveway (north of salt shed)

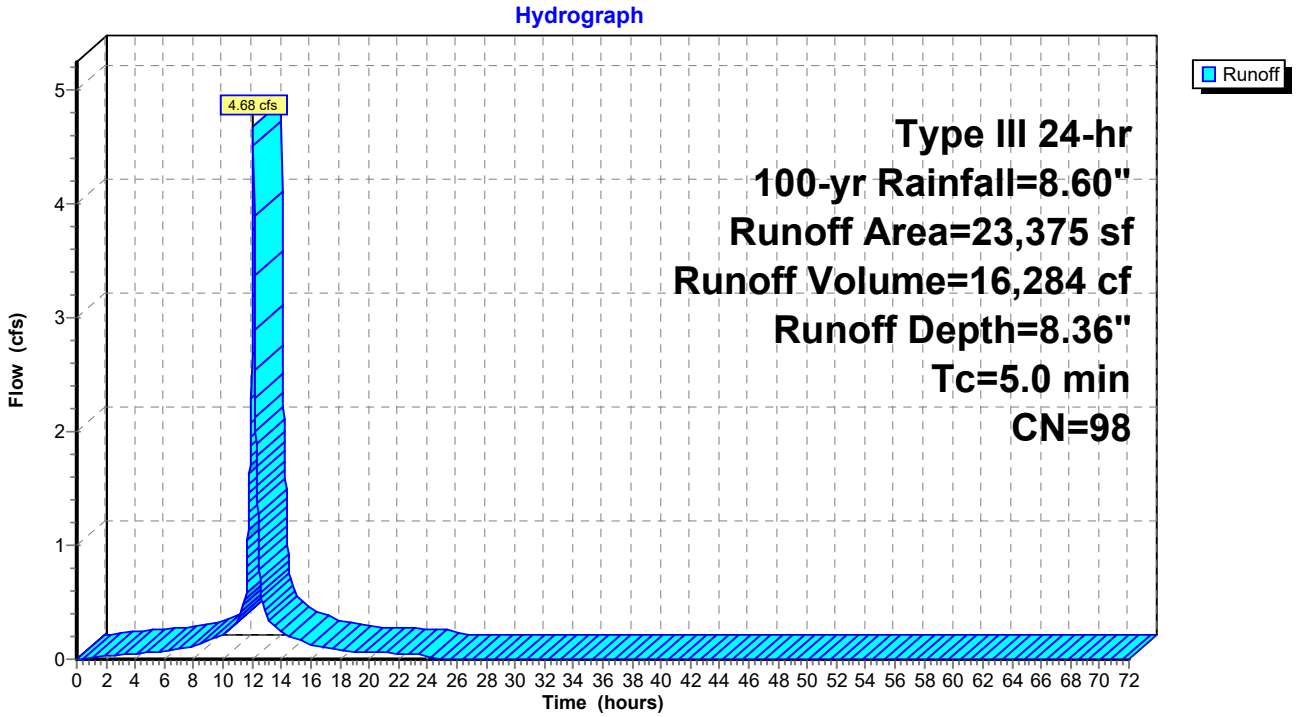
Runoff = 4.68 cfs @ 12.07 hrs, Volume= 16,284 cf, Depth= 8.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-yr Rainfall=8.60"

Area (sf)	CN	Description
23,375	98	Paved roads w/curbs & sewers, HSG A
23,375		100.00% Impervious Area

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

Subcatchment 1S: Driveway (north of salt shed)



Summary for Subcatchment 8S: Driveway/Roof (west of salt shed)

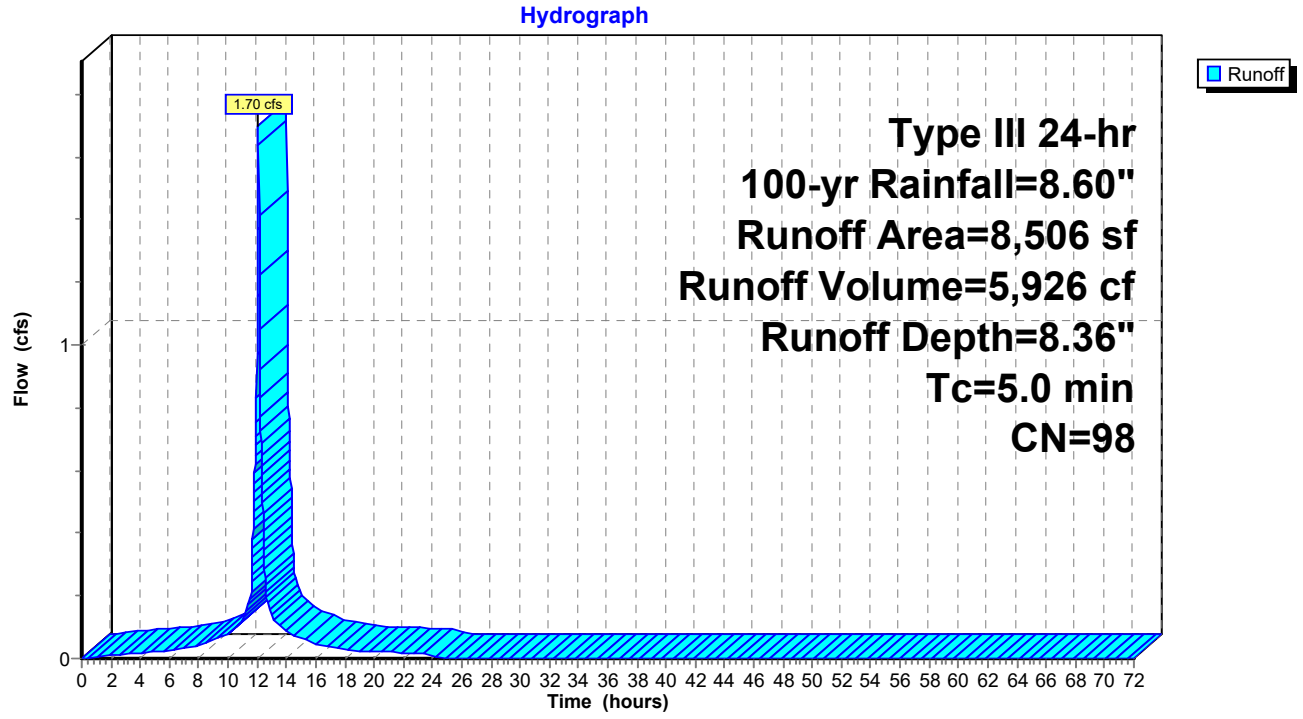
Runoff = 1.70 cfs @ 12.07 hrs, Volume= 5,926 cf, Depth= 8.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-yr Rainfall=8.60"

Area (sf)	CN	Description
2,506	98	Paved parking, HSG A
6,000	98	Unconnected roofs, HSG A
8,506	98	Weighted Average
8,506		100.00% Impervious Area
6,000		70.54% Unconnected

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

Subcatchment 8S: Driveway/Roof (west of salt shed)



Summary for Pond 2P: Inflitration Basin

Inflow Area = 31,881 sf,100.00% Impervious, Inflow Depth = 8.36" for 100-yr event
Inflow = 6.38 cfs @ 12.07 hrs, Volume= 22,210 cf
Outflow = 4.24 cfs @ 12.15 hrs, Volume= 22,210 cf, Atten= 34%, Lag= 4.9 min
Discarded = 0.83 cfs @ 12.15 hrs, Volume= 18,023 cf
Primary = 3.41 cfs @ 12.15 hrs, Volume= 4,187 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Peak Elev= 142.16' @ 12.15 hrs Surf.Area= 3,266 sf Storage= 4,516 cf

Plug-Flow detention time= 27.4 min calculated for 22,204 cf (100% of inflow)
Center-of-Mass det. time= 27.4 min (766.8 - 739.4)

Volume	Invert	Avail.Storage	Storage Description
#1	140.33'	7,577 cf	**Infiltration Basin (Prismatic)** Listed below (Recalc)

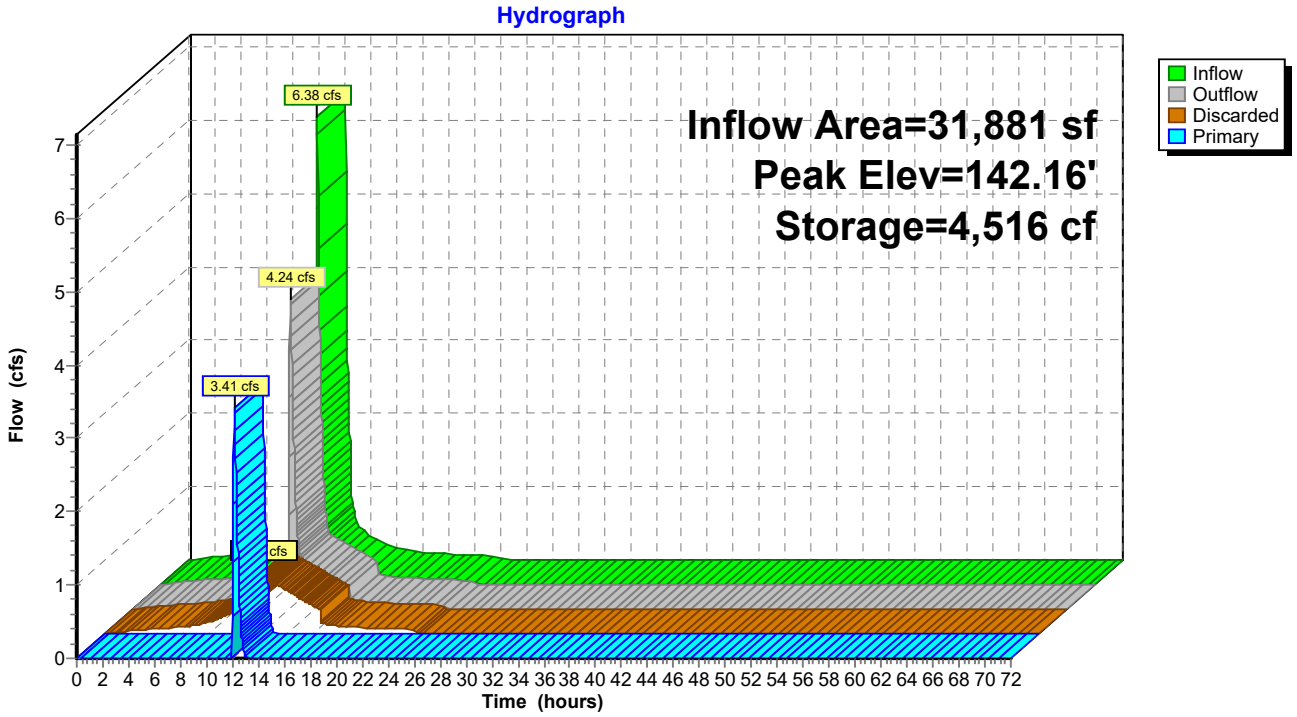
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
140.33	1,699	0	0
141.70	2,831	3,103	3,103
143.00	4,051	4,474	7,577

Device	Routing	Invert	Outlet Devices
#1	Discarded	140.33'	**8.270 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 136.33' Phase-In= 0.01'
#2	Primary	141.70'	**4.0' long x 36.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.83 cfs @ 12.15 hrs HW=142.16' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.83 cfs)

Primary OutFlow Max=3.39 cfs @ 12.15 hrs HW=142.16' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 3.39 cfs @ 1.84 fps)

Pond 2P: Inflitration Basin



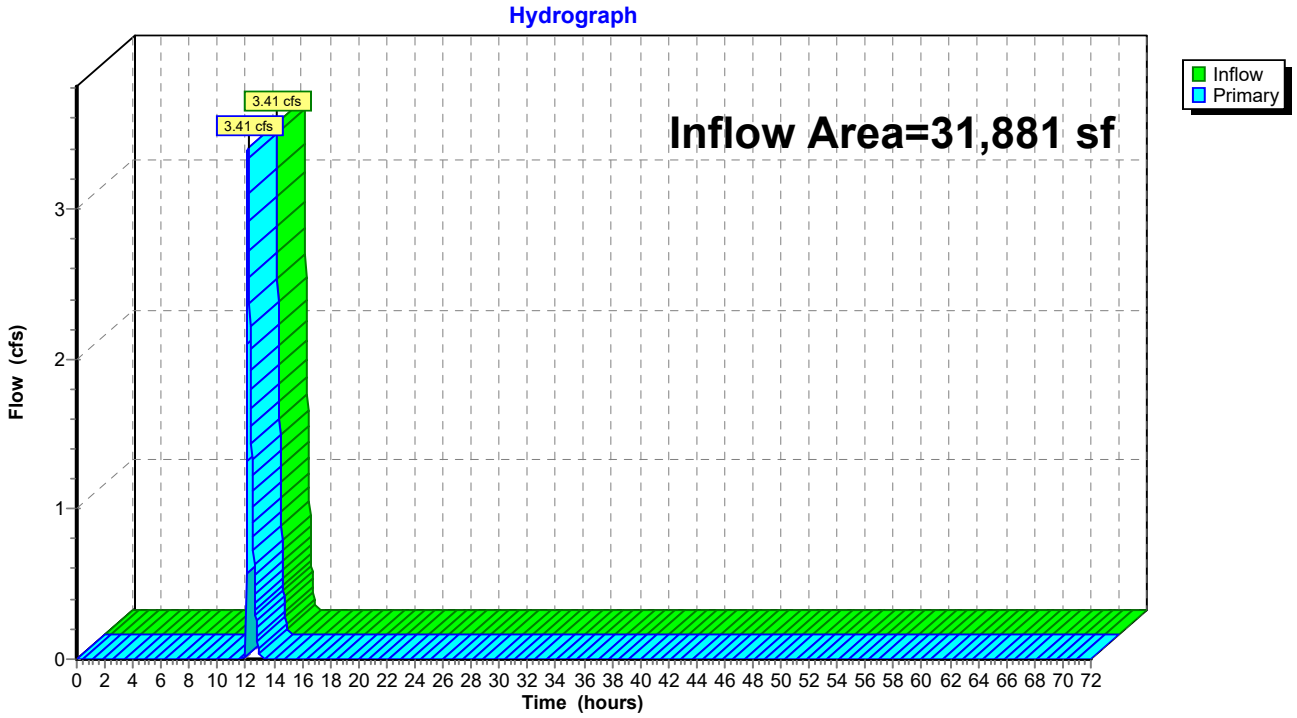
Summary for Pond 5P: Discharge

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 31,881 sf,100.00% Impervious, Inflow Depth = 1.58" for 100-yr event
Inflow = 3.41 cfs @ 12.15 hrs, Volume= 4,187 cf
Primary = 3.41 cfs @ 12.15 hrs, Volume= 4,187 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs

Pond 5P: Discharge



Summary for Pond 7P: Catch Basin

[57] Hint: Peaked at 142.77' (Flood elevation advised)

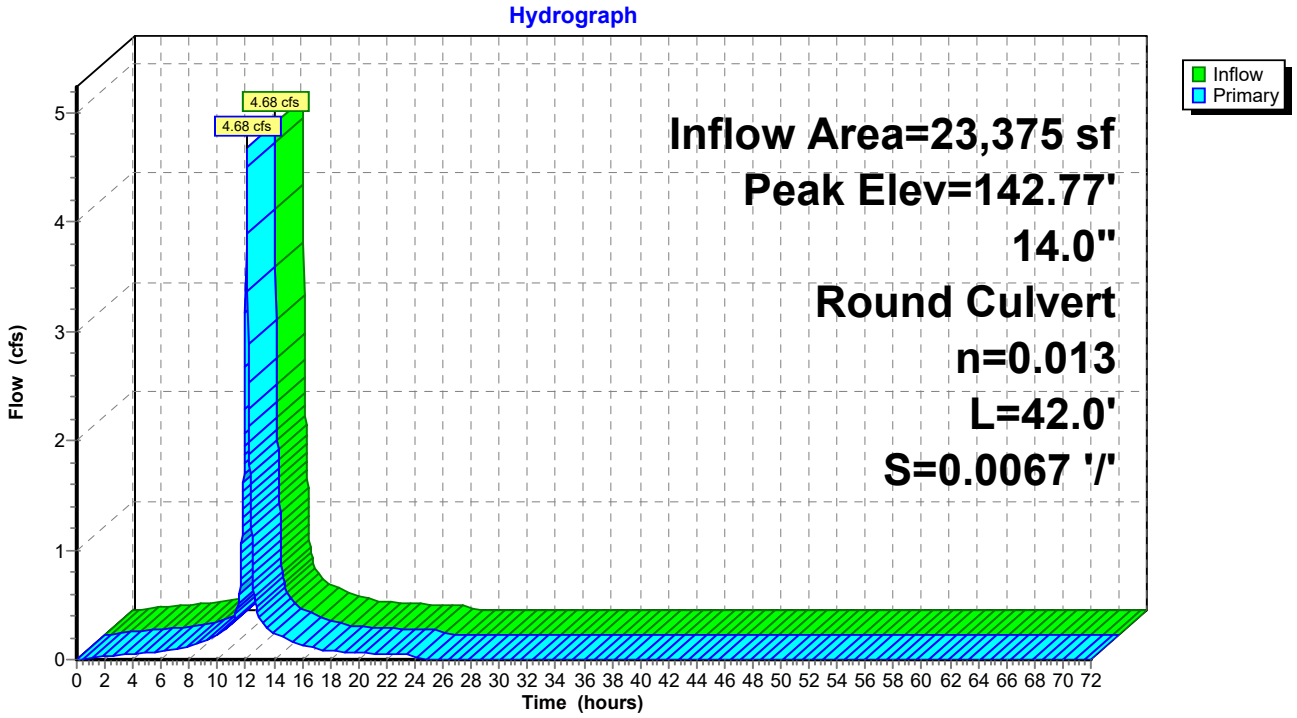
Inflow Area = 23,375 sf,100.00% Impervious, Inflow Depth = 8.36" for 100-yr event
Inflow = 4.68 cfs @ 12.07 hrs, Volume= 16,284 cf
Outflow = 4.68 cfs @ 12.07 hrs, Volume= 16,284 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.68 cfs @ 12.07 hrs, Volume= 16,284 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Peak Elev= 142.77' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	140.43'	**14.0" Round Culvert** L= 42.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 140.43' / 140.15' S= 0.0067 '/' Cc= 0.900 n= 0.013, Flow Area= 1.07 sf

Primary OutFlow Max=4.36 cfs @ 12.07 hrs HW=142.71' TW=141.99' (Dynamic Tailwater)
1=Culvert (Inlet Controls 4.36 cfs @ 4.07 fps)

Pond 7P: Catch Basin



APPENDIX 3

Sudbury DPW Fueling Facility
Recharge Calculation

Required Recharge

Area Summary	
	Area (SF)*
Existing Impervious	29,430
Proposed Impervious	31,881
Required Recharge Area *(Proposed - Existing)*	2,451

* Areas calculated in HydroCAD

Note: Existing unpaved area is HSG A according to Web Soil Survey.

Hydrologic Soil Group Summary		
Group	Target Depth Factor (in)	Area (SF)
A	0.6	2,451
B	0.35	0
C	0.25	0
D	0.1	0

Required Recharge (*Rv*) Calculation:

Rv = Target Depth Factor x Δ Impervious Area
Rv = 0.6 x (1/12) x 2,451
Rv = 123 CF

Proposed Recharge Summary

Location	Volume (CF)
Infiltration Basin	3,103
Total	3,103

(Volume below spillway elevation)

Rv = 123 CF
Provided recharge = 3,103 CF

Recharge Requirement is met.

Sudbury DPW Fueling Facility
Drawdown Calculations

-- Maximum drawdown time is 72 hours **--**

Time to drawdown calculation

$$\text{Time} = \frac{Rv}{k * \text{bottom area}}$$

where,

Rv = storage volume
k = saturated hydraulic conductivity rate
bottom area = average surface storage area of recharge structure

Proposed Storage Drawdown Calcuations

Infiltration Basin			
Storage volume	3,103	CF	
Bottom area	1,699	SF	
k	8.27	in/hr *	* assumed from Rawls Rate Table for sand
Time =	2.65	hours	

Proposed drawdown time is acceptable.

Sudbury DPW Fueling Facility
Water Quality Volume

Standard 4 Water Quality

As stated in the Stormwater Handbook, the required water quality volume equals 1.0 inches of runoff times the total impervious area of the post-development site.

Proposed Impervious Area					31,881	SF
Req'd Water Quality Volume						
31,881 sf	x	1"	x	1'/12"	= 2,657	CF
Provided Recharge Volume				=	3,032	CF

WQV Requirement is exceeded.

INSTRUCTIONS:
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.

Version 1, Automated: Mar. 4, 2008

Location: Sudbury, 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)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Oil Grit Separator	0.25	0.75	0.19	0.56
Sediment Forebay	0.25	0.56	0.14	0.42
Infiltration Basin	0.80	0.42	0.34	0.08
	0.00	0.08	0.00	0.08

Total TSS Removal = 92%

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

Project: Sudbury DPW Fueling Facility
Prepared By: Zach Wallin
Date: 2/19/2019

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

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

APPENDIX 4

Long Term Pollution Prevention Plan
Sudbury DPW Fueling Facility
Sudbury, MA

To meet the requirements of Standard 4 of the Massachusetts Stormwater Handbook, this Long Term Pollution Prevention Plan is provided to identify the proper procedures of practices for source control and pollution prevention.

Storage and Handling of Oil and other Hazardous Materials, including Fuel Island

Vehicle fuel will be stored onsite in above ground storage tanks. Spill kits will be kept onsite, and spills will be cleaned up immediately. Spills of gasoline or oil over 10 gallons will be reported to the Massachusetts Department of Environmental Protection within 24 hours. The storage tanks will be monitored to detect leaks and repaired if necessary. The fueling system itself will include a 10,000 gallon gasoline tank and a 6,000 gallon diesel tank. The tanks will be double walled and ballistic resistant with leak detection and a fuel management system. A positive limiting barrier will be provided around the perimeter of the slab to contain minor spills. Leak detection and tank monitoring will provide additional containment measures. Pretreatment stormwater BMPs downstream of these activities will include a deep sump hooded catch basin, oil-grit separator, and sediment forebay discharging to an infiltration basin.

Operation and Maintenance of Stormwater Control Structures

Included in Appendix 4 is the Operation and Maintenance plan for this site, which includes periodic removal of sediment from catch basins and other stormwater structures. The Department of Public Works will be responsible for the implementation of the plan.

Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan

SECTION 1: Introduction

The project consists of replacing the DPW's current UST fueling system with a new AST fueling system. The new fuel system will include a concrete drive pad, concrete tank pad, and canopy. As part of this project, there will be stormwater BMPs added such as a deep sump hooded catch basin, oil-grit separator, sediment forebay, and infiltration basin. Construction will also include regrading the project area and adding, replacing, or removing pavement depending on the specific location within the area.

As part of this project, this "Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan" has been developed to ensure that no disturbance to wetland resource areas are created during the construction of these repairs.

SECTION 2: Construction Period Pollution Prevention Measures

Best Management Practices (BMPs) will be utilized as Construction Period Pollution Prevention Measures to reduce potential pollutants and prevent any off-site discharge. The objectives of the BMPs for construction activity are to minimize the disturbed areas, stabilize any disturbed areas, control the site perimeter, and retain sediment. Both erosion and sedimentation controls and non-stormwater best management measures will be used to minimize site disturbance and ensure compliance with the performance standards of the Wetlands Protection Act (WPA) and MassDEP Stormwater Standards. Measures will be taken to minimize the area disturbed by construction activities to reduce the potential for soil erosion and stormwater pollution problems. In addition, good housekeeping measures will be followed for the day-to-day operation of the construction site under the control of the contractor to minimize the impact of construction. This section describes the control practices that will be in place during construction activities. All recommended control practices will comply with the standards set in the MassDEP Stormwater Handbook.

2.1 Minimize Disturbed Area and Protect Natural Features and Soil

To minimize disturbed areas, all work will be completed within well-defined work limits. These work limits are shown on the site plans included with this submission. The Contractor shall not disturb native vegetation without prior approval from the Engineer. The Contractor will be responsible to make sure that all workers know the proper work limits and do not extend their work into the undisturbed areas. The protective measures are described in more detail in the following sections.

2.2 Control Stormwater Flowing onto and through the project

The Contractor will be required to install compost filter tubes where shown in the attached plan set.

2.3 Stabilize Soils

The Contractor shall limit the area of land which is exposed and free from vegetation during the project. The soils will be exposed for no longer that one week.

2.4 Proper storage and cover of any stockpiles

The location of the Contractor's storage areas for equipment and/or materials shall be upon cleared portions of the job site, or areas to be cleared as a part of this project, and shall require written approval of the Engineer.

Adequate measures for erosion and sediment control, such as the placement of compost filter tubes around the downstream perimeter of stockpiles, shall be employed to protect any downstream areas from siltation.

There shall be no storage of equipment or materials in areas designated as wetlands.

The Engineer may designate an area, or areas, where the Contractor may store materials used in his operations.

2.5 Perimeter Controls and Sediment Barriers

Erosion control lines as described in Section 5 will be utilized to ensure that no sedimentation occurs outside the perimeter of the work area.

2.6 Storm Drain Inlet Protection

Catch basin protection will be implemented for all catch basins affected by the work area. Silt sacks will be placed in the catch basin to minimize sediment loading into the catch basin.

2.7 Retain Sediment On-Site

The Contractor will be responsible to monitor all erosion control measures. Whenever necessary, the Contractor will clear all sediment from the compost filter tubes and/or silt fence. Daily monitoring should be conducted using the attached Inspection Form.

2.8 Material Handling and Waste Management

All materials stored on-site will be stored in a neat, orderly manner in appropriate containers. All materials will be kept in their original containers with the original manufacturer’s label. Substances will not be mixed with one another unless recommended by the manufacturer.

All waste materials will be collected and stored in a securely lidded metal container from a licensed management company. The waste and any construction debris from the site will be hauled off-site daily and disposed of properly. The Contractor will be responsible for all waste removal. Manufacturer's recommendations for proper use and disposal will be followed for all materials.

2.9 Designated Washout Areas

The Contractor shall use washout facilities at their own plants, unless otherwise directed by the Engineer.

2.10 Proper Equipment/Vehicle Fueling and Maintenance Practices

On-site vehicles will be monitored for leaks and receive regular preventative maintenance to reduce the risk of leakage. To ensure that leaks on stored equipment do not contaminate the site oil-absorbing mats will be placed under vehicles or equipment prone to leakage during storage. Regular fueling and service of the equipment may be performed using approved methods and with care taken to minimize chance of spills. Repair of equipment or machinery within a 100-foot water resources buffer area shall not be allowed without the prior approval of the Engineer. Any petroleum products will be stored in tightly sealed containers that are clearly labeled.

2.11 Equipment/Vehicle Washing

The Contractor will be responsible to ensure that no equipment is washed on-site except to remove sediments prior to transport from the site.

SECTION 3: Spill Prevention and Control Plan

The Contractor will be responsible for preventing spills in accordance with the project specifications and applicable federal, state and local regulations. The Contractor will identify a properly trained site employee, involved with the day-to-day site operations to be the spill prevention and cleanup coordinator. The name(s) of the responsible spill personnel will be posted on-site. Each employee will be instructed that all spills are to be reported to the spill prevention and cleanup coordinator.

3.1 Spill Control Equipment

Spill control/containment equipment will be kept in the work Area. Materials and equipment necessary for spill cleanup will be kept either in the work Area or in an otherwise accessible on-site location. Equipment and materials will include, but not be limited to, absorbent booms/mats, brooms, dust pans, mops, rags, gloves, goggles, sand, plastic and metal containers specifically for this purpose. It is the responsibility of the Contractor to ensure the inventory will be readily accessible and maintained.

3.2 Notification

All workers will be directed to inform the on-site supervisor of a spill event. The supervisor will assess the incident and initiate proper containment and response procedures immediately upon notification. Workers should avoid direct contact with spilled materials during the containment procedures. Primary notification of a spill should be made to the local Fire Department and Police Departments. Secondary Notification will be to the certified cleanup contractor if deemed necessary by Fire and/or Police personnel. The third level of notification is to the DEP. The specific cleanup contractor to be used will be identified by the Contractor prior to commencement of construction activities.

3.3 Spill Containment and Clean-Up Measures

Spills will be contained with granular sorbent material, sand, sorbent pads, booms or all of the above to prevent spreading. Certified cleanup contractors should complete spill cleanup. The material manufacturer's recommended methods for spill cleanup will be clearly posted and on-site personnel will be made aware of the procedures and the location of the information and cleanup supplies.

3.4 Hazardous Materials Spill Report

The Contractor will report and record any spill. The spill report will present a description of the release, including the quantity and type of material, date of the spill, circumstances leading to the release, location of spill, response actions and personnel, documentation of notifications and corrective measures implemented to prevent reoccurrence.

This document does not relieve the Contractor of the Federal reporting requirements of 40 CFR Part 110, 40 CFR Part 117, 40 CFR Part 302 and the State requirements specified under the Massachusetts Contingency Plan (M.C.P) relating to spills or other releases of oils or hazardous substances. Where a release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under either 40 CFR Part 110, 40 CFR Part 117 or 40 CFR Part 302, occurs during a twenty-four (24) hour period, the Contractor is required to comply with the response requirements of the above mentioned regulations. Spills of oil or hazardous material in excess of the reportable quantity will be reported to the National Response Center (NRC).

SECTION 4: Contact Information/Responsible Parties

Owner/Operator:
Daniel Nason
Director of Public Works
275 Old Lancaster Road
Sudbury, MA
978-440-5490

Engineer:
James Fair, PE
Weston & Sampson
5 Centennial Drive
Peabody, MA 01960
978-977-0110

Site Inspector:
TBD

Contractor:
TBD

SECTION 5: Erosion and Sedimentation Control

Erosion and Sedimentation Control details and layout can be found in the attached plan set.

SECTION 6: Site Development Plan

The Site Development Plan is included in the attached plan set.

SECTION 7: Operation and Maintenance of Erosion Control

The erosion control measures will be installed as detailed in the attached plan set. If there is a failure to the controls, the Contractor will be required to stop work until the failure is repaired.

Periodically throughout the work, whenever the Engineer deems it necessary, the sediment that has been deposited against the controls will be removed to ensure that the controls are working properly.

SECTION 8: Inspection Schedule

During construction the erosion and sedimentation controls will be inspected daily. Once the contractor is selected, an on-site inspector will be selected to work closely with the Engineer to ensure that all erosion and sedimentation controls are in place and working properly. An Inspection Form is included.

Inspection Form

Inspected By: _____ Date: _____Time:_____

YES	NO	DOES NOT APPLY	ITEM
			Do any erosion/siltation control measures require repair or clean out to maintain adequate function?
			Is there any evidence that sediment is leaving the site and entering the wetlands?
			Are any temporary soil stockpiles or construction materials located in non-approved areas?
			Are on-site construction traffic routes, parking, and storage of equipment and supplies located in areas not specifically designed for them?

Specific location, current weather conditions, and action to be taken:

_____

_____

_____

_____

_____

Other Comments:

_____

_____

Pending the actions noted above I certify that the site is in compliance with the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan.

Signature: _____ Date: _____

Illicit Discharge Compliance Statement

Section I – Purpose/Intent

The purpose of this document is to provide for the health, safety, and general welfare of the citizens of Sudbury, Massachusetts through the regulation of non-stormwater discharges into existing outstanding resource areas near the proposed Sudbury DPW facility site to the maximum extent practicable, as required by federal and state law. This document establishes methods for controlling the introduction of pollutants into existing outstanding resource areas to comply with requirements of the National Pollutant Discharge Elimination System (NPDES) permit process.

Section II - Definitions

For the purposes of this statement, the following shall mean:

Best Management Practices (BMPs): Schedules of activities, prohibitions of practices, general good housekeeping practices, pollution prevention and educational practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants directly or indirectly to stormwater, receiving waters, or stormwater conveyance systems. BMPs also include treatment practices, operating procedures, and practices to control site runoff, spillage or leaks, sludge or water disposal, or drainage from raw materials storage.

Clean Water Act: The federal Water Pollution Control Act (33 U.S.C § 1251 et seq.), and any subsequent amendments thereto.

Construction Activity: Activities subject to the Massachusetts Erosion and Sedimentation Control Act or NPDES Construction Permits. Such activities include but are not limited to clearing and grubbing, grading, excavating, and demolition.

Hazardous Materials: Any material, including any substance, waste, or combination thereof, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause, or significantly contribute to, a substantial present or potential hazard to human health, safety, property, or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Illegal Connection: An illegal connection is defined as either of the following:

a. Any pipe, open channel, drain or conveyance, whether on the surface or subsurface, which allows an illicit discharge to enter the outstanding resource area including but not limited to any conveyances which allow any non-stormwater discharge including sewage, process wastewater, and wash water, regardless of whether said drain or connection has been previously allowed, permitted, or approved by an authorized enforcement agency; or

b. Any pipe, open channel, drain or conveyance connected to the Town of Sudbury storm water treatment system which has not been documented in plans, maps, or equivalent records and approved by an authorized enforcement agency.

Illicit Discharge: Any direct or indirect non-stormwater discharge to the Town of Sudbury stormwater treatment system, except as exempted in Section II of this ordinance.

Industrial Activity: Activities subject to NPDES Industrial Permits as defined in 40CFR, Section 122.26 (b) (14).

National Pollutant Discharge Elimination System (NPDES) Stormwater Discharge Permit: A permit issued by MassDEP under authority delegated pursuant to 33 USC § 1342 (b) that authorizes the discharge of pollutants to waters of the United States, whether the permit is applicable on an individual, group, or general area-wide basis.

Town of Sudbury Stormwater Treatment System: Any facility, owned or maintained by the town, designed or used for collecting and/or conveying stormwater, including but not limited to roads with drainage systems, Town of Sudbury streets, curbs, gutters, inlets, catch basins, piped storm drains, pumping facilities, infiltration, retention and detention basins, natural and man-made or altered drainage channels, reservoirs, and other drainage structures.

Non-Stormwater Discharge: Any discharge to the storm drain system that is not composed entirely of stormwater.

Person: Any individual, association, organization, partnership, firm, joint venture, public or private corporation, trust, estate, commission, board, public or private institution, utility, cooperative, city, county or other political subdivision of the State, interstate body, or any other legal entity.

Pollutant: Anything which causes or contributes to pollution. Pollutants may include, but are not limited to: paints, varnishes, and solvents; petroleum hydrocarbons; automotive fluids; cooking grease; detergents (biodegradable or otherwise); degreasers; cleaning chemicals; non-hazardous liquid and solid wastes; refuse, rubbish, garbage, litter, or other discarded or abandoned objects and accumulations, so that same may cause or contribute to pollution; floatables; pesticides, herbicides, and fertilizers; liquid and solid wastes; sewage, fecal coliform and pathogens; dissolved and particulate metals; animal wastes; wastes and residues that result from constructing a building or structure; concrete and cement; and noxious or offensive matter of any kind.

Pollution: Contamination or other alteration of any water's physical, chemical, or biological properties by addition of any constituent including but not limited to a change in temperature, taste, color, turbidity, or odor of such waters, or the discharge of any liquid, gaseous, solid, radioactive, or other substance into any such waters as will or is likely to create a nuisance or render such waters harmful, detrimental, or injurious to the public health, safety, welfare, or environment, or to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses, or to livestock, wild animals, birds, fish or other aquatic life.

Premises: Any building, lot, parcel of land, or portion of land whether improved or unimproved including adjacent sidewalks and parking strips.

Stormwater: Any surface flow, runoff, and drainage consisting entirely of water from any form of natural precipitation, and resulting from such precipitation.

Wastewater: Any water or other liquid discharged from a facility, that has been used, as for washing, flushing, or in a manufacturing process, and so contains waste products.

Section III - Prohibitions

Prohibition of Illicit Discharges:

No person shall throw, drain, or otherwise discharge, cause or allow others under its control to throw, drain, or otherwise discharge into the Town of Sudbury stormwater treatment system or watercourses any materials, including but not limited to, any pollutants or waters containing any pollutants, other than stormwater. The commencement, conduct, or continuance of any illicit discharge to the storm drain system is prohibited except as described as follows:

1. Water line flushing performed by a government agency, other potable water sources, landscape irrigation or lawn watering, diverted stream flows, rising ground water, ground water infiltration to storm drains, uncontaminated pumped ground water, foundation or footing drains (not including active groundwater dewatering systems), crawl space pumps, air conditioning condensation, springs, natural riparian habitat or wetland flows, and any other water source not containing pollutants;

2. Discharges or flows from fire fighting, and other discharges specified in writing by the Town of Sudbury as being necessary to protect public health and safety;

3. Dye testing is an allowable discharge, but requires a verbal notification to the Town of Sudbury prior to the time of the test;

4. Any non-stormwater discharge permitted under an NPDES permit, waiver, or waste discharge order issued to the discharger and administered under the authority of the Federal Environmental Protection Agency, provided that the discharger is in full compliance with all requirements of the permit, waiver, or order and other applicable laws and regulations, and provided that written approval has been granted for a discharge to the Town of Sudbury stormwater treatment system.

Section IV - Industrial or Construction Activity Discharges

Any person subject to an industrial or construction activity NPDES stormwater discharge permit shall comply with all provisions of such permit. Proof of compliance with said permit may be required in a form acceptable to the Town of Sudbury Department of Public Works prior to allowing discharges to the Sudbury stormwater treatment system.

Section V - Notification of Spills and Accidental Discharges

Notwithstanding other requirements of law, as soon as any person responsible for a facility, activity or operation, or responsible for emergency response for a facility, activity or operation has information of any known or suspected release of pollutants or non-stormwater discharges from that facility, activity, or operation which are resulting or may result in illicit discharges or pollutants discharging into stormwater, the Town of Sudbury stormwater treatment system, State Waters, or Waters of the U.S., said person shall take all necessary steps to ensure the discovery, containment, and cleanup of such release so as to minimize the effects of the discharge. In the event of such a release of hazardous materials, said person shall immediately notify emergency response agencies of the occurrence via emergency dispatch services. In the event of a release of non-hazardous materials, said person shall notify the Town of Sudbury Department of Public Works in person or by phone no later than the next business day, including the nature, quantity and time of occurrence of the discharge. Notifications in person or by phone shall be confirmed by written notice, via certified mail return receipt requested addressed to the Town of Sudbury Department of Public Works within three (3) business days of the initial notice. If the discharge of prohibited materials emanates from a commercial or industrial establishment, the owner or operator of such establishment shall also retain an on-site written record of the discharge and the actions taken to prevent its recurrence. Such records shall be retained for at least three years.

IN WITNESS WHEREOF the parties hereto have executed copies of this Agreement on the 6th day of March, 2019.

Daniel Nason
Director of Public Works
Town of Sudbury, MA

Operations and Maintenance Plan

Sudbury DPW Fueling Facility

275 Old Lancaster Road
Sudbury, Massachusetts

March 2019

Signature of Owner/Applicant

Daniel F. Nason, Director

Name, Title

3/6/19

Date

Weston & Sampson
5 Centennial Drive
Peabody, MA 01960

www.westonandsapmson.com
Tel: 978-532-1900

Table of Contents

1.0 Introduction

The following document has been written to comply with the stormwater guidelines set forth by the Massachusetts Department of Environmental Protection (MassDEP). The intent of these guidelines is to encourage Low Impact Development techniques to improve the quality of the stormwater runoff. These techniques, also known as Best Management Practices (BMPs) collect, store, and treat the runoff before discharging to adjacent environmental resources.

2.0 Purpose

This Operation and Maintenance Plan (O&M Plan) is intended to provide a mechanism for the consistent inspection and maintenance of each BMP installed on the project site. Included in this O&M Plan is a description of each BMP type and an inspection form for each BMP. The Sudbury DPW is the owner and operator of the system and is responsible for its upkeep and maintenance. This work will be funded on an annual basis through the facilities operating budget. The estimated budget to maintain these BMPs utilizing is approximately $1,000 per year.

In the event the Sudbury DPW sells the property, it is the DPW's responsibility to transfer this plan, as well as the past three years of operation and maintenance records, to the new property owner.

3.0 BMP Description and Locations

Proposed BMP's are described below and identified on the BMP Location Map included in Attachment A of O&M Plan.

3.1 Deep Sump Hooded Catch Basin

A deep sump hooded catch basin will be located near the northwest corner of the existing salt shed and used as pre-treatment before entering the oil-grit separator. The deep sump hooded catch basin is a collection system that is designed to remove trash, debris, and coarse sediment from the stormwater runoff.

3.2 Oil-Grit Separator

The oil-grit separator will be located at the site and used as pre-treatment before entering the sediment forebay of the infiltration basin. The oil-grit separator is designed to oils, debris, and coarse sediment from the stormwater runoff.

3.3 Infiltration Basin

An infiltration basin will be built on the Western side of the site down gradient from the fuel island area. It will include a sediment forebay with a stone check dam. This infiltration basin will provide peak rate attenuation and will also significantly mitigate TSS.

3.4 Outlet Structures and Channels

Outlet structures and channels include flared end sections and riprap channels. This project includes one flared end section in the infiltration basin sediment forebay and an overflow spillway channel from the infiltration basin. These should be kept clean from debris and sediment.

4.0 Inspection, Maintenance Checklist and Schedule

4.1 Deep Sump Hooded Catch Basin and Oil-Grit Separator

Inspect and/or clean structures at least four times per year and at the end of foliage and snow removal seasons. Sediments must be removed whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the structure. The structure should be cleaned a minimum of four times per year regardless of the amount of sediment in the basin. It shall be cleaned using clamshell buckets or vacuum trucks.

In the event of contamination by a spill or other means, all cleanings must be evaluated in accordance with the Hazardous Waste Regulations, 310 CMR 30.000 and handled as hazardous waste.

In the absence of evidence of contamination, cleanings may be taken to a landfill or other facility permitted by MassDEP to accept Solid Waste without any prior approval by MassDEP. Please note that current MassDEP regulations prevent landfills from accepting materials that contain free-draining liquids.

4.2 Infiltration Basin

The infiltration basin shall be inspected every six months during the first year, and annually thereafter. All accumulated sediment and debris in the infiltration basin should be removed and disposed of according to local, state and federal regulations. During the growing season, vegetation should not exceed six inches in height in the infiltration basin and should be mowed as necessary. Any grassed areas in close proximity to any areas that use salt in deicing applications should be re-seeded in the spring. Bare spots should be re-seeded as needed.

4.3 Outlet Structures and Channels

All inlet and outlet channels and structures, including flared ends, shall be inspected and cleaned twice a year and after heavy rainstorms. Sediment and debris should be removed by hand and disposed of in accordance with local, state and federal regulations.

5.0 Documentation and Record Keeping

- An inspection form should be filled out every time maintenance work is performed.
- A binder should be kept at the DPW Facility that contains all the completed inspection forms and any other related materials.
- A review of all Operation & Maintenance actions should take place annually to ensure that these Stormwater BMPs are being taken care of in the manner illustrated in this Operation & Maintenance Plan.
- All operation and maintenance log forms for the last three years, at a minimum, shall be kept on site at the Sudbury DPW Facility.
- The inspection and maintenance schedule may be refined in the future based on the findings and results of this operation and maintenance program or policy.
- The owner of the property shall maintain a log of disposal activities which shall include the types of material disposed and disposal locations.
- The owner of the property shall provide provisions for the Planning Board or its designee to enter the property at reasonable times and a reasonable manner for the purpose of inspection.

ATTACHMENT A

(BMP Location Map)

DEEP SUMP HOODED CATCH BASIN

OIL-GRIT SEPARATOR

FLARED END

INFILTRATION BASIN

BENCHMARK
SQ. CUT AT TOP STEP
ELEV. 146.19

SUDBURY DPW FUELING FACILITY
SUDBURY, MA

BMP LOCATION MAP

DESIGNED BY: ZDW	SCALE: 1"= 40'	DATE: 2/20/2019

Weston & Sampson℠

P:\MA\Sudbury MA\DPW Fueling Facility\CAD (2016)\XREF\XR-GD.dwg

DPW Fueling Facility
Town of Sudbury
Permanent BMP Inspection Checklist

☐ **Deep Sump Hooded Catch Basin and Oil-Grit Separator**

Frequency: Inspect and clean deep sump hooded catch basin and oil-grit separator in March, June, September and December.

Structure Number: _____

Inspected By: _____ Date: _____

Observations: _____
_____
_____

Actions Taken: _____
_____
_____

Instructions: Clean units four times per year or whenever the depth of the deposits is greater than or equal to one half the depth from the bottom of the invert to the lowest pipe in the structure.

☐ **Infiltration Basin**

Frequency: The infiltration basin should be inspected every six months during the first year and annually thereafter.

Structure No.: _____

Inspected By: _____ Date: _____

Observations: _____
_____
_____

Actions Taken: _____
_____
_____

Instructions: Inspect grassed area. Mow grass as needed in infiltration basin. Remove accumulated trash and debris. Remove sediment and re-seed bare spots as needed. All trash, debris, and sediments should be disposed of in accordance with local, state, and federal regulations.

☐ **Stormwater Outfalls**

Frequency: Minimum twice per year

Location: Infiltration basin sediment forebay.

Inspected By: _____ Date: _____

Observations: _____
_____
_____

Actions Taken: _____
_____
_____

Instructions: Inspect outfalls at least twice per year, clean as needed.

APPENDIX D

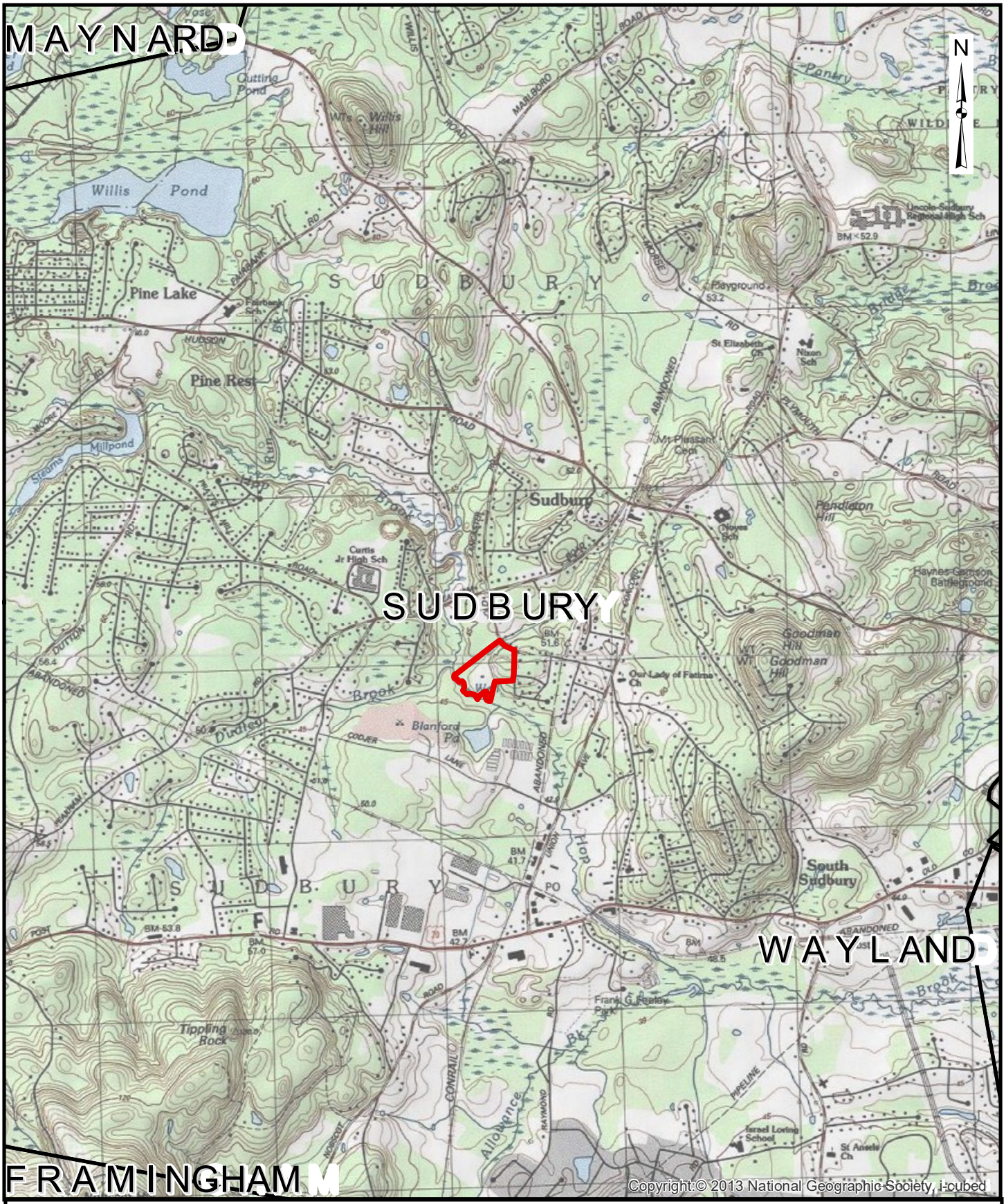


FIGURE 1
DPW Fueling Facility
Sudbury, Massachusetts

Locus Map

Work Area

2,400 0 2,400

Scale In Feet

Weston & Sampson

Path: \\wse03.local\WSE\Depts\Water\ERMAP\GIS - Constraints Mapping\Sudbury\DPW Fueling Facility\Figure 1 -locus.mxd User: GasparA Saved: 11/29/2018 10:38:21 AM Opened: 11/29/2018 10:38:40 AM

FIGURE 2
DPW Fueling Facility
Sudbury, Massachusetts

ENVIRONMENTAL RECEPTORS

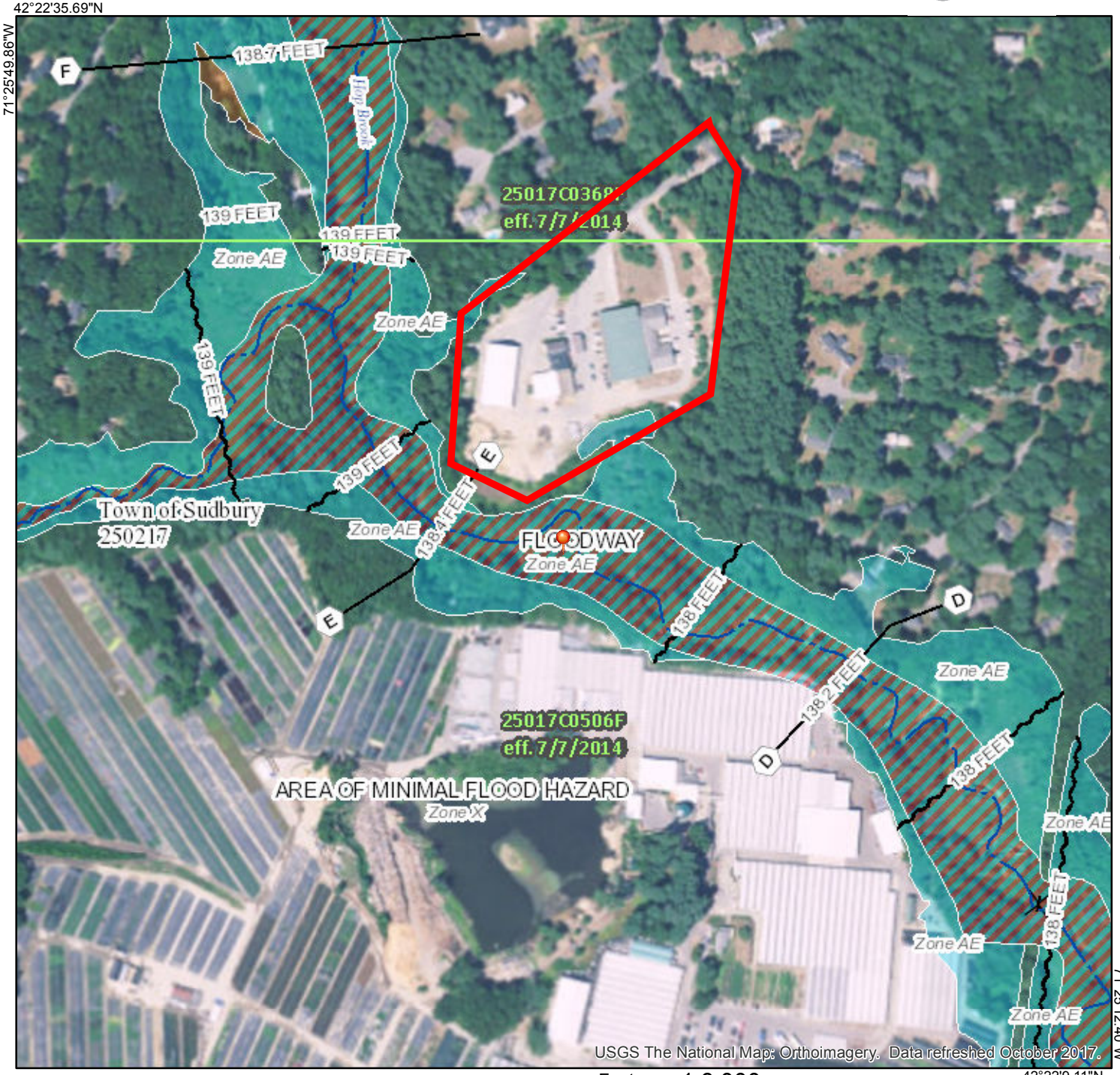
200 0 200
Scale In Feet

Weston & Sampson

Path: \\wse03.local\WSE\Depts\Water\ERMAP\GIS - Constraints Mapping\Sudbury\DPW Fueling Facility\Figure 1 - Env Receptor.mxd **User:** GasparA **Saved:** 11/29/2018 10:45:01 AM **Opened:** 11/29/2018 10:45:14 AM

National Flood Hazard Layer FIRMette

FEMA



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
- 513 — Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 11/20/2018 at 12:52:48 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.

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APPENDIX E

SECTION 01562

DUST CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION:

This section of the specification covers the control of dust via calcium chloride and water, complete.

PART 2 - PRODUCTS

2.01 CALCIUM CHLORIDE:

A. Calcium chloride shall conform to the requirements of AASHTO-M 144, Type I or Type II and Specification for Calcium Chloride, ASTM D98. The calcium chloride shall be packaged in moisture proof bags or in airtight drums with the manufacturer, name of product, net weight, and percentage of calcium chloride guaranteed by the manufacturer legibly marked on each container.

B. Calcium chloride failing to meet the requirements of the aforementioned specifications or that which has become caked or sticky in shipment, may be rejected by the Engineer.

2.02 WATER:

A. Water shall not be brackish and shall be free from oil, acid, and injurious alkali or vegetable matter.

PART 3 - EXECUTION

3.01 APPLICATION:

A. Calcium chloride shall be applied when ordered by the Engineer and only in areas which will not be adversely affected by the application. See Section 01570, ENVIRONMENTAL PROTECTION.

B. Calcium chloride shall be uniformly applied at the rate of 1-1/2 pounds per square yard or at any other rate as required by the Engineer. Application shall be by means of a

mechanical spreader, or other approved methods. The number and frequency of applications shall be determined by the Engineer.

C. Water may be sprinkler applied with equipment including a tank with gauge-equipped pressure pump and a nozzle-equipped spray bar.

D. Water shall be dispersed through the nozzle under a minimum pressure of 20 pounds per square inch, gauge pressure.

END OF SECTION

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SECTION 01570

ENVIRONMENTAL PROTECTION

PART 1 – GENERAL

1.01 DESCRIPTION:

A. The work covered by this section of the specifications consists of furnishing all labor, materials, tools and equipment and performing all work required for the prevention of environmental pollution during and as a result of construction operations under this contract.

B. The requirements set forth in this section of the specifications apply to construction adjacent to wetlands, unless otherwise specifically stated.

C. All work under this Contract shall be in accordance with the Conservation Commissions' Orders of Conditions as well as any conditional requirements applied.

D. Prior to commencement of work, the Contractor shall meet with representatives of the Engineer to develop mutual understandings relative to compliance of the environmental protection program.

1.02 SUBMITTALS:

A. The Contractor shall submit for approval six sets of details and literature fully describing environmental protection methods to be employed in carrying out construction activities within 100 feet of wetlands or across areas designated as wetlands.

PART 2 - PRODUCTS

2.01 STRAW BALES:

A. Straw bales shall consist of certified seed free stems of agricultural grain and cereal crops and shall be free of grasses and legumes. Standard bales shall be 14-inches high, 18- inches wide and 36- to 40-inches long tied with polypropylene twine and weigh within 5 percent of 7 lbs. per cubic ft.

2.02 CATCH BASIN PROTECTION:

A. To trap sediment and to prevent sediment from clogging drainage systems, catch basin protection in the form of a siltation sack (Siltsack as manufactured by ACF Environmental, Inc. or approved equal) shall be provided as approved by the Engineer.

2.03 COMPOST FILTER TUBES:

A. Compost filter tubes shall be a tubular filter sock of mesh fabric. The fabric will have openings of between 1/8" to ¼" diameter. The mesh material will either photo degrade

within one year or be made of nylon with a life expectancy of 24 months. The sock shall be filled with a mix of composted leaf mulch, bark mulch and wood chips that have been composted for at least one year. The sock will have a minimum diameter of 12-inches.

PART 3- EXECUTION

3.01 NOTIFICATION AND STOPPAGE OF WORK:

A. The Engineer will notify the Contractor in writing of any non-compliance with the provisions of the Order of Conditions. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the Contractor fails to act promptly, the Owner may order stoppage of all or part of the work through the Engineer until satisfactory corrective action has been taken. No claim for an extension of time or for excess costs or damage incurred by the Contractor as a result of time lost due to any stop work orders shall be made unless it was later determined that the Contractor was in compliance.

3.02 AREA OF CONSTRUCTION ACTIVITY:

A. Insofar as possible, the Contractor shall confine his construction activities to those areas defined by the plans and specifications. All land resources within the project boundaries and outside the limits of permanent work performed under this contract shall be preserved in their present condition or be restored to a condition after completion of construction at least equal to that which existed prior to work under this contract.

3.03 PROTECTION OF WATER RESOURCES:

A. The Contractor shall not pollute streams, lakes or reservoirs with fuels, oils, bitumens, calcium chloride, acids or other harmful materials. It is the Contractor's responsibility to comply with all applicable Federal, State, County and Municipal laws regarding pollution of rivers and streams.

B. Special measures should be taken to insure against spillage of any pollutants into public waters.

3.04 CONSTRUCTION IN AREAS DESIGNATED AS BUFFER ZONE ON THE DRAWINGS:

A. Insofar as possible, the Contractor shall make every effort to minimize disturbance within 100-feet of wetland resource areas. Total easement widths shall be limited to the widths shown.

B. The Contractor shall perform his work in such a way that these areas are left in the condition existing prior to construction.

3.05 PROTECTING AND MINIMIZING EXPOSED AREAS:

A. The Contractor shall limit the area of land which is exposed and free from vegetation during construction. In areas where the period of exposure will be greater than two (2)

months, temporary vegetation, mulching or other protective measures shall be provided as specified.

B. The Contractor shall take account of the conditions of the soil where temporary cover crop will be used to insure that materials used for temporary vegetation are adaptive to the sediment control. Materials to be used for temporary vegetation shall be approved by the Engineer.

3.06 LOCATION OF STORAGE AREAS:

A. The location of the Contractor's storage areas for equipment and/or materials shall be upon cleared portions of the job site or areas to be cleared as a part of this project, and shall require written approval of the Engineer. Plans showing storage facilities for equipment and materials shall be submitted for approval of the Engineer.

B. No excavated materials or materials used in backfill operations shall be deposited within a minimum distance of one hundred (100) feet of any watercourse or any drainage facility. Adequate measures for erosion and sediment control such as the placement of compost filter tubes around the downstream perimeter of stockpiles shall be employed to protect any downstream areas from siltation.

C. There shall be no storage of equipment or materials in areas designated as wetlands.

D. The Engineer may designate a particular area or areas where the Contractor may store materials used in his operations.

3.07 CLEARING AND GRUBBING:

A. The Contractor shall clear and grub only on the Owner's land, and only the area required for construction operations, as approved by the Engineer.

3.08 DISCHARGE OF DEWATERING OPERATIONS:

A. Any water that is pumped and discharged from excavation efforts as part of the Contractor's water handling shall be filtered by an approved method prior to its discharge into a receiving water or drainage system.

B. Under no circumstances shall the Contractor discharge water to the areas designated as wetlands.

C. The pumped water shall be filtered through filter fabric and baled straw, a vegetative filter strip or a vegetated channel to trap sediment occurring as a result of the construction operations. The vegetated channel shall be constructed such that the discharge flow rate shall not exceed a velocity of more than 1 foot per second. Accumulated sediment shall be cleared from the channel periodically.

3.09 DUST CONTROL:

A. During the progress of the work, the Contractor shall conduct his operations and maintain the area of his activities, including sweeping and sprinkling of streets as necessary, to minimize creation and dispersion of dust. If the Engineer decides it is necessary to use calcium chloride for more effective dust control, the Contractor shall furnish and spread the material, as directed.

B. Calcium Chloride shall not be used for dust control within a drainage basin or in the vicinity of any source of potable water.

3.10 CATCH BASIN PROTECTION:

A. Catch basin protection shall be used for every catch basin, shown on the plans or as required by the Engineer, to trap sediment and prevent it from clogging drainage systems and entering wetlands. Siltation sacks shall be securely installed under the catch basin grate. Care shall be taken to keep the siltation sacks from breaking apart or clogging. All deposited sediment shall be removed periodically and at times prior to predicted precipitation to allow free drainage flow. Prior to working in areas where catch basins are to be protected, each catch basin sump shall be cleaned of all debris and protected. The contractor shall properly dispose of all debris at no additional cost to the Owner.

3.11 COMPOST FILTER TUBES:

A. The compost filter tubes will be staked in the ground using wooden stakes driven at 4-foot intervals. The wooden stakes will be placed at a minimum depth of 24-inches into the ground.

END OF SECTION

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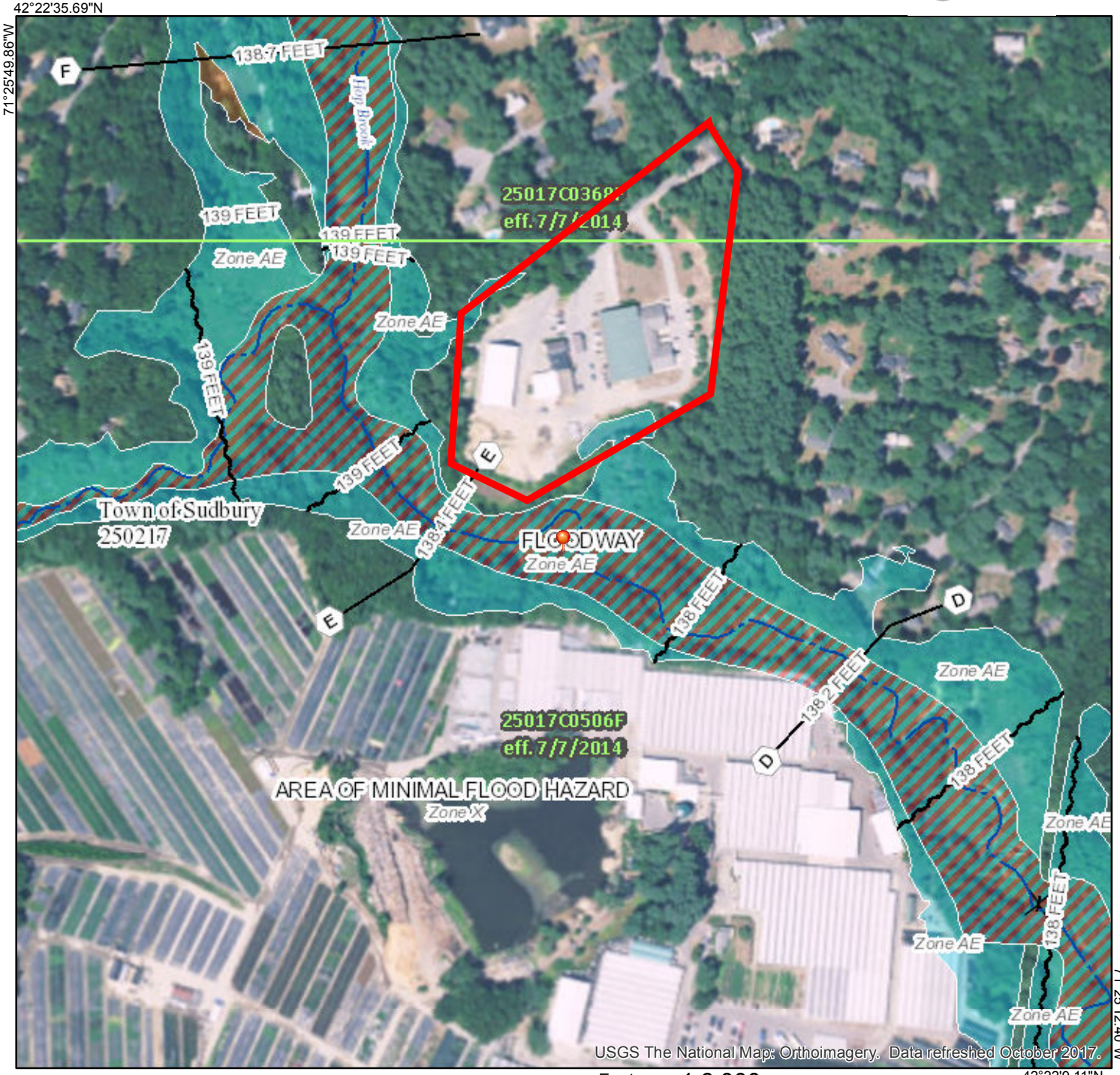
National Flood Hazard Layer FIRMette

FEMA



Legend

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- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

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N

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APPENDIX F

AFFIDAVIT OF SERVICE

Under the Massachusetts Wetlands Protection Act

I, Mel Higgins, hereby certify under the Pains and Penalties of Perjury that on March 18, 2019 I gave notification to abutters in compliance with the second paragraph of Massachusetts General Laws, Chapter 131, Section 40, and the DEP Guide to Abutter Notification dated, April 8, 1994, in connection with the following matter:

> A Notice of Intent has been filed under the Massachusetts Wetlands Protection Act by the Town of Sudbury with the Sudbury Conservation Commission on March 18, 2019 for property located at 275 Old Lancaster Road in Sudbury.

The completed notification and a list of the abutters to whom it was given and their addresses, are attached to this Affidavit of Service.

March 18, 2019
DATE

Name: Mel Higgins
Title: Senior Environmental Scientist
Organization: Weston & Sampson Engineers, Inc

Notification to Abutters Under the Massachusetts Wetlands Protection Act

In accordance with the second paragraph of Massachusetts General Laws Chapter 131, Section 40, you are hereby notified of the following:

A. The name of the applicant is: Town of Sudbury
275 Old Lancaster Road
Sudbury, MA 01776

B. The name of the owner is: same as above

C. The applicant has filed a Notice of Intent with the Sudbury Conservation Commission seeking permission to alter an Area Subject to Protection under the Wetlands Protection Act (General Laws Chapter 131, Section 40). The Work includes the construction of a new DPW fueling facility.

D. The address of the lot(s) where the activity is proposed: 275 Old Lancaster Road

E. Copies of the Notice of Intent may be examined at 275 Old Lancaster Road between the hours of 8:00 AM and 5:00 PM on Monday – Friday. For more information call the Sudbury Conservation Commission at (978)-440-5471

F. Information regarding the project, date, time and place of the public hearing may be obtained from Weston & Sampson Engineers, by contacting Mel Higgins at 978-532-1900 ext. 2332 between the hours of 8:00 – 5:00 on the following days of the week: Monday – Friday or the Sudbury Conservation Commission at (978)-440-5471 between the hours of 8:00 AM and 5:00 PM on Monday – Friday.

NOTE: Notice of the public hearing, including its date, time, and place, will be published at least five (5) days prior to the hearing date in the local paper

NOTE: Notice of the meeting of the Conservation Commission, including its date, time and place will be posted in the Town Hall not less than forty-eight (48) hours in advance of the meeting.

NOTE: You also may contact your local Conservation Commission or the Department of Environmental Protection Regional Office for more information about this application or the Wetlands Protection Act.

abutters_id_	abutters_owner1	abutters owner2	abutters_address	a	abutters_town	abutters_	abutters_zi	abutters_bookpa	abutters_location
H07-0016	FITZHUGH WILLIAM H & SOPHIA		37 BROOK LN		SUDBURY	MA	01776	13224-713	37 BROOK LN
H07-0052	MULLER ROBERT C & LORIE S		23 WILDWOOD LANE		SUDBURY	MA	01776	62588-371	23 WILDWOOD LN
H07-0053	BASINSKI ANDREW & SARA		17 WILDWOOD LANE		SUDBURY	MA	01776	68364-430	17 WILDWOOD LN
H08-0004	BARTH DOUGLAS J & LISA V		286 OLD LANCASTER ROAD		SUDBURY	MA	01776	25175-479	286 OLD LANCASTER RD
H08-0005	CLANCY BRETT & ALICA		270 OLD LANCASTER RD		SUDBURY	MA	01776	70182-95	270 OLD LANCASTER RD
H08-0006	ARSHADI AMIR &	BAHREVAR ELIKA	258 OLD LANCASTER RD		SUDBURY	MA	01776	71220-210	258 OLD LANCASTER RD
H08-0044	ALTERIO DINO R & MAUREEN L		259 OLD LANCASTER RD		SUDBURY	MA	01776	66651-410	259 OLD LANCASTER RD
H08-0049	TOWN OF SUDBURY	DEPARTMENT OF PUBLIC WORKS	275 OLD LANCASTER		SUDBURY	MA	01776	7431-153	275 OLD LANCASTER RD
H08-0053	YARNALL THOMAS P & KAREN L		7 WILDWOOD LANE		SUDBURY	MA	01776	16554-311	7 WILDWOOD LN
J07-0007	CAVICCHIO PAUL F JR	TRS CAVICCHIO FAMILY 1994 REAL TY TRUST	110 CODJER LANE		SUDBURY	MA	01776	25172-58	CODJER LN
J08-0001	TOWN OF SUDBURY		278 OLD SUDBURY RD		SUDBURY	MA	01776	33383-149	WASH BROOK RD
J08-0306	KUNKEL NANCY J		22 PINE RIDGE RD		SUDBURY	MA	01776	66346-0031	22 PINE RIDGE RD
J08-0316	LOUGHRY KEVIN G & JUDITH A		24 WASH BROOK RD		SUDBURY	MA	01776	19063-75	24 WASH BROOK RD
J08-0320	KORN ANDREW & RANDI		21 PINE RIDGE RD		SUDBURY	MA	01776	68273-459	21 PINE RIDGE RD

Agatha Gery
1/31/2019

APPENDIX G

Weston & Sampson SM

westonandsampson.com

5 Centennial Drive
Peabody, MA 01960 (HQ)
tel: 978.532.1900

Wetland Delineation Report

November 2018

TOWN OF
Sudbury
MASSACHUSETTS

275 Old Lancaster Road

WETLAND DELINEATION REPORT

275 OLD LANCASTER ROAD

SUDBURY, MA

Prepared for
SUDBURY DEPARTMENT OF PUBLIC WORKS

Prepared by
Weston & Sampson Engineers, Inc.
5 Centennial Drive
Peabody, MA 01960
978.532.1900

11/26/2018

Project #: 2180684

TABLE OF CONTENTS

Page

APPENDICES

1.0 SITE DESCRIPTION

On November 09, 2018, the presence of wetland resources was investigated on a parcel of land approximately 16 acres in size at 275 Old Lancaster Road in Sudbury, Massachusetts. The site under consideration is located on a developed lot containing three buildings, a fueling station, parking areas and paved roads. The perimeter of the site is wooded, and elevation decreases to areas of wetlands and intermittent and perennial streams. Please see Figure 1 (Wetlands Field Map) and Figure 2 (USGS Topographic Map) in Appendix C of this report for the investigation area.

Wetland resource areas including bordering vegetated wetlands (BVW), mean annual high-water (MAHW) and top of bank (TOB) were identified and flagged in the field using pink flagging by a Weston & Sampson employee who is trained in the wetland delineation process using the Massachusetts Department of Environmental Protection (MassDEP) and the US Army Corps of Engineers methodology. A further description of these wetland resource areas is presented, below.

2.0 DELINEATION OF WETLAND RESOURCES

2.1 Site Observations

The Weston & Sampson wetland scientist observed the following protected wetland resources at the site:

- Bordering Vegetated Wetlands
- Mean Annual High-Water
- Top-of-Bank

Field data were recorded on United States Army Corps of Engineers (ACOE) Wetland Delineation Data Forms. See Appendix A for completed ACOE data forms and Appendix B for site photographs.

According to the site's FEMA Flood Insurance Rate map (FIRM), some of the site is not located within the 100 Year Flood Zone. These areas are in the northwest and southeast of the site. See Appendix C for FIRM map.

2.2 Wetland Delineation Methodology

Wetland delineation assessment was conducted in accordance to the Massachusetts Wetland Protection Act Regulations (310 CMR 10.55(2)(c)), Massachusetts Department of Environmental Protection (MassDEP) Delineating Bordering Vegetated Wetlands Under the Massachusetts Protection Act (March 1995), and ACOE Wetland Manual (Technical Report Y-87-1).

The methodology included the characterization of vegetation, soil any hydrologic conditions in both wetland and upland areas to identify the transitional area, which was used as the BVW limit. Pink flags with distinct flag numbers were left in the field to show wetland resource area limits.

2.3 Bordering Vegetated Wetlands (BVW)

A total of two BVW series were delineated at the site. The limit of the BVW resource area was determined by locating the transitional area between wetland and upland vegetation, soils and hydrologic conditions.

Vegetation, hydrology and soils were assessed in both wetland and upland areas to accurately place the wetland limits at the site. The percentage of vegetative species was estimated by creating sample plots. Sample plot radius for trees, shrubs, herb and woody vine strata was 30', 15', 5' and 30', respectively. After creating the sample plot areas, the percent basal area coverage of each species within the monitoring plot was recorded. Using these field observations, the percent dominance of each species within its stratum was calculated. The 50/20 Rule was then used to determine dominance. Dominant species were considered the most abundant plant species (when ranked in descending order of abundance and cumulatively totaled) that immediately exceeds 50% of the total dominance measure (basal area) for the stratum, plus any additional species comprising 20% or more of the total dominance measure for the stratum. Once the dominant species were determined, they were treated equally to determine the presence of hydrophytic vegetation. If the number of dominant species with a Wetland Indicator Status of FAC (excluding FAC-), FACW or OBL is greater than, or equal to, the number of remaining dominant species, the area was considered a jurisdictional wetland resource area based on vegetation.

A soil sample from each wetland sample plot was also taken. Each soil sample went to a depth of at least 12 inches. The soil was characterized to determine if the soil sample is considered a hydric (wetland) soil. Soil samples, including mottles, were characterized based on color using Munsell Soil-Color charts as a color reference.

The general area was then assessed for hydrologic conditions, including, but not limited to, site inundation, depth to free water, depth of soil saturation, water marks, drift lines, sediment deposits, water stained leaves.

This resource areas are associated with Hop Brook. Wetland flags left in the field include:

- BVW-A1 through BVW-A10
- BVW-B1 through BVW-B9

BVW A Series

Dominant vegetation within the wetland resource area included red maple (*Acer rubrum*), glossy buckthorn (*Frangula alnus*) and skunk cabbage (*Symplocarpus foetidus*), all species that thrive in wet

conditions. Soils within the BVW were considered histosols. Other indicators of wetland hydrology included surface water, a high water table, saturated soils and water-stained leaves.

Dominant upland vegetation in the area included eastern white pine (*Pinus strobus*) and red oak (*Quercus rubra*). Soil in the upland area consisted of loamy sand with no evidence of mottling within the top 16 inches.

A 100-foot buffer zone is associated with the BVW resource area.

BVW B Series

Dominant vegetation within the wetland resource area included common reed (*Phragmites australis*), a species that thrives in wet conditions. Soils within the BVW were considered histosols. Other indicators of wetland hydrology included surface water, a high water table and saturated soils.

Dominant upland vegetation in the area included upland grasses. Soil in the upland area consisted of gravelly sand with no evidence of mottling within the top 15 inches.

A 100-foot buffer zone is associated with the BVW resource area.

2.4 Mean Annual High-water Line (MAHW)

The mean annual high-water line along a perennial stream, as defined in 310 CMR 10.58(2), is the "line that is apparent from visible markings or changes in the character of soils or vegetation due to the prolonged presence of water and that distinguishes between predominantly aquatic and predominantly terrestrial land." Of the field indicators outlined in the Massachusetts Wetlands Protection Act that were used to delineate this line with respect to Hop Brook, the most conspicuous indicators were changes in slope and changes in vegetation. (Please refer to Appendix B for photographs.)

Flags indicating the location of the mean annual high-water line were labeled MAHW-A1 through MAHW-A24. The location of the mean annual high-water line is also shown in Appendix C, Figure 1.

A 200-foot riverfront area is associated with the mean annual high-water line.

2.5 Bank

Intermittent Stream Bank (A Series)

An intermittent stream as defined in 310 CMR 10.58(2) is a stream that does not flow within its boundaries throughout the entire year and is associated with a catchment basin less than or equal to 0.5 square miles. Using USGS StreamStats, the catchment basin associated with this intermittent stream is calculated to be 0.36 square miles. The top of bank associated with the intermittent stream at the Sudbury DPW site was flagged using numbers TOB-A1 through TOB-A27.

A 100-foot buffer zone is associated with the top of bank of the intermittent stream.

2.6 Other Protected Areas

Besides what was noted above, Weston & Sampson created an environmental receptors map of the site to determine the presence of other protected areas (Appendix C, Figure 3). The data source of these map layers was the Massachusetts Geographic Information System (MassGIS). These areas included:

- NHESP Priority Habitats of Rare Species
- NHESP Estimated Habitats of Rare Wildlife
- NHESP Verified and Estimated Vernal Pools
- Areas of Critical Environmental Concern

A FEMA Flood Insurance Rate Map (FIRM) was created online from the FEMA website to determine if there is a 100-year flood zone at the site. See Appendix C for FIRM map.

The proposed site is not located within any Natural Heritage areas. With regards to flood hazard areas, portions of the investigation area are located within the 100-year flood zone along some of the northwest and southeast areas.

3.0 SUMMARY

On Novemeber 09, 2018, the presence of wetland resources was investigated at 275 Old Lancaster Road in Sudbury, Massachusetts. Wetland resource areas including bordering vegetated wetlands, mean annual high-water and intermittent stream banks were identified and flagged in the field. Natural Heritage and Endangered Species Program data layers from MassGIS showed that the area of investigation was absent of any Natural Heritage areas. FEMA FIRM mapping indicated that portions of the northwest and southeast areas of the investigation area are within the 100-year flood zone.

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APPENDIX A

US ACOE Data Forms

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Sudbury DPW Fueling Facility City/County: Sudbury, Middlesex Sampling Date: 11/09/2018

Applicant/Owner: Town of Sudbury State: MA Sampling Point: BVW-A2 (WET)

Investigator(s): Nathaniel Parker Section, Township, Range:

Landform (hillslope, terrace, etc.): Swamp, depression, bogs Local relief (concave, convex, none): concave

Slope (%): 0-1 Lat: 42º 22' 27.07 N Long: 71º 25' 35.58" W Datum: WGS84

Soil Map Unit Name: Freetown Muck NWI classification: PFO1F

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID: BVW-A2 (WET)

Remarks: (Explain alternative procedures here or in a separate report.)

Water in Hop Brook was exceptionally high for this time of year. According to USGS Groundwater Watch, wells around Sudbury show aquifer water levels to be high as of 11/09/18: https://groundwaterwatch.usgs.gov/StateMap.asp?sa=MA&sc=25

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- X Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No ____	Depth (inches): 0	
Water Table Present?	Yes X	No ____	Depth (inches): 4	
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 0	**Wetland Hydrology Present?** **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: BVW-A2 WET

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. red maple (***Acer rubrum***)	10	Yes	FAC
2. white pine (***Pinus strobus***)	10	Yes	FACU
3.			
4.			
5.			
6.			
7.			
	20	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. glossy buckthorn (***Frangula alnus***)	10	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	10	= Total Cover	
Herb Stratum (Plot size: 5)			
1. skunk cabbage (***Symplocarpus foetidus***)	5	Yes	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	5	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5	x 1 =	5
FACW species		x 2 =	
FAC species	20	x 3 =	60
FACU species	10	x 4 =	40
UPL species		x 5 =	
Column Totals:	35 (A)		105 (B)

Prevalence Index = B/A = 3.0

Hydrophytic Vegetation Indicators:

___ Rapid Test for Hydrophytic Vegetation

X Dominance Test is >50%

X Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

The location of sampling had fairly sparse vegetative cover.

SOIL

Sampling Point: BVW-A2 (WET)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 2/1	98	5YR 4/6	2	C	M	muck	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- X Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Sudbury DPW Fueling Facility City/County: Sudbury, Middlesex Sampling Date: 11/09/2018

Applicant/Owner: Town of Sudbury State: MA Sampling Point: BVW-A2 (UP)

Investigator(s): Nathaniel Parker Section, Township, Range:

Landform (hillslope, terrace, etc.): Swamp, depression, bogs Local relief (concave, convex, none): concave

Slope (%): 0-3 Lat: 42º 22' 27.13 N Long: 71º 25' 34.86" W Datum: WGS84

Soil Map Unit Name: Windsor loamy sand NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?** **Yes** ____ **No** X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	If yes, optional Wetland Site ID: BVW-A2 (UP)

Remarks: (Explain alternative procedures here or in a separate report.)

Water in Hop Brook was exceptionally high for this time of year. According to USGS Groundwater Watch, wells around Sudbury aquifer water levels to be high right now: https://groundwaterwatch.usgs.gov/StateMap.asp?sa=MA&sc=25

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: BVW-A2 (UP)

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. red oak (***Quercus rubra***)	30	Yes	FACU
2. white pine (***Pinus strobus***)	10	Yes	FACU
3.			
4.			
5.			
6.			
7.			
	40	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. glossy buckthorn (***Frangula alnus***)	10	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	10	= Total Cover	
Herb Stratum (Plot size: 5)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
		= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33.33 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species 10	x 3 = 30
FACU species 40	x 4 = 160
UPL species	x 5 =
Column Totals: 50 (A)	190 (B)

Prevalence Index = B/A = 3.8

Hydrophytic Vegetation Indicators:

___ Rapid Test for Hydrophytic Vegetation

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** _____ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

The location of sampling had fairly sparse vegetative cover.

SOIL

Sampling Point: BVW-A2 (UP)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-1	10YR 2/1	100					organic topsoil	
1-5	10YR 3/2	100					loamy sand	
5-16	10YR 4/4	100					loamy sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** X

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Sudbury DPW Fueling Facility City/County: Sudbury, Middlesex Sampling Date: 11/09/2018

Applicant/Owner: Town of Sudbury State: MA Sampling Point: BVW-B3 (WET)

Investigator(s): Nathaniel Parker Section, Township, Range:

Landform (hillslope, terrace, etc.): Swamp, depression, bogs Local relief (concave, convex, none): concave

Slope (%): 0-1 Lat: 42° 22' 25.11 N Long: 71° 25' 30.19" W Datum: WGS84

Soil Map Unit Name: Freetown Muck NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X	No ____	If yes, optional Wetland Site ID: BVW-B3 (WET)
Wetland Hydrology Present?	Yes X	No ____	

Remarks: (Explain alternative procedures here or in a separate report.)

Water in Hop Brook was exceptionally high for this time of year. According to USGS Groundwater Watch, wells around Sudbury show aquifer water levels to be high as of 11/09/18: https://groundwaterwatch.usgs.gov/StateMap.asp?sa=MA&sc=25

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No ____	Depth (inches): 0
Water Table Present?	Yes X	No ____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: BVW-B3 (WET)

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. common reed (***Phragmites australis***)	100	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species 100	x 2 = 200
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: 100 (A)	200 (B)

Prevalence Index = B/A = 2

Hydrophytic Vegetation Indicators:

___ Rapid Test for Hydrophytic Vegetation

X Dominance Test is >50%

X Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

The location of sampling had fairly sparse vegetative cover.

SOIL

Sampling Point: BVW-B3 (WET)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-15	10YR 2/1	100					muck	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- X Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Sudbury DPW Fueling Facility City/County: Sudbury, Middlesex Sampling Date: 11/09/2018

Applicant/Owner: Town of Sudbury State: MA Sampling Point: BVW-B3 (UP)

Investigator(s): Nathaniel Parker Section, Township, Range:

Landform (hillslope, terrace, etc.): Swamp, depression, bogs Local relief (concave, convex, none): concave

Slope (%): 0-3 Lat: 42° 22' 25.06 N Long: 71° 25' 30.60" W Datum: WGS84

Soil Map Unit Name: Windsor loamy sand NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No X

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?** **Yes** ____ **No** X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	If yes, optional Wetland Site ID: BVW-B3 (UP)

Remarks: (Explain alternative procedures here or in a separate report.)

Water in Hop Brook was exceptionally high for this time of year. According to USGS Groundwater Watch, wells around Sudbury aquifer water levels to be high right now: https://groundwaterwatch.usgs.gov/StateMap.asp?sa=MA&sc=25

With regards to upland conditions being normal, they are normal in that the Sudbury DPW site has been established for some years. However, normal upland circumstances are most often defined by undisturbed sites with natural non-anthropogenic characteristics such as trees and well-developed soil horizons that are typical of upland areas.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: BVW-B3 (UP)

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. Upland grass	15		
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	15 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species 15	x 5 = 75
Column Totals: 15 (A)	75 (B)

Prevalence Index = B/A = 5.0

Hydrophytic Vegetation Indicators:

___ Rapid Test for Hydrophytic Vegetation

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

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Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** _____ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

The location of sampling had fairly sparse vegetative cover.

SOIL

Sampling Point: BVW-B3 (UP)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-14	10YR 4/4	100					gravelly sand	fill and pavement

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
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- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
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- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** X

Remarks:

APPENDIX B

Site Photographs

Photo 1: Bordering Vegetated Wetlands

Photo 2: Hydric Soils in Wetlands

Photo 3: Intermittent Stream in November

Photo 4: High Water from Hop Brook

Photo 5: Bordering Vegetated Wetlands Boundary at BVW B Series

APPENDIX C

Figures

FIGURE 1

Wetlands Field Map

FIGURE 1

SUDBURY DPW FUELING FACILITY

WETLANDS FIELD MAP

NOVEMBER 2018 SCALE: NOTED

Weston & Sampson

Path: \\wse03.local\WSE\Projects\MA\Sudbury MA\DPW Fueling Facility\Wetlands Delineation\GIS\Mapfiles\Wetlands Field Map.mxd **User:** parkem **Saved:** 11/26/2018 9:16:44 AM **Opened:** 11/26/2018 9:17:07 AM

FIGURE 2

USGS Topographic Map

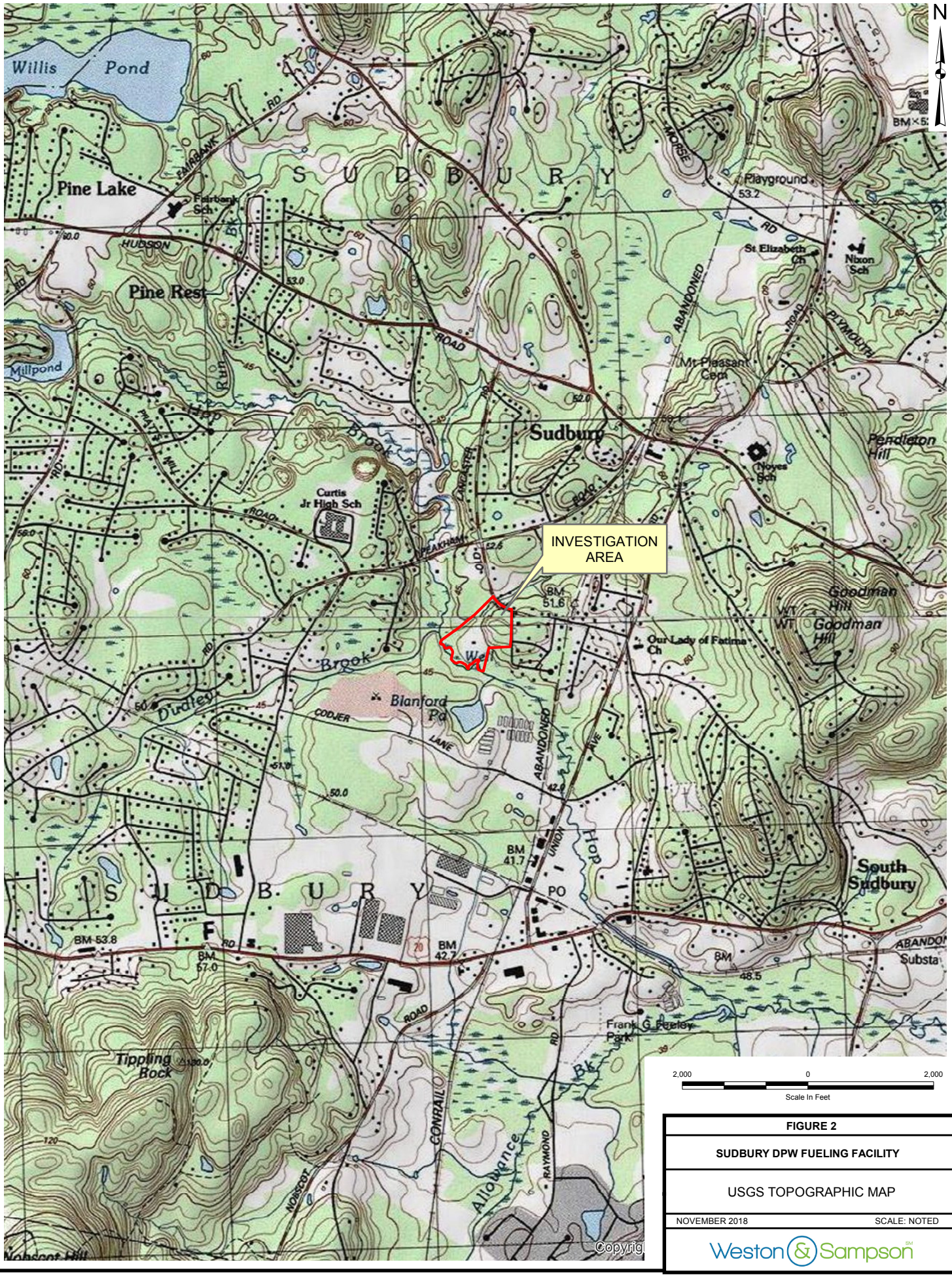

FIGURE 2

SUDBURY DPW FUELING FACILITY

USGS TOPOGRAPHIC MAP

NOVEMBER 2018 SCALE: NOTED

Weston & Sampson

Path: \\wse03.local\WSE\Projects\MA\Sudbury MA\DPW Fueling Facility\Wetlands Delineation\GIS\Mapfiles\USGS Topo.mxd **User:** parkern **Saved:** 11/20/2018 12:15:10 PM **Opened:** 11/26/2018 9:15:06 AM

FIGURE 3

Environmental Resources Map

FIGURE 3

SUDBURY DPW FUELING FACILITY

ENVIRONMENTAL RECEPTORS MAP

NOVEMBER 2018 SCALE: NOTED

Weston & Sampson

Path: \\wse03.local\WSE\Projects\MA\Sudbury MA\DPW Fueling Facility\Wetlands Delineation\GIS\Mapfiles\Environmental Receptors Map.mxd **User:** parkem **Saved:** 11/20/2018 12:45:14 PM **Opened:** 11/26/2018 9:12:09 AM

FIGURE 4

FEMA FIRM Map

National Flood Hazard Layer FIRMette

FEMA

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
- 513 — Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 11/20/2018 at 12:52:48 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.

LOCUS MAP
SCALE: 1"=1000'

DRAWING INDEX

SHEET NO.	DRAWING NO.	TITLE
1	--	COVER SHEET
2	C-0.01	GENERAL NOTES, AND LEGEND
3	C-1.01	EXISTING CONDITIONS PLAN
4	C-2.01	SITE PREPARATION AND EROSION CONTROL PLAN
5	C-3.01	GRADING AND DRAINAGE PLAN
6	C-4.01	LANDSCAPING PLAN
7	C-5.01	DETAILS I
8	C-5.02	DETAILS II
9	C-5.03	DETAILS III
10	EQ-1.01	FUEL SYSTEM PLAN AND ELEVATION

TOWN OF SUDBURY, MASSACHUSETTS

DEPARTMENT OF PUBLIC WORKS
FUEL SYSTEM

NOTICE OF INTENT PERMITTING

MARCH 2019

Weston & Sampson Engineers, Inc.
5 Centennial Drive, Peabody, MA 01960

File No. - - - - -

GENERAL NOTES

1. TOPOGRAPHICAL INFORMATION BASED UPON SURVEY PERFORMED BY WESTON AND SAMPSON IN NOVEMBER 2018.
2. REFER TO EXISTING CONDITIONS FOR SURVEY LEGEND. ALL BIDDERS ARE REQUIRED TO INSPECT THE PROJECT SITE IN ITS ENTIRETY PRIOR TO SUBMITTING THEIR BID, AND BECOME FAMILIAR WITH ALL CONDITIONS AS THEY MAY AFFECT THEIR BID. CONTRACTOR AND SUB-CONTRACTOR SHALL BE FAMILIAR WITH ALL DRAWINGS AND SPECIFICATIONS PRIOR TO COMMENCING THE CONSTRUCTION.
3. LOCATIONS OF ANY UTILITIES SHOWN ON THESE PLANS ARE APPROXIMATE ONLY. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATION OF SUCH UTILITIES, PROTECTING ALL EXISTING UTILITIES AND REPAIRING ANY DAMAGE DONE DURING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE COORDINATION WITH UTILITY COMPANIES AND PUBLIC AGENCIES AND FOR OBTAINING ALL REQUIRED PERMITS AND PAYING ALL REQUIRED FEES. IN ACCORDANCE WITH M.G.L. CHAPTER 82, SECTION 40, INCLUDING AMENDMENTS, CONTRACTORS SHALL NOTIFY ALL UTILITY COMPANIES AND GOVERNMENT AGENCIES IN WRITING PRIOR TO EXCAVATION.
4. WHERE AN EXISTING UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, THE LOCATION, ELEVATION AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR AND THE INFORMATION FURNISHED TO THE ENGINEER FOR RESOLUTION OF THE CONFLICT.
5. THE CONTRACTOR SHALL MAKE ALL ARRANGEMENTS FOR THE ALTERATION AND ADJUSTMENT OF GAS, ELECTRIC, TELEPHONE AND ANY OTHER PRIVATE UTILITIES BY THE UTILITY OWNER AT NO ADDITIONAL COST TO THE TOWN OF SUDBURY.
6. CONTRACTOR SHALL BE RESPONSIBLE FOR REVIEWING ALL DRAWINGS AND SPECIFICATIONS TO DETERMINE THE EXTENT OF EXCAVATION AND DEMOLITION REQUIRED TO RECEIVE SITE IMPROVEMENTS.
7. ANY DISCREPANCIES OR CONFLICTS BETWEEN THE DRAWINGS AND EXISTING CONDITIONS, EXISTING CONDITIONS TO REMAIN, TEMPORARY CONSTRUCTION, PERMANENT CONSTRUCTION AND WORK OF ADJACENT CONTRACTS SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER BEFORE PROCEEDING. ITEMS ENCOUNTERED IN AREAS OF EXCAVATION THAT ARE NOT INDICATED ON THE DRAWINGS, BUT ARE VISIBLE ON SURFACE, SHALL BE THE CONTRACTOR'S RESPONSIBILITY AND SHALL BE REMOVED AT NO ADDITIONAL COST TO THE OWNER.
8. ANY ALTERATIONS TO THESE DRAWINGS MADE IN THE FIELD DURING CONSTRUCTION SHALL BE RECORDED BY THE GENERAL CONTRACTOR ON "AS-BUILT" DRAWINGS.
9. ALL AREAS DISTURBED BY THE CONTRACTOR'S OPERATIONS OUTSIDE THE PROJECT LIMITS, SHALL BE RESTORED TO THE ORIGINAL CONDITION BY THE CONTRACTOR AT NO ADDITIONAL COST AND TO THE SATISFACTION OF THE OWNER.
10. ALL WORK SHOWN ON THE PLANS AS BOLD SHALL REPRESENT PROPOSED WORK. THE TERM "PROPOSED (PROP)" INDICATES WORK TO BE CONSTRUCTED USING NEW MATERIALS OR, WHERE APPLICABLE, RE-USING EXISTING MATERIALS IDENTIFIED AS "REMOVE AND RESET (R&R)", OR REMOVE, RELOCATE, RESET, (R,R&R).
11. ALL KNOWN EXISTING STATE, COUNTY AND TOWN LOCATION LINES AND PRIVATE PROPERTY LINES HAVE BEEN ESTABLISHED FROM AVAILABLE INFORMATION AND ARE INDICATED ON THE PLANS.
12. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PROTECT HIS EMPLOYEES, AS WELL AS PUBLIC USERS FROM INJURY DURING THE ENTIRE CONSTRUCTION PERIOD USING ALL NECESSARY SAFEGUARDS, INCLUDING BUT NOT LIMITED TO, THE ERECTION OF TEMPORARY WALKS, STRUCTURES, PROTECTIVE BARRIERS, COVERING, OR FENCES AS NEEDED.
13. THE CONTRACTOR SHALL SUPPLY THE OWNER WITH THE NAME OF THE OSHA "COMPETENT PERSON" PRIOR TO CONSTRUCTION.
14. FILLING OF EXCAVATED AREAS SHALL NOT TAKE PLACE WITHOUT THE PRESENCE OR PERMISSION OF THE OWNER.
15. EXISTING TREES TO REMAIN SHALL BE PROTECTED FROM CONSTRUCTION ACTIVITIES. NO STOCKPILING OF MATERIAL, EQUIPMENT OR VEHICULAR TRAFFIC SHALL BE ALLOWED WITHIN THE DRIP LINE OF TREES TO REMAIN. NO GUYS SHALL BE ATTACHED TO ANY TREE TO REMAIN. WHEN NECESSARY OR AS DIRECTED BY THE ENGINEER, THE CONTRACTOR SHALL ERECT TEMPORARY BARRIERS FOR THE PROTECTION OF EXISTING TREES DURING CONSTRUCTION.
16. TREES AND SHRUBS WITHIN THE LIMITS OF WORK SHALL BE REMOVED ONLY UPON THE APPROVAL OF THE ENGINEER OR AS NOTED ON THE PLANS.
17. THE CONTRACTOR SHALL CALL DIGSAFE AT 1-888-344-7233 AT LEAST 72 HOURS, SATURDAYS, AND HOLIDAYS EXCLUDED, PRIOR TO EXCAVATING AT ANY LOCATION. A COPY OF THE DIGSAFE PROJECT REFERENCE NUMBER(S) SHALL BE GIVEN TO THE OWNER PRIOR TO EXCAVATION.
18. NO FILLING SHALL OCCUR AROUND EXISTING TREES TO REMAIN WITHOUT THE APPROVAL OF THE OWNER OR OWNER REPRESENTATIVE.
19. THE CONTRACTOR SHALL REMOVE ALL SURFACE VEGETATION PRIOR TO GRADING THE SITE. STUMPS SHALL BE STOCKPILED ON SITE FOR DISPOSAL BY THE GC. TEMPORARY EROSION CONTROL MEASURES SHOWN ON THE DRAWINGS (INCLUDING SILT FENCE, STRAW WATTLES, OR SILT SOCKS) SHALL BE INSTALLED BY THE CONTRACTOR UNLESS OTHERWISE NOTED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THESE TEMPORARY EROSION CONTROL MEASURES THROUGHOUT THE PROJECT WHICH COST SHALL BE INCIDENTAL TO THE PROJECT.
20. ALL UNSUITABLE UNCONTAMINATED EXCESS SOIL FROM CONSTRUCTION ACTIVITIES SHALL BE STOCKPILED ON SITE, AS DIRECTED BY THE TOWN, AT NO ADDITIONAL COST TO THE OWNER. REMOVAL ACTIVITIES SHALL BE IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS AT NO ADDITIONAL COST TO THE OWNER. SUITABLE SOIL EXCAVATION AS PART OF THE PROJECT MUST MEET ONE OR MORE OF THE MATERIAL REQUIREMENTS SPECIFIED IN 02300-EARTHWORK. ON-SITE FILL MATERIALS, WHICH DO NOT CONFORM TO SPEC 02300, SHALL NOT BE USED BELOW ANY STRUCTURES. IF THE CONTRACTOR PROPOSES TO USE THE EXISTING FILL ON SITE BELOW PAVEMENT AREAS, HE MUST DEMONSTRATE THAT THE FILL MEETS THE REQUIREMENTS PER SECTION 02300 OF THE SPECIFICATIONS. ALL EXCAVATED FILL MATERIAL WHICH DOES NOT MEET THE REQUIREMENTS OF THE CONTRACT DOCUMENTS SHALL BE REMOVED AND DISPOSED OF OFF-SITE AT NO ADDITIONAL COST.
21. CONTRACTOR IS RESPONSIBLE FOR STAKING CONSTRUCTION BASELINES IN FIELD. NO CONSTRUCTION WILL BE PERFORMED WITHOUT THE PROPOSED BASELINES AND LAYOUTS APPROVED BY THE ENGINEER.
22. NO FILL SHALL CONTAIN HAZARDOUS MATERIALS.
23. CONTRACTOR SHALL PROVIDE TEMPORARY FENCING AROUND PERIMETER OF WORK AREA (LIMIT OF WORK). FENCE SHALL NOT IMPEDE TRAVEL WAYS.
24. ANY QUANTITIES SHOWN ON PLANS ARE FOR COMPARATIVE BIDDING PURPOSES ONLY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VISIT THE PROJECT SITE TO VERIFY ALL QUANTITIES AND CONDITIONS PRIOR TO SUBMITTING BID.
25. ALL EXISTING DRAINAGE FACILITIES TO REMAIN SHALL BE MAINTAINED FREE OF DEBRIS, SOIL, SEDIMENT, AND FOREIGN MATERIAL AND OPERATIONAL THROUGHOUT THE LIFE OF THE CONTRACT. REMOVE ALL SOIL, SEDIMENT, DEBRIS AND FOREIGN MATERIAL FROM ALL DRAINAGE STRUCTURES, INCLUDING BUT NOT LIMITED TO, DRAINAGE INLETS, MANHOLES AND CATCH BASINS WITHIN THE LIMIT OF WORK AND DRAINAGE STRUCTURES OUTSIDE THE LIMIT OF WORK THAT ARE IMPACTED BY THE WORK FOR THE ENTIRE DURATION OF CONSTRUCTION.
26. CONTRACTOR'S STAGING AREA MUST BE WITHIN THE CONTRACT LIMIT LINE AND IN AREAS APPROVED BY OWNER. ANY OTHER AREAS THAT THE CONTRACTOR MAY WISH TO USE FOR STAGING MUST BE COORDINATED WITH THE OWNER.
27. THE CONTRACTOR SHALL KEEP ALL STREETS, PARKING LOTS AND WALKS THAT ARE NOT RESTRICTED FROM PUBLIC USE DURING CONSTRUCTION BROOM CLEAN AT ALL TIMES. THE CONTRACTOR SHALL USE ACCEPTABLE METHODS AND MATERIALS TO MAINTAIN ADEQUATE DUST CONTROL THROUGHOUT CONSTRUCTION.
28. CONTRACTOR SHALL COORDINATE ALL WORK WITH THE OWNER.
29. CONTRACTOR SHALL DEWATER AS NECESSARY TO PERFORM THE PROPOSED WORK. CONTRACTOR SHALL BE AWARE OF PERCHED GROUNDWATER. (SEE SPECIFICATION SECTION 00320 SUBSURFACE DATA).
30. THE LIMIT OF WORK SHALL BE DELINEATED IN THE FIELD PRIOR TO THE START OF SITE CLEARING OR CONSTRUCTION.
31. DEEP SUMP CATCH BASINS AND STORMWATER BASIN SHALL BE CLEANED FOLLOWING CONSTRUCTION AND SHALL FOLLOW THE OPERATION AND MAINTENANCE PLAN THEREAFTER.
32. HAULING OF EARTH MATERIALS TO AND FROM THE SITE SHALL BE RESTRICTED TO THE HOURS OF 7:00 AM TO 5:00 PM MONDAY THROUGH FRIDAY.
33. ANY BOULDERS 3 CY OR SMALLER SHALL BE CONSIDERED UNDOCUMENTED FILL AND SHALL BE DISPOSED OF AT NO ADDITIONAL COST TO THE OWNER.
34. WORK ON SATURDAYS SHALL ONLY BE CONDUCTED IF PRIOR WRITTEN PERMISSION IS PROVIDED BY THE TOWN.
35. THE TERM "AS DIRECTED" AS USED IN THE CONTRACT DRAWINGS SHALL BE REPLACED WITH "AS REQUIRED".

EROSION AND SEDIMENT CONTROL NOTES

1. ALL SEDIMENT AND EROSION CONTROL DEVICES SHALL BE PUT INTO PLACE PRIOR TO BEGINNING ANY CONSTRUCTION OR DEMOLITION. REFER TO PLAN FOR APPROXIMATE LOCATION OF EROSION AND SEDIMENT CONTROL. REFER TO SPECS AND DETAILS FOR TYPE OF EROSION AND SEDIMENT CONTROL.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONTINUAL MAINTENANCE OF ALL CONTROL DEVICES THROUGHOUT THE DURATION OF THE PROJECT.
3. CONTRACTOR SHALL MEET ALL OF THE STATE OF MASSACHUSETTS D.E.P. AND THE TOWN OF SUDBURY WETLAND ORDINANCE REGULATIONS FOR SEDIMENT AND EROSION CONTROL.
4. EXCAVATED MATERIAL STOCKPILED ON THE SITE SHALL BE SURROUNDED BY A RING OF UNBROKEN SEDIMENT AND EROSION CONTROL FENCE. THE LIMITS OF ALL GRADING AND DISTURBANCE SHALL BE KEPT TO A MINIMUM WITHIN THE APPROVED AREA OF CONSTRUCTION. ALL AREAS OUTSIDE OF THE LIMIT OF CONTRACT SHALL REMAIN TOTALLY UNDISTURBED UNLESS OTHERWISE APPROVED BY OWNER'S REPRESENTATIVE.
5. ALL CATCH BASINS AND DRAIN GRATES WITHIN LIMIT OF CONTRACT SHALL BE PROTECTED WITH FILTER FABRIC DURING THE ENTIRE DURATION OF CONSTRUCTION.
6. EROSION CONTROL BARRIERS TO BE INSTALLED AT THE TOE OF SLOPES. SEE SITE PREPARATION PLAN, NOTES, DETAILS AND SPECIFICATIONS.
7. ANY AREA OUTSIDE THE PROJECT LIMIT THAT IS DISTURBED SHALL BE RESTORED TO ITS ORIGINAL CONDITION AT NO COST TO THE OWNER.
8. THE CONTRACTOR SHALL PROVIDE DUST CONTROL FOR CONSTRUCTION OPERATIONS AS APPROVED BY OWNER.
9. ALL POINTS OF CONSTRUCTION EGRESS OR INGRESS SHALL BE MAINTAINED TO PREVENT TRACKING OR FLOWING OF SEDIMENT ON TO PUBLIC/PRIVATE ROADS.

DEMOLITION & SITE PREPARATION NOTES

1. THE CONTRACTOR SHALL INCLUDE IN THE BID THE COST OF REMOVING ANY EXISTING SITE FEATURES AND APPURTENANCES NECESSARY TO ACCOMPLISH THE CONSTRUCTION OF THE PROPOSED SITE IMPROVEMENTS. THE CONTRACTOR SHALL ALSO INCLUDE IN THE BID THE COST NECESSARY TO RESTORE SUCH ITEMS IF THEY ARE SCHEDULED TO REMAIN AS PART OF THE FINAL SITE IMPROVEMENTS. REFER TO PLANS TO DETERMINE EXCAVATION, DEMOLITION AND TO DETERMINE THE LOCATION OF THE PROPOSED SITE IMPROVEMENTS.
2. THE OWNER RESERVES THE RIGHT TO REVIEW ALL MATERIALS DESIGNATED FOR REMOVAL AND TO RETAIN OWNERSHIP OF SUCH MATERIALS. IF THE OWNER RETAINS ANY MATERIAL THE CONTRACTOR SHALL ALLOW ARRANGEMENTS WITH THE OWNER TO HAVE THOSE MATERIALS REMOVED OFF SITE AT NO ADDITIONAL COST.
3. UNLESS SPECIFICALLY NOTED TO BE SAVED / STOCKPILED (R&S) OR REUSED / RELOCATED (R&R), ALL SITE FEATURES CALLED FOR REMOVAL (REM) SHALL BE REMOVED WITH THEIR FOOTINGS, ATTACHMENTS, BASE MATERIAL, ETC, TRANSPORTED FROM THE SITE TO BE DISPOSED OF IN A LAWFUL MANNER AT AN ACCEPTABLE DISPOSAL SITE AND AT NO COST TO THE OWNER.
4. ALL EXISTING SITE FEATURES TO REMAIN SHALL BE PROTECTED THROUGHOUT THE CONSTRUCTION PERIOD. ANY FEATURES DAMAGED DURING CONSTRUCTION OPERATIONS SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE OWNER'S REPRESENTATIVE AT NO ADDITIONAL COST.
5. DURING EARTHWORK OPERATIONS, CONTRACTOR SHALL TAKE CARE TO NOT DISTURB EXISTING MATERIALS TO REMAIN, OUTSIDE THE LIMITS OF EXCAVATION AND BACKFILL AND SHALL TAKE WHATEVER MEASURES NECESSARY, AT THE CONTRACTOR'S EXPENSE, TO PREVENT ANY EXCAVATED MATERIAL FROM COLLAPSING. ALL BACKFILL MATERIALS SHALL BE PLACED AND COMPACTED AS SPECIFIED TO THE SUBGRADE REQUIRED FOR THE INSTALLATION OF THE REMAINDER OF THE CONTRACT WORK.
6. IT SHALL BE THE CONTRACTOR'S OPTION, WITH CONCURRENCE OF THE OWNER, TO REUSE EXISTING GRAVEL IF IT MEETS THE REQUIREMENTS OF THE SPECIFICATIONS FOR GRAVEL BORROW.
7. ALL ITEMS CALLED FOR REMOVAL SHALL BE REMOVED TO FULL DEPTH INCLUDING ALL FOOTINGS, FOUNDATIONS, AND OTHER APPURTENANCES, EXCEPT AS SPECIFICALLY NOTED OTHERWISE.
8. 'CLEAR AND GRUB VEGETATION' SHALL INCLUDE REMOVAL OF GRASS, SHRUBS, AND UNDERBRUSH, REMOVAL OF ROOTS, ROUGH GRADING, INSTALLATION OF LOAM (IF APPLICABLE), FINE GRADING, SEEDING AND TURF ESTABLISHMENT BY THE CONTRACTOR.
9. TREES DESIGNATED FOR REMOVAL SHALL BE TAGGED BY CONTRACTOR AND APPROVED BY OWNER'S REPRESENTATIVE PRIOR TO COMMENCEMENT OF CONSTRUCTION.
10. THE STORAGE OF MATERIALS AND EQUIPMENT WILL BE PERMITTED AT LOCATIONS DESIGNATED BY OWNER OR OWNER'S REPRESENTATIVE. PROTECTION OF STORED MATERIALS AND EQUIPMENT SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
11. STRIP & STORE EXISTING TOPSOIL FOR LATER REUSE WHERE APPROPRIATE, AND AS NOTED ON PLAN, WITH APPROPRIATE EROSION AND SEDIMENT CONTROLS.
12. LOAM / TOP SOIL DESIGNATED FOR REUSE AS GENERAL FILL SHALL BE BLENDED WITH SUITABLE BORROW MATERIAL AS SPECIFIED.
13. THE CONTRACTOR SHALL PROTECT EXISTING TREES TO REMAIN, CONTRACTOR SHALL INSTALL TREE PROTECTION BARRIER AFTER CLEARING UNDERBRUSH AND TAKE DUE CARE TO PREVENT INJURY TO TREES DURING CLEARING OPERATIONS.

LAYOUT & MATERIALS NOTES

1. REFER TO EXISTING CONDITIONS PLANS FOR SURVEY INFORMATION (SHEET C1.01).
2. COORDINATE ALL LAYOUT ACTIVITIES WITH THE SCOPE OF WORK CALLED FOR BY DEMOLITION, GRADING AND UTILITIES OPERATIONS ENCOMPASSED BY THIS CONTRACT. SET, PROTECT AND REPLACE REFERENCE STAKES AS NECESSARY OR AS REQUIRED BY THE OWNER'S REPRESENTATIVE.
3. ALL WORK SHALL BE PERFORMED BY CONTRACTOR UNLESS SPECIFICALLY INDICATED THAT THE WORK WILL BE PERFORMED "BY TOWN".
4. TO FACILITATE LAYOUT OF PROPOSED SITE FEATURES AND FACILITIES, LAYOUT INFORMATION FOR CERTAIN FUTURE WORK, WHICH IS NOT INCLUDED WITHIN THE SCOPE OF THIS CONTRACT HAS BEEN PROVIDED ON THE LAYOUT AND MATERIALS PLAN FOR INFORMATION ONLY. THE LAYOUT OF SITE AMENITIES AND FENCES MUST BE APPROVED BY THE OWNER'S REPRESENTATIVE PRIOR TO INSTALLATION. SOME ITEMS ARE "NOT IN CONTRACT" (NIC) AND SHOWN FOR REFERENCE ONLY.
5. THE LAYOUT OF SITE AMENITIES AND FENCES MUST BE APPROVED BY THE OWNER'S REPRESENTATIVE PRIOR TO INSTALLATION.
6. THE LAYOUT OF ALL NEW PATHWAYS / WALKWAYS AND THE GRADING OF ALL SLOPES AND CROSS SLOPES SHALL CONFORM TO THE COMMONWEALTH OF MASSACHUSETTS RULES AND REGULATIONS FOR HANDICAP ACCESS CMR 521, AND THE AMERICANS WITH DISABILITIES ACT (ADA), TITLE 3. THE CONTRACTOR SHALL NOTIFY THE OWNER IMMEDIATELY OF ANY DISCREPANCIES BETWEEN ACTUAL CONDITIONS AND THOSE REQUIRED.
7. ALL LAYOUT LINES, OFFSETS, OR REFERENCES TO LOCATING OBJECTS ARE EITHER PARALLEL OR PERPENDICULAR UNLESS OTHERWISE DESIGNATED WITH ANGLE OFFSETS NOTED.
8. ALL PROPOSED SITE FEATURES SHALL BE LAID OUT AND STAKED FOR REVIEW AND APPROVAL BY THE OWNER'S REPRESENTATIVE PRIOR TO COMMENCEMENT OF INSTALLATION. ANY REQUIRED ADJUSTMENTS TO THE LAYOUT SHALL BE UNDERTAKEN AS REQUIRED, AT NO ADDITIONAL COST TO THE OWNER.
9. ALL PROPOSED PAVEMENTS SHALL MEET THE LINE AND GRADE OF EXISTING ADJACENT PAVEMENT SURFACES AND SHALL BE TREATED WITH AN RS-1 TACK COAT AT POINT OF CONNECTION. ALL PATHWAY WIDTHS SHALL BE AS NOTED ON THE LAYOUT AND MATERIALS PLAN.
10. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND GRADES ON THE GROUND AND REPORT ANY DISCREPANCIES IMMEDIATELY TO THE OWNER.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD MEASUREMENT OF ALL PROPOSED FENCES AND GATES.
12. THE DEPTH OF LOAM BORROW FOR ALL PROPOSED LAWN AREAS SHALL BE 6" MINIMUM. ALL DISTURBED AREAS SHALL BE RESTORED WITH LOAM AND SEED UNLESS OTHERWISE NOTED
13. ALL REFERENCES TO LOAM AND SEED (L&S) REFER TO HYDROMULCH SEEDED LAWN.
14. REFER TO DETAIL DRAWINGS FOR CONSTRUCTION DETAILS.

GRADING, UTILITIES & DRAINAGE NOTES

1. ALL WORK RELATING TO INSTALLATION, RENOVATION OR MODIFICATION OF WATER, DRAINAGE AND/OR SEWER SERVICES SHALL BE PERFORMED IN ACCORDANCE WITH THE STANDARDS OF THE TOWN OF SUDBURY.
2. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND GRADES ON THE GROUND AND REPORT ANY DISCREPANCIES IMMEDIATELY TO THE OWNER.
3. ALL GRADING IS TO BE SMOOTH AND CONTINUOUS WHERE PROPOSED GRAVEL SURFACE MEETS EXISTING SURFACE, BLEND THE TWO PAVEMENTS AND ELIMINATE ROUGH SPOTS AND ABRUPT GRADE CHANGES AND MEET LINE AND GRADE OF EXISTING CONDITIONS WITH NEW IMPROVEMENTS.
4. CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE (1.5% MINIMUM) AWAY FROM ALL BUILDING FOUNDATIONS AND STRUCTURES.
5. CONTRACTOR SHALL ENSURE ALL AREAS ARE PROPERLY PITCHED TO DRAIN, WITH NO SURFACE WATER PONDING OR PUDDLING.
6. ALL UTILITY GRATES, COVERS OR OTHER SURFACE ELEMENTS INTENDED TO BE EXPOSED AT GRADE SHALL BE FLUSH WITH THE ADJACENT FINISHED GRADE AND ADJUSTED TO PROVIDE A SMOOTH TRANSITION AT ALL EDGES.
7. THE CONTRACTOR SHALL SET SUBGRADE ELEVATIONS TO ALLOW FOR POSITIVE DRAINAGE AND PROVIDE EROSION CONTROL DEVICES, STRUCTURES, MATERIALS AND CONSTRUCTION METHODS TO DIRECT SILT MIGRATION AWAY FROM DRAINAGE AND OTHER UTILITY SYSTEMS, PUBLIC/PRIVATE STREETS AND WORK AREAS. CLEAN BASINS REGULARLY AND AT THE END OF THE PROJECT.
8. EXCAVATION REQUIRED WITHIN PROXIMITY OF KNOWN EXISTING UTILITY LINES SHALL BE DONE BY HAND. CONTRACTOR SHALL REPAIR ANY DAMAGE TO EXISTING UTILITY LINES OR STRUCTURES INCURRED DURING CONSTRUCTION OPERATIONS AT NO COST TO THE OWNER.
9. WHERE NEW EARTHWORK MEETS EXISTING EARTHWORK, CONTRACTOR SHALL BLEND NEW EARTHWORK SMOOTHLY INTO EXISTING, PROVIDING VERTICAL CURVES OR ROUNDS AT ALL TOP AND BOTTOM OF SLOPES.
10. WHERE A SPECIFIC LIMIT OF WORK LINE IS NOT OBVIOUS OR IMPLIED, BLEND GRADES TO EXISTING CONDITIONS WITHIN 5 FEET OF PROPOSED CONTOURS.
11. RESTORE ALL DISTURBED AREAS AND LIMITS OF ALL REMOVALS TO LOAM AND SEED (L&S) UNLESS OTHERWISE NOTED.
12. SEE EARTHWORK SECTION OF SPECIFICATIONS FOR SPECIFIC EXCAVATION AND FILLING PROCEDURES.

ABBREVIATIONS

GENERAL

PROP	PROPOSED
ADJ	ADJUST
BIT. CONC.	BITUMINOUS CONCRETE
CEM. CONC.	CEMENT CONCRETE
℄	BASELINE
N.T.S.	NOT TO SCALE
B.M.	BENCH MARK
ABAN	ABANDON
MB	MAIL BOX
GRAN. CURB	GRANITE CURB
EXIST. (OR EX.)	EXISTING
FDN	FOUNDATION
F.L.	FLOW LINE
(OR F)	PROPERTY LINE
℞	PAVEMENT
PVMT	PAVED WATERWAY
P.W.W.	REINFORCED CONCRETE
RC	MASSACHUSETTS HIGHWAY BOUND
M.H.B.	REMOVE
REM	REMODEL
REMOD	RETAIN
RET	RIGHT-OF-WAY
R.O.W.	REMOVE AND RESET
R&R	REMOVE, RELOCATED AND RESET
R,R&R	REMOVE AND STACK
R&S	REMOVE AND DISPOSE
R&D	STONE BOUND
SB	NOT IN CONTRACT
NIC	HANDICAP
H.C.	WHEELCHAIR RAMP
WCR	FINISHED FLOOR
FF	HOT MIX ASPHALT
HMA	GENERAL CONTRACTOR
G.C.	ELECTRICAL CONTRACTOR
E.C.	PLUMBING CONTRACTOR
P.C.	SOLID WHITE EDGE LINE
SWEL	BROKEN WHITE LANE LINE
BWLL	SOLID YELLOW EDGE LINE
SYEL	STONE BOUND/ DRILL HOLE
SB/DH	CHAIN LINK FENCE
CLF	TEMPORARY
TEMP.	TYPICAL
TYP.	EQUIPMENT
EQ	HANDICAP
H.C.	EDGE OF PAVEMENT
EOP	PROTECT
PROT	CONNECT TO EXISTING
CTE	ROOF LEADER
RL	LIMIT OF WORK
L.O.W.	VERIFY IN FIELD
VIF	APPROXIMATE
APPROX.	TEMPORARY BENCHMARK
TBM	ALTERNATE
ALT.	

UTILITIES

GICI	GUTTER INLET W/ CURB INLET
CBCI	CATCH BASIN W/ CURB INLET
CB	CATCH BASIN
C.I.T.	CHANGE IN TYPE
CTE	CONNECT TO EXISTING
F&G	FRAME AND GRATE
F&C	FRAME AND COVER
CI	CURB INLET
CIP	CAST IRON PIPE
CMP	CORRUGATED METAL PIPE
DI	DUCTILE IRON PIPE
GI	GUTTER INLET
ACCM PIPE	ASPHALT COATED CORRUGATED METAL PIPE
HYD	HYDRANT
INV, ELEV.	INVERT ELEVATION
UP	UTILITY POLE
SMH	SEWER MANHOLE
WG	WATER GATE
DS	DOWN SPOUT
HDPE	HIGH DENSITY POLYETHYLENE PIPE
PVC	POLYVINYL CHLORIDE
RCP	REINFORCED CONCRETE PIPE
DMH	DRAIN MANHOLE
LB	LEACHING BASIN
LG	LEACHING GALLEY
CI	CAST IRON
OCS	OUTLET CONTROL STRUCTURE
OGT	OIL AND GRIT TRAP
VC	VITRIFIED CLAY PIPE
LP	LIGHT POLE
OHW	OVERHEAD WIRE
UPLP	UTILITY POLE WITH LIGHT
SWTU	STORM WATER TREATMENT UNIT
HH	HANDHOLE
GW	GARAGE WASTE
CO	CLEANOUT
LC	LEACHING CHAMBER
GV	GATE VALVE
GALV.	GALVANIZED
F&I	FURNISH & INSTALL
BGS	BELOW GRADE SURFACE

ALIGNMENT/GRADING

BW	BOTTOM OF WALL
BOC	BOTTOM OF CURB
PI	POINT OF INTERSECTION
PC	POINT OF CURVATURE
PT	POINT OF TANGENCY
PRC	POINT OF REVERSE CURVATURE
PCC	POINT OF COMPOUND CURVATURE
PVI	POINT OF VERTICAL INTERSECTION
PVC	POINT OF VERTICAL CURVATURE
PVT	POINT OF VERTICAL TANGENCY
ELEV	ELEVATION
CC	CENTER OF CURVE
H.P.	HIGH POINT
L.P.	LOW POINT
R	RADIUS OF CURVATURE
STA	STATION
S.S.D.	STOPPING SIGHT DISTANCE
TOC	TOP OF CURB
TW	TOP OF WALL

GENERAL SYMBOLS

PROPOSED

CB — CATCH BASIN
OWS — OIL WATER SEPERATOR
FLARED END
CURB (OR BERM)-TYPE NOTED
EDGE OF ROAD
HANDHOLE (NUMBER AS NOTED)
E — E — ELECTRIC MANHOLE
T — T — UTILITY MANHOLE
OR LP — LIGHTPOLE
DRAIN PIPE
E — E — ELECTRIC LINE
T — T — TELEPHONE/COMMUNICATIONS/FIRE ALARM
PROPERTY LINE
TP1 OR TP-2 — TEST PIT/BORINGS
VENT PIPES
SIGN
EDGE OF WOODS
BOLLARD (BOL)/ METAL POST
SAWCUT
EROSION CONTROL (SPECIFIED ON PLANS)
LIMIT OF GRADING
LOW — LIMIT OF WORK
TEMPORARY FENCE

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MARCH 6, 2019

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No.	Date	Description	Dr.By	Ck.By	App.By
A		ISSUED FOR PERMIT REVIEW	NCH	JRF	JRF
B		ISSUED FOR PERMIT REVIEW	NCH	JRF	JRF
C		ISSUED FOR PERMIT REVIEW	NCH	JRF	JRF
D		ISSUED FOR PERMIT REVIEW	NCH	JRF	JRF
E		ISSUED FOR PERMIT REVIEW	NCH	JRF	JRF

REGISTERED PROFESSIONAL ENGINEER
JAMES R. FAIR
COMMONWEALTH OF MASSACHUSETTS
No. 40434
REGISTERED PROFESSIONAL ENGINEER
2/6/19

SUDBURY DEPARTMENT OF PUBLIC WORKS
SUDBURY, MA
SUDBURY DPW FUEL SYSTEM
GENERAL NOTES & LEGEND

DR.BY NCH | DSN.BY JRF | CHK.BY JRF | APP.BY JRF
JOB NO. 2180684
CONTRACT: -
SCALE: -
CADD NO. -
FILE NO.

C0.01

SHEET 2 OF 10

EXISTING CONDITIONS LEGEND

EDGE OF WOODS		D	STORM SEWER LINE
DECIDUOUS TREE		S	SANITARY SEWER LINE
CONIFEROUS TREE		W	WATER LINE
SHRUB/BUSH		G	GAS LINE
SIGN		SIG	SIGNAL WIRE LINE
UTILITY POLE		C	CABLE LINE
LIGHT POLE		FO	FIBER OPTIC LINE
HYDRANT		LPS	LOW PRESSURE SEWER LINE
WATER SHUTOFF		E	ELECTRIC LINE
GAS VALVE		OHU	OVERHEAD UTILITIES
WATER VALVE		T	TELEPHONE LINE
MONUMENT			SANITARY MANHOLE (SMH)
IRON PIN / IRON ROD			DRAINAGE MANHOLE (DMH)
HANDICAP SPACE			CATCHBASIN (CB)
HAND HOLE			METAL POST/BOLLARD (BOL)
ELEC. METER			ELECTRIC MANHOLE (MHE)
GAS METER			UNKNOWN MANHOLE
PROPERTY LINE			TELEPHONE MANHOLE (MHT)
EASEMENT			VENT PIPE
MAJOR CONTOUR LINE		CNO	COULD NOT OPEN
MINOR CONTOUR LINE			FLOW DIRECTION
		MAG NAIL	MAGNETIC CONCRETE NAIL

BENCHMARK
MAG NAIL IN POLE
ELEV. 148.50

BENCHMARK
SQ. CUT AT TOP STEP
ELEV. 146.19

Water Resource Protection District - Zone III
Residential A District

GENERAL NOTES:

1. ALL UNDERGROUND UTILITIES ARE APPROXIMATE AND ARE FROM MAP REFERENCES 1 AND 3 BELOW.
2. ALL ELECTRICAL UTILITIES ARE APPROXIMATE AND ARE FROM MAP REFERENCE 4 BELOW.
3. UTILITY OBSERVED IN FIELD, HOWEVER RECORDS NOT AVAILABLE TO VERIFY LOCATION OR CONNECTIONS.
4. AS-BUILT RECORDS NOT AVAILABLE TO CONFIRM UTILITY LOCATIONS OR CONNECTIONS.

MAP REFERENCES:

1. MAP ENTITLED "SUDBURY DEPARTMENT OF PUBLIC WORKS BUILDING", GRADING AND DRAINAGE PLAN, DATED MAY 2002 AND PREPARED BY DIMARINISI & WOLFE, AND LIN ASSOCIATES, INC.
2. MAP ENTITLED "SUDBURY DEPARTMENT OF PUBLIC WORKS BUILDING", EXISTING CONDITIONS PLAN, DATED MAY 2002 AND PREPARED BY DIMARINISI & WOLFE, AND LIN ASSOCIATES, INC.
3. MAP ENTITLED "SUDBURY DEPARTMENT OF PUBLIC WORKS BUILDING", UTILITIES PLAN, DATED MAY 2002 AND PREPARED BY DIMARINISI & WOLFE, AND LIN ASSOCIATES, INC.
4. MAP ENTITLED "SUDBURY DEPARTMENT OF PUBLIC WORKS BUILDING", ELECTRICAL SITE PLAN, DATED MAY 2002 AND PREPARED BY DIMARINISI & WOLFE, AND MACRITCHIE ENGINEERING INCORPORATED.

SURVEY NOTES:

1. UNDERGROUND UTILITY LOCATIONS SHOWN HEREON ARE BASED ON UTILITY EVIDENCE VISIBLE AT GROUND SURFACE AND RECORD DRAWINGS AND ARE SUBJECT TO FIELD VERIFICATION BY EXCAVATION. UTILITIES SHOWN DO NOT PURPORT TO CONSTITUTE OR REPRESENT ALL UTILITIES LOCATED UPON OR ADJACENT TO THE SURVEYED PREMISES.
2. SURVEY PERFORMED BY WESTON & SAMPSON PE, LS, LA, PC. IN NOV. 2018.
3. CONTOURS AND ELEVATIONS SHOWN ON NAVD88 VERTICAL DATUM BASED ON GPS OBSERVATIONS.
4. NORTH ORIENTATION IS BASED ON GPS OBSERCATIONS TAKEN AT THE TIME OF THE FIELD SURVEY. MAPPING PREPARED ON NAD83 STATE PLANE COORDINATE SYSTEM-MASSACHUSETTS MAINLAND ZONE.

0 30 60 100
SCALE: 1" = 30'

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MARCH 6, 2019

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No.	Date	Dr.By	Ck.By	App.By	Description
					APPROVED

DATE

REGISTERED PROFESSIONAL ENGINEER

COMMONWEALTH OF MASSACHUSETTS
JAMES R. FINN
CIVIL
No. 46424
REGISTERED PROFESSIONAL ENGINEER
3/6/19

SUDBURY DEPARTMENT OF PUBLIC WORKS
SUDBURY, MA

SUDBURY DPW FUEL SYSTEM

EXISTING CONDITIONS PLAN

CADD NO.	SCALE:	CONTRACT:	JOB NO.	DR.BY	DSN.BY	CHK.BY	APP.BY
-	-	-	2180684	NCH	JRF	JRF	JRF

C1.01

FILE NO.

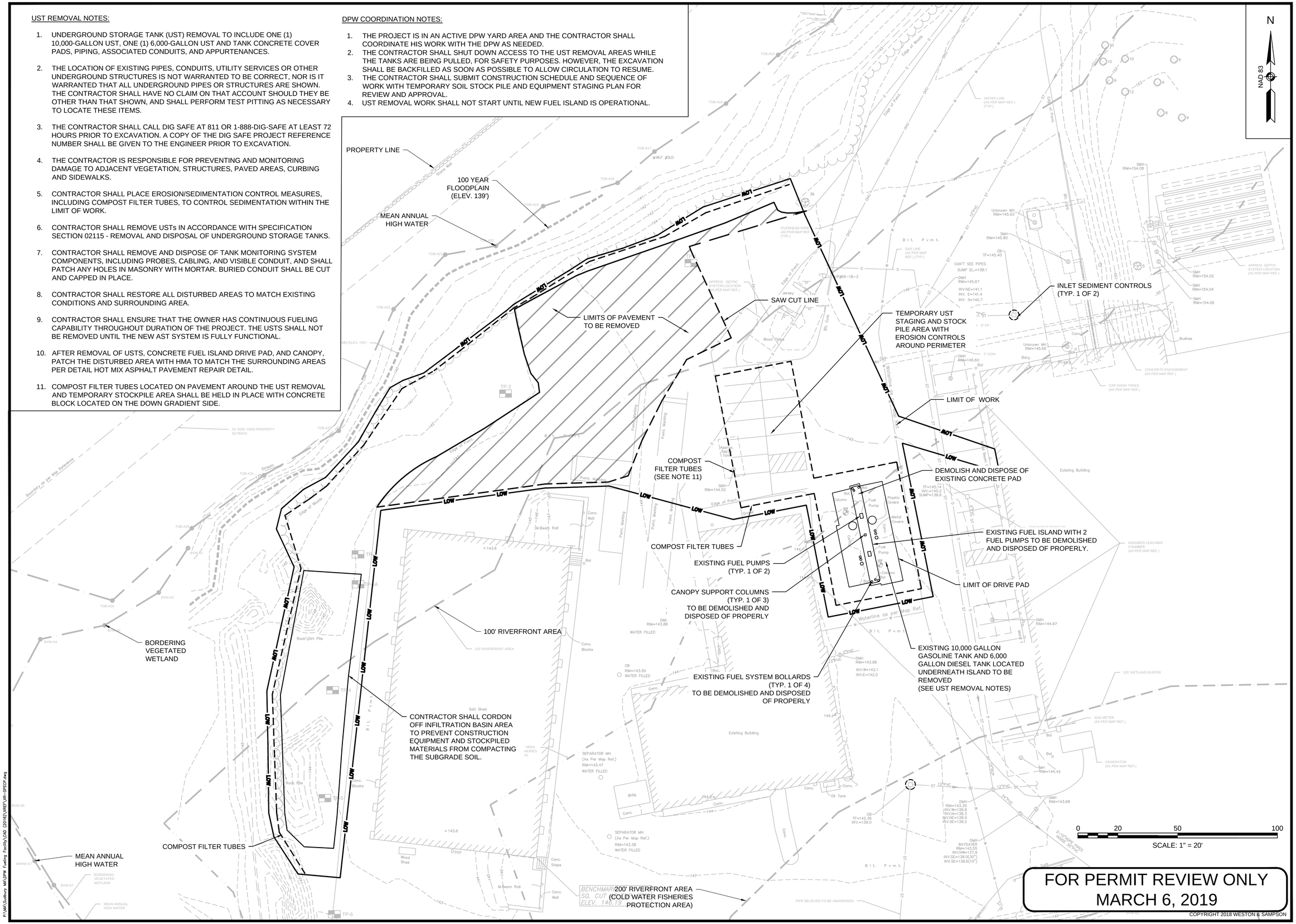
SHEET 3 OF 10

UST REMOVAL NOTES:

1. UNDERGROUND STORAGE TANK (UST) REMOVAL TO INCLUDE ONE (1) 10,000-GALLON UST, ONE (1) 6,000-GALLON UST AND TANK CONCRETE COVER PADS, PIPING, ASSOCIATED CONDUITS, AND APPURTENANCES.
2. THE LOCATION OF EXISTING PIPES, CONDUITS, UTILITY SERVICES OR OTHER UNDERGROUND STRUCTURES IS NOT WARRANTED TO BE CORRECT, NOR IS IT WARRANTED THAT ALL UNDERGROUND PIPES OR STRUCTURES ARE SHOWN. THE CONTRACTOR SHALL HAVE NO CLAIM ON THAT ACCOUNT SHOULD THEY BE OTHER THAN THAT SHOWN, AND SHALL PERFORM TEST PITTING AS NECESSARY TO LOCATE THESE ITEMS.
3. THE CONTRACTOR SHALL CALL DIG SAFE AT 811 OR 1-888-DIG-SAFE AT LEAST 72 HOURS PRIOR TO EXCAVATION. A COPY OF THE DIG SAFE PROJECT REFERENCE NUMBER SHALL BE GIVEN TO THE ENGINEER PRIOR TO EXCAVATION.
4. THE CONTRACTOR IS RESPONSIBLE FOR PREVENTING AND MONITORING DAMAGE TO ADJACENT VEGETATION, STRUCTURES, PAVED AREAS, CURBING AND SIDEWALKS.
5. CONTRACTOR SHALL PLACE EROSION/SEDIMENTATION CONTROL MEASURES, INCLUDING COMPOST FILTER TUBES, TO CONTROL SEDIMENTATION WITHIN THE LIMIT OF WORK.
6. CONTRACTOR SHALL REMOVE USTs IN ACCORDANCE WITH SPECIFICATION SECTION 02115 - REMOVAL AND DISPOSAL OF UNDERGROUND STORAGE TANKS.
7. CONTRACTOR SHALL REMOVE AND DISPOSE OF TANK MONITORING SYSTEM COMPONENTS, INCLUDING PROBES, CABLING, AND VISIBLE CONDUIT, AND SHALL PATCH ANY HOLES IN MASONRY WITH MORTAR. BURIED CONDUIT SHALL BE CUT AND CAPPED IN PLACE.
8. CONTRACTOR SHALL RESTORE ALL DISTURBED AREAS TO MATCH EXISTING CONDITIONS AND SURROUNDING AREA.
9. CONTRACTOR SHALL ENSURE THAT THE OWNER HAS CONTINUOUS FUELING CAPABILITY THROUGHOUT DURATION OF THE PROJECT. THE USTS SHALL NOT BE REMOVED UNTIL THE NEW AST SYSTEM IS FULLY FUNCTIONAL.
10. AFTER REMOVAL OF USTS, CONCRETE FUEL ISLAND DRIVE PAD, AND CANOPY, PATCH THE DISTURBED AREA WITH HMA TO MATCH THE SURROUNDING AREAS PER DETAIL HOT MIX ASPHALT PAVEMENT REPAIR DETAIL.
11. COMPOST FILTER TUBES LOCATED ON PAVEMENT AROUND THE UST REMOVAL AND TEMPORARY STOCKPILE AREA SHALL BE HELD IN PLACE WITH CONCRETE BLOCK LOCATED ON THE DOWN GRADIENT SIDE.

DPW COORDINATION NOTES:

1. THE PROJECT IS IN AN ACTIVE DPW YARD AREA AND THE CONTRACTOR SHALL COORDINATE HIS WORK WITH THE DPW AS NEEDED.
2. THE CONTRACTOR SHALL SHUT DOWN ACCESS TO THE UST REMOVAL AREAS WHILE THE TANKS ARE BEING PULLED, FOR SAFETY PURPOSES. HOWEVER, THE EXCAVATION SHALL BE BACKFILLED AS SOON AS POSSIBLE TO ALLOW CIRCULATION TO RESUME.
3. THE CONTRACTOR SHALL SUBMIT CONSTRUCTION SCHEDULE AND SEQUENCE OF WORK WITH TEMPORARY SOIL STOCK PILE AND EQUIPMENT STAGING PLAN FOR REVIEW AND APPROVAL.
4. UST REMOVAL WORK SHALL NOT START UNTIL NEW FUEL ISLAND IS OPERATIONAL.



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No.	Date	Description
A	3/6/19	PROVIDED

REGISTERED PROFESSIONAL ENGINEER

JAMES R. FOLI
CIVIL
No. 40434
3/6/19

SUDBURY DEPARTMENT OF PUBLIC WORKS
SUDBURY, MA
SUDBURY DPW FUEL SYSTEM

SITE PREPARATION AND EROSION CONTROL PLAN

DR.BY	DSN.BY	CHK.BY	APP.BY
NCH	JRF	JRF	JRF

JOB NO. 21806684
CONTRACT: -
SCALE: -
CADD NO.
FILE NO.

C2.01

SHEET 4 OF 10

N

PROPERTY LINE

100 YEAR FLOODPLAIN (ELEV. 139')

MEAN ANNUAL HIGH WATER

*1,385 SQ FT NET INCREASE IN IMPERVIOUS AREA

*1,066 SQ FT OF PAVEMENT REMOVAL. REPLACE WITH LOAM AND SEED WITH PLANTS AS SHOWN ON LANDSCAPING PLAN.

HMA CURB

1 FT BENCH BEHIND TOP OF CURB

*2,451 SQ FT OF ADDED PAVEMENT

APPROX LIMIT OF GRADING

SEDIMENT FOREBAY

LEVEL SPREADER

2:1 SLOPE

EMERGENCY OVERFLOW SPILLWAY

2:1 SLOPE

4:1 SLOPE

FOREBAY STONE CHECK DAM

4:1 SLOPE

3 FT BENCH MATCHING ADJACENT EXISTING EDGE OF PAVEMENT GRADE

INFILTRATION BASIN

MEAN ANNUAL HIGH WATER

BORDERING VEGETATED WETLAND

CB 1
R=142.75
I(out)=140.43 (OGS 1)

P 1
14 LF - 14" DI
S=0.005 FT/FT

OGS 1
R=142.76
I(in)=140.36 (CB 1)
I(out)=140.26 (FE 1)

P 2
19 LF - 14" DI
S=0.006 FT/FT

FE 1
INV=140.15

100' RIVERFRONT AREA

200' RIVERFRONT AREA (COLD WATER FISHERIES PROTECTION AREA)

APPROX LIMIT OF WORK

SAW CUT EXISTING PAVEMENT FOR REGRADING

REMOVE AND REPLACE EXISTING PAVEMENT

RESTORE PARKING SPACE PAVEMENT MARKINGS TO MATCH EXISTING CONDITIONS

CONCRETE TANK PAD

CANOPY LIMITS

CONCRETE FUEL ISLAND

UNDERGROUND ELECTRICAL CONDUITS

UNDERGROUND COMMUNICATIONS CONDUITS

EXISTING FUEL SYSTEM TO BE REMOVED. SEE DRAWING 2.01.

BENCHMARK
SQ. CUT AT TOP STEP
ELEV. 146.19

TP-6

SCALE: 1"=20'

FOR PERMIT REVIEW ONLY
MARCH 6, 2019

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No.	Date	Dr.By	Ck.By	App.By	Description
A		P	P	R	O V E D

REGISTERED PROFESSIONAL ENGINEER

DATE

JAMES R. FINN
CIVIL
No. 44424
REGISTERED PROFESSIONAL ENGINEER
3/6/19

SUDBURY DEPARTMENT OF PUBLIC WORKS
SUDBURY, MA

SUDBURY DPW FUEL SYSTEM

GRADING AND DRAINAGE PLAN

CADD NO.	SCALE:	CONTRACT:	JOB NO.	DR.BY	DSN.BY	CHK.BY	APP.BY
-	-	-	2180684	ZDW	JRF	JRF	JRF

C3.01

FILE NO.

SHEET 5 OF 10

N

PLANT SYMBOLS

- JUNIPERUS SCOPULORUM 'WICHITA BLUE' (JS)
- LINDERA BENZOIN (LB)
- CLETHRA ALNIFOLIA (CA)
- CORNUS SERICEA (CS)
- PANICUM VIRGATUM (PV)

100 YEAR FLOODPLAIN (ELEV. 139')

MEAN ANNUAL HIGH WATER

PROPERTY LINE

CANOPY LIMITS

6" LOAM AND SEED MIX (TYP.) (~3000 SQ FT)

APPROX LIMIT OF GRADING

APPROX LIMIT OF WORK

100' RIVERFRONT AREA

PLACE EROSION CONTROL BLANKET ON SEEDED 2:1 SLOPES

6" LOAM AND N.E. WETLAND SEED MIX (TYP.) (~5000 SQ FT)

200' RIVERFRONT AREA (COLD WATER FISHERIES PROTECTION AREA)

MEAN ANNUAL HIGH WATER

BORDERING VEGETATED WETLAND

BENCHMARK
SQ. CUT AT TOP STEP
ELEV. 146.19

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MARCH 6, 2019

SCALE: 1"=20'

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REGISTERED PROFESSIONAL ENGINEER

JAMES R. FINN CIVIL No. 44424 REGISTERED PROFESSIONAL ENGINEER
3/6/19

SUDBURY DEPARTMENT OF PUBLIC WORKS
SUDBURY, MA.

SUDBURY DPW FUEL SYSTEM

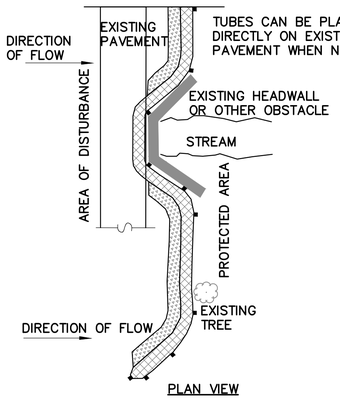
LANDSCAPING PLAN

CAD'D NO.	SCALE:	CONTRACT:	JOB NO. 21806684	DR.BY ZDW	DSN.BY JRF	CHK.BY JRF	APP.BY JRF
	-	-					

C4.01

FILE NO.

SHEET 6 OF 10



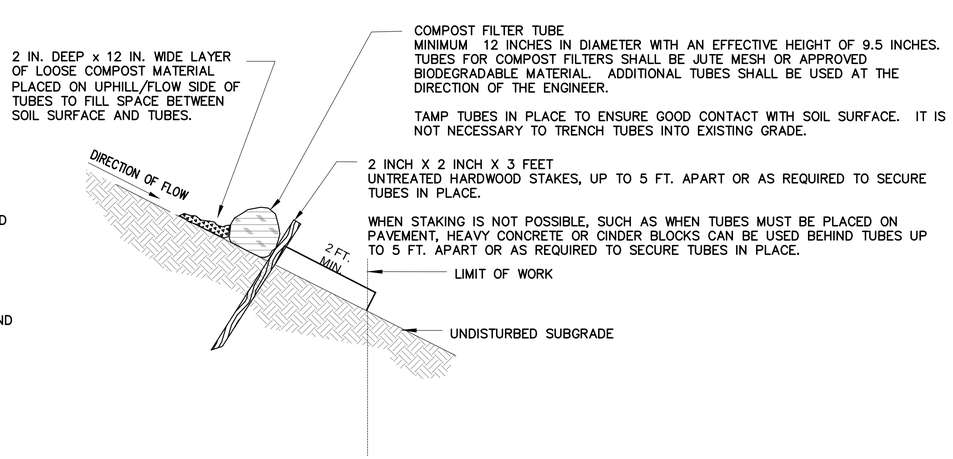
PLAN VIEW

PLACING TUBES AGAINST THE UPHILL SIDE OF WELL– ANCHORED, STATIONARY FEATURES SUCH AS EXISTING TREES CAN PROVIDE ADDITIONAL BRACING.

CURVE ENDS UPHILL TO PREVENT DIVERSION OF UNFILTERED RUN–OFF.

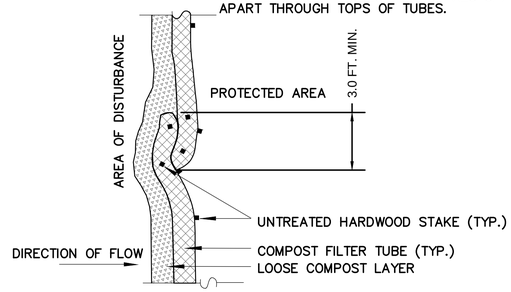
GENERAL NOTES:

1. PROVIDE A MINIMUM TUBE DIAMETER OF 12 INCHES FOR SLOPES UP TO 50 FEET IN LENGTH WITH A SLOPE RATIO OF 3H:1V OR STEEPER. LONGER SLOPES OF 3H:1V MAY REQUIRE LARGER TUBE DIAMETER OR ADDITIONAL COURSING OF FILTER TUBES TO CREATE A FILTER BERM. REFER TO MANUFACTURER'S RECOMMENDATIONS FOR SITUATIONS WITH LONGER OR STEEPER SLOPES.
2. INSTALL TUBES ALONG CONTOURS AND PERPENDICULAR TO SHEET OR CONCENTRATED FLOW.
3. DO NOT INSTALL IN PERENNIAL, EPHEMERAL OR INTERMITTENT STREAMS.
4. CONFIGURE TUBES AROUND EXISTING SITE FEATURES TO MINIMIZE SITE DISTURBANCE AND MAXIMIZE CAPTURE AREA OF STORMWATER RUN–OFF.
5. MULCH MATERIAL FOR THE FILTER TUBES SHALL BE WEED–FREE STRAW, WOOD EXCELSIOR, COMPOST, OR WOOD CHIPS, OR COIR. STRAW SHALL BE WEED FREE AND DERIVED FROM THRESHING OF GRAIN CROP.



PROVIDE A 3 FT. MINIMUM OVERLAP AT ENDS OF TUBES TO JOIN IN A CONTINUOUS BARRIER AND MINIMIZE UNIMPEDED FLOW.
STAKE JOINING TUBES SNUGLY AGAINST EACH OTHER TO PREVENT UNFILTERED FLOW BETWEEN THEM.

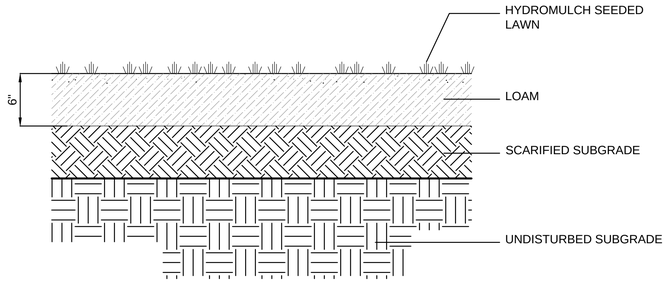
SECURE ENDS OF TUBES WITH STAKES SPACED 18 IN. APART THROUGH TOPS OF TUBES.



PLAN VIEW – JOINING DETAIL

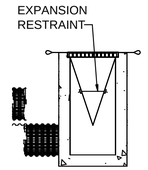
1 EROSION CONTROL MEASURE: SINGLE COMPOST FILTER TUBE DETAIL

SCALE: N.T.S.



2 LOAM & SEED

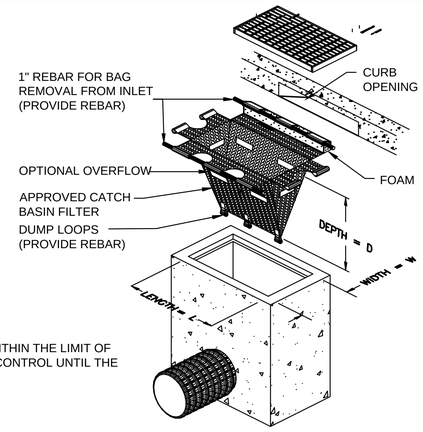
SCALE: N.T.S.



SIDE VIEW INSTALLED

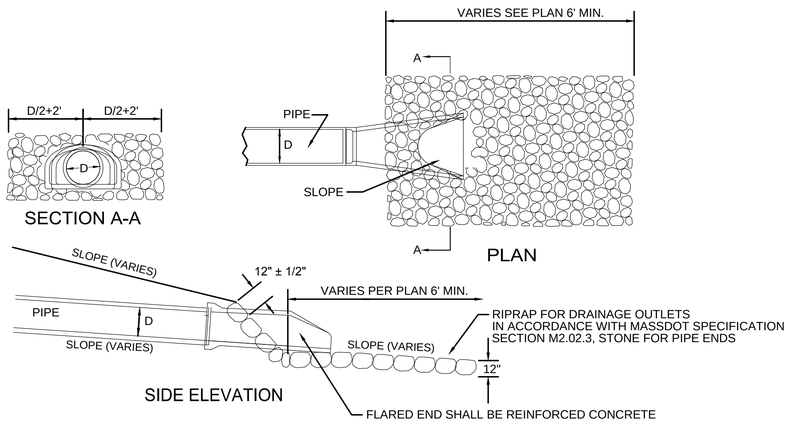
NOTE:

ALL NEW CATCH BASINS WITHIN THE LIMIT OF WORK SHALL HAVE INLET CONTROL UNTIL THE COMPLETION OF PAVING.



3 INLET SEDIMENT CONTROL

SCALE: N.T.S.



4 FLARED END PIPE DETAIL

SCALE: N.T.S.

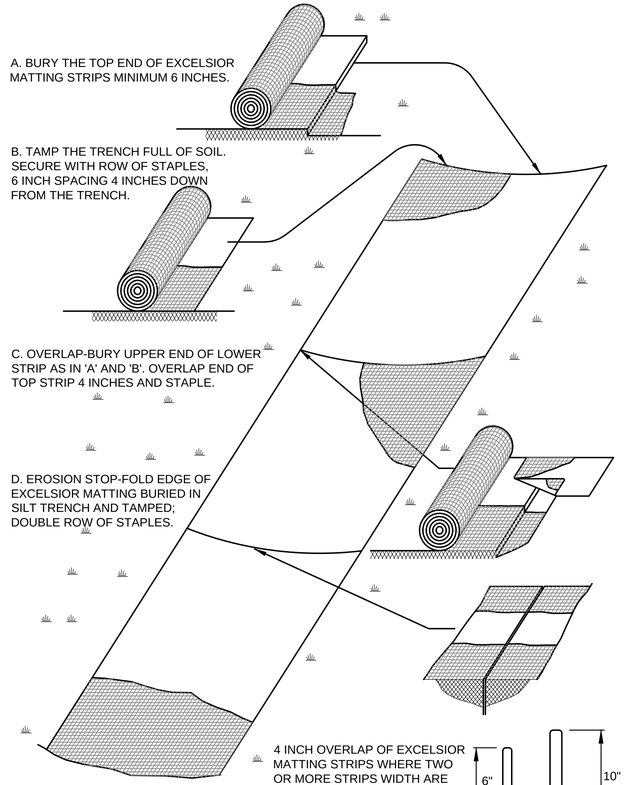
1. EROSION CONTROL MEASURES SHALL BE INCORPORATED IN THE SEQUENCE OF CONSTRUCTION TO PREVENT SEDIMENT LADEN WATER FROM LEAVING THE SITE.
2. AREAS SUBJECT TO EROSION SHALL BE MINIMIZED IN TERMS OF TIME AND AREA.
3. IN GENERAL, WORK REQUIRING EROSION CONTROL INCLUDES EXCAVATIONS, FILLS, DRAINAGE, SWALES AND DITCHES, ROUGH AND FINISH GRADING, AND STOCKPILING OF EARTH.
4. DO NOT DISTURB VEGETATION AND TOPSOIL BEYOND THE PROPOSED LIMIT OF SILT FENCE ACTIVITIES.
5. TEMPORARY SILT CONTROLS SHALL BE PLACED AS SHOWN ON THE PLAN. PERMANENTLY STABILIZE EACH COMPLETED SEGMENT OF CONSTRUCTION.
6. THE CONTRACTOR SHALL REMOVE TEMPORARY SILT CONTROLS AND ALL ACCUMULATED SILT AND DEBRIS AFTER COMPLETION OF CONSTRUCTION OPERATIONS.
7. SILT CONTROLS SHALL BE IN PLACE AT ALL TIMES DURING CONSTRUCTION.
8. THE CONTRACTOR SHALL REMOVE AND LEGALLY DISPOSE OF ALL SILT AND DEBRIS FROM EACH DRAINAGE STRUCTURE UPON COMPLETION OF THE PROJECT.
9. OBJECTS AND/OR AREAS DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED TO THEIR ORIGINAL CONDITION.
10. ALL DISTURBED AREAS SHALL BE RESTORED TO EXISTING GRADE. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE AS NEEDED.
11. SILT CONTROLS SHALL BE REMOVED UPON THE SATISFACTORY COMPLETION OF ALL WORK SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
12. SITE PERIMETER SHALL HAVE COMPOST FILTER TUBES INSTALLED AS SHOWN ON THE PLANS.

A. BURY THE TOP END OF EXCELSIOR MATTING STRIPS MINIMUM 6 INCHES.

B. TAMP THE TRENCH FULL OF SOIL. SECURE WITH ROW OF STAPLES, 6 INCH SPACING 4 INCHES DOWN FROM THE TRENCH.

C. OVERLAP-BURY UPPER END OF LOWER STRIP AS IN 'A' AND 'B'. OVERLAP END OF TOP STRIP 4 INCHES AND STAPLE.

D. EROSION STOP-FOLD EDGE OF EXCELSIOR MATTING BURIED IN SILT TRENCH AND TAMPED; DOUBLE ROW OF STAPLES.



EXCELSIOR MATTING BLANKET

NOTE:
JUTE NETTING TO BE USED ON ALL SLOPES GREATER THAN 4H:1V AS INDICATED ON GRADING PLANS

4 INCH OVERLAP OF EXCELSIOR MATTING STRIPS WHERE TWO OR MORE STRIPS WIDTH ARE REQUIRED. STAPLES ON 1'-6" CENTERS.

STAPLE OUTSIDE EDGE ON 2'-0" CENTERS.

TYPICAL STAPLES #8 GAUGE WIRE

5 EROSION CONTROL BLANKET

SCALE: N.T.S.

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MARCH 6, 2019

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No.	Date	Description	Dr.By	Ck.By	App.By
A		PROVED			
D					

REGISTERED PROFESSIONAL ENGINEER

JAMES R. FAIT
CIVIL
No. 40434
3/6/19

SUDBURY DEPARTMENT OF PUBLIC WORKS
SUDBURY, MA

SUDBURY DPW FUEL SYSTEM

DETAILS I

DSN.BY	DR.BY	CHK.BY	APP.BY
JRF	NCH	JRF	JRF

JOB NO. 2180684
CONTRACT: -
SCALE: -
CADD NO.
FILE NO.

C5.01

SHEET 7 OF 10

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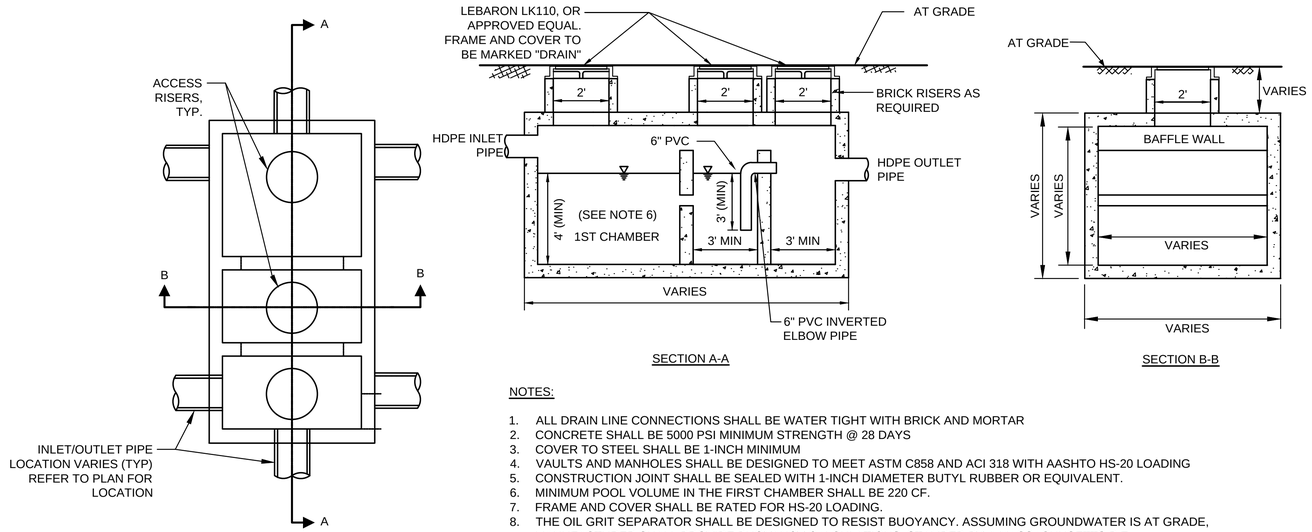
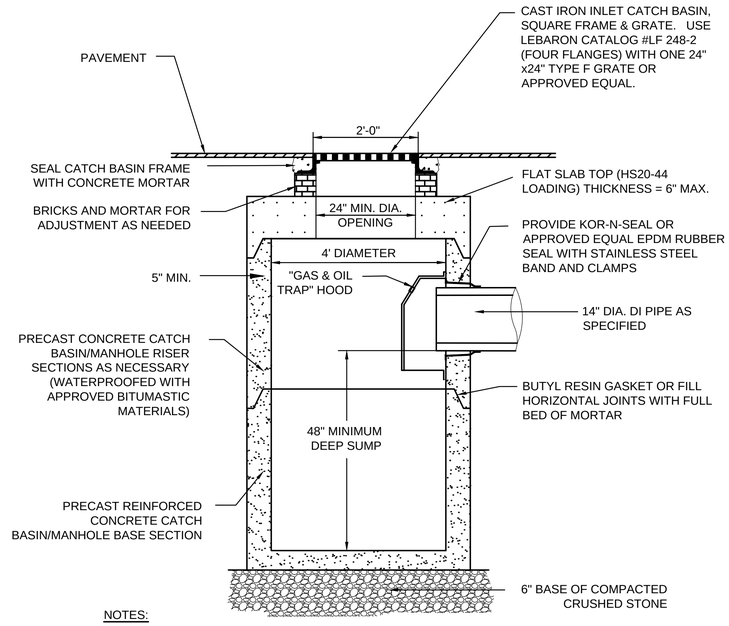


NOTES:

1. ALL DRAIN LINE CONNECTIONS SHALL BE WATER TIGHT WITH BRICK AND MORTAR
2. CONCRETE SHALL BE 5000 PSI MINIMUM STRENGTH @ 28 DAYS
3. COVER TO STEEL SHALL BE 1-INCH MINIMUM
4. VAULTS AND MANHOLES SHALL BE DESIGNED TO MEET ASTM C858 AND ACI 318 WITH AASHTO HS-20 LOADING
5. CONSTRUCTION JOINT SHALL BE SEALED WITH 1-INCH DIAMETER BUTYL RUBBER OR EQUIVALENT.
6. MINIMUM POOL VOLUME IN THE FIRST CHAMBER SHALL BE 220 CF.
7. FRAME AND COVER SHALL BE RATED FOR HS-20 LOADING.
8. THE OIL GRIT SEPARATOR SHALL BE DESIGNED TO RESIST BUOYANCY. ASSUMING GROUNDWATER IS AT GRADE, MANUFACTURER SHALL PROVIDE BUOYANCY CALCULATIONS, STAMPED BY A MASSACHUSETTS P.E.

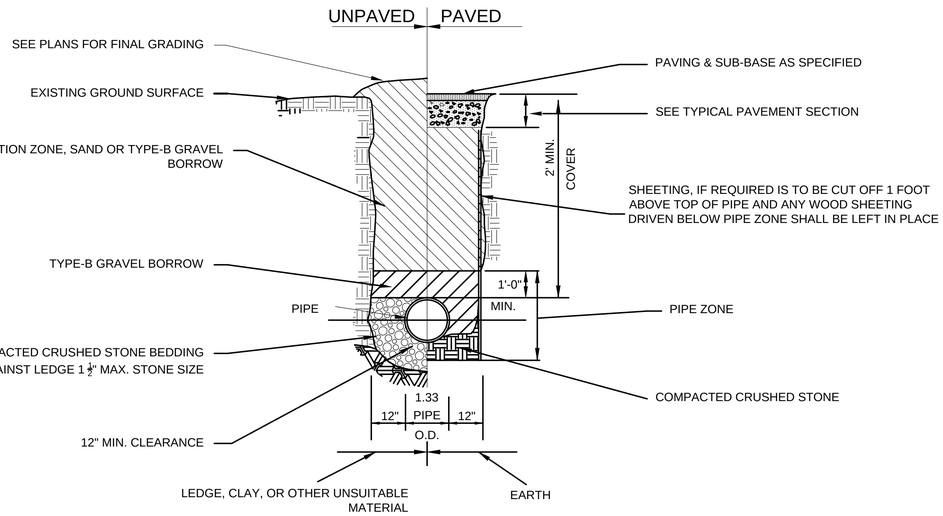
1 OIL GRIT SEPARATOR
SCALE: N.T.S.



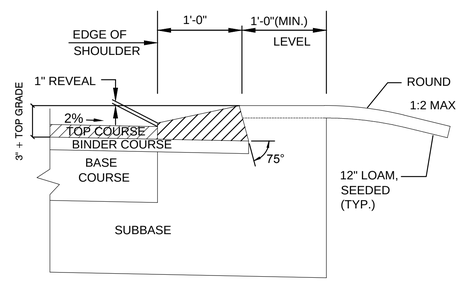
NOTES:

1. THE CATCH BASIN SHALL BE DESIGNED TO RESIST BUOYANCY. ASSUMING GROUNDWATER IS AT GRADE, MANUFACTURER SHALL PROVIDE BUOYANCY CALCULATIONS, STAMPED BY A MASSACHUSETTS P.E.
2. MANHOLE FRAME AND COVER SHALL BE H-20 WHEEL LOAD RATED.
3. CATCH BASIN SHALL BE CONFIGURED TO ALLOW PLACEMENT OF DRAINAGE PIPE WITH 1 FOOT OF COVER.

2 STANDARD CATCH BASIN
SCALE: N.T.S.



3 TYPICAL DRAIN TRENCH DETAIL
SCALE: N.T.S.



NOTES:

1. PAVEMENT THICKNESS SHALL BE AS FOLLOWS:
   TOP COURSE=2"
   BINDER COURSE=3"
2. ALL PAVED AREAS SHALL HAVE A 12" MIN COMPACTED GRAVEL BORROW BASE COURSE.

4 MODIFIED 1' WIDE CAPE COD BERM WITH 1" REVEAL
SCALE: N.T.S.

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MARCH 6, 2019

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No.	Date	Description	Dr.By	Ck.By	App.By	DATE
		A P P R O V E D				

REGISTERED PROFESSIONAL ENGINEER

JAMES R. FINN CIVIL No. 40434 REGISTERED PROFESSIONAL ENGINEER
2/6/19

SUDBURY DEPARTMENT OF PUBLIC WORKS
SUDBURY, MA.
SUDBURY DPW FUEL SYSTEM
DETAILS II

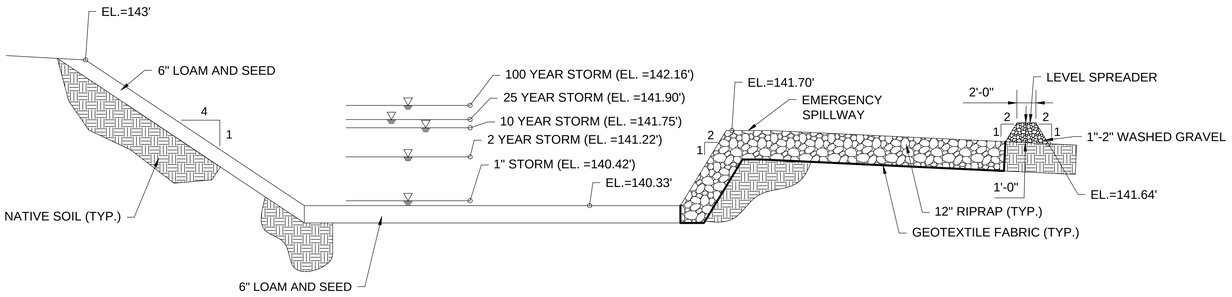
DR.BY	DSN.BY	CHK.BY	APP.BY
NCH	JRF	JRF	JRF

JOB NO. 2180684
CONTRACT: -
SCALE: -
CADD NO.
FILE NO.

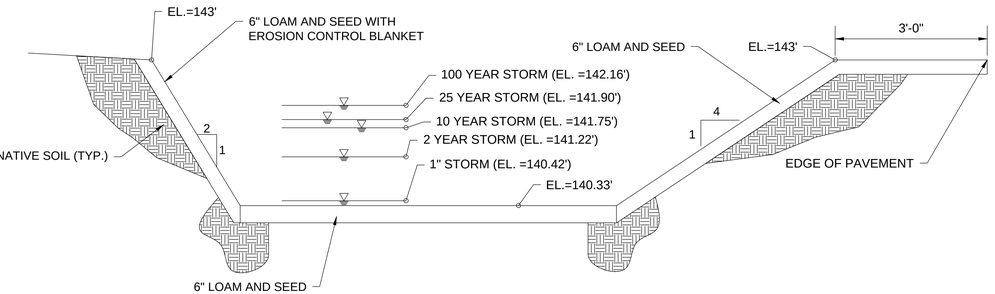
C5.02

SHEET 8 OF 10

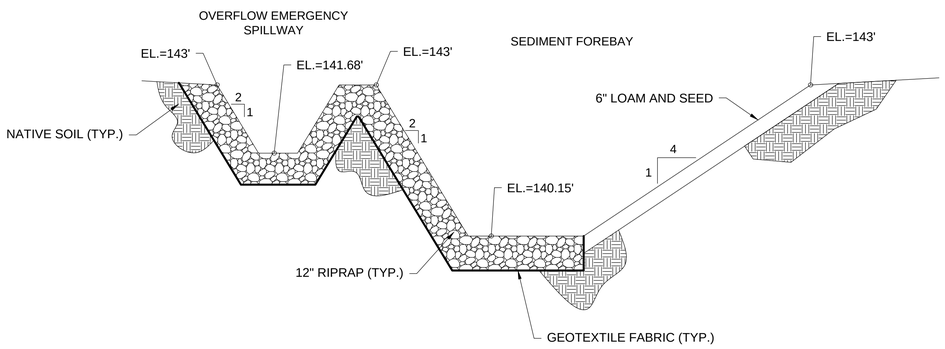
P:\MA\Sudbury, MA\DPW Fueling Facility\CAD (2016)\PLAN SET\C700-01.dwg



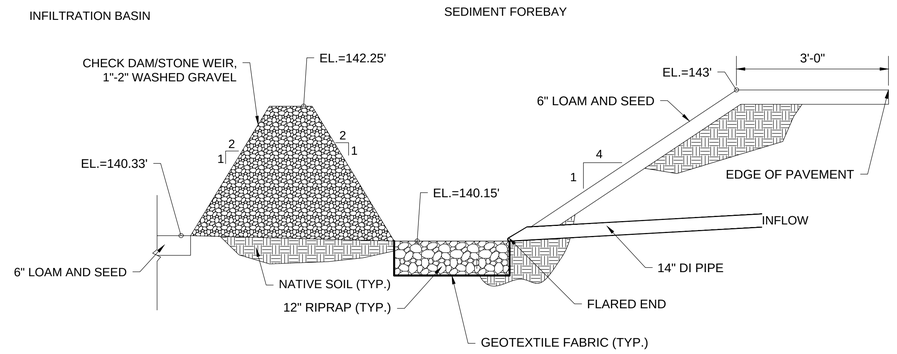
1 INFILTRATION BASIN SECTION A-A
SCALE: N.T.S.



2 INFILTRATION BASIN SECTION B-B
SCALE: N.T.S.



3 INFILTRATION BASIN SECTION C-C
SCALE: N.T.S.



4 INFILTRATION BASIN SECTION D-D
SCALE: N.T.S.

GENERAL NOTES:

1. SEE LANDSCAPING PLAN FOR PLANTING REQUIREMENTS.
2. RIM ELEVATION ALL AROUND INFILTRATION BASIN AND SEDIMENT FOREBAY IS 143'.

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MARCH 6, 2019

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No.	Date	Description	Dr.By	Ck.By	App.By	DATE
			A	P	R	
			O	V	E	
			D			

REGISTERED PROFESSIONAL ENGINEER

JAMES R. RAY
CIVIL
No. 40434
3/6/19

SUDBURY DEPARTMENT OF PUBLIC WORKS
SUDBURY, MA

SUDBURY DPW FUEL SYSTEM

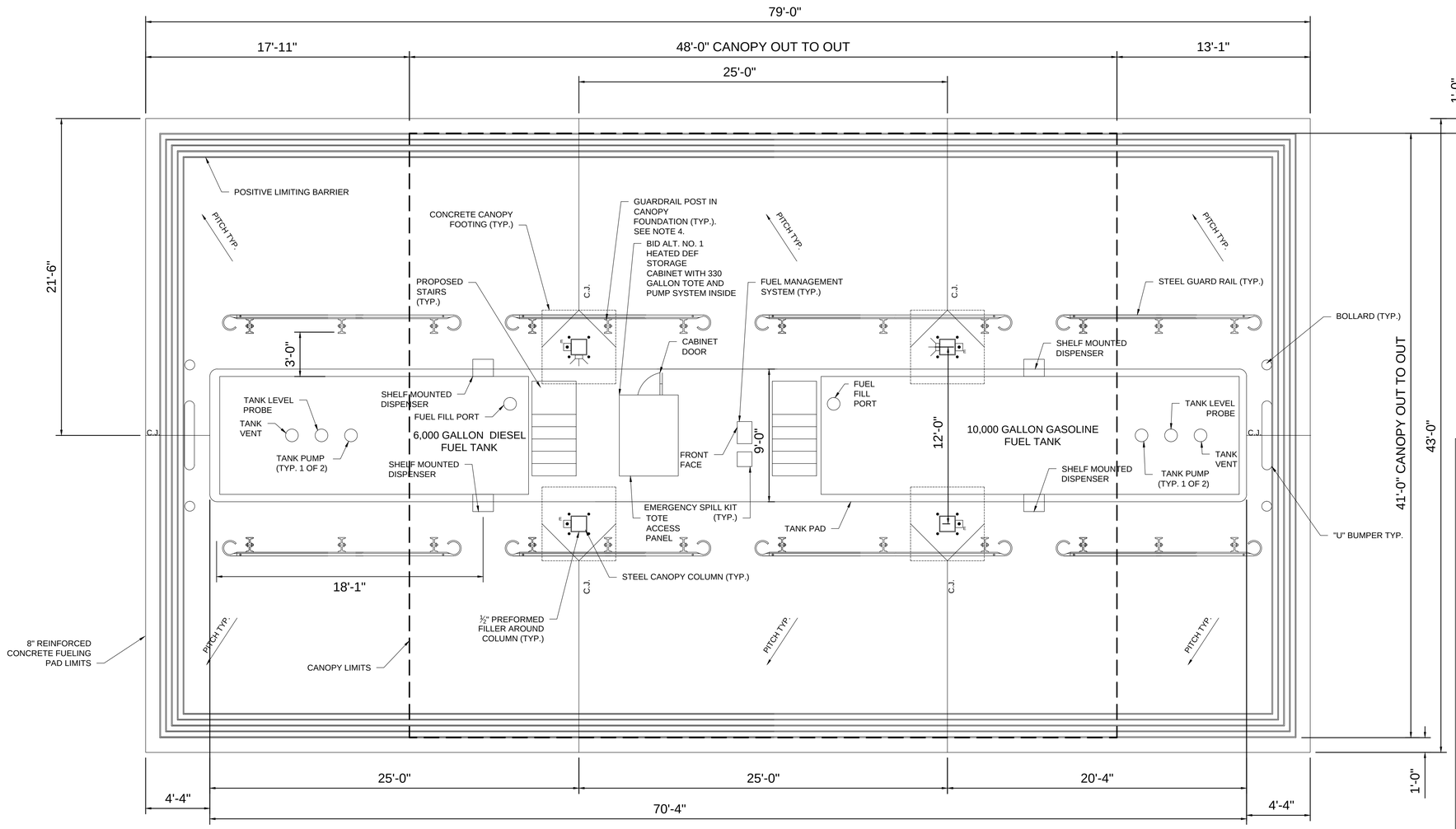
DETAILS III

CADD NO.	SCALE:	CONTRACT:	JOB NO.	DR.BY	DSN.BY	CHK.BY	APP.BY
-	-	-	2180684	NCH	JRF	JRF	JRF

C5.03

FILE NO.

SHEET 9 OF 10

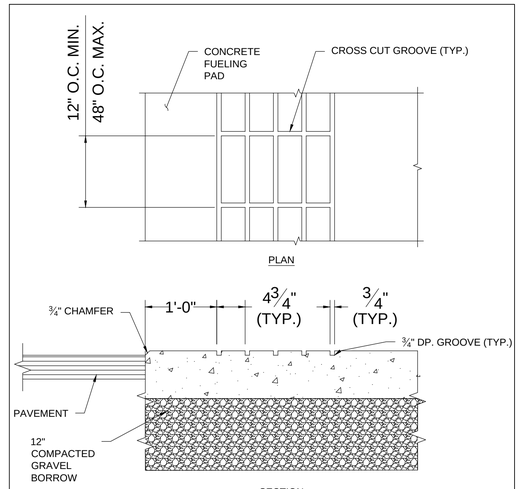


FUEL PUMP ISLAND PLAN

SCALE: ¼" = 1'-0"

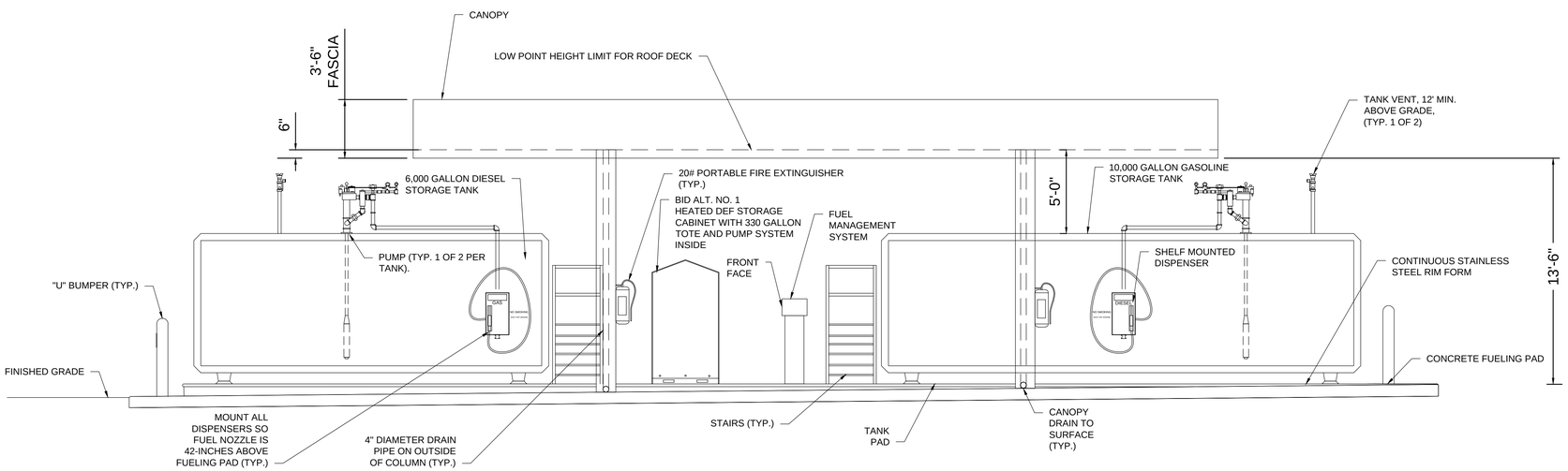
LEGEND:

- - EMERGENCY PUMP SHUTOFF SWITCH
- - TANK ALARM
- C.J. - CONTROL JOINT



POSITIVE LIMITING BARRIER DETAIL

SCALE: NTS



FUEL PUMP ISLAND PLAN - ELEVATION

SCALE: ¼" = 1'-0"

FUEL SYSTEM NOTES:

1. THE HEATED DEF CABINET SHALL BE BID ALT. NO. 1.
2. PLANS ARE SCHEMATIC AND SHOW THE GENERAL LAYOUT OF THE FUEL SYSTEM ONLY AND NOT ALL FUEL SYSTEM COMPONENTS ARE SHOWN. THE CONTRACTOR SHALL PROVIDE ALL EQUIPMENT, MATERIALS, LABOR, ETC. INCLUDING PIPING, VALVES, WIRING, AND ALL OTHER APPURTENANCES AS NEEDED IN ORDER TO PROVIDE A COMPLETE AND OPERABLE SYSTEM.
3. CONCRETE SLAB PITCH SHALL BE AS SHOWN.
4. GUARDRAILS SHALL BE BOLTED TO THE CONCRETE FUEL PAD WHERE THERE IS A CONFLICT WITH THE CANOPY FOOTERS.
5. ELEVATION OF TANK PAD SHALL BE 144.95'.
6. SEAL CONTROL JOINT PENETRATIONS THROUGH POSITIVE LIMITING BARRIER WITH PETROLEUM RESISTANT SEALANT.

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A	P	P	R	O	V	E	D	DATE

REGISTERED PROFESSIONAL ENGINEER

JAMES R. FAIR CIVIL No. 40434 COMMONWEALTH OF MASSACHUSETTS
3/6/19

SUDBURY DEPARTMENT OF PUBLIC WORKS
SUDBURY, MA
SUDBURY DPW FUEL SYSTEM

FUEL SYSTEM PLAN AND ELEVATION

APP BY	JRF
CHK BY	JRF
DSN BY	JRF
DR BY	NCH
JOB NO.	2180684
CONTRACT:	-
SCALE:	-
CADD NO.	-
FILE NO.	

EQ-1.01

SHEET 10 OF 10

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