Date: April 16, 2020

To: Town of Cumberland Planning Board

From: Carla Nixon, Town Planner

**Subject: Town of Cumberland Town Office Parking Expansion -Major Site Plan Review**

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## I. REQUEST/OVERVIEW:

The applicant and owner is the Town of Cumberland. This application is for Planning Board Site Plan Review.

The parcel is located at 23 Drowne Road and is shown on Tax Assessor Map R 03, Lot 51A in the Rural Residential 1 (RR 1) zoning district.

The Applicant is represented by Dan Diffin, P.E., of Sevee and Maher Engineering.

## II. PROJECT HISTORY: None

## III. DESCRIPTION:

## IV. Outside Agency Approvals Required:

| Agency | Type of Permit | Status |
|---|---|---|
| | | |
| MDEP | Site Location of Development | Under Review |
| MDEP | NRPA | Under Review |
| MDOT | Entrance Permit | On File |
| Maine Historic Preservation Commission | Review | On File |

## V. DEPARTMENT HEAD REVIEWS:

Department Head Reviews: No comments received.

## VI. Lands and Conservation Commission: ***See review included in on-line packet.***

## VII. PEER REVIEW ENGINEER REVIEW: Al Palmer, P.E.: Gorrill Palmer Engineers. ***See review included in on-line packet.***

## VIII. REQUESTED WAIVERS (3):

1. A waiver from a high intensity soil survey.
2. A waiver from performing a hydrogeological evaluation for the project. There will be no subsurface wastewater disposal or other anticipated groundwater impacts associated with this project.
3. A waiver from performing a market study. Based on the use and function of this property, a market study does not apply to this project.

## IX. FINDINGS OF FACT

### SECTION 229:10: APPROVAL STANDARDS AND CRITERIA

The following criteria shall be used by the Planning Board in reviewing applications for site plan review and shall serve as minimum requirements for approval of the application. The application shall be approved unless the Planning Board determines that the applicant has failed to meet one or more of these standards. In all instances, the burden of proof shall be on the applicant who must produce evidence sufficient to warrant a finding that all applicable criteria have been met.

***Please refer to Section 2-1 of the Site Plan Review application submitted by the Applicant for responses to the Approval Standards and Criteria.***

### SECTION 229- 11: LIMITATION OF APPROVAL

Construction of the improvements covered by any site plan approval must be substantially commenced within twelve (12) months of the date upon which the approval was granted. If construction has not been substantially commenced within 12 months of the date upon which the approval was granted, the approval shall be null and vid. If construction has not been substantially completed within 24 months of the date upon which approval was granted or within a time period as specified by the Planning Board, the approval shall be null and void. The applicant may request an extension of the deadline to commence or complete construction prior to expiration of the period. Such request must be in writing and must be made to the Planning Board. The Planning Board may grant up to two one-year extensions to the period if the approved plan conforms to the ordinances in effect at the time the extension is granted and any and all federal and state approvals and permits are current.

### SECTION 229-12: STANDARD CONDITION OF APPROVAL:

This approval is dependent upon and limited to the proposals and plans contained in the application and supporting documents submitted and affirmed to by the applicant. Any variation from the plans, proposals and supporting documents, except minor changes as so determined by the Town Planner which do not affect approval standards, is subject to review and approval of the Planning Board (if Staff Review, the Town Planner or Staff Review Committee) prior to implementation. This condition shall be included on all site plans.

## X. CONDITIONS OF APPROVAL:

1. All required local, state and federal permits shall be submitted prior to the preconstruction conference.

2. A preconstruction conference shall be held prior to the start of construction.

3. All clearing limits shall be flagged prior to the preconstruction conference and inspected and approved by the Town Engineer.

4. A blasting permit, if blasting is required, shall be obtained from the Code Enforcement Officer prior to blasting.

5. That any outstanding issues identified by the peer review engineer be addressed prior to the preconstruction conference.

GORRILL PALMER

707 Sable Oaks Drive, Suite 30
South Portland, Maine 04106
207.772.2515

# MEMORANDUM

**To:** Town of Cumberland

**From:** Alton Palmer, Principal

**Date:** April 13, 2020

**Project:** Town of Cumberland Town Office Site Improvements

**Subject:** Peer Review

As requested by the Town, Gorrill Palmer has conducted an Engineering Peer Review for the above referenced project. Information received for this assignment included:

- Site Plan Review application and attachments, dated March 2020, prepared by Sevee & Maher Engineers on behalf of the Town of Cumberland, consisting of 218 pages
- Site Plan Drawing Set, dated March 2020, prepared by Sevee & Maher Engineers consisting of 10 drawings.

Based on our review of this information, general engineering principles and the Town of Cumberland Zoning Ordinance and Site Plan Review Ordinance, we offer the following comments related to the engineering and design aspects of this project:

- Site Plan Review Application
  - As the Applicant proposes a modest increase in the post development peak runoff rate leaving the site, is a waiver of Chapter 229, Section 10.C(b) required?
  - With respect to the Stormwater Analysis and Plans, we offer the following comments:
    - Provide temporary seeding mix on plan sheet C300
    - Correct typo in Section 6.C Mulch on plan sheet C300
    - A hydrometer test to determine the clay component of the soil should be included on plan sheet C302 under Testing and Submittals
    - Provide test pit information witnessed by a Soil Scientist for the UDSF
    - Show spillway size for UDSF 2 on plans
    - Show berm width on plans
    - Show typical berm section on plans
    - Show orifice detail on plans
    - Correct reference to 41 lf 12" pipe adjacent to UDSF 2 on plan sheet C103
    - The Stormwater Report lists the tributary area to UDSF 2 as 3,900 sf impervious and 3,900 sf vegetated. The treatment calculations list the tributary vegetated area as 4,997 sf. Revise areas as applicable.
    - Provide Water Quality treatment plan depicting treatment areas.
    - Revise Hydrocad analysis to reflect actual size of UDSF 2. It appears that the Storage Surface Area was mistakenly entered as "Acres" vs "SF" which results in approximately 1 Million Acres of Cumulative Storage.
    - Revise quantity calculation to reflect actual size of UDSF 2
    - Provide spillway analysis/berm height check for 25- and 100-year storms.

        - As noted in the stormwater report, the peak post development flow at AP-1 for the 25-year storm increases from the predevelopment condition by 12% which is proposed as an insignificant increase. The MDEP would not typically view a 12% increase as insignificant.
        - Since an increase in flow is proposed to the adjacent wetland, the applicant should address the discharge to wetland standard contained in section 4.1 of Chapter 500 including the use of level spreaders.
- Site Plans
    - Site Layout Plan (C-103)
        - No pedestrian connection is shown between the satellite parking area and the main parking field for the Town Office. If the satellite parking area is going to be used for overflow voter parking, is it desirable to have people using the connecting driveway as the primary pedestrian route as well, considering the driveway is only 20' in width.
        - Show stop sign/stop bar at access drive/Tuttle Road intersection
        - Designate accessible ramps at the existing sidewalk intersection with the proposed drive.
        - Show spot grades at accessible parking and walkway to fields to provide accessible slopes
        - Designate whether parking islands are landscaped or striped
        - Add guardrail to the top of the retaining wall
        - Revise retaining wall detail to show parking at a higher elevation than ground outside parking area.
        - No lighting or photometrics were provided for this site.

We appreciate the opportunity to assist the Planning Department with this project. Do not hesitate to contact our office with any questions.

SME
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ENGINEERS

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Cumberland, ME 04021
Tel: 207.829.5016 • Fax: 207.829.5692
info@smemaine.com
smemaine.com

April 15, 2020

Carla Nixon, Town Planner
Cumberland Town Hall
290 Tuttle Road
Cumberland, Maine 04021

Subject: Town Office Parking Expansion
Town of Cumberland Site Plan Review Application
Response to Peer Review Comments dated 4/13/2020

Dear Ms. Nixon,

On behalf of the Town of Cumberland (Town), Sevee & Maher Engineers, Inc. (SME) has prepared the following response to peer review comments by Gorrill Palmer for the Town Office Parking Expansion project. The comments were received in a memo sent via email on April 13, 2020

The comment headings and numbers correspond to peer review sections included in the memo. The plans and application materials were revised in response as indicated below:

**Engineer Peer Review Comments**

- **Site Plan Review Application**
  - **As the Applicant proposes a modest increase in the post development peak runoff rate leaving the site, is a waiver of Chapter 229, Section 10.C(b) required?**

    SME Response: As outlined in the Stormwater Management Report submitted with this application, this project discharges to a wetland complex within the Town Office property and reduces the peak flows during the 2-year and 10-year storm. There is a minor increase during the 25-year storm of less than 1.0 cfs. If a waiver is required, the Applicant request that the Planning Board consider the waiver at the meeting.
  - **With respect to the Stormwater Analysis, we offer the following comments:**
    - **Provide temporary seeding mix on plan sheet C300**

      SME Response: A mix for temporary seeding was added to Drawing C-300 in accordance with the Maine Erosion and Sediment Control Practices Field Guide for Contractors.
    - **Correct typo in Section 6.C Mulch on plan sheet C300**

      SME Response: Typo on Drawing C-300 has been corrected.

- **A hydrometer test to determine the clay component of the soil should be included on plan sheet C303 under Testing and Submittals**

  SME Response: The contractor will be required to run the hydrometer test to confirm that the clay content of the Coarse Sand Layer is less than 2%. A note was added to the detail as requested.

- **Provide test pit information witnessed by a Soil Scientist for the UDSF**

  SME Response: A monitoring well (MW-302) near the proposed UDSF location was drilled in November 2000 and indicates soil type and groundwater elevations. Soil between the depth of 3 and 12 feet was noted to have petroleum odor. The UDSF will be constructed with a 30-mil HDPE liner to separate stormwater treatment from groundwater and possibly petroleum-impacted soil. The Applicant is working with the Maine Department of Environmental Protection (MEDEP) on soils information to confirm that the well meets the intent of Chapter 500. A copy of the permit will be provided to the Town once received.

- **Show spillway size for UDSF2 on plans**

  SME Response: The spillway for UDSF 2 is a 5-foot wide grass overflow. Drawing C-103 has been updated.

- **Show berm width on plans**

  SME Response: Drawing C-103 has been updated to indicate the 4-foot berm width.

- **Show typical berm section on plans**

  SME Response: A typical berm section has been added on Drawing C-302.

- **Show orifice detail on plans**

  SME Response: Notes were added on drawing C-103 a cap on the end of the 4-inch underdrain pipes with a ¾-inch orifice drilled into it.

- **Correct reference to 41 lf 12" pipe adjacent to UDSF 2 on plan sheet C103**

  SME Response: The reference to "41 LF of 12" pipe" was removed form Drawing C-103.

- **The Stormwater Report lists the tributary areas to UDSF 2 as 3,900 sf impervious and 3,900 sf vegetated. The treatment calculations list the tributary vegetated area as 4,997 sf. Revise areas as applicable.**

  SME Response: The vegetated area treated by UDSF 2 is 4,997 square feet. The Stormwater Management Report has been corrected to reflect this.

- **Provide Water Quality treatment plan depicting treatment areas.**

  SME Response: Summary of treatment areas are shown in Appendix F of the Stormwater Management Report. The Applicant is coordinating with the MEDEP for review of water quality treatment areas at the site as part of the Site Location of Development Permit application and will forward a copy of the permit once received.

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ENGINEERS

- **Revise HydroCAD analysis to reflect actual size od USDF 2. It appears that the Storage Surface Area was mistakenly entered as "Acres" vs "SF" which results in approximately 1 Million Acres of Cumulative Storage.**

  SME Response: Proposed HydroCAD calculations were corrected to show USDF 2 storage in square feet.

- **Revise quantity calculations to reflect actual size of UDSF 2**

  SME Response: The Water Quantity Table in the revised Stormwater Management Report was updated with the new peak flows.

- **Provide spillway analysis/berm height check for 25- and 100-year storms.**

  SME Response: Spillway and berm analysis for a 25-year storm is shown in proposed HydroCAD calculations as Secondary Outflow. Attached are the flows over the berm during a 100-year storm. At UDSF 1, the peak elevation in the pond is at 105.93, which is contained within the spillway. At UDSF 2, the peak elevation is at 103.13 which is also contained within the spillway.

- **As noted in the stormwater report, the peak post development flow at AP-1 for the 25-year storm increases from the predevelopment condition by 12% which is proposed as an insignificant increase. The MDEP would not typically view a 12% increase as insignificant.**

  SME Response: As discussed at the pre-application meeting with the MEDEP peak flows that are less than 5% or 1 cfs increase are considered insignificant.

- **Since an increase in flow is proposed to the adjacent wetland, the applicant should address the discharge to wetland standard contained in section 4.1 of Chapter 500 including the use of level spreaders.**

  SME Response: The peak flow into the off-site wetland at Analysis Point 1 will only increase 0.76 cfs during a 25-year storm and will be reduced during the 2-year storm by 0.01 cfs and reduced in the 10-year storm by 0.18 cfs. This does not warrant the construction of a level spreader, which would need to occur in the wetland area. In addition, the outlets to the on-site wetland areas are limited to the underdrain pipes and overflows from UDSF 1 and UDSF 2. The remainder of the site will drain via overland flow into the wetlands.

  The flow from the outlet pipes of the UDSFs will consist of point flow from ¾-inch orifices draining to a riprap apron converting the flows to overland flow. The amount of drainage from these pipes will not require a level spreader.

  In addition, the drainage over the spillway at UDSF 1 during a 25-year storm will be 0.28-feet in depth and will drain into the forested area to the south. The drainage over the spillway at UDSF 2 will be 0.09-feet deep and will be spread to sheet flow as a result. Therefore, a level spreader will not be required at either point.

- **Site Plans**
  - **Site Layout Plan (C-103)**
    - **No pedestrian connection is shown between the satellite parking area and the main parking field for the Town Office. If the parking area is going to be used for overflow voter parking, is it desirable to have people using the connecting driveway as the primary pedestrian route as well, considering the driveway is only 20' in width.**

      SME Response: The two parking areas will be connected by the 6' paved sidewalk connection shown on drawings C-102. A sign has been added to direct pedestrians to use the sidewalk connection instead of walking on the 20-foot wide connecting driveway.

    - **Show stop sign/stop bar at access drive/Tuttle Road intersection**

      SME Response: Drawing C-102 was updated to show a painted stop line and stop sign at the new access from Tuttle Road.

    - **Designate accessible ramps at the existing sidewalk intersection with the proposed drive.**

      SME Response: Drawing C-102 was updated with accessible sidewalk ramps at the new access and a detail was added to drawing C-301.

    - **Show spot grades at accessible parking and walkway to fields to provide accessible slopes**

      SME Response: Spot grades were added to the accessible parking and walkway, as shown on Drawing C-103.

    - **Designate whether parking islands are landscaped or striped**

      SME Response: Parking islands will be loamed and seeded with grass seed. Drawing C-103 has been updated to reflect this.

    - **Add guardrail to the top of the retaining wall**

      SME Response: Drawing C-102 currently shows proposed wood guardrail along the parking along the retaining wall.

    - **Revise retaining wall detail to show parking at a higher elevation than ground outside parking area.**

      SME Response: The segmental retaining wall detail on Drawing C-301 has been revised.

    - **No lighting or photometrics were provides for this site**

      SME Response: The Town does not intend to put lighting in at this parking lot area. The access from Tuttle Road will be lit with existing parking lot lighting and no change is proposed.

If you have any questions or comments, please do not hesitate to contact me. We look forward to discussing this project in more detail with the Planning Board on April 21st.

Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Daniel P. Diffin, P.E., LEED AP BD+C
Vice President

Attachments

**ATTACHMENT 1**

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## Summary for Pond 1aP: UDSF 1

Inflow Area = 0.591 ac, 53.90% Impervious, Inflow Depth = 5.72" for 100-year event
Inflow = 4.04 cfs @ 12.07 hrs, Volume= 0.282 af
Outflow = 3.70 cfs @ 12.11 hrs, Volume= 0.254 af, Atten= 8%, Lag= 2.0 min
Primary = 0.03 cfs @ 12.11 hrs, Volume= 0.059 af
Secondary = 3.67 cfs @ 12.11 hrs, Volume= 0.195 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 105.93' @ 12.11 hrs Surf.Area= 1,747 sf Storage= 2,583 cf

Plug-Flow detention time= 127.3 min calculated for 0.254 af (90% of inflow)
Center-of-Mass det. time= 79.2 min ( 880.7 - 801.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 104.00' | 2,703 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 104.00 | 956 | 0 | 0 |
| 105.00 | 1,339 | 1,148 | 1,148 |
| 105.50 | 1,552 | 723 | 1,870 |
| 106.00 | 1,778 | 833 | 2,703 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Secondary | 105.50' | **5.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |
| #2 | Primary | 101.80' | **0.8" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |

**Primary OutFlow** Max=0.03 cfs @ 12.11 hrs HW=105.93' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 0.03 cfs @ 9.75 fps)

**Secondary OutFlow** Max=3.66 cfs @ 12.11 hrs HW=105.93' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 3.66 cfs @ 1.70 fps)

## Summary for Pond 1bP: UDSF 2

Inflow Area = 0.206 ac, 44.23% Impervious, Inflow Depth = 5.25" for 100-year event
Inflow = 1.30 cfs @ 12.07 hrs, Volume= 0.090 af
Outflow = 1.27 cfs @ 12.09 hrs, Volume= 0.090 af, Atten= 2%, Lag= 1.1 min
Primary = 0.03 cfs @ 12.09 hrs, Volume= 0.048 af
Secondary = 1.24 cfs @ 12.09 hrs, Volume= 0.042 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 103.13' @ 12.09 hrs Surf.Area= 773 sf Storage= 801 cf

Plug-Flow detention time= 135.5 min calculated for 0.090 af (100% of inflow)
Center-of-Mass det. time= 135.5 min ( 946.0 - 810.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 101.50' | 1,783 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 101.50 | 291 | 0 | 0 |
| 102.00 | 401 | 173 | 173 |
| 103.00 | 663 | 532 | 705 |
| 103.50 | 1,074 | 434 | 1,139 |
| 104.00 | 1,500 | 644 | 1,783 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 99.30' | **0.8" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #2 | Secondary | 103.00' | **10.1' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |

**Primary OutFlow** Max=0.03 cfs @ 12.09 hrs HW=103.13' (Free Discharge)
↑—**1=Orifice/Grate** (Orifice Controls 0.03 cfs @ 9.39 fps)

**Secondary OutFlow** Max=1.23 cfs @ 12.09 hrs HW=103.13' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 1.23 cfs @ 0.91 fps)

ATTACHMENT 2

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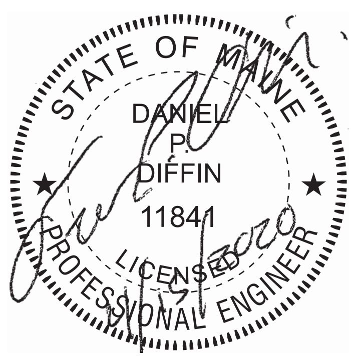
# STORMWATER MANAGEMENT REPORT
# PUBLIC WORKS IMPROVEMENTS PROJECT AND TOWN OFFICE PARKING EXPANSION
# CUMBERLAND, MAINE

Prepared for

## TOWN OF CUMBERLAND, MAINE




February 2020
REVISED: APRIL 2020

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ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

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**STORMWATER MANAGEMENT REPORT**
**PUBLIC WORKS AND TOWN PARKING ADDITION**
**CUMBERLAND, MAINE**

## 1.0 INTRODUCTION

This Stormwater Management Report was prepared by Sevee & Maher Engineers, Inc. (SME) to assess stormwater management design for the construction for the proposed improvements in the Town of Cumberland Public Works Improvements Project and Town Office Parking Expansion located in Cumberland, Maine. Stormwater design is based on the water quality and quantity objectives identified in Chapter 500 of the Maine Department of Environmental Protection's (MEDEP) Stormwater Management Law. This project will require a Site Location of Development Act (SLODA) Permit from the MEDEP for Common Scheme of Development.

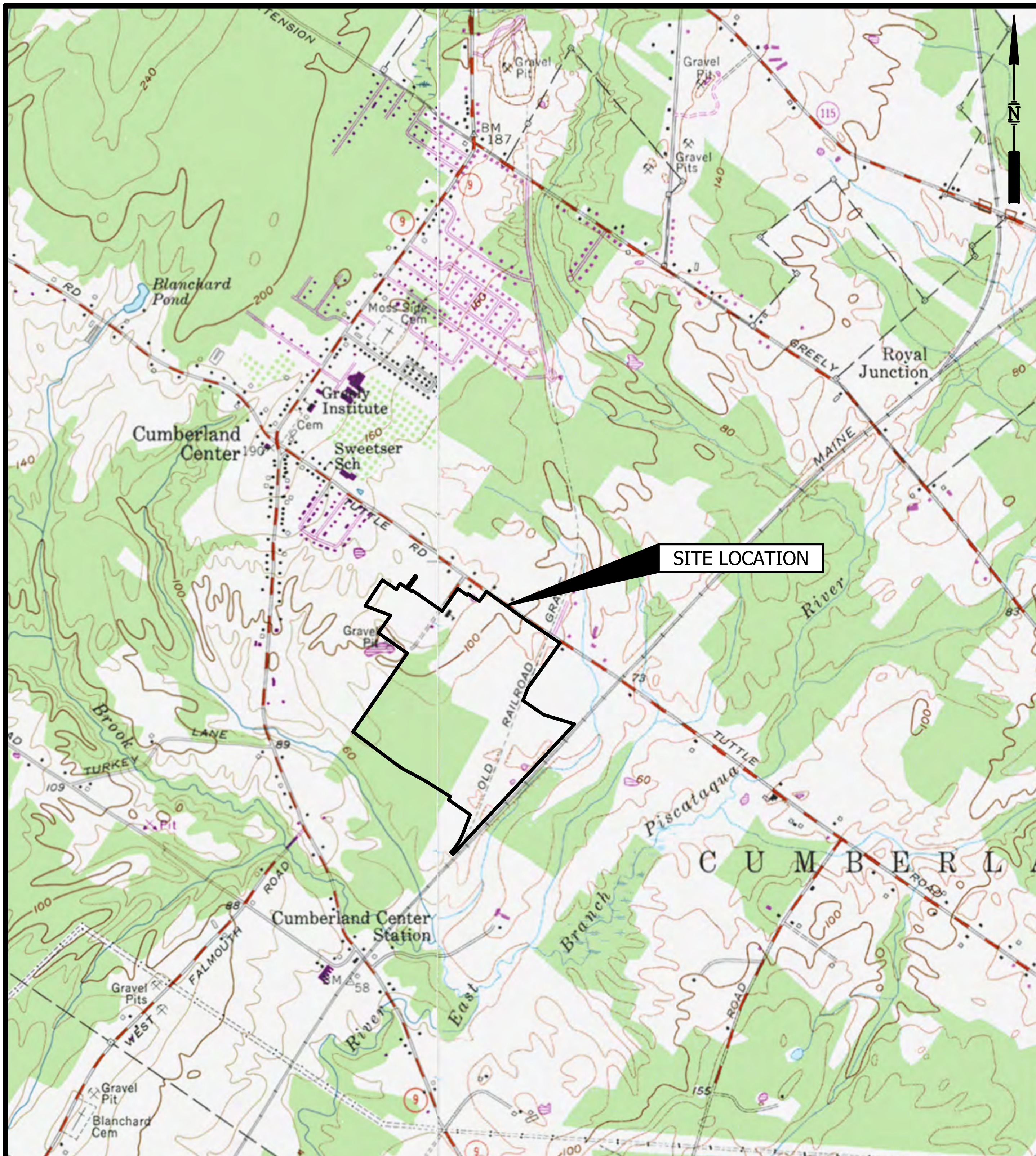
## 2.0 PROJECT DESCRIPTION

The Town of Cumberland (Town) is proposing to permit historical and proposed development on four Town owned parcels at 23 Drowne Road, 290 Tuttle Road, and setback off Tuttle Road between the Town Forest and railroad in Cumberland, Maine. The proposed development on these properties includes improvements to the Cumberland Public Works facility, the expansion of the Town Hall parking lot, and construction of a Sand/Salt Shed to relocate the existing. The Town plans to improve the facilities to benefit municipal staff, school bus drivers, and the residents of Cumberland. The four properties are shown on the attached Figure 1 Site Location Map.

The historical construction on the four parcels since 1975 and the proposed projects will result in approximately 5.14 acres of impervious area total. The parcels are also generally contiguous and require the Maine Department of Environmental Protection (MEDEP) Site Location of Development Act (SLODA) permit under the classification of Common Scheme of Development. The four parcels with the areas of each historical and proposed project are shown on the attached Figure 2 Common Scheme Neighborhood Aerial Map and the acreage of development is shown on Table 1.

<u>Public Works Improvements Project</u>

The Cumberland Public Works facility is located at 23 Drowne Road and is adjacent to a public Civic Lot at 3 Oak Street. The Public Works parcel is 9.2 acres and the Civic Lot is 4.4 acres in size. The existing facility includes the Public Works Garage, a cold storage building, a school bus maintenance building, an administrative trailer, sand/salt shed, school bus and staff parking, existing gravel compost pad, and a closed wood waste landfill. The existing wood waste landfill is also on the 9.2-acre property but is excluded from the SLODA permit because it is permitted under the MEDEP Solid Waste Bureau.




BASE MAP ADAPTED FROM 7.5 MIN
USGS TOPOGRAPHIC QUADRANGLES
CUMBERLAND CENTER, ME - 1975
YARMOUTH, ME - 1975

1000 0 2000 FEET

FIGURE 1
SITE LOCATION MAP
PUBLIC WORKS IMPROVEMENTS
CUMBERLAND, MAINE

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ENGINEERS

DWG: SITELOC LMN: COMMON SCHEME CTB: SME-STD REV: 12/2/2020

\\Nserver\cfs\TCU\Public Works Relocation\Current Site\Acad\Figures\SITELOC.dwg, 1/2/2020 11:37:13 AM, bwb


NOTES:

1. EXISTING PARCELS FROM TOWN OF CUMBERLAND GIS.
2. BASEMAP AERIAL PHOTO FROM GOOGLE EARTH, DATED 5/4/2018.

100 0 200 400 FEET

FIGURE 2
COMMON SCHEME
NEIGHBORHOOD AERIAL MAP
PUBLIC WORKS IMPROVEMENTS
CUMBERLAND, MAINE

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Phone 207.829.5016 • Fax 207.829.5692 • smemaine.com

DWG: BASE LMN: COMMON SCHEME CTB: SME-STD REV: 1/22/2020

**Table 1**
**Town of Cumberland Municipal Upgrades**
**Maine Department of Environmental Protection**
**Permitting Review of Historical Development**
Prepared by Sevee & Maher Engineers, Inc.
February 5, 2020

| Maine DEP Laws | | Year | Development | Project Impervious Area from Buildings (acres)* | Project Impervious Area from Parking/Drives/Walks (acres)* | Total Impervious (acres) |
|---|---|---|---|---|---|---|
| | | 1950 | School Building | 0.28 | 1.55 | 1.83 |
| | | 1973 | Public Works (PW) Garage/Salt Pil | 0.30 | 2.66 | 2.96 |
| 1975 | Site Location of Development (3-acres of non-revegetated Impervious area) | | | | | |
| | | 1980 | PW Maintenance Building | 0.05 | | 0.05 |
| | | 1990 | PW Cold Storage Building | 0.06 | | 0.06 |
| 1997 | Stormwater Management (1-acre impervious area) | | | | | |
| | | 1998 | Town Hall Building and Parking | 0.34 | 1.12 | 1.46 |
| | | 2004 | Salt Shed Original Construction | 0.06 | 0.1 | 0.16 |
| 2005 | Stormwater Major Update | | | | | |
| 2015 | Stormwater Major Update | | | | | |
| | | 2016 | Town Forest Trail Improvements | | 0.51 | 0.51 |
| | | 2020 | Relocated Sand/Salt Shed Bldg. | 0.18 | 0.45 | 0.63 |
| | | 2020 | Public Works Improvements | 0.35 | 1.32 | 1.67 |
| | | 2020 | Parking | 0.00 | 0.60 | 0.60 |
| | | | | | **Total Impervious Area (after 1975)** | **5.14** |

The proposed redevelopment includes 8,500-square-foot expansion to the existing Public Works Garage for four school bus and mechanic bays, a proposed 4,100-square-foot Office Building, the reconfiguration and expansion of site parking for forty (40) school bus spaces and 76 vehicle parking spaces, the relocation of the existing cold storage building, and construction of stormwater treatment. The project will include the demolition of the existing bus maintenance garage, the sand/salt shed, and other miscellaneous buildings. In addition, the gravel compost pads on top of the landfill and gravel storage areas on the Civic Lot will be removed and the areas revegetated and seeded with a New England Meadow Mix to promote additional growth.

The existing garage and parking area built in 1973 included 3.0 acres total of impervious area, which predates DEP Stormwater Law. The proposed area defined as redevelopment will include approximately 1.8 acres of impervious area and 1.0 acre of revegetated areas. The project will also include maintenance of approximated 1.1 acres of existing pavement that will include removal of the pavement, slight adjustments to the grades less than 12 inches, and repaving. The areas defined as redevelopment are shown on the attached Figure 3 Redevelopment Areas.

Town Office Parking Expansion

The Town Office, Town Forest, and Town Landfill are located at 290 Tuttle Road on a parcel 109 acres in size. An existing school, built in 1950, on the property and its historical improvements will not be included in this permit because it is privately operated via a land lease from the Town which excludes it from common scheme of development. The Town Landfill is not included in this permit because it is permitted under the DEP Solid Waste Bureau. This application incudes the Town Office building and parking which was constructed in 1998 and met the standards for development at that time. In 2016, the Town Forest trails increased by 0.5 acre of impervious area. The previous site development is shown on Figure 2.

The Town proposes to construct a parking expansion to serve as overflow during Town events and voting and additional parking for access to the Town ballfields. The parking expansion will include 36 spaces accessed via a 24-foot drive connected to the existing parking lot. A sidewalk connection will be made to the sidewalk on Tuttle Road and a small pedestrian accessway for the ballfield access. The proposed expansion will include an increase in impervious area of 0.6 acre on the property. The proposed improvements for the project are shown in the attached drawing set for Town Office Parking Expansion submitted with this application.

As shown on the drawings, the site has been designed to avoid direct wetland impacts. A Natural Resource Protection Act (NRPA) Permit by Rule (PBR) will be required for the construction of the access walk to the ballfields over the on-site stream and alterations within 75 feet of the stream. The NRPA PBR application will be submitted to MEDEP at a later date.


N

## LEGEND

| | |
|---|---|
| (green) | REDEVELOPMENT OF LAND USE (±111,510 SF) |
| (blue) | MAINTENANCE OF PAVEMENT (±48,970 SF) |

AREAS WITHOUT SHADING TO HAVE NO SIGNIFICANT CHANGE OF LAND USE.

NOTES:

1. PROPERTY BOUNDARY PREPARED BY BOUNDARY POINTS PROFESSIONAL LAND SURVEYING, LLC, CUMBERLAND, MAINE, DATED AUGUST, 2019. VERTICAL DATUM: NAVD 1988. HORIZONTAL DATUM: NAD83.

25 0 50 100 FEET

# FIGURE 3
# REDEVELOPMENT AREAS
# TOWN OF CUMBERLAND
# PUBLIC WORKS IMPROVEMENTS
# DROWNE ROAD
# CUMBERLAND, MAINE


SME
SEVEE & MAHER ENGINEERS
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • smemaine.com


DWG: BASE LMN: REDEVELOPMENT CTB: SME-STD REV: 1/22/2020

## 3.0 SITE WATERSHED

On-site soils for both sites were identified using the Natural Resources Conservation Service (NRCS) soil information for Cumberland and Part of Oxford County, Maine. A copy of the custom Soil Resource Report is included in Appendix A of this report. The report includes a soil map for the project area. Soil mapping information is also included in the project plan sets.

The soil within the watersheds for the consist of Suffield (SuD2/SuC2) silt loam, Nicholville (BgB) very sandy silt loam, Lamoine (BuB) silt loam, Elmwood (EmB) fine sandy loam, Scantic (Sn) silt loam, Hinkley-Suffield (HnC) complex, and Gravel pits (Gp). Soil natural drainage classifications range from “Excessively drained” to “Poorly drained.” Hydrologic soil groups range from Type A to Type D.

Stormwater management plans identify the on-site drainage patterns before and after development (see Drawings D-100 and D-101). These drawings are included in both project plan set for reference. Appendix B provides pre-development stormwater calculations and Appendix C includes post development calculations. These calculations were prepared using TR-20 methodologies within the HydroCAD Version 10.0 computer stormwater modeling system by Applied Microcomputer Systems of Chocorua, New Hampshire.

Public Works Improvements Project

The existing Public Works facility and Civic Lot is a local high point that drains to three distinct Analysis Points. The first, identified as Analysis Point 1 (AP1), is an existing pond south of the wood waste landfill. AP1 receives flows from the closed wood waste landfill, existing gravel compost pad and existing sand/salt shed area, which drain southeasterly via overland flow and riprap lined drainage swales on or abutting the closed landfill. In addition, most of the public works site drains toward Drowne Road and into a series of catch basins and closed storm drain system that outlet to the pond. The rear of the public works site and front of the Civic Lot also drain to a culvert that flows into a 15-inch storm drain system and to the pond.

The areas draining to AP1 in post developed conditions will generally flow similar to existing conditions. Approximately 1.5 acres of gravel pad will be removed from the existing compost area over the top of the closed landfill. In addition, the sand/salt shed and most of the paved and gravel surface in the area will be removed and seeded as lawn. Additional pavement will be added around the public works facility to accommodate the expanded parking, and areas in the subcatchment will drain to three distinct stormwater treatment measures, an underdrained soil filter, a Filterra Tree Box Filter and a roof dripline filter.

AP2 is a point to the west of the civic lot and includes flows from the rear half of the civic lot via overland flows. The catchment consists of gravel surface storage areas used for existing public works operations that will be revegetated and seeded as meadow areas in post development. The flow patterns to AP2 will be generally similar in post development conditions.

AP3 is an existing drainage easement north of the site that conveys flows to a culvert in Oak Street. The drainage subcatchment to AP3 is a small area on the northwest portion of the Public Works site that includes impervious areas associated with the existing snowmobile club shed. In developed conditions, the shed will be removed and reseeded and the overall catchment size will be reduced as a result of a slight revision to flow patterns in the area.

The soil within the watersheds for the public work project consist of Suffield (SuD2/SuC2) silt loam, Nicholville (BgB) very sandy silt loam, Lamoine (BuB) silt loam, Scantic (Sn) silt loam, Hinkley-Suffield (HnC) complex, and Gravel pits (Gp). Soil natural drainage classifications range from "Excessively drained" to "Poorly drained." Hydrologic soil groups range from Type A to Type D. The soils from the report in the area of the wood waste landfill closure include areas of Gp and BgB which are classified as HSG A and HSG B, respectively. To accurately represent the soil liner over the extents of the landfill these HSG A and HSG B soil types were revised to HSG D with a meadow land cover.

Town Office Parking Expansion

The area within the footprint of the proposed parking lot is currently undeveloped wooded land that slopes from west to east between 6 and 9 percent grade. Stormwater runoff flows southeasterly to an existing stream and wetland complex that outlets to the larger wetland complex within the Town Forest area.

The proposed parking area will result in approximately 18,800 square feet of new impervious area and 25,800 square feet of new developed area. Stormwater runoff from the new parking lot will generally flow in the same direction and be captured in two underdrained soil filters that will provide treatment and peak flow attenuation.

The soil within the watersheds for the parking expansion consist of Lamoine (BuB) silt loam and Elmwood (EmB) fine sandy loam. Soil natural drainage classifications range from "Excessively drained" to "Poorly drained." Hydrologic soil groups range from Type B to Type C.

## 4.0 BASIC STANDARDS

Erosion and Sediment Control details are included on the drawings and in Section 14 of the SLODA Permit application.

## 5.0 GENERAL STANDARDS

The following is a summary of how the two projects meet the General Standards outlined in Chapter 500.

Public Works Improvements Project

The Public Works project is required to meet the Redevelopment portion of the General Standards since the site is fully developed in existing conditions. The areas considered as redevelopment on the site are shown Figure 3 Redevelopment Areas and total approximately 111,500 square feet. Figure 3 also highlights the portion of the project site that meets the definition of maintenance reviewed with the DEP staff during the pre-application meeting. The site area within the extents of the existing landfill, including a large portion of the gravel compost pad, are permitted under a MEDEP Solid Waste Bureau Permit and not subject to Site Law. In general, the definition is the areas where grade was not raised or lowered more than 12 inches and the general flow patterns were not significantly revised. The Redevelopment Treatment Level Calculations are included in Appendix D of this report and show the project must provide treatment for approximately 50 percent of the redeveloped area or 56,303 square feet.

This treatment will be provided through construction of an underdrained soil filter, Filterra Tree Box Filter, and roof dripline filters on the new administration building.

The underdrained soil filter has been designed to capture runoff from the bus and bus driver parking on the north of the site. The areas captured include portions of the proposed public works building expansion. The soil filter will treat 23,200 square feet of impervious area and 12,100 square feet of landscaped area, for a total of 35,300 square feet.

The Filterra Tree Box Filter was designed to capture runoff from the southerly site entrance and parking and maneuvering areas along the south side of the existing public works building. The Filterra unit was sized in accordance with the manufacturer’s recommendations as evidenced by the approval letter included in Appendix G. The treatment provided will be for approximately 15,600 square feet of impervious area and 1,300 square feet of landscaped area, for a total of 16,900 square feet of treatment.

The new administration building will be treated with the construction of dripline filters at each drip edge along the full length of the building. The roof dripline filters will capture 4,100 square feet of area total.

The three treatment measures combined will treat approximately 42,900 square feet of impervious area and 13,412 square feet of landscaped area. This is equivalent to 50.5 percent of the total redeveloped areas on the public works site.

The sizing for the treatment measures and the Treatment Summary are included in Appendix E of this report.

Town Office Parking Expansion

Stormwater treatment at the Town Office Parking Expansion will be accomplished by directing flow from the new development to two underdrained soil filters. The flows from most of the parking area will be treated in Underdrained Soil Filter 1, which will treat 13,900 square feet of impervious area and 2,700 square feet of landscaped area. Underdrained soil filter 2 was sized to treat 3,900 square feet of impervious and 5,000 square feet of lawn area from the access drive connecting the existing Town Office Parking Expansion to the new parking area.

The two filters have been designed to treat 95 percent of the 18,800 square feet of new impervious area and 95 percent of the 25,800 square feet of new developed area. The sizing calculations for the underdrained soil filters and the Treatment Summary are included in Appendix F of this report.

## 6.0 FLOODING STANDARDS

Stormwater quantity is managed to the maximum extent practicable through minimizing the amount of impervious area on the site, revegetating the cleared and grubbed area with meadow seed, and utilizing the storage characteristics of the grassed underdrained soil filter north of the proposed building.

The stormwater model for these projects were developed to size the water quality treatment BMPs and to determine peak flow rates to the identified Analysis Points. Stormwater peak flow rates were modeled for the 2-, 10-, and 25-year/24-hour storm events with Type III Soil Conservation Service rainfall distribution, using the HydroCAD computer modeling system by Applied Microcomputer Systems of Chocorua, New Hampshire. The peak flow rates at each Analysis Point are summarized in Tables 2 and 3. Rainfall intensities were taken from Appendix H of MEDEP's Chapter 500 for each of the storms. The peak flows for each project are presented in the following subsections of this report.

### Public Works

The following table provides the results of the modelling for peak flows at the Analysis Points for the Public Works Facility. Copies of the HydroCAD calculations for the Public Works project provided in Appendix B.

**TABLE 2**

**PUBLIC WORKS IMPROVEMENTS**
**STORMWATER QUANTITY SUMMARY**

| | 2-Year Storm | | 10-Year Storm | | 25-Year Storm | |
|---|---|---|---|---|---|---|
| | **Existing** | **Proposed** | **Existing** | **Proposed** | **Existing** | **Proposed** |
| **Analysis Point 1 (cfs)** | 12.05 | 10.72 | 23.99 | 19.42 | 32.38 | 25.78 |
| **Analysis Point 2 (cfs)** | 4.50 | 4.21 | 9.77 | 9.36 | 14.41 | 13.94 |
| **Analysis Point 3 (cfs)** | 0.36 | 0.25 | 0.76 | 0.58 | 1.11 | 0.87 |

As shown, site drainage from the proposed redevelopment will generally follow the pre-development conditions.

Flows at AP1 will decrease due to the removal of the gravel compost pad and sand/salt shed building. In addition, flows will be attenuated for the areas draining to the Filterra Tree Box Filter and Underdrained Soil Filter.

The flows at AP2 and AP3 will decrease from the revegetation of the gravel areas on the Civic Lot and reduction of the catchment to AP3.

**Town Office Parking Expansion**

The peak flow rates for the Town Office Parking Expansion are shown in Table 3. Copies of the HydroCAD calculations for the Public Works project are provided in Appendix C.

**TABLE 3**

**TOWN OFFICE PARKING EXPANSION**
**STORMWATER QUANTITY SUMMARY**

| | 2-Year Storm | | 10-Year Storm | | 25-Year Storm | |
|---|---|---|---|---|---|---|
| | **Existing** | **Proposed** | **Existing** | **Proposed** | **Existing** | **Proposed** |
| **Analysis Point 1 (cfs)** | 0.85 | 0.84 | 3.35 | 3.17 | 5.96 | 6.70 |

As outlined in Table 3, our model indicates decreased peak flow rates at AP-1 during the 2-year and 10-year storms and an increase during the 25-year storm of 0.74 cfs. The attenuation of the flows from the paved parking area is accomplished in the two underdrained soil filters which were oversized to capture the 10-year storm. The increase at AP-1 during the 25-year storm is equivalent to a 12 percent increase, but less than one cfs. The downstream channel is a wetland complex within the Town Office property that will not be adversely impacted by this minor increase during larger storm events.

## 7.0 MAINTENANCE PLAN, INSPECTIONS, AND REQUIREMENTS

Maintenance of the proposed facility and stormwater treatment BMPs will be performed by the Town Public Works personnel for the soil filters and Contech for the Tree Box Filter for the first year after installation. Contact information for the facility and Owner's representative is included in the Post-Construction Stormwater Management Plan, attached as Appendix H. During construction, the site work contractor (not yet selected) will be responsible for all site maintenance. The Post-Construction Stormwater Management Plan describes the facilities to be maintained and includes sample maintenance logs. The Town will procure a third-party contract for the maintenance of the Filterra unit after the first year is up.

## 8.0 CONCLUSION

The stormwater management for the Public Works and Town Office projects was designed in accordance with MEDEP Chapter 500 requirements for new development. Water quality treatment will be provided by a grassed underdrained soil filters, roof dripline filters, and a tree box filter outlined in Section 5.0 of this report.

The peak flows for each project site have been controlled to less than the pre-development conditions. As a result, there will be no adverse impacts on downstream drainage or abutting properties.

**APPENDIX A**

**NRCS SOIL SURVEY**

SME
SEVEE & MAHER
ENGINEERS

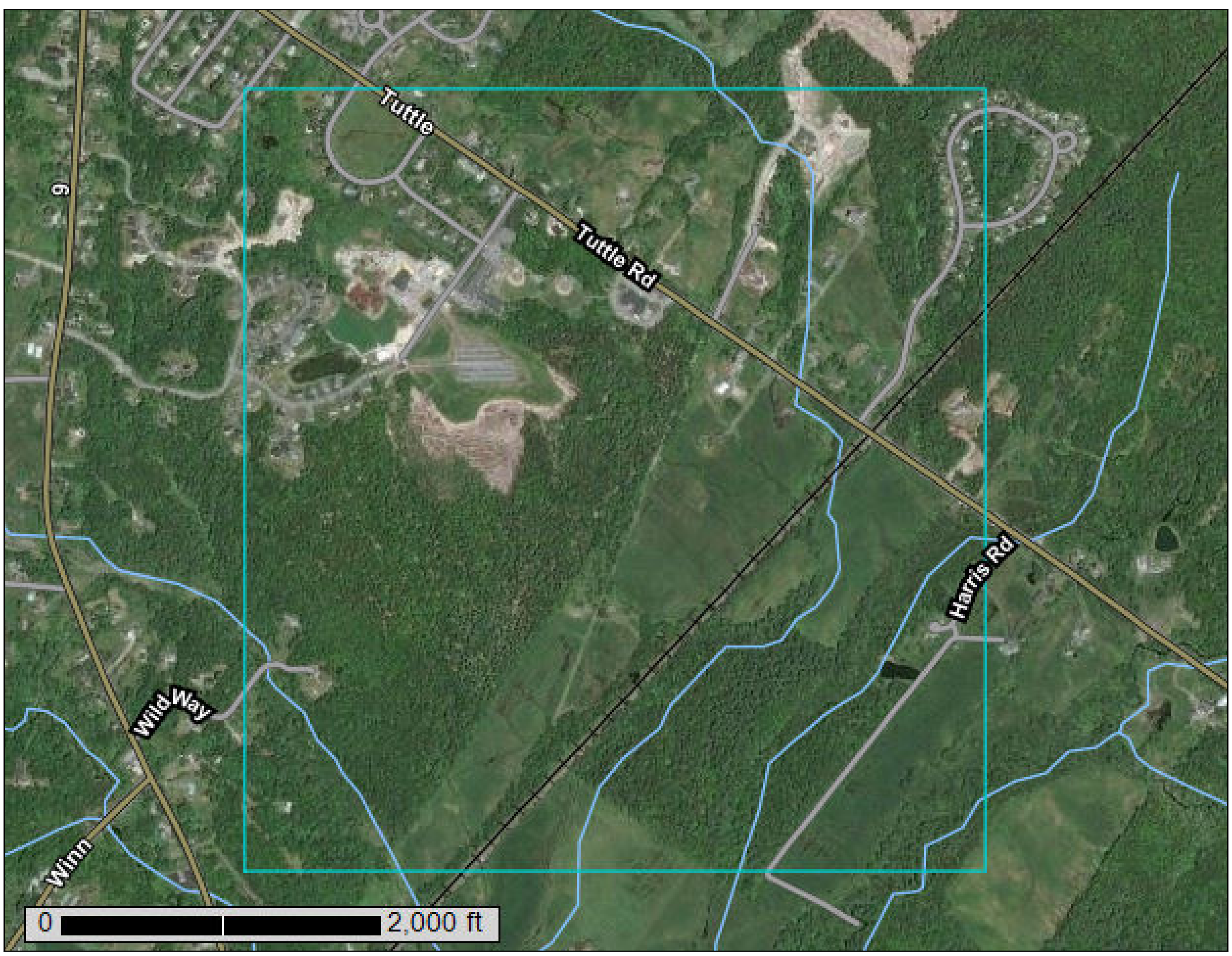
United States Department of Agriculture

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 Cumberland County and Part of Oxford County, Maine




January 8, 2020

# Preface

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

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

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

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

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

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

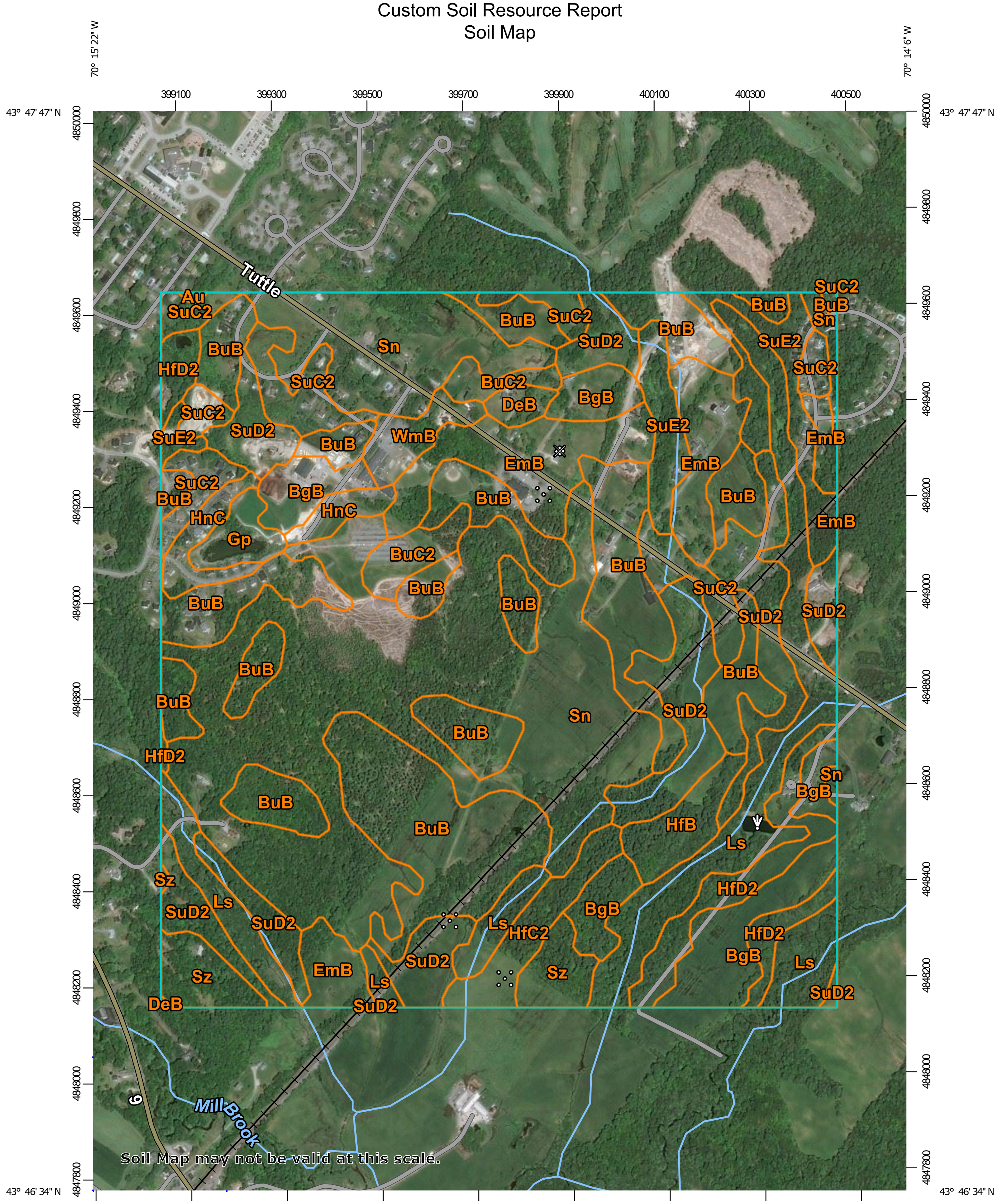
The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

# Contents

# Soil Map

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

# Soil Map




Map Scale: 1:10,900 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 150, 300, 600, 900

Feet: 0, 500, 1000, 2000, 3000

N

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 1:24,000.

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: Cumberland County and Part of Oxford County, Maine
Survey Area Data: Version 16, Sep 16, 2019

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

Date(s) aerial images were photographed: Jun 7, 2019—Jul 2, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

| MAP LEGEND | MAP INFORMATION |
| --- | --- |
| | 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 |
|---|---|---|---|
| Au | Au Gres loamy sand | 0.2 | 0.0% |
| BgB | Nicholville very fine sandy loam, 0 to 8 percent slopes | 28.4 | 5.4% |
| BuB | Lamoine silt loam, 3 to 8 percent slopes | 110.8 | 21.2% |
| BuC2 | Buxton silt loam, 8 to 15 percent slopes | 7.7 | 1.5% |
| DeB | Deerfield loamy fine sand, 3 to 8 percent slopes | 2.4 | 0.5% |
| EmB | Elmwood fine sandy loam, 0 to 8 percent slopes | 34.8 | 6.7% |
| Gp | Gravel pits | 4.7 | 0.9% |
| HfB | Hartland very fine sandy loam, 3 to 8 percent slopes | 7.1 | 1.4% |
| HfC2 | Hartland very fine sandy loam, 8 to 15 percent slopes, eroded | 8.6 | 1.7% |
| HfD2 | Hartland very fine sandy loam, 15 to 25 percent slopes, eroded | 16.7 | 3.2% |
| HnC | Hinckley-Suffield complex, 8 to 15 percent slopes | 7.9 | 1.5% |
| Ls | Limerick-Saco silt loams | 45.0 | 8.6% |
| Sn | Scantic silt loam, 0 to 3 percent slopes | 133.1 | 25.5% |
| SuC2 | Suffield silt loam, 8 to 15 percent slopes, eroded | 24.1 | 4.6% |
| SuD2 | Suffield silt loam, 15 to 25 percent slopes, eroded | 54.2 | 10.4% |
| SuE2 | Suffield silt loam, 25 to 45 percent slopes, eroded | 19.3 | 3.7% |
| Sz | Swanton fine sandy loam | 11.3 | 2.2% |
| WmB | Windsor loamy sand, 0 to 8 percent slopes | 5.4 | 1.0% |
| **Totals for Area of Interest** | | **521.8** | **100.0%** |

# Map Unit Descriptions

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

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

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

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

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

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

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

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

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps.

The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

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

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

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

# Cumberland County and Part of Oxford County, Maine

## Au—Au Gres loamy sand

**Map Unit Setting**

*National map unit symbol:* blgr
*Elevation:* 10 to 2,200 feet
*Mean annual precipitation:* 29 to 50 inches
*Mean annual air temperature:* 37 to 46 degrees F
*Frost-free period:* 70 to 160 days
*Farmland classification:* Not prime farmland

**Map Unit Composition**

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

**Description of Au Gres**

**Setting**

*Landform:* Outwash plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Sandy glaciofluvial deposits derived from granite and gneiss

**Typical profile**

*H1 - 0 to 10 inches:* loamy sand
*H2 - 10 to 32 inches:* loamy sand
*H3 - 32 to 65 inches:* sand

**Properties and qualities**

*Slope:* 0 to 3 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Poorly drained
*Capacity of the most limiting layer to transmit water (Ksat):* High (2.00 to 6.00 in/hr)
*Depth to water table:* About 0 to 18 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* Low (about 3.6 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 4w
*Hydrologic Soil Group:* A/D
*Hydric soil rating:* Yes

**Minor Components**

**Saugatuck**

*Percent of map unit:* 6 percent
*Landform:* Outwash plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Talf

*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* Yes

**Deerfield**

*Percent of map unit:* 4 percent
*Landform:* Outwash plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Rise
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Scantic**

*Percent of map unit:* 2 percent
*Landform:* Coastal plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Dip
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

**Walpole**

*Percent of map unit:* 2 percent
*Landform:* Outwash plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* Yes

**Windsor**

*Percent of map unit:* 1 percent
*Landform:* Outwash plains
*Landform position (two-dimensional):* Summit
*Landform position (three-dimensional):* Rise
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

## BgB—Nicholville very fine sandy loam, 0 to 8 percent slopes

### Map Unit Setting

*National map unit symbol:* 2yjg5
*Elevation:* 20 to 2,300 feet
*Mean annual precipitation:* 34 to 50 inches
*Mean annual air temperature:* 37 to 45 degrees F
*Frost-free period:* 90 to 160 days
*Farmland classification:* Farmland of statewide importance

**Map Unit Composition**

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

**Description of Nicholville**

**Setting**

*Landform:* Lakebeds (relict)
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Side slope
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Coarse-silty glaciomarine deposits

**Typical profile**

*Ap - 0 to 7 inches:* very fine sandy loam
*Bs - 7 to 19 inches:* very fine sandy loam
*BC - 19 to 30 inches:* very fine sandy loam
*C - 30 to 65 inches:* loamy very fine sand

**Properties and qualities**

*Slope:* 0 to 8 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Moderately well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.14 to 1.42 in/hr)
*Depth to water table:* About 18 to 30 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:* High (about 10.3 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 2e
*Hydrologic Soil Group:* C
*Hydric soil rating:* No

**Minor Components**

**Croghan**

*Percent of map unit:* 5 percent
*Landform:* Lakebeds (relict)
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Side slope
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Roundabout, somewhat poorly drained**

*Percent of map unit:* 5 percent
*Landform:* Lakebeds (relict)
*Landform position (two-dimensional):* Footslope, toeslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Linear

*Across-slope shape:* Linear
*Hydric soil rating:* No

**Salmon**

*Percent of map unit:* 3 percent
*Landform:* Lakebeds (relict)
*Landform position (two-dimensional):* Backslope, summit
*Landform position (three-dimensional):* Side slope, crest
*Down-slope shape:* Linear
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Roundabout**

*Percent of map unit:* 2 percent
*Landform:* Lakebeds (relict)
*Landform position (two-dimensional):* Footslope, toeslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Linear
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

## BuB—Lamoine silt loam, 3 to 8 percent slopes

### Map Unit Setting

*National map unit symbol:* 2t0kc
*Elevation:* 10 to 490 feet
*Mean annual precipitation:* 33 to 60 inches
*Mean annual air temperature:* 36 to 52 degrees F
*Frost-free period:* 90 to 160 days
*Farmland classification:* Farmland of statewide importance

### Map Unit Composition

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

### Description of Lamoine

#### Setting

*Landform:* Marine terraces, river valleys
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Fine glaciomarine deposits

#### Typical profile

*Ap - 0 to 7 inches:* silt loam
*Bw - 7 to 13 inches:* silt loam
*Bg - 13 to 24 inches:* silty clay loam
*Cg - 24 to 65 inches:* silty clay

**Properties and qualities**

*Slope:* 3 to 8 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Somewhat poorly drained
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.14 in/hr)
*Depth to water table:* About 6 to 17 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:* Moderate (about 7.6 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 3w
*Hydrologic Soil Group:* C/D
*Hydric soil rating:* No

**Minor Components**

**Scantic**

*Percent of map unit:* 10 percent
*Landform:* Marine terraces, river valleys
*Landform position (two-dimensional):* Toeslope, footslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Linear
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

**Buxton**

*Percent of map unit:* 3 percent
*Landform:* Marine terraces, river valleys
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Side slope
*Down-slope shape:* Linear
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Ragmuff**

*Percent of map unit:* 1 percent
*Landform:* Marine terraces, river valleys
*Landform position (two-dimensional):* Backslope, shoulder
*Landform position (three-dimensional):* Side slope, base slope
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Biddeford**

*Percent of map unit:* 1 percent
*Landform:* Marine terraces, river valleys
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Ecological site:* Marine Terrace Depression (F144BY002ME)
*Hydric soil rating:* Yes

## BuC2—Buxton silt loam, 8 to 15 percent slopes

### Map Unit Setting

*National map unit symbol:* 2x1by
*Elevation:* 10 to 490 feet
*Mean annual precipitation:* 33 to 60 inches
*Mean annual air temperature:* 36 to 52 degrees F
*Frost-free period:* 90 to 160 days
*Farmland classification:* Not prime farmland

### Map Unit Composition

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

### Description of Buxton

#### Setting

*Landform:* Marine terraces, river valleys
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Side slope
*Down-slope shape:* Linear
*Across-slope shape:* Convex
*Parent material:* Fine glaciomarine deposits

#### Typical profile

*Ap - 0 to 7 inches:* silt loam
*Bw1 - 7 to 18 inches:* silt loam
*Bw2 - 18 to 23 inches:* silty clay loam
*BC - 23 to 35 inches:* silty clay loam
*C - 35 to 65 inches:* silty clay

#### Properties and qualities

*Slope:* 8 to 15 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Moderately well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.14 in/hr)
*Depth to water table:* About 17 to 24 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:* High (about 9.1 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 3e
*Hydrologic Soil Group:* C/D
*Hydric soil rating:* No

### Minor Components

#### Lamoine

*Percent of map unit:* 7 percent
*Landform:* Marine terraces, river valleys
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Hydric soil rating:* No

#### Scantic

*Percent of map unit:* 5 percent
*Landform:* Marine terraces, river valleys
*Landform position (two-dimensional):* Toeslope, footslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

#### Buxton, >15% slopes

*Percent of map unit:* 3 percent
*Landform:* Marine terraces, river valleys
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Side slope
*Down-slope shape:* Linear
*Across-slope shape:* Convex
*Hydric soil rating:* No

## DeB—Deerfield loamy fine sand, 3 to 8 percent slopes

### Map Unit Setting

*National map unit symbol:* 2xfg9
*Elevation:* 0 to 1,190 feet
*Mean annual precipitation:* 36 to 71 inches
*Mean annual air temperature:* 39 to 55 degrees F
*Frost-free period:* 145 to 240 days
*Farmland classification:* Farmland of statewide importance

### Map Unit Composition

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

### Description of Deerfield

#### Setting

*Landform:* Kame terraces, outwash plains, outwash terraces, outwash deltas
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Convex, linear, concave

*Across-slope shape:* Concave, linear, convex
*Parent material:* Sandy outwash derived from granite, gneiss, and/or quartzite

**Typical profile**

*Ap - 0 to 9 inches:* loamy fine sand
*Bw - 9 to 25 inches:* loamy fine sand
*BC - 25 to 33 inches:* fine sand
*Cg - 33 to 60 inches:* sand

**Properties and qualities**

*Slope:* 3 to 8 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Moderately well drained
*Runoff class:* Very 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:* About 15 to 37 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Salinity, maximum in profile:* Nonsaline (0.0 to 1.9 mmhos/cm)
*Sodium adsorption ratio, maximum in profile:* 11.0
*Available water storage in profile:* Moderate (about 6.5 inches)

**Interpretive groups**

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

### Minor Components

**Windsor**

*Percent of map unit:* 7 percent
*Landform:* Outwash deltas, kame terraces, outwash plains, outwash terraces
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear, concave, convex
*Across-slope shape:* Concave, linear, convex
*Hydric soil rating:* No

**Wareham**

*Percent of map unit:* 5 percent
*Landform:* Depressions, drainageways
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

**Sudbury**

*Percent of map unit:* 2 percent
*Landform:* Outwash plains, outwash terraces, outwash deltas, kame terraces
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear, convex, concave
*Across-slope shape:* Concave, linear, convex
*Hydric soil rating:* No

**Ninigret**

*Percent of map unit:* 1 percent
*Landform:* Kame terraces, outwash terraces, outwash plains
*Landform position (three-dimensional):* Tread

*Down-slope shape:* Convex, linear
*Across-slope shape:* Convex, concave
*Hydric soil rating:* No

## EmB—Elmwood fine sandy loam, 0 to 8 percent slopes

### Map Unit Setting

*National map unit symbol:* blh8
*Elevation:* 10 to 900 feet
*Mean annual precipitation:* 36 to 55 inches
*Mean annual air temperature:* 39 to 46 degrees F
*Frost-free period:* 90 to 195 days
*Farmland classification:* All areas are prime farmland

### Map Unit Composition

*Elmwood and similar soils:* 88 percent
*Minor components:* 12 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Elmwood

#### Setting

*Landform:* Stream terraces
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Coarse-loamy glaciolacustrine deposits

#### Typical profile

*H1 - 0 to 8 inches:* fine sandy loam
*H2 - 8 to 25 inches:* sandy loam
*H3 - 25 to 65 inches:* silty clay loam

#### Properties and qualities

*Slope:* 0 to 8 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Moderately well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)
*Depth to water table:* About 18 to 36 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* High (about 9.7 inches)

#### Interpretive groups

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

**Minor Components**

**Swanton**

*Percent of map unit:* 7 percent
*Landform:* Stream terraces
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* Yes

**Melrose**

*Percent of map unit:* 3 percent
*Landform:* Stream terraces
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Whately**

*Percent of map unit:* 2 percent
*Landform:* Stream terraces
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

## Gp—Gravel pits

**Map Unit Setting**

*National map unit symbol:* blh9
*Elevation:* 10 to 2,200 feet
*Mean annual precipitation:* 30 to 50 inches
*Mean annual air temperature:* 37 to 46 degrees F
*Frost-free period:* 70 to 160 days
*Farmland classification:* Not prime farmland

**Map Unit Composition**

*Gravel pits:* 92 percent
*Minor components:* 8 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Gravel Pits**

**Typical profile**

*H1 - 0 to 6 inches:* extremely gravelly sand
*H2 - 6 to 60 inches:* extremely gravelly sand

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 8s
*Hydric soil rating:* No

### Minor Components

**Hinckley**

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

**Windsor**

*Percent of map unit:* 2 percent
*Landform:* Outwash terraces
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Deerfield**

*Percent of map unit:* 1 percent
*Landform:* Outwash terraces
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

## HfB—Hartland very fine sandy loam, 3 to 8 percent slopes

### Map Unit Setting

*National map unit symbol:* blhb
*Elevation:* 10 to 2,500 feet
*Mean annual precipitation:* 34 to 55 inches
*Mean annual air temperature:* 37 to 46 degrees F
*Frost-free period:* 60 to 195 days
*Farmland classification:* Farmland of statewide importance

### Map Unit Composition

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

### Description of Hartland

#### Setting

*Landform:* Lakebeds
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Coarse-silty glaciolacustrine deposits

#### Typical profile

*H1 - 0 to 9 inches:* very fine sandy loam
*H2 - 9 to 29 inches:* silt loam
*H3 - 29 to 65 inches:* silt loam

#### Properties and qualities

*Slope:* 3 to 8 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* High (about 11.8 inches)

#### Interpretive groups

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

### Minor Components

#### Belgrade

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

#### Elmwood

*Percent of map unit:* 3 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

#### Tunbridge

*Percent of map unit:* 2 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Tread

*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Buxton**
*Percent of map unit:* 2 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Hartland, slopes >8%**
*Percent of map unit:* 1 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Hartland, slopes <3%**
*Percent of map unit:* 1 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Roundabout**
*Percent of map unit:* 1 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

## HfC2—Hartland very fine sandy loam, 8 to 15 percent slopes, eroded

**Map Unit Setting**
*National map unit symbol:* blhc
*Elevation:* 10 to 2,500 feet
*Mean annual precipitation:* 34 to 50 inches
*Mean annual air temperature:* 37 to 46 degrees F
*Frost-free period:* 60 to 160 days
*Farmland classification:* Not prime farmland

**Map Unit Composition**

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

**Description of Hartland**

**Setting**

*Landform:* Lakebeds
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Coarse-silty glaciolacustrine deposits

**Typical profile**

*H1 - 0 to 9 inches:* very fine sandy loam
*H2 - 9 to 29 inches:* silt loam
*H3 - 29 to 65 inches:* silt loam

**Properties and qualities**

*Slope:* 8 to 15 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* High (about 11.8 inches)

**Interpretive groups**

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

**Minor Components**

**Belgrade**

*Percent of map unit:* 6 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Buxton**

*Percent of map unit:* 3 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Tunbridge**

*Percent of map unit:* 2 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Hollis**

*Percent of map unit:* 2 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Hartland, slopes >15%**

*Percent of map unit:* 1 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Hartland, slopes <8%**

*Percent of map unit:* 1 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

## HfD2—Hartland very fine sandy loam, 15 to 25 percent slopes, eroded

### Map Unit Setting

*National map unit symbol:* blhd
*Elevation:* 10 to 900 feet
*Mean annual precipitation:* 34 to 48 inches
*Mean annual air temperature:* 43 to 46 degrees F
*Frost-free period:* 90 to 160 days
*Farmland classification:* Not prime farmland

### Map Unit Composition

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

### Description of Hartland

#### Setting

*Landform:* Lakebeds
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Coarse-silty glaciolacustrine deposits

#### Typical profile

*H1 - 0 to 9 inches:* very fine sandy loam
*H2 - 9 to 29 inches:* silt loam
*H3 - 29 to 65 inches:* silt loam

#### Properties and qualities

*Slope:* 15 to 25 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* High (about 11.8 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 4e
*Hydrologic Soil Group:* B
*Hydric soil rating:* No

### Minor Components

#### Melrose

*Percent of map unit:* 7 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

#### Buxton

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

#### Hartland, slopes <15%

*Percent of map unit:* 2 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Tread

*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Hartland, slopes >25%**

*Percent of map unit:* 1 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

## HnC—Hinckley-Suffield complex, 8 to 15 percent slopes

**Map Unit Setting**

*National map unit symbol:* 2svlx
*Elevation:* 0 to 470 feet
*Mean annual precipitation:* 36 to 71 inches
*Mean annual air temperature:* 39 to 55 degrees F
*Frost-free period:* 145 to 240 days
*Farmland classification:* Not prime farmland

**Map Unit Composition**

*Hinckley and similar soils:* 60 percent
*Suffield and similar soils:* 25 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Hinckley**

**Setting**

*Landform:* Kame terraces, outwash plains, kames, eskers, moraines, outwash terraces, outwash deltas
*Landform position (two-dimensional):* Shoulder, backslope, footslope
*Landform position (three-dimensional):* Nose slope, side slope, crest, head slope, riser
*Down-slope shape:* Linear, convex, concave
*Across-slope shape:* Convex, linear, concave
*Parent material:* Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

**Typical profile**

*A - 0 to 8 inches:* loamy sand
*Bw1 - 8 to 11 inches:* gravelly loamy sand
*Bw2 - 11 to 16 inches:* gravelly loamy sand
*BC - 16 to 19 inches:* very gravelly loamy sand
*C - 19 to 65 inches:* very gravelly sand

**Properties and qualities**

*Slope:* 8 to 15 percent

*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Excessively drained
*Runoff class:* Very 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:* Very low (about 2.9 inches)

**Interpretive groups**
*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 4e
*Hydrologic Soil Group:* A
*Hydric soil rating:* No

**Description of Suffield**

**Setting**
*Landform:* Marine terraces
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Parent material:* Silty glaciolacustrine deposits over clayey glaciolacustrine deposits

**Typical profile**
*Ap - 0 to 6 inches:* silt loam
*Bw - 6 to 18 inches:* silt loam
*2C - 18 to 65 inches:* silty clay loam

**Properties and qualities**
*Slope:* 8 to 15 percent
*Depth to restrictive feature:* 18 to 39 inches to strongly contrasting textural stratification
*Natural drainage class:* Moderately well drained
*Runoff class:* Medium
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)
*Depth to water table:* About 18 to 30 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*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:* C
*Hydric soil rating:* No

**Minor Components**

**Melrose**
*Percent of map unit:* 5 percent
*Landform:* Outwash plains, outwash terraces, outwash deltas
*Landform position (three-dimensional):* Riser

*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Elmridge**
*Percent of map unit:* 4 percent
*Landform:* Marine terraces
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Belgrade**
*Percent of map unit:* 3 percent
*Landform:* Marine terraces
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Lamoine**
*Percent of map unit:* 3 percent
*Landform:* Plains
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* No

## Ls—Limerick-Saco silt loams

### Map Unit Setting
*National map unit symbol:* blj2
*Elevation:* 10 to 2,000 feet
*Mean annual precipitation:* 34 to 48 inches
*Mean annual air temperature:* 37 to 46 degrees F
*Frost-free period:* 80 to 160 days
*Farmland classification:* Not prime farmland

### Map Unit Composition
*Limerick and similar soils:* 55 percent
*Saco and similar soils:* 30 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Limerick

#### Setting
*Landform:* Flood plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Talf

*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Coarse-silty alluvium derived from slate

**Typical profile**
*H1 - 0 to 8 inches:* silt loam
*H2 - 8 to 16 inches:* silt loam
*H3 - 16 to 65 inches:* silt loam

**Properties and qualities**
*Slope:* 0 to 2 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Poorly drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)
*Depth to water table:* About 0 to 12 inches
*Frequency of flooding:* Frequent
*Frequency of ponding:* None
*Available water storage in profile:* Very high (about 18.2 inches)

**Interpretive groups**
*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 4w
*Hydrologic Soil Group:* B/D
*Hydric soil rating:* Yes

### Description of Saco

**Setting**
*Landform:* Flood plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Parent material:* Coarse-silty alluvium

**Typical profile**
*H1 - 0 to 12 inches:* silt loam
*H2 - 12 to 24 inches:* silt loam
*H3 - 24 to 65 inches:* silt loam

**Properties and qualities**
*Slope:* 0 to 2 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Very poorly drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)
*Depth to water table:* About 0 to 6 inches
*Frequency of flooding:* Frequent
*Frequency of ponding:* None
*Available water storage in profile:* Very high (about 15.0 inches)

**Interpretive groups**
*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 6w
*Hydrologic Soil Group:* B/D
*Hydric soil rating:* Yes

### Minor Components

#### Rumney

*Percent of map unit:* 7 percent
*Landform:* Flood plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* Yes

#### Lovewell

*Percent of map unit:* 3 percent
*Landform:* Flood plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

#### Cornish

*Percent of map unit:* 3 percent
*Landform:* Flood plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

#### Podunk

*Percent of map unit:* 2 percent
*Landform:* Flood plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

## Sn—Scantic silt loam, 0 to 3 percent slopes

### Map Unit Setting

*National map unit symbol:* 2slv3
*Elevation:* 10 to 900 feet
*Mean annual precipitation:* 33 to 60 inches
*Mean annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 90 to 160 days
*Farmland classification:* Not prime farmland

### Map Unit Composition

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

### Description of Scantic

#### Setting

*Landform:* Marine terraces, river valleys
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Glaciomarine deposits

#### Typical profile

*Ap - 0 to 9 inches:* silt loam
*Bg1 - 9 to 16 inches:* silty clay loam
*Bg2 - 16 to 29 inches:* silty clay
*Cg - 29 to 65 inches:* silty clay

#### Properties and qualities

*Slope:* 0 to 3 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Poorly drained
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)
*Depth to water table:* About 0 to 12 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* Moderate (about 6.3 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 4w
*Hydrologic Soil Group:* D
*Hydric soil rating:* Yes

### Minor Components

#### Lamoine

*Percent of map unit:* 8 percent
*Landform:* River valleys, marine terraces
*Landform position (three-dimensional):* Riser, rise
*Down-slope shape:* Convex
*Across-slope shape:* Linear
*Hydric soil rating:* No

#### Biddeford

*Percent of map unit:* 3 percent
*Landform:* Marine terraces, river valleys
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Dip
*Down-slope shape:* Concave
*Across-slope shape:* Concave, linear
*Ecological site:* Marine Terrace Depression (F144BY002ME)
*Hydric soil rating:* Yes

**Roundabout**

*Percent of map unit:* 2 percent
*Landform:* River valleys, marine terraces
*Landform position (three-dimensional):* Tread, talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* Yes

**Buxton**

*Percent of map unit:* 2 percent
*Landform:* Marine terraces, river valleys
*Landform position (three-dimensional):* Riser, rise
*Down-slope shape:* Convex
*Across-slope shape:* Linear
*Hydric soil rating:* No

## SuC2—Suffield silt loam, 8 to 15 percent slopes, eroded

**Map Unit Setting**

*National map unit symbol:* blk1
*Elevation:* 10 to 900 feet
*Mean annual precipitation:* 34 to 48 inches
*Mean annual air temperature:* 43 to 46 degrees F
*Frost-free period:* 90 to 160 days
*Farmland classification:* Not prime farmland

**Map Unit Composition**

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

**Description of Suffield**

**Setting**

*Landform:* Coastal plains
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Fine glaciolacustrine deposits

**Typical profile**

*H1 - 0 to 6 inches:* silt loam
*H2 - 6 to 23 inches:* silt loam
*H3 - 23 to 33 inches:* silty clay
*H4 - 33 to 65 inches:* silty clay

**Properties and qualities**

*Slope:* 8 to 15 percent
*Depth to restrictive feature:* More than 80 inches

*Natural drainage class:* Moderately well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)
*Depth to water table:* About 18 to 30 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* High (about 9.5 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 4e
*Hydrologic Soil Group:* C
*Hydric soil rating:* No

### Minor Components

**Hartland**

*Percent of map unit:* 6 percent
*Landform:* Coastal plains
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Belgrade**

*Percent of map unit:* 5 percent
*Landform:* Coastal plains
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Suffield, slopes >15%**

*Percent of map unit:* 2 percent
*Landform:* Coastal plains
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Suffield, slopes <8%**

*Percent of map unit:* 2 percent
*Landform:* Coastal plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

## SuD2—Suffield silt loam, 15 to 25 percent slopes, eroded

### Map Unit Setting

*National map unit symbol:* blk2
*Elevation:* 10 to 900 feet
*Mean annual precipitation:* 34 to 48 inches
*Mean annual air temperature:* 43 to 46 degrees F
*Frost-free period:* 90 to 160 days
*Farmland classification:* Not prime farmland

### Map Unit Composition

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

### Description of Suffield

#### Setting

*Landform:* Coastal plains
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Fine glaciolacustrine deposits

#### Typical profile

*H1 - 0 to 6 inches:* silt loam
*H2 - 6 to 23 inches:* silt loam
*H3 - 23 to 33 inches:* silty clay
*H4 - 33 to 65 inches:* silty clay

#### Properties and qualities

*Slope:* 15 to 25 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Moderately well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)
*Depth to water table:* About 18 to 36 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* High (about 9.5 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 6e
*Hydrologic Soil Group:* C
*Hydric soil rating:* No

**Minor Components**

**Hartland**

*Percent of map unit:* 7 percent
*Landform:* Coastal plains
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Belgrade**

*Percent of map unit:* 3 percent
*Landform:* Coastal plains
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Suffield, slopes <15%**

*Percent of map unit:* 3 percent
*Landform:* Coastal plains
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Suffield, slopes >25%**

*Percent of map unit:* 2 percent
*Landform:* Coastal plains
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

## SuE2—Suffield silt loam, 25 to 45 percent slopes, eroded

**Map Unit Setting**

*National map unit symbol:* blk3
*Elevation:* 10 to 1,500 feet
*Mean annual precipitation:* 34 to 48 inches
*Mean annual air temperature:* 43 to 46 degrees F
*Frost-free period:* 90 to 160 days
*Farmland classification:* Not prime farmland

**Map Unit Composition**

*Suffield and similar soils:* 85 percent

*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Suffield

#### Setting

*Landform:* Coastal plains
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Fine glaciolacustrine deposits

#### Typical profile

*H1 - 0 to 6 inches:* silt loam
*H2 - 6 to 23 inches:* silt loam
*H3 - 23 to 33 inches:* silty clay
*H4 - 33 to 65 inches:* silty clay

#### Properties and qualities

*Slope:* 25 to 45 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Moderately well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)
*Depth to water table:* About 18 to 36 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* High (about 9.5 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 7e
*Hydrologic Soil Group:* C
*Hydric soil rating:* No

### Minor Components

#### Hartland

*Percent of map unit:* 7 percent
*Landform:* Coastal plains
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

#### Suffield, slopes <25%

*Percent of map unit:* 4 percent
*Landform:* Coastal plains
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

#### Belgrade

*Percent of map unit:* 3 percent

*Landform:* Coastal plains
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Suffield, slopes >45%**
*Percent of map unit:* 1 percent
*Landform:* Coastal plains
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

## Sz—Swanton fine sandy loam

**Map Unit Setting**
*National map unit symbol:* blk4
*Elevation:* 10 to 900 feet
*Mean annual precipitation:* 34 to 55 inches
*Mean annual air temperature:* 39 to 46 degrees F
*Frost-free period:* 90 to 195 days
*Farmland classification:* Not prime farmland

**Map Unit Composition**
*Swanton and similar soils:* 85 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Swanton**

**Setting**
*Landform:* Outwash plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Loamy glaciolacustrine deposits

**Typical profile**
*H1 - 0 to 9 inches:* fine sandy loam
*H2 - 9 to 32 inches:* fine sandy loam
*H3 - 32 to 65 inches:* silty clay

**Properties and qualities**
*Slope:* 0 to 3 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Poorly drained

*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)
*Depth to water table:* About 0 to 18 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* High (about 9.3 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 4w
*Hydrologic Soil Group:* C/D
*Hydric soil rating:* Yes

### Minor Components

**Scantic**

*Percent of map unit:* 8 percent
*Landform:* Coastal plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Dip
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

**Whately**

*Percent of map unit:* 4 percent
*Landform:* Outwash plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Dip
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

**Elmwood**

*Percent of map unit:* 3 percent
*Landform:* Outwash plains
*Landform position (two-dimensional):* Summit
*Landform position (three-dimensional):* Rise
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

## WmB—Windsor loamy sand, 0 to 8 percent slopes

### Map Unit Setting

*National map unit symbol:* 2w2x2
*Elevation:* 0 to 1,410 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 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:* 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**

*Oe - 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 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**

*Percent of map unit:* 5 percent
*Landform:* Outwash plains, eskers, deltas, kames
*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

**Agawam**

*Percent of map unit:* 5 percent
*Landform:* Kames, moraines, outwash terraces, kame terraces, outwash plains

*Landform position (two-dimensional):* Footslope, summit, backslope, shoulder
*Landform position (three-dimensional):* Side slope, crest, tread, riser, rise
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

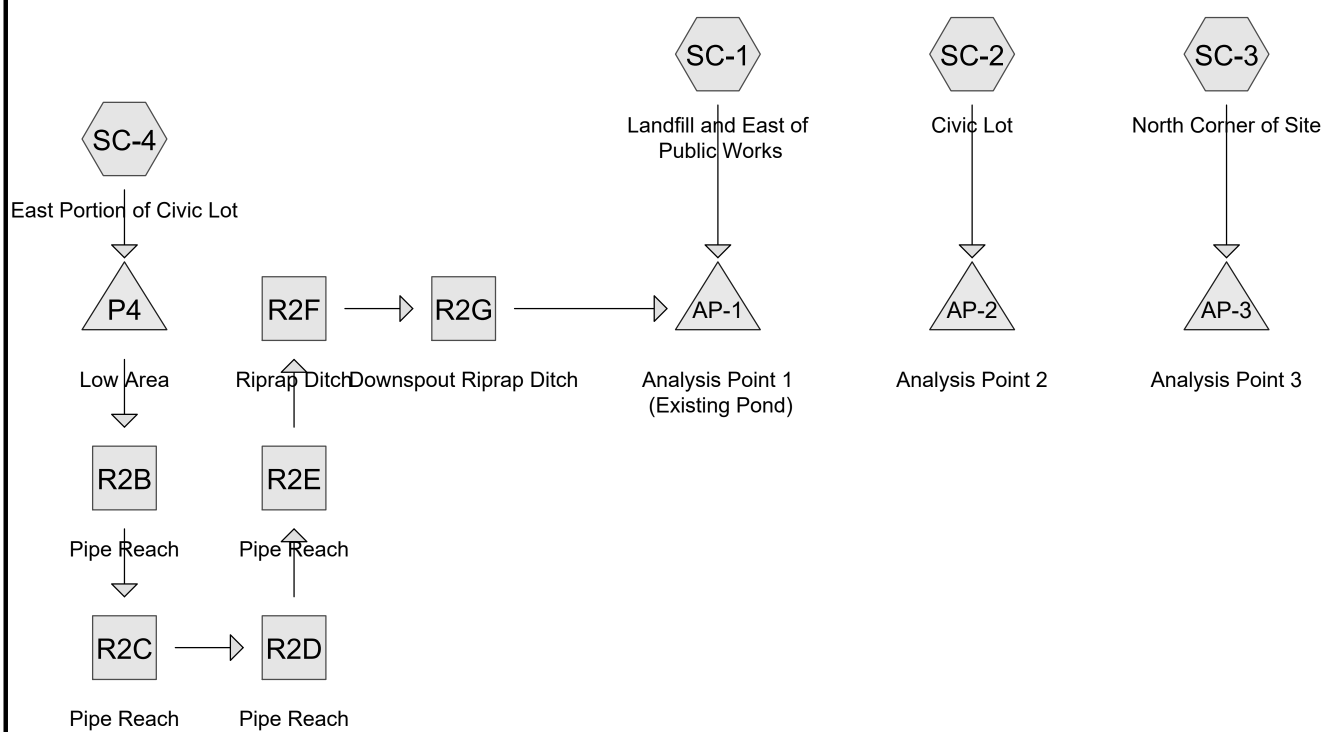
**Deerfield**

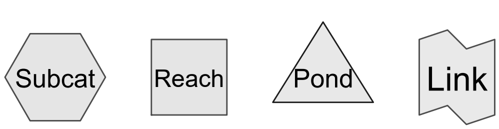
*Percent of map unit:* 5 percent
*Landform:* Outwash plains, deltas, terraces
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Tread, talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**APPENDIX B**

**PUBLIC WORKS SITE HYDROCAD CALCULATIONS**

SEVEE & MAHER ENGINEERS




**Routing Diagram for Cumberland Public Works - Existing HydroCAD**
Prepared by Sevee & Maher Engineers, Printed 2/7/2020
HydroCAD® 10.00-22 s/n 01260 © 2018 HydroCAD Software Solutions LLC

## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 0.045 | 39 | >75% Grass cover, Good, HSG A (SC-1) |
| 0.891 | 61 | >75% Grass cover, Good, HSG B (SC-1, SC-2, SC-4) |
| 1.580 | 74 | >75% Grass cover, Good, HSG C (SC-1, SC-2, SC-3, SC-4) |
| 1.279 | 80 | >75% Grass cover, Good, HSG D (SC-1, SC-2) |
| 0.033 | 48 | Brush, Good, HSG B (SC-4) |
| 0.835 | 65 | Brush, Good, HSG C (SC-2, SC-4) |
| 0.021 | 73 | Brush, Good, HSG D (SC-1) |
| 0.591 | 96 | Gravel (SC-4) |
| 1.954 | 96 | Gravel surface (SC-1, SC-2) |
| 2.874 | 78 | Meadow, non-grazed, HSG D (SC-1) |
| 2.332 | 98 | Pavement (SC-1, SC-2, SC-4) |
| 0.748 | 98 | Roofs (SC-1, SC-2, SC-3, SC-4) |
| 0.221 | 77 | Woods, Poor, HSG C (SC-3) |
| 0.819 | 32 | Woods/grass comb., Good, HSG A (SC-1) |
| 0.160 | 58 | Woods/grass comb., Good, HSG B (SC-1, SC-2) |
| 4.649 | 72 | Woods/grass comb., Good, HSG C (SC-1, SC-2, SC-4) |
| 1.209 | 79 | Woods/grass comb., Good, HSG D (SC-1, SC-2) |

## Summary for Subcatchment SC-1: Landfill and East of Public Works

Runoff = 10.10 cfs @ 12.30 hrs, Volume= 1.098 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.10"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 81,175 | 98 | Pavement |
| * | 17,719 | 98 | Roofs |
| * | 74,072 | 96 | Gravel surface |
| | 125,175 | 78 | Meadow, non-grazed, HSG D |
| | 0 | 65 | Brush, Good, HSG C |
| | 910 | 73 | Brush, Good, HSG D |
| | 1,940 | 39 | >75% Grass cover, Good, HSG A |
| | 35,690 | 61 | >75% Grass cover, Good, HSG B |
| | 10,419 | 74 | >75% Grass cover, Good, HSG C |
| | 34,346 | 80 | >75% Grass cover, Good, HSG D |
| | 35,681 | 32 | Woods/grass comb., Good, HSG A |
| | 4,094 | 58 | Woods/grass comb., Good, HSG B |
| | 13 | 72 | Woods/grass comb., Good, HSG C |
| | 11,905 | 79 | Woods/grass comb., Good, HSG D |
| | 433,139 | 80 | Weighted Average |
| | 334,245 | | 77.17% Pervious Area |
| | 98,894 | | 22.83% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 13.1 | 100 | 0.0100 | 0.13 | | **Sheet Flow, A TO B**<br>Grass: Short n= 0.150 P2= 3.10" |
| 4.0 | 118 | 0.0050 | 0.49 | | **Shallow Concentrated Flow, B to C**<br>Short Grass Pasture Kv= 7.0 fps |
| 0.3 | 55 | 0.0620 | 2.82 | 0.25 | **Pipe Channel, C to D**<br>4.0" Round Area= 0.1 sf Perim= 1.0' r= 0.08'<br>n= 0.025 Corrugated metal |
| 0.5 | 188 | 0.0199 | 6.40 | 5.03 | **Pipe Channel, D to E**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.013 Corrugated PE, smooth interior |
| 0.5 | 163 | 0.0122 | 5.01 | 3.94 | **Pipe Channel, E to F**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.013 Corrugated PE, smooth interior |
| 0.3 | 152 | 0.0322 | 8.14 | 6.39 | **Pipe Channel, F to G**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.013 Corrugated PE, smooth interior |
| 0.1 | 112 | 0.0777 | 20.07 | 63.06 | **Pipe Channel, G to H**<br>24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'<br>n= 0.013 Corrugated PE, smooth interior |
| 0.1 | 116 | 0.0543 | 16.78 | 52.72 | **Pipe Channel, H to I**<br>24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'<br>n= 0.013 Corrugated PE, smooth interior |
| 0.1 | 143 | 0.1540 | 28.26 | 88.78 | **Pipe Channel, I to J**<br>24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'<br>n= 0.013 Corrugated PE, smooth interior |
| 0.1 | 67 | 0.0760 | 19.85 | 62.37 | **Pipe Channel, J to K**<br>24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'<br>n= 0.013 Corrugated PE, smooth interior |
| 0.0 | 38 | 0.1090 | 31.15 | 220.21 | **Pipe Channel, K to L**<br>36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75'<br>n= 0.013 Corrugated PE, smooth interior |
| 1.6 | 77 | 0.0260 | 0.81 | | **Shallow Concentrated Flow, L to M**<br>Woodland Kv= 5.0 fps |
| 20.7 | 1,329 | Total | | | |

## Summary for Subcatchment SC-2: Civic Lot

Runoff = 4.50 cfs @ 12.60 hrs, Volume= 0.690 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.10"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 188 | 98 | Pavement |
| * | 8,696 | 98 | Roofs |
| * | 11,042 | 96 | Gravel surface |
| | 13,592 | 65 | Brush, Good, HSG C |
| | 2,057 | 61 | >75% Grass cover, Good, HSG B |
| | 49,354 | 74 | >75% Grass cover, Good, HSG C |
| | 21,358 | 80 | >75% Grass cover, Good, HSG D |
| | 2,880 | 58 | Woods/grass comb., Good, HSG B |
| | 201,158 | 72 | Woods/grass comb., Good, HSG C |
| | 40,766 | 79 | Woods/grass comb., Good, HSG D |
| | 351,091 | 75 | Weighted Average |
| | 342,207 | | 97.47% Pervious Area |
| | 8,884 | | 2.53% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 29.4 | 100 | 0.0100 | 0.06 | | **Sheet Flow, A to B**<br>Grass: Bermuda n= 0.410 P2= 3.10" |
| 8.4 | 446 | 0.0310 | 0.88 | | **Shallow Concentrated Flow, B to C**<br>Woodland Kv= 5.0 fps |
| 2.7 | 218 | 0.0180 | 1.35 | 5.39 | **Channel Flow, C to D**<br>Area= 4.0 sf Perim= 7.2' r= 0.56'<br>n= 0.100 Earth, dense brush, high stage |
| 40.5 | 764 | Total | | | |

## Summary for Subcatchment SC-3: North Corner of Site

Runoff = 0.36 cfs @ 12.25 hrs, Volume= 0.037 af, Depth= 1.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.10"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 333 | 98 | Roofs |
| | 8,056 | 74 | >75% Grass cover, Good, HSG C |
| | 9,638 | 77 | Woods, Poor, HSG C |
| | 18,027 | 76 | Weighted Average |
| | 17,694 | | 98.15% Pervious Area |
| | 333 | | 1.85% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 16.5 | 100 | 0.0400 | 0.10 | | **Sheet Flow, A TO B**<br>Woods: Light underbrush n= 0.400 P2= 3.10" |
| 0.9 | 121 | 0.0248 | 2.36 | | **Shallow Concentrated Flow, B to C**<br>Grassed Waterway Kv= 15.0 fps |
| 17.4 | 221 | Total | | | |

## Summary for Subcatchment SC-4: East Portion of Civic Lot

Runoff = 3.88 cfs @ 12.07 hrs, Volume= 0.266 af, Depth= 1.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.10"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 25,735 | 96 | Gravel |
| * | 20,230 | 98 | Pavement |
| * | 5,829 | 98 | Roofs |
| | 1,421 | 48 | Brush, Good, HSG B |
| | 22,798 | 65 | Brush, Good, HSG C |
| | 1,017 | 74 | >75% Grass cover, Good, HSG C |
| | 1,083 | 61 | >75% Grass cover, Good, HSG B |
| | 1,325 | 72 | Woods/grass comb., Good, HSG C |
| | 79,438 | 86 | Weighted Average |
| | 53,379 | | 67.20% Pervious Area |
| | 26,059 | | 32.80% Impervious Area |

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

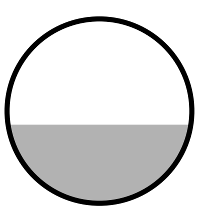
## Summary for Reach R2B: Pipe Reach

Inflow Area = 1.824 ac, 32.80% Impervious, Inflow Depth = 1.60" for 2-year event
Inflow = 3.48 cfs @ 12.11 hrs, Volume= 0.243 af
Outflow = 3.47 cfs @ 12.12 hrs, Volume= 0.243 af, Atten= 0%, Lag= 0.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 6.98 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 2.58 fps, Avg. Travel Time= 1.2 min

Peak Storage= 91 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.53'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 9.21 cfs

15.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 182.0' Slope= 0.0203 '/'
Inlet Invert= 128.70', Outlet Invert= 125.00'



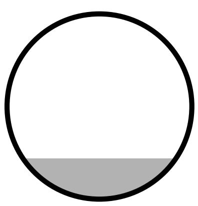
## Summary for Reach R2C: Pipe Reach

Inflow Area = 1.824 ac, 32.80% Impervious, Inflow Depth = 1.60" for 2-year event
Inflow = 3.47 cfs @ 12.12 hrs, Volume= 0.243 af
Outflow = 3.47 cfs @ 12.12 hrs, Volume= 0.243 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 17.47 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 6.46 fps, Avg. Travel Time= 0.2 min

Peak Storage= 13 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.27'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 33.04 cfs

15.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 65.0' Slope= 0.2615 '/'
Inlet Invert= 124.00', Outlet Invert= 107.00'



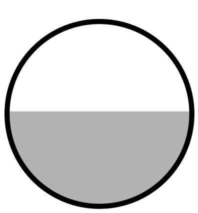
## Summary for Reach R2D: Pipe Reach

Inflow Area = 1.824 ac, 32.80% Impervious, Inflow Depth = 1.60" for 2-year event
Inflow = 3.47 cfs @ 12.12 hrs, Volume= 0.243 af
Outflow = 3.47 cfs @ 12.12 hrs, Volume= 0.243 af, Atten= 0%, Lag= 0.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.48 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 2.03 fps, Avg. Travel Time= 1.1 min

Peak Storage= 84 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.64'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 6.65 cfs

15.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 132.0' Slope= 0.0106 '/'
Inlet Invert= 106.20', Outlet Invert= 104.80'



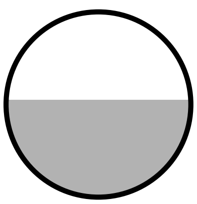
## Summary for Reach R2E: Pipe Reach

Inflow Area = 1.824 ac, 32.80% Impervious, Inflow Depth = 1.60" for 2-year event
Inflow = 3.47 cfs @ 12.12 hrs, Volume= 0.243 af
Outflow = 3.47 cfs @ 12.13 hrs, Volume= 0.243 af, Atten= 0%, Lag= 0.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.31 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.97 fps, Avg. Travel Time= 0.7 min

Peak Storage= 54 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.66'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 6.38 cfs

15.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 82.0' Slope= 0.0098 '/'
Inlet Invert= 104.80', Outlet Invert= 104.00'



## Summary for Reach R2F: Riprap Ditch

Inflow Area = 1.824 ac, 32.80% Impervious, Inflow Depth = 1.60" for 2-year event
Inflow = 3.47 cfs @ 12.13 hrs, Volume= 0.243 af
Outflow = 3.45 cfs @ 12.14 hrs, Volume= 0.243 af, Atten= 0%, Lag= 0.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.26 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 0.77 fps, Avg. Travel Time= 2.5 min

Peak Storage= 176 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.45'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 83.14 cfs

2.00' x 2.00' deep channel, n= 0.040 Mountain streams
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 115.0' Slope= 0.0174 '/'
Inlet Invert= 104.00', Outlet Invert= 102.00'

## Summary for Reach R2G: Downspout Riprap Ditch

Inflow Area = 1.824 ac, 32.80% Impervious, Inflow Depth = 1.60" for 2-year event
Inflow = 3.45 cfs @ 12.14 hrs, Volume= 0.243 af
Outflow = 3.45 cfs @ 12.14 hrs, Volume= 0.243 af, Atten= 0%, Lag= 0.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.01 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.66 fps, Avg. Travel Time= 0.7 min

Peak Storage= 49 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.15'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 422.75 cfs

4.00' x 2.00' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 16.00'
Length= 71.0' Slope= 0.2535 '/'
Inlet Invert= 100.00', Outlet Invert= 82.00'

‡

## Summary for Pond AP-1: Analysis Point 1 (Existing Pond)

Inflow Area = 11.767 ac, 24.38% Impervious, Inflow Depth = 1.37" for 2-year event
Inflow = 12.05 cfs @ 12.24 hrs, Volume= 1.342 af
Primary = 12.05 cfs @ 12.24 hrs, Volume= 1.342 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

## Summary for Pond AP-2: Analysis Point 2

Inflow Area = 8.060 ac, 2.53% Impervious, Inflow Depth = 1.03" for 2-year event
Inflow = 4.50 cfs @ 12.60 hrs, Volume= 0.690 af
Primary = 4.50 cfs @ 12.60 hrs, Volume= 0.690 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

## Summary for Pond AP-3: Analysis Point 3

Inflow Area = 0.414 ac, 1.85% Impervious, Inflow Depth = 1.08" for 2-year event
Inflow = 0.36 cfs @ 12.25 hrs, Volume= 0.037 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Peak Elev= 127.00' @ 24.99 hrs Surf.Area= 100.046 ac Storage= 0.037 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 127.00' | 161.500 af | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (acres) | Inc.Store (acre-feet) | Cum.Store (acre-feet) |
|---|---|---|---|
| 127.00 | 100.000 | 0.000 | 0.000 |
| 128.00 | 223.000 | 161.500 | 161.500 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 128.00' | **8.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=127.00' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Summary for Pond P4: Low Area

| | | | | |
|---|---|---|---|---|
| Inflow Area = | 1.824 ac, 32.80% Impervious, | Inflow Depth = 1.75" | for 2-year event | |
| Inflow = | 3.88 cfs @ | 12.07 hrs, Volume= | 0.266 af | |
| Outflow = | 3.48 cfs @ | 12.11 hrs, Volume= | 0.243 af, | Atten= 10%, Lag= 2.3 min |
| Primary = | 3.48 cfs @ | 12.11 hrs, Volume= | 0.243 af | |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 132.15' @ 12.11 hrs Surf.Area= 2,699 sf Storage= 1,303 cf

Plug-Flow detention time= 61.6 min calculated for 0.243 af (92% of inflow)
Center-of-Mass det. time= 19.2 min ( 842.2 - 823.0 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 131.00' | 9,686 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 131.00 | 100 | 0 | 0 |
| 132.00 | 1,847 | 974 | 974 |
| 133.00 | 7,719 | 4,783 | 5,757 |
| 133.50 | 8,000 | 3,930 | 9,686 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 133.00' | **30.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |
| #2 | Device 3 | 132.00' | **1.5" x 6.5" Horiz. Orifice/Grate X 28.00** C= 0.600<br>Limited to weir flow at low heads |
| #3 | Primary | 129.70' | **12.0" Round Culvert** |

L= 135.0' CPP, square edge headwall, Ke= 0.500
Inlet / Outlet Invert= 129.70' / 128.70' S= 0.0074 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

**Primary OutFlow** Max=3.47 cfs @ 12.11 hrs HW=132.14' TW=129.23' (Dynamic Tailwater)
—**1=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)
—**3=Culvert** (Passes 3.47 cfs of 4.11 cfs potential flow)
—**2=Orifice/Grate** (Orifice Controls 3.47 cfs @ 1.83 fps)

## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 0.045 | 39 | >75% Grass cover, Good, HSG A (SC-1) |
| 0.891 | 61 | >75% Grass cover, Good, HSG B (SC-1, SC-2, SC-4) |
| 1.580 | 74 | >75% Grass cover, Good, HSG C (SC-1, SC-2, SC-3, SC-4) |
| 1.279 | 80 | >75% Grass cover, Good, HSG D (SC-1, SC-2) |
| 0.033 | 48 | Brush, Good, HSG B (SC-4) |
| 0.835 | 65 | Brush, Good, HSG C (SC-2, SC-4) |
| 0.021 | 73 | Brush, Good, HSG D (SC-1) |
| 0.591 | 96 | Gravel (SC-4) |
| 1.954 | 96 | Gravel surface (SC-1, SC-2) |
| 2.874 | 78 | Meadow, non-grazed, HSG D (SC-1) |
| 2.332 | 98 | Pavement (SC-1, SC-2, SC-4) |
| 0.748 | 98 | Roofs (SC-1, SC-2, SC-3, SC-4) |
| 0.221 | 77 | Woods, Poor, HSG C (SC-3) |
| 0.819 | 32 | Woods/grass comb., Good, HSG A (SC-1) |
| 0.160 | 58 | Woods/grass comb., Good, HSG B (SC-1, SC-2) |
| 4.649 | 72 | Woods/grass comb., Good, HSG C (SC-1, SC-2, SC-4) |
| 1.209 | 79 | Woods/grass comb., Good, HSG D (SC-1, SC-2) |
| **20.241** | **78** | **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 | SC-1 | 0.00 | 0.00 | 55.0 | 0.0620 | 0.025 | 4.0 | 0.0 | 0.0 |
| 2 | SC-1 | 0.00 | 0.00 | 188.0 | 0.0199 | 0.013 | 12.0 | 0.0 | 0.0 |
| 3 | SC-1 | 0.00 | 0.00 | 163.0 | 0.0122 | 0.013 | 12.0 | 0.0 | 0.0 |
| 4 | SC-1 | 0.00 | 0.00 | 152.0 | 0.0322 | 0.013 | 12.0 | 0.0 | 0.0 |
| 5 | SC-1 | 0.00 | 0.00 | 112.0 | 0.0777 | 0.013 | 24.0 | 0.0 | 0.0 |
| 6 | SC-1 | 0.00 | 0.00 | 116.0 | 0.0543 | 0.013 | 24.0 | 0.0 | 0.0 |
| 7 | SC-1 | 0.00 | 0.00 | 143.0 | 0.1540 | 0.013 | 24.0 | 0.0 | 0.0 |
| 8 | SC-1 | 0.00 | 0.00 | 67.0 | 0.0760 | 0.013 | 24.0 | 0.0 | 0.0 |
| 9 | SC-1 | 0.00 | 0.00 | 38.0 | 0.1090 | 0.013 | 36.0 | 0.0 | 0.0 |
| 10 | R2B | 128.70 | 125.00 | 182.0 | 0.0203 | 0.013 | 15.0 | 0.0 | 0.0 |
| 11 | R2C | 124.00 | 107.00 | 65.0 | 0.2615 | 0.013 | 15.0 | 0.0 | 0.0 |
| 12 | R2D | 106.20 | 104.80 | 132.0 | 0.0106 | 0.013 | 15.0 | 0.0 | 0.0 |
| 13 | R2E | 104.80 | 104.00 | 82.0 | 0.0098 | 0.013 | 15.0 | 0.0 | 0.0 |
| 14 | P4 | 129.70 | 128.70 | 135.0 | 0.0074 | 0.013 | 12.0 | 0.0 | 0.0 |

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 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

**Subcatchment SC-1: Landfill and East of** Runoff Area=433,139 sf 22.83% Impervious Runoff Depth=2.55"
Flow Length=1,329' Tc=20.7 min CN=80 Runoff=19.72 cfs 2.110 af

**Subcatchment SC-2: Civic Lot** Runoff Area=351,091 sf 2.53% Impervious Runoff Depth=2.13"
Flow Length=764' Tc=40.5 min CN=75 Runoff=9.77 cfs 1.430 af

**Subcatchment SC-3: North Corner of Site** Runoff Area=18,027 sf 1.85% Impervious Runoff Depth=2.21"
Flow Length=221' Tc=17.4 min CN=76 Runoff=0.76 cfs 0.076 af

**Subcatchment SC-4: East Portion of Civic** Runoff Area=79,438 sf 32.80% Impervious Runoff Depth=3.10"
Tc=5.0 min CN=86 Runoff=6.79 cfs 0.470 af

**Reach R2B: Pipe Reach** Avg. Flow Depth=0.60' Max Vel=7.39 fps Inflow=4.33 cfs 0.448 af
15.0" Round Pipe n=0.013 L=182.0' S=0.0203 '/' Capacity=9.21 cfs Outflow=4.33 cfs 0.448 af

**Reach R2C: Pipe Reach** Avg. Flow Depth=0.31' Max Vel=18.63 fps Inflow=4.33 cfs 0.448 af
15.0" Round Pipe n=0.013 L=65.0' S=0.2615 '/' Capacity=33.04 cfs Outflow=4.33 cfs 0.448 af

**Reach R2D: Pipe Reach** Avg. Flow Depth=0.73' Max Vel=5.77 fps Inflow=4.33 cfs 0.448 af
15.0" Round Pipe n=0.013 L=132.0' S=0.0106 '/' Capacity=6.65 cfs Outflow=4.33 cfs 0.448 af

**Reach R2E: Pipe Reach** Avg. Flow Depth=0.76' Max Vel=5.59 fps Inflow=4.33 cfs 0.448 af
15.0" Round Pipe n=0.013 L=82.0' S=0.0098 '/' Capacity=6.38 cfs Outflow=4.33 cfs 0.448 af

**Reach R2F: Riprap Ditch** Avg. Flow Depth=0.51' Max Vel=2.41 fps Inflow=4.33 cfs 0.448 af
n=0.040 L=115.0' S=0.0174 '/' Capacity=83.14 cfs Outflow=4.33 cfs 0.448 af

**Reach R2G: Downspout Riprap Ditch** Avg. Flow Depth=0.18' Max Vel=5.43 fps Inflow=4.33 cfs 0.448 af
n=0.040 L=71.0' S=0.2535 '/' Capacity=422.75 cfs Outflow=4.33 cfs 0.448 af

**Pond AP-1: Analysis Point 1 (Existing Pond)** Inflow=23.99 cfs 2.559 af
Primary=23.99 cfs 2.559 af

**Pond AP-2: Analysis Point 2** Inflow=9.77 cfs 1.430 af
Primary=9.77 cfs 1.430 af

**Pond AP-3: Analysis Point 3** Peak Elev=127.00' Storage=0.076 af Inflow=0.76 cfs 0.076 af
Outflow=0.00 cfs 0.000 af

**Pond P4: Low Area** Peak Elev=132.41' Storage=2,227 cf Inflow=6.79 cfs 0.470 af
Outflow=4.33 cfs 0.448 af

**Total Runoff Area = 20.241 ac Runoff Volume = 4.087 af Average Runoff Depth = 2.42"**
**84.78% Pervious = 17.161 ac 15.22% Impervious = 3.080 ac**

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 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

**Subcatchment SC-1: Landfill and East of** Runoff Area=433,139 sf 22.83% Impervious Runoff Depth=3.60"
Flow Length=1,329' Tc=20.7 min CN=80 Runoff=27.85 cfs 2.984 af

**Subcatchment SC-2: Civic Lot** Runoff Area=351,091 sf 2.53% Impervious Runoff Depth=3.11"
Flow Length=764' Tc=40.5 min CN=75 Runoff=14.41 cfs 2.090 af

**Subcatchment SC-3: North Corner of Site** Runoff Area=18,027 sf 1.85% Impervious Runoff Depth=3.21"
Flow Length=221' Tc=17.4 min CN=76 Runoff=1.11 cfs 0.111 af

**Subcatchment SC-4: East Portion of Civic** Runoff Area=79,438 sf 32.80% Impervious Runoff Depth=4.22"
Tc=5.0 min CN=86 Runoff=9.15 cfs 0.641 af

**Reach R2B: Pipe Reach** Avg. Flow Depth=0.62' Max Vel=7.48 fps Inflow=4.54 cfs 0.619 af
15.0" Round Pipe n=0.013 L=182.0' S=0.0203 '/' Capacity=9.21 cfs Outflow=4.54 cfs 0.619 af

**Reach R2C: Pipe Reach** Avg. Flow Depth=0.31' Max Vel=18.88 fps Inflow=4.54 cfs 0.619 af
15.0" Round Pipe n=0.013 L=65.0' S=0.2615 '/' Capacity=33.04 cfs Outflow=4.54 cfs 0.619 af

**Reach R2D: Pipe Reach** Avg. Flow Depth=0.76' Max Vel=5.83 fps Inflow=4.54 cfs 0.619 af
15.0" Round Pipe n=0.013 L=132.0' S=0.0106 '/' Capacity=6.65 cfs Outflow=4.54 cfs 0.619 af

**Reach R2E: Pipe Reach** Avg. Flow Depth=0.78' Max Vel=5.64 fps Inflow=4.54 cfs 0.619 af
15.0" Round Pipe n=0.013 L=82.0' S=0.0098 '/' Capacity=6.38 cfs Outflow=4.54 cfs 0.619 af

**Reach R2F: Riprap Ditch** Avg. Flow Depth=0.52' Max Vel=2.44 fps Inflow=4.54 cfs 0.619 af
n=0.040 L=115.0' S=0.0174 '/' Capacity=83.14 cfs Outflow=4.54 cfs 0.619 af

**Reach R2G: Downspout Riprap Ditch** Avg. Flow Depth=0.18' Max Vel=5.51 fps Inflow=4.54 cfs 0.619 af
n=0.040 L=71.0' S=0.2535 '/' Capacity=422.75 cfs Outflow=4.54 cfs 0.619 af

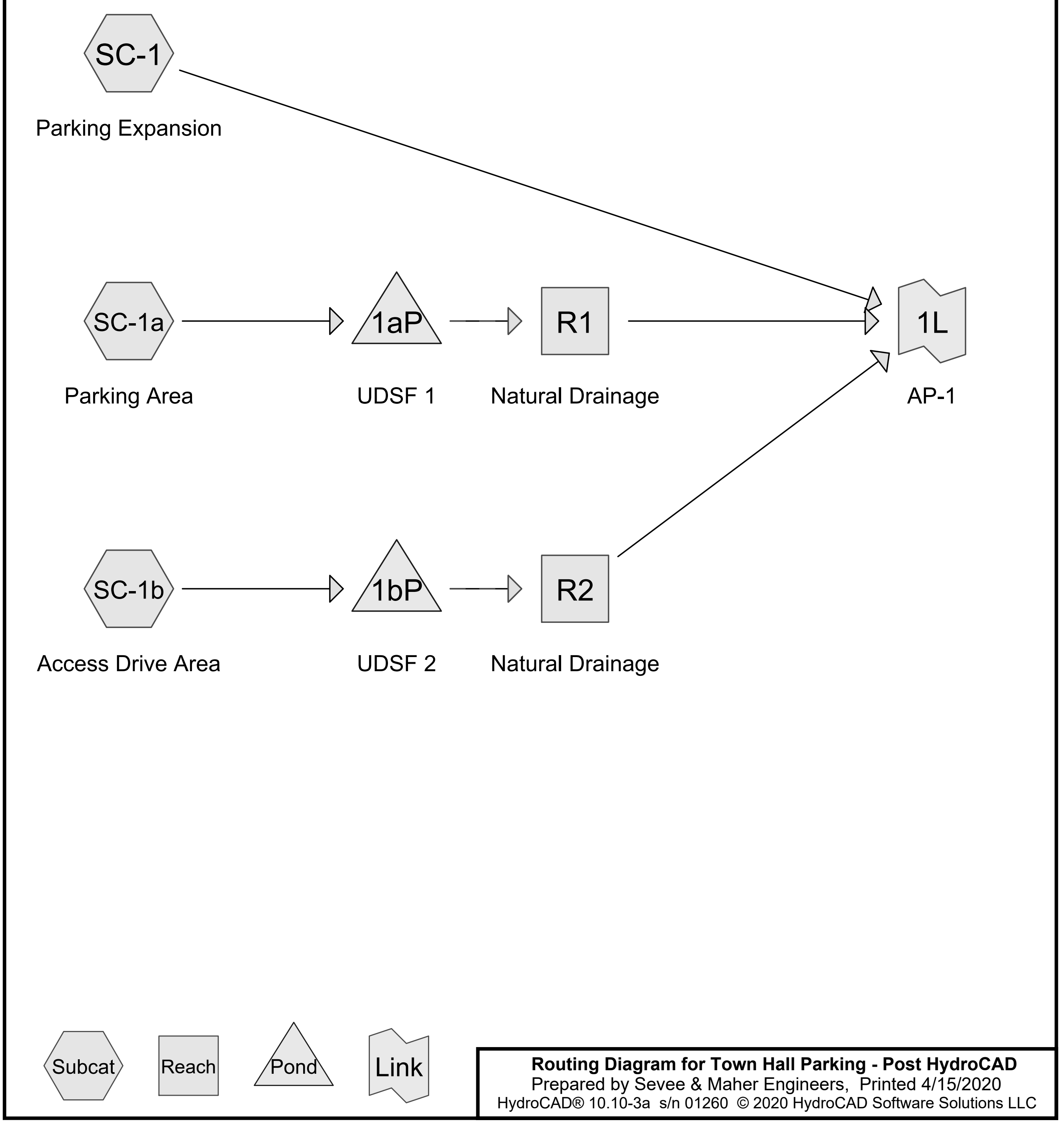
**Pond AP-1: Analysis Point 1 (Existing Pond)** Inflow=32.38 cfs 3.603 af
Primary=32.38 cfs 3.603 af

**Pond AP-2: Analysis Point 2** Inflow=14.41 cfs 2.090 af
Primary=14.41 cfs 2.090 af

**Pond AP-3: Analysis Point 3** Peak Elev=127.00' Storage=0.111 af Inflow=1.11 cfs 0.111 af
Outflow=0.00 cfs 0.000 af

**Pond P4: Low Area** Peak Elev=132.68' Storage=3,561 cf Inflow=9.15 cfs 0.641 af
Outflow=4.54 cfs 0.619 af

**Total Runoff Area = 20.241 ac Runoff Volume = 5.826 af Average Runoff Depth = 3.45"**
**84.78% Pervious = 17.161 ac 15.22% Impervious = 3.080 ac**




**Routing Diagram for Town Hall Parking - Post HydroCAD**
Prepared by Sevee & Maher Engineers, Printed 4/15/2020
HydroCAD® 10.10-3a s/n 01260 © 2020 HydroCAD Software Solutions LLC

## Summary for Subcatchment SC-1: Parking Expansion

Runoff = 0.79 cfs @ 12.36 hrs, Volume= 0.123 af, Depth= 0.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.10"

| Area (sf) | CN | Description |
|---|---|---|
| 13,551 | 98 | Paved parking, HSG C |
| 130,762 | 58 | Woods/grass comb., Good, HSG B |
| 2,248 | 74 | >75% Grass cover, Good, HSG C |
| 146,561 | 62 | Weighted Average |
| 133,010 | | 90.75% Pervious Area |
| 13,551 | | 9.25% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 14.7 | 100 | 0.0200 | 0.11 | | **Sheet Flow, A-B**<br>Grass: Dense n= 0.240 P2= 3.00" |
| 3.2 | 233 | 0.0600 | 1.22 | | **Shallow Concentrated Flow, C-D**<br>Woodland Kv= 5.0 fps |
| 0.8 | 427 | 0.0400 | 9.07 | 145.08 | **Channel Flow, C-D**<br>Area= 16.0 sf Perim= 14.5' r= 1.10'<br>n= 0.035 Earth, dense weeds |
| 18.7 | 760 | Total | | | |

## Summary for Subcatchment SC-1a: Parking Area

Runoff = 0.94 cfs @ 12.08 hrs, Volume= 0.065 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.10"

| Area (sf) | CN | Description |
|---|---|---|
| 13,875 | 98 | Paved parking, HSG C |
| 9,159 | 58 | Woods/grass comb., Good, HSG B |
| 2,707 | 61 | >75% Grass cover, Good, HSG B |
| 25,741 | 80 | Weighted Average |
| 11,866 | | 46.10% Pervious Area |
| 13,875 | | 53.90% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.0 | | | | | **Direct Entry, Tc MUST BE GREATER THAN OR EQUAL TO 5 MI** |

## Summary for Subcatchment SC-1b: Access Drive Area

Runoff = 0.26 cfs @ 12.08 hrs, Volume= 0.019 af, Depth= 1.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.10"

| Area (sf) | CN | Description |
|---|---|---|
| 3,963 | 98 | Paved parking, HSG C |
| 4,997 | 58 | Woods/grass comb., Good, HSG B |
| 8,960 | 76 | Weighted Average |
| 4,997 | | 55.77% Pervious Area |
| 3,963 | | 44.23% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.0 | | | | | **Direct Entry, Tc MUST BE GREATER THAN OR EQUAL TO 5 MI** |

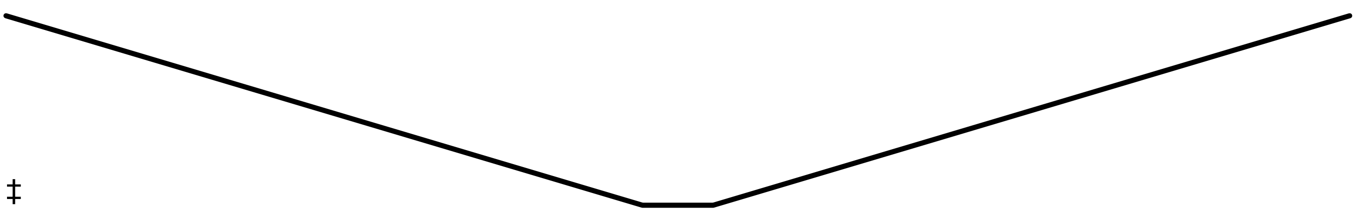
## Summary for Reach R1: Natural Drainage

Inflow Area = 0.591 ac, 53.90% Impervious, Inflow Depth > 0.98" for 2-year event
Inflow = 0.03 cfs @ 16.56 hrs, Volume= 0.048 af
Outflow = 0.03 cfs @ 16.82 hrs, Volume= 0.048 af, Atten= 0%, Lag= 16.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.35 fps, Min. Travel Time= 8.0 min
Avg. Velocity = 0.35 fps, Avg. Travel Time= 8.0 min

Peak Storage= 15 cf @ 16.69 hrs
Average Depth at Peak Storage= 0.01' , Surface Width= 10.51'
Bank-Full Depth= 3.00' Flow Area= 300.0 sf, Capacity= 1,532.48 cfs

10.00' x 3.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 30.0 '/' Top Width= 190.00'
Length= 165.0' Slope= 0.0079 '/'
Inlet Invert= 101.30', Outlet Invert= 100.00'



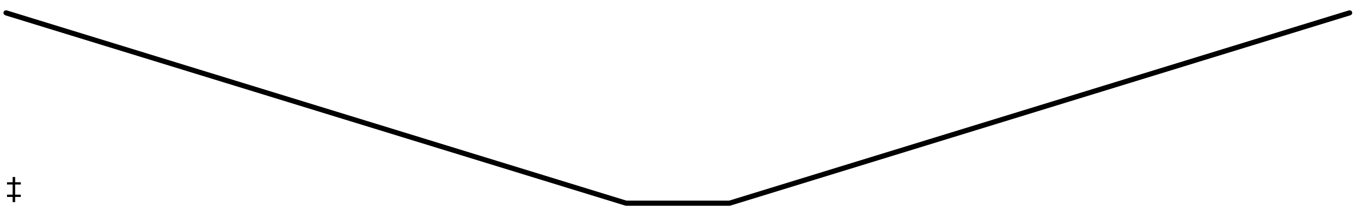
## Summary for Reach R2: Natural Drainage

Inflow Area = 0.206 ac, 44.23% Impervious, Inflow Depth = 1.08" for 2-year event
Inflow = 0.03 cfs @ 13.02 hrs, Volume= 0.019 af
Outflow = 0.03 cfs @ 13.57 hrs, Volume= 0.019 af, Atten= 0%, Lag= 33.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.19 fps, Min. Travel Time= 11.9 min
Avg. Velocity = 0.19 fps, Avg. Travel Time= 11.9 min

Peak Storage= 20 cf @ 13.38 hrs
Average Depth at Peak Storage= 0.01' , Surface Width= 10.88'
Bank-Full Depth= 2.00' Flow Area= 140.0 sf, Capacity= 384.22 cfs

10.00' x 2.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 30.0 '/' Top Width= 130.00'
Length= 132.0' Slope= 0.0038 '/'
Inlet Invert= 100.50', Outlet Invert= 100.00'



## Summary for Pond 1aP: UDSF 1

Inflow Area = 0.591 ac, 53.90% Impervious, Inflow Depth = 1.33" for 2-year event
Inflow = 0.94 cfs @ 12.08 hrs, Volume= 0.065 af
Outflow = 0.03 cfs @ 16.56 hrs, Volume= 0.048 af, Atten= 97%, Lag= 268.6 min
Primary = 0.03 cfs @ 16.56 hrs, Volume= 0.048 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 105.39' @ 16.56 hrs Surf.Area= 1,506 sf Storage= 1,704 cf

Plug-Flow detention time= 467.8 min calculated for 0.048 af (74% of inflow)
Center-of-Mass det. time= 375.4 min ( 1,218.9 - 843.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 104.00' | 2,703 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 104.00 | 956 | 0 | 0 |
| 105.00 | 1,339 | 1,148 | 1,148 |
| 105.50 | 1,552 | 723 | 1,870 |
| 106.00 | 1,778 | 833 | 2,703 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Secondary | 105.50' | **5.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |
| #2 | Primary | 101.80' | **0.8" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |

**Primary OutFlow** Max=0.03 cfs @ 16.56 hrs HW=105.39' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 0.03 cfs @ 9.08 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=104.00' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Summary for Pond 1bP: UDSF 2

Inflow Area = 0.206 ac, 44.23% Impervious, Inflow Depth = 1.08" for 2-year event
Inflow = 0.26 cfs @ 12.08 hrs, Volume= 0.019 af
Outflow = 0.03 cfs @ 13.02 hrs, Volume= 0.019 af, Atten= 89%, Lag= 56.7 min
Primary = 0.03 cfs @ 13.02 hrs, Volume= 0.019 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 102.25' @ 13.02 hrs Surf.Area= 468 sf Storage= 284 cf

Plug-Flow detention time= 90.5 min calculated for 0.019 af (100% of inflow)
Center-of-Mass det. time= 90.5 min ( 947.0 - 856.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 101.50' | 1,783 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 101.50 | 291 | 0 | 0 |
| 102.00 | 401 | 173 | 173 |
| 103.00 | 663 | 532 | 705 |
| 103.50 | 1,074 | 434 | 1,139 |
| 104.00 | 1,500 | 644 | 1,783 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 99.30' | **0.8" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |
| #2 | Secondary | 103.00' | **5.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |

**Primary OutFlow** Max=0.03 cfs @ 13.02 hrs HW=102.25' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.03 cfs @ 8.23 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=101.50' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Summary for Link 1L: AP-1

| | | | | |
|---|---|---|---|---|
| Inflow Area = | 4.161 ac, | 17.32% Impervious, | Inflow Depth > 0.55" | for 2-year event |
| Inflow = | 0.84 cfs @ | 12.37 hrs, Volume= | 0.189 af | |
| Primary = | 0.84 cfs @ | 12.37 hrs, Volume= | 0.189 af, | Atten= 0%, Lag= 0.0 min |

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment SC-1: Parking Expansion** Runoff Area=146,561 sf 9.25% Impervious Runoff Depth=1.20"
Flow Length=760' Tc=18.7 min CN=62 Runoff=2.91 cfs 0.336 af

**Subcatchment SC-1a: Parking Area** Runoff Area=25,741 sf 53.90% Impervious Runoff Depth=2.55"
Tc=5.0 min CN=80 Runoff=1.83 cfs 0.125 af

**Subcatchment SC-1b: Access Drive Area** Runoff Area=8,960 sf 44.23% Impervious Runoff Depth=2.21"
Tc=5.0 min CN=76 Runoff=0.55 cfs 0.038 af

**Reach R1: Natural Drainage** Avg. Flow Depth=0.08' Max Vel=0.63 fps Inflow=0.68 cfs 0.100 af
n=0.035 L=165.0' S=0.0079 '/' Capacity=1,532.48 cfs Outflow=0.63 cfs 0.099 af

**Reach R2: Natural Drainage** Avg. Flow Depth=0.02' Max Vel=0.22 fps Inflow=0.06 cfs 0.038 af
n=0.035 L=132.0' S=0.0038 '/' Capacity=384.22 cfs Outflow=0.06 cfs 0.038 af

**Pond 1aP: UDSF 1** Peak Elev=105.64' Storage=2,091 cf Inflow=1.83 cfs 0.125 af
Primary=0.03 cfs 0.053 af Secondary=0.65 cfs 0.047 af Outflow=0.68 cfs 0.100 af

**Pond 1bP: UDSF 2** Peak Elev=103.01' Storage=714 cf Inflow=0.55 cfs 0.038 af
Primary=0.03 cfs 0.036 af Secondary=0.03 cfs 0.002 af Outflow=0.06 cfs 0.038 af

**Link 1L: AP-1** Inflow=3.17 cfs 0.473 af
Primary=3.17 cfs 0.473 af

**Total Runoff Area = 4.161 ac Runoff Volume = 0.499 af Average Runoff Depth = 1.44"**
**82.68% Pervious = 3.441 ac 17.32% Impervious = 0.721 ac**

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment SC-1: Parking Expansion** Runoff Area=146,561 sf 9.25% Impervious Runoff Depth=1.95"
Flow Length=760' Tc=18.7 min CN=62 Runoff=5.07 cfs 0.548 af

**Subcatchment SC-1a: Parking Area** Runoff Area=25,741 sf 53.90% Impervious Runoff Depth=3.60"
Tc=5.0 min CN=80 Runoff=2.58 cfs 0.177 af

**Subcatchment SC-1b: Access Drive Area** Runoff Area=8,960 sf 44.23% Impervious Runoff Depth=3.21"
Tc=5.0 min CN=76 Runoff=0.80 cfs 0.055 af

**Reach R1: Natural Drainage** Avg. Flow Depth=0.14' Max Vel=0.85 fps Inflow=1.86 cfs 0.150 af
n=0.035 L=165.0' S=0.0079 '/' Capacity=1,532.48 cfs Outflow=1.62 cfs 0.150 af

**Reach R2: Natural Drainage** Avg. Flow Depth=0.06' Max Vel=0.38 fps Inflow=0.35 cfs 0.055 af
n=0.035 L=132.0' S=0.0038 '/' Capacity=384.22 cfs Outflow=0.30 cfs 0.055 af

**Pond 1aP: UDSF 1** Peak Elev=105.78' Storage=2,316 cf Inflow=2.58 cfs 0.177 af
Primary=0.03 cfs 0.055 af Secondary=1.83 cfs 0.095 af Outflow=1.86 cfs 0.150 af

**Pond 1bP: UDSF 2** Peak Elev=103.09' Storage=765 cf Inflow=0.80 cfs 0.055 af
Primary=0.03 cfs 0.041 af Secondary=0.32 cfs 0.014 af Outflow=0.35 cfs 0.055 af

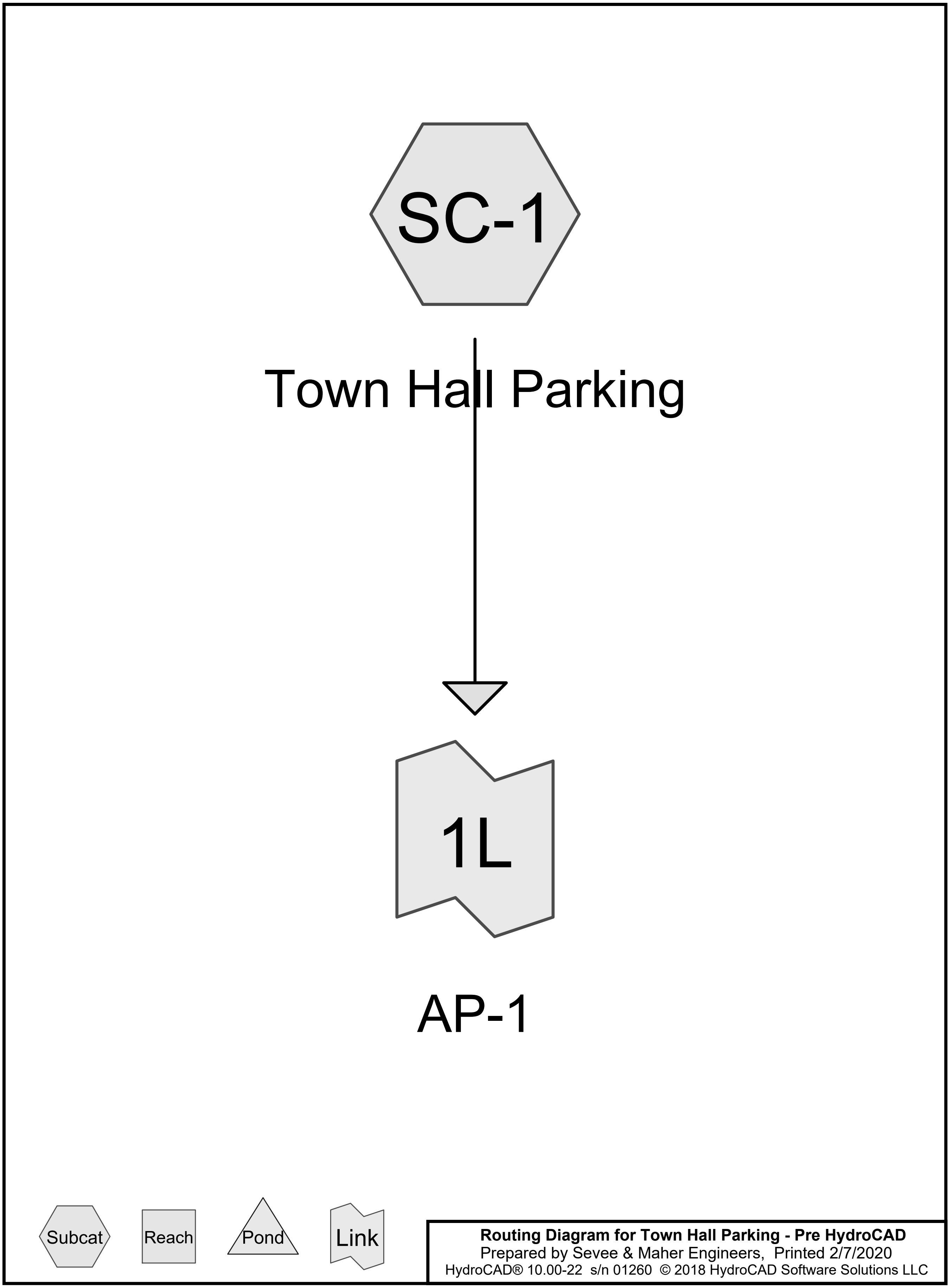
**Link 1L: AP-1** Inflow=6.70 cfs 0.753 af
Primary=6.70 cfs 0.753 af

**Total Runoff Area = 4.161 ac Runoff Volume = 0.780 af Average Runoff Depth = 2.25"**
**82.68% Pervious = 3.441 ac 17.32% Impervious = 0.721 ac**

# APPENDIX C

## TOWN OFFICE PARKING EXPANSION HYDROCAD CALCULATIONS

SME
SEVEE & MAHER
ENGINEERS




**Routing Diagram for Town Hall Parking - Pre HydroCAD**
Prepared by Sevee & Maher Engineers, Printed 2/7/2020

## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 0.346 | 74 | >75% Grass cover, Good, HSG C (SC-1) |
| 0.586 | 48 | Brush, Good, HSG B (SC-1) |
| 0.271 | 98 | Paved parking, HSG C (SC-1) |
| 2.958 | 58 | Woods/grass comb., Good, HSG B (SC-1) |
| **4.161** | **61** | **TOTAL AREA** |

## Summary for Subcatchment SC-1: Town Hall Parking

Runoff = 0.85 cfs @ 12.40 hrs, Volume= 0.140 af, Depth= 0.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.10"

| Area (sf) | CN | Description |
|---|---|---|
| 25,520 | 48 | Brush, Good, HSG B |
| 15,086 | 74 | >75% Grass cover, Good, HSG C |
| 11,800 | 98 | Paved parking, HSG C |
| 128,856 | 58 | Woods/grass comb., Good, HSG B |
| 181,262 | 61 | Weighted Average |
| 169,462 | | 93.49% Pervious Area |
| 11,800 | | 6.51% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 14.7 | 100 | 0.0200 | 0.11 | | **Sheet Flow, A-B**<br>Grass: Dense n= 0.240 P2= 3.00" |
| 3.2 | 233 | 0.0600 | 1.22 | | **Shallow Concentrated Flow, C-D**<br>Woodland Kv= 5.0 fps |
| 0.8 | 427 | 0.0400 | 9.07 | 145.08 | **Channel Flow, C-D**<br>Area= 16.0 sf Perim= 14.5' r= 1.10'<br>n= 0.035 Earth, dense weeds |
| 18.7 | 760 | Total | | | |

## Summary for Link 1L: AP-1

Inflow Area = 4.161 ac, 6.51% Impervious, Inflow Depth = 0.40" for 2-year event
Inflow = 0.85 cfs @ 12.40 hrs, Volume= 0.140 af
Primary = 0.85 cfs @ 12.40 hrs, Volume= 0.140 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

## Summary for Subcatchment SC-1: Town Hall Parking

Runoff = 3.35 cfs @ 12.29 hrs, Volume= 0.394 af, Depth= 1.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.60"

| Area (sf) | CN | Description |
|---|---|---|
| 25,520 | 48 | Brush, Good, HSG B |
| 15,086 | 74 | >75% Grass cover, Good, HSG C |
| 11,800 | 98 | Paved parking, HSG C |
| 128,856 | 58 | Woods/grass comb., Good, HSG B |
| 181,262 | 61 | Weighted Average |
| 169,462 | | 93.49% Pervious Area |
| 11,800 | | 6.51% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 14.7 | 100 | 0.0200 | 0.11 | | **Sheet Flow, A-B**<br>Grass: Dense n= 0.240 P2= 3.00" |
| 3.2 | 233 | 0.0600 | 1.22 | | **Shallow Concentrated Flow, C-D**<br>Woodland Kv= 5.0 fps |
| 0.8 | 427 | 0.0400 | 9.07 | 145.08 | **Channel Flow, C-D**<br>Area= 16.0 sf Perim= 14.5' r= 1.10'<br>n= 0.035 Earth, dense weeds |
| 18.7 | 760 | Total | | | |

## Summary for Link 1L: AP-1

Inflow Area = 4.161 ac, 6.51% Impervious, Inflow Depth = 1.14" for 10-year event
Inflow = 3.35 cfs @ 12.29 hrs, Volume= 0.394 af
Primary = 3.35 cfs @ 12.29 hrs, Volume= 0.394 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

## Summary for Subcatchment SC-1: Town Hall Parking

Runoff = 5.96 cfs @ 12.28 hrs, Volume= 0.649 af, Depth= 1.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.80"

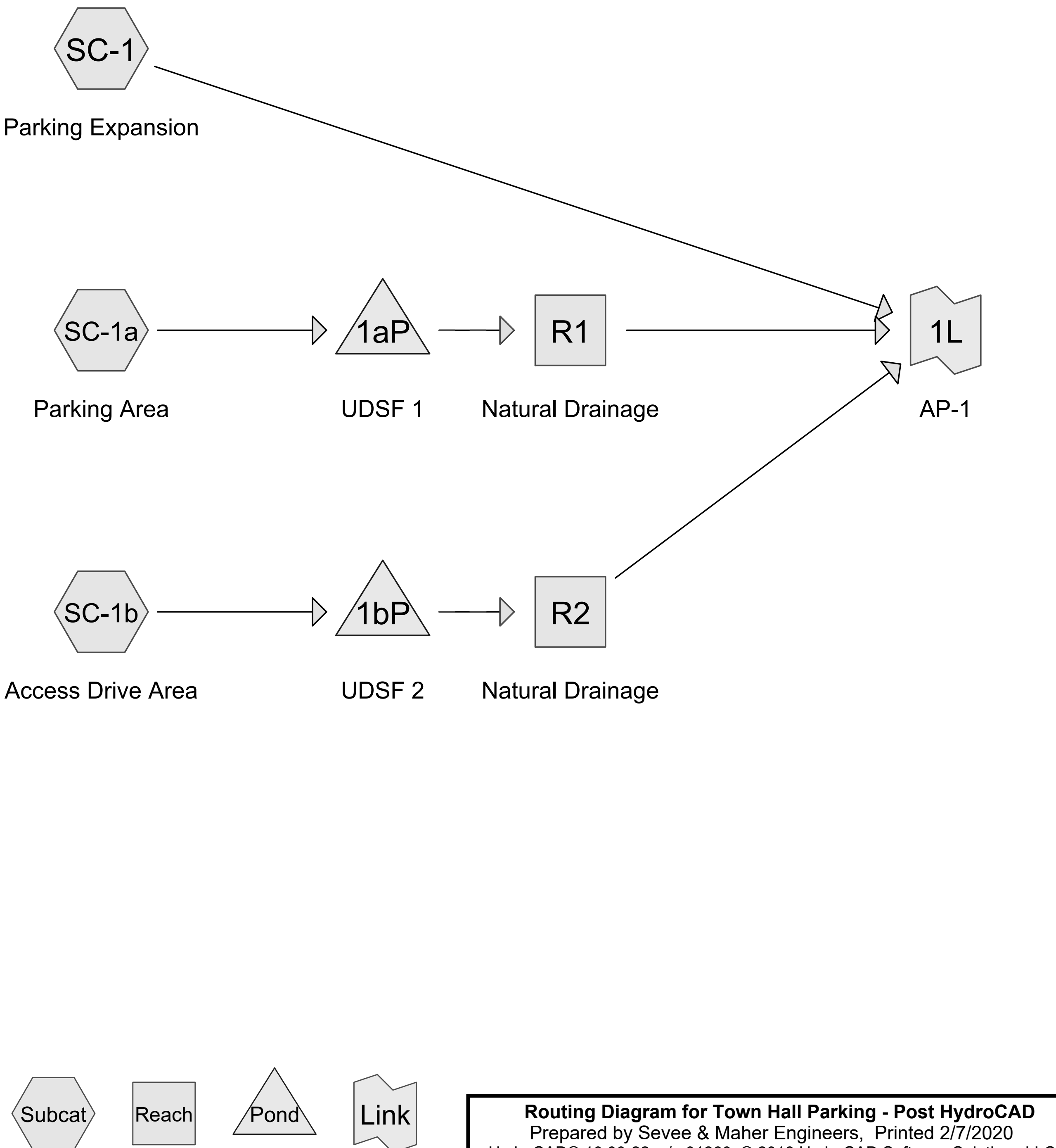
| Area (sf) | CN | Description |
|---|---|---|
| 25,520 | 48 | Brush, Good, HSG B |
| 15,086 | 74 | >75% Grass cover, Good, HSG C |
| 11,800 | 98 | Paved parking, HSG C |
| 128,856 | 58 | Woods/grass comb., Good, HSG B |
| 181,262 | 61 | Weighted Average |
| 169,462 | | 93.49% Pervious Area |
| 11,800 | | 6.51% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 14.7 | 100 | 0.0200 | 0.11 | | **Sheet Flow, A-B**<br>Grass: Dense n= 0.240 P2= 3.00" |
| 3.2 | 233 | 0.0600 | 1.22 | | **Shallow Concentrated Flow, C-D**<br>Woodland Kv= 5.0 fps |
| 0.8 | 427 | 0.0400 | 9.07 | 145.08 | **Channel Flow, C-D**<br>Area= 16.0 sf Perim= 14.5' r= 1.10'<br>n= 0.035 Earth, dense weeds |
| 18.7 | 760 | Total | | | |

## Summary for Link 1L: AP-1

Inflow Area = 4.161 ac, 6.51% Impervious, Inflow Depth = 1.87" for 25-year event
Inflow = 5.96 cfs @ 12.28 hrs, Volume= 0.649 af
Primary = 5.96 cfs @ 12.28 hrs, Volume= 0.649 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs




**Routing Diagram for Town Hall Parking - Post HydroCAD**
Prepared by Sevee & Maher Engineers, Printed 2/7/2020
HydroCAD® 10.00-22 s/n 01260 © 2018 HydroCAD Software Solutions LLC

## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 0.062 | 61 | >75% Grass cover, Good, HSG B (SC-1a) |
| 0.052 | 74 | >75% Grass cover, Good, HSG C (SC-1) |
| 0.721 | 98 | Paved parking, HSG C (SC-1, SC-1a, SC-1b) |
| 3.327 | 58 | Woods/grass comb., Good, HSG B (SC-1, SC-1a, SC-1b) |
| **4.161** | **65** | **TOTAL AREA** |

## Summary for Subcatchment SC-1: Parking Expansion

Runoff = 0.79 cfs @ 12.36 hrs, Volume= 0.123 af, Depth= 0.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.10"

| Area (sf) | CN | Description |
|---|---|---|
| 13,551 | 98 | Paved parking, HSG C |
| 130,762 | 58 | Woods/grass comb., Good, HSG B |
| 2,248 | 74 | >75% Grass cover, Good, HSG C |
| 146,561 | 62 | Weighted Average |
| 133,010 | | 90.75% Pervious Area |
| 13,551 | | 9.25% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 14.7 | 100 | 0.0200 | 0.11 | | **Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.00" |
| 3.2 | 233 | 0.0600 | 1.22 | | **Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps |
| 0.8 | 427 | 0.0400 | 9.07 | 145.08 | **Channel Flow, C-D** Area= 16.0 sf Perim= 14.5' r= 1.10' n= 0.035 Earth, dense weeds |
| 18.7 | 760 | Total | | | |

## Summary for Subcatchment SC-1a: Parking Area

Runoff = 0.94 cfs @ 12.08 hrs, Volume= 0.065 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.10"

| Area (sf) | CN | Description |
|---|---|---|
| 13,875 | 98 | Paved parking, HSG C |
| 9,159 | 58 | Woods/grass comb., Good, HSG B |
| 2,707 | 61 | >75% Grass cover, Good, HSG B |
| 25,741 | 80 | Weighted Average |
| 11,866 | | 46.10% Pervious Area |
| 13,875 | | 53.90% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.0 | | | | | **Direct Entry, Tc MUST BE GREATER THAN OR EQUAL TO 5 MI** |

## Summary for Subcatchment SC-1b: Access Drive Area

Runoff = 0.26 cfs @ 12.08 hrs, Volume= 0.019 af, Depth= 1.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.10"

| Area (sf) | CN | Description |
|---|---|---|
| 3,963 | 98 | Paved parking, HSG C |
| 4,997 | 58 | Woods/grass comb., Good, HSG B |
| 8,960 | 76 | Weighted Average |
| 4,997 | | 55.77% Pervious Area |
| 3,963 | | 44.23% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.0 | | | | | **Direct Entry, Tc MUST BE GREATER THAN OR EQUAL TO 5 MI** |

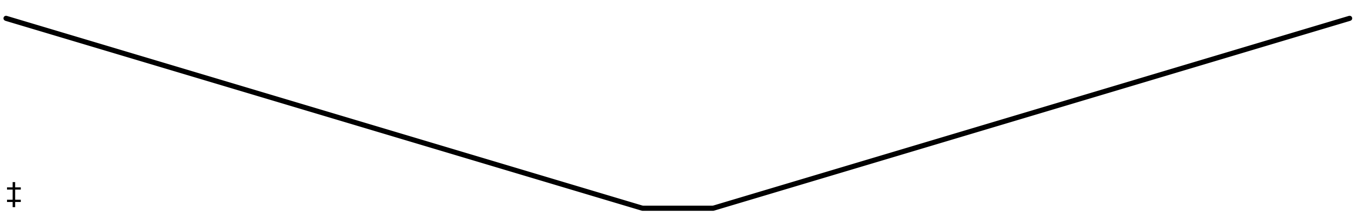
## Summary for Reach R1: Natural Drainage

Inflow Area = 0.591 ac, 53.90% Impervious, Inflow Depth > 0.98" for 2-year event
Inflow = 0.03 cfs @ 16.56 hrs, Volume= 0.048 af
Outflow = 0.03 cfs @ 16.82 hrs, Volume= 0.048 af, Atten= 0%, Lag= 16.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.35 fps, Min. Travel Time= 8.0 min
Avg. Velocity = 0.35 fps, Avg. Travel Time= 8.0 min

Peak Storage= 15 cf @ 16.69 hrs
Average Depth at Peak Storage= 0.01'
Bank-Full Depth= 3.00' Flow Area= 300.0 sf, Capacity= 1,532.48 cfs

10.00' x 3.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 30.0 '/' Top Width= 190.00'
Length= 165.0' Slope= 0.0079 '/'
Inlet Invert= 101.30', Outlet Invert= 100.00'




## Summary for Reach R2: Natural Drainage

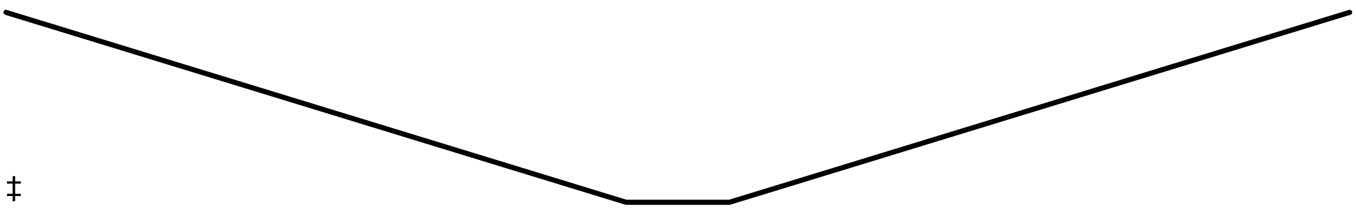
[79] Warning: Submerged Pond 1bP Primary device # 1 by 1.20'

Inflow Area = 0.206 ac, 44.23% Impervious, Inflow Depth > 0.01" for 2-year event
Inflow = 0.00 cfs @ 24.18 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 25.05 hrs, Volume= 0.000 af, Atten= 0%, Lag= 52.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.19 fps, Min. Travel Time= 11.9 min
Avg. Velocity = 0.19 fps, Avg. Travel Time= 11.9 min

Peak Storage= 0 cf @ 24.85 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 2.00' Flow Area= 140.0 sf, Capacity= 384.22 cfs

10.00' x 2.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 30.0 '/' Top Width= 130.00'
Length= 132.0' Slope= 0.0038 '/'
Inlet Invert= 100.50', Outlet Invert= 100.00'



‡

## Summary for Pond 1aP: UDSF 1

[44] Hint: Outlet device #2 is below defined storage

| | | | | |
|---|---|---|---|---|
| Inflow Area = | 0.591 ac, 53.90% Impervious, Inflow Depth = 1.33" for 2-year event | | | |
| Inflow = | 0.94 cfs @ | 12.08 hrs, Volume= | 0.065 af | |
| Outflow = | 0.03 cfs @ | 16.56 hrs, Volume= | 0.048 af, | Atten= 97%, Lag= 268.6 min |
| Primary = | 0.03 cfs @ | 16.56 hrs, Volume= | 0.048 af | |
| Secondary = | 0.00 cfs @ | 0.00 hrs, Volume= | 0.000 af | |

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 105.39' @ 16.56 hrs Surf.Area= 1,506 sf Storage= 1,704 cf

Plug-Flow detention time= 467.8 min calculated for 0.048 af (74% of inflow)
Center-of-Mass det. time= 375.4 min ( 1,218.9 - 843.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 104.00' | 2,703 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 104.00 | 956 | 0 | 0 |
| 105.00 | 1,339 | 1,148 | 1,148 |
| 105.50 | 1,552 | 723 | 1,870 |
| 106.00 | 1,778 | 833 | 2,703 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Secondary | 105.50' | **5.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |
| #2 | Primary | 101.80' | **0.8" Vert. Orifice/Grate** C= 0.600 |

**Primary OutFlow** Max=0.03 cfs @ 16.56 hrs HW=105.39' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 0.03 cfs @ 9.08 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=104.00' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Summary for Pond 1bP: UDSF 2

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 0.206 ac, 44.23% Impervious, Inflow Depth = 1.08" for 2-year event
Inflow = 0.26 cfs @ 12.08 hrs, Volume= 0.019 af
Outflow = 0.00 cfs @ 24.18 hrs, Volume= 0.000 af, Atten= 100%, Lag= 725.8 min
Primary = 0.00 cfs @ 24.18 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 101.50' @ 24.18 hrs Surf.Area= 291.264 ac Storage= 0.018 af

Plug-Flow detention time= 659.6 min calculated for 0.000 af (1% of inflow)
Center-of-Mass det. time= 453.3 min ( 1,309.8 - 856.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 101.50' | 1,074.622 af | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (acres) | Inc.Store (acre-feet) | Cum.Store (acre-feet) |
|---|---|---|---|
| 101.50 | 291.250 | 0.000 | 0.000 |
| 102.00 | 401.000 | 173.062 | 173.062 |
| 103.00 | 663.000 | 532.000 | 705.062 |
| 103.50 | 815.240 | 369.560 | 1,074.622 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 99.30' | **0.8" Vert. Orifice/Grate** C= 0.600 |
| #2 | Secondary | 103.00' | **10.1' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |

**Primary OutFlow** Max=0.02 cfs @ 24.18 hrs HW=101.50' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.02 cfs @ 7.09 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=101.50' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Summary for Link 1L: AP-1

Inflow Area = 4.161 ac, 17.32% Impervious, Inflow Depth > 0.49" for 2-year event
Inflow = 0.82 cfs @ 12.37 hrs, Volume= 0.171 af
Primary = 0.82 cfs @ 12.37 hrs, Volume= 0.171 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

## Summary for Subcatchment SC-1: Parking Expansion

Runoff = 2.91 cfs @ 12.28 hrs, Volume= 0.336 af, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.60"

| Area (sf) | CN | Description |
|---|---|---|
| 13,551 | 98 | Paved parking, HSG C |
| 130,762 | 58 | Woods/grass comb., Good, HSG B |
| 2,248 | 74 | >75% Grass cover, Good, HSG C |
| 146,561 | 62 | Weighted Average |
| 133,010 | | 90.75% Pervious Area |
| 13,551 | | 9.25% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 14.7 | 100 | 0.0200 | 0.11 | | **Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.00" |
| 3.2 | 233 | 0.0600 | 1.22 | | **Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps |
| 0.8 | 427 | 0.0400 | 9.07 | 145.08 | **Channel Flow, C-D** Area= 16.0 sf Perim= 14.5' r= 1.10' n= 0.035 Earth, dense weeds |
| 18.7 | 760 | Total | | | |

## Summary for Subcatchment SC-1a: Parking Area

Runoff = 1.83 cfs @ 12.07 hrs, Volume= 0.125 af, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.60"

| Area (sf) | CN | Description |
|---|---|---|
| 13,875 | 98 | Paved parking, HSG C |
| 9,159 | 58 | Woods/grass comb., Good, HSG B |
| 2,707 | 61 | >75% Grass cover, Good, HSG B |
| 25,741 | 80 | Weighted Average |
| 11,866 | | 46.10% Pervious Area |
| 13,875 | | 53.90% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.0 | | | | | **Direct Entry, Tc MUST BE GREATER THAN OR EQUAL TO 5 MI** |

## Summary for Subcatchment SC-1b: Access Drive Area

Runoff = 0.55 cfs @ 12.08 hrs, Volume= 0.038 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.60"

| Area (sf) | CN | Description |
|---|---|---|
| 3,963 | 98 | Paved parking, HSG C |
| 4,997 | 58 | Woods/grass comb., Good, HSG B |
| 8,960 | 76 | Weighted Average |
| 4,997 | | 55.77% Pervious Area |
| 3,963 | | 44.23% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.0 | | | | | **Direct Entry, Tc MUST BE GREATER THAN OR EQUAL TO 5 MI** |

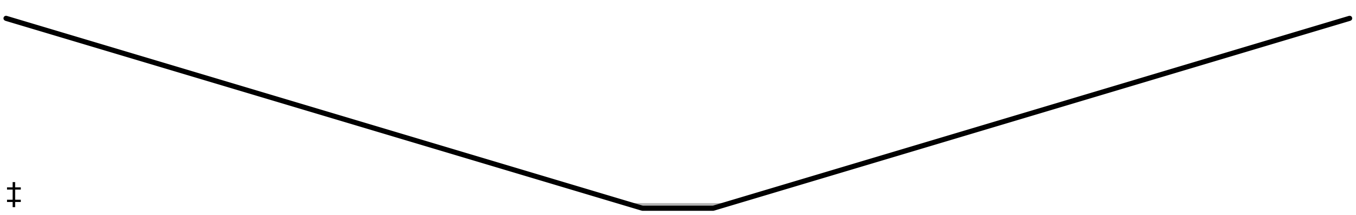
## Summary for Reach R1: Natural Drainage

Inflow Area = 0.591 ac, 53.90% Impervious, Inflow Depth > 2.03" for 10-year event
Inflow = 0.68 cfs @ 12.34 hrs, Volume= 0.100 af
Outflow = 0.63 cfs @ 12.48 hrs, Volume= 0.099 af, Atten= 7%, Lag= 8.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.63 fps, Min. Travel Time= 4.4 min
Avg. Velocity = 0.35 fps, Avg. Travel Time= 7.8 min

Peak Storage= 165 cf @ 12.41 hrs
Average Depth at Peak Storage= 0.08'
Bank-Full Depth= 3.00' Flow Area= 300.0 sf, Capacity= 1,532.48 cfs

10.00' x 3.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 30.0 '/' Top Width= 190.00'
Length= 165.0' Slope= 0.0079 '/'
Inlet Invert= 101.30', Outlet Invert= 100.00'



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## Summary for Reach R2: Natural Drainage

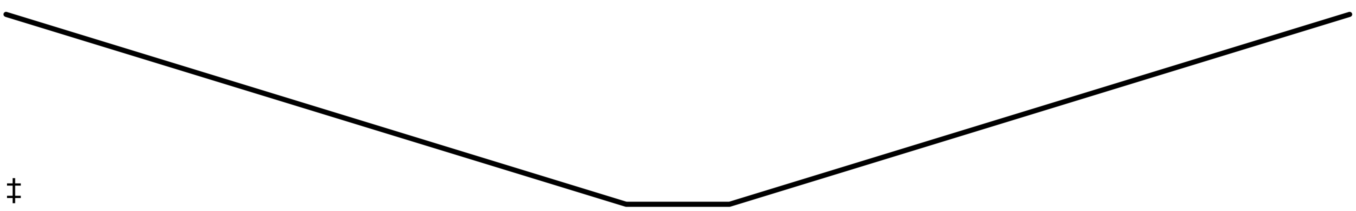
[79] Warning: Submerged Pond 1bP Primary device # 1 by 1.20'

Inflow Area = 0.206 ac, 44.23% Impervious, Inflow Depth > 0.01" for 10-year event
Inflow = 0.00 cfs @ 24.17 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 25.02 hrs, Volume= 0.000 af, Atten= 0%, Lag= 50.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.19 fps, Min. Travel Time= 11.9 min
Avg. Velocity = 0.19 fps, Avg. Travel Time= 11.9 min

Peak Storage= 0 cf @ 24.82 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 2.00' Flow Area= 140.0 sf, Capacity= 384.22 cfs

10.00' x 2.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 30.0 '/' Top Width= 130.00'
Length= 132.0' Slope= 0.0038 '/'
Inlet Invert= 100.50', Outlet Invert= 100.00'



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## Summary for Pond 1aP: UDSF 1

[44] Hint: Outlet device #2 is below defined storage

| | | | |
|---|---|---|---|
| Inflow Area = | 0.591 ac, 53.90% Impervious, Inflow Depth = 2.55" | for 10-year event | |
| Inflow = | 1.83 cfs @ 12.07 hrs, Volume= | 0.125 af | |
| Outflow = | 0.68 cfs @ 12.34 hrs, Volume= | 0.100 af, | Atten= 63%, Lag= 15.7 min |
| Primary = | 0.03 cfs @ 12.34 hrs, Volume= | 0.053 af | |
| Secondary = | 0.65 cfs @ 12.34 hrs, Volume= | 0.047 af | |

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 105.64' @ 12.34 hrs Surf.Area= 1,615 sf Storage= 2,091 cf

Plug-Flow detention time= 264.5 min calculated for 0.100 af (80% of inflow)
Center-of-Mass det. time= 186.0 min ( 1,010.5 - 824.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 104.00' | 2,703 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 104.00 | 956 | 0 | 0 |
| 105.00 | 1,339 | 1,148 | 1,148 |
| 105.50 | 1,552 | 723 | 1,870 |
| 106.00 | 1,778 | 833 | 2,703 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Secondary | 105.50' | **5.0' long x 10.0' 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) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |
| #2 | Primary | 101.80' | **0.8" Vert. Orifice/Grate** C= 0.600 |

**Primary OutFlow** Max=0.03 cfs @ 12.34 hrs HW=105.64' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 0.03 cfs @ 9.39 fps)

**Secondary OutFlow** Max=0.65 cfs @ 12.34 hrs HW=105.64' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 0.65 cfs @ 0.93 fps)

## Summary for Pond 1bP: UDSF 2

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 0.206 ac, 44.23% Impervious, Inflow Depth = 2.21" for 10-year event
Inflow = 0.55 cfs @ 12.08 hrs, Volume= 0.038 af
Outflow = 0.00 cfs @ 24.17 hrs, Volume= 0.000 af, Atten= 100%, Lag= 725.8 min
Primary = 0.00 cfs @ 24.17 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 101.50' @ 24.17 hrs Surf.Area= 291.278 ac Storage= 0.037 af

Plug-Flow detention time= 725.2 min calculated for 0.000 af (1% of inflow)
Center-of-Mass det. time= 465.1 min ( 1,300.5 - 835.4 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 101.50' | 1,074.622 af | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (acres) | Inc.Store (acre-feet) | Cum.Store (acre-feet) |
|---|---|---|---|
| 101.50 | 291.250 | 0.000 | 0.000 |
| 102.00 | 401.000 | 173.062 | 173.062 |
| 103.00 | 663.000 | 532.000 | 705.062 |
| 103.50 | 815.240 | 369.560 | 1,074.622 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 99.30' | **0.8" Vert. Orifice/Grate** C= 0.600 |
| #2 | Secondary | 103.00' | **10.1' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |

**Primary OutFlow** Max=0.02 cfs @ 24.17 hrs HW=101.50' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.02 cfs @ 7.09 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=101.50' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Summary for Link 1L: AP-1

Inflow Area = 4.161 ac, 17.32% Impervious, Inflow Depth > 1.26" for 10-year event
Inflow = 3.14 cfs @ 12.38 hrs, Volume= 0.436 af
Primary = 3.14 cfs @ 12.38 hrs, Volume= 0.436 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

## Summary for Subcatchment SC-1: Parking Expansion

Runoff = 5.07 cfs @ 12.28 hrs, Volume= 0.548 af, Depth= 1.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.80"

| Area (sf) | CN | Description |
|---|---|---|
| 13,551 | 98 | Paved parking, HSG C |
| 130,762 | 58 | Woods/grass comb., Good, HSG B |
| 2,248 | 74 | >75% Grass cover, Good, HSG C |
| 146,561 | 62 | Weighted Average |
| 133,010 | | 90.75% Pervious Area |
| 13,551 | | 9.25% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 14.7 | 100 | 0.0200 | 0.11 | | **Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.00" |
| 3.2 | 233 | 0.0600 | 1.22 | | **Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps |
| 0.8 | 427 | 0.0400 | 9.07 | 145.08 | **Channel Flow, C-D** Area= 16.0 sf Perim= 14.5' r= 1.10' n= 0.035 Earth, dense weeds |
| 18.7 | 760 | Total | | | |

## Summary for Subcatchment SC-1a: Parking Area

Runoff = 2.58 cfs @ 12.07 hrs, Volume= 0.177 af, Depth= 3.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.80"

| Area (sf) | CN | Description |
|---|---|---|
| 13,875 | 98 | Paved parking, HSG C |
| 9,159 | 58 | Woods/grass comb., Good, HSG B |
| 2,707 | 61 | >75% Grass cover, Good, HSG B |
| 25,741 | 80 | Weighted Average |
| 11,866 | | 46.10% Pervious Area |
| 13,875 | | 53.90% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.0 | | | | | **Direct Entry, Tc MUST BE GREATER THAN OR EQUAL TO 5 MI** |

## Summary for Subcatchment SC-1b: Access Drive Area

Runoff = 0.80 cfs @ 12.07 hrs, Volume= 0.055 af, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.80"

| Area (sf) | CN | Description |
|---|---|---|
| 3,963 | 98 | Paved parking, HSG C |
| 4,997 | 58 | Woods/grass comb., Good, HSG B |
| 8,960 | 76 | Weighted Average |
| 4,997 | | 55.77% Pervious Area |
| 3,963 | | 44.23% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.0 | | | | | **Direct Entry, Tc MUST BE GREATER THAN OR EQUAL TO 5 MI** |

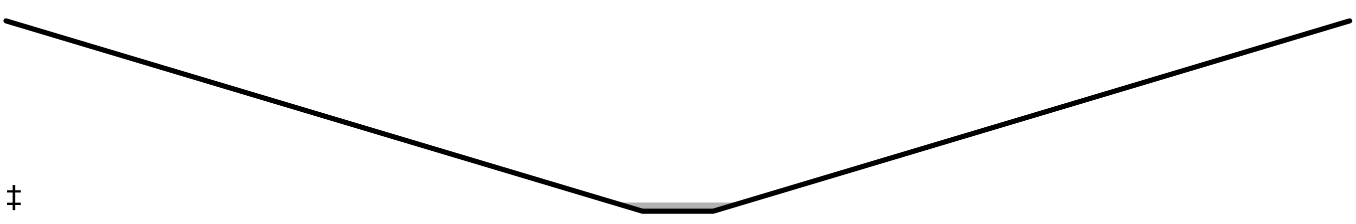
## Summary for Reach R1: Natural Drainage

Inflow Area = 0.591 ac, 53.90% Impervious, Inflow Depth > 3.05" for 25-year event
Inflow = 1.86 cfs @ 12.14 hrs, Volume= 0.150 af
Outflow = 1.62 cfs @ 12.25 hrs, Volume= 0.150 af, Atten= 13%, Lag= 6.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.85 fps, Min. Travel Time= 3.2 min
Avg. Velocity = 0.36 fps, Avg. Travel Time= 7.6 min

Peak Storage= 317 cf @ 12.20 hrs
Average Depth at Peak Storage= 0.14'
Bank-Full Depth= 3.00' Flow Area= 300.0 sf, Capacity= 1,532.48 cfs

10.00' x 3.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 30.0 '/' Top Width= 190.00'
Length= 165.0' Slope= 0.0079 '/'
Inlet Invert= 101.30', Outlet Invert= 100.00'



## Summary for Reach R2: Natural Drainage

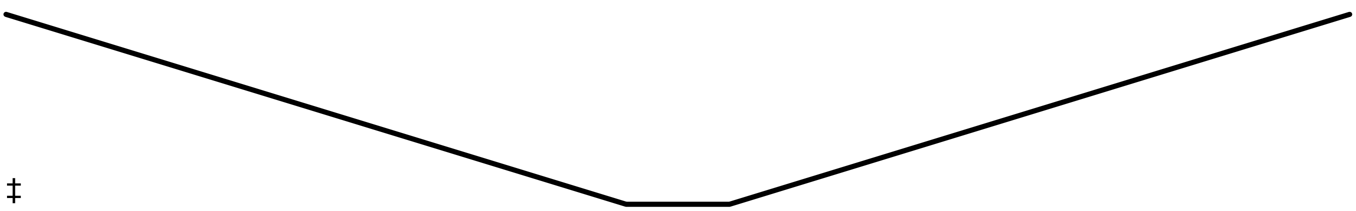
[79] Warning: Submerged Pond 1bP Primary device # 1 by 1.20'

Inflow Area = 0.206 ac, 44.23% Impervious, Inflow Depth > 0.02" for 25-year event
Inflow = 0.00 cfs @ 24.17 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 25.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 49.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.19 fps, Min. Travel Time= 11.9 min
Avg. Velocity = 0.19 fps, Avg. Travel Time= 11.9 min

Peak Storage= 0 cf @ 24.80 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 2.00' Flow Area= 140.0 sf, Capacity= 384.22 cfs

10.00' x 2.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 30.0 '/' Top Width= 130.00'
Length= 132.0' Slope= 0.0038 '/'
Inlet Invert= 100.50', Outlet Invert= 100.00'



‡

## Summary for Pond 1aP: UDSF 1

[44] Hint: Outlet device #2 is below defined storage

| | | | |
|---|---|---|---|
| Inflow Area = | 0.591 ac, 53.90% Impervious, Inflow Depth = 3.60" | for 25-year event | |
| Inflow = | 2.58 cfs @ 12.07 hrs, Volume= | 0.177 af | |
| Outflow = | 1.86 cfs @ 12.14 hrs, Volume= | 0.150 af, | Atten= 28%, Lag= 4.3 min |
| Primary = | 0.03 cfs @ 12.14 hrs, Volume= | 0.055 af | |
| Secondary = | 1.83 cfs @ 12.14 hrs, Volume= | 0.095 af | |

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 105.78' @ 12.14 hrs Surf.Area= 1,677 sf Storage= 2,316 cf

Plug-Flow detention time= 188.5 min calculated for 0.150 af (85% of inflow)
Center-of-Mass det. time= 122.9 min ( 937.5 - 814.6 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 104.00' | 2,703 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 104.00 | 956 | 0 | 0 |
| 105.00 | 1,339 | 1,148 | 1,148 |
| 105.50 | 1,552 | 723 | 1,870 |
| 106.00 | 1,778 | 833 | 2,703 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Secondary | 105.50' | **5.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |
| #2 | Primary | 101.80' | **0.8" Vert. Orifice/Grate** C= 0.600 |

**Primary OutFlow** Max=0.03 cfs @ 12.14 hrs HW=105.78' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 0.03 cfs @ 9.56 fps)

**Secondary OutFlow** Max=1.82 cfs @ 12.14 hrs HW=105.78' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 1.82 cfs @ 1.32 fps)

## Summary for Pond 1bP: UDSF 2

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 0.206 ac, 44.23% Impervious, Inflow Depth = 3.21" for 25-year event
Inflow = 0.80 cfs @ 12.07 hrs, Volume= 0.055 af
Outflow = 0.00 cfs @ 24.17 hrs, Volume= 0.000 af, Atten= 100%, Lag= 725.7 min
Primary = 0.00 cfs @ 24.17 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 101.50' @ 24.17 hrs Surf.Area= 291.291 ac Storage= 0.054 af

Plug-Flow detention time= 765.8 min calculated for 0.000 af (1% of inflow)
Center-of-Mass det. time= 470.9 min ( 1,295.5 - 824.6 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 101.50' | 1,074.622 af | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (acres) | Inc.Store (acre-feet) | Cum.Store (acre-feet) |
|---|---|---|---|
| 101.50 | 291.250 | 0.000 | 0.000 |
| 102.00 | 401.000 | 173.062 | 173.062 |
| 103.00 | 663.000 | 532.000 | 705.062 |
| 103.50 | 815.240 | 369.560 | 1,074.622 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 99.30' | **0.8" Vert. Orifice/Grate** C= 0.600 |
| #2 | Secondary | 103.00' | **10.1' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |

**Primary OutFlow** Max=0.02 cfs @ 24.17 hrs HW=101.50' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.02 cfs @ 7.09 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=101.50' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Summary for Link 1L: AP-1

Inflow Area = 4.161 ac, 17.32% Impervious, Inflow Depth > 2.01" for 25-year event
Inflow = 6.67 cfs @ 12.27 hrs, Volume= 0.698 af
Primary = 6.67 cfs @ 12.27 hrs, Volume= 0.698 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

**APPENDIX D**

**PUBLIC WORKS REDEVELOPMENT TREATMENT CALCULATION SUMMARY**

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**SME**
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# REDEVELOPMENT TREATMENT LEVEL CALCULATIONS

**Project Name:** Cumberland Municipal Site Upgrades
**Project Location:** Public Works, 23 Drowne Road, Cumberland
**Project No:** 19231
**By:** JRG
**Date:** 2/4/2020
**Checked By:** DPD
**Date:** 2/5/2020

| LISTING OF AREAS - EXISTING | | | | | | | |
|---|---|---|---|---|---|---|---|
| Area | Pollutant Ranking | | | | | | Notes |
| | 0 | 1 | 2 | 3 | 4 | 5 | |
| Pavement | | | | | 25,932 | | |
| Gravel | | | | 38,269 | | | |
| Concrete | | | | 883 | | | |
| Buildings | | | | 3,377 | | | |
| Grass | | | 29,926 | | | | |
| Brush/Woods | 13,123 | | | | | | |
| **Total** | **13,123** | **0** | **29,926** | **42,529** | **25,932** | **0** | **111,510 TOTAL** |

| LISTING OF AREAS - PROPOSED | | | | | | | |
|---|---|---|---|---|---|---|---|
| Area | Pollutant Ranking | | | | | | Notes |
| | 0 | 1 | 2 | 3 | 4 | 5 | |
| Pavement | | | | | 44,884 | | |
| Gravel | | | | 4,748 | | | |
| Concrete | | | | 987 | | | |
| Buildings | | | | 15,455 | | | |
| Dripline Filter | | | 869 | | | | |
| Walkway Pavement | | | 1,360 | | | | |
| Grass | | | 22,956 | | | | |
| Brush/Woods | 20,251 | | | | | | |
| **Total** | **20,251** | **0** | **25,185** | **21,190** | **44,884** | **0** | **111,510 TOTAL** |

| EXISTING POLLUTANT RANKING CALCULATIONS | | | | |
|---|---|---|---|---|
| **Land Use Type (from MEDEP Chapter 500)** | **(Square Feet)** | **(Acres)** | **Pollutant Ranking** | **Total Score** |
| Other Roads/Medium Use Parking Lots | 25,932 | 0.60 | 4 | 2.38 |
| Other Parking/Industrial Roofs | 42,529 | 0.98 | 3 | 2.93 |
| Other Rooftops/Lawn Areas | 29,926 | 0.69 | 2 | 1.37 |
| Walkways/Landscaped/Stormwater Treatment Systen | 0 | 0.00 | 1 | 0.00 |
| Forest; Meadow mowed no more than twice per year | 13,123 | 0.30 | 0 | 0.00 |
| **Total** | **111,510** | **2.56** | **EIR** | **6.68** |

| PROPOSED POLLUTANT RANKING CALCULATIONS | | | | |
|---|---|---|---|---|
| **Land Use Type (from MEDEP Chapter 500)** | **Area to be Redeveloped** | **Area to be Redeveloped** | **Pollutant Ranking** | **Total Score** |
| Other Roads/Medium Use Parking Lots | 44,884 | 1.03 | 4 | 4.12 |
| Other Parking/Industrial Roofs | 21,190 | 0.49 | 3 | 1.46 |
| Other Rooftops/Lawn Areas | 25,185 | 0.58 | 2 | 1.16 |
| Walkways/Landscaped/Stormwater Treatment Systen | 0 | 0.00 | 1 | 0.00 |
| Forest; Meadow mowed no more than twice per year | 20,251 | 0.46 | 0 | 0.00 |
| **Total** | **111,510** | **2.56** | **PIR** | **6.74** |

| | |
|---|---|
| **EIR / Redeveloped Acres =** | **2.61** |
| **PIR / Redeveloped Acres =** | **2.63** |
| **Ranked Impact Change Due to Redevelopment =** | **0.02** |

**50% treatment is required per Table 3 of Chapter 500 = 55,755 Square Feet (1.27 acres)**

| | |
|---|---|
| Total Redeveloped Area (from above table) = | 111,510 |
| Impervious Area Treated (from Stormwater Sizing Calculations) = | 56,303 |

**Treatment Percentage Provided = 50.5%**

# APPENDIX E

# PUBLIC WORKS BMP TREATMENT SIZING

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smemaine.com

# STORMWATER TREATMENT SIZING CALCULATIONS

| | |
|---|---|
| **Project Name:** | **Cumberland Municipal Site Upgrades** |
| **Project Location:** | **Public Works, 23 Drowne Road** |
| **Project No:** | **19231** |
| **By:** | **JRG** |
| **Date:** | **2/4/2020** |
| **Checked By:** | **DPD** |
| **Date:** | **2/5/2020** |

**Stormwater Treatment: Undersdrained Soil Filter #1** Bus Parking Area

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | DEVELOPED AREA | = | 35,286 sf | | |
| | | | IMPERVIOUS AREAS CAPTURED | = | 23,172 sf | | |
| | | | NON-IMPERVIOUS AREAS CAPTURED | = | 12,114 sf | | |
| | | | TOTAL AREA CAPTURED | = | 35,286 sf | | |
| | | | REQUIRED TREATMENT VOLUME | | | | |
| (1"/12") | 23,172 | + (0.4"/12") | 12,114 | = | 2,335 cf | 3,155 cf provided | |
| | | | CHANNEL PROTECTION VOLUME (DEPTH) | = | 1.5 ft | 1.5 ft provided | |
| | | | REQUIRED FILTER SURFACE AREA | | | | |
| (0.05) | 23,172 | + (0.2) | 12,114 | = | 1,401 sf | 1,407 sf provided | |

Note: Stone strip will serve as a sediment trap

**Stormwater Treatment: Roof Dripline Filter #1** East Side of Admin Building

ROOF AREAS CAPTURED = 2,050 sf
GRASS AREAS CAPTURED = N/A

MINIMUM STORAGE VOLUME
1 inch x Impervious Area = 171 cf

<u>PROPOSED FILTER SIZE</u> = 4 feet wide by 1.25 feet deep by 96 feet long
(with 40% voids in stone)

Storage Volume Provided = 192 cf

**Stormwater Treatment: Roof Dripline Filter #2** West Side of Admin Building

ROOF AREAS CAPTURED = 2,050 sf
GRASS AREAS CAPTURED = N/A

MINIMUM STORAGE VOLUME
1 inch x Impervious Area = 171 cf

<u>PROPOSED FILTER SIZE</u> = 4 feet wide by 1.25 feet deep by 86 feet long
(with 40% voids in stone)

ACTUAL VOLUME PROPOSED = 172 cf

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# STORMWATER TREATMENT SIZING CALCULATIONS

**Project Name:** Cumberland Municipal Site Upgrades
**Project Location:** Public Works, 23 Drowne Road
**Project No:** 19231
**By:** JRG
**Date:** 2/4/2020
**Checked By:** DPD
**Date:** 2/5/2020

| Name | Impervious Area (sf) | Landscaped Area (sf) | Developed Area (sf) | Treatment Area (Acres) | Filterra Model Number | Unit Treatment Area (Acres) |
|---|---|---|---|---|---|---|
| Filterra #1 at CB #3 | 15,619 | 1,298 | 16,917 | 0.388 | 6x12 | 0.420 |

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## TREATMENT SUMMARY FOR REDEVELOPMENT STANDARD
## PUBLIC WORKS IMPROVEMENTS

| | Subcatchment ID | Impervious Area (SF) | Landscaped Area (SF) | Redeveloped Area (SF) |
|---|---|---|---|---|
| **Total Project Treatment Area** | | 68,303 | 43,207 | 111,510 |
| **Required Treatment Area (50%)** | | 34,152 | 21,604 | **55,755** |
| Underdrained Soil Filter #1 | SC-1d | 23,172 | 12,114 | 35,286 |
| Roof Dripline Filter #1 | SC-1a | 2,050 | 0 | 2,050 |
| Roof Dripline Filter #2 | SC-1c | 2,050 | 0 | 2,050 |
| Filterra at CB #103 | SC-1b | 15,619 | 1,298 | 16,917 |
| **Total Area Treated** | | 42,891 | 13,412 | **56,303** |
| **Percent of Redeveloped Area Treated** | | | | **50.5%** |

# APPENDIX F

## TOWN OFFICE PARKING BMP TREATMENT SIZING

SME
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# STORMWATER TREATMENT SIZING CALCULATIONS

**Project Name:** Cumberland Town Office Parking Expan
**Project Location:** Tuttle Road
**Project No:** 19231
**By:** NMT
**Date:** 2/4/2020
**Checked By:** DPD
**Date:** 2/7/2020

**Stormwater Treatment: OPTION 1 Underdrained Soil Filter**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | DEVELOPED AREA | = | | sf | |
| | | | IMPERVIOUS AREAS CAPTURED | = | 13,875 | sf | |
| | | | NON-IMPERVIOUS AREAS CAPTURED | = | 2,707 | sf | |
| | | | TOTAL AREA CAPTURED | = | 16,582 | sf | |
| | | | REQUIRED TREATMENT VOLUME | | | | |
| (1."/12") | 13,875 | + (0.4"/12") | 2,707 | = | 1,246 | cf | 1,870 cf provided |
| | | | CHANNEL PROTECTION VOLUME (DEPTH) | = | 1.50 | ft | 1.5 ft provided |
| | | | REQUIRED FILTER SURFACE AREA | | | | |
| (0.05) | 13,875 | + (0.2) | 2,707 | = | 748 | sf | 956 sf provided |
| | | | SEDIMENT TRAP VOLUME | | | | |
| (10.00) | | lbs per acre: | (90 lb/ft3) | = | | cf | |

**Stormwater Treatment: OPTION 2 Underdrained Soil Filter**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | DEVELOPED AREA | = | | sf | |
| | | | IMPERVIOUS AREAS CAPTURED | = | 3,963 | sf | |
| | | | NON-IMPERVIOUS AREAS CAPTURED | = | 4,997 | sf | |
| | | | TOTAL AREA CAPTURED | = | 8,960 | sf | |
| | | | REQUIRED TREATMENT VOLUME | | | | |
| (1."/12") | 3,963 | + (0.4"/12") | 4,997 | = | 497 | cf | 705 cf provided |
| | | | CHANNEL PROTECTION VOLUME (DEPTH) | = | 1.50 | ft | 1.5 ft provided |
| | | | REQUIRED FILTER SURFACE AREA | | | | |
| (0.05) | 3,963 | + (0.2) | 4,997 | = | 298 | sf | 298 sf provided |
| | | | SEDIMENT TRAP VOLUME | | | | |
| (10.00) | | lbs per acre: | (90 lb/ft3) | = | | cf | |

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**TREATMENT SUMMARY FOR NEW DEVELOPMENT STANDARD**
**TOWN OFFICE PARKING EXPANSION**

| | Subcatchment ID | New Impervious Area (SF) | New Landscaped Area (SF) | New Development Area (SF) |
|---|---|---|---|---|
| **Total Project Areas** | | 18,804 | 6,983 | 25,787 |
| | | | | |
| **Required Treatment Area - 95% New Impervious 80% New Development** | | 17,864 | 5,586 | **12,894** |
| Underdrained Soil Filter #1 | SC-1a | 13,875 | 2,707 | 16,582 |
| Underdrain Soil Filter #2 | SC-1b | 3,963 | 4,997 | 8,960 |
| **Total Area Treated** | | 17,838 | 7,704 | **25,542** |
| **Percent of New Impervious Treated** | | **95%** | | |
| **Percent of New Development Area Treated** | | | | **99%** |

# APPENDIX G

# FILTERRA DESIGN REVIEW LETTERS

Contech Engineered Solutions LLC
71 US Rte 1, Suite F
Scarborough, ME 04074
Phone: (207) 885-6191
www.ContechES.com

Nicholas Thompson
SME
4 Blanchard Road, PO Box 85A
Cumberland, ME 04021

February 5, 2020

RE: Public Works Improvements, Cumberland, ME (Contech Reference No. 639,765)
Review of Filterra Design

Dear Mr. Thompson:

The purpose of this letter is to document Contech Engineered Solutions' review of the plans and the proposed application of the Filterra water quality unit for the Public Works Improvements, Cumberland, ME.

Contech Engineered Solutions (Contech) has reviewed the Filterra design for this project. We believe the Filterra configuration listed below to be an appropriate water quality solution for this site. The Filterra system is approved for use by MEDEP as an alternate to the General Standards of the Stormwater Rules (Chapter 500) if designed, installed, and maintained in accordance with the provisions noted in the February 2, 2017 approval letter from the MEDEP.

Based on our review, the Filterra was designed in accordance with the sizing design guidelines to treat 90% of the annual runoff volume prior to bypass. In order to adequately treat the runoff from this area, Contech recommends the following units:

| Subcatchment ID | Impervious Area | Pervious Area | Filterra Size | Model Name |
|---|---|---|---|---|
| South Parking Area | 0.358 ac | 0.030 ac | 6x12 | FT1206 |

Our systems require periodic maintenance to continue operating properly. Given typical runoff pollutant loading rates, Contech recommends maintenance inspections on an annual basis. Based on the location of the system, we anticipate replacement of the mulch layer every 12 months for the system to continue to remove pollutants. Contech will be responsible for two maintenance visits during the first year of operation as included in the purchase of the Filterra unit; subsequent years of maintenance shall be performed by a third party at the owner's expense.

This system is expected to operate in accordance with Contech's design intent. Please feel free to contact me if you have any questions or concerns.

Sincerely,

David Adams, PE
Contech Engineered Solutions, LLC.
(207) 885-6191
dadams@conteches.com

# APPENDIX H

# POST-CONSTRUCTION STORMWATER MANAGEMENT PLAN

SME
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ENGINEERS

# POST-CONSTRUCTION STORMWATER MANAGEMENT PLAN
# TOWN OF CUMBERLAND MUNICIPAL UPGRADES
# CUMBERLAND, MAINE

Prepared for

**TOWN OF CUMBERLAND**
Maine


February 2020

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ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

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**POST-CONSTRUCTION STORMWATER MANAGEMENT PLAN**
**TOWN OF CUMBERLAND MUNICIPAL UPGRADES**
**CUMBERLAND, MAINE**

## 1.0 SITE DESCRIPTION

The Town of Cumberland (Town) is proposing to permit historical and proposed development on four Town owned parcels at 23 Drowne Road, 290 Tuttle Road, and setback off Tuttle Road between the Town Forest and railroad in Cumberland, Maine. The proposed development on these properties includes improvements to the Cumberland Public Works facility, the expansion of the Town Hall parking lot, and construction of a Sand/Salt Shed to relocate the existing. This Post Construction Stormwater Management Plan shall apply to these three projects as described below.

Public Works Improvements Project

The Cumberland Public Works facility is located at 23 Drowne Road and is adjacent to a public Civic Lot at 3 Oak Street. The Public Works parcel is 9.2 acres and the Civic Lot is 4.4 acres in size. The existing facility includes the Public Works Garage, a cold storage building, a school bus maintenance building, an administrative trailer, sand/salt shed, school bus and staff parking, existing gravel compost pad, and a closed wood waste landfill. The existing wood waste landfill is also on the 9.2-acre property, but is excluded from the SLODA permit because it is permitted under the MEDEP Solid Waste Bureau.

The proposed redevelopment includes 8,500-square-foot expansion to the existing Public Works Garage for four school bus and mechanic bays, a proposed 4,100-square-foot Office Building, the reconfiguration and expansion of site parking for forty (40) school bus spaces and 76 vehicle parking spaces, the relocation of the existing cold storage building, and construction of stormwater treatment. The project will include the demolition of the existing bus maintenance garage, the sand/salt shed, and other miscellaneous buildings. In addition, the gravel compost pads on top of the landfill and gravel storage areas on the Civic Lot will be removed and the areas revegetated and seeded with a New England Meadow Mix to promote additional growth.

The existing garage and parking area built in 1973 included 3.0 acres total of impervious area, which predates MEDEP Stormwater Law. The proposed area defined as redevelopment will include approximately 1.8 acres of impervious area and 1.0 acre of revegetated areas. The project will also include maintenance of approximated 1.1 acres of existing pavement that will include removal of the pavement, slight adjustments to the grades less than 12 inches, and repaving.

The stormwater treatment for this project will include an underdrained soil filter, Filterra Tree Box Filter, and sections of Roof Dripline Filters along the proposed Office Building. Additional stormwater conveyance will include closed storm drain systems and overland flow.

Town Office Parking Expansion

The Town Office, Town Forest, and Town Landfill are located at 290 Tuttle Road on a parcel 109 acres in size. An existing school, built in 1950, on the property and its historical improvements will not be included in this permit because it is privately operated via a land lease from the Town which excludes it from common scheme of development. The Town Landfill is not included in this permit because it is permitted under the MEDEP Solid Waste Bureau. This application incudes the Town Office building and parking which was constructed in 1998 and met the standards for development at that time. In 2016, the Town Forest trails increased by 0.5 acre of impervious area.

The Town proposes to construct a parking expansion to serve as overflow during Town events and voting and additional parking for access to the Town ballfields. The parking expansion will include 36 spaces accessed via a 24-foot drive connected to the existing parking lot. A sidewalk connection will be made to the sidewalk on Tuttle Road and a small pedestrian accessway for the ballfield access. The proposed expansion will include an increase in impervious area of 0.6 acre on the property. The proposed improvements for the project are shown in the attached drawing set for Town Office Parking Expansion submitted with this application.

The stormwater treatment for this project will include an underdrained soil filter and Filterra Tree Box Filter. Additional stormwater measures include a catch basin, crushed stone drip strip for sediment pretreatment, and overland flow areas.

Relocated Sand/Salt Shed

A new Sand/Salt Shed will be constructed at the Town compost facility located between the Town Forest and railroad setback 2,100 feet off Tuttle Road on a 31.7-acre parcel. The sand/salt building will be used as storage for the Town sand and salt supply and will be used by snowplow trucks during the winter. The access road to the site and compost extent were constructed in 2019 under a permit from the Solid Waste Bureau. The proposed 8,000-square-foot sand/salt shed will be built within the footprint of the gravel pad approved for the Compost operations. Approximately 12,300 square feet of maneuvering area will be paved around the building for truck use and snow plowing. In total, the project will result in 20,300 square feet of impervious area to be covered under this application. The improvements for the Sand/Salt Shed are approved by the Town as shown on the attached Town of Cumberland Compost Pad and Sand/Salt Shed Relocation drawing set dated October 22, 2019.

Stormwater measures for this project will include maintenance of the paved areas around the Sand/Salt Shed.

## 2.0 FACILITY CONTACTS

| | |
|---|---|
| Facility: | Cumberland Town Public Works<br>23 Drowne Road<br>Cumberland, Maine 04021<br><br>Cumberland Town Hall<br>290 Tuttle Road<br>Cumberland, Maine 04021 |
| Owner Representative: | William R. Shane, P.E.<br>Town Manager<br>Town of Cumberland<br>207-829-5559 |
| Maintenance Responsibility: | Christopher Bolduc<br>Assistant Town Manager/Public Works Director<br>Town of Cumberland<br>207-829-5559 |
| Consultant/Designer: | Sevee & Maher Engineers<br>4 Blanchard Road<br>Cumberland, Maine 04021<br>207-829-5016<br>Daniel P. Diffin, P.E.<br>dpd@smemaine.com |

Town of Cumberland (Town) facility maintenance team are responsible after year 1 for inspection and maintenance and will have knowledge of erosion and stormwater control, including the standards and conditions in the permit. Post-Construction documentation and inspection logs will be maintained by the Town for a period well in excess of five years, as required by Chapter 500.

## 3.0 POST-CONSTRUCTION STORMWATER MANAGEMENT PLAN OVERVIEW AND OBJECTIVES

The Post-Construction Stormwater Management Plan (PSWMP) is an important component of the overall stormwater management system for the site. PSWMP addresses various maintenance activities that should occur after construction and site stabilization. Proper implementation of the PSWMP can minimize pollutant generation and transport and maintain the stormwater treatment system to ensure proper operation. This PSWMP includes three primary components:

1. Site Management Practices
2. Inspections
3. Routine Maintenance and Corrective Actions

### 3.1 Site Management Practices

Site management practices are aimed at reducing pollutants by minimizing use of certain materials, using alternative materials, or removing pollutants prior to discharge to the stormwater treatment system. These practices shall include:

a. Use slow release sulfur or plastic coated ureaform fertilizers (e.g., Nutralene).

b. Do not fertilize vegetated swales once vegetation is established.

c. Minimize use of pesticides by using a sound integrated pest management (IPM) approach to monitor and control the actual pests present.

d. Collect and remove autumn leaves to minimize transport to the stormwater treatment system.

e. Minimize use of de-icing materials and sand.

f. Routine sweeping of parking areas and driveways.

g. Fertilizers, pesticides and other hazardous materials should be stored in enclosed areas to avoid exposure to precipitation.

h. Material handling should be conducted to minimize risk of spillage and release to the stormwater treatment system.

### 3.2 Inspections

A series of routine inspections shall be completed to allow for the early identification of potential problems, and to guide routine maintenance activities. Inspections shall be carried out in accordance with the Schedule in Table 3. Dates and observations shall be recorded for each inspection on the attached 'Inspection Log'.

## 3.3 Routine Maintenance and Corrective Actions

Routine maintenance activities are designed to ensure proper function of the stormwater management system and minimize pollutant transport from the site. Routine maintenance activities must be completed according to the schedule (Table 3) provided in this plan. This schedule is the minimum amount of maintenance required, and maintenance that is more frequent may be needed when indicated by the inspections. Corrective actions (supplemental maintenance activities or repairs) should be started within the following work day and should be completed within 7 days of the inspection identifying the problem. Each maintenance activity will be recorded on the attached 'Maintenance and Repair Log'.

During construction, the Sitework Contractor (not yet selected by Bid process) shall be responsible for cleaning and maintaining stormwater components on the schedule outlined in Table 3.

Following completion of construction, the Town will be responsible for cleaning and maintaining stormwater components on the schedule outlined in Table 3.

Place removed sediments in an area of low erosion potential, either on-site or off-site, and seed with erosion control seed mix.

The following describes specific stormwater facilities maintenance requirements and minimum schedule of inspection and maintenance.

1. Open swales and ditches need to be inspected in the spring and fall, or after a major rainfall event, to assure that debris or sediments do not reduce the effectiveness of the system. Debris needs to be removed at that time. Sign of erosion or blockage shall be immediately repaired to assure a vigorous growth of vegetation for the stability of the structure and proper functioning. Swales that show newly formed channels or gullies will be immediately repaired by reseeding/sodding of bare spots, removal of trash, leaves and/or accumulated sediments, and the control of woody or other undesirable vegetation.
2. Vegetated ditches should be mowed at least once during the growing season. Larger brush or trees must not be allowed to become established in the channel. Any areas where the vegetation fails will be subject to erosion and should be repaired and revegetated.
3. If sediment in culverts or piped drainage systems exceeds 20 percent of the diameter of the pipe, it should be removed. This may be accomplished by hydraulic flushing or other mechanical means; however, care should be taken to not flush the sediments into the filter basins, or retention/detention pond as it will reduce the pond's capacity and hasten the time when it must be cleaned. Storm pipes should be inspected on an annual basis.

4. Catch basin sumps and the outlet control structures shall be cleaned of debris and sediment at least annually to minimize clogging and transportation of sediment during rainfall events.

**TABLE 1**

**CATCH BASIN INVENTORY**
**CUMBERLAND PUBLIC WORKS SITE**

| Catch Basin ID | Location |
|---|---|
| CB #101 | SOUTHEAST END OF UNDERDRAINED SOIL FILTER #1 |
| CB #102 | SOUTHWEST OF THE COLD STORAGE BUILDING |
| CB #103 | PUBLIC WORKS ENTRANCE |
| CB #104 | SOUTH SIDE OF ADMINISTRATOR REAR PARKING |
| CB #105 | NORTHSIDE OF ADMINISTRATOR REAR PARKING |
| CB #106 | NORTHWEST OF THE PUBLIC WORKS GARAGE |

**TABLE 2**

**CATCH BASIN INVENTORY**
**TOWN OFFICE PARKING EXPANSION**

| Catch Basin ID | Location |
|---|---|
| CATCH BASIN | ENTRANCE TO PARKING EXPANSION ACCESS DRIVE |

5. Paved surfaces shall be swept or vacuumed at least annually in the spring to remove winter sand and periodically during the year on an as-needed basis to minimize the transportation of sediment during rainfall events.

6. The vegetated Meadow Buffer areas shall be inspected annually for evidence of erosion or concentrated flows through or around the buffer. All eroded areas should be repaired, seeded, and mulched. Mowing shall occur no more than twice per year, buffers may not be maintained as a lawn.

7. The Underdrain Soil Filter shall be inspected semi-annually and following storm events greater than one-half inch of rainfall. The system should be inspected after every one-half inch of rainfall in the first few months to ensure proper function. Debris shall be removed from the reservoir course to ensure proper drainage.

8. The Roof Dripline Filters shall be inspected semi-annually and following major storm events. The system should be inspected after every major storm in the first few months to ensure proper function. Debris shall be removed from the reservoir course to ensure proper drainage. The Roof Dripline Filter may not be paved over or altered and a gutter shall not be installed on the roofline.

## 3.4 Housekeeping

1. Spill prevention. Provide controls to prevent pollutants from being discharged from materials on site, including storage practices to minimize exposure of the materials to stormwater, and appropriate spill prevention, containment, and response planning and implementation.
2. Groundwater protection. Do not handle or store, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater in areas of the site draining to an infiltration area. An "infiltration area" is any area of the site that by design or as a result of soils, topography, and other relevant factors accumulates runoff that infiltrates into the soil. Provide dikes, berms, sumps, and other forms of secondary containments that prevent discharge to groundwater to isolate portions of the site for the purposes of storage and handling of these materials.
3. Fugitive sediment and dust. Provide measures to ensure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil may not be used for dust control. If off-site tacking occurs, roadway must be swept immediately and no less than once a week prior to significant stormwater event.
4. Debris and other materials. Prevent litter, construction debris, and chemicals exposed to stormwater from becoming a pollutant source.
5. Trench or foundation de-watering. Trench de-watering is the removal of water from trenches, foundations, coffer dams, ponds, and other areas within the construction area that retain water after excavation. In most cases the collected water is heavily silted and hinders correct and safe construction practices. Remove the collected water from the ponded area and dispose of in accordance with notes on Drawing C-300 and the project specifications.
6. Non–stormwater discharges. Identify and prevent contamination by non-stormwater discharges.
7. Additional requirements. Additional requirements may be applied on a site-specific basis.

## 3.5 MEDEP 5-Year Re-certification

Submit a certification of the following to the department within three months of the expiration of each five-year interval from the date of issuance of the permit.

a. Identification and repair of erosion problems. All areas of the project site have been inspected for areas of erosion, and appropriate steps have been taken to permanently stabilize these areas.

b. Inspection and repair of stormwater control system. All aspects of the stormwater control system have been inspected for damage, wear, and malfunction, and appropriate steps have been taken to repair or replace the system, or portions of the system.

c. Maintenance. The erosion and stormwater maintenance plan for the site is being implemented as written, or modifications to the plan have been submitted to and approved by the department, and the maintenance log is being maintained.

**TABLE 3**

**TOWN OF CUMBERLAND PUBLIC WORKS, TOWN OFFICE PARKING EXPANSION, AND SAND/SALT SHED RELOCATION LONG-TERM INSPECTION AND MAINTENANCE PLAN**

| | Spring | Fall or Yearly | After a Major Storm | Every 2-5 Years |
|---|---|---|---|---|
| **Vegetated Areas** | | | | |
| Inspect all slopes and embankments. | X | | X | |
| Replant bare areas or areas with sparse growth. | X | | X | |
| Armor areas with rill erosion with an appropriate lining or divert the erosive flows to on-site areas able to withstand concentrated flows. | X | | X | |
| **Stormwater Channels** | | | | |
| Inspect ditches, swales and other open stormwater channels. | X | X | X | |
| Remove any obstructions and accumulated sediments or debris. | X | X | | |
| Control vegetated growth and woody vegetation. | | X | | |
| Repair any erosion of the ditch lining. | | X | | |
| Mow vegetated ditches. | | X | | |
| Remove woody vegetation growing through riprap. | | X | | |
| Repair any slumping side slopes. | | X | | |
| Replace riprap where underlying filter fabric or underdrain gravel is showing or where stones have dislodged. | | X | | |
| **Culverts** | | | | |
| Remove accumulated sediments and debris at the inlet, at the outlet, and within the conduit. | X | X | X | |
| Repair any erosion damage at the culvert's inlet and outlet. | X | X | X | |
| **Catch Basin Systems/Outlet Control Structures** | | | | |
| Remove and legally dispose of accumulated sediments and debris from the bottom of the basin, inlet grates, inflow channels to the basin, and pipes between basins. | X | X | | |
| Remove floating debris and floating oils (using oil absorptive pads) from any trap designed for such and dispose in a legal manner. | X | X | | |
| **Driveways and Parking Surfaces** | | | | |
| Clear accumulated winter sand in parking lots and along roadways. | X | | | |
| Sweep pavement to remove sediment. | X | | | |
| Grade road shoulders and remove excess sand either manually or by front-end loader. | X | | | |
| Ensure that stormwater is not impeded by accumulations of material or false ditches in the shoulder. | X | | | |

| | Spring | Fall or Yearly | After a Major Storm | Every 2-5 Years |
|---|---|---|---|---|
| Rake and replace Superhumus in areas where necessary. | | | | |
| **Roof Dripline Filter** | | | | |
| Inspect drip edge for debris and to ensure proper function. | X | X | X | |
| Remove accumulated sediment, plants, excessive growth, and weeds. | | X | | |
| **Grassed Underdrained Soil Filters** | | | | |
| Inspect soil filter to see that collected water drains within 24 hours. | X | X | X | |
| Rototill top 6” soil, or remove and replace the top 3” to 4” of filter soil with clean soil to the proper specification, when the bed fails to drain dry within 24 to 48 hours. | | | | X |
| Remove accumulated sediment, dead portions of plants, excessive growth, and weeds. | | X | | |
| Mow grass-covered filter bed no shorter than 6”, at a frequency of no more than 2 times per growing season, to maintain a high-grass meadow. Do not fertilize unless absolutely needed. | X | X | | |
| **Filterra Bioretention System** | | | | |
| Inspect unit and surrounding area and remove excess sediment, trash debris, sands, and/or leaf litter. | X | X | X | |
| Remove tree grate and erosion control stones and replace mulch. | | X | | X |
| Evaluate plant health; prune or replace as necessary. | | | | X |

The maintenance needs for most vegetative and stabilization measures may be found in the Maine Erosion and Sediment Control BMPs manual as published in 2016 (or latest version) and/or the Maine Stormwater Best Management Practices Manual.

**TOWN OF CUMBERLAND PUBLIC WORKS, TOWN OFFICE PARKING EXPANSION, AND SAND/SALT SHED RELOCATION**
**INSPECTION LOG**

| Date | Device/Area Inspected | Inspected By | Observations, Deficiencies & Recommended Corrective Actions |
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**TOWN OF CUMBERLAND PUBLIC WORKS, TOWN OFFICE PARKING EXPANSION, AND SAND/SALT SHED RELOCATION**
**MAINTENANCE AND REPAIR LOG**

| Date | Device or Area Maintained/ Repaired | Maintenance and/or Repair Completed By | Maintenance Completed/Corrective Actions Taken |
|---|---|---|---|
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# APPENDIX A

# FILTERRA OWNER'S MANUAL

# Filterra Owner's Manual

filterra®

Bioretention Systems

CONTECH®
ENGINEERED SOLUTIONS

# Table of Contents



## Enclosed

Local Area Filterra Plant List

# Introduction

Thank you for your purchase of the Filterra® Bioretention System.  Filterra is a specially engineered stormwater treatment system incorporating high performance biofiltration media to remove pollutants from stormwater runoff. The system's biota (vegetation and soil microorganisms) then further breakdown and absorb captured pollutants. All components of the system work together to provide a sustainable long-term solution for treating stormwater runoff.

The Filterra system has been delivered to you with protection in place to resist intrusion of construction related sediment which can contaminate the biofiltration media and result in inadequate system performance.  These protection devices are intended as a best practice and cannot fully prevent contamination.  It is the purchaser's responsibility to provide adequate measures to prevent construction related runoff from entering the Filterra system.

Included with your purchase is Activation of the Filterra system by the manufacturer as well as a 1-year warranty from delivery of the system and 1-year of routine maintenance (mulch replacement, debris removal, and pruning of vegetation) up to twice during the first year after activation.

# Design and Installation

Each project presents different scopes for the use of Filterra systems. Information and help may be provided to the design engineer during the planning process. Correct Filterra box sizing (by rainfall region) is essential to predict pollutant removal rates for a given area. The engineer shall submit calculations for approval by the local jurisdiction. The contractor is responsible for the correct installation of Filterra units as shown in approved plans. A comprehensive installation manual is available at www.ContechES.com.

# Activation Overview

Activation of the Filterra system is a procedure completed by the manufacturer to place the system into working condition.  This involves the following items:

- Removal of construction runoff protection devices
- Planting of the system's vegetation
- Placement of pretreatment mulch layer using mulch certified for use in Filterra systems.

Activation MUST be provided by the manufacturer to ensure proper site conditions are met for Activation, proper installation of the vegetation, and use of pretreatment mulch certified for use in Filterra systems.

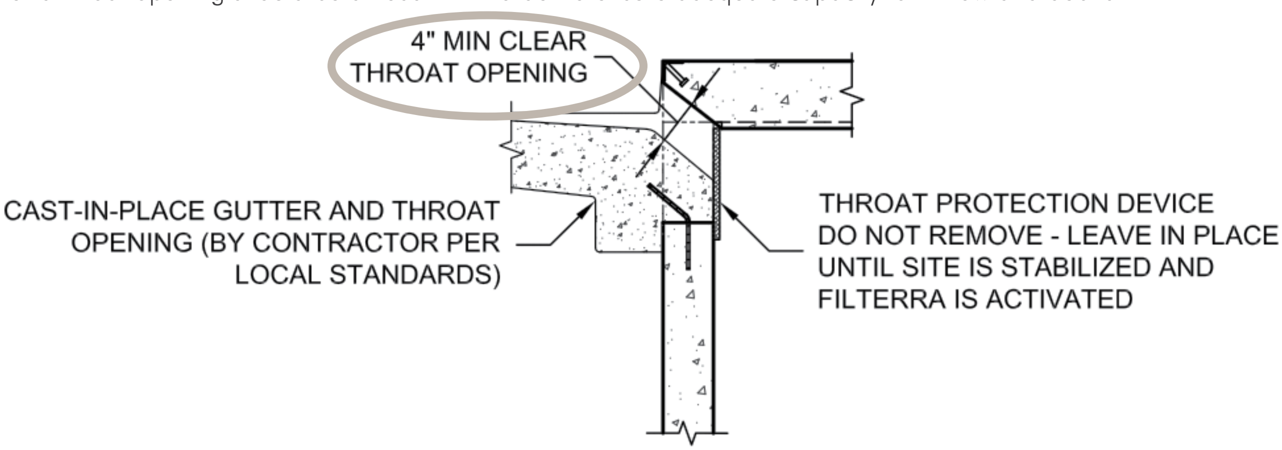
## Minimum Requirements

The minimum requirements for Filterra Activation are as follows:

1. The site landscaping must be fully stabilized, i.e. full landscaping installed and some grass cover (not just straw and seed) is required to reduce sediment transport. Construction debris and materials should be removed from surrounding area.

2. Final paving must be completed. Final paving ensures that paving materials will not enter and contaminate the Filterra system during the paving process, and that the plant will receive runoff from the drainage area, assisting with plant survival for the Filterra system.

3. Filterra throat opening should be at least 4" in order to ensure adequate capacity for inflow and debris.




An Activation Checklist is included on page 12 to ensure proper conditions are met for Contech to perform the Activation services. A charge of $500.00 will be invoiced for each Activation visit requested by Customer where Contech determines that the site does not meet the conditions required for Activation.

## Filterra Plant Selection Overview

A Plant List has been enclosed with this packet highlighting recommended plants for Filterra systems in your area. Keep in mind that plants are subject to availability due to seasonality and required minimum size for the Filterra system. Plants installed in the Filterra system are container plants (max 15 gallon) from nursery stock and will be immature in height and spread at Activation.

It is the responsibility of the owner to provide adequate irrigation when necessary to the plant of the Filterra system.

The "Planting Requirements for Filterra Systems" document is included as an appendix and discusses proper selection and care of the plants within Filterra systems.

## Warranty Overview

Refer to the Contech Engineered Solutions LLC Stormwater Treatment System LIMITED WARRANTY for further information. The following conditions may void the Filterra system's warranty and waive the manufacturer provided Activation and Maintenance services:

- Unauthorized activation or performance of any of the items listed in the activation overview
- Any tampering, modifications or damage to the Filterra system or runoff protection devices
- Removal of any Filterra system components
- Failure to prevent construction related runoff from entering the Filterra system
- Failure to properly store and protect any Filterra components (including media and underdrain stone) that may be shipped separately from the vault

## Routine Maintenance Guidelines

With proper routine maintenance, the biofiltration media within the Filterra system should last as long as traditional bioretention media. Routine maintenance is included by the manufacturer on all Filterra systems for the first year after activation. This includes a maximum of 2 visits to remove debris, replace pretreatment mulch, and prune the vegetation. More information is provided in the Operations and Maintenance Guidelines. Some Filterra systems also contain pretreatment or outlet bays. Depending on site pollutant loading, these bays may require periodic removal of debris, however this is not included in the first year of maintenance, and would likely not be required within the first year of operation.

These services, as well as routine maintenance outside of the included first year, can be provided by certified maintenance providers listed on the Contech website. Training can also be provided to other stormwater maintenance or landscape providers.

## Why Maintain?

All stormwater treatment systems require maintenance for effective operation. This necessity is often incorporated in your property's permitting process as a legally binding BMP maintenance agreement. Other reasons to maintain are:

- Avoiding legal challenges from your jurisdiction's maintenance enforcement program.
- Prolonging the expected lifespan of your Filterra media.
- Avoiding more costly media replacement.
- Helping reduce pollutant loads leaving your property.

Simple maintenance of the Filterra is required to continue effective pollutant removal from stormwater runoff before discharge into downstream waters. This procedure will also extend the longevity of the living biofilter system. The unit will recycle and accumulate pollutants within the biomass, but is also subjected to other materials entering the inlet. This may include trash, silt and leaves etc. which will be contained above the mulch layer. Too much silt may inhibit the Filterra's flow rate, which is the reason for site stabilization before activation. Regular replacement of the mulch stops accumulation of such sediment.

## When to Maintain?

Contech includes a 1-year maintenance plan with each system purchase. Annual included maintenance consists of a maximum of two (2) scheduled visits. Additional maintenance may be necessary depending on sediment and trash loading (by Owner or at additional cost). The start of the maintenance plan begins when the system is activated.

Maintenance visits are scheduled seasonally; the spring visit aims to clean up after winter loads including salts and sands while the fall visit helps the system by removing excessive leaf litter.

It has been found that in regions which receive between 30-50 inches of annual rainfall, (2) two visits are generally required; regions with less rainfall often only require (1) one visit per annum. Varying land uses can affect maintenance frequency; e.g. some fast food restaurants require more frequent trash removal. Contributing drainage areas which are subject to new development wherein the recommended erosion and sediment control measures have not been implemented may require additional maintenance visits.

Some sites may be subjected to extreme sediment or trash loads, requiring more frequent maintenance visits. This is the reason for detailed notes of maintenance actions per unit, helping the Supplier and Owner predict future maintenance frequencies, reflecting individual site conditions.

Owners must promptly notify the (maintenance) Supplier of any damage to the plant(s), which constitute(s) an integral part of the bioretention technology. Owners should also advise other landscape or maintenance contractors to leave all maintenance to the Supplier (i.e. no pruning or fertilizing) during the first year.

## Exclusion of Services

Clean up due to major contamination such as oils, chemicals, toxic spills, etc. will result in additional costs and are not covered under the Supplier maintenance contract. Should a major contamination event occur the Owner must block off the outlet pipe of the Filterra (where the cleaned runoff drains to, such as drop inlet) and block off the throat of the Filterra. The Supplier should be informed immediately.

## Maintenance Visit Summary

Each maintenance visit consists of the following simple tasks (detailed instructions below).

1. Inspection of Filterra and surrounding area
2. Removal of tree grate and erosion control stones
3. Removal of debris, trash and mulch
4. Mulch replacement
5. Plant health evaluation and pruning or replacement as necessary
6. Clean area around Filterra
7. Complete paperwork

## Maintenance Tools, Safety Equipment and Supplies

Ideal tools include: camera, bucket, shovel, broom, pruners, hoe/rake, and tape measure. Appropriate Personal Protective Equipment (PPE) should be used in accordance with local or company procedures. This may include impervious gloves where the type of trash is unknown, high visibility clothing and barricades when working in close proximity to traffic and also safety hats and shoes. A T-Bar or crowbar should be used for moving the tree grates (up to 170 lbs ea.). Most visits require minor trash removal and a full replacement of mulch. See below for actual number of bagged mulch that is required in each media bay size. Mulch should be a double shredded, hardwood variety. Some visits may require additional Filterra engineered soil media available from the Supplier.

| Box Length | Box Width | Filter Surface Area ($ft^2$) | Volume at 3" ($ft^3$) | # of 2 $ft^3$ Mulch Bags |
|---|---|---|---|---|
| 4 | 4 | 4 | 4 | 2 |
| 6 | 4 | 6 | 6 | 3 |
| 8 | 4 | 8 | 8 | 4 |
| 6 | 6 | 9 | 9 | 5 |
| 8 | 6 | 12 | 12 | 6 |
| 10 | 6 | 15 | 15 | 8 |
| 12 | 6 | 18 | 18 | 9 |
| 13 | 7 | 23 | 23 | 12 |

# Maintenance Visit Procedure

Keep sufficient documentation of maintenance actions to predict location specific maintenance frequencies and needs. An example Maintenance Report is included in this manual.

## 1. Inspection of Filterra and surrounding area

- Record individual unit before maintenance with photograph (numbered). Record on Maintenance Report (see example in this document) the following:

Record on Maintenance Report the following:

| | |
|---|---|
| Standing Water | yes \| no |
| Damage to Box Structure | yes \| no |
| Damage to Grate | yes \| no |
| Is Bypass Clear | yes \| no |

If yes answered to any of these observations, record with close-up photograph (numbered).

## 2. Removal of tree grate and erosion control stones

- Remove cast iron grates for access into Filterra box.
- Dig out silt (if any) and mulch and remove trash & foreign items.

## 3. Removal of debris, trash and mulch

Record on Maintenance Report the following:

| | |
|---|---|
| Silt/Clay | yes \| no |
| Cups/ Bags | yes \| no |
| Leaves | yes \| no |
| Buckets Removed | ________ |

- After removal of mulch and debris, measure distance from the top of the Filterra engineered media soil to the top of the top slab. Compare the measured distance to the distance shown on the approved Contract Drawings for the system. Add Filterra media (not top soil or other) to bring media up as needed to distance indicated on drawings.

Record on Maintenance Report the following:

| | |
|---|---|
| Distance to Top of Top Slab (inches) | ________ |
| Inches of Media Added | ________ |

## 4. Mulch replacement

- Add double shredded mulch evenly across the entire unit to a depth of 3”.
- Refer to Filterra Mulch Specifications for information on acceptable sources.
- Ensure correct repositioning of erosion control stones by the Filterra inlet to allow for entry of trash during a storm event.
- Replace Filterra grates correctly using appropriate lifting or moving tools, taking care not to damage the plant.

## 5. Plant health evaluation and pruning or replacement as necessary

- Examine the plant’s health and replace if necessary.
- Prune as necessary to encourage growth in the correct directions

Record on Maintenance Report the following:

| | |
|---|---|
| Height above Grate | ____________________(ft) |
| Width at Widest Point | ____________________(ft) |
| Health | healthy \| unhealthy |
| Damage to Plant | yes \| no |
| Plant Replaced | yes \| no |

## 6. Clean area around Filterra

- Clean area around unit and remove all refuse to be disposed of appropriately.

## 7. Complete paperwork

- Deliver Maintenance Report and photographs to appropriate location (normally Contech during maintenance contract period).
- Some jurisdictions may require submission of maintenance reports in accordance with approvals. It is the responsibility of the Owner to comply with local regulations.

# Maintenance Checklist

| Drainage System Failure | Problem | Conditions to Check | Condition that Should Exist | Actions |
|---|---|---|---|---|
| Inlet | Excessive sediment or trash accumulation. | Accumulated sediments or trash impair free flow of water into Filterra. | Inlet should be free of obstructions allowing free distributed flow of water into Filterra. | Sediments and/or trash should be removed. |
| Mulch Cover | Trash and floatable debris accumulation. | Excessive trash and/or debris accumulation. | Minimal trash or other debris on mulch cover. | Trash and debris should be removed and mulch cover raked level. Ensure bark nugget mulch is not used. |
| Mulch Cover | "Ponding" of water on mulch cover. | "Ponding" in unit could be indicative of clogging due to excessive fine sediment accumulation or spill of petroleum oils. | Stormwater should drain freely and evenly through mulch cover. | Recommend contact manufacturer and replace mulch as a minimum. |
| Vegetation | Plants not growing or in poor condition. | Soil/mulch too wet, evidence of spill. Incorrect plant selection. Pest infestation. Vandalism to plants. | Plants should be healthy and pest free. | Contact manufacturer for advice. |
| Vegetation | Plant growth excessive. | Plants should be appropriate to the species and location of Filterra. | | Trim/prune plants in accordance with typical landscaping and safety needs. |
| Structure | Structure has visible cracks. | Cracks wider than 1/2 inch or evidence of soil particles entering the structure through the cracks. | | Vault should be repaired. |
| *Maintenance is ideally to be performed twice annually.* | | | | |

# Filterra Inspection & Maintenance Log

**Filterra System Size/Model:**__________________________ **Location:** ________________________________________

| Date | Mulch & Debris Removed | Depth of Mulch Added | Mulch Brand | Height of Vegetation Above Grate | Vegetation Species | Issues with System | Comments |
|---|---|---|---|---|---|---|---|
| *1/1/17* | *5 – 5 gal Buckets* | *3"* | *Lowe's Premium Brown Mulch* | *4'* | *Galaxy Magnolia* | *- Standing water in downstream structure* | *- Removed blockage in downstream structure* |
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# Appendix 1 – Filterra® Activation Checklist

CONTECH® ENGINEERED SOLUTIONS

Project Name:______________________________ Company:______________________________

Site Contact Name: ______________________________ Site Contact Phone/Email: ______________________

Site Owner/End User Name:____________________ Site Owner/End User Phone/Email: ______________________

Preferred Activation Date: ______________________________ (provide 2 weeks minimum from date this form is submitted)

| Site Designation | System Size | Final Pavement / Top Coat Complete | Landscaping Complete / Grass Emerging | Construction materials / Piles / Debris Removed | Throat Opening Measures 4" Min. Height | Plant Species Requested |
|---|---|---|---|---|---|---|
| | | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | |
| | | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | |
| | | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | |
| | | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | |
| | | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | |
| | | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | |
| | | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | |
| | | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | |
| | | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | |

*Attach additional sheets as necessary.*

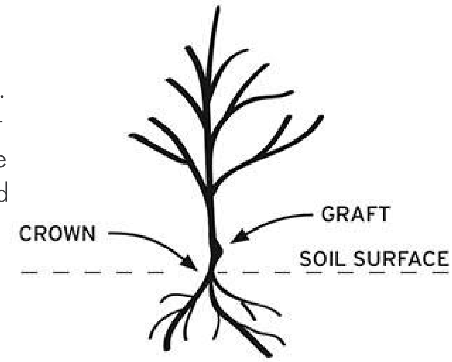
**NOTE**: A charge of $500.00 will be invoiced for each Activation visit requested by Customer where Contech determines that the site does not meet the conditions required for Activation. ONLY Contech authorized representatives can perform Activation of Filterra systems; unauthorized Activations will void the system warranty and waive manufacturer supplied Activation and 1st Year Maintenance.

______________________________________________ ______________________

Signature Date

# Appendix 2 – Planting Requirements for Filterra® Systems

## Plant Material Selection




- Select plant(s) as specified in the engineering plans and specifications.
- Select plant(s) with full root development but not to the point where root bound.
- Use local nursery container plants only. Ball and burlapped plants are not permitted.
- For precast Filterra systems with a tree grate, plant(s) must not have scaffold limbs at least 14 inches from the crown due to spacing between the top of the mulch and the tree grate. Lower branches can be pruned away provided there are sufficient scaffold branches for tree or shrub development.
- For precast Filterra systems with a tree grate, at the time of installation, it is required that plant(s) must be at least 6″ above the tree grate opening at installation for all Filterra configurations. This DOES NOT apply to Full Grate Cover designs.
- Plant(s) shall not have a mature height greater than 25 feet.
- For standard 21″ media depth, a 7 – 15 gallon container size shall be used. Media less than 21″ (Filterra boxes only) will require smaller container plants.
- For precast Filterra systems, plant(s) should have a single trunk at installation, and pruning may be necessary at activation and maintenance for some of the faster growing species, or species known to produce basal sprouts.

## Plant Installation

- During transport protect the plant leaves from wind and excessive jostling.
- Prior to removing the plant(s) from the container, ensure the soil moisture is sufficient to maintain the integrity of the root ball. If needed, pre-wet the container plant.
- Cut away any roots which are growing out of the container drain holes. Plants with excessive root growth from the drain holes should be rejected.
- Plant(s) should be carefully removed from the pot by gently pounding on the sides of the container with the fist to loosen root ball. Then carefully slide out. Do not lift plant(s) by trunk as this can break roots and cause soil to fall off. Extract the root ball in a horizontal position and support it to prevent it from breaking apart. Alternatively the pot can be cut away to minimize root ball disturbance.
- Remove any excess soil from above the root flare after removing plant(s) from container.
- Excavate a hole with a diameter 4″ greater than the root ball, gently place the plant(s).
- If plant(s) have any circling roots from being pot bound, gently tease them loose without breaking them.
- If root ball has a root mat on the bottom, it should be shaved off with a knife just above the mat line.
- Plant the tree/shrub/grass with the top of the root ball 1″ above surrounding media to allow for settling.
- All plants should have the main stem centered in the tree grate (where applicable) upon completion of installation.
- With all trees/shrubs, remove dead, diseased, crossed/rubbing, sharply crotched branches or branches growing excessively long or in wrong direction compared to majority of branches.
- To prevent transplant shock (especially if planting takes place in the hot season), it may be necessary to prune some of the foliage to compensate for reduced root uptake capacity. This is accomplished by pruning away some of the smaller secondary branches or a main scaffold branch if there are too many. Too much foliage relative to the root ball can dehydrate and damage the plant.
- Plant staking may be required.

## Mulch Installation

- Only mulch that has been meeting Contech Engineered Solutions' mulch specifications can be used in the Filterra system.
- Mulch must be applied to a depth of 3" evenly over the surface of the media.

## Irrigation Requirements

- Each Filterra system must receive adequate irrigation to ensure survival of the living system during periods of drier weather.
- Irrigation sources include rainfall runoff from downspouts and/or gutter flow, applied water through the tree grate or in some cases from an irrigation system with emitters installed during construction.
- At Activation: Apply about one (cool climates) to two (warm climates) gallons of water per inch of trunk diameter over the root ball.
- During Establishment: In common with all plants, each Filterra plant will require more frequent watering during the establishment period. One inch of applied water per week for the first three months is recommended for cooler climates (2 to 3 inches for warmer climates). If the system is receiving rainfall runoff from the drainage area, then irrigation may not be needed. Inspection of the soil moisture content can be evaluated by gently brushing aside the mulch layer and feeling the soil. Be sure to replace the mulch when the assessment is complete. Irrigate as needed**.
- Established Plants: Established plants have fully developed root systems and can access the entire water column in the media. Therefore irrigation is less frequent but requires more applied water when performed. For a mature system assume 3.5 inches of available water within the media matrix. Irrigation demand can be estimated as 1" of irrigation demand per week. Therefore if dry periods exceed 3 weeks, irrigation may be required. It is also important to recognize that plants which are exposed to windy areas and reflected heat from paved surfaces may need more frequent irrigation. Long term care should develop a history which is more site specific.

** Five gallons per square yard approximates 1 inch of water Therefore for a 6' by 6' Filterra approximately 20-60 gallons of water is needed. To ensure even distribution of water it needs to be evenly sprinkled over the entire surface of the filter bed, with special attention to make sure the root ball is completely wetted. NOTE: if needed, measure the time it takes to fill a five gallon bucket to estimate the applied water flow rate then calculate the time needed to irrigate the Filterra. For example, if the flow rate of the sprinkler is 5 gallons/minute then it would take 12 minutes to irrigate a 6' by 6' filter.

# Notes

9025 Centre Pointe Drive, Suite 400
West Chester, OH 45069
info@conteches.com | 800-338-1122
www.ContechES.com



PDF 1/18

**ATTACHMENT 3**

SME
SEVEE & MAHER
ENGINEERS


NOTES:

1. SEE DWG C-100 FOR GENERAL NOTES AND PLAN REFERENCES.
2. THERE IS NO PROPOSED LIGHTING IN THE PARKING LOT.

15 0 30 60 FEET

STATE OF MAINE DANIEL P. DIFFIN 11841 LICENSED PROFESSIONAL ENGINEER

TOWN OF CUMBERLAND
TOWN OFFICE PARKING EXPANSION
TUTTLE ROAD
CUMBERLAND, MAINE

SITE LAYOUT PLAN

SME SEVEE & MAHER ENGINEERS
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • smemaine.com

| | |
|---|---|
| DESIGN BY: | NMT |
| DRAWN BY: | BWB |
| DATE: | 1/2020 |
| CHECKED BY: | BDP |
| LMN: | SITE |
| CTB: | SME-STD |

JOB NO. 19231.00 DWG FILE BASE C-102

| REV. | BY | DATE | STATUS |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | DPD | 4/2020 | REVISED PER TOWN REVIEW COMMENTS |
| | DPD | 3/2020 | ISSUED TO TOWN FOR SITE PLAN REVIEW |
| | DPD | 2/2020 | ISSUED TO MEDEP FOR REVIEW |


NOTES:

1. SEE DWG C-100 FOR GENERAL NOTES AND PLAN REFERENCES.

TOWN OF CUMBERLAND
TOWN OFFICE PARKING EXPANSION
TUTTLE ROAD
CUMBERLAND, MAINE

GRADING, DRAINAGE, AND EROSION CONTROL PLAN

SME SEVEE & MAHER ENGINEERS
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • smemaine.com

| REV. | BY | DATE | STATUS |
|---|---|---|---|
| | DPD | 4/2020 | REVISED PER TOWN REVIEW COMMENTS |
| | DPD | 3/2020 | ISSUED TO TOWN FOR SITE PLAN REVIEW |
| | DPD | 2/2020 | ISSUED TO MEDEP FOR REVIEW |

DESIGN BY: NMT
DRAWN BY: BWB
DATE: 1/2020
CHECKED BY: BDP
LMN: GRADE
CTB: SME-STD

JOB NO. 19231.00 DWG FILE BASE

C-103

# EROSION CONTROL NOTES:

A. GENERAL

1. All soil erosion and sediment control will be done in accordance with: (1) the Maine Erosion and Sediment Control Handbook: Best Management Practices, Maine Department of Environmental Protection (MEDEP), October 2016.

2. The site Contractor (to be determined) will be responsible for the inspection and repair/replacement/maintenance of all erosion control measures, disturbed areas, material storage areas, and vehicle access points until all disturbed areas are stabilized.

3. Disturbed areas will be permanently stabilized within 7 days of final grading. Disturbed areas not to be worked upon within 14 days of disturbance will be temporarily stabilized within 7 days of the disturbance.

4. In all areas, removal of trees, bushes and other vegetation, as well as disturbance of topsoil will be kept to a minimum while allowing proper site operations.

5. Any suitable topsoil will be stripped and stockpiled for reuse as directed by the Owner. Topsoil will be stockpiled in a manner such that natural drainage is not obstructed and no off-site sediment damage will result. In any event, stockpiles will not be located within 100 feet of wetlands and will be at least 50 feet upgradient of the stockpile's perimeter silt fence. The sideslopes of the topsoil stockpile will not exceed 2:1. Silt fence will be installed around the perimeter of all topsoil stockpiles. Topsoil stockpiles will be surrounded with siltation fencing and will be temporarily seeded with Aroostook rye, annual or perennial ryegrass within 7 days of formation, or temporarily mulched.

6. Winter excavation and earthwork will be completed so as to minimize exposed areas while satisfactorily completing the project. Limit exposed areas to those areas in which work is to occur during the following 15 days and that can be mulched in one day. All areas will be considered denuded until the subbase gravel is installed in roadway areas or the areas of future loam and seed have been loamed, seeded, and mulched.

Install any added measures necessary to control erosion/sedimentation. The particular measure used will be dependent upon site conditions, the size of the area to be protected, and weather conditions.

To minimize areas without erosion control protection, continuation of earthwork operations on additional areas will not begin until the exposed soil surface on the area being worked has been stabilized.

B. TEMPORARY MEASURES

1. STABILIZED CONSTRUCTION ENTRANCE/EXIT

A crushed stone stabilized construction entrance/exit will be placed at any point of vehicular access to the site, in accordance with the detail shown on this sheet.

2. SILT FENCE

a. Silt fence will be installed prior to all construction activity, where soil disturbance may result in erosion. Silt fence will be erected at locations shown on the plans and/or downgradient of all construction activity.

b. Silt fences will be removed when they have served their useful purpose, but not before the upgradient areas have been permanently stabilized.

c. Silt fences will be inspected immediately after each rainfall and at least daily during prolonged rainfall. They will be inspected if there are any signs of erosion or sedimentation below them. Any required repairs will be made immediately. If there are signs of undercutting at the center or the edges, or impounding of large volumes of water behind them, they will be replaced with a temporary crushed stone check dam.

d. Sediment deposits will be removed after each storm event if significant build-up has occurred or if deposits exceed half the height of the barrier.

3. STONE CHECK DAMS

Stone check dams will be installed in grass-lined swales and ditches during construction. Remove stone check dams when they have served their useful purpose, but not before upgradient areas have been permanently stabilized.

4. EROSION CONTROL MIX SEDIMENT BARRIER

a. Where approved, erosion control mix sediment barriers may be used as a substitute for silt fence. See the details in this drawing set for specifications.

b. Rock Filter Berms: To provide more filtering capacity or to act as a velocity check dam, a berm's center can be composed of clean crushed rock ranging in size from the french drain stone to riprap.

5. TEMPORARY SEEDING

Stabilize disturbed areas that will not be brought to final grade and reduce problems associated with mud and dust production from exposed soil surfaces during construction with temporary vegetation.

TEMPORARY SEEDING SPECIFICATIONS:

| Mixture: | Application rate (lbs/acre) |
|---|---|
| Winter Rye | 112 |
| Oats | 80 |
| Annual Ryegrass | 40 |
| Perennial Ryegrass | 40 |
| Sundangrass | 40 |

6. TEMPORARY MULCHING

Use temporary mulch in the following locations and/or circumstances:

- In sensitive areas (within 100 feet of streams, wetlands and in lake watersheds) temporary mulch will be applied within 7 days of exposing spill or prior to any storm event.
- Apply temporary mulch within 14 days of disturbance or prior to any storm event in all other areas.
- Areas which have been temporarily or permanently seeded will be mulched immediately following seeding.
- Areas which cannot be seeded within the growing season will be mulched for over-winter protection and the area will be seeded at the beginning of the growing season.
- Mulch can be used in conjunction with tree, shrub, vine, and ground cover plantings.
- Mulch anchoring will be used on slopes greater than 5 percent in late fall (past October 15), and over-winter (October 15 - April 15).

The following materials may be used for temporary mulch:

a. Hay or Straw material shall be air-dried, free of seeds and coarse material. Apply 2 bales/1,000 sf or 1.5 to 2 tons/acre to cover 90% of ground surface.

b. Erosion Control Mix: It can be used as a stand-alone reinforcement:
- on slopes 2 horizontal to 1 vertical or less;
- on frozen ground or forested areas; and
- at the edge of gravel parking areas and areas under construction.

c. Erosion control mix alone is not suitable:
- on slopes with groundwater seepage;
- at low points with concentrated flows and in gullies;
- at the bottom of steep perimeter slopes exceeding 100 feet in length;
- below culvert outlet aprons; and around catch basins and closed storm systems.

d. Chemical Mulches and Soil Binders: Wide ranges of synthetic spray-on materials are marketed to protect the soil surface. These are emulsions that are mixed with water and applied to the soil. They may be used alone, but most often are used to hold wood fiber, hydro-mulches or straw to the soil surface.

e. Erosion Control Blankets and Mats: Mats are manufactured combinations of mulch and netting designed to retain soil moisture and modify soil temperature. During the growing season (April 15 to October 15) use mats indicated on drawings or North American Green (NAG) S75 (or mulch and netting) on:
- the base of grassed waterways;
- steep slopes (15 percent or greater); and
- any disturbed soil within 100 feet of lakes, streams, or wetlands.

During the late fall and winter (October 15 to April 15) use heavy grade mats indicated on drawings for NAG SC250 on all areas noted above plus use lighter grade mats NAG S75 (or mulch and netting) on:
- sideslopes of grassed waterways; and moderate slopes (between 8 and 15 percent).

C. TEMPORARY DUST CONTROL

To prevent the blowing and movement of dust from exposed soil surfaces, and reduce the presence of dust, use water or calcium chloride to control dusting by preserving the moisture level in the road surface materials.

D. CONSTRUCTION DE-WATERING

1. Water from construction de-watering operations shall be cleaned of sediment before reaching wetlands, water bodies, streams or site boundaries. Utilize temporary sediment basins, erosion control soil filter berms backed by staked hay bales, A Dirt Bag 55" sediment filter bag by ACF Environmental, or other approved Best Management Practices (BMP's).

2. In sensitive areas near streams or ponds, discharge the water from the de-watering operation into a temporary sediment basin created by a surrounding filter berm of uncompacted erosion control mix immediately backed by staked hay bales (see the site details). Locate the temporary sediment basin at lease 100 feet from the nearest water body, such that the filtered water will flow through undisturbed vegetated soil areas prior to reaching the water body or property line.

E. PERMANENT MEASURES

1. Riprapped Aprons: All storm drain pipe outlets and the inlet and outlet of culverts will have riprap aprons to protect against scour and deterioration.

2. Topsoil, Seed, and Mulch: All areas disturbed during construction, but not subject to other restoration (paving, riprap, etc.) will be loamed, limed, fertilized, seeded, and mulched.

Seeded Preparation: Use stockpiled materials spread to the depths shown on the plans, if available. Approved topsoil substitutes may be used. Grade the site as needed.

a. Seeding will be completed by August 15 of each year. Late season seeding may be done between August 15 and October 15. Areas not seeded or which do not obtain satisfactory growth by October 15, will be seeded with Aroostook Rye or mulched. After November 1, or the first killing frost, disturbed areas will be seeded at double the specified application rates, mulched, and anchored.

PERMANENT SEEDING SPECIFICATIONS

| Mixture: | Roadside (lbs/acre) | Lawn (lbs/acre) |
|---|---|---|
| Kentucky Bluegrass | 20 | 55 |
| White Clover | 5 | 0 |
| Creeping Red Fescue | 20 | 55 |
| Perennial Ryegrass | 5 | 15 |

b. Mulch in accordance with specifications for temporary mulching.

c. If permanent vegetated stabilization cannot be established due to the season of the year, all exposed and disturbed areas not to undergo further disturbance are to have dormant seeding applied and be temporarily mulched to protect the site.

3. Ditches and Channels: All ditches on-site will be lined with North American Green S75 erosion control mesh (or an approved equal) upon installation of loam and seed.

F. WINTER CONSTRUCTION AND STABILIZATION

1. Natural Resource Protection: During winter construction, a double-row of sediment barriers (i.e., silt fence backed with hay bales or erosion control mix) will be placed between any natural resource and the disturbed area. Projects crossing the natural resource will be protected a minimum distance of 100 feet on either side from the resource.

2. Sediment Barriers: During frozen conditions, sediment barriers may consist of erosion control mix berms or any other recognized sediment barriers as frozen soil prevents the proper installation of hay bales or silt fences.

3. Mulching:

- All areas will be considered to be denuded until seeded and mulched. Hay and straw mulch will be applied at a rate of twice the normal accepted rate.
- Mulch will not be spread on top of snow.
- After each day of final grading, the area will be properly stabilized with anchored hay or straw or erosion control matting.
- Between the dates of November 1 and April 15, all mulch will be anchored by either mulch netting, emulsion chemical, tracking or wood cellulose fiber.

5. Soil Stockpiling: Stockpiles of soil or subsoil will be mulched for over-winter protection with hay or straw at twice the normal rate or with a 4-inch layer of erosion control mix. This will be done within 24 hours of stocking and re-established prior to any rainfall or snowfall. Any soil stockpiles shall not be placed (even covered with mulch) within 100 feet from any natural resources.

6. Seeding: Dormant seeding may be placed prior to the placement of mulch or erosion control blankets. If dormant seeding is used for the site, all disturbed areas will receive 4 inches of loam and seed at an application rate of three times the rate for permanent seeding. All areas seeded during the winter will be inspected in the spring for adequate catch. All areas insufficiently vegetated (less than 75 percent catch) will be revegetated by replacing loam, seed, and mulch.

If dormant seeding is not used for the site, all disturbed areas will be revegetated in the spring.

7. Maintenance: Maintenance measures will be applied as needed during the entire construction season. After each rainfall of 0.5" or greater, snow storm, or period of thawing and runoff, and at least once a week, the site Contractor will perform a visual inspection of all installed erosion control measures and perform repairs as needed to ensure their continuous function.

8. Identified repairs will be started no later than the end of the net work day and be completed within seven (7) calendar days.

Following the temporary and/or final seeding and mulching, the Contractor will, in the spring, inspect and repair any damages and/or bare spots. An established vegetative cover means a minimum of 85 to 90 percent of areas vegetated with vigorous growth.

G. OVER-WINTER CONSTRUCTION EROSION CONTROL MEASURES

1. Stabilization of Disturbed Soil: By October 15, all disturbed soils on areas having a slope less than 15 percent will be seeded and mulched. If the Contractor fails to stabilize these soils by this date, then the Contractor shall stabilize the soil for late fall and winter, by using either temporary seeding or mulching.

2. Stabilization of Disturbed Slopes: All slopes to be vegetated will be completed by October 15. The Owner will consider any area having a grade greater than 15 percent (6.5H:1V) to be a slope. Slopes not vegetated by October 15 will receive one of the following actions to stabilize the slope for late fall and winter:

a. Stabilize the soil with temporary vegetation and erosion control mesh.
b. Stabilize the slope with erosion control mix.
c. Stabilize the slope with stone riprap.

3. Stabilization of Ditches and Channels: All stone-lined ditches and channels to be used to convey runoff through the winter will be constructed and stabilized by November 15. Grass-lined ditches and channels will be complete by September 15. Grass-lined ditches not stabilized by September 15 shall be lined with either sod or riprap.

H. MAINTENANCE PLAN

1. Routine Maintenance: Inspection will be performed as outlined in the project's Erosion Control Plan. Inspection will be by a qualified person during wet weather to ensure that the facility performs as intended. Inspection priorities will include checking erosion controls for accumulation of sediments.

I. Housekeeping

1. Spill prevention. Controls must be used to prevent pollutants from being discharged from materials on site, including storage practices to minimize exposure of the materials to stormwater, and appropriate spill prevention, containment, and response planning and implementation.

2. Groundwater protection. During construction, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater may not be stored or handled in areas of the site draining to an infiltration area. An "infiltration area" is any area of the site that by design or as a result of soils, topography and other relevant factors accumulates runoff that infiltrates into the soil. Dikes, berms, sumps, and other forms of secondary containment that prevent discharge to groundwater may be used to isolate portions of the site for the purposes of storage and handling of these materials.

3. Fugitive sediment and dust. Actions must be taken to ensure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil may not be used for dust control. If off-site tracking occurs roadways should be swept immediately and no less once a week and prior to significant storm events.

4. Debris and other materials. Litter, construction debris, and chemicals exposed to stormwater must be prevented from becoming a pollutant source.

5. Trench or foundation de-watering. Trench de-watering is the removal of water from trenches, foundations, coffer dams, ponds, and other areas within the construction area that retain water after excavation. In most cases the collected water is heavily silted and hinders correct and safe construction practices. The collected water must be removed from the ponded area, either through gravity or pumping, and must be spread through natural wooded buffers or removed to areas that are specifically designed to collect the maximum amount of sediment possible, like a cofferdam sedimentation basin. Avoid allowing the water to flow over disturbed areas of the site. Equivalent measures may be taken if approved by the department.

6. Authorized Non-stormwater discharges. Identify and prevent contamination by non-stormwater discharges. Where allowed non-stormwater discharges exist, they must be identified and steps should be taken to ensure the implementation of appropriate pollution prevention measures for the non-stormwater component(s) of the discharge. Authorized non-stormwater discharges are:

(a) Discharges from firefighting activity;

(b) Fire hydrant flushings;

(c) Vehicle washwater if detergents are not used and washing is limited to the exterior of vehicles (engine, undercarriage and transmission washing is prohibited);

(d) Dust control runoff in accordance with permit conditions and Appendix (C)(3);

(e) Routine external building washdown, not including surface paint removal, that does not involve detergents;

(f) Pavement washwater (where spills/leaks of toxic or hazardous materials have not occurred, unless all spilled material had been removed) if detergents are not used;

(g) Uncontaminated air conditioning or compressor condensate;

(h) Uncontaminated groundwater or spring water;

(i) Foundation or footer drain-water where flows are not contaminated;

(j) Uncontaminated excavation dewatering (see requirements in Appendix C(5));

(k) Potable water sources including waterline flushings; and

(l) Landscape irrigation.

7. Unauthorized non-stormwater discharges . The Department's approval under this Chapter does not authorize a discharge that is mixed with a source of non_stormwater, other than those discharges in compliance with Appendix C (6). Specifically, the Department's approval does not authorize discharges of the following:

(a) Wastewater from the washout or cleanout of concrete, stucco, paint, form release oils, curing compounds or other construction materials;

(b) Fuels, oils or other pollutants used in vehicle and equipment operation and maintenance;

(c) Soaps, solvents, or detergents used in vehicle and equipment washing; and

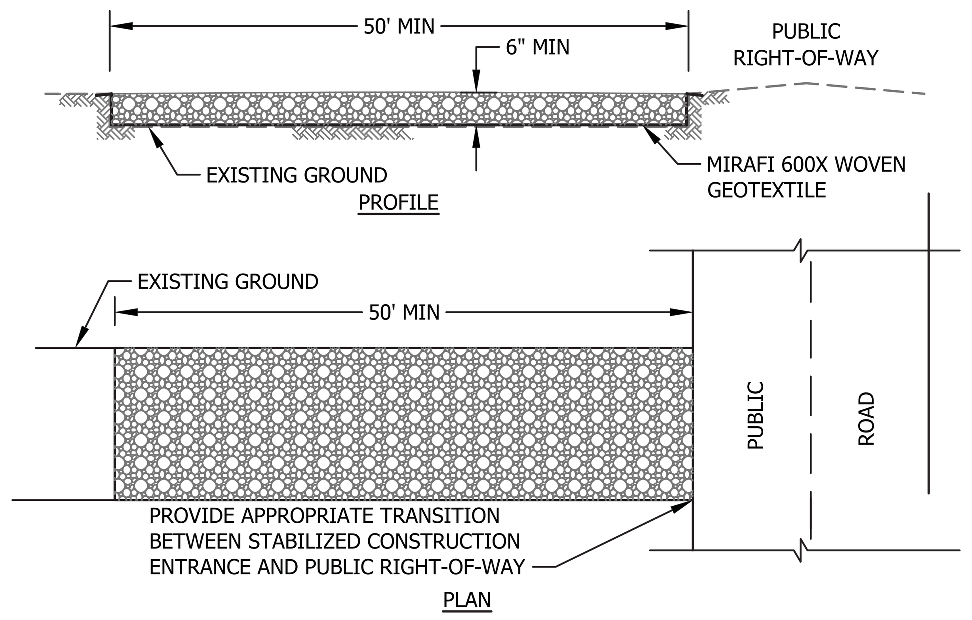
(d) Toxic or hazardous substances from a spill or other release.

8. Additional requirements. Additional requirements may be applied on a site-specific basis.

J. CONSTRUCTION SEQUENCE

In general, the expected sequence of construction for each phase is provided below. Construction is proposed to start in and end in 2020.

- Mobilization
- Install temporary erosion control measures
- Clearing and grubbing
- Site Grading
- Build underdrained soil filter and roof dripline filter
- Site stabilization, pavement, loam and seed, and landscaping

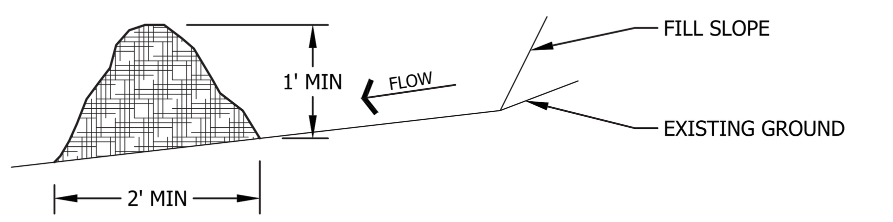



CONSTRUCTION SPECIFICATIONS

NOTES:
1. STONE SIZE - 2" TO 3" STONE OR RECLAIMED OR RECYCLED CONCRETE OR EQUIVALENT.
2. LENGTH - AS EFFECTIVE, BUT NOT LESS THAN 50 FEET.
3. THICKNESS - NOT LESS THAN SIX (6) INCHES.
4. WIDTH - 10 FEET MINIMUM, OR NOT LESS THAN FULL WIDTH OF ALL POINTS OF INGRESS OR EGRESS.
5. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC REPAIR AND TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.

## STABILIZED CONSTRUCTION ENTRANCE/EXIT

NTS




## EROSION CONTROL MIX SEDIMENT BARRIER

NOTES:

1. EROSION CONTROL MIX CAN BE MANUFACTURED ON OR OFF THE SITE. IT MUST CONSIST PRIMARILY OF ORGANIC MATERIAL SEPARATED AT THE POINT OF GENERATION, AND MAY INCLUDE: SHREDDED BARK, STUMP GRINDINGS, COMPOSTED BARK, OR FLUME GRIT AND FRAGMENTED WOOD GENERATED FROM WATER-FLUME LOG HANDLING SYSTEMS.
WOOD CHIPS, GROUND CONSTRUCTION DEBRIS, REPROCESSED WOOD PRODUCTS OR BARK CHIPS WILL NOT BE ACCEPTABLE AS THE ORGANIC COMPONENT OF THE MIX.
EROSION CONTROL MIX SHALL CONTAIN A WELL-GRADED MIXTURE OF PARTICLE SIZES AND MAY CONTAIN ROCKS LESS THAN 4" IN DIAMETER.
EROSION CONTROL MIX MUST BE FREE OF REFUSE, PHYSICAL CONTAMINANTS, AND MATERIAL TOXIC TO PLANT GROWTH.
THE MIX COMPOSITION SHALL MEET THE FOLLOWING STANDARDS:
   A. ORGANIC MATERIAL: BETWEEN 20% - 100% (DRY WEIGHT BASIS)
   B. PARTICLE SIZE: BY WEIGHT, 100% PASSING 6" SCREEN, 70-85% PASSING 0.75" SCREEN
   C. THE ORGANIC PORTION NEEDS TO BE FIBROUS AND ELONGATED.
   D. LARGE PORTIONS OF SILTS, CLAYS OR FINE SANDS ARE NOT ACCEPTABLE IN THE MIX.
   E. SOLUBLE SALTS CONTENT SHALL BE LESS THAN 4.0 MMHOS/CM.
   F. PH: 5.0 - 8.0

2. ON SLOPES LESS THAN 5% OR AT THE BOTTOM OF SLOPES 2:1 OR LESS UP TO 20 FEET LONG, THE BARRIER MUST CONFORM TO THE ABOVE DIMENSIONS. ON THE LONGER OR STEEPER SLOPES, THE BARRIER SHOULD BE WIDER TO ACCOMMODATE THE ADDITIONAL FLOW.

3. THE BARRIER MUST BE PLACED ALONG A RELATIVELY LEVEL ELEVATION. IT MAY BE NECESSARY TO CUT TALL GRASSES OR WOODY VEGETATION TO AVOID CREATING VOIDS AND BRIDGES THAT WOULD ENABLE FINES TO WASH UNDER THE BARRIER THROUGH THE GRASS BLADES OR PLANT STEMS.

4. LOCATIONS WHERE OTHER BMP'S SHOULD BE USED:
   A. AT LOW POINTS OF CONCENTRATED FLOW
   B. BELOW CULVERT OUTLET APRONS
   C. WHERE A PREVIOUS STAND-ALONE EROSION CONTROL MIX APPLICATION HAS FAILED
   D. AT THE BOTTOM OF STEEP PERIMETER SLOPES THAT ARE MORE THAN 50 FEET FROM TOP TO BOTTOM (LARGE UPGRADIENT WATERSHED)
   E. AROUND CATCH BASINS AND CLOSED STORM DRAIN SYSTEMS.

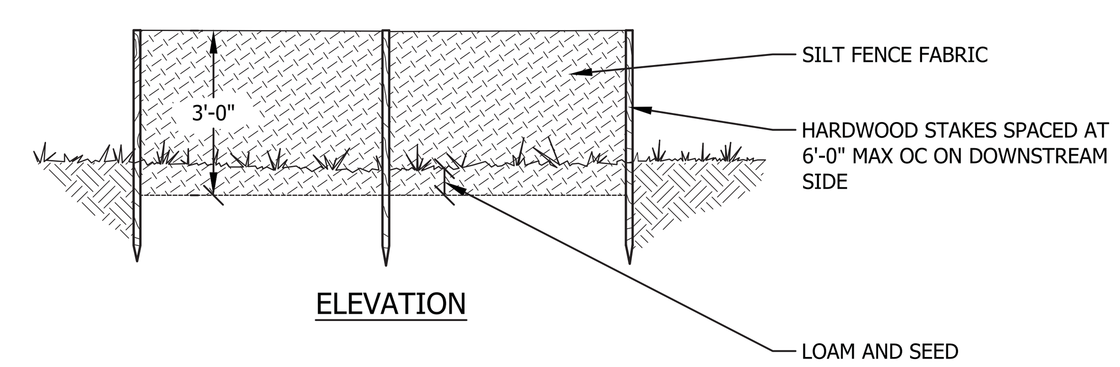
5. THE EROSION CONTROL MIX BARRIERS SHOULD BE INSPECTED REGULARLY AND AFTER EACH LARGE RAINFALL. REPAIR ALL DAMAGED SECTIONS OF BERM IMMEDIATELY BY REPLACING OR ADDING ADDITIONAL MATERIAL PLACED ON THE BERM TO THE DESIRED HEIGHT AND WIDTH.

6. IT MAY BE NECESSARY TO REINFORCE THE BARRIER WITH SILT FENCE OR STONE CHECK DAMS IF THERE ARE SIGNS OF UNDERCUTTING OR THE IMPOUNDMENT OF LARGE VOLUMES OF WATER.

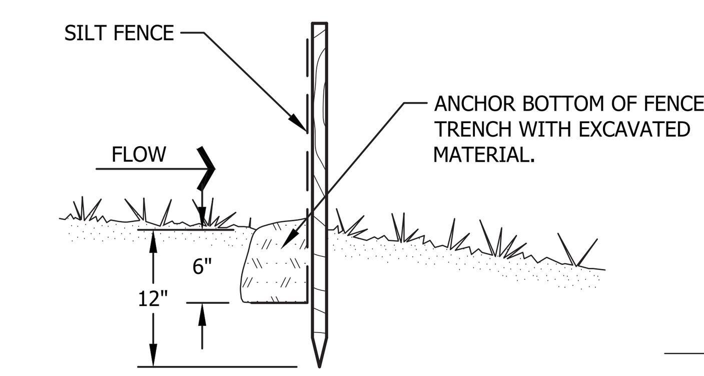
7. SEDIMENT DEPOSITS SHOULD BE REMOVED WHEN THEY REACH APPROXIMATELY ONE-HALF THE HEIGHT OF THE BARRIER.

8. REPLACE SECTIONS OF BERM THAT DECOMPOSE, BECOME CLOGGED WITH SEDIMENT OR OTHERWISE BECOME INEFFECTIVE. THE BARRIER SHOULD BE RESHAPED AS NEEDED.

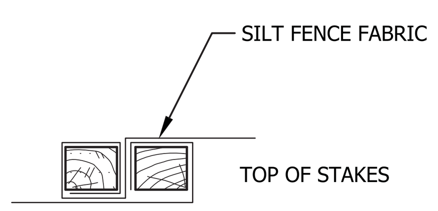
9. EROSION CONTROL MIX BARRIERS CAN BE LEFT IN PLACE AFTER CONSTRUCTION. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER BARRIER IS NO LONGER REQUIRED SHOULD BE SPREAD TO CONFORM TO THE EXISTING GRADE AND BE SEEDED AND MULCHED. WOODY VEGETATION CAN BE PLANTED INTO THE BARRIERS, OR THEY CAN BE OVER-SEEDED WITH LEGUMES. IF THE BARRIER NEEDS TO BE REMOVED, IT CAN BE SPREAD OUT INTO THE LANDSCAPE.




ELEVATION




SECTION



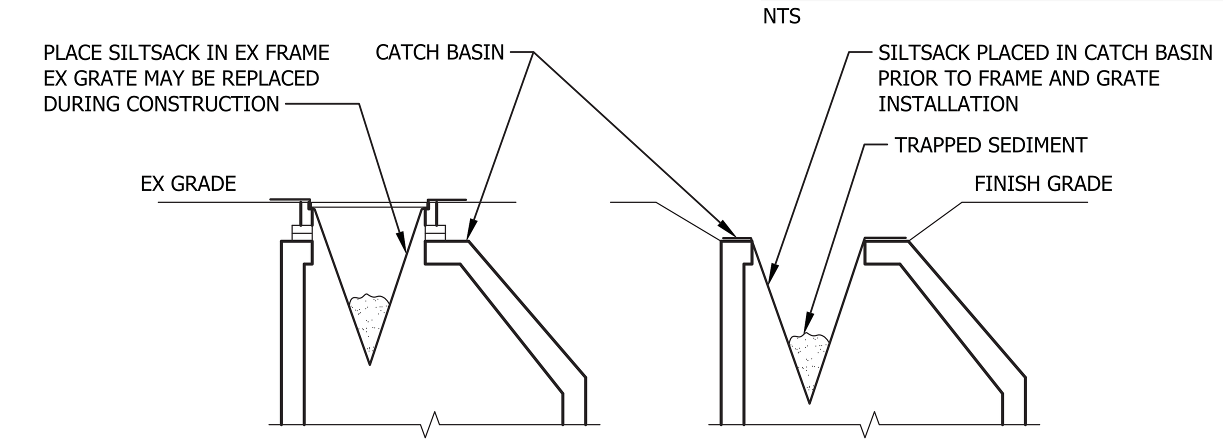

OVERLAP JOINTS

NOTE:
CONTRACTORS OPTION TO USE SEDIMENT BARRIER OR SILT FENCE FOR SLOPE PROTECTION.

## SILT FENCE

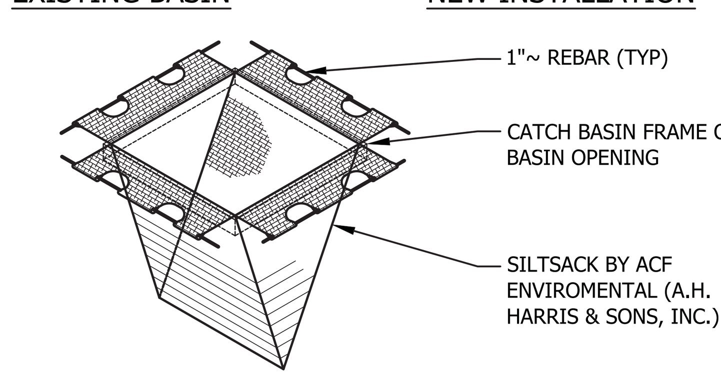
## SURFACE DRAINAGE SEDIMENT CONTROL

NTS




EXISTING BASIN

NEW INSTALLATION




SILTSACK

## CATCH BASIN PROTECTION

NTS

| REV. | BY | DATE | STATUS |
|---|---|---|---|
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| | | | |
| | DPD | 4/2020 | REVISED PER TOWN REVIEW COMMENTS |
| | DPD | 3/2020 | ISSUED TO MEDEP FOR REVIEW |
| | DPD | 2/2020 | ISSUED TO MEDEP FOR REVIEW |

STATE OF MAINE
DANIEL DIFFIN
11841
LICENSED
PROFESSIONAL ENGINEER

TOWN OF CUMBERLAND
TOWN OFFICE PARKING EXPANSION
TUTTLE ROAD
CUMBERLAND, MAINE

EROSION CONTROL NOTES AND DETAILS


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| | |
|---|---|
| DESIGN BY: | NMT |
| DRAWN BY: | SJM |
| DATE: | 1/2020 |
| CHECKED BY: | BDP |
| LMN: | NONE |
| CTB: | SME-STD |

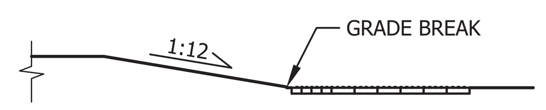
JOB NO. 19231.00 DWG FILE DETAILS

C-300

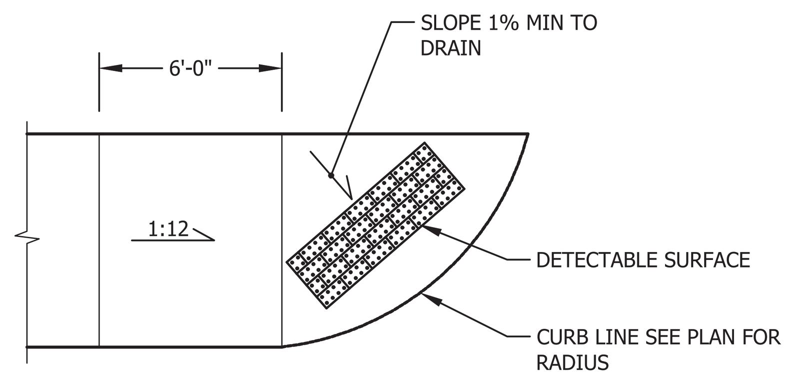
| CONSTRUCTION | USE |
|---|---|
| 1 1/4" HMA MDOT 9.5mm<br>2 1/4" HMA MDOT 19.0mm<br>3" COMPACTED AGGREGATE BASE, MDOT 703.06(a) TYPE A<br>15" COMPACTED AGGREGATE SUBBASE, MDOT 703.06(b) TYPE D<br>COMPACTED SUBGRADE | BITUMINOUS<br>PARKING LOT |
| 4" TOPSOIL, NO STONES OVER 3/4" DIA.<br>GRANULAR MATERIAL IN FILL AREAS<br>COMPACTED SUBGRADE | GRASS<br>ALL DISTURBED AREAS OTHER THAN PLAY FIELDS |

NOTES:
1. HMA = HOT MIX ASPHALT.
   MDOT = MAINE DEPARTMENT OF TRANSPORTATION.
2. ALL COURSE THICKNESS AFTER FINAL COMPACTION.

## SCHEDULE OF SURFACE FINISHES
NTS

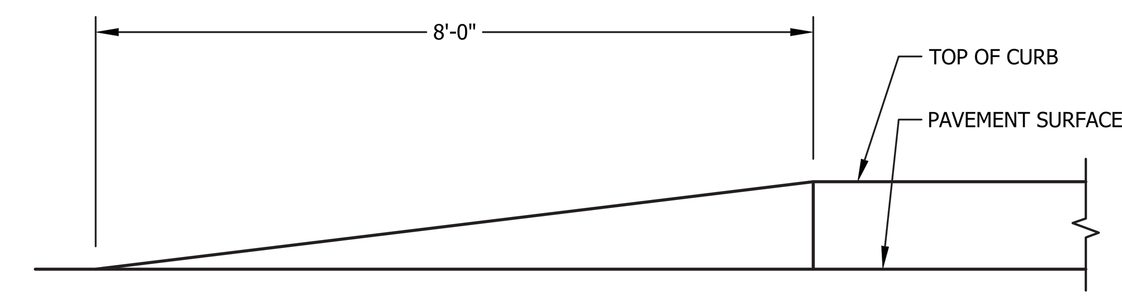



ELEVATION

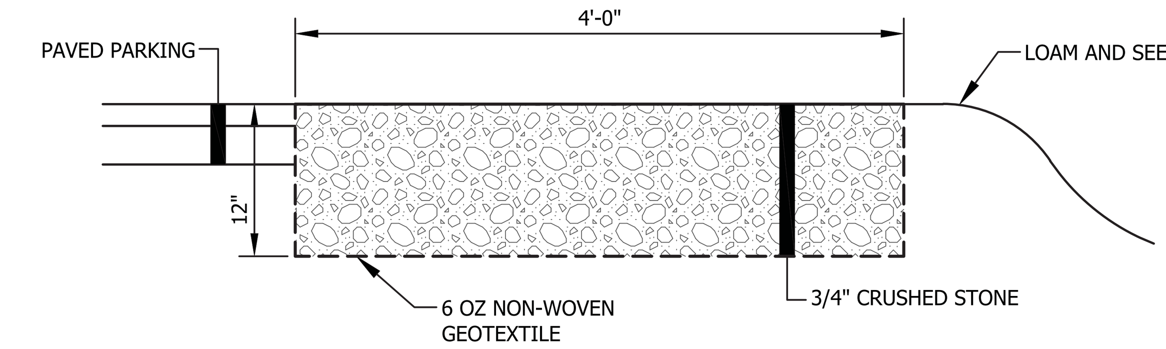



RAMP WITH END LANDING - PLAN

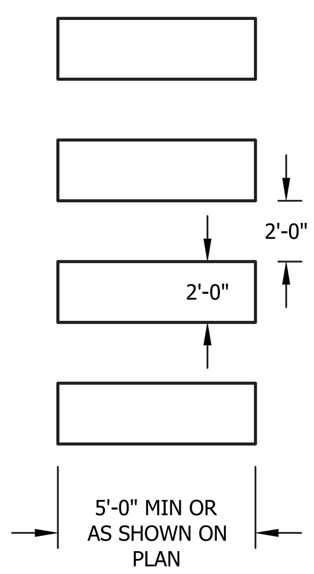
## SIDEWALK RAMP WITH DETECTABLE WARNING
NTS



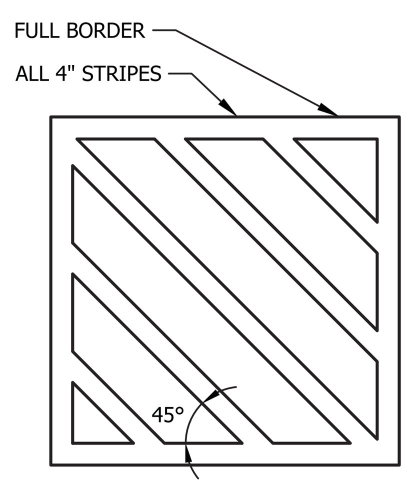

## CURB TIP DOWN
NTS



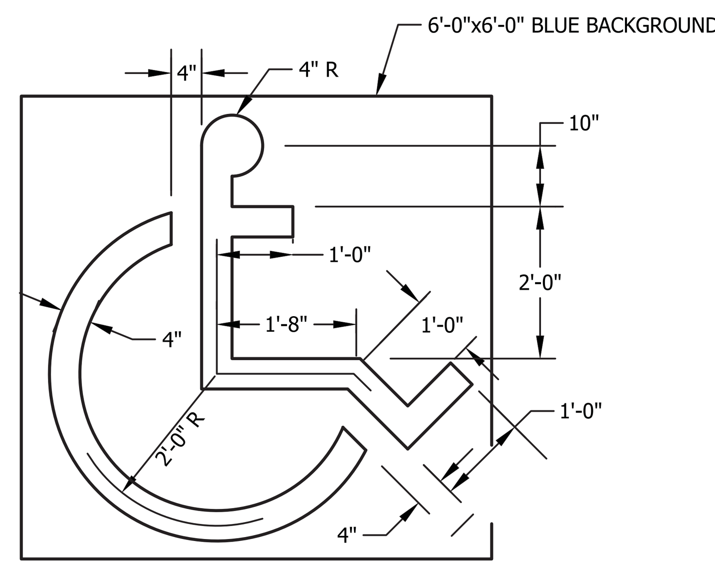

## CRUSHED STONE STRIP
NTS



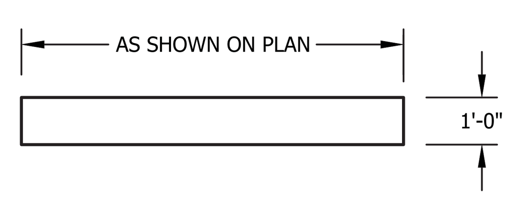

CROSSWALK



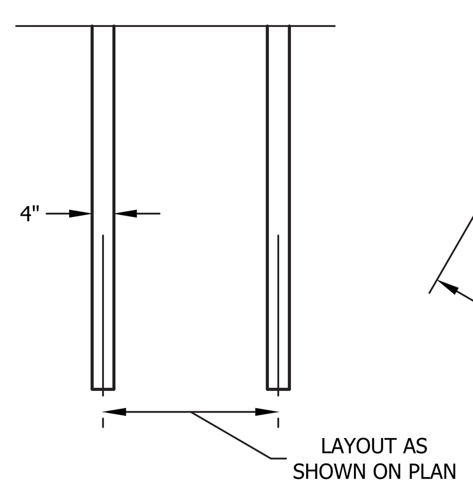

NO PARKING



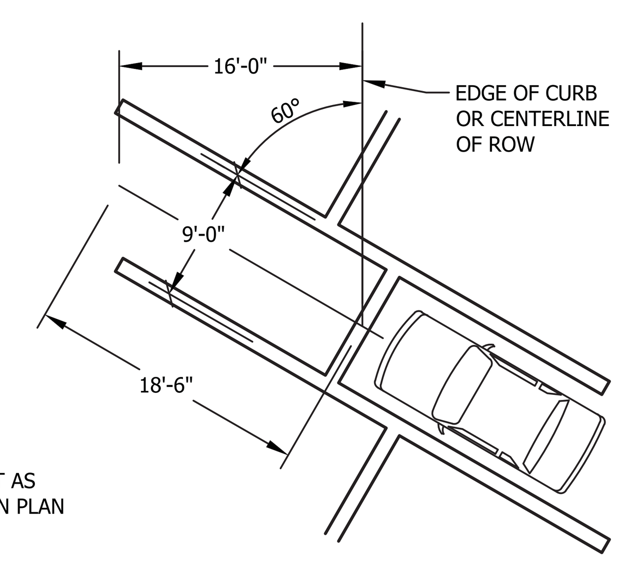

BARRIER FREE STALL SYMBOL




STOP LINE

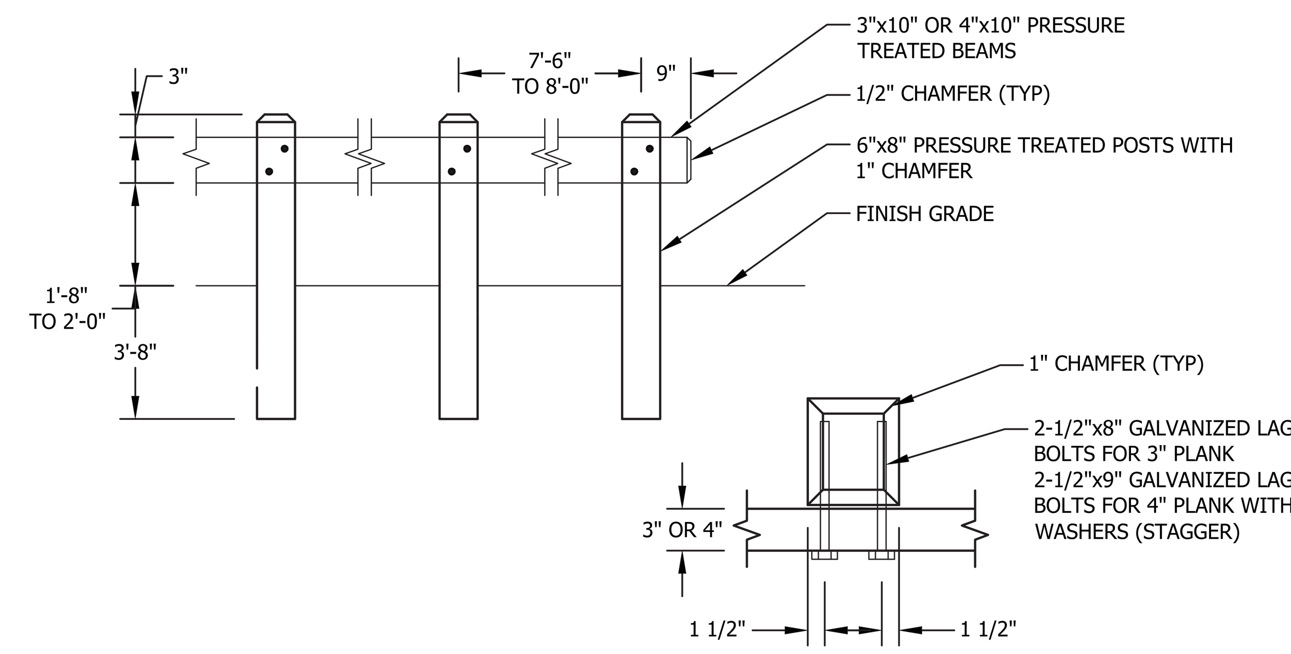



PARKING SPACE

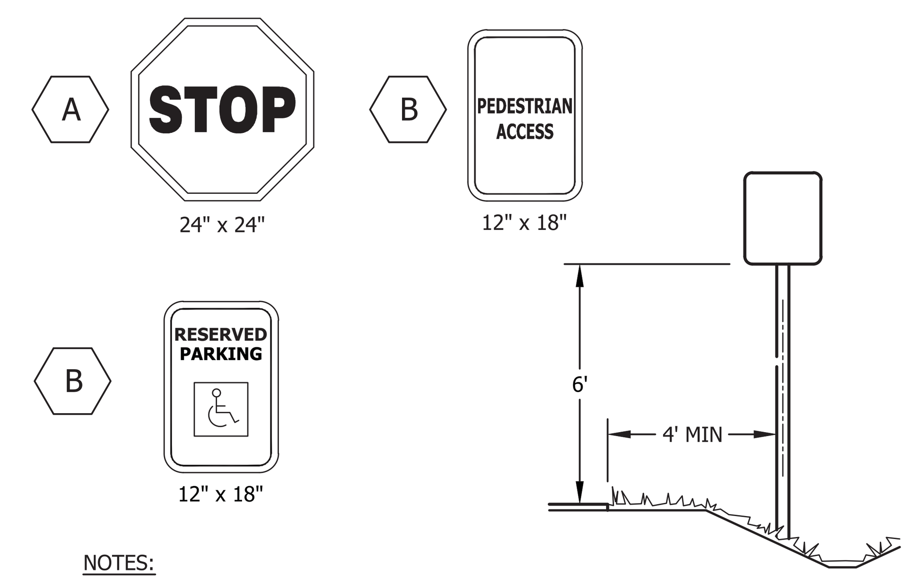



PARKING SPACE

## STRIPING DETAILS
NTS

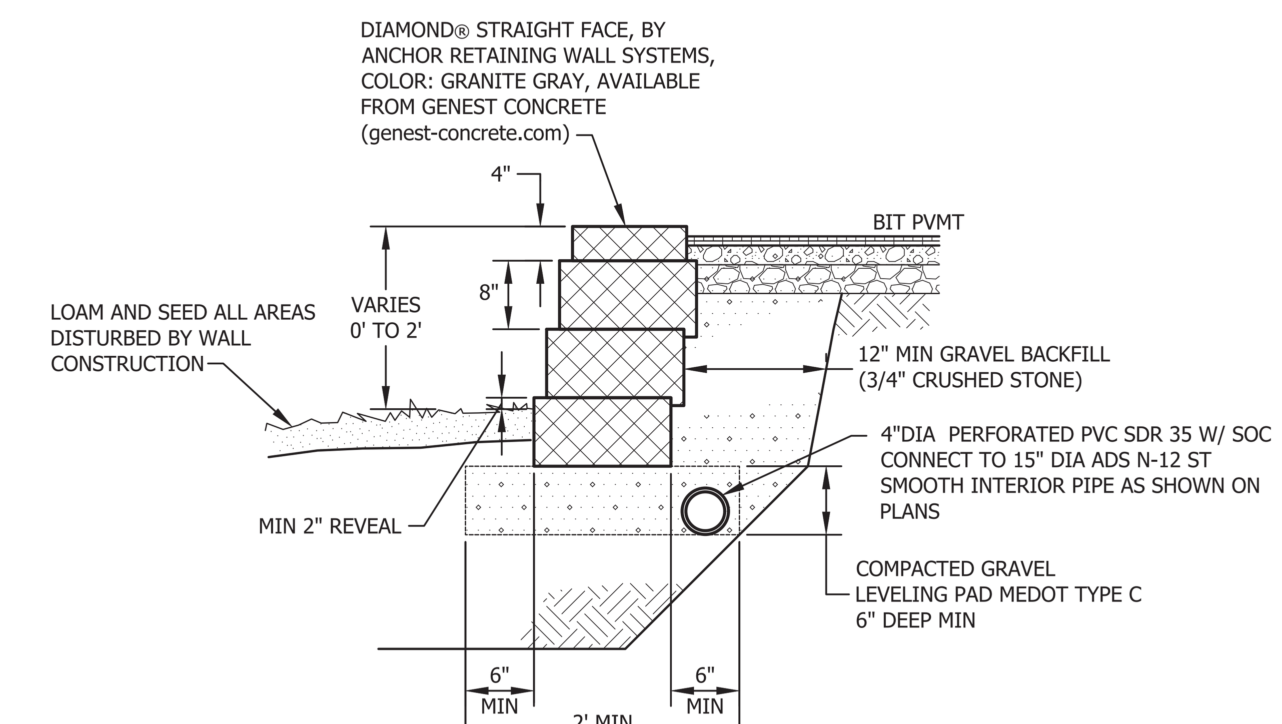



## WOOD GUARDRAIL
NTS

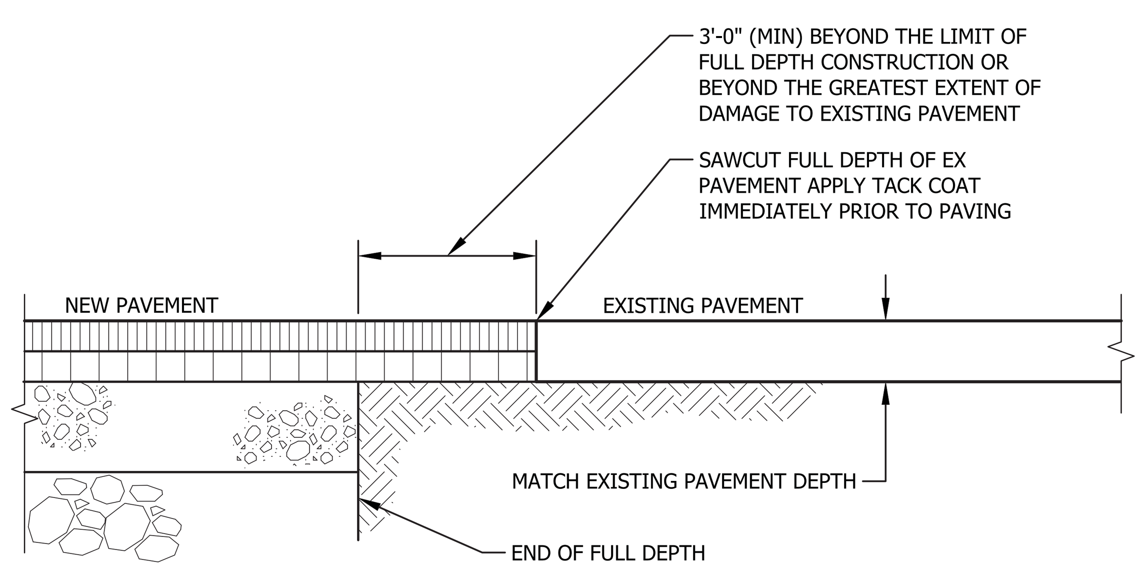



NOTES:
1. SIGNS SHALL BE FABRICATED AND INSTALLED IN ACCORDANCE WITH MAINE DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS, HIGHWAYS AND BRIDGES REVISION OF DECEMBER 2002, SECTION 645.
2. ALL PERMANENT SIGNS ON THIS PROJECT ARE CLASSIFIED UNDER SECTION 645.03(b) TYPE 1 REGULATORY WARNING AND ROUTE MARKER ASSEMBLY SIGNS.
3. SIGN MATERIAL SHALL BE AS SPECIFIED IN SECTION 719 OF THE MDOT STANDARD SPECIFICATIONS.
4. POSTS SHALL BE METAL CHANNELS AS SPECIFIED IN SECTION 720.08. ALTERNATE POSTS MAY BE 4"x6" WOOD AS SPECIFIED IN SECTION 720.12, AS APPROVED BY ENGINEER.
5. POSTS IN THE PUBLIC RIGHT-OF-WAY TO BE ON BREAKAWAY POSTS AS SPECIFIED IN SECTION 720 OF THE MDOT STANDARD SPECIFICATIONS.

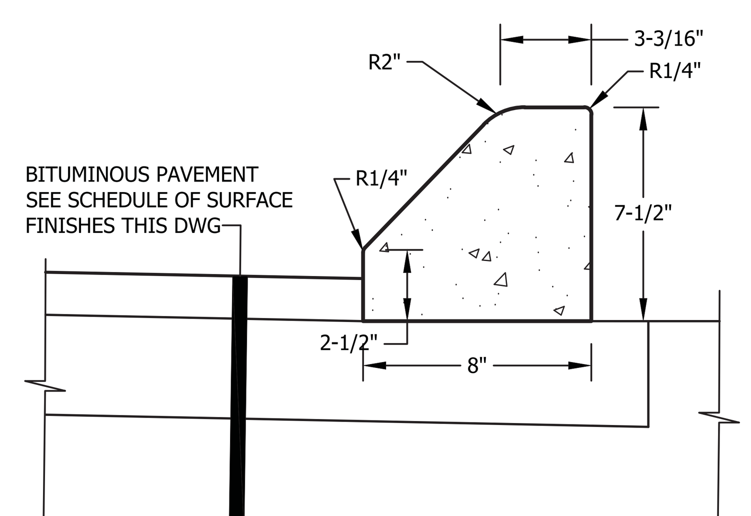
## ROAD SIGN LEGEND
NTS




## SEGMENTAL RETAINING WALL
NTS




## PAVEMENT CUTTING AND MATCHING
NTS




CONCRETE NOTES:
1. MINIMUM 28 DAY COMPRESSIVE STRENGTH: 4,000 PSI
2. AIR ENTRAINMENT: 4% TO 6%
3. REINFORCING: FIBERMESH OR EQUIVALENT GRACE PRODUCT
4. STRAND LENGTH 1-1/2", 1" TO 1-1/2 LB/CUBIC YARD
5. SLUMP: 1" TO 1-1/2"
6. FINISH:
   a. VERTICAL AND TOP FACES: SMOOTH SLIPFORM
   b. SLOPED FACES: BROOM
7. JOINTS: SAWCUT 10' OC 3" DEEP THE DAY AFTER PLACING
8. SEALER: SALTGUARD OR EQUAL WATER BASED SEALER

## SLIPFORM CONCRETE CURB
NTS

| REV. | BY | DATE | STATUS |
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| | DPD | 4/2020 | REVISED PER TOWN REVIEW COMMENTS |
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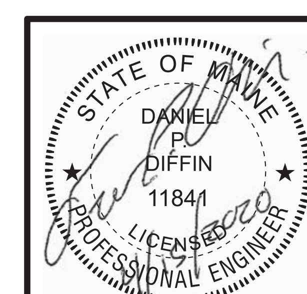


TOWN OF CUMBERLAND
TOWN OFFICE PARKING EXPANSION
TUTTLE ROAD
CUMBERLAND, MAINE

SECTIONS AND DETAILS


SME
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| | |
|---|---|
| DESIGN BY: | NMT |
| DRAWN BY: | BWB |
| DATE: | 1/2020 |
| CHECKED BY: | BDP |
| LMN: | NONE |
| CTB: | SME-STD |

JOB NO. 19231.00 DWG FILE DETAILS

C-301

THE SANDY LOAM TOPSOIL SHALL BE TESTED AT A SOIL TESTING LAB AND:

- MATCH THE USDA SANDY LOAM TOPSOIL CLASSIFICATION
- HAVE 5-8% HUMIFIED ORGANIC MATTER
- HAVE A CLAY CONTENT OF LESS THAN 2%
- BE FREE OF STONES, STUMPS, ROOTS OR OTHER OBJECTS GREATER THAN 2".

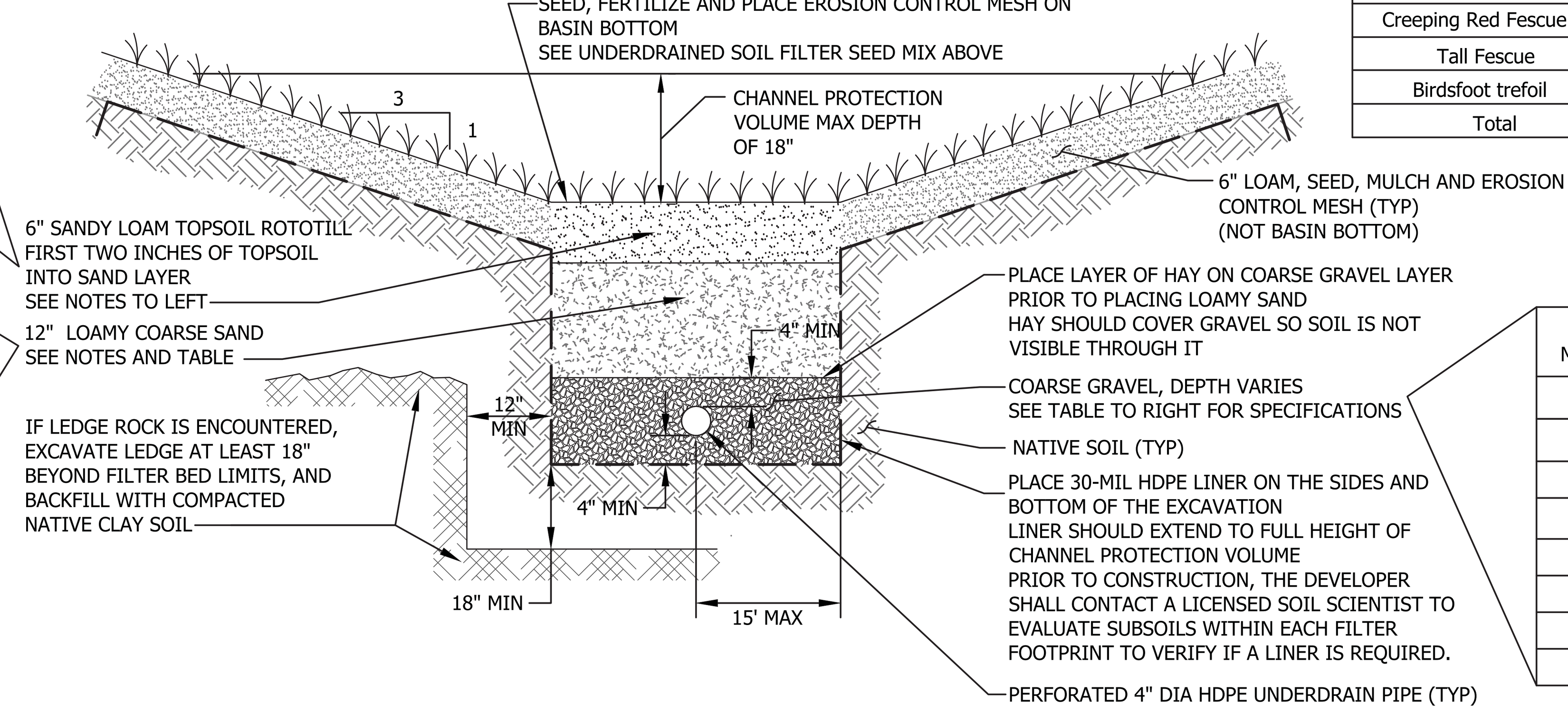
IF THE TOPSOIL DOES NOT CONTAIN SUFFICIENT NUTRIENT CONTENT TO SUPPORT GRASS GROWTH, SUPPLEMENT WITH SUPERHUMUS ORGANIC MATTER AND RETEST ORGANIC MATTER AND CLAY CONTENT.

NOTE:

1. FILTER OUTLET DISCHARGE SHALL BE CONTROLLED BY A 1.25-INCH DIAMETER CONSTRICTIVE ORIFICE TO OBTAIN A 24 TO 48 HOUR RELEASE TIME.

SOIL FOR 12" LOAMY COARSE SAND LAYER (MEDOT #703.01)

| SIEVE SIZE | % BY WEIGHT |
|---|---|
| #10 | 85-100 |
| #20 | 70-100 |
| #60 | 15-40 |
| #200 | 8-15 |
| #200 (CLAY SIZE) | < 2.0 |




UNDERDRAINED SOIL FILTER

| Name | LBS/ACRE |
|---|---|
| Creeping Red Fescue | 20 |
| Tall Fescue | 20 |
| Birdsfoot trefoil | 8 |
| Total | 48 |

COARSE GRAVEL
MEDOT SPECIFICATIONS FOR UNDERDRAINS (MEDOT #703.22)

| SIEVE SIZE | % PASSING BY WEIGHT |
|---|---|
| UNDERDRAIN TYPE B | |
| 1" | 95-100 |
| $\frac{1}{2}$" | 75-100 |
| #4 | 50-100 |
| #20 | 15-80 |
| #50 | 0-15 |
| #200 | 0-5 |

CONSTRUCTION OVERSIGHT:

CONSTRUCTION SEQUENCE: THE SOIL FILTER MEDIA AND VEGETATION MUST NOT BE INSTALLED UNTIL THE AREA THAT DRAINS TO THE FILTER HAS BEEN PERMANENTLY STABILIZED WITH PAVEMENT OR OTHER STRUCTURE, 90% VEGETATION COVER, OR OTHER PERMANENT STABILIZATION UNLESS THE RUNOFF FROM THE CONTRIBUTING DRAINAGE AREA IS DIVERTED AROUND THE FILTER UNTIL STABILIZATION IS COMPLETE.

COMPACTION OF SOIL FILTER: FILTER SOIL MEDIA AND UNDERDRAIN BEDDING MATERIAL MUST BE COMPACTED TO BETWEEN 90% AND 92% STANDARD PROCTOR.

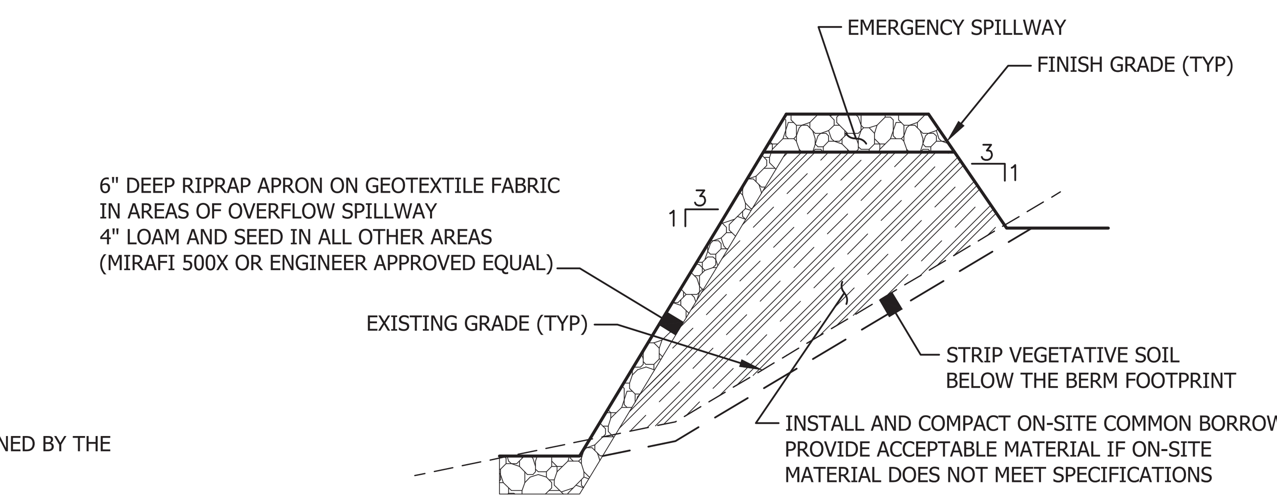
CONSTRUCTION OVERSIGHT: INSPECTION BY A PROFESSIONAL ENGINEER FAMILIAR WITH CONSTRUCTION REQUIREMENTS OF OF UNDERDRAINED SOIL FILTERS WILL OCCUR AT A MINIMUM:

- AFTER THE PRELIMINARY CONSTRUCTION OF THE FILTER GRADES AND ONCE THE UNDERDRAIN PIPES ARE INSTALLED BUT NOT BACKFILLED,
- AFTER THE DRAINAGE LAYER IS CONSTRUCTED AND PRIOR TO THE INSTALLATION OF THE FILTER MEDIA,
- AFTER THE FILTER MEDIA HAS BEEN INSTALLED AND SEEDED.
- AFTER ONE YEAR TO INSPECT HEALTH OF THE VEGETATION AND MAKE CORRECTIONS, AND
- ALL THE MATERIAL USED FOR THE CONSTRUCTION OF THE FILTER BASIN MUST BE CONFIRMED AS SUITABLE BY THE DESIGN ENGINEER. TESTING MUST BE DONE BY A CERTIFIED LABORATORY TO SHOW THAT THEY ARE PASSING DEP SPECIFICATIONS.

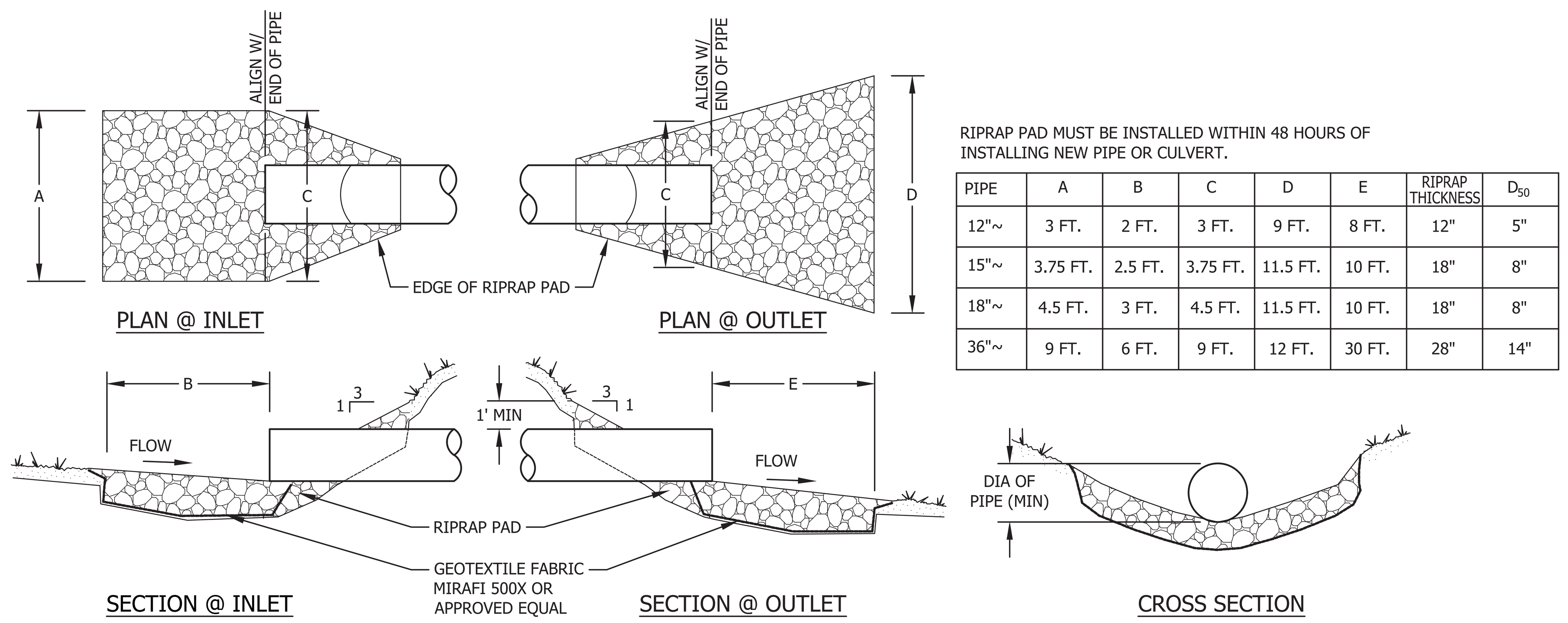
TESTING AND SUBMITTALS: THE CONTRACTOR SHALL IDENTIFY THE LOCATION OF THE SOURCE OF EACH COMPONENT OF THE FILTER MEDIA. ALL RESULTS OF FIELD AND LABORATORY TESTING SHALL BE SUBMITTED TO THE PROJECT ENGINEER FOR CONFIRMATION. THE CONTRACTOR SHALL:

- SELECT SAMPLES OF EACH TYPE OF MATERIAL TO BE BLENDED FOR THE MIXED FILTER MEDIA AND SAMPLES OF THE UNDERDRAIN BEDDING MATERIAL. SAMPLES MUST BE A COMPOSITE OF THREE DIFFERENT LOCATIONS (GRABS) FROM THE STOCKPILE OR PIT FACE. SAMPLE SIZE REQUIRED WILL BE DETERMINED BY THE TESTING LABORATORY.
- PERFORM A SIEVE ANALYSIS CONFORMING TO ASTM C136 (STANDARD TEST METHOD FOR SIEVE ANALYSIS OF FINE AND COARSE AGGREGATES 1996A) ON EACH TYPE OF THE SAMPLE MATERIAL. A HYDROMETER TEST WILL BE REQUIRED TO CONFIRM CLAY CONTENT OF THE SANDY LOAM TOPSOIL.

TYPICAL UNDERDRAINED SOIL FILTER DETAIL
NTS




TYPICAL UNDERDRAINED SOIL FILTER BERM
NTS




RIPRAP PAD MUST BE INSTALLED WITHIN 48 HOURS OF INSTALLING NEW PIPE OR CULVERT.

| PIPE | A | B | C | D | E | RIPRAP THICKNESS | $D_{50}$ |
|---|---|---|---|---|---|---|---|
| 12"~ | 3 FT. | 2 FT. | 3 FT. | 9 FT. | 8 FT. | 12" | 5" |
| 15"~ | 3.75 FT. | 2.5 FT. | 3.75 FT. | 11.5 FT. | 10 FT. | 18" | 8" |
| 18"~ | 4.5 FT. | 3 FT. | 4.5 FT. | 11.5 FT. | 10 FT. | 18" | 8" |
| 36"~ | 9 FT. | 6 FT. | 9 FT. | 12 FT. | 30 FT. | 28" | 14" |

RIPRAP INLET/OUTLET PROTECTION
NTS

STATE OF MAINE
DANIEL P. DIFFIN
11841
LICENSED
PROFESSIONAL ENGINEER

TOWN OF CUMBERLAND
TOWN OFFICE PARKING EXPANSION
TUTTLE ROAD
CUMBERLAND, MAINE

SECTIONS AND DETAILS

| REV. | BY | DATE | STATUS |
|---|---|---|---|
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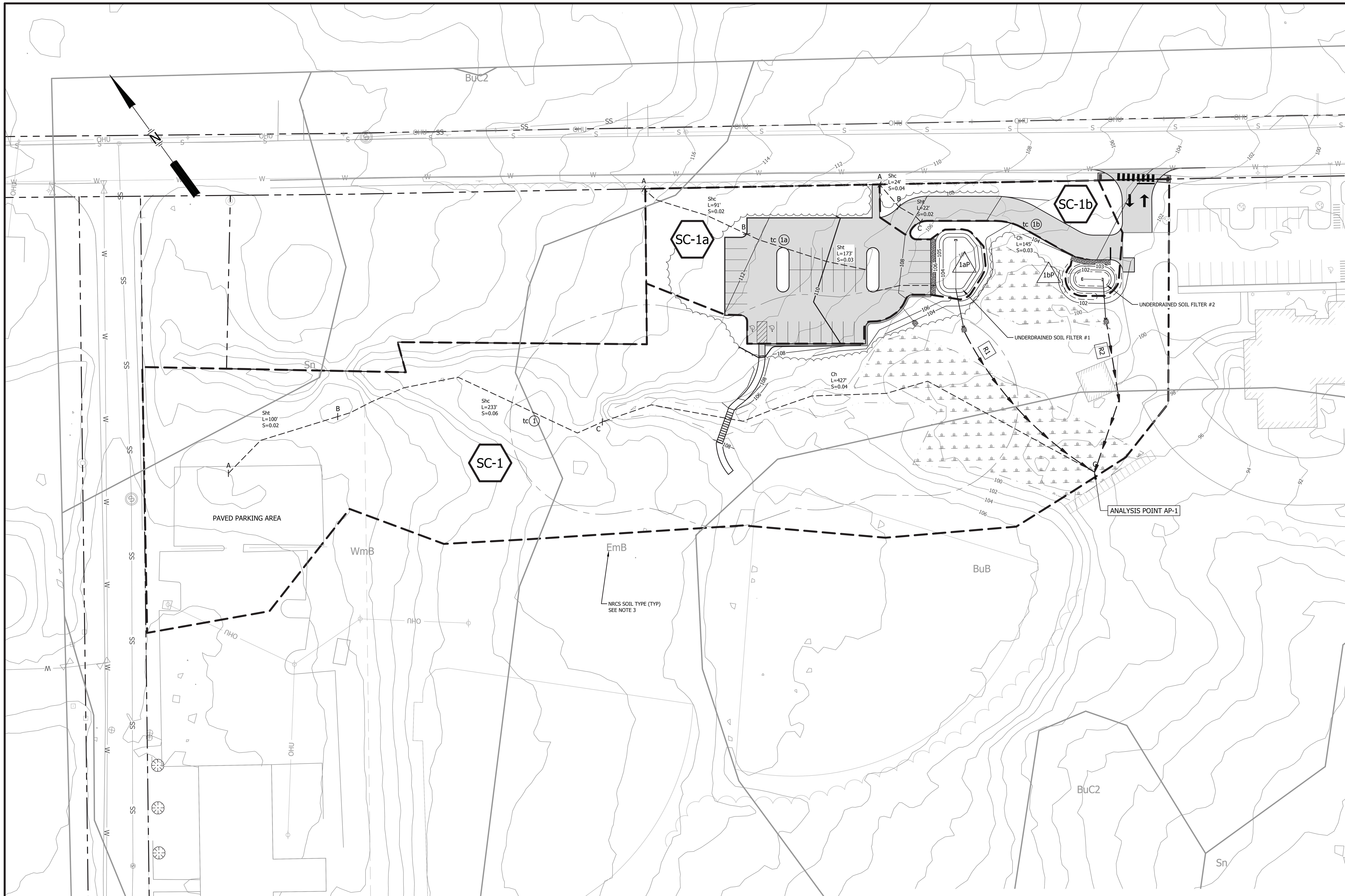
| | |
|---|---|
| DESIGN BY: | NMT |
| DRAWN BY: | BWB |
| DATE: | 1/2020 |
| CHECKED BY: | BDP |
| LMN: | NONE |
| CTB: | SME-STD |

JOB NO. 19231.00 DWG FILE DETAILS

C-302




STORMWATER MANAGEMENT LEGEND

| | |
|---|---|
| 1 | SUBCATCHMENT DESIGNATION |
| | SUBCATCHMENT BOUNDARY |
| A B C | TIME OF CONCENTRATION SEGMENT DESIGNATION<br>TIME OF CONCENTRATION PATH |
| | SOIL TYPE BOUNDARY |
| BuC2 | SOIL TYPE DESIGNATION |
| Sht L=50' S=0.005 | TIME OF CONCENTRATION TYPE, LENGTH AND SLOPE |
| Sht | SHEET FLOW |
| Shc | SHALLOW CONCENTRATED FLOW |
| Ch | CHANNEL FLOW |
| | DRAINAGE REACH |
| 81 | REACH DESIGNATION (HYDROCAD) |
| 1aP | POND/STRUCTURE DESIGNATION (HYDROCAD) |
| tc 1 | TIME OF CONCENTRATION WITH SUBCATCHMENT DESIGNATION |

20 0 40 80 FEET

| MAP UNIT SYMBOL | MAP UNIT NAME |
|---|---|
| BgB | Nicholville |
| BuB | Lamoine |
| BuC2 | Buxton |
| EmB | Elmwood |
| HnC | Hinckley-Suffield |
| Sn | Scantic |
| WmB | Windsor |

NOTES:

1. SEE DWG C-100 FOR GENERAL NOTES AND PLAN REFERENCES.
2. ALL SITE AND CONSTRUCTION ACTIVITIES SHALL BE IN COMPLIANCE WITH MEDEP BEST MANAGEMENT PRACTICES AND EXISTING FEDERAL, STATE, AND LOCAL PERMITS AND PERMITTING REQUIREMENTS FOR THE SITE.
3. SOIL TYPE DESIGNATIONS AND BOUNDARIES FROM A UNITED STATES DEPARTMENT OF AGRICULTURE NRCS CUSTOM SOIL REPORT FOR CUMBERLAND COUNTY AND PART OF OXFORD COUNTY MAINE DATED JANUARY 2, 2020.

| REV. | BY | DATE | STATUS |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | DPD | 4/2020 | REVISED PER TOWN REVIEW COMMENTS |
| | DPD | 4/2020 | REVISED PER MEDEP COMMENTS |
| | DPD | 3/2020 | ISSUED TO TOWN FOR SITE PLAN REVIEW |
| | DPD | 2/2020 | ISSUED FOR MEDEP REVIEW |

STATE OF MAINE
DANIEL P. DIFFIN
11841
LICENSED
PROFESSIONAL ENGINEER

# TOWN OF CUMBERLAND
# TOWN OFFICE PARKING EXPANSION
# TUTTLE ROAD
# CUMBERLAND, MAINE

## STORMWATER MANAGEMENT PLAN
## POST-DEVELOPMENT CONDITIONS


SME
SEVEE & MAHER ENGINEERS
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • smemaine.com


| | |
|---|---|
| DESIGN BY: | NMT |
| DRAWN BY: | BWB |
| DATE: | 1/2020 |
| CHECKED BY: | BDP |
| LMN: | SMP-E |
| CTB: | SMP |

JOB NO. 19231.00 DWG FILE BASE

D-101

LANDS AND CONSERVATION COMMISSION
Town of Cumberland
290 Tuttle Road
Cumberland, ME 04021

April 2, 2020

To: Carla Nixon, Town Planner

From: Mike Schwindt, Chair
Lands and Conservation Commission

Re: Proposed new Town Hall parking lot

By unanimous vote the LCC recommends the Town forego expanding parking spaces adjacent to the Town Hall for several reasons:

--the land was originally donated to the Town for forestry and educational purposes. Expanding the parking lot will remove another parcel of land from its natural state, further reducing the extent and ecological functions of the Town Forest and creating additional impervious surface area on the property. Impervious surfaces require more stormwater management and often contribute to additional erosion, sedimentation, and pollution in nearby streams and wetlands. In addition, cutting trees down that are currently storing carbon and have the potential to store additional carbon in the future will eliminate an important "natural solution" to combating rising temperatures related to carbon pollution. This seems antithetical to other climate-related goals of the Town and State of Maine.

-- the justification for more parking slots is apparently to better accommodate parking needs during elections and other occasional events when overflow parking is needed. Since elections are generally held twice and occasionally three times a year and last but a day each time, we don’t think that justifies an expanded parking area. Instead, we’d prefer the Town explore other alternatives for election days including greater use of absentee voting, parking slots along Tuttle Road as well as shuttle service from offsite locations such as the school. The most recent election seemed to work out well with the Police Department directing traffic at the Town Hall parking lot, and makes more sense to us to continue this practice than build yet another paved lot for occasional use.

--the aesthetics of driving along Tuttle Road would be significantly altered by having another parking lot to look at rather than green space.

In summary, we believe the conservation value of the trees, shrubs and open space outweighs the need for an overflow parking lot which would be needed only occasionally during the year.

We are also aware of a 1/2/20 engineer’s map showing a police station to be added on the far side of the parking lot.

# TOWN OF CUMBERLAND PLANNING BOARD
# SITE PLAN REVIEW APPLICATION
# TOWN OFFICE PARKING EXPANSION

Prepared for

## TOWN OF CUMBERLAND, MAINE

290 Tuttle Road

Cumberland, Maine

March 2020

STATE OF MAINE
DANIEL
P.
DIFFIN
11841
LICENSED
PROFESSIONAL ENGINEER

4 Blanchard Road
P.O. Box 85A
Cumberland, Maine 04021
Phone: 207.829.5016 sme-engineers.com

ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

SME
SEVEE & MAHER
ENGINEERS

**SITE PLAN REVIEW**
**Town of Cumberland**

**Appendix C**
**Planning Board Site Plan Review Application**

Applicant's name Town of Cumberland, William R. Shane, P.E.

Applicant's address 290 Tuttle Road, Cumberland Center, ME 04021

Cell phone N/A Home phone N/A Office phone 207-829-5559

Email Address wshane@cumberlandmaine.com

Project address 290 Tuttle Road, Cumberland Center, ME 04021

Project name Town Office Parking Expansion

Describe project See Project Description Section

Number of employees 25 employees

Days and hours of operation Monday to Wedneday 8 am to 5 pm, Thursday 8 am to 6 pm

Project review and notice fee $500 and $150

Name of representative Daniel Diffin, P.E., Sevee & Maher Engineers, Inc.

Contact information: Cell: N/A Office: 207-829-5016

What is the applicant's interest in the property?

Own x Lease ___ Purchase and sale agreement ___ (provide copy of document)
If you are not the owner, list owner's name, address and phone number Town of Cumberland Owned

If you are not the owner, list owner's name, address and phone number ___

**Boundary Survey**
Submitted? Yes ✓ No ___

Are there any deed restrictions or easements? Yes ___ No ✓ If yes, provide information and show easement location on site plan.

**Building Information**
Are there existing buildings on the site? ✓ No ___ Number: 2
Yes Will they be removed? Yes ___ No ✓ (Note: A demolition permit is required 10 days prior to demolition.)

Will a new structure(s) be built on the site? Yes ___ No ✓
Describe: N/A
Number of new buildings 0
Square footage N/A
Number of floor levels including basement N/A

**Parking**
Number of existing parking spaces: Approximately 88
Number of new parking spaces: 36
Number of handicapped spaces: 2 (new)
Will parking area be paved? ✓ Yes No

**Entrance**
Location: Tuttle Road
Width 24 feet Length 52 feet
Is it paved?___✓___Yes______No_______If not, do you plan to pave it?

Where will snow storage for entrance and parking be located? Show on site plan.

**Utilities** N/A

**Water:** Public water______Well_______(Show location on site plan.)

**Sewer/septic:** Public sewer______Private septic_______Show location on site plan and submit HHE-200 septic design or location of passing test pit locations if new system is proposed. Also show any wells on abutting properties within 200 feet of the site.

**Electric:** On site? Yes___✓___No _______
Show location of existing and proposed utilities on the site plan and indicate if they are above or below ground.

**Signs**
Number: N/A
Size: N/A
Material: N/A
Submit sign design and completed sign application.
Will the sign be lighted?______Submit information on type and wattage of lights.
Show location of sign(s) on the site plan.

**Natural Features**
Show location of any of the following on the site plan:
River______Stream___✓___Wetland ___✓___ Pond ______ Lake ______ Stone walls ______
Are there any other historic or natural features? ______________________________

**Lighting**
Will there be any exterior lights? Yes ______ No___✓___Show location on site plan (e.g., pole fixtures, wall packs on building) and provide fixture and lumen information.

**Trees**
Show location of existing trees on the site plan and indicate if any are to be removed.

**Landscaping**
Is there existing landscaping on the site? Yes ______ No___✓___Show type and location on site plan.

Is new landscaping proposed? (Note: if property has frontage on Route 100, a twenty-five-foot landscape easement to the Town is required.)

**Buffering**
Show any existing or proposed buffering measures for adjacent properties, e.g., plantings, fences.

**Erosion Control**
Has an erosion and sedimentation control plan been submitted? Yes ✓ No ______

**Stormwater Management Plan**
Provide stormwater information for both pre and post development of the site. Show location of any detention areas and/or culverts on the site plan.

**Fire Protection**
Location of nearest hydrant N/A Sprinklers? Yes ______ No ✓
Do you plan to have an alarm system? Yes______No ✓ Please contact the Fire/EMS Department at 829-4573 to discuss any Town or state requirements.

**Trash** N/A
Will trash be stored inside ______ outside______. If outside, will a dumpster be used? Yes______No_______. Show location on site plan and show type of screening proposed (e.g., fencing, plantings).

**Technical Capacity**
List and provide contact information for all consultants who worked on the project, for example: licensed land surveyor, licensed soils evaluator, professional engineer, attorney, etc.

See Attachment C

**Financial Capacity**
Please indicate how project will be financed. If obtaining a bank loan, provide a letter from the bank

See Attachment B

- Zoning district: Rural Residential 1
- Minimum lot size: 4 acres
- Classification of proposed use: Municipal/Town
- Parcel size: 109 acres
- Frontage: 1,300 feet
- Setbacks: Front 200 feet Side 30 feet Rear 75 feet
- Board of Appeals Required? No
- Tax Map R3 Lot 51A Deed book 0589 Deed page 0207
- Floodplain map number 230162 0015 B Designation Zone C
- Vernal pool identified? No
- Is parcel in a subdivision? No
- Outside agency permits required: MDEP SLODA Yes NRPA Permit-by-Rule Yes
  MDEP Tier 1 N/A MDEP Tier 2 N/A Army Corps of Engineers N/A
  MDEP general construction (stormwater) permit (for disturbance of 1 acre or more)
- MDOT entrance permit Yes
- MDOT traffic movement permit N/A
- Traffic study required N/A
- Hydrogeologic evaluation N/A
- Market study N/A
- Route 1 Design Guidelines? N/A
- Route 100, VMU or TCD Design Standards? N/A

Applicant's signature ______________________

Submission date: March 30, 2020

# PLANNING BOARD SITE PLAN REVIEW SUBMISSION CHECKLIST

## *FOR ALL PROJECTS:*

| Submission Requirement | Provide Location in Application Packet (e.g., plan sheet number, binder section, narrative | If requesting a waiver, indicate below: |
|---|---|---|
| *Example: Erosion Control* | *Plan Sheet E-1* | |
| **General Information:** | | |
| Completed Site Plan Application Form | This Document | |
| Names and addresses of all consultants | Attachment C | |
| Narrative describing existing conditions and the proposed project | Narrative | |
| Evidence of right, title or interest (deed, option, etc.) | Attachment A | |
| Names and Addresses of all property owners within 200 feet | Attachment | |
| Boundaries of all contiguous property under control of owner | Drawing C-101 | |
| Tax map and lot numbers | This Document | |
| Area of the parcel | This Document | |
| FEMA Floodplain designation & map # | This Document | |
| Zoning classification | This Document | |
| Evidence of technical and financial capability to carry out the project | Attachment B and C | |
| Boundary survey | Drawing C-101 | |
| List of waiver requests on separate sheet with reason for request. | Narrative | |
| Proposed solid waste disposal plan | Narrative | ✓ |
| | | |
| **Existing Conditions Plan showing:** | | |
| Name, registration number and seal of person who prepared plan | Drawing C-101 | |
| North arrow, date, scale, legend | Drawing C-101 | |
| Area of the parcel | Drawing C-101 | |
| Setbacks and building envelope | Drawing C-101 | |
| Utilities, including sewer & water, culverts & drains, on-site sewage | Drawing C-101 | |
| Location of any septic systems | Drawing C-101 | |
| Location, names, widths of existing public or private streets ROW's | Drawing C-101 | |

| | | |
|---|---|---|
| | | |
| Location, dimension of ground floor elevation of all existing buildings | Drawing C-101 | |
| | | |
| Location, dimension of existing driveways, parking, loading, walkways | Drawing C-101 | |
| Location of intersecting roads & driveways within 200 feet of the site | Drawing C-101 | |
| Wetland areas | Drawing C-101 | |
| Natural and historic features such as water bodies, stands of trees, streams, graveyards, stonewalls, floodplains | Drawing C-101 | |
| Direction of existing surface water drainage across the site & off site | Drawing C-101 | |
| Location, front view, dimensions and lighting of existing signs | Drawing C-101 | |
| Location and dimensions of existing easements & copies of documents | Drawing C-101 | |
| Location of nearest fire hydrant or water supply for fire protection | Drawing C-101 | |
| | | |
| **Proposed Development Site Plan showing:** | | |
| Name of development | Drawing C-102 | |
| Date | Drawing C-102 | |
| North arrow | Drawing C-102 | |
| Scale | Drawing C-102 | |
| Legend | Drawing C-102 | |
| Landscape plan | | ✓ |
| Stormwater management | Drawings D-100 and D-101 | |
| Wetland delineation | Drawing C-102 | |
| Current & proposed stands of trees | Drawing C-102 | |
| Erosion control plan | Drawing C-103 | |
| Landscape plan | | ✓ |
| Lighting/photometric plan | | ✓ |
| Location and dimensions of all proposed buildings | N/A | |
| Location and size of utilities, including sewer, water, culverts and drains | Drawing C-103 | |
| Location and dimension of proposed on-site septic system; test pit locations and nitrate plumes | N/A | |
| Location of wells on subject property and within 200' of the site | N/A | |
| Location, names and widths of existing and proposed streets and ROW's | Drawing C-102 | |

| | | |
|---|---|---|
| Location and dimensions of all accessways and loading and unloading facilities | Drawing C-102 | |
| | | |
| Location and dimension of all existing and proposed pedestrian ways | Drawings C-101 and C-102 | |
| Location, dimension and # of spaces of proposed parking areas, including handicapped spaces | Drawing C-102 | |
| Total floor area and ground coverage of each proposed building and structure | N/A | |
| Proposed sign location and sign lighting | N/A | |
| Proposed lighting location and details | | ✓ |
| Covenants and deed restrictions proposed | Drawing C-101 | |
| Snow storage location | Drawing C-102 | |
| Solid waste storage location and fencing/buffering | | ✓ |
| Location of all fire protection | | ✓ |
| Location of all temporary & permanent monuments | Drawing C-101 | |
| Street plans and profiles | N/A | |

## ***ADDITIONAL REQUIREMENTS FOR MAJOR SITE PLAN PROJECTS:***

| **Submission Requirement** | **Provide Location in Application Packet (e.g., plan sheet number, binder section, narrative** | **If requesting a waiver, indicate below:** |
|---|---|---|
| High intensity soils survey | | ✓ |
| Hydro geologic evaluation | | ✓ |
| Traffic Study | Narrative | |
| Market Study | | ✓ |
| Location of proposed recreation areas (parks, playgrounds, other public areas) | N/A | |
| Location and type of outdoor furniture and features such as benches, fountains. | N/A | |

## TABLE OF CONTENTS



## LIST OF ATTACHMENTS

**LIST OF FIGURES**

**TOWN OF CUMBERLAND**
**PLANNING BOARD SITE PLAN REVIEW APPLICATION**
**TOWN OFFICE PARKING EXPANSION**
**CUMBERLAND, MAINE**

## 1.0 PROJECT DESCRIPTION

The Town of Cumberland (Town) is proposing to expand the Town Hall parking lot at 290 Tuttle Road in Cumberland, Maine. The parking addition will benefit the Town Office for overflow during voting, Town events, and provide additional parking for access to the Town ballfields. Due to the size and nature of the project, Site Plan Review is required through the Town Planning Board. The project location is shown in Figure 1, Site Location Map.

The Town-owned parcel of interest is 109 acres and is located within the Rural Residential 1 Zone (RR1) on the Official Zoning Map. The property is identified as Lot 51A on Cumberland Tax Map R3. A copy of the deed is provided in Attachment A. The existing land to the west of Town Hall is forested and includes an area of freshwater wetland and a tributary stream. To the west exists residential property, to the north abuts Tuttle Road, to the east exists Town Hall, and to the south are Town-owned ballfields.

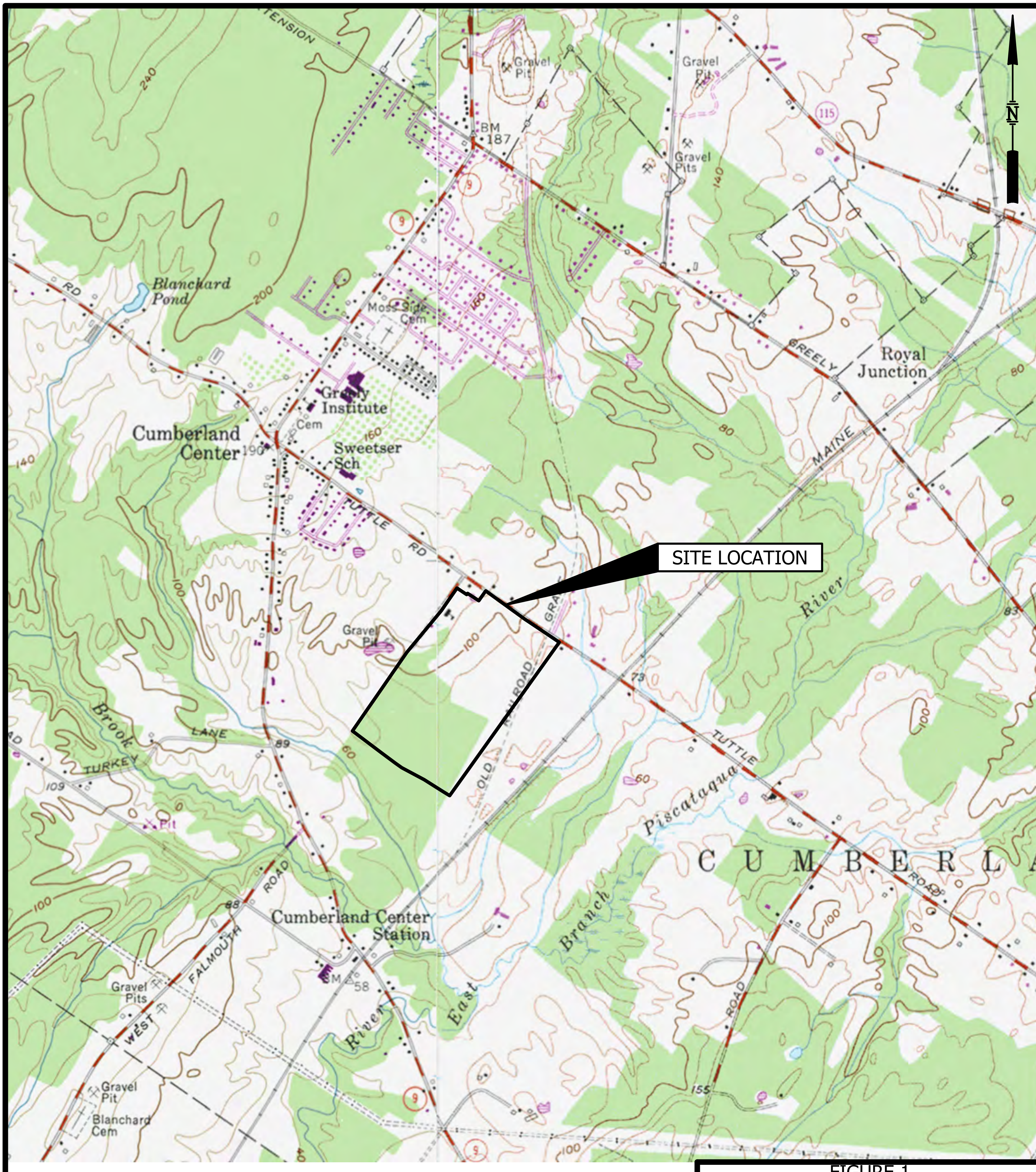
The project includes construction of a paved parking area of 36 parking spaces including two (2) handicap Americans with Disabilities Act (ADA) spaces, a 20-foot-wide access road connecting to the existing Town Office parking lot, a 24-foot-wide entrance from Tuttle Road, a sidewalk connection to Tuttle Road, and a mowed grass path and wood bridge to access the Town ballfields. The additional parking spaces will provide the Town with excess parking during large Town meetings, voting, and during events at the ballfields. In total, the new parking will result in an increase of 0.6 acres of impervious area on the site.

The Maine Department of Environmental Protection (MEDEP) has determined that the Town Office property coupled with the abutting Town-Owned properties are considered Common Scheme of Development. Therefore, this project, coupled with the Sand/Salt Storage building project approved by the Planning Board in 2019 and the Public Works Improvements project in front of the Planning Board concurrently, requires a Site Location of Development Act (SLODA) permit to approve historical and proposed developments on the properties. The SLODA permit application was submitted on February 10, 2020 and is currently under review. Additional details on the permit requirements and stormwater treatment associated with said requirements are included in the Stormwater Management Report included in Attachment F.

A MEDEP Natural Resources Protection Act (NRPA) Permit-by-Rule for activities within 75 feet of a stream is required for this project. A copy of the NRPA permit application will be submitted to the Town once completed.

A Maine Department of Transportation (MaineDOT) Driveway/Entrance Permit application was submitted to the MDOT on February 13, 2020 and approved on February 19, 2020. A copy of the permit is included in Attachment E.

The remaining details for the project are described in the following Section which defines how the project complies with the applicable Chapters of the Town of Cumberland Zoning and Site Plan Review Ordinances.




BASE MAP ADAPTED FROM 7.5 MIN
USGS TOPOGRAPHIC QUADRANGLES
CUMBERLAND CENTER, ME - 1975
YARMOUTH, ME - 1975

1000 0 2000 FEET

FIGURE 1
SITE LOCATION MAP
TOWN OF CUMBERLAND
TOWN OFFICE PARKING EXPANSION
TUTTLE ROAD
CUMBERLAND, MAINE

SME
SEVEE & MAHER
ENGINEERS

DWG: SITELOC LMN: SITELOC CTB: SME-STD REV: 2/13/2020

\\nserver\CFS\TCU\Town Office Parking Expansion\Acad\Figures\SITELOC.dwg, 2/13/2020 8:27:52 AM, jrl

## 2.0 CHAPTER 229 – SITE PLAN REVIEW

### 2.1 §229-4 Waivers and Modifications

As part of this application, the Town requests the following waivers from the Site Plan Review ordinance:

- A waiver from performing a high intensity soil survey for the project. The project will be constructed on already developed land and there are no subsurface septic systems proposed. A medium density soil survey from a Custom Soil Resource Report by the U.S. Natural Resources Conservation Service (NRCS) was used for this application.
- A waiver from performing a hydrogeological evaluation for the project. There will be no subsurface wastewater disposal or other anticipated groundwater impacts associated with this project. The site is not present in a significant sand and gravel aquifer.
- A waiver from performing a market study. This parking lot project is proposed to meet specific Town needs. Based on the use and function of this property, a market study does not apply to this project.

### 2.2 §229-8 Financial and Technical Capacity

The Town plans to finance the project through a municipal bond. The official bond statement is provided in Attachment B for reference.

Technical capacity and contact information for Sevee & Maher Engineers, Inc. (SME) and Boundary Points Maine Land Surveyors is provided in Attachment C.

### 2.3 §229-10 Approval Standards and Criteria

#### A. Utilization of the Site

Proposed site modifications are meant to minimize impact to adjacent properties and natural resources. The parking expansion will occur in an undeveloped wooded area adjacent to the existing parking lot. The area is not currently located in an environmentally sensitive area or a significantly mapped sand and gravel aquifer. The Maine Natural Areas Program (MNAP) identified no rare, threatened, or endangered plant species within the project area. The Maine Department of Inland Fisheries and Wildlife (MDIFW) Service has not mapped designated essential or significant wildlife habitats in the project area. Tree clearing for the project will occur between July 31 and June 1.

Request letters and responses from the MNAP and MDIFW are included in Attachment D, for reference.

There were natural resources identified on the property, including forested wetlands south of the access drive and parking area, and a small stream between the new parking and the ballfields. The parking design was completed to avoid any additional wetlands impacts or work within 25 feet of the stream. Construction is required within 75 feet of the stream, which requires a NRPA Permit-by-Rule from the MEDEP.

## B. Traffic, Circulation and Parking

Access to the parking addition will be provided from a new entrance off Tuttle Road to the western side of the existing parking area. The entry dimensions are 24 feet wide and 52 feet long into the property. Entrance radii at the proposed access are 25 feet to provide safe access to the site. Existing sight distance from the entrance is in excess of 1,000 feet looking southbound and approximately 700 feet looking northbound. A copy of the MaineDOT Driveway/Entrance Permit is provided in Attachment E, for reference.

Town Hall hours of operation are Monday to Wednesday, 8:00 am to 5:00 pm and Thursday, 8:00 am to 6:00 pm. About 25 employees work during the regular hours per day and approximately 65 customers visit per day. Peak hours of the day are from 9 to 11 am and from 3 to 5 pm. Proposed parking on site includes 36 spaces with 24-foot-wide internal travel lanes throughout the paved lot. The orientation of the parking spaces is at 90 degrees and a typical space is 9 feet wide by 18 feet long. Two (2) American with Disabilities Act (ADA) parking spaces with van accessibility are proposed near the pedestrian access to the ballfields.

The Town currently does not plan to hire additional Town Hall employees. Supplementary parking is planned for the overflow of the public during increased times of demand such as Election Day and for use of the ballfields. The additions include 36 parking spaces, which totals an estimated 36 trips generated from the increase in parking. Parking improvements will not generate 100 or more passenger car equivalent trips during peak hours of traffic and a Traffic Movement Permit from the Maine Department of Transportation (MEDOT) will not be required.

The pedestrian access to the Town Hall is a proposed 6-foot-wide sidewalk connection from the parking area to the Tuttle Road sidewalk. Pedestrian access from the parking area to the ballfields is proposed as a 5-foot-wide mowed grass path to a 5-foot-wide by 30-foot-long wood footbridge over a stream to the south of the parking area.

## C. Stormwater Management and Erosion Control

Stormwater management of the site is described in detail in the Stormwater Management Report included as Attachment F. The report includes analysis for multiple projects as submitted to the MEDEP for the SLODA permit application. Erosion control measures are included on Drawing C-300 and were designed in compliance with the October 2016 edition of the Maine Erosion Control Best Management Practices Manual for Designers and Engineers.

## D. Water, Sewer and Fire Protection

The site will not be served by public water or sewer. There are no wells or subsurface wastewater disposal systems proposed as part of site development. Utilities and fire protection are not proposed for this project.

## E. Water Protection

There will be no groundwater used or hazardous materials discharged as a result of this project. There will be no hazardous materials stored on site. The property is not located within an area designated as a source protection area or a sand and gravel aquifer. No effects to groundwater are anticipated from this project.

## F. Floodplain Management

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for the project area is included in Attachment G. The project is located in Zone C and is indicated as an area of minimal flood hazard.

## G. Historic and Archaeological resources.

A site review has been requested from the Maine Historic Preservation Commission (MHPC). A copy of the request for review and the written response from the MHPC is provided in Attachment H. There are no known National Register eligible properties or areas considered sensitive for archaeological resources.

## H. Exterior Lighting

There will be no exterior lighting of this parking lot.

## I. Buffering and Landscaping

Existing wooded buffers will remain to reduce the visual impact of the parking lot. A minimum buffer of 25 feet will remain between the parking area boundary and the tree line on Tuttle Road. A buffer of 10 feet will remain between the access road and the tree line on Tuttle Road.

Landscaping is provided around the perimeter of the parking area through the preservation of trees, which has been maximized through the design of low-impact parking area.

## J. Noise

Noise levels at the parking expansion will be minimal with minor increase only during use. The area is anticipated to be used during regular hours of operation at the Town Hall. Regular daily hours are from Monday to Wednesday from 8:00 am to 5:00 pm and Thursday from 8:00 am to 6:00 pm. Noise levels on site are not anticipated to create a nuisance for neighboring properties.

Construction of the project will generally consist between the hours of 7:00 am and 7:00 pm on Mondays through Fridays. Blasting is not proposed for this project. If ledge is encountered, it will be removed mechanically.

## K. Storage of Materials

The parking expansion will not be used as a storage area. Wastes will not be stored on site; therefore, a dumpster reciprocal will not be required. There will be no hazardous materials stored on site.

## L. Capacity of the Applicant

Financial and technical capacity of the Town are outlined in Attachment B and C of this application.

## M. Design and Performance Standards

Not applicable to this project.

# ATTACHMENT A

# TITLE, RIGHT, OR INTEREST

SME
SEVEE & MAHER
ENGINEERS

Book
589
Page 204

and the residue to be equally divided between my son Stephen Longfellow and my daughter Abigail and their respective heirs.

Witness my hand and the Seal of the Probate Court for said County of Cumberland, the day and year first above written.

Edward C. Reynolds Register

Received March 2, 1892 at 11h. -m. A. M. and recorded according to the original

Attest:

James M. Thompson Register

Drowne
To
Browne &c
Devise

Extract from the Will of
Elizabeth J. Drowne.
State of Maine

Cumberland County. Probate Office.

Portland, March 1st A. D. 1892.

I hereby certify, That the last Will and Testament of Elizabeth J. Drowne late of Portland in said County, deceased, was proved, approved and allowed by the Judge of Probate for said County, at a Court held at Portland, on the tenth day of February 1892, and that the following is a true copy of so much of said Will as devises Real Estate in the County aforesaid:-

Copy.

I, Elizabeth J. Drowne, of Portland, in the County of Cumberland and State of Maine, do hereby make, publish and declare this instrument to be my last will and testament, hereby revoking any and all other wills, by me heretofore made.

First: I give, devise and bequeath unto my niece Edith L. D. Browne of the city, county and State of New York, one third part, share and proportion of whatever interest I now have, or which I, or my estate, may or shall at any time hereafter, have or acquire in and to the Underwood Spring Company (said spring and premises belonging to said Company are situated in the town of Falmouth Maine,) or in any property connected with, or that shall hereafter belong thereto and in which I, or my estate, can or shall have an interest, right or title therein.

I also give and bequeath unto the said Edith L. D. Browne all shares and interest I may own at my decease in and to the Boston and Maine Railroad Company. I also give and bequeath unto the said Edith L. D. Browne all the furniture I may own at my decease now in my homestead on State Street, in said

Portland and which furniture I received from my fathers estate.

Upon the death of my husband Joseph Drowne, I give, devise and bequeath unto the said Edith L. D. Browne the premises with the land belonging thereto, being my homestead situated on the Westerly side of State Street, in said Portland, together with all my my furniture in said homestead, the said Joseph Drowne to have control, use and hold said premises and furniture during his life, and upon his death the same to become the property of the said Edith L. D. Browne her heirs and assigns forever.

Second. I give, devise and bequeath unto my niece, Ella Christine Deake of Paris, France, one third part, share and proportion of whatever interest I now have, or which I or my estate may or shall at any time hereafter have or acquire in and to the Underwood Spring Co., or in any property connected with, or that shall hereafter belong thereto, and in which I or my estate can or shall have any interest right and title therein. I also give and bequeath unto the said Ella Christine Deake all shares and interest I may own at my decease in and to the Boston and Albany Railroad Company.

Third. I give and bequeath unto my nephew, Charles Standish Deake of Portland, Maine, one third part, share and proportion of whatever interest I now have or which I or my estate, may or shall at any time hereafter have or acquire in and to the Underwood Spring Company or in any property connected with, or that shall hereafter belong thereto, and in which I, or my estate, can or shall have any interest, right and title therein.

I also give and bequeath unto the said Charles Standish Deake all shares and interest I may own at my decease in and to the Fitchburg Railroad Company of Massachusetts.

Fourth. I order and direct my Executors, to enter into a contract with the City of Portland, at the expense of my estate, so that perpetual care shall be had and given, to the full extent of the Provisions of the ordinance of said City, to my lot in Evergreen Cemetery, numbered thirty-three (33) section M, the care to extend to the granite and marble and other materials now placed, or which shall hereafter be placed, upon said lot as aforesaid. My Executors are also authorized to expend such an amount of money for tablets improvements etc, as they shall deem proper and expedient.

Fifth. I give and bequeath unto my husband Joseph Drowne, during his life the use and income of all my real estate wherever situated or however bounded, together with the right to use and control all the furniture in my homestead on State Street, during his life, excepting the furniture which I have bequeathed to my niece Edith L. D. Browne and formerly belonging to my father's estate, and also excepting the house, garden and such portion of the out buildings of my premises upon the Tuttle Road in the town of Cumberland, Maine and which I have hereinafter given for a certain period to John H. True of Portland. Should my Executors, or the survivor, have an opportunity to sell and dispose of any of my Real Estate, excepting the State Street homestead and the farm in Cumberland, and it should be considered by them, or the survivor, to be of great advantage to my estate to sell, lease or exchange the same, I hereby authorize them, or the survivor so to do, without obtaining license from the Judge of Probate, the income from said sales to be used by my husband during his life and the proceeds from any sale or sales of my Real Estate to be given and divided among the parties mentioned in the sixth item of this will and proportioned in the same manner as therein stated. The taxes, repairs, charges and expenses belonging to, arising from, or growing out of said Real Estate are to be paid from the income thereof.

Sixth. Upon the death of my husband I give, devise and bequeath all my said several parcels of Real Estate wherever situated and however bounded, excepting my State Street house and lot, and excepting the premises or farm upon the Tuttle Road in the town of Cumberland Maine, unto the following persons, - and in the following proportions, - or shares, viz: One fifth (1/5) part thereof to my adopted daughter Mary Frances True of Portland - one fifth (1/5) part thereof to said Edith L. D. Browne - one fifth (1/5) part thereof to said Ella Christine Deake - one fifth (1/5) part thereof to the said Charles Standish Deake - one tenth (1/10) part thereof to Isaac Frederick Sturdivant, - one tenth (1/10) part thereof to Florence Sturdivant. To have and to hold said several parcels of Real Estate as herein specified, unto the parties so herein in this item named, and in said proportions, as to them, their heirs and assigns forever.

Seventh. I give and bequeath to the following named persons, the following named sums, the same to be paid by my Executors - to said persons when payment can be made without detriment to my estate and of this my executors are to be the sole judges.

To Elizabeth Sturdivant True, daughter of John H. True of Portland the sum of Five hundred dollars. To Elizabeth Browne Deake, daughter of Charles S. Deake, the sum of Five Hundred dollars, and to Phillip Drowne Sturdivant of Boston, Massachusetts the sum of Two hundred dollars.

Eighth. I give and bequeath to the following named persons, the following sums or amounts - the same to be paid by my Executors to said persons - when payment can be made conveniently and without injury to my estate, and of this my Executors are to be the sole judges, viz: To Mrs. Isabella C. Osgood of Boston, Massachusetts, the sum of One thousand dollars. To Mary A. Battelle of Portland, Maine the sum of One thousand dollars. To Harriet C. Blanchard of Portland the sum of Five hundred Dollars. To Annie H. Blanchard of said Portland the sum of Five Hundred Dollars. To Mrs. Harriet B. McLellan of Portland, the sum of Four hundred dollars - this amount is to be used by the said Harriet B. McLellan for the benefit of Mary F. Bradford of Cumberland Maine. To Mrs. Annie A. Folsom of Exeter, New Hampshire, the sum of Two hundred dollars - and to Mrs. Eleanor S. Hay of said Portland the sum of One Hundred dollars.

Ninth. I give and bequeath to my husband Joseph Drowne, for life, as herein set forth the use and income of my said farm situated upon the Tuttle Road in said town of Cumberland, but to John H. True of Portland I give the use and occupancy, for himself and family of the house, garden and such portion of the out buildings as he may need upon said farm, on said Tuttle Road, in said town of Cumberland free of rent and taxes, for the term of fifteen years from the date of the probate of my will, if he or his family desire so to use and occupy the same. If said John H. True and his family do not desire to use and occupy said house, garden, etc. then the same is to be devised to my husband Joseph Drowne during his life.

Tenth. Upon the death of my husband the income of said farm so given and bequeathed by me to my husband as above mentioned, I give and bequeath to the Inhabitants of the town of Cumberland Maine, said income to be used and expended for the cause of education within its limits, by the officers of said town who have charge of the schools therein. Said income is to be expended annually by them or a majority of said officers, in said cause, as they shall think is best and prudent.

Eleventh. Upon the death of my husband and at the end of fifteen years from the probate of my Will, I give and devise and bequeath unto the said Inhabitants of said town of Cumberland; said farm, house, buildings etc., situated upon said Tuttle Road in said town of Cumberland. The income of said farm, house etc, is to be used and expended in the cause of education by those who have charge of the schools, within the limits of said town, in such manner as a majority of said officers shall judge and determine is best and wise. Said farm shall not be sold, and the income thereof is to be expended for the cause of education, as above mentioned and for that cause alone.

Should said inhabitants refuse to accept said gift or fail to use and expend the income, as I have directed, then, and in that case, if such failure should continue for more than eighteen months at any one time I give and bequeath said farm to the persons named in the sixth item of this my last will and testament, and in the proportions therein mentioned. Should any of said persons have deceased the share he, she or they would have received if alive shall descend to the survivors in the same proportions as I have mentioned in said item.

Twelfth. Should any Personal Estate remain after the payment of all debts, charges of administration and the aforesaid legacies I give and bequeath said rest, residue and remainder of said personal estate to my adopted daughter Mary Frances True, my nieces Edith L. D. Browne and Ella Christine Deake and to my nephew Charles Standish Deake share and share alike and to their heirs and assigns forever. This gift is not to take effect until the death of said Joseph Drowne as he is to have the use and income of said residue during his life.

Thirteenth. All my wearing apparel, ornaments and jewelry and personal belongings I give and bequeath unto my adopted daughter Mary F. True and my niece Edith L. D. Browne, they to keep the same, or dispose of the same, in the manner they should judge to be in accordance with my wishes.

Fourteenth. I appoint my husband Joseph Drowne and Frederick Fox or the survivor, both of said Portland, Executors of this my last will and testament, and I request the Judge of Probate to grant letters testamentary to them, or the survivor, without requiring bonds or sureties of them, or either of them. And in witness whereof that this instrument is my last will and testament I have hereunto set my hand and seal upon this the twenty-second 22d. day of July in the year of our Lord one thousand eight hundred and ninety-one.

(July 22, 1891)

Elizabeth I. Drowne. Seal.

Signed, sealed, published and declared by the above Elizabeth E. Drowe to be her last will and testament, in our presence who, in her presence, and at her request, and in the presence of each other have hereunto subscribed our names as witnesses at said Portland on the twenty-second day of July A. D. 1891.
July 22, 1891.

Annie Mitchell.
Barbara A. Fraser.
Winifred Joyce.

Witness my hand and the Seal of the Probate Court for said County of Cumberland, the day and year first above written.
Edward C. Reynolds. Register.

Received March 2, 1892, at 11h. -m. A.M. and recorded, according to the original.
Attest:
James M. Thompson Register.

Day
To
Crocker
Devise.

Extract from the Will of
Eunice Day
State of Maine.
Cumberland County, Probate Office.
Portland Feb. 4th A. D. 1892.

I hereby certify, That a verified copy of the last Will and Testament of Eunice Day late of Portland in said County, deceased, was proved, approved and allowed as the last Will and Testament of the said Eunice Day by the Judge of Probate for said County, at a Court held at Portland, on the fifth day of January 1892; and that the following is a true copy of so much of said Will as devises Real Estate in the County aforesaid:

2. I give to my daughter-in-law Ellen Elizabeth Crocker my dwelling house on Cumberland Street in said Portland with the lot of land connected therewith and the privileges and appurtenances thereto belonging, to her her heirs and assigns forever.

XXX. 8. I give and bequeath to my daughter Lucretia D. Sewall her heirs and assigns forever, to and for her own sole and separate use, free from any control on the part of her husband or any other person for or on his account, the homestead on Elm Street in said Portland with the lot of land on which

# ATTACHMENT B

# FINANCIAL CAPABILITY

SME
SEVEE & MAHER
ENGINEERS

## OFFICIAL STATEMENT
## TOWN OF CUMBERLAND, MAINE
## $6,340,000
## 2020 GENERAL OBLIGATION BONDS

This Official Statement is provided for the purpose of presenting certain information relating to the Town of Cumberland, Maine (the "Town" or "Cumberland") in connection with the sale of its 2020 General Obligation Bonds (the "Bonds").

## THE BONDS

### DESCRIPTION OF THE BONDS

The Bonds will be issued only as fully-registered bonds without coupons, one certificate per maturity, and, when issued, will be registered in the name of Cede & Co., as nominee for The Depository Trust Company, New York City, New York ("DTC" or the "Securities Depository"). DTC will act as the securities depository for the Bonds. Purchases of the Bonds will be made in book-entry form, in the minimum denomination of $5,000, or any integral multiple thereof. The Bonds will be dated on the date of delivery and will bear interest (accrued on the basis of a 360-day year with twelve 30-day months) payable on May 1, 2020, and semi-annually thereafter on November 1 and May 1 of each year until maturity, or redemption prior to maturity. The Bonds will mature as follows:

| Amount | May 1, | CUSIP | Amount | May 1, | CUSIP |
|---|---|---|---|---|---|
| | | | $335,000 | 2031 | 230687HT5 |
| $335,000 | 2022 | 230687HJ7 | 335,000 | 2032 | 230687HU2 |
| 335,000 | 2023 | 230687HK4 | 335,000 | 2033 | 230687HV0 |
| 335,000 | 2024 | 230687HL2 | 335,000 | 2034 | 230687HW8 |
| 335,000 | 2025 | 230687HM0 | 335,000 | 2035 | 230687HX6 |
| 335,000 | 2026 | 230687HN8 | 330,000 | 2036 | 230687HY4 |
| 335,000 | 2027 | 230687HP3 | 330,000 | 2037 | 230687HZ1 |
| 335,000 | 2028 | 230687HQ1 | 330,000 | 2038 | 230687JA4 |
| 335,000 | 2029 | 230687HR9 | 330,000 | 2039 | 230687JB2 |
| 335,000 | 2030 | 230687HS7 | 330,000 | 2040 | 230687JC0 |

It is expected that the Bonds will be available for delivery at DTC on or about January 30, 2020.

Principal of and interest on the Bonds will be payable in Clearing House Funds to DTC, or its nominee, as registered owner of the Bonds by U.S. Bank National Association, Boston, Massachusetts, as paying agent (the "Paying Agent"). Transfer of principal and interest payments to Participants of DTC will be the responsibility of DTC. Transfer of principal and interest payments to Beneficial Owners (as hereinafter defined) will be the responsibility of such Participants and other nominees of Beneficial Owners. The Town will not be responsible or liable for maintaining, supervising or reviewing the records maintained by DTC, its Participants or persons acting through such Participants. See "THE BONDS - BOOK-ENTRY-ONLY SYSTEM" herein.

### OPTIONAL REDEMPTION PRIOR TO MATURITY

Bonds maturing on and before May 1, 2030 are not subject to optional redemption prior to their stated dates of maturity. Bonds maturing on and after May 1, 2031 are subject to redemption prior to their stated dates of maturity, at the option of the Town, on and after May 1, 2030, as a whole or in part at any time, in such order of maturity as the Town, in its discretion, may determine at a price of par (100% of original stated amount of value at maturity), together with interest accrued and unpaid to the redemption date, if any.

## GENERAL PROVISIONS REGARDING REDEMPTION

### Notice of Redemption

In the case of every redemption of the Bonds, the Town shall cause notice of such redemption to be given to the registered owner of any Bonds designated for redemption in whole or in part, at his or her address as the same shall last appear upon the registration books kept by the Paying Agent by mailing a copy of the redemption notice by first class mail not less than thirty (30) days prior to the redemption date. Any notice mailed shall be conclusively presumed to have been duly given, whether or not the Bondholder actually receives notice. The failure of the Town to give notice to a Bondholder or any defect in such notice shall not affect the validity of the redemption of any Bond of any other owner. Each notice of redemption shall specify the date fixed for redemption, the place or places of payment, that payment will be made upon presentation and surrender of the Bonds to be redeemed, that interest, if any, accrued to the date fixed for redemption will be paid as specified in said notice, and that on and after said date interest thereon will cease to accrue. If less than all the Bonds outstanding are to be redeemed, the notice of redemption shall specify the numbers of the Bonds or portions thereof (in denominations of $5,000 or any integral multiple thereof) to be redeemed. The Town shall notify the Securities Depository (see "THE BONDS - BOOK-ENTRY-ONLY SYSTEM" herein) in the same manner as the Bondholders, with a request that the Securities Depository notify its Participants who in turn notify the beneficial owners of such Bonds. Any failure on the part of the Securities Depository, or failure on the part of a nominee of a Beneficial Owner (having received notice from the Town, a Participant or otherwise) to notify the Beneficial Owner so affected, shall not affect the validity of the redemption of such Bond.

### Bonds Due and Payable on Redemption Date; Interest Ceases to Accrue

On any redemption date, the principal amount of each Bond to be redeemed, together with the premium, if any, and accrued interest thereon to such date, shall become due and payable. Funds shall be deposited with the Paying Agent to pay, and the Paying Agent is authorized and directed to apply such funds to the payment of the Bonds called for redemption, together with accrued interest thereon to the redemption date and redemption premium, if any. After such redemption date, notice having been given and funds deposited in the manner described above, then, notwithstanding that any Bonds called for redemption shall not have been surrendered, no further interest shall accrue on any of such Bonds. From and after such date of redemption (such notice having been given and funds deposited), the Bonds to be redeemed shall not be deemed to be outstanding.

### Cancellation

All Bonds that have been redeemed shall be canceled by the Paying Agent and either destroyed by the Paying Agent with counterparts of a certificate of destruction evidencing such destruction furnished by the Paying Agent to the Town or returned to the Town at its request.

### Partial Redemption of Bonds

Bonds or portions of Bonds to be redeemed in part shall be selected when held by a Securities Depository by lot and when not held by a Securities Depository, by the Town by lot or in such other manner as the Town in its discretion may deem appropriate.

## RECORD DATE; PAYMENT

The principal of the Bonds is payable upon surrender thereof at the principal Corporate Trust Office of the Paying Agent. Payment of the interest on the Bonds will be made to the person appearing on the registration books of the Paying Agent as the registered owner thereof at the close of business on the $15^{th}$ day of the month preceding each interest payment date for the Bonds, and if such day is not a regular business day of the Paying Agent the next day preceding which is a regular business day of the Paying Agent, by check, wire or draft mailed to each registered owner at such person's address as it appears on the registration books, or at another address as is furnished to the Paying Agent in writing by the owner. Interest that is not timely paid or provided for shall cease to be payable to the registered owner as of the regular record date and shall be payable to the registered owner at the close of business on a special record date to be fixed by the Paying Agent.

## AUTHORIZATION AND PURPOSE

The Bonds are being issued by the Town pursuant to Title 30-A, Section 5772 of the Maine Revised Statutes, as amended; Article XI, Section 6 and Article XII, Section 7(a) of the Town's Charter and Order 19-090 adopted by the Town Council on July 8, 2019 to provide funds to finance the following projects (the "Projects"):

| Project | Projected Amount |
|---|---|
| Fire Truck | $1,400,000 |
| Town Garage | 4,260,000 |
| Sand/Salt Shed | 500,000 |
| Brush Compost Facility | 500,000 |
| Town Hall Parking | 190,000 |
| Council Chambers | 150,000 |
| **Total** | **$7,000,000**[1] |

NOTE: [1] Par amount of Bonds, in the amount of $6,340,000, plus allocable net Original Issue Premium, in the amount of $660,000, provided Bond Proceeds to provide funds to finance the Projects.

### Unspent Bond Proceeds

In the event that any proceeds of the Bonds remain unspent upon completion of a Project or the Town abandons any Project, the Town reserves the right to reallocate unspent proceeds to the costs of other qualified projects approved, or to be approved, by the Town, or to apply unspent proceeds to the payment of debt service on the Bonds.

## SOURCE OF PAYMENT AND REMEDIES

### General

The Bonds are general obligations of the Town and their payment is not limited to a particular fund or revenue source. Municipalities in the State of Maine (the "State") have the right to tax their inhabitants to pay municipal indebtedness. The Bonds are payable as to both principal and interest from ad valorem taxes that are subject to limitation unless the Town follows certain procedural requirements under Title 30-A, Section 5721-A of the Maine Revised Statutes, as amended, in which case the Town has the power to levy such ad valorem taxes without limit as to rate or amount upon all the taxable property within its territorial limits (see "THE BONDS – SOURCE OF PAYMENT AND REMEDIES – Limitation on Municipal Property Tax Levy" herein), except to the extent that the Town may enter into an agreement under Title 30-A, Chapter 223, Subchapter V of the Maine Revised Statutes, as amended, to share its assessed valuation with another municipality, and except to the extent that the Town establishes or has established development districts as tax increment financing districts or affordable housing development districts pursuant to Title 30-A, Chapter 206 and former (now repealed) Chapter 207 of the Maine Revised Statutes, as amended, the captured tax increment of which may or may not be available for payment of debt service on the Bonds (see "TOWN FINANCES - TAX INCREMENT FINANCING DISTRICTS AND AFFORDABLE HOUSING DEVELOPMENT DISTRICTS" herein). The Treasurer of the Town has

# ATTACHMENT C

# TECHNICAL CAPABILITY

SME
SEVEE & MAHER
ENGINEERS

**TECHNICAL CAPACITY**

The Town is working with the following permit application representative and site design engineer:

Sevee & Maher Engineers, Inc. (SME)

SME of Cumberland, Maine is providing technical assistance for the site design and environmental permitting. Founded in 1985, SME has obtained hundreds of local, state, and federal permits related to environmental projects throughout the Northeast, including Site Location Permits for Backyard Farms in Madison, the Pineland Center in New Gloucester, the Mill Stream Subdivision in Freeport, and the Pine Tree Landfill in Hampden.

Sevee & Maher Engineers, Inc.
4 Blanchard Road
Cumberland, Maine 04021
207-829-5016

Daniel P. Diffin, P.E., LEED AP – Permitting and Site Design, SME

Mr. Diffin has more than twelve years of experience on a wide variety of civil engineering design and construction management projects for private and public sector clients. Mr. Diffin has been responsible for the engineering, design, and construction services for land development projects, commercial, industrial, and medical site developments, educational campuses, stormwater management and erosion control projects, and local, state, and federal permitting. Projects include: Backyard Farms, Madison; Maine R&D Station and other facility upgrades; and 2015 Mill Build-out Plan, Woodland Mill, Baileyville Maine.

The Town is working with the following subconsultant to support the project:

David Bouffard, LSE – Surveyor, Boundary Points Maine Land Surveying

Boundary Points Maine Land Surveying
P.O. Box 1751
Cumberland, ME 04021
207-854-1015

ATTACHMENT D

MNAP AND MDIFW REVIEW LETTERS

SME SEVEE & MAHER ENGINEERS

SME
SEVEE & MAHER
ENGINEERS

4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 • Fax: 207.829.5692
info@smemaine.com
smemaine.com

January 8, 2020

Mr. Lisa St. Hilaire
Maine Natural Areas Program
93 State House Station
Augusta, Maine 04333-0093

Subject: Town of Cumberland Municipal Site Upgrades
Cumberland, Maine

Dear Lisa,

The Town of Cumberland is seeking approval for the improvements and construction of municipal projects on four Town owned parcels in Cumberland, Maine under a Maine Department of Environmental Protection (MEDEP) Site Location of Dedham Development Act (SLODA) permit. The location of the projects is outlined in the attached Figure 1 - Site Location Map.

We would appreciate receiving any information relative to unusual natural areas at, or in the immediate vicinity of our project.

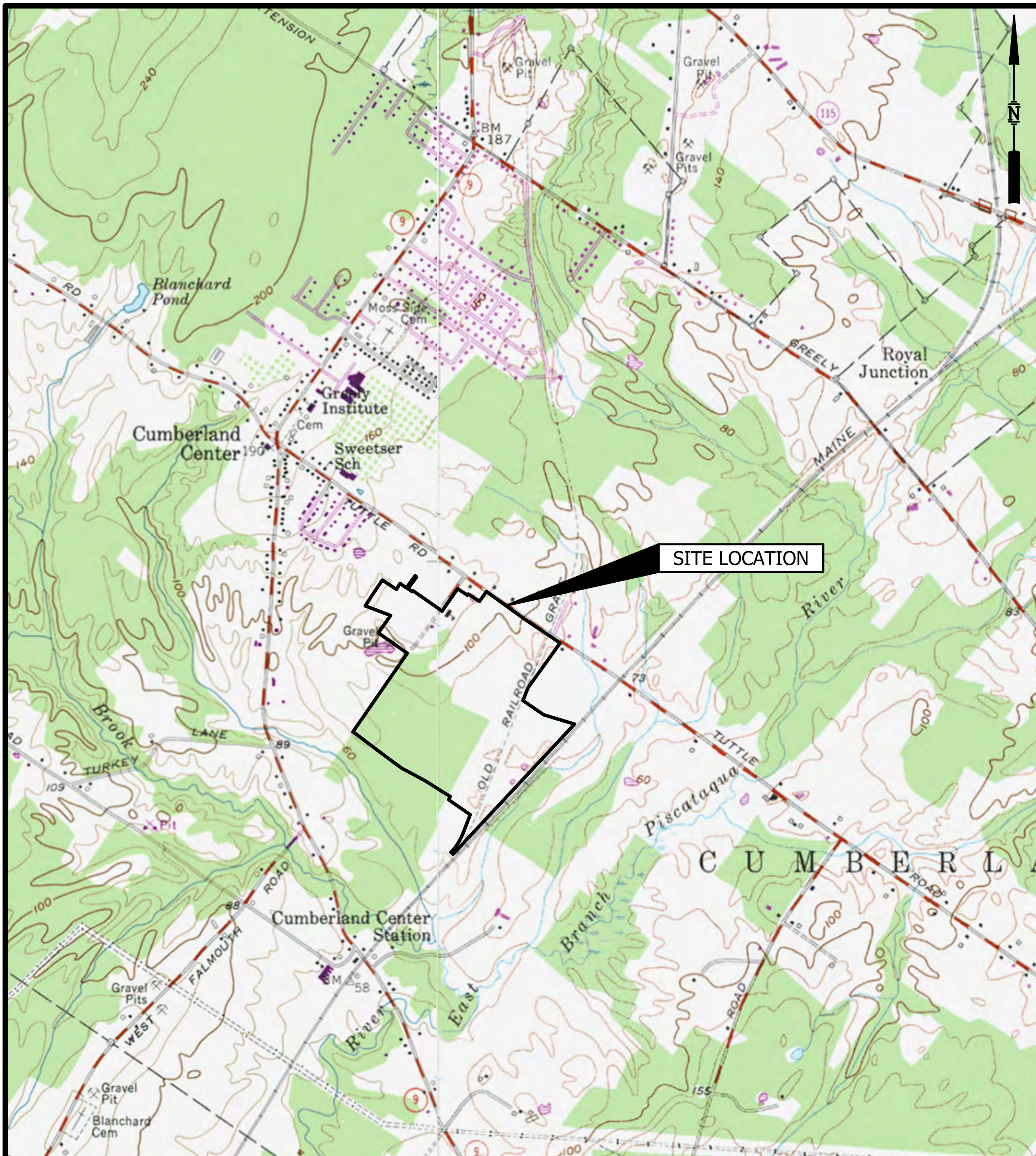
Please feel free to contact me at 207.829.5016 or dpd@smemaine.com if you have any questions or need additional information.

Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Daniel P. Diffin, P.E., LEED AP BD+C
Vice President/Project Manager

Attachments: Figure 1 - Site Location Map




BASE MAP ADAPTED FROM 7.5 MIN
USGS TOPOGRAPHIC QUADRANGLES
CUMBERLAND CENTER, ME - 1975
YARMOUTH, ME - 1975

1000 0 2000 FEET

FIGURE 1
SITE LOCATION MAP
PUBLIC WORKS IMPROVEMENTS
CUMBERLAND, MAINE

SME
SEVEE & MAHER
ENGINEERS

DWG: SITELOC LMN: COMMON SCHEME CTB: SME-STD REV: 12/2/2020

\\Nserver\cfs\TCU\Public Works Relocation\Current Site\Acad\Figures\SITELOC.dwg, 1/2/2020 11:37:13 AM, bwb

**STATE OF MAINE**
**DEPARTMENT OF AGRICULTURE, CONSERVATION & FORESTRY**
177 STATE HOUSE STATION
AUGUSTA, MAINE 04333

**JANET T. MILLS**
**GOVERNOR**

**AMANDA E. BEAL**
**COMMISSIONER**

January 8, 2020

Daniel Diffin
Sevee & Maher Engineers
PO Box 85A
Cumberland, ME 04021

Via email: dpd@smemaine.com

Re: Rare and exemplary botanical features in proximity to: Municipal Site Upgrades, Cumberland, Maine

Dear Mr. Diffin:

I have searched the Maine Natural Areas Program's Biological and Conservation Data System files in response to your request received January 8, 2020 for information on the presence of rare or unique botanical features documented from the vicinity of the project in Cumberland, Maine. Rare and unique botanical features include the habitat of rare, threatened, or endangered plant species and unique or exemplary natural communities. Our review involves examining maps, manual and computerized records, other sources of information such as scientific articles or published references, and the personal knowledge of staff or cooperating experts.

Our official response covers only botanical features. For authoritative information and official response for zoological features you must make a similar request to the Maine Department of Inland Fisheries and Wildlife, 284 State Street, Augusta, Maine 04333.

According to the information currently in our Biological and Conservation Data System files, there are no rare botanical features documented specifically within the project area. This lack of data may indicate minimal survey efforts rather than confirm the absence of rare botanical features. You may want to have the site inventoried by a qualified field biologist to ensure that no undocumented rare features are inadvertently harmed.

If a field survey of the project area is conducted, please refer to the enclosed supplemental information regarding rare and exemplary botanical features documented to occur in the vicinity of the project site. The list may include information on features that have been known to occur historically in the area as well as recently field-verified information. While historic records have not been documented in several years, they may persist in the area if suitable habitat exists. The enclosed list identifies features with potential to occur in the area, and it should be considered if you choose to conduct field surveys.

This finding is available and appropriate for preparation and review of environmental assessments, but it is not a substitute for on-site surveys. Comprehensive field surveys do not exist for all natural areas in Maine, and in the absence of a specific field investigation, the Maine Natural Areas Program cannot provide a definitive statement on the presence or absence of unusual natural features at this site.

**MOLLY DOCHERTY, DIRECTOR**
MAINE NATURAL AREAS PROGRAM
BLOSSOM LANE, DEERING BUILDING

PHONE: (207) 287-804490
WWW.MAINE.GOV/DACF/MNAP

The Maine Natural Areas Program (MNAP) is continuously working to achieve a more comprehensive database of exemplary natural features in Maine. We would appreciate the contribution of any information obtained should you decide to do field work. MNAP welcomes coordination with individuals or organizations proposing environmental alteration or conducting environmental assessments. If, however, data provided by MNAP are to be published in any form, the Program should be informed at the outset and credited as the source.

The Maine Natural Areas Program has instituted a fee structure of $75.00 an hour to recover the actual cost of processing your request for information. You will receive an invoice for $150.00 for two hours of our services.

Thank you for using MNAP in the environmental review process. Please do not hesitate to contact me if you have further questions about the Natural Areas Program or about rare or unique botanical features on this site.

Sincerely,

Kristen Puryear | Ecologist | Maine Natural Areas Program
207-287-8043 | kristen.puryear@maine.gov

# Rare and Exemplary Botanical Features within 4 miles of
# Project: Municipal Site Upgrades, Cumberland, Maine

| Common Name | State Status | State Rank | Global Rank | Date Last Observed | Occurrence Number | Habitat |
|---|---|---|---|---|---|---|
| **American Chestnut** | | | | | | |
| | SC | S4 | G4 | 2001-02-13 | 2 | Hardwood to mixed forest (forest, upland) |
| **Broad Beech Fern** | | | | | | |
| | SC | S2 | G5 | 2016-09-04 | 28 | Hardwood to mixed forest (forest, upland) |
| **Engelmann's Spikerush** | | | | | | |
| | PE | SH | G4G5 | 1916-08-31 | 2 | Open wetland, not coastal nor rivershore (non-forested, wetland) |
| **Enriched Northern Hardwoods Forest** | | | | | | |
| | <null> | S3 | GNR | 2001-08-28 | 34 | Hardwood to mixed forest (forest, upland) |
| **Fern-leaved False Foxglove** | | | | | | |
| | SC | S3 | G5 | 1902-09-02 | 13 | Dry barrens (partly forested, upland),Hardwood to mixed forest (forest, upland) |
| **Foxtail Bog-clubmoss** | | | | | | |
| | E | S1 | G5 | 2017-08-22 | 1 | <null> |
| **Great Blue Lobelia** | | | | | | |
| | PE | SX | G5 | 1905-09 | 3 | Forested wetland,Non-tidal rivershore (non-forested, seasonally wet) |
| **Hollow Joe-pye Weed** | | | | | | |
| | SC | S2 | G5? | 2011-08-04 | 19 | Open wetland, not coastal nor rivershore (non-forested, wetland),Old field/roadside (non-forested, wetland or upland) |
| **Horned Pondweed** | | | | | | |
| | SC | S2 | G5 | 1913-09-13 | 9 | Tidal wetland (non-forested, wetland) |
| **Marsh Milkwort** | | | | | | |
| | PE | SH | G5T4 | 1903-08-18 | 1 | Dry barrens (partly forested, upland),Open wetland, not coastal nor rivershore (non-forested, wetland) |
| **Mountain-laurel** | | | | | | |
| | SC | S2 | G5 | 1985-08-01 | 13 | Conifer forest (forest, upland),Hardwood to mixed forest (forest, |

# Rare and Exemplary Botanical Features within 4 miles of
# Project: Municipal Site Upgrades, Cumberland, Maine

| Common Name | State Status | State Rank | Global Rank | Date Last Observed | Occurrence Number | Habitat |
|---|---|---|---|---|---|---|
| | | | | | | upland) |
| **Mountain Honeysuckle** | | | | | | |
| | E | S2 | G5 | 2018-06-02 | 14 | Dry barrens (partly forested, upland),Hardwood to mixed forest (forest, upland) |
| **Oak - Hickory Forest** | | | | | | |
| | <null> | S1 | G4G5 | 2014-08-21 | 5 | Hardwood to mixed forest (forest, upland) |
| **Pocket Swamp** | | | | | | |
| | <null> | S2 | G5 | 2017-07-27 | 24 | Forested wetland,Hardwood to mixed forest (forest, upland) |
| **Rattlesnake Hawkweed** | | | | | | |
| | E | S1 | G5T4Q | 1909-07 | 1 | Dry barrens (partly forested, upland) |
| **Screwstem** | | | | | | |
| | T | S1 | G5 | 2014-09-24 | 17 | Coastal non-tidal wetland (non-forested, wetland) |
| **Slender Knotweed** | | | | | | |
| | PE | SH | G5 | 1902-09-07 | 1 | Dry barrens (partly forested, upland) |
| **Smooth Winterberry Holly** | | | | | | |
| | SC | S3 | G5 | 2017-08-22 | 32 | Forested wetland |
| | SC | S3 | G5 | 2017-08-23 | 45 | Forested wetland |
| **Spotted Wintergreen** | | | | | | |
| | T | S2 | G5 | 2009-07-26 | 30 | Conifer forest (forest, upland),Hardwood to mixed forest (forest, upland) |
| **Upper Floodplain Hardwood Forest** | | | | | | |
| | <null> | S3 | GNR | 2012 | 20 | Forested wetland |
| **Variable Sedge** | | | | | | |
| | E | S1 | G3 | 1985-07-16 | 5 | Dry barrens (partly forested, upland),Hardwood to mixed forest (forest, upland) |

## Rare and Exemplary Botanical Features within 4 miles of
## Project: Municipal Site Upgrades, Cumberland, Maine

| Common Name | State Status | State Rank | Global Rank | Date Last Observed | Occurrence Number | Habitat |
|---|---|---|---|---|---|---|
| | E | S1 | G3 | 2012-08-09 | 1 | Dry barrens (partly forested, upland),Hardwood to mixed forest (forest, upland) |
| | E | S1 | G3 | 2018-08-29 | 6 | Dry barrens (partly forested, upland),Hardwood to mixed forest (forest, upland) |
| | E | S1 | G3 | 2017-08-22 | 4 | Dry barrens (partly forested, upland),Hardwood to mixed forest (forest, upland) |
| **Water-plantain Spearwort** | | | | | | |
| | PE | SH | G4 | 1903-07-29 | 2 | Open water (non-forested, wetland) |
| **Wild Leek** | | | | | | |
| | SC | S3 | G5 | 2017-05-17 | 28 | Hardwood to mixed forest (forest, upland),Forested wetland |

## STATE RARITY RANKS

**S1** Critically imperiled in Maine because of extreme rarity (five or fewer occurrences or very few remaining individuals or acres) or because some aspect of its biology makes it especially vulnerable to extirpation from the State of Maine.
**S2** Imperiled in Maine because of rarity (6-20 occurrences or few remaining individuals or acres) or because of other factors making it vulnerable to further decline.
**S3** Rare in Maine (20-100 occurrences).
**S4** Apparently secure in Maine.
**S5** Demonstrably secure in Maine.
**SU** Under consideration for assigning rarity status; more information needed on threats or distribution.
**SNR** Not yet ranked.
**SNA** Rank not applicable.
**S#?** Current occurrence data suggests assigned rank, but lack of survey effort along with amount of potential habitat create uncertainty (e.g. S3?).

**Note**: **State Rarity Ranks** are determined by the Maine Natural Areas Program for rare plants and rare and exemplary natural communities and ecosystems. The Maine Department of Inland Fisheries and Wildlife determines State Rarity Ranks for animals.

## GLOBAL RARITY RANKS

**G1** Critically imperiled globally because of extreme rarity (five or fewer occurrences or very few remaining individuals or acres) or because some aspect of its biology makes it especially vulnerable to extinction.
**G2** Globally imperiled because of rarity (6-20 occurrences or few remaining individuals or acres) or because of other factors making it vulnerable to further decline.
**G3** Globally rare (20-100 occurrences).
**G4** Apparently secure globally.
**G5** Demonstrably secure globally.
**GNR** Not yet ranked.

**Note**: **Global Ranks** are determined by NatureServe.

## STATE LEGAL STATUS

**Note**: State legal status is according to 5 M.R.S.A. § 13076-13079, which mandates the Department of Conservation to produce and biennially update the official list of Maine's **Endangered** and **Threatened** plants. The list is derived by a technical advisory committee of botanists who use data in the Natural Areas Program's database to recommend status changes to the Department of Conservation.

**E** ENDANGERED; Rare and in danger of being lost from the state in the foreseeable future; or federally listed as Endangered.
**T** THREATENED; Rare and, with further decline, could become endangered; or federally listed as Threatened.

## NON-LEGAL STATUS

**SC** SPECIAL CONCERN; Rare in Maine, based on available information, but not sufficiently rare to be considered Threatened or Endangered.
**PE** Potentially Extirpated; Species has not been documented in Maine in past 20 years or loss of last known occurrence has been documented.

## ELEMENT OCCURRENCE RANKS - EO RANKS

Element Occurrence ranks are used to describe the quality of a rare plant population or natural community based on three factors:

- **Size**: Size of community or population relative to other known examples in Maine. Community or population's viability, capability to maintain itself.
- **Condition**: For communities, condition includes presence of representative species, maturity of species, and evidence of human-caused disturbance. For plants, factors include species vigor and evidence of human-caused disturbance.
- **Landscape context**: Land uses and/or condition of natural communities surrounding the observed area. Ability of the observed community or population to be protected from effects of adjacent land uses.

These three factors are combined into an overall ranking of the feature of **A**, **B**, **C**, or **D**, where **A** indicates an **excellent** example of the community or population and **D** indicates a **poor** example of the community or population. A rank of **E** indicates that the community or population is **extant** but there is not enough data to assign a quality rank. The Maine Natural Areas Program tracks all occurrences of rare (S1-S3) plants and natural communities as well as A and B ranked common (S4-S5) natural communities.

**Note**: **Element Occurrence Ranks** are determined by the Maine Natural Areas Program for rare plants and rare and exemplary natural communities and ecosystems. The Maine Department of Inland Fisheries and Wildlife determines Element Occurrence ranks for animals.

Visit our website for more information on rare, threatened, and endangered species!
http://www.maine.gov/dacf/mnap

4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 • Fax: 207.829.5692
info@smemaine.com
smemaine.com

January 8, 2020

John Perry, Environmental Review Coordinator
Maine Department of Inland Fisheries and Wildlife
284 State Street, 41 SHS
Augusta, Maine 04333-0041

Subject: Town of Cumberland Municipal Site Upgrades
Cumberland, Maine

Dear John:

The Town of Cumberland is seeking approval for the improvements and construction of municipal projects in Cumberland, Maine under a Maine Department of Environmental Protection (MEDEP) Site Location of Development Act (SLODA) permit. As shown on the attached Figure 1 - Site Location Map, the properties are located off Tuttle Road. The properties consist of four town-owned parcels of 4.4 acres, 9.2 acres, 109 acres, and 31.7 acres. The lots are bordered to the north by Tuttle Road and residential properties and to the east by the Maine Central Railroad. Residential properties exist to the south and west of the parcels.

We would appreciate receiving any information relative to rare, threatened, or endangered species or the presence of important wildlife or fisheries habitat at or in the immediate vicinity of our project.

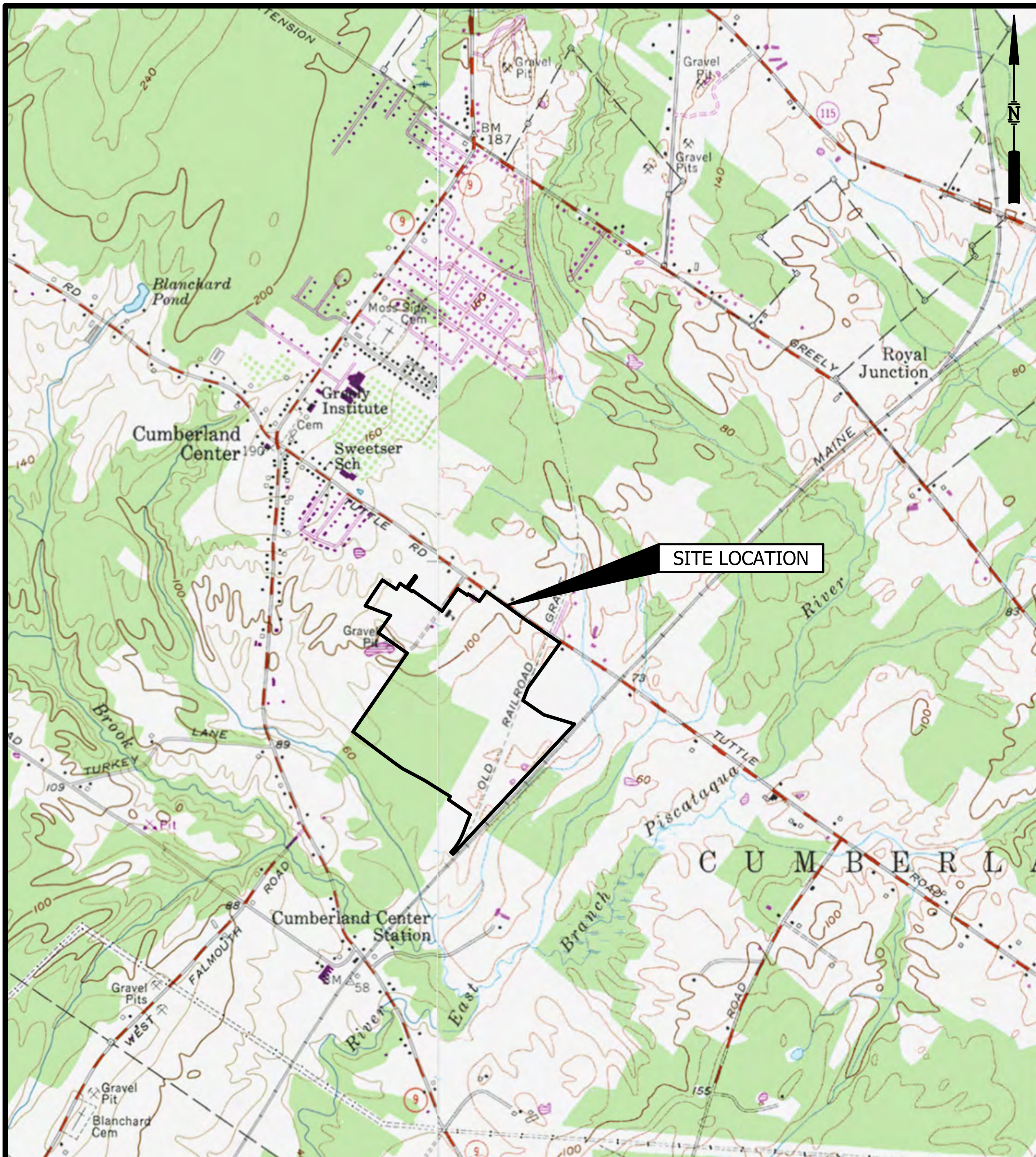
Should you have any questions or require additional information, please contact me. Thank you in advance for your consideration.

Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Daniel Diffin, P.E., LEED AP BD+C
Vice President/Project Manager

Attachments: Figure 1 - Site Location Map




BASE MAP ADAPTED FROM 7.5 MIN
USGS TOPOGRAPHIC QUADRANGLES
CUMBERLAND CENTER, ME - 1975
YARMOUTH, ME - 1975

1000 0 2000 FEET

FIGURE 1
SITE LOCATION MAP
PUBLIC WORKS IMPROVEMENTS
CUMBERLAND, MAINE

SME
SEVEE & MAHER
ENGINEERS

DWG: SITELOC LMN: COMMON SCHEME CTB: SME-STD REV: 12/2/2020

\\Nserver\cfs\TCU\Public Works Relocation\Current Site\Acad\Figures\SITELOC.dwg, 1/2/2020 11:37:13 AM, bwb

JANET T. MILLS
GOVERNOR

STATE OF MAINE
DEPARTMENT OF
INLAND FISHERIES & WILDLIFE
284 STATE STREET
41 STATE HOUSE STATION
AUGUSTA ME 04333-0041

JUDITH CAMUSO
COMMISSIONER

January 28, 2020

Daniel Diffin
Sevee & Maher Engineers
4 Blanchard Rd.
P.O. Box 85A
Cumberland Center, ME 04021

**RE: Information Request –Town of Cumberland Public Works Site Improvements, Cumberland**

Dear Daniel:

Per your request received on January 09, 2020, we have reviewed current Maine Department of Inland Fisheries and Wildlife (MDIFW) information for known locations of Endangered, Threatened, and Special Concern species; designated Essential and Significant Wildlife Habitats; and inland fisheries habitat concerns within the vicinity of the *Town of Cumberland Public Works Site Improvements* project in Cumberland. Note that as project details are lacking, and due to the general nature and scale of the map that was provided, our comments are non-specific and should be considered preliminary.

Our Department has not mapped any Essential Habitats that would be directly affected by your project.

***Endangered, Threatened, and Special Concern Species***

<u>Bats</u> – Of the eight species of bats that occur in Maine, the three *Myotis* species are protected under Maine's Endangered Species Act (MESA) and are afforded special protection under 12 M.R.S §12801 - §12810. The three *Myotis* species include little brown bat (State Endangered), northern long-eared bat (State Endangered), and eastern small-footed bat (State Threatened). The five remaining bat species are listed as Special Concern: big brown bat, red bat, hoary bat, silver-haired bat, and tri-colored bat. While a comprehensive statewide inventory for bats has not been completed, based on historical evidence it is likely that several of these species occur within the project area during migration and/or the breeding season. However, our Agency does not anticipate significant impacts to any of the bat species as a result of this project.

***Significant Wildlife Habitat***

<u>Significant Vernal Pools</u> - At this time MDIFW Significant Wildlife Habitat (SWH) maps indicate no known presence of SWHs subject to protection under the Natural Resources Protection Act (NRPA) within the project area, which include Waterfowl and Wading Bird Habitats, Seabird Nesting Islands, Shorebird Areas, and Significant Vernal Pools. However, a comprehensive statewide inventory for Significant Vernal Pools has not been completed. Therefore, we recommend that surveys for vernal pools be conducted within the project boundary by qualified wetland scientists prior to final project design to determine whether there are Significant Vernal Pools present in the area. These surveys should extend up to 250 feet beyond the anticipated project footprint because of potential performance standard requirements for off-site Significant Vernal Pools, assuming such pools are located on land owned or controlled by the applicant. Once surveys are completed, survey forms should be submitted to our

Agency for review well before the submission of any necessary permits. Our Department will need to review and verify any vernal pool data prior to final determination of significance.

***Fisheries Habitat***

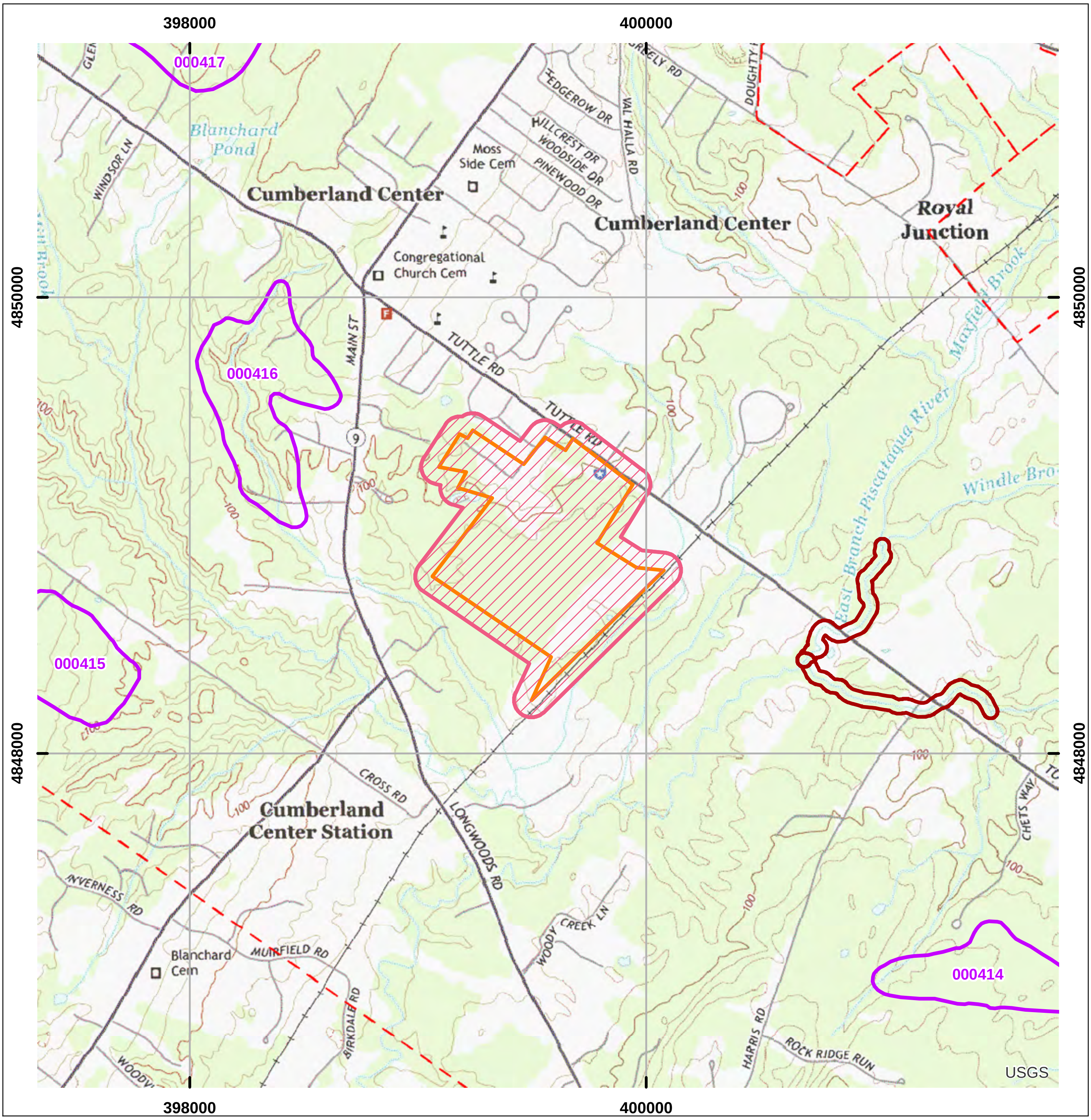
We recommend that 100-foot undisturbed vegetated buffers be maintained along streams. Buffers should be measured from the edge of stream or associated fringe and floodplain wetlands. Maintaining and enhancing buffers along streams that support coldwater fisheries is critical to the protection of water temperatures, water quality, natural inputs of coarse woody debris, and various forms of aquatic life necessary to support conditions required by many fish species. Stream crossings should be avoided, but if a stream crossing is necessary, or an existing crossing needs to be modified, it should be designed to provide full fish passage. Small streams, including intermittent streams, can provide crucial rearing habitat, cold water for thermal refugia, and abundant food for juvenile salmonids on a seasonal basis and undersized crossings may inhibit these functions. Generally, MDIFW recommends that all new, modified, and replacement stream crossings be sized to span at least 1.2 times the bankfull width of the stream. In addition, we generally recommend that stream crossings be open bottomed (i.e. natural bottom), although embedded structures which are backfilled with representative streambed material have been shown to be effective in not only providing habitat connectivity for fish but also for other aquatic organisms. Construction Best Management Practices should be closely followed to avoid erosion, sedimentation, alteration of stream flow, and other impacts as eroding soils from construction activities can travel significant distances as well as transport other pollutants resulting in direct impacts to fish and fisheries habitat. In addition, we recommend that any necessary instream work occur between July 15 and October 1.

This consultation review has been conducted specifically for known MDIFW jurisdictional features and should not be interpreted as a comprehensive review for the presence of other regulated features that may occur in this area. Prior to the start of any future site disturbance we recommend additional consultation with the municipality, and other state resource agencies including the Maine Natural Areas Program, Maine Department of Marine Resources, and Maine Department of Environmental Protection in order to avoid unintended protected resource disturbance.

Please feel free to contact my office if you have any questions regarding this information, or if I can be of any further assistance.

Best regards,

Becca Settele
Wildlife Biologist




# Environmental Review of Fish and Wildlife Observations and Priority Habitats

Project Name: Cumberland, Town of Cumberland Public Works Site Improvements (Version 2)

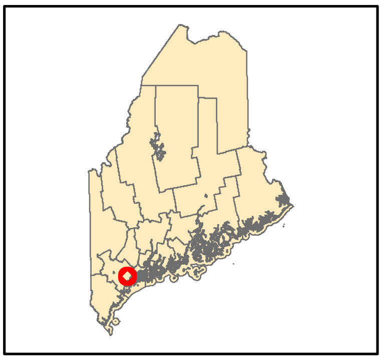
Maine Department of
Inland Fisheries and Wildlife

0 0.125 0.25 0.5 0.75 1 Miles

Projection: UTM, NAD83, Zone 19N

Date: 1/10/2020

- ProjectPoints
- ProjectLines
- ProjectPolys
- ProjectSearchAreas
- Maine Cliff and Talus Areas
- Deer Winter Area
- LUPC p-fw
- Cooperative DWAs
- Seabird Nesting Islands
- Shorebird Areas
- Inland Waterfowl and Wading Bird
- 2008 Iwwh - Shoreland Zoning
- Tidal Waterfowl and Wading Bird
- Significant Vernal Pools
- Environmental Review Polygons
- Roseate Tern
- Piping Plover and Least Tern
- Aquatic ETSc - 2.5 mi review
- Rare Mussels - 5 mi review
- Maine Heritage Fish Waters
- Arctic Charr Habitat
- Redfin Pickerel and Swamp Darter Habitats - buffer100ft
- Special Concern occupied habitats - 100ft buffer
- Wild Lake Trout Habitats



**ATTACHMENT E**

**MAINEDOT ENTRANCE PERMIT**

SEVEE & MAHER ENGINEERS

4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 • Fax: 207.829.5692
info@smemaine.com
smemaine.com

February 13, 2020

Mr. Anthony Fontaine, MEDOT Permit Field Specialist
Maine Department of Transportation
P.O. Box 358
Scarborough, ME 04074

Subject: Town of Cumberland, Town Office Parking Expansion
Maine DOT Driveway/Entrance Permit Application

Dear Mr. Fontaine:

On behalf of the Town of Cumberland (Town), Sevee & Maher Engineers (SME) is pleased to submit the attached the Maine Department of Transportation (MEDOT) Application for Driveway/Entrance Permit for the Town Office Parking Expansion in Cumberland. The proposed entrance to the facility from Tuttle Road is shown in Figure 1. The property is located off Tuttle Road in Cumberland on a Town owned 109-acre parcel. Existing residential properties border the parcel to the south, residential and Town owned property exists to the east, Tuttle Road abuts the property to the north, and Drowne Road to the west.

The existing property is partially developed and includes Town Hall, an elderly home, little league ballfields, the Town Landfill, and wooded area consisting the Town Forest trails within the Rural Residential 1 Zone. Proposed construction includes a 14,100-square-foot paved area of 36 parking spots. Proposed access to the parking area will be a 20-foot wide paved drive from the existing parking area.

The Town proposes a new entrance from Tuttle Road for ease of access to the additional parking. The entrance will be paved with the dimensions of 24 feet wide by 50 feet long. Turning radii of 25 feet are proposed at the entrance to provide safe access to the site. Existing sight distance from the entrance is in excess of 1,000 feet looking southbound and approximately 700 feet looking northbound.

Town Hall hours of operation are Monday to Wednesday, 8:00 am to 5:00 pm and Thursday, 8:00 am to 6:00 pm. About 25 employees work during the regular hours per day and approximately 65 customers visit per day. Peak hours of the day are from 9 to 11 am and from 3 to 5 pm.

Please feel free to contact me at 207.829.5016 or dpd@smemaine.com if you have any questions or need additional information.

Very truly yours,

SEVEE & MAHER ENGINEERS, INC.

Daniel Diffin, P.E., LEED AP BD+C

Attachments

cc: Application for Driveway/Entrance Permit
Figure 1 – Maine Department of Transportation, Tuttle Road
Cumberland Tax Map R03
Site Layout Plan – Town Office Parking Expansion

| Date Received: | **APPLICATION FOR DRIVEWAY/ENTRANCE PERMIT**<br>**MAINE DEPARTMENT OF TRANSPORTATION**<br>**P.O. Box 358**<br>**Scarborough, ME 04070**<br>**Phone: (207)-885-7000 FAX: (207)-883-3806** |
|---|---|
| **Application No.** ________ | |

Application is hereby made to construct, change location, grade or use served by a driveway or entrance to property in accordance with Title 23 M.R.S.A. § 704 and §705.

**Section A** Property Owner Information

1. Land Owner's Name: *Town of Cumberland* Phone# *207-849-5559*
2. Land Owner's Mailing Address: *290 Tuttle Road* (Address) *Cumberland* (Town/City) *ME* (State) *04021* (Zip Code)
3. Applicant or Agent's Name: *Sevee & Maher Engineers, Inc., Dan Diffin, P.E.* Phone # *207-849-5016*
4. Applicant/Agent Mailing Address: *4 Blanchard Road* (Address) *Cumberland* (Town/City) *ME* (State) *04021* (Zip Code)
5. Other contact information: *N/A* Work *N/A* Cell *N/A*

**Section B** Property Location Information

6. Directions to property: *From I-295 N, Take Exit 10. Turn right then turn right at the second light onto ME-9 N. Continue straight for about 9.8 mi, then turn right onto Tuttle Road. In about 0.8 mi, the Cumberland Town Hall at 290 Tuttle Road will be on the right.*
7. Route No. *N/A* Road Name: *Tuttle Road*
8. ❒North ☒ South ❒East ❒West – side of highway
9. City/Town: *Cumberland* County: *Cumberland*
10. Distance from nearest intersection: *0.0 mi* *(estimated in tenths of a mile)* Name of Intersection: *Catalpa Lane and Tuttle Road*
11. Nearest Utility Pole #: *CMP #107* Attach Survey Data *(if available)*
12. Map and Lot number *R3/51A* (**MUST** provide copy of tax map) Lot prior to May 25,2002? ☒ Yes ____No

**Proposed Location of Driveway/Entrance shall be staked and flagged by applicant.**

**Section C** Driveway/ Entrance Information

13. Desired width of Driveway/Entrance: *24 feet* (feet) Type of Surface: *Pavement* (gravel, pavement, etc.)
14. Will the development associated with this driveway/entrance have more than 10,000 square feet of impervious surface draining towards the highway? YES _____ NO ☒ "Impervious surfaces" are the footprint of buildings, pavement, gravel, or other low-permeability or compacted surfaces, not including natural or man-made water bodies.
15. Does your property have an existing access? ☒ yes _____no (If no go to line 18)
16. If this is an existing access and you are changing its use, please describe *N/A* ________ Go to Section D.
17. If this is an existing access and you are physically modifying, please describe: *N/A* ________ Go to Section D.
18. Proposed Driveway/Entrance Purpose: ❒ Single Family Residence ❒ Home Business ❒ Commercial/Industrial ❒ Subdivision or Development ❒ Multi-family with 5 or less units ❒ Multifamily with more than 5 units ❒ Retail ☒ Office ❒School ❒Business Park ❒ Mall ❒ Other (explain)________

\# employees/day *25* # customers/day *65* Busiest time of day *9 to 1 am and 3 to 5 pm* # of Lots *1*

**Section D** Construction Information

19. Construction expected to begin on *August 2020* (date) and be completed on *September 2020* (date)
20. Person/Company constructing entrance *Contractor*
21. Construction contacts name *To be determined* Phone *To be determined*

Site Sketch or attach Site Plan

**SEE ATTACHED SITE LAYOUT PLAN**

**THE OWNER HEREBY AGREES**

Draw arrow to show "North"

1) Provide, erect and maintain all necessary barricades, lights, warning signs and other devices to direct traffic safely while the work is in progress.
2) **At no time cause the highway to be closed to traffic.**
3) Where the drive/entrance is located within a curb, curb and gutter, and/or sidewalk section, completely remove the existing curb, curb and gutter, and/or sidewalk as may be required to create the drive/entrance and restore drainage. All driveways/entrances abutting sidewalk sections shall meet the requirements set forth in the Americans with Disabilities Act of 1990, 42 U.S.C. §§ 12132 et seq.
4) Obtain, deliver to site and install any culverts and/or drainage structures necessary for drainage; the size, type and length of such culverts or structures shall be as specified in the permit pursuant to 23 M.R.S.A. § 705. **All culverts and/or drainage structures shall be new.**
5) Complete construction of proposed driveway/entrance within twelve months of commencement of construction.
6) **COMPLY WITH ALL FEDERAL, STATE AND MUNICIPAL LAWS AND ORDINANCES.**
7) Not alter, without the express written consent of the MDOT, any culverts, drainage patterns or swales within MDOT right-of-way.
8) File a copy of the approved driveway/entrance permit with the affected municipality or LURC, as appropriate, within 5 business days of receiving the MDOT approval.
9) Shall construct and maintain the entrance side slopes to be no steeper than the adjacent roadway side slopes, but in no case to be steeper than 3 horizontal to 1 vertical, unless the side slope is behind existing roadway guardrail, in which case it shall be no steeper than 2 horizontal to 1 vertical.
10) Notify the MeDOT(in writing) of a proposed change to use served by driveway/entrance when increase in traffic flow is expected to occur. This does not exempt the need for obtaining a Traffic Movement Permit (TMP) if trip generation meets or exceeds 100 passenger car equivalents (pce) during the peak hour of the day.

**FURTHER CONDITION OF THE PERMIT:**
The owner shall assume the defense of, and pay all damages, fines, and penalties for which he/she shall become liable, and shall indemnify and safe harmless said Department, its representatives, agents and employees from liability, actions against all suite, claims, damages for wrongful death, personal injuries or property damage suffered by any person or association which results from the willful or negligent action or inaction of the owner/applicant/agent and in proceedings of every kind arising out of the construction and maintenance of said entrance(s), including snow removal. Nothing herein shall, nor is intended to, waive and defense, immunity or limitation of liability which may be available to the MDOT, their officers, agents or employees under the Maine Tort Claims Act or any other privileges and/or immunities provided by law.

The submission of false or misleading statements on or with this application, or the omission of information necessary to prevent statements submitted herein or herewith from being misleading, is a crime punishable under Chapter 19 of the Maine Criminal Code, and any permit issued in reliance thereon will be considered null and void with [illegible] tion by the Department.

**Date Filed:** 2/13/2020 ______________ Signature of Owner ______________

Signature of Applicant____________________________________________

☐**By signing and checking this box I hereby certify that I have been granted permission from the property owner to act in their behalf.**

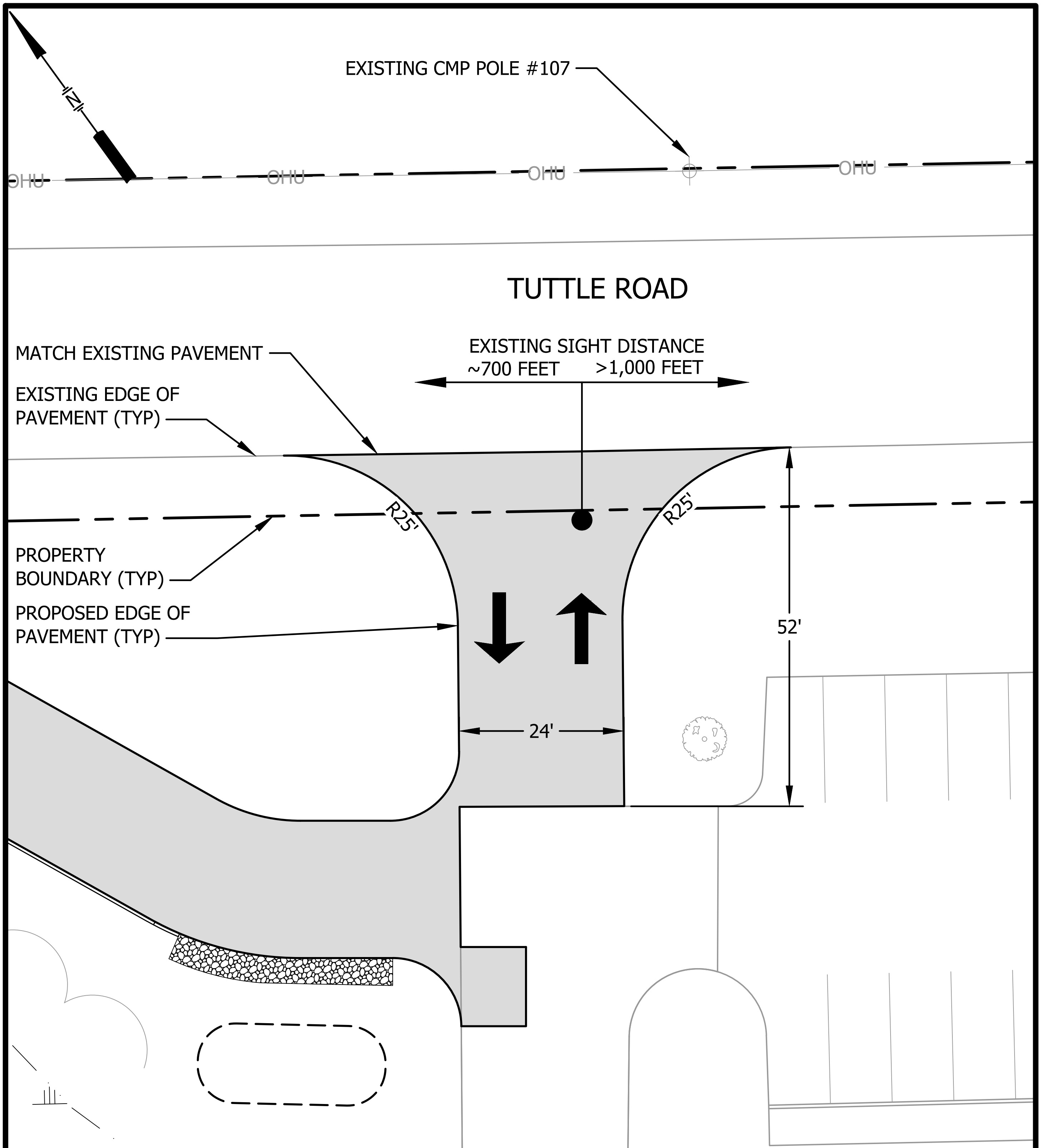
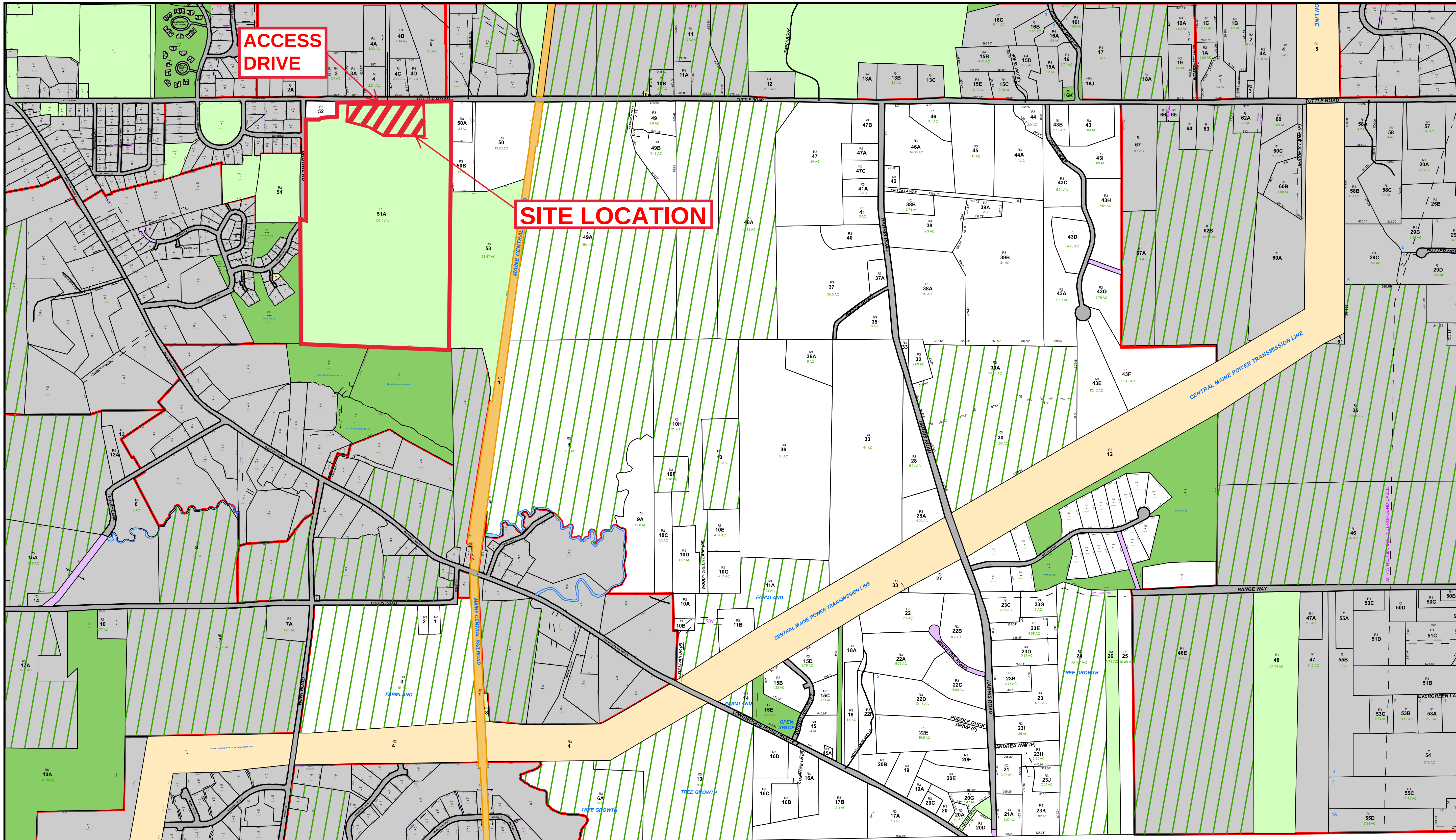



FIGURE 1
MAINE DEPARTMENT OF TRANSPORTATION
TUTTLE ROAD
CUMBERLAND, MAINE

SME
SEVEE & MAHER ENGINEERS

10 0 20 FEET

DWG: BASE LMN: MDOT CTB: SME-STD REV: 2/12/2020




Maps Prepared by: Spatial Alternatives 207.846.2355 www.spatialalternatives.com

Tax Sheets are intended for assessing purposes only.
Boundary locations are approximate and should not be used for conveyance of property.

**Legend**

| | | | |
|---|---|---|---|
| ROW/Easements | Farmland and Tree Growth | ROW | Roads |
| **Tax Parcels** | Town Owned or Cemetery | Utility | Water |
| Parcels | Open Space | Railroad | |

# *Town of Cumberland, Maine*

1,100
Feet

Index Map

R04 R05 R03 R01

N

**Cumberland Tax Map**
**R03**
Map updated to: April 1, 2018


NOTES:

1. SEE DWG C-100 FOR GENERAL NOTES AND PLAN REFERENCES.

| REV. | BY | DATE | STATUS |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | DPD | 2/2020 | ISSUED TO MEDEP FOR REVIEW |

STATE OF MAINE
DANIEL DIFFIN
14841
LICENSED
PROFESSIONAL ENGINEER

TOWN OF CUMBERLAND
TOWN OFFICE PARKING EXPANSION
TUTTLE ROAD
CUMBERLAND, MAINE

SITE LAYOUT PLAN

SME
SEVEE & MAHER ENGINEERS
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • smemaine.com

| | |
|---|---|
| DESIGN BY: | NMT |
| DRAWN BY: | BWB |
| DATE: | 1/2020 |
| CHECKED BY: | BDP |
| LMN: | SITE |
| CTB: | SME-STD |

JOB NO. 19231.00 DWG FILE BASE

C-102

# Maine Department of Transportation

Janet T. Mills
Governor

## Driveway/Entrance Permit

Bruce A. Van Note
Commissioner

**Permit Number:** 27750 - **Entrance ID:** 1

| OWNER | |
|---|---|
| Name: | **Town of Cumberland** |
| Address: | **290 Tuttle Road** |
| | **Cumberland, ME 04021** |
| Telephone: | **(207)849-5559** |
| Date Printed: | **February 19, 2020** |

**LOCATION**

| | |
|---|---|
| Route: | **C450N, Tuttle Road** |
| Municipality: | **Cumberland** |
| County: | **Cumberland** |
| Tax Map: | **R3** Lot Number: **51A** |
| Culvert Size: | **inches** |
| Culvert Type: | **N/R** |
| Culvert Length: | **feet** |
| Date of Permit: | **February 19, 2020** |
| Approved Entrance Width: | **24 feet** |

In accordance with rules promulgated under 23 M.R.S.A., Chapter 13, Subchapter I, Section 704, the Maine Department of Transportation (MaineDOT) approves a permit and grants permission to perform the necessary grading to construct, in accordance with sketch or attached plan, **an Entrance** to **Office Space** at a point **834** feet **East** from **Drowne Road**, subject to the Chapter 299 Highway Driveway and Entrance Rules, standard conditions and special conditions (if any) listed below.

Conditions of Approval:

This Permittee acknowledges and agrees to comply with the Standard Conditions and Approval attached hereto and to any Specific Conditions of Approval shown here.

(G = GPS Location; W = Waiver; S = Special Condition)

G - THE ENTRANCE SHALL BE LOCATED AT GPS COORDINATES: 43.790000N, -70.245480W.

S - In the town of Cumberland on the southwesterly side of Tuttle Road, the centerline being approximately 834 feet southeasterly of the centerline of Drowne Road and approximately 32 feet northwesterly of utility pole 107.

S - The existing bituminous curb shall be saw cut so as to create a 4' terminal end ("tip down") compliant with MaineDOT Standard Detail 609.

Approved by: Anthony Fontaine Date: 2-19-2020

**STANDARD CONDITIONS AND APPROVAL**

1. Provide, erect and maintain all necessary barricades, lights, warning signs and other devices as directed by MaineDOT to properly safeguard traffic while the construction is in progress.

2. At no time cause the highway to be closed to traffic

3. Where the driveway is located within a curb, curb and gutter, and/or sidewalk section, completely remove the existing curb, curb and gutter, and/or sidewalk as may be required to create the driveway and restore drainage. All driveways abutting sidewalk sections shall meet the requirements set forth in the Americans with Disabilities Act of 1990, 42 U.S.C. Sec. 12131 et seq.

4. Obtain, have delivered to the site, and install any culverts and/or drainage structures which may be necessary for drainage, the size, type and length as called for in the permit pursuant to 23 M.R.S.A. Sec. 705. All culverts and/or drainage structures shall be new.

5. Start construction of the proposed driveway within twenty-four (24) months of the date of permit issuance and substantially complete construction of the proposed driveway within twelve months of commencement of construction.

6. Comply with all applicable federal, state and municipal regulations and ordinances.

7. Do not alter, without the express written consent of the MaineDOT, any culverts or drainage swales within the MaineDOT right of way.

8. File a copy of the approved driveway permit with the affected municipality or LURC, as appropriate within 5 business days of receiving the MaineDOT approval.

9. Construct and maintain the driveway side slopes to be no steeper than the adjacent roadway side slopes, but in no case to be steeper than 3 horizontal to 1 vertical, unless the side slope is behind existing roadway guardrail, in which case it shall be no steeper than 2 horizontal to 1 vertical.

10. Notify the MaineDOT of a proposed change of use served by the driveway when increase in traffic flow is expected to occur. This does not exempt the need for obtaining a Traffic Movement Permit (TMP) if trip generation meets or exceeds 100 passenger car equivalents (PCE) during the peak hour of the day.

11. Construct or implement and maintain erosion and sedimentation measures sufficient to protect MaineDOT facilities.

12. Driveways shall be designed such that all maneuvering and parking of any vehicles will take place outside the highway right-of-way and where vehicles will exit the premises without backing onto the highway traveled way or shoulders. All driveways will have a turnaround area to accomodate vehicles using the premises.

13. Closing any portion of a highway or roadway including lanes, shoulders, sidewalks, bike lanes, or ATV access routes is not permitted without MaineDOT approval.

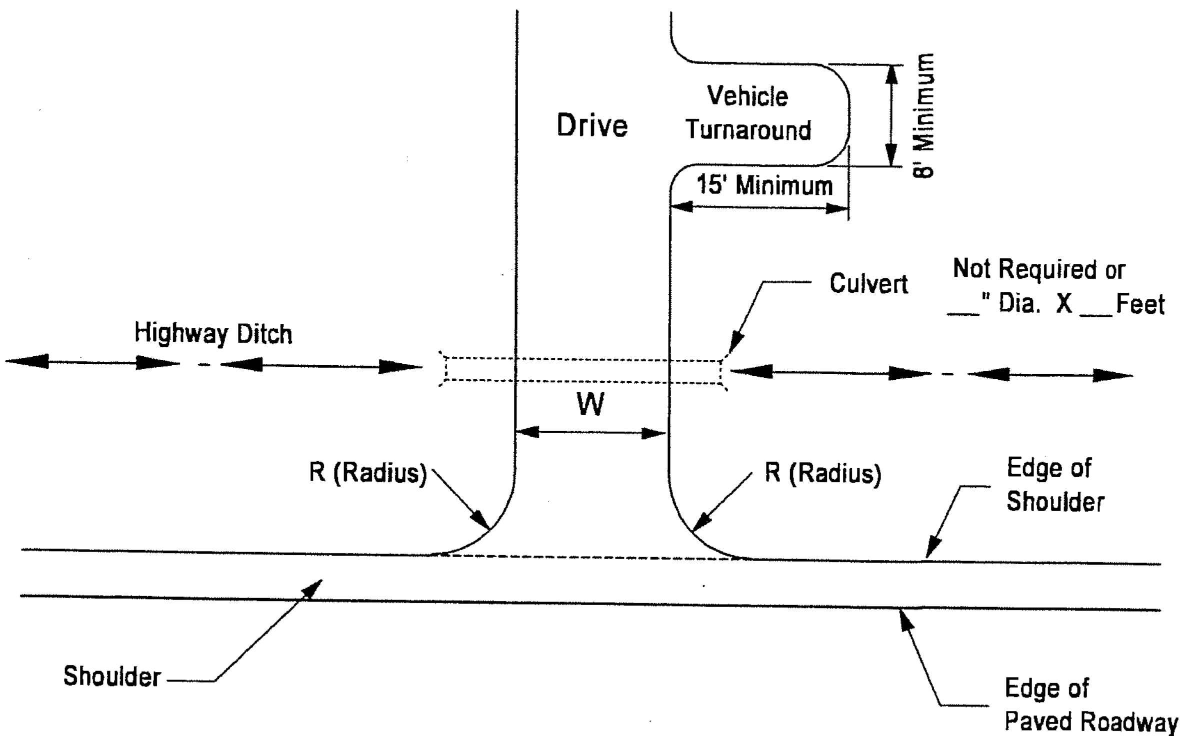
**FURTHER CONDITION OF THE PERMIT**

The owner shall assume, the defense of, and pay all damages, fines, and penalties for which he/she shall become liable, and shall indemnify and safe harmless said Department, its representatives, agents and employees from liability, actions against all suits, claims, damages for wrongful death, personal injuries or property damage suffered by any person or association which results from the willful or negligent action or inaction of the owner/applicant (agent) and in proceedings of every kind arising out of the construction and maintenance of said entrance(s), including snow removal.

Nothing herein shall, nor is intended to, waive any defense, immunity or limitation of liability which may be available to the MaineDOT, their officers, agents or employees under the Maine Tort Claims Act or any other privileges and/or immunities provided by law. It is a further condition that the owner will agree to keep the right of way inviolate for public highway purposes and no signs (other than traffic signs and signals), posters, billboards, roadside stands, culvert end walls or private installations shall be permitted within Right of Way limits.

# State of Maine
# Department of Transportation
# Entrance / Driveway Details

PLAN

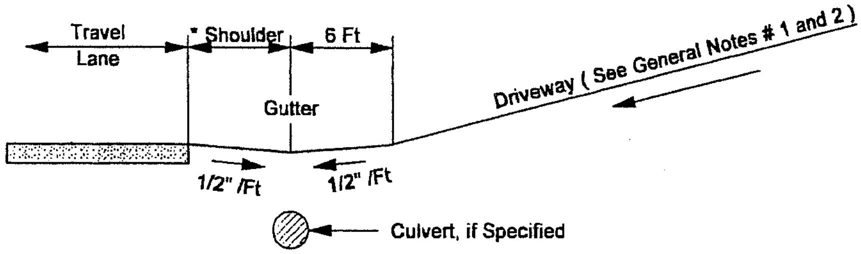



GENERAL NOTES -

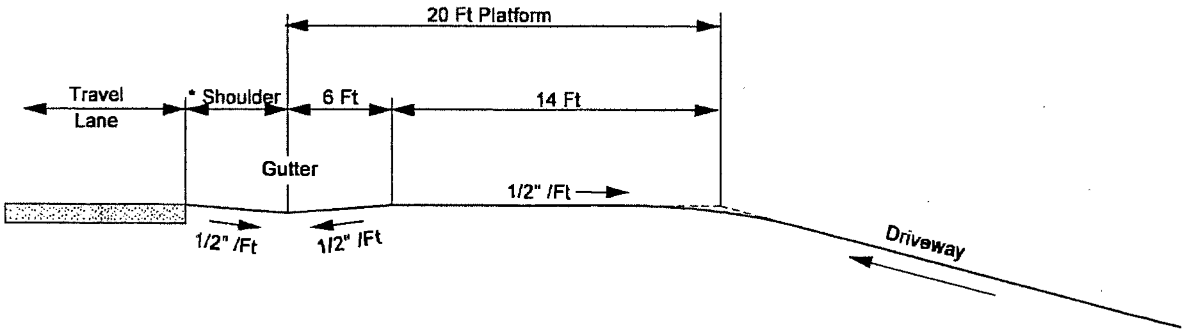
1. ALL RESIDENTAL OR COMMERCIAL DRIVES WITH 10% GRADE OR MORE SLOPING DOWN TOWARDS THE HIGHWAY SHALL BE PAVED TO THE RIGHT OF WAY LINE, AS A MINIMUM, INCUDING SHOULDER, IF GRAVEL AND HAVE DITCHES TO CONTROL RUNOFF.
2. DRIVES SLOPING TO THE HIGHWAY SHALL BE CROWNED ( 1/2" PER FT. MINIMUM ).
3. TO THE MAXIMUM EXTENT PRACTICAL, THE ENTRANCE MUST BE CONSTRUCTED PERPENDICULAR TO THE HIGHWAY AT THE POINT OF ACCESS. EXCEPT WHERE CURBING EXISTS OR IS PROPOSED, THE MINIMUM RADIUS ON THE EDGES OF THE ENTRANCE MUST BE 10 FEET OR AS OTHERWISE REQUIRED AS SHOWN.
4. ENTRANCES/DRIVEWAYS WILL BE BUILT WITH AN ADEQUATE TURN-AROUND AREA ON SITE TO ALLOW ALL VEHICLES TO MANUVER AND PARK WITHOUT BACKING ONTO THE HIGHWAY. THIS TURN-AROUND SHALL BE AT LEAST 8 FEET WIDE BY 15 FEET LONG.
5. ENTRANCES/DRIVEWAYS AND OTHER ASSOCIATED SITE WORK WHICH DIRECTS WATER (RUNOFF) TOWARD THE HIGHWAY MUST BE CONSTRUCTED, CROWNED STABILIZED AND MAINTAINED WITH MATERIALS AND APPROPRIATE TEMPORARY/PERMANENT EROSION CONTROL MATERIALS IN ACCORDANCE WITH MDOT BEST MANAGEMENT PRACTICES.
6. THE PROFILE OF THE ENTRANCES MUST COMPLY WITH THE DETAILS SHOWN ON PAGE 2.

# MDOT Entrance / Driveway Details, Continued

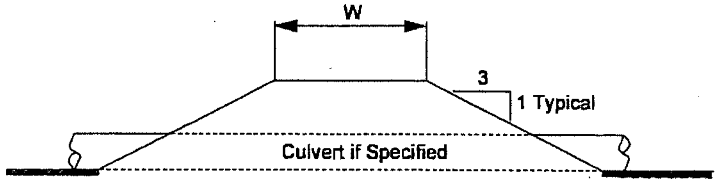
## PROFILE
## Details




NOTE :
Grade of Existing Shoulder Should Be Maintained To Create A Gutter With a Minimum Of Three Inches Below The Edge Of Traveled Way.
* Distance Of The Gutter From The Edge Of Traveled Way Should Be The Same As Existing Shoulder Or A Minimum Of 4 Feet.




## Driveway Cross Section



**ATTACHMENT F**

**STORMWATER MANAGEMENT REPORT**

SME
SEVEE & MAHER
ENGINEERS

# STORMWATER MANAGEMENT REPORT
# PUBLIC WORKS IMPROVEMENTS PROJECT AND TOWN OFFICE PARKING EXPANSION
# CUMBERLAND, MAINE

Prepared for

## TOWN OF CUMBERLAND, MAINE

STATE OF MAINE
DANIEL P. DIFFIN
11841
LICENSED
PROFESSIONAL ENGINEER

February 2020

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P.O. Box 85A
Cumberland, Maine 04021
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ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

SME
SEVEE & MAHER ENGINEERS

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**STORMWATER MANAGEMENT REPORT**
**PUBLIC WORKS AND TOWN PARKING ADDITION**
**CUMBERLAND, MAINE**

## 1.0 INTRODUCTION

This Stormwater Management Report was prepared by Sevee & Maher Engineers, Inc. (SME) to assess stormwater management design for the construction for the proposed improvements in the Town of Cumberland Public Works Improvements Project and Town Office Parking Expansion located in Cumberland, Maine. Stormwater design is based on the water quality and quantity objectives identified in Chapter 500 of the Maine Department of Environmental Protection's (MEDEP) Stormwater Management Law. This project will require a Site Location of Development Act (SLODA) Permit from the MEDEP for Common Scheme of Development.

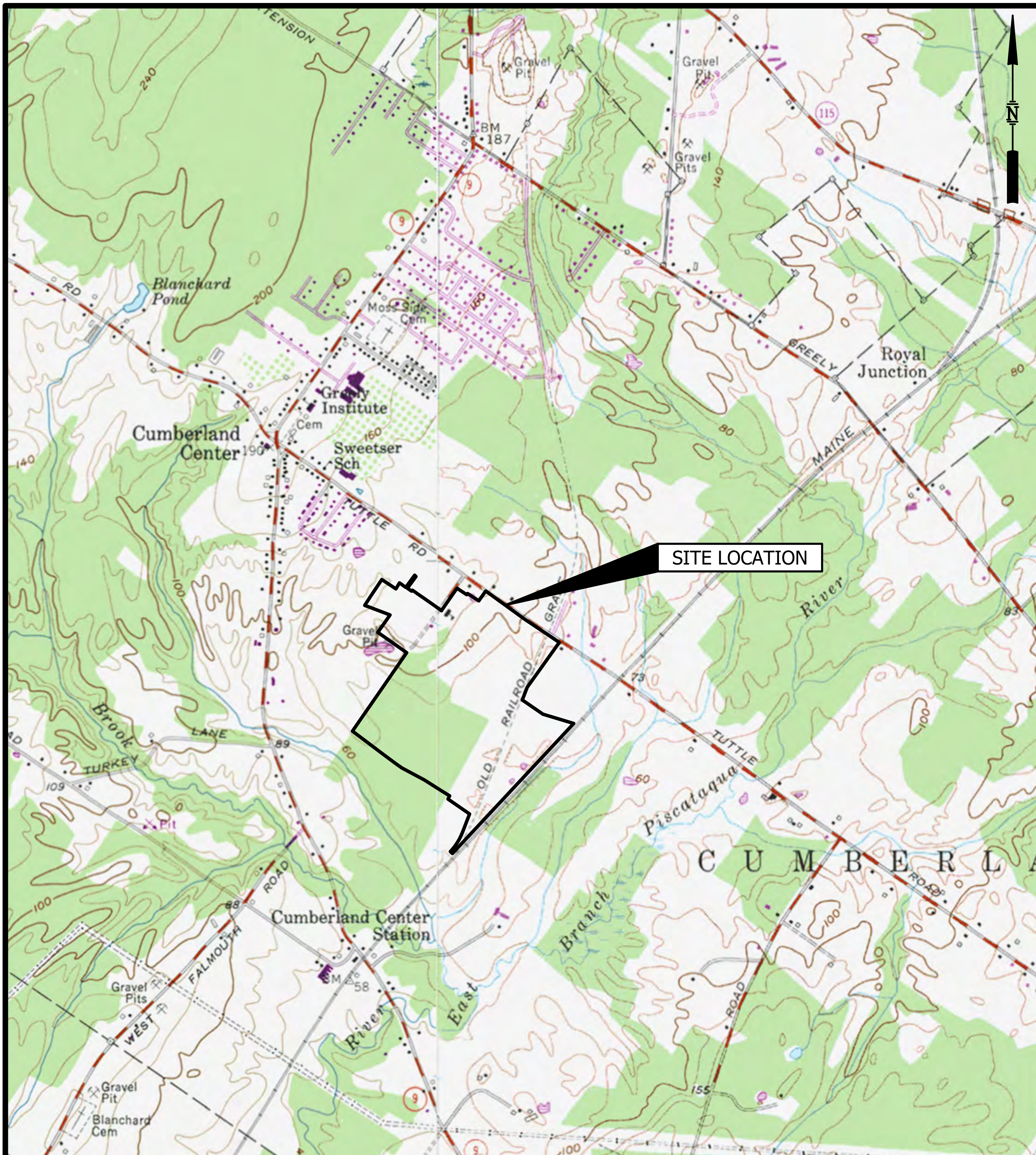
## 2.0 PROJECT DESCRIPTION

The Town of Cumberland (Town) is proposing to permit historical and proposed development on four Town owned parcels at 23 Drowne Road, 290 Tuttle Road, and setback off Tuttle Road between the Town Forest and railroad in Cumberland, Maine. The proposed development on these properties includes improvements to the Cumberland Public Works facility, the expansion of the Town Hall parking lot, and construction of a Sand/Salt Shed to relocate the existing. The Town plans to improve the facilities to benefit municipal staff, school bus drivers, and the residents of Cumberland. The four properties are shown on the attached Figure 1 Site Location Map.

The historical construction on the four parcels since 1975 and the proposed projects will result in approximately 5.14 acres of impervious area total. The parcels are also generally contiguous and require the Maine Department of Environmental Protection (MEDEP) Site Location of Development Act (SLODA) permit under the classification of Common Scheme of Development. The four parcels with the areas of each historical and proposed project are shown on the attached Figure 2 Common Scheme Neighborhood Aerial Map and the acreage of development is shown on Table 1.

Public Works Improvements Project

The Cumberland Public Works facility is located at 23 Drowne Road and is adjacent to a public Civic Lot at 3 Oak Street. The Public Works parcel is 9.2 acres and the Civic Lot is 4.4 acres in size. The existing facility includes the Public Works Garage, a cold storage building, a school bus maintenance building, an administrative trailer, sand/salt shed, school bus and staff parking, existing gravel compost pad, and a closed wood waste landfill. The existing wood waste landfill is also on the 9.2-acre property but is excluded from the SLODA permit because it is permitted under the MEDEP Solid Waste Bureau.




BASE MAP ADAPTED FROM 7.5 MIN
USGS TOPOGRAPHIC QUADRANGLES
CUMBERLAND CENTER, ME - 1975
YARMOUTH, ME - 1975

1000 0 2000 FEET

FIGURE 1
SITE LOCATION MAP
PUBLIC WORKS IMPROVEMENTS
CUMBERLAND, MAINE

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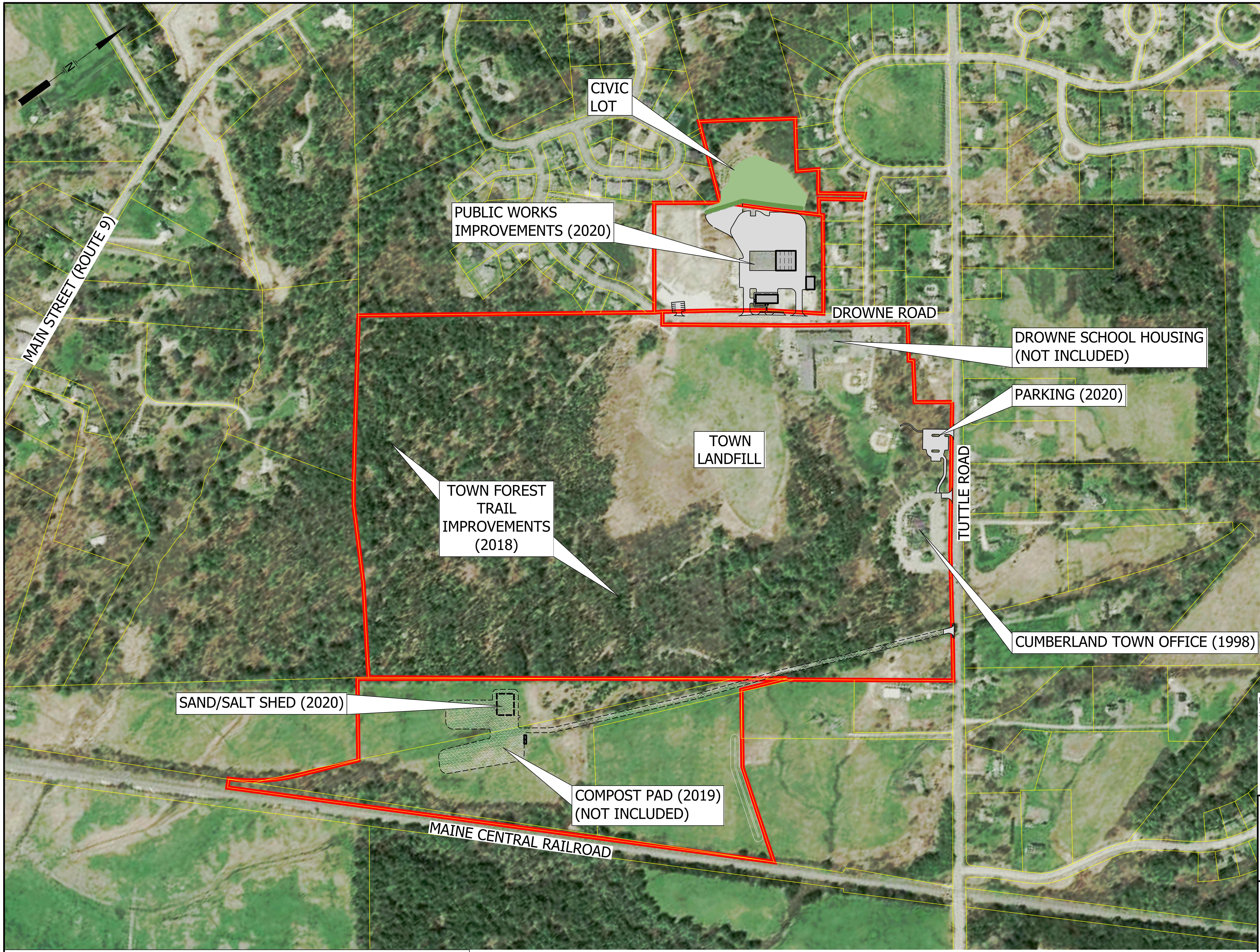
ENGINEERS

| | | | |
|---|---|---|---|
| DWG: SITELOC | LMN: COMMON SCHEME | CTB: SME-STD | REV: 12/2/2020 |

\\Nserver\cfs\TCU\Public Works Relocation\Current Site\Acad\Figures\SITELOC.dwg, 1/2/2020 11:37:13 AM, bwb




NOTES:

1. EXISTING PARCELS FROM TOWN OF CUMBERLAND GIS.
2. BASEMAP AERIAL PHOTO FROM GOOGLE EARTH, DATED 5/4/2018.

100 0 200 400 FEET

FIGURE 2
COMMON SCHEME
NEIGHBORHOOD AERIAL MAP
PUBLIC WORKS IMPROVEMENTS
CUMBERLAND, MAINE

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4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • smemaine.com

DWG: BASE | LMN: COMMON SCHEME | CTB: SME-STD | REV: 1/22/2020

**Table 1**
**<u>Town of Cumberland Municipal Upgrades</u>**
**Maine Department of Environmental Protection**
**Permitting Review of Historical Development**
Prepared by Sevee & Maher Engineers, Inc.
February 5, 2020

| Maine DEP Laws | Year | Development | Project Impervious Area from Buildings (acres)* | Project Impervious Area from Parking/Drives/Walks (acres)* | Total Impervious (acres) |
|---|---|---|---|---|---|
| | 1950 | School Building | 0.28 | 1.55 | 1.83 |
| | 1973 | Public Works (PW) Garage/Salt Pil | 0.30 | 2.66 | 2.96 |
| 1975 Site Location of Development (3-acres of non-revegetated Impervious area) | | | | | |
| | 1980 | PW Maintenance Building | 0.05 | | 0.05 |
| | 1990 | PW Cold Storage Building | 0.06 | | 0.06 |
| 1997 Stormwater Management (1-acre impervious area) | | | | | |
| | 1998 | Town Hall Building and Parking | 0.34 | 1.12 | 1.46 |
| | 2004 | Salt Shed Original Construction | 0.06 | 0.1 | 0.16 |
| 2005 Stormwater Major Update | | | | | |
| 2015 Stormwater Major Update | | | | | |
| | 2016 | Town Forest Trail Improvements | | 0.51 | 0.51 |
| | 2020 | Relocated Sand/Salt Shed Bldg. | 0.18 | 0.45 | 0.63 |
| | 2020 | Public Works Improvements | 0.35 | 1.32 | 1.67 |
| | 2020 | Parking | 0.00 | 0.60 | 0.60 |
| | | | | **<u>Total Impervious Area (after 1975)</u>** | **<u>5.14</u>** |

The proposed redevelopment includes 8,500-square-foot expansion to the existing Public Works Garage for four school bus and mechanic bays, a proposed 4,100-square-foot Office Building, the reconfiguration and expansion of site parking for forty (40) school bus spaces and 76 vehicle parking spaces, the relocation of the existing cold storage building, and construction of stormwater treatment. The project will include the demolition of the existing bus maintenance garage, the sand/salt shed, and other miscellaneous buildings. In addition, the gravel compost pads on top of the landfill and gravel storage areas on the Civic Lot will be removed and the areas revegetated and seeded with a New England Meadow Mix to promote additional growth.

The existing garage and parking area built in 1973 included 3.0 acres total of impervious area, which predates DEP Stormwater Law. The proposed area defined as redevelopment will include approximately 1.8 acres of impervious area and 1.0 acre of revegetated areas. The project will also include maintenance of approximated 1.1 acres of existing pavement that will include removal of the pavement, slight adjustments to the grades less than 12 inches, and repaving. The areas defined as redevelopment are shown on the attached Figure 3 Redevelopment Areas.

<u>Town Office Parking Expansion</u>

The Town Office, Town Forest, and Town Landfill are located at 290 Tuttle Road on a parcel 109 acres in size. An existing school, built in 1950, on the property and its historical improvements will not be included in this permit because it is privately operated via a land lease from the Town which excludes it from common scheme of development. The Town Landfill is not included in this permit because it is permitted under the DEP Solid Waste Bureau. This application incudes the Town Office building and parking which was constructed in 1998 and met the standards for development at that time. In 2016, the Town Forest trails increased by 0.5 acre of impervious area. The previous site development is shown on Figure 2.

The Town proposes to construct a parking expansion to serve as overflow during Town events and voting and additional parking for access to the Town ballfields. The parking expansion will include 36 spaces accessed via a 24-foot drive connected to the existing parking lot. A sidewalk connection will be made to the sidewalk on Tuttle Road and a small pedestrian accessway for the ballfield access. The proposed expansion will include an increase in impervious area of 0.6 acre on the property. The proposed improvements for the project are shown in the attached drawing set for Town Office Parking Expansion submitted with this application.

As shown on the drawings, the site has been designed to avoid direct wetland impacts. A Natural Resource Protection Act (NRPA) Permit by Rule (PBR) will be required for the construction of the access walk to the ballfields over the on-site stream and alterations within 75 feet of the stream. The NRPA PBR application will be submitted to MEDEP at a later date.


N

## LEGEND

REDEVELOPMENT OF LAND USE (±111,510 SF)

MAINTENANCE OF PAVEMENT (±48,970 SF)

AREAS WITHOUT SHADING TO HAVE NO SIGNIFICANT CHANGE OF LAND USE.

NOTES:

1. PROPERTY BOUNDARY PREPARED BY BOUNDARY POINTS PROFESSIONAL LAND SURVEYING, LLC, CUMBERLAND, MAINE, DATED AUGUST, 2019. VERTICAL DATUM: NAVD 1988. HORIZONTAL DATUM: NAD83.

25 0 50 100 FEET

# FIGURE 3
# REDEVELOPMENT AREAS
# TOWN OF CUMBERLAND
# PUBLIC WORKS IMPROVEMENTS
# DROWNE ROAD
# CUMBERLAND, MAINE

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| DWG: | BASE | LMN: | REDEVELOPMENT | CTB: | SME-STD | REV: | 1/22/2020 |
|---|---|---|---|---|---|---|---|

## 3.0 SITE WATERSHED

On-site soils for both sites were identified using the Natural Resources Conservation Service (NRCS) soil information for Cumberland and Part of Oxford County, Maine. A copy of the custom Soil Resource Report is included in Appendix A of this report. The report includes a soil map for the project area. Soil mapping information is also included in the project plan sets.

The soil within the watersheds for the consist of Suffield (SuD2/SuC2) silt loam, Nicholville (BgB) very sandy silt loam, Lamoine (BuB) silt loam, Elmwood (EmB) fine sandy loam, Scantic (Sn) silt loam, Hinkley-Suffield (HnC) complex, and Gravel pits (Gp). Soil natural drainage classifications range from “Excessively drained” to “Poorly drained.” Hydrologic soil groups range from Type A to Type D.

Stormwater management plans identify the on-site drainage patterns before and after development (see Drawings D-100 and D-101). These drawings are included in both project plan set for reference. Appendix B provides pre-development stormwater calculations and Appendix C includes post development calculations. These calculations were prepared using TR-20 methodologies within the HydroCAD Version 10.0 computer stormwater modeling system by Applied Microcomputer Systems of Chocorua, New Hampshire.

Public Works Improvements Project

The existing Public Works facility and Civic Lot is a local high point that drains to three distinct Analysis Points. The first, identified as Analysis Point 1 (AP1), is an existing pond south of the wood waste landfill. AP1 receives flows from the closed wood waste landfill, existing gravel compost pad and existing sand/salt shed area, which drain southeasterly via overland flow and riprap lined drainage swales on or abutting the closed landfill. In addition, most of the public works site drains toward Drowne Road and into a series of catch basins and closed storm drain system that outlet to the pond. The rear of the public works site and front of the Civic Lot also drain to a culvert that flows into a 15-inch storm drain system and to the pond.

The areas draining to AP1 in post developed conditions will generally flow similar to existing conditions. Approximately 1.5 acres of gravel pad will be removed from the existing compost area over the top of the closed landfill. In addition, the sand/salt shed and most of the paved and gravel surface in the area will be removed and seeded as lawn. Additional pavement will be added around the public works facility to accommodate the expanded parking, and areas in the subcatchment will drain to three distinct stormwater treatment measures, an underdrained soil filter, a Filterra Tree Box Filter and a roof dripline filter.

AP2 is a point to the west of the civic lot and includes flows from the rear half of the civic lot via overland flows. The catchment consists of gravel surface storage areas used for existing public works operations that will be revegetated and seeded as meadow areas in post development. The flow patterns to AP2 will be generally similar in post development conditions.

AP3 is an existing drainage easement north of the site that conveys flows to a culvert in Oak Street. The drainage subcatchment to AP3 is a small area on the northwest portion of the Public Works site that includes impervious areas associated with the existing snowmobile club shed. In developed conditions, the shed will be removed and reseeded and the overall catchment size will be reduced as a result of a slight revision to flow patterns in the area.

The soil within the watersheds for the public work project consist of Suffield (SuD2/SuC2) silt loam, Nicholville (BgB) very sandy silt loam, Lamoine (BuB) silt loam, Scantic (Sn) silt loam, Hinkley-Suffield (HnC) complex, and Gravel pits (Gp). Soil natural drainage classifications range from “Excessively drained” to “Poorly drained.” Hydrologic soil groups range from Type A to Type D. The soils from the report in the area of the wood waste landfill closure include areas of Gp and BgB which are classified as HSG A and HSG B, respectively. To accurately represent the soil liner over the extents of the landfill these HSG A and HSG B soil types were revised to HSG D with a meadow land cover.

Town Office Parking Expansion

The area within the footprint of the proposed parking lot is currently undeveloped wooded land that slopes from west to east between 6 and 9 percent grade. Stormwater runoff flows southeasterly to an existing stream and wetland complex that outlets to the larger wetland complex within the Town Forest area.

The proposed parking area will result in approximately 18,800 square feet of new impervious area and 25,800 square feet of new developed area. Stormwater runoff from the new parking lot will generally flow in the same direction and be captured in two underdrained soil filters that will provide treatment and peak flow attenuation.

The soil within the watersheds for the parking expansion consist of Lamoine (BuB) silt loam and Elmwood (EmB) fine sandy loam. Soil natural drainage classifications range from “Excessively drained” to “Poorly drained.” Hydrologic soil groups range from Type B to Type C.

## 4.0 BASIC STANDARDS

Erosion and Sediment Control details are included on the drawings and in Section 14 of the SLODA Permit application.

## 5.0 GENERAL STANDARDS

The following is a summary of how the two projects meet the General Standards outlined in Chapter 500.

Public Works Improvements Project

The Public Works project is required to meet the Redevelopment portion of the General Standards since the site is fully developed in existing conditions. The areas considered as redevelopment on the site are shown Figure 3 Redevelopment Areas and total approximately 111,500 square feet. Figure 3 also highlights the portion of the project site that meets the definition of maintenance reviewed with the DEP staff during the pre-application meeting. The site area within the extents of the existing landfill, including a large portion of the gravel compost pad, are permitted under a MEDEP Solid Waste Bureau Permit and not subject to Site Law. In general, the definition is the areas where grade was not raised or lowered more than 12 inches and the general flow patterns were not significantly revised. The Redevelopment Treatment Level Calculations are included in Appendix D of this report and show the project must provide treatment for approximately 50 percent of the redeveloped area or 56,303 square feet.

This treatment will be provided through construction of an underdrained soil filter, Filterra Tree Box Filter, and roof dripline filters on the new administration building.

The underdrained soil filter has been designed to capture runoff from the bus and bus driver parking on the north of the site. The areas captured include portions of the proposed public works building expansion. The soil filter will treat 23,200 square feet of impervious area and 12,100 square feet of landscaped area, for a total of 35,300 square feet.

The Filterra Tree Box Filter was designed to capture runoff from the southerly site entrance and parking and maneuvering areas along the south side of the existing public works building. The Filterra unit was sized in accordance with the manufacturer's recommendations as evidenced by the approval letter included in Appendix G. The treatment provided will be for approximately 15,600 square feet of impervious area and 1,300 square feet of landscaped area, for a total of 16,900 square feet of treatment.

The new administration building will be treated with the construction of dripline filters at each drip edge along the full length of the building. The roof dripline filters will capture 4,100 square feet of area total.

The three treatment measures combined will treat approximately 42,900 square feet of impervious area and 13,412 square feet of landscaped area. This is equivalent to 50.5 percent of the total redeveloped areas on the public works site.

The sizing for the treatment measures and the Treatment Summary are included in Appendix E of this report.

Town Office Parking Expansion

Stormwater treatment at the Town Office Parking Expansion will be accomplished by directing flow from the new development to two underdrained soil filters. The flows from most of the parking area will be treated in Underdrained Soil Filter 1, which will treat 13,900 square feet of impervious area and 2,700 square feet of landscaped area. Underdrained soil filter 2 was sized to treat 3,900 square feet of impervious and 3,900 square feet of lawn area from the access drive connecting the existing Town Office Parking Expansion to the new parking area.

The two filters have been designed to treat 95 percent of the 18,800 square feet of new impervious area and 95 percent of the 25,800 square feet of new developed area. The sizing calculations for the underdrained soil filters and the Treatment Summary are included in Appendix F of this report.

## 6.0 FLOODING STANDARDS

Stormwater quantity is managed to the maximum extent practicable through minimizing the amount of impervious area on the site, revegetating the cleared and grubbed area with meadow seed, and utilizing the storage characteristics of the grassed underdrained soil filter north of the proposed building.

The stormwater model for these projects were developed to size the water quality treatment BMPs and to determine peak flow rates to the identified Analysis Points. Stormwater peak flow rates were modeled for the 2-, 10-, and 25-year/24-hour storm events with Type III Soil Conservation Service rainfall distribution, using the HydroCAD computer modeling system by Applied Microcomputer Systems of Chocorua, New Hampshire. The peak flow rates at each Analysis Point are summarized in Tables 2 and 3. Rainfall intensities were taken from Appendix H of MEDEP’s Chapter 500 for each of the storms. The peak flows for each project are presented in the following subsections of this report.

### Public Works

The following table provides the results of the modelling for peak flows at the Analysis Points for the Public Works Facility. Copies of the HydroCAD calculations for the Public Works project provided in Appendix B.

**TABLE 2**

**PUBLIC WORKS IMPROVEMENTS**
**STORMWATER QUANTITY SUMMARY**

| | 2-Year Storm | | 10-Year Storm | | 25-Year Storm | |
|---|---|---|---|---|---|---|
| | **Existing** | **Proposed** | **Existing** | **Proposed** | **Existing** | **Proposed** |
| **Analysis Point 1 (cfs)** | 12.05 | 10.72 | 23.99 | 19.42 | 32.38 | 25.78 |
| **Analysis Point 2 (cfs)** | 4.50 | 4.21 | 9.77 | 9.36 | 14.41 | 13.94 |
| **Analysis Point 3 (cfs)** | 0.36 | 0.25 | 0.76 | 0.58 | 1.11 | 0.87 |

As shown, site drainage from the proposed redevelopment will generally follow the pre-development conditions.

Flows at AP1 will decrease due to the removal of the gravel compost pad and sand/salt shed building. In addition, flows will be attenuated for the areas draining to the Filterra Tree Box Filter and Underdrained Soil Filter.

The flows at AP2 and AP3 will decrease from the revegetation of the gravel areas on the Civic Lot and reduction of the catchment to AP3.

## Town Office Parking Expansion

The peak flow rates for the Town Office Parking Expansion are shown in Table 3. Copies of the HydroCAD calculations for the Public Works project are provided in Appendix C.

**TABLE 3**

**TOWN OFFICE PARKING EXPANSION**
**STORMWATER QUANTITY SUMMARY**

| | 2-Year Storm | | 10-Year Storm | | 25-Year Storm | |
|---|---|---|---|---|---|---|
| | **Existing** | **Proposed** | **Existing** | **Proposed** | **Existing** | **Proposed** |
| **Analysis Point 1 (cfs)** | 0.85 | 0.82 | 3.35 | 3.14 | 5.96 | 6.67 |

As outlined in Table 3, our model indicates decreased peak flow rates at AP-1 during the 2-year and 10-year storms and an increase during the 25-year storm of 0.71 cfs. The attenuation of the flows from the paved parking area is accomplished in the two underdrained soil filters which were oversized to capture the 10-year storm. The increase at AP-1 during the 25-year storm is equivalent to a 12 percent increase, but less than one cfs. The downstream channel is a wetland complex within the Town Office property that will not be adversely impacted by this minor increase during larger storm events.

## 7.0 MAINTENANCE PLAN, INSPECTIONS, AND REQUIREMENTS

Maintenance of the proposed facility and stormwater treatment BMPs will be performed by the Town Public Works personnel for the soil filters and Contech for the Tree Box Filter for the first year after installation. Contact information for the facility and Owner's representative is included in the Post-Construction Stormwater Management Plan, attached as Appendix H. During construction, the site work contractor (not yet selected) will be responsible for all site maintenance. The Post-Construction Stormwater Management Plan describes the facilities to be maintained and includes sample maintenance logs. The Town will procure a third-party contract for the maintenance of the Filterra unit after the first year is up.

## 8.0 CONCLUSION

The stormwater management for the Public Works and Town Office projects was designed in accordance with MEDEP Chapter 500 requirements for new development. Water quality treatment will be provided by a grassed underdrained soil filters, roof dripline filters, and a tree box filter outlined in Section 5.0 of this report.

The peak flows for each project site have been controlled to less than the pre-development conditions. As a result, there will be no adverse impacts on downstream drainage or abutting properties.

**APPENDIX A**

**USDA SOIL REPORT**

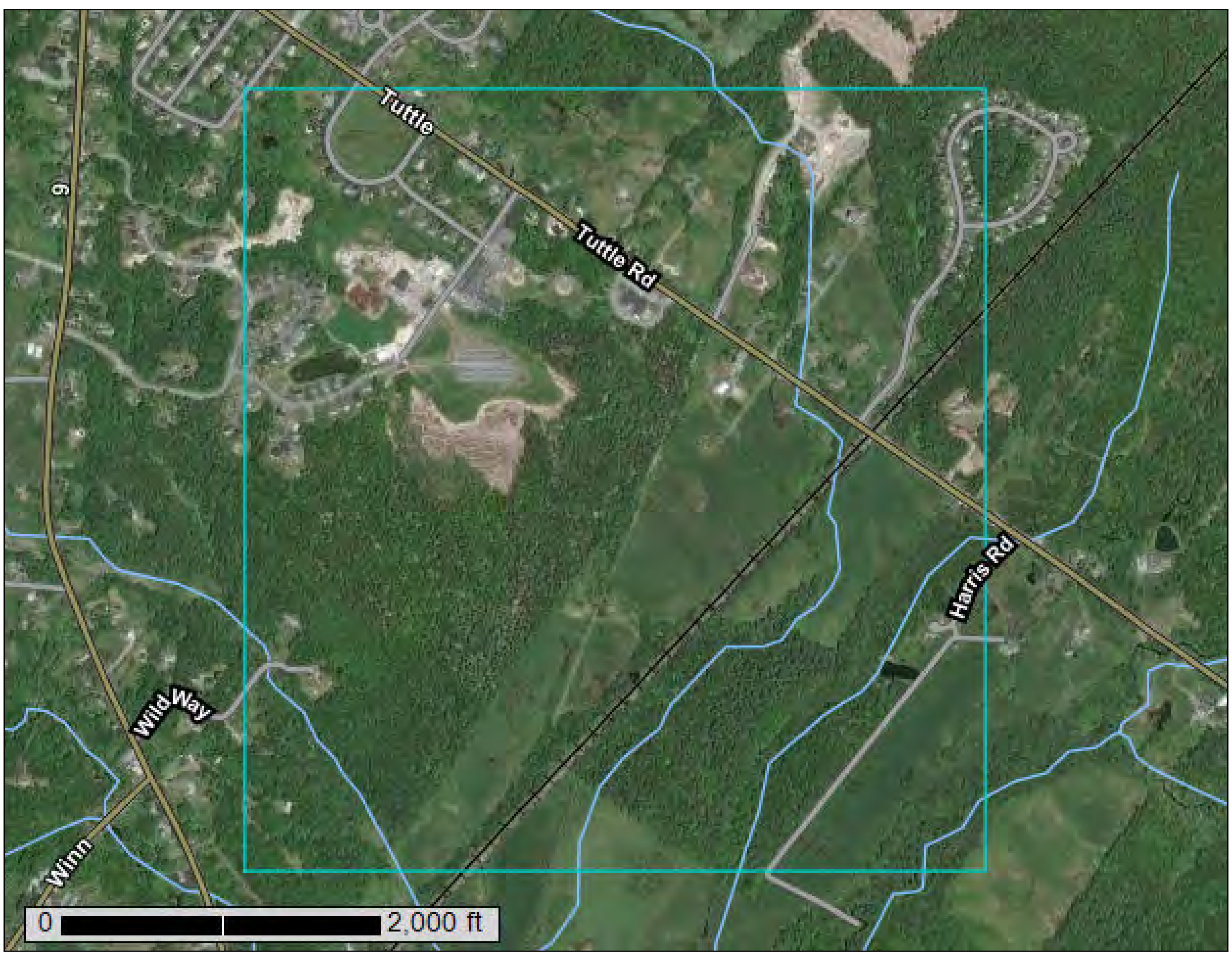
SME
SEVEE & MAHER
ENGINEERS

United States Department of Agriculture

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 Cumberland County and Part of Oxford County, Maine




January 8, 2020

# 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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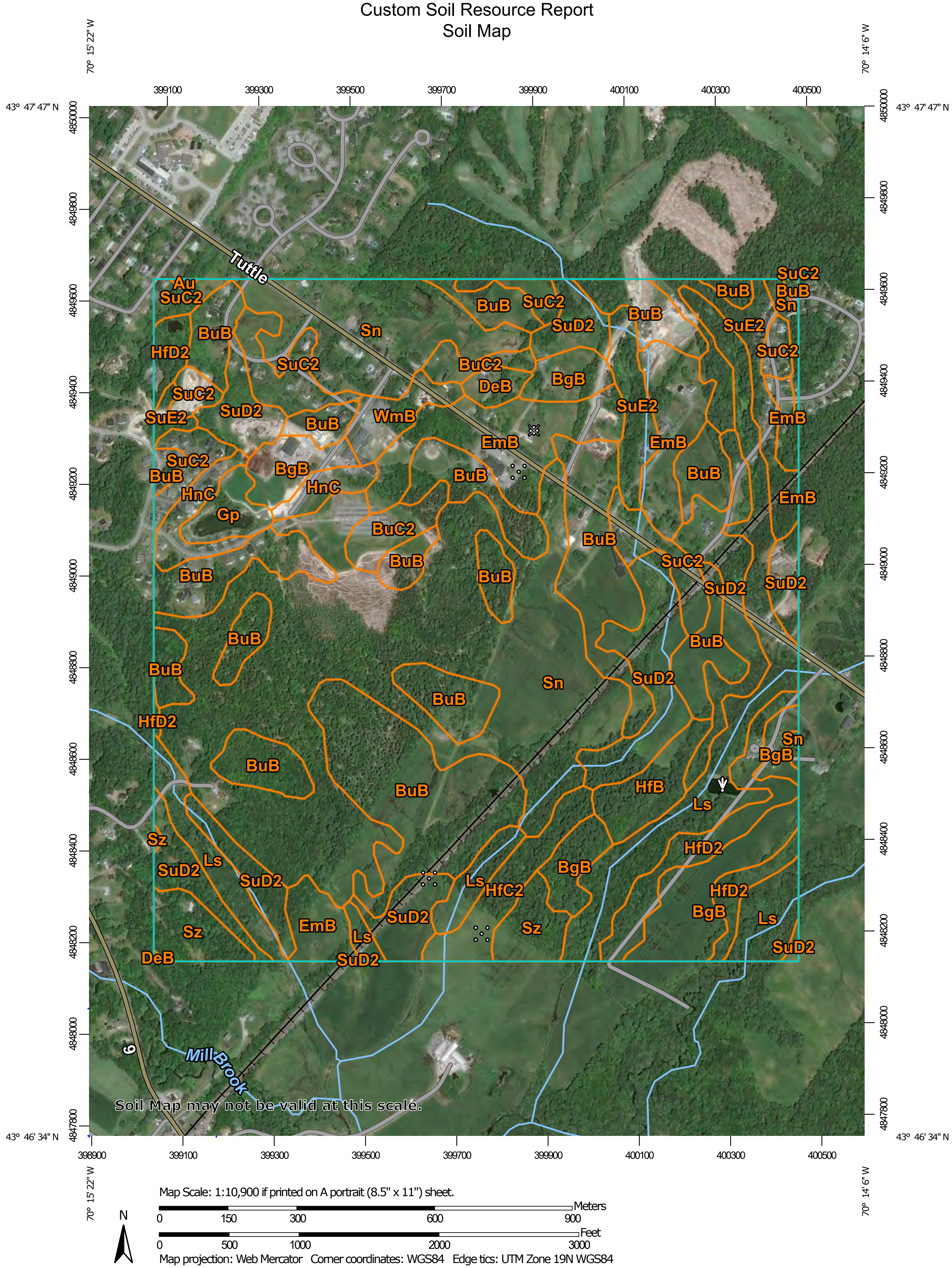
# Contents

# 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.

Soil Map




Map Scale: 1:10,900 if printed on A portrait (8.5" x 11") sheet.

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 1:24,000.

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: Cumberland County and Part of Oxford County, Maine
Survey Area Data: Version 16, Sep 16, 2019

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

Date(s) aerial images were photographed: Jun 7, 2019—Jul 2, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

| MAP LEGEND | MAP INFORMATION |
| --- | --- |
| | 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 |
|---|---|---|---|
| Au | Au Gres loamy sand | 0.2 | 0.0% |
| BgB | Nicholville very fine sandy loam, 0 to 8 percent slopes | 28.4 | 5.4% |
| BuB | Lamoine silt loam, 3 to 8 percent slopes | 110.8 | 21.2% |
| BuC2 | Buxton silt loam, 8 to 15 percent slopes | 7.7 | 1.5% |
| DeB | Deerfield loamy fine sand, 3 to 8 percent slopes | 2.4 | 0.5% |
| EmB | Elmwood fine sandy loam, 0 to 8 percent slopes | 34.8 | 6.7% |
| Gp | Gravel pits | 4.7 | 0.9% |
| HfB | Hartland very fine sandy loam, 3 to 8 percent slopes | 7.1 | 1.4% |
| HfC2 | Hartland very fine sandy loam, 8 to 15 percent slopes, eroded | 8.6 | 1.7% |
| HfD2 | Hartland very fine sandy loam, 15 to 25 percent slopes, eroded | 16.7 | 3.2% |
| HnC | Hinckley-Suffield complex, 8 to 15 percent slopes | 7.9 | 1.5% |
| Ls | Limerick-Saco silt loams | 45.0 | 8.6% |
| Sn | Scantic silt loam, 0 to 3 percent slopes | 133.1 | 25.5% |
| SuC2 | Suffield silt loam, 8 to 15 percent slopes, eroded | 24.1 | 4.6% |
| SuD2 | Suffield silt loam, 15 to 25 percent slopes, eroded | 54.2 | 10.4% |
| SuE2 | Suffield silt loam, 25 to 45 percent slopes, eroded | 19.3 | 3.7% |
| Sz | Swanton fine sandy loam | 11.3 | 2.2% |
| WmB | Windsor loamy sand, 0 to 8 percent slopes | 5.4 | 1.0% |
| **Totals for Area of Interest** | | **521.8** | **100.0%** |

# Map Unit Descriptions

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

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

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

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

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

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

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

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

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps.

The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

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

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

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

# Cumberland County and Part of Oxford County, Maine

## Au—Au Gres loamy sand

### Map Unit Setting

*National map unit symbol:* blgr
*Elevation:* 10 to 2,200 feet
*Mean annual precipitation:* 29 to 50 inches
*Mean annual air temperature:* 37 to 46 degrees F
*Frost-free period:* 70 to 160 days
*Farmland classification:* Not prime farmland

### Map Unit Composition

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

### Description of Au Gres

#### Setting

*Landform:* Outwash plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Sandy glaciofluvial deposits derived from granite and gneiss

#### Typical profile

*H1 - 0 to 10 inches:* loamy sand
*H2 - 10 to 32 inches:* loamy sand
*H3 - 32 to 65 inches:* sand

#### Properties and qualities

*Slope:* 0 to 3 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Poorly drained
*Capacity of the most limiting layer to transmit water (Ksat):* High (2.00 to 6.00 in/hr)
*Depth to water table:* About 0 to 18 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* Low (about 3.6 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 4w
*Hydrologic Soil Group:* A/D
*Hydric soil rating:* Yes

### Minor Components

#### Saugatuck

*Percent of map unit:* 6 percent
*Landform:* Outwash plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Talf

*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* Yes

**Deerfield**

*Percent of map unit:* 4 percent
*Landform:* Outwash plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Rise
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Scantic**

*Percent of map unit:* 2 percent
*Landform:* Coastal plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Dip
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

**Walpole**

*Percent of map unit:* 2 percent
*Landform:* Outwash plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* Yes

**Windsor**

*Percent of map unit:* 1 percent
*Landform:* Outwash plains
*Landform position (two-dimensional):* Summit
*Landform position (three-dimensional):* Rise
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

## BgB—Nicholville very fine sandy loam, 0 to 8 percent slopes

### Map Unit Setting

*National map unit symbol:* 2yjg5
*Elevation:* 20 to 2,300 feet
*Mean annual precipitation:* 34 to 50 inches
*Mean annual air temperature:* 37 to 45 degrees F
*Frost-free period:* 90 to 160 days
*Farmland classification:* Farmland of statewide importance

**Map Unit Composition**

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

**Description of Nicholville**

**Setting**

*Landform:* Lakebeds (relict)
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Side slope
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Coarse-silty glaciomarine deposits

**Typical profile**

*Ap - 0 to 7 inches:* very fine sandy loam
*Bs - 7 to 19 inches:* very fine sandy loam
*BC - 19 to 30 inches:* very fine sandy loam
*C - 30 to 65 inches:* loamy very fine sand

**Properties and qualities**

*Slope:* 0 to 8 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Moderately well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.14 to 1.42 in/hr)
*Depth to water table:* About 18 to 30 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:* High (about 10.3 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 2e
*Hydrologic Soil Group:* C
*Hydric soil rating:* No

**Minor Components**

**Croghan**

*Percent of map unit:* 5 percent
*Landform:* Lakebeds (relict)
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Side slope
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Roundabout, somewhat poorly drained**

*Percent of map unit:* 5 percent
*Landform:* Lakebeds (relict)
*Landform position (two-dimensional):* Footslope, toeslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Linear

*Across-slope shape:* Linear
*Hydric soil rating:* No

**Salmon**

*Percent of map unit:* 3 percent
*Landform:* Lakebeds (relict)
*Landform position (two-dimensional):* Backslope, summit
*Landform position (three-dimensional):* Side slope, crest
*Down-slope shape:* Linear
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Roundabout**

*Percent of map unit:* 2 percent
*Landform:* Lakebeds (relict)
*Landform position (two-dimensional):* Footslope, toeslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Linear
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

## BuB—Lamoine silt loam, 3 to 8 percent slopes

**Map Unit Setting**

*National map unit symbol:* 2t0kc
*Elevation:* 10 to 490 feet
*Mean annual precipitation:* 33 to 60 inches
*Mean annual air temperature:* 36 to 52 degrees F
*Frost-free period:* 90 to 160 days
*Farmland classification:* Farmland of statewide importance

**Map Unit Composition**

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

**Description of Lamoine**

**Setting**

*Landform:* Marine terraces, river valleys
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Fine glaciomarine deposits

**Typical profile**

*Ap - 0 to 7 inches:* silt loam
*Bw - 7 to 13 inches:* silt loam
*Bg - 13 to 24 inches:* silty clay loam
*Cg - 24 to 65 inches:* silty clay

**Properties and qualities**

*Slope:* 3 to 8 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Somewhat poorly drained
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.14 in/hr)
*Depth to water table:* About 6 to 17 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:* Moderate (about 7.6 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 3w
*Hydrologic Soil Group:* C/D
*Hydric soil rating:* No

## Minor Components

**Scantic**

*Percent of map unit:* 10 percent
*Landform:* Marine terraces, river valleys
*Landform position (two-dimensional):* Toeslope, footslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Linear
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

**Buxton**

*Percent of map unit:* 3 percent
*Landform:* Marine terraces, river valleys
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Side slope
*Down-slope shape:* Linear
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Ragmuff**

*Percent of map unit:* 1 percent
*Landform:* Marine terraces, river valleys
*Landform position (two-dimensional):* Backslope, shoulder
*Landform position (three-dimensional):* Side slope, base slope
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Biddeford**

*Percent of map unit:* 1 percent
*Landform:* Marine terraces, river valleys
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Ecological site:* Marine Terrace Depression (F144BY002ME)
*Hydric soil rating:* Yes

## BuC2—Buxton silt loam, 8 to 15 percent slopes

**Map Unit Setting**

*National map unit symbol:* 2x1by
*Elevation:* 10 to 490 feet
*Mean annual precipitation:* 33 to 60 inches
*Mean annual air temperature:* 36 to 52 degrees F
*Frost-free period:* 90 to 160 days
*Farmland classification:* Not prime farmland

**Map Unit Composition**

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

**Description of Buxton**

**Setting**

*Landform:* Marine terraces, river valleys
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Side slope
*Down-slope shape:* Linear
*Across-slope shape:* Convex
*Parent material:* Fine glaciomarine deposits

**Typical profile**

*Ap - 0 to 7 inches:* silt loam
*Bw1 - 7 to 18 inches:* silt loam
*Bw2 - 18 to 23 inches:* silty clay loam
*BC - 23 to 35 inches:* silty clay loam
*C - 35 to 65 inches:* silty clay

**Properties and qualities**

*Slope:* 8 to 15 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Moderately well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.14 in/hr)
*Depth to water table:* About 17 to 24 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:* High (about 9.1 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 3e
*Hydrologic Soil Group:* C/D
*Hydric soil rating:* No

**Minor Components**

**Lamoine**

*Percent of map unit:* 7 percent
*Landform:* Marine terraces, river valleys
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Scantic**

*Percent of map unit:* 5 percent
*Landform:* Marine terraces, river valleys
*Landform position (two-dimensional):* Toeslope, footslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

**Buxton, >15% slopes**

*Percent of map unit:* 3 percent
*Landform:* Marine terraces, river valleys
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Side slope
*Down-slope shape:* Linear
*Across-slope shape:* Convex
*Hydric soil rating:* No

## DeB—Deerfield loamy fine sand, 3 to 8 percent slopes

**Map Unit Setting**

*National map unit symbol:* 2xfg9
*Elevation:* 0 to 1,190 feet
*Mean annual precipitation:* 36 to 71 inches
*Mean annual air temperature:* 39 to 55 degrees F
*Frost-free period:* 145 to 240 days
*Farmland classification:* Farmland of statewide importance

**Map Unit Composition**

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

**Description of Deerfield**

**Setting**

*Landform:* Kame terraces, outwash plains, outwash terraces, outwash deltas
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Convex, linear, concave

*Across-slope shape:* Concave, linear, convex
*Parent material:* Sandy outwash derived from granite, gneiss, and/or quartzite

**Typical profile**

*Ap - 0 to 9 inches:* loamy fine sand
*Bw - 9 to 25 inches:* loamy fine sand
*BC - 25 to 33 inches:* fine sand
*Cg - 33 to 60 inches:* sand

**Properties and qualities**

*Slope:* 3 to 8 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Moderately well drained
*Runoff class:* Very 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:* About 15 to 37 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Salinity, maximum in profile:* Nonsaline (0.0 to 1.9 mmhos/cm)
*Sodium adsorption ratio, maximum in profile:* 11.0
*Available water storage in profile:* Moderate (about 6.5 inches)

**Interpretive groups**

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

### Minor Components

**Windsor**

*Percent of map unit:* 7 percent
*Landform:* Outwash deltas, kame terraces, outwash plains, outwash terraces
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear, concave, convex
*Across-slope shape:* Concave, linear, convex
*Hydric soil rating:* No

**Wareham**

*Percent of map unit:* 5 percent
*Landform:* Depressions, drainageways
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

**Sudbury**

*Percent of map unit:* 2 percent
*Landform:* Outwash plains, outwash terraces, outwash deltas, kame terraces
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear, convex, concave
*Across-slope shape:* Concave, linear, convex
*Hydric soil rating:* No

**Ninigret**

*Percent of map unit:* 1 percent
*Landform:* Kame terraces, outwash terraces, outwash plains
*Landform position (three-dimensional):* Tread

*Down-slope shape:* Convex, linear
*Across-slope shape:* Convex, concave
*Hydric soil rating:* No

## EmB—Elmwood fine sandy loam, 0 to 8 percent slopes

**Map Unit Setting**

*National map unit symbol:* blh8
*Elevation:* 10 to 900 feet
*Mean annual precipitation:* 36 to 55 inches
*Mean annual air temperature:* 39 to 46 degrees F
*Frost-free period:* 90 to 195 days
*Farmland classification:* All areas are prime farmland

**Map Unit Composition**

*Elmwood and similar soils:* 88 percent
*Minor components:* 12 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Elmwood**

**Setting**

*Landform:* Stream terraces
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Coarse-loamy glaciolacustrine deposits

**Typical profile**

*H1 - 0 to 8 inches:* fine sandy loam
*H2 - 8 to 25 inches:* sandy loam
*H3 - 25 to 65 inches:* silty clay loam

**Properties and qualities**

*Slope:* 0 to 8 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Moderately well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)
*Depth to water table:* About 18 to 36 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* High (about 9.7 inches)

**Interpretive groups**

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

### Minor Components

#### Swanton

*Percent of map unit:* 7 percent
*Landform:* Stream terraces
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* Yes

#### Melrose

*Percent of map unit:* 3 percent
*Landform:* Stream terraces
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

#### Whately

*Percent of map unit:* 2 percent
*Landform:* Stream terraces
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

## Gp—Gravel pits

### Map Unit Setting

*National map unit symbol:* blh9
*Elevation:* 10 to 2,200 feet
*Mean annual precipitation:* 30 to 50 inches
*Mean annual air temperature:* 37 to 46 degrees F
*Frost-free period:* 70 to 160 days
*Farmland classification:* Not prime farmland

### Map Unit Composition

*Gravel pits:* 92 percent
*Minor components:* 8 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Gravel Pits

#### Typical profile

*H1 - 0 to 6 inches:* extremely gravelly sand
*H2 - 6 to 60 inches:* extremely gravelly sand

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 8s
*Hydric soil rating:* No

### Minor Components

**Hinckley**

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

**Windsor**

*Percent of map unit:* 2 percent
*Landform:* Outwash terraces
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Deerfield**

*Percent of map unit:* 1 percent
*Landform:* Outwash terraces
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

## HfB—Hartland very fine sandy loam, 3 to 8 percent slopes

### Map Unit Setting

*National map unit symbol:* blhb
*Elevation:* 10 to 2,500 feet
*Mean annual precipitation:* 34 to 55 inches
*Mean annual air temperature:* 37 to 46 degrees F
*Frost-free period:* 60 to 195 days
*Farmland classification:* Farmland of statewide importance

### Map Unit Composition

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

### Description of Hartland

#### Setting

*Landform:* Lakebeds
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Coarse-silty glaciolacustrine deposits

#### Typical profile

*H1 - 0 to 9 inches:* very fine sandy loam
*H2 - 9 to 29 inches:* silt loam
*H3 - 29 to 65 inches:* silt loam

#### Properties and qualities

*Slope:* 3 to 8 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* High (about 11.8 inches)

#### Interpretive groups

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

### Minor Components

#### Belgrade

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

#### Elmwood

*Percent of map unit:* 3 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

#### Tunbridge

*Percent of map unit:* 2 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Tread

*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Buxton**

*Percent of map unit:* 2 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Hartland, slopes >8%**

*Percent of map unit:* 1 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Hartland, slopes <3%**

*Percent of map unit:* 1 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Roundabout**

*Percent of map unit:* 1 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

## HfC2—Hartland very fine sandy loam, 8 to 15 percent slopes, eroded

### Map Unit Setting

*National map unit symbol:* blhc
*Elevation:* 10 to 2,500 feet
*Mean annual precipitation:* 34 to 50 inches
*Mean annual air temperature:* 37 to 46 degrees F
*Frost-free period:* 60 to 160 days
*Farmland classification:* Not prime farmland

**Map Unit Composition**

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

**Description of Hartland**

**Setting**

*Landform:* Lakebeds
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Coarse-silty glaciolacustrine deposits

**Typical profile**

*H1 - 0 to 9 inches:* very fine sandy loam
*H2 - 9 to 29 inches:* silt loam
*H3 - 29 to 65 inches:* silt loam

**Properties and qualities**

*Slope:* 8 to 15 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* High (about 11.8 inches)

**Interpretive groups**

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

**Minor Components**

**Belgrade**

*Percent of map unit:* 6 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Buxton**

*Percent of map unit:* 3 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Tunbridge**

*Percent of map unit:* 2 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Hollis**

*Percent of map unit:* 2 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Hartland, slopes >15%**

*Percent of map unit:* 1 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Hartland, slopes <8%**

*Percent of map unit:* 1 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

## HfD2—Hartland very fine sandy loam, 15 to 25 percent slopes, eroded

### Map Unit Setting

*National map unit symbol:* blhd
*Elevation:* 10 to 900 feet
*Mean annual precipitation:* 34 to 48 inches
*Mean annual air temperature:* 43 to 46 degrees F
*Frost-free period:* 90 to 160 days
*Farmland classification:* Not prime farmland

### Map Unit Composition

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

### Description of Hartland

#### Setting

*Landform:* Lakebeds
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Coarse-silty glaciolacustrine deposits

#### Typical profile

*H1 - 0 to 9 inches:* very fine sandy loam
*H2 - 9 to 29 inches:* silt loam
*H3 - 29 to 65 inches:* silt loam

#### Properties and qualities

*Slope:* 15 to 25 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* High (about 11.8 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 4e
*Hydrologic Soil Group:* B
*Hydric soil rating:* No

### Minor Components

#### Melrose

*Percent of map unit:* 7 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

#### Buxton

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

#### Hartland, slopes <15%

*Percent of map unit:* 2 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Tread

*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Hartland, slopes >25%**
*Percent of map unit:* 1 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

## HnC—Hinckley-Suffield complex, 8 to 15 percent slopes

**Map Unit Setting**
*National map unit symbol:* 2svlx
*Elevation:* 0 to 470 feet
*Mean annual precipitation:* 36 to 71 inches
*Mean annual air temperature:* 39 to 55 degrees F
*Frost-free period:* 145 to 240 days
*Farmland classification:* Not prime farmland

**Map Unit Composition**
*Hinckley and similar soils:* 60 percent
*Suffield and similar soils:* 25 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Hinckley**

**Setting**
*Landform:* Kame terraces, outwash plains, kames, eskers, moraines, outwash terraces, outwash deltas
*Landform position (two-dimensional):* Shoulder, backslope, footslope
*Landform position (three-dimensional):* Nose slope, side slope, crest, head slope, riser
*Down-slope shape:* Linear, convex, concave
*Across-slope shape:* Convex, linear, concave
*Parent material:* Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

**Typical profile**
*A - 0 to 8 inches:* loamy sand
*Bw1 - 8 to 11 inches:* gravelly loamy sand
*Bw2 - 11 to 16 inches:* gravelly loamy sand
*BC - 16 to 19 inches:* very gravelly loamy sand
*C - 19 to 65 inches:* very gravelly sand

**Properties and qualities**
*Slope:* 8 to 15 percent

*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Excessively drained
*Runoff class:* Very 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:* Very low (about 2.9 inches)

**Interpretive groups**
*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 4e
*Hydrologic Soil Group:* A
*Hydric soil rating:* No

### Description of Suffield

**Setting**
*Landform:* Marine terraces
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Parent material:* Silty glaciolacustrine deposits over clayey glaciolacustrine deposits

**Typical profile**
*Ap - 0 to 6 inches:* silt loam
*Bw - 6 to 18 inches:* silt loam
*2C - 18 to 65 inches:* silty clay loam

**Properties and qualities**
*Slope:* 8 to 15 percent
*Depth to restrictive feature:* 18 to 39 inches to strongly contrasting textural stratification
*Natural drainage class:* Moderately well drained
*Runoff class:* Medium
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)
*Depth to water table:* About 18 to 30 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*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:* C
*Hydric soil rating:* No

### Minor Components

**Melrose**
*Percent of map unit:* 5 percent
*Landform:* Outwash plains, outwash terraces, outwash deltas
*Landform position (three-dimensional):* Riser

*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Elmridge**

*Percent of map unit:* 4 percent
*Landform:* Marine terraces
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Belgrade**

*Percent of map unit:* 3 percent
*Landform:* Marine terraces
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Lamoine**

*Percent of map unit:* 3 percent
*Landform:* Plains
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* No

## Ls—Limerick-Saco silt loams

### Map Unit Setting

*National map unit symbol:* blj2
*Elevation:* 10 to 2,000 feet
*Mean annual precipitation:* 34 to 48 inches
*Mean annual air temperature:* 37 to 46 degrees F
*Frost-free period:* 80 to 160 days
*Farmland classification:* Not prime farmland

### Map Unit Composition

*Limerick and similar soils:* 55 percent
*Saco and similar soils:* 30 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Limerick

**Setting**

*Landform:* Flood plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Talf

*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Coarse-silty alluvium derived from slate

**Typical profile**
*H1 - 0 to 8 inches:* silt loam
*H2 - 8 to 16 inches:* silt loam
*H3 - 16 to 65 inches:* silt loam

**Properties and qualities**
*Slope:* 0 to 2 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Poorly drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)
*Depth to water table:* About 0 to 12 inches
*Frequency of flooding:* Frequent
*Frequency of ponding:* None
*Available water storage in profile:* Very high (about 18.2 inches)

**Interpretive groups**
*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 4w
*Hydrologic Soil Group:* B/D
*Hydric soil rating:* Yes

### Description of Saco

**Setting**
*Landform:* Flood plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Parent material:* Coarse-silty alluvium

**Typical profile**
*H1 - 0 to 12 inches:* silt loam
*H2 - 12 to 24 inches:* silt loam
*H3 - 24 to 65 inches:* silt loam

**Properties and qualities**
*Slope:* 0 to 2 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Very poorly drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)
*Depth to water table:* About 0 to 6 inches
*Frequency of flooding:* Frequent
*Frequency of ponding:* None
*Available water storage in profile:* Very high (about 15.0 inches)

**Interpretive groups**
*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 6w
*Hydrologic Soil Group:* B/D
*Hydric soil rating:* Yes

### Minor Components

#### Rumney

*Percent of map unit:* 7 percent
*Landform:* Flood plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* Yes

#### Lovewell

*Percent of map unit:* 3 percent
*Landform:* Flood plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

#### Cornish

*Percent of map unit:* 3 percent
*Landform:* Flood plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

#### Podunk

*Percent of map unit:* 2 percent
*Landform:* Flood plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

## Sn—Scantic silt loam, 0 to 3 percent slopes

### Map Unit Setting

*National map unit symbol:* 2slv3
*Elevation:* 10 to 900 feet
*Mean annual precipitation:* 33 to 60 inches
*Mean annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 90 to 160 days
*Farmland classification:* Not prime farmland

**Map Unit Composition**

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

**Description of Scantic**

**Setting**

*Landform:* Marine terraces, river valleys
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Glaciomarine deposits

**Typical profile**

*Ap - 0 to 9 inches:* silt loam
*Bg1 - 9 to 16 inches:* silty clay loam
*Bg2 - 16 to 29 inches:* silty clay
*Cg - 29 to 65 inches:* silty clay

**Properties and qualities**

*Slope:* 0 to 3 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Poorly drained
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)
*Depth to water table:* About 0 to 12 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* Moderate (about 6.3 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 4w
*Hydrologic Soil Group:* D
*Hydric soil rating:* Yes

**Minor Components**

**Lamoine**

*Percent of map unit:* 8 percent
*Landform:* River valleys, marine terraces
*Landform position (three-dimensional):* Riser, rise
*Down-slope shape:* Convex
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Biddeford**

*Percent of map unit:* 3 percent
*Landform:* Marine terraces, river valleys
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Dip
*Down-slope shape:* Concave
*Across-slope shape:* Concave, linear
*Ecological site:* Marine Terrace Depression (F144BY002ME)
*Hydric soil rating:* Yes

**Roundabout**

*Percent of map unit:* 2 percent
*Landform:* River valleys, marine terraces
*Landform position (three-dimensional):* Tread, talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* Yes

**Buxton**

*Percent of map unit:* 2 percent
*Landform:* Marine terraces, river valleys
*Landform position (three-dimensional):* Riser, rise
*Down-slope shape:* Convex
*Across-slope shape:* Linear
*Hydric soil rating:* No

## SuC2—Suffield silt loam, 8 to 15 percent slopes, eroded

### Map Unit Setting

*National map unit symbol:* blk1
*Elevation:* 10 to 900 feet
*Mean annual precipitation:* 34 to 48 inches
*Mean annual air temperature:* 43 to 46 degrees F
*Frost-free period:* 90 to 160 days
*Farmland classification:* Not prime farmland

### Map Unit Composition

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

### Description of Suffield

**Setting**

*Landform:* Coastal plains
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Fine glaciolacustrine deposits

**Typical profile**

*H1 - 0 to 6 inches:* silt loam
*H2 - 6 to 23 inches:* silt loam
*H3 - 23 to 33 inches:* silty clay
*H4 - 33 to 65 inches:* silty clay

**Properties and qualities**

*Slope:* 8 to 15 percent
*Depth to restrictive feature:* More than 80 inches

*Natural drainage class:* Moderately well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)
*Depth to water table:* About 18 to 30 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* High (about 9.5 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 4e
*Hydrologic Soil Group:* C
*Hydric soil rating:* No

**Minor Components**

**Hartland**

*Percent of map unit:* 6 percent
*Landform:* Coastal plains
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Belgrade**

*Percent of map unit:* 5 percent
*Landform:* Coastal plains
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Suffield, slopes >15%**

*Percent of map unit:* 2 percent
*Landform:* Coastal plains
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Suffield, slopes <8%**

*Percent of map unit:* 2 percent
*Landform:* Coastal plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

## SuD2—Suffield silt loam, 15 to 25 percent slopes, eroded

### Map Unit Setting

*National map unit symbol:* blk2
*Elevation:* 10 to 900 feet
*Mean annual precipitation:* 34 to 48 inches
*Mean annual air temperature:* 43 to 46 degrees F
*Frost-free period:* 90 to 160 days
*Farmland classification:* Not prime farmland

### Map Unit Composition

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

### Description of Suffield

#### Setting

*Landform:* Coastal plains
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Fine glaciolacustrine deposits

#### Typical profile

*H1 - 0 to 6 inches:* silt loam
*H2 - 6 to 23 inches:* silt loam
*H3 - 23 to 33 inches:* silty clay
*H4 - 33 to 65 inches:* silty clay

#### Properties and qualities

*Slope:* 15 to 25 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Moderately well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)
*Depth to water table:* About 18 to 36 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* High (about 9.5 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 6e
*Hydrologic Soil Group:* C
*Hydric soil rating:* No

**Minor Components**

**Hartland**

*Percent of map unit:* 7 percent
*Landform:* Coastal plains
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Belgrade**

*Percent of map unit:* 3 percent
*Landform:* Coastal plains
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Suffield, slopes <15%**

*Percent of map unit:* 3 percent
*Landform:* Coastal plains
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Suffield, slopes >25%**

*Percent of map unit:* 2 percent
*Landform:* Coastal plains
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

## SuE2—Suffield silt loam, 25 to 45 percent slopes, eroded

**Map Unit Setting**

*National map unit symbol:* blk3
*Elevation:* 10 to 1,500 feet
*Mean annual precipitation:* 34 to 48 inches
*Mean annual air temperature:* 43 to 46 degrees F
*Frost-free period:* 90 to 160 days
*Farmland classification:* Not prime farmland

**Map Unit Composition**

*Suffield and similar soils:* 85 percent

*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Suffield

#### Setting

*Landform:* Coastal plains
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Fine glaciolacustrine deposits

#### Typical profile

*H1 - 0 to 6 inches:* silt loam
*H2 - 6 to 23 inches:* silt loam
*H3 - 23 to 33 inches:* silty clay
*H4 - 33 to 65 inches:* silty clay

#### Properties and qualities

*Slope:* 25 to 45 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Moderately well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)
*Depth to water table:* About 18 to 36 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* High (about 9.5 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 7e
*Hydrologic Soil Group:* C
*Hydric soil rating:* No

### Minor Components

#### Hartland

*Percent of map unit:* 7 percent
*Landform:* Coastal plains
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

#### Suffield, slopes <25%

*Percent of map unit:* 4 percent
*Landform:* Coastal plains
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

#### Belgrade

*Percent of map unit:* 3 percent

*Landform:* Coastal plains
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Suffield, slopes >45%**

*Percent of map unit:* 1 percent
*Landform:* Coastal plains
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

## Sz—Swanton fine sandy loam

**Map Unit Setting**

*National map unit symbol:* blk4
*Elevation:* 10 to 900 feet
*Mean annual precipitation:* 34 to 55 inches
*Mean annual air temperature:* 39 to 46 degrees F
*Frost-free period:* 90 to 195 days
*Farmland classification:* Not prime farmland

**Map Unit Composition**

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

**Description of Swanton**

**Setting**

*Landform:* Outwash plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Loamy glaciolacustrine deposits

**Typical profile**

*H1 - 0 to 9 inches:* fine sandy loam
*H2 - 9 to 32 inches:* fine sandy loam
*H3 - 32 to 65 inches:* silty clay

**Properties and qualities**

*Slope:* 0 to 3 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Poorly drained

*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)
*Depth to water table:* About 0 to 18 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* High (about 9.3 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 4w
*Hydrologic Soil Group:* C/D
*Hydric soil rating:* Yes

### Minor Components

**Scantic**

*Percent of map unit:* 8 percent
*Landform:* Coastal plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Dip
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

**Whately**

*Percent of map unit:* 4 percent
*Landform:* Outwash plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Dip
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

**Elmwood**

*Percent of map unit:* 3 percent
*Landform:* Outwash plains
*Landform position (two-dimensional):* Summit
*Landform position (three-dimensional):* Rise
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

## WmB—Windsor loamy sand, 0 to 8 percent slopes

### Map Unit Setting

*National map unit symbol:* 2w2x2
*Elevation:* 0 to 1,410 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 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:* 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**

*Oe - 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 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**

*Percent of map unit:* 5 percent
*Landform:* Outwash plains, eskers, deltas, kames
*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

**Agawam**

*Percent of map unit:* 5 percent
*Landform:* Kames, moraines, outwash terraces, kame terraces, outwash plains

*Landform position (two-dimensional):* Footslope, summit, backslope, shoulder
*Landform position (three-dimensional):* Side slope, crest, tread, riser, rise
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

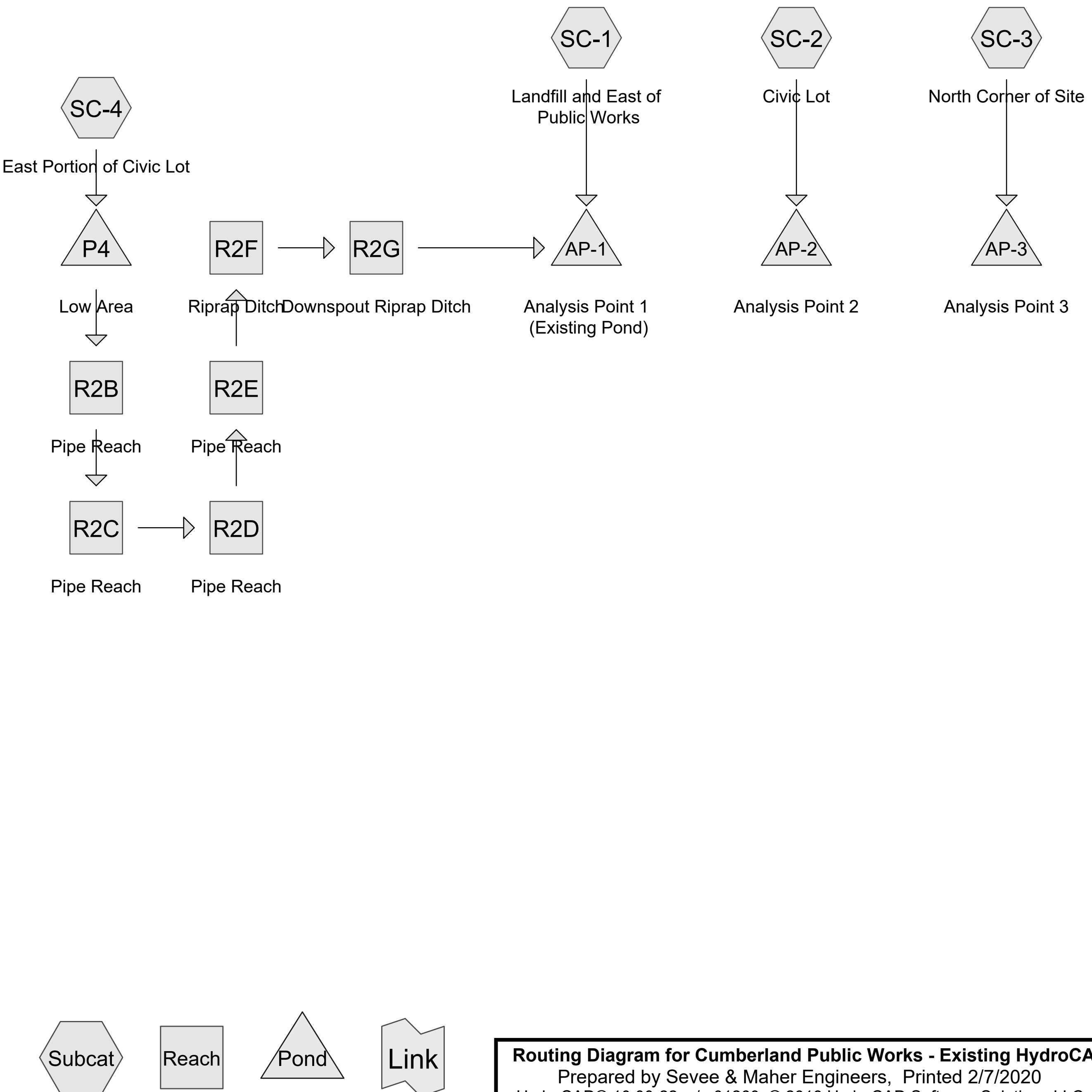
**Deerfield**

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

## APPENDIX B

## PUBLIC WORKS SITE HYDROCAD CALCULATIONS

SME
SEVEE & MAHER
ENGINEERS




**Routing Diagram for Cumberland Public Works - Existing HydroCAD**
Prepared by Sevee & Maher Engineers, Printed 2/7/2020
HydroCAD® 10.00-22 s/n 01260 © 2018 HydroCAD Software Solutions LLC

## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 0.045 | 39 | >75% Grass cover, Good, HSG A (SC-1) |
| 0.891 | 61 | >75% Grass cover, Good, HSG B (SC-1, SC-2, SC-4) |
| 1.580 | 74 | >75% Grass cover, Good, HSG C (SC-1, SC-2, SC-3, SC-4) |
| 1.279 | 80 | >75% Grass cover, Good, HSG D (SC-1, SC-2) |
| 0.033 | 48 | Brush, Good, HSG B (SC-4) |
| 0.835 | 65 | Brush, Good, HSG C (SC-2, SC-4) |
| 0.021 | 73 | Brush, Good, HSG D (SC-1) |
| 0.591 | 96 | Gravel (SC-4) |
| 1.954 | 96 | Gravel surface (SC-1, SC-2) |
| 2.874 | 78 | Meadow, non-grazed, HSG D (SC-1) |
| 2.332 | 98 | Pavement (SC-1, SC-2, SC-4) |
| 0.748 | 98 | Roofs (SC-1, SC-2, SC-3, SC-4) |
| 0.221 | 77 | Woods, Poor, HSG C (SC-3) |
| 0.819 | 32 | Woods/grass comb., Good, HSG A (SC-1) |
| 0.160 | 58 | Woods/grass comb., Good, HSG B (SC-1, SC-2) |
| 4.649 | 72 | Woods/grass comb., Good, HSG C (SC-1, SC-2, SC-4) |
| 1.209 | 79 | Woods/grass comb., Good, HSG D (SC-1, SC-2) |

## Summary for Subcatchment SC-1: Landfill and East of Public Works

Runoff = 10.10 cfs @ 12.30 hrs, Volume= 1.098 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.10"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 81,175 | 98 | Pavement |
| * | 17,719 | 98 | Roofs |
| * | 74,072 | 96 | Gravel surface |
| | 125,175 | 78 | Meadow, non-grazed, HSG D |
| | 0 | 65 | Brush, Good, HSG C |
| | 910 | 73 | Brush, Good, HSG D |
| | 1,940 | 39 | >75% Grass cover, Good, HSG A |
| | 35,690 | 61 | >75% Grass cover, Good, HSG B |
| | 10,419 | 74 | >75% Grass cover, Good, HSG C |
| | 34,346 | 80 | >75% Grass cover, Good, HSG D |
| | 35,681 | 32 | Woods/grass comb., Good, HSG A |
| | 4,094 | 58 | Woods/grass comb., Good, HSG B |
| | 13 | 72 | Woods/grass comb., Good, HSG C |
| | 11,905 | 79 | Woods/grass comb., Good, HSG D |
| | 433,139 | 80 | Weighted Average |
| | 334,245 | | 77.17% Pervious Area |
| | 98,894 | | 22.83% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 13.1 | 100 | 0.0100 | 0.13 | | **Sheet Flow, A TO B**<br>Grass: Short n= 0.150 P2= 3.10" |
| 4.0 | 118 | 0.0050 | 0.49 | | **Shallow Concentrated Flow, B to C**<br>Short Grass Pasture Kv= 7.0 fps |
| 0.3 | 55 | 0.0620 | 2.82 | 0.25 | **Pipe Channel, C to D**<br>4.0" Round Area= 0.1 sf Perim= 1.0' r= 0.08'<br>n= 0.025 Corrugated metal |
| 0.5 | 188 | 0.0199 | 6.40 | 5.03 | **Pipe Channel, D to E**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.013 Corrugated PE, smooth interior |
| 0.5 | 163 | 0.0122 | 5.01 | 3.94 | **Pipe Channel, E to F**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.013 Corrugated PE, smooth interior |
| 0.3 | 152 | 0.0322 | 8.14 | 6.39 | **Pipe Channel, F to G**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.013 Corrugated PE, smooth interior |
| 0.1 | 112 | 0.0777 | 20.07 | 63.06 | **Pipe Channel, G to H**<br>24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'<br>n= 0.013 Corrugated PE, smooth interior |
| 0.1 | 116 | 0.0543 | 16.78 | 52.72 | **Pipe Channel, H to I**<br>24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'<br>n= 0.013 Corrugated PE, smooth interior |
| 0.1 | 143 | 0.1540 | 28.26 | 88.78 | **Pipe Channel, I to J**<br>24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'<br>n= 0.013 Corrugated PE, smooth interior |
| 0.1 | 67 | 0.0760 | 19.85 | 62.37 | **Pipe Channel, J to K**<br>24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'<br>n= 0.013 Corrugated PE, smooth interior |
| 0.0 | 38 | 0.1090 | 31.15 | 220.21 | **Pipe Channel, K to L**<br>36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75'<br>n= 0.013 Corrugated PE, smooth interior |
| 1.6 | 77 | 0.0260 | 0.81 | | **Shallow Concentrated Flow, L to M**<br>Woodland Kv= 5.0 fps |
| 20.7 | 1,329 | Total | | | |

## Summary for Subcatchment SC-2: Civic Lot

Runoff = 4.50 cfs @ 12.60 hrs, Volume= 0.690 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.10"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 188 | 98 | Pavement |
| * | 8,696 | 98 | Roofs |
| * | 11,042 | 96 | Gravel surface |
| | 13,592 | 65 | Brush, Good, HSG C |
| | 2,057 | 61 | >75% Grass cover, Good, HSG B |
| | 49,354 | 74 | >75% Grass cover, Good, HSG C |
| | 21,358 | 80 | >75% Grass cover, Good, HSG D |
| | 2,880 | 58 | Woods/grass comb., Good, HSG B |
| | 201,158 | 72 | Woods/grass comb., Good, HSG C |
| | 40,766 | 79 | Woods/grass comb., Good, HSG D |
| | 351,091 | 75 | Weighted Average |
| | 342,207 | | 97.47% Pervious Area |
| | 8,884 | | 2.53% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 29.4 | 100 | 0.0100 | 0.06 | | **Sheet Flow, A to B**<br>Grass: Bermuda n= 0.410 P2= 3.10" |
| 8.4 | 446 | 0.0310 | 0.88 | | **Shallow Concentrated Flow, B to C**<br>Woodland Kv= 5.0 fps |
| 2.7 | 218 | 0.0180 | 1.35 | 5.39 | **Channel Flow, C to D**<br>Area= 4.0 sf Perim= 7.2' r= 0.56'<br>n= 0.100 Earth, dense brush, high stage |
| 40.5 | 764 | Total | | | |

## Summary for Subcatchment SC-3: North Corner of Site

Runoff = 0.36 cfs @ 12.25 hrs, Volume= 0.037 af, Depth= 1.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.10"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 333 | 98 | Roofs |
| | 8,056 | 74 | >75% Grass cover, Good, HSG C |
| | 9,638 | 77 | Woods, Poor, HSG C |
| | 18,027 | 76 | Weighted Average |
| | 17,694 | | 98.15% Pervious Area |
| | 333 | | 1.85% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 16.5 | 100 | 0.0400 | 0.10 | | **Sheet Flow, A TO B**<br>Woods: Light underbrush n= 0.400 P2= 3.10" |
| 0.9 | 121 | 0.0248 | 2.36 | | **Shallow Concentrated Flow, B to C**<br>Grassed Waterway Kv= 15.0 fps |
| 17.4 | 221 | Total | | | |

## Summary for Subcatchment SC-4: East Portion of Civic Lot

Runoff = 3.88 cfs @ 12.07 hrs, Volume= 0.266 af, Depth= 1.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.10"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 25,735 | 96 | Gravel |
| * | 20,230 | 98 | Pavement |
| * | 5,829 | 98 | Roofs |
| | 1,421 | 48 | Brush, Good, HSG B |
| | 22,798 | 65 | Brush, Good, HSG C |
| | 1,017 | 74 | >75% Grass cover, Good, HSG C |
| | 1,083 | 61 | >75% Grass cover, Good, HSG B |
| | 1,325 | 72 | Woods/grass comb., Good, HSG C |
| | 79,438 | 86 | Weighted Average |
| | 53,379 | | 67.20% Pervious Area |
| | 26,059 | | 32.80% Impervious Area |

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

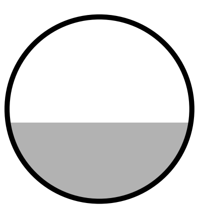
## Summary for Reach R2B: Pipe Reach

Inflow Area = 1.824 ac, 32.80% Impervious, Inflow Depth = 1.60" for 2-year event
Inflow = 3.48 cfs @ 12.11 hrs, Volume= 0.243 af
Outflow = 3.47 cfs @ 12.12 hrs, Volume= 0.243 af, Atten= 0%, Lag= 0.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 6.98 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 2.58 fps, Avg. Travel Time= 1.2 min

Peak Storage= 91 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.53'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 9.21 cfs

15.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 182.0' Slope= 0.0203 '/'
Inlet Invert= 128.70', Outlet Invert= 125.00'



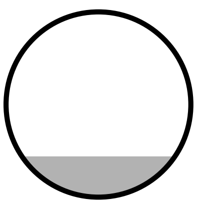
## Summary for Reach R2C: Pipe Reach

Inflow Area = 1.824 ac, 32.80% Impervious, Inflow Depth = 1.60" for 2-year event
Inflow = 3.47 cfs @ 12.12 hrs, Volume= 0.243 af
Outflow = 3.47 cfs @ 12.12 hrs, Volume= 0.243 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 17.47 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 6.46 fps, Avg. Travel Time= 0.2 min

Peak Storage= 13 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.27'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 33.04 cfs

15.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 65.0' Slope= 0.2615 '/'
Inlet Invert= 124.00', Outlet Invert= 107.00'



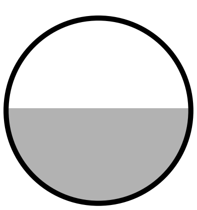
## Summary for Reach R2D: Pipe Reach

Inflow Area = 1.824 ac, 32.80% Impervious, Inflow Depth = 1.60" for 2-year event
Inflow = 3.47 cfs @ 12.12 hrs, Volume= 0.243 af
Outflow = 3.47 cfs @ 12.12 hrs, Volume= 0.243 af, Atten= 0%, Lag= 0.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.48 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 2.03 fps, Avg. Travel Time= 1.1 min

Peak Storage= 84 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.64'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 6.65 cfs

15.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 132.0' Slope= 0.0106 '/'
Inlet Invert= 106.20', Outlet Invert= 104.80'



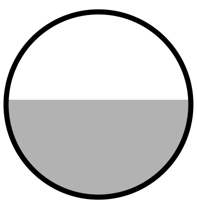
## Summary for Reach R2E: Pipe Reach

Inflow Area = 1.824 ac, 32.80% Impervious, Inflow Depth = 1.60" for 2-year event
Inflow = 3.47 cfs @ 12.12 hrs, Volume= 0.243 af
Outflow = 3.47 cfs @ 12.13 hrs, Volume= 0.243 af, Atten= 0%, Lag= 0.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.31 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.97 fps, Avg. Travel Time= 0.7 min

Peak Storage= 54 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.66'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 6.38 cfs

15.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 82.0' Slope= 0.0098 '/'
Inlet Invert= 104.80', Outlet Invert= 104.00'



## Summary for Reach R2F: Riprap Ditch

Inflow Area = 1.824 ac, 32.80% Impervious, Inflow Depth = 1.60" for 2-year event
Inflow = 3.47 cfs @ 12.13 hrs, Volume= 0.243 af
Outflow = 3.45 cfs @ 12.14 hrs, Volume= 0.243 af, Atten= 0%, Lag= 0.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.26 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 0.77 fps, Avg. Travel Time= 2.5 min

Peak Storage= 176 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.45'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 83.14 cfs

2.00' x 2.00' deep channel, n= 0.040 Mountain streams
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 115.0' Slope= 0.0174 '/'
Inlet Invert= 104.00', Outlet Invert= 102.00'

## Summary for Reach R2G: Downspout Riprap Ditch

Inflow Area = 1.824 ac, 32.80% Impervious, Inflow Depth = 1.60" for 2-year event
Inflow = 3.45 cfs @ 12.14 hrs, Volume= 0.243 af
Outflow = 3.45 cfs @ 12.14 hrs, Volume= 0.243 af, Atten= 0%, Lag= 0.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.01 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.66 fps, Avg. Travel Time= 0.7 min

Peak Storage= 49 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.15'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 422.75 cfs

4.00' x 2.00' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 16.00'
Length= 71.0' Slope= 0.2535 '/'
Inlet Invert= 100.00', Outlet Invert= 82.00'

‡

## Summary for Pond AP-1: Analysis Point 1 (Existing Pond)

Inflow Area = 11.767 ac, 24.38% Impervious, Inflow Depth = 1.37" for 2-year event
Inflow = 12.05 cfs @ 12.24 hrs, Volume= 1.342 af
Primary = 12.05 cfs @ 12.24 hrs, Volume= 1.342 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

## Summary for Pond AP-2: Analysis Point 2

Inflow Area = 8.060 ac, 2.53% Impervious, Inflow Depth = 1.03" for 2-year event
Inflow = 4.50 cfs @ 12.60 hrs, Volume= 0.690 af
Primary = 4.50 cfs @ 12.60 hrs, Volume= 0.690 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

## Summary for Pond AP-3: Analysis Point 3

Inflow Area = 0.414 ac, 1.85% Impervious, Inflow Depth = 1.08" for 2-year event
Inflow = 0.36 cfs @ 12.25 hrs, Volume= 0.037 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Peak Elev= 127.00' @ 24.99 hrs Surf.Area= 100.046 ac Storage= 0.037 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 127.00' | 161.500 af | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (acres) | Inc.Store (acre-feet) | Cum.Store (acre-feet) |
|---|---|---|---|
| 127.00 | 100.000 | 0.000 | 0.000 |
| 128.00 | 223.000 | 161.500 | 161.500 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 128.00' | **8.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=127.00' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Summary for Pond P4: Low Area

| | | | | |
|---|---|---|---|---|
| Inflow Area = | 1.824 ac, 32.80% Impervious, | Inflow Depth = 1.75" for 2-year event | | |
| Inflow = | 3.88 cfs @ | 12.07 hrs, Volume= | 0.266 af | |
| Outflow = | 3.48 cfs @ | 12.11 hrs, Volume= | 0.243 af, | Atten= 10%, Lag= 2.3 min |
| Primary = | 3.48 cfs @ | 12.11 hrs, Volume= | 0.243 af | |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 132.15' @ 12.11 hrs Surf.Area= 2,699 sf Storage= 1,303 cf

Plug-Flow detention time= 61.6 min calculated for 0.243 af (92% of inflow)
Center-of-Mass det. time= 19.2 min ( 842.2 - 823.0 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 131.00' | 9,686 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 131.00 | 100 | 0 | 0 |
| 132.00 | 1,847 | 974 | 974 |
| 133.00 | 7,719 | 4,783 | 5,757 |
| 133.50 | 8,000 | 3,930 | 9,686 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 133.00' | **30.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |
| #2 | Device 3 | 132.00' | **1.5" x 6.5" Horiz. Orifice/Grate X 28.00** C= 0.600<br>Limited to weir flow at low heads |
| #3 | Primary | 129.70' | **12.0" Round Culvert** |

L= 135.0' CPP, square edge headwall, Ke= 0.500
Inlet / Outlet Invert= 129.70' / 128.70' S= 0.0074 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

**Primary OutFlow** Max=3.47 cfs @ 12.11 hrs HW=132.14' TW=129.23' (Dynamic Tailwater)
- **1=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)
- **3=Culvert** (Passes 3.47 cfs of 4.11 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 3.47 cfs @ 1.83 fps)

## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 0.045 | 39 | >75% Grass cover, Good, HSG A (SC-1) |
| 0.891 | 61 | >75% Grass cover, Good, HSG B (SC-1, SC-2, SC-4) |
| 1.580 | 74 | >75% Grass cover, Good, HSG C (SC-1, SC-2, SC-3, SC-4) |
| 1.279 | 80 | >75% Grass cover, Good, HSG D (SC-1, SC-2) |
| 0.033 | 48 | Brush, Good, HSG B (SC-4) |
| 0.835 | 65 | Brush, Good, HSG C (SC-2, SC-4) |
| 0.021 | 73 | Brush, Good, HSG D (SC-1) |
| 0.591 | 96 | Gravel (SC-4) |
| 1.954 | 96 | Gravel surface (SC-1, SC-2) |
| 2.874 | 78 | Meadow, non-grazed, HSG D (SC-1) |
| 2.332 | 98 | Pavement (SC-1, SC-2, SC-4) |
| 0.748 | 98 | Roofs (SC-1, SC-2, SC-3, SC-4) |
| 0.221 | 77 | Woods, Poor, HSG C (SC-3) |
| 0.819 | 32 | Woods/grass comb., Good, HSG A (SC-1) |
| 0.160 | 58 | Woods/grass comb., Good, HSG B (SC-1, SC-2) |
| 4.649 | 72 | Woods/grass comb., Good, HSG C (SC-1, SC-2, SC-4) |
| 1.209 | 79 | Woods/grass comb., Good, HSG D (SC-1, SC-2) |
| **20.241** | **78** | **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 | SC-1 | 0.00 | 0.00 | 55.0 | 0.0620 | 0.025 | 4.0 | 0.0 | 0.0 |
| 2 | SC-1 | 0.00 | 0.00 | 188.0 | 0.0199 | 0.013 | 12.0 | 0.0 | 0.0 |
| 3 | SC-1 | 0.00 | 0.00 | 163.0 | 0.0122 | 0.013 | 12.0 | 0.0 | 0.0 |
| 4 | SC-1 | 0.00 | 0.00 | 152.0 | 0.0322 | 0.013 | 12.0 | 0.0 | 0.0 |
| 5 | SC-1 | 0.00 | 0.00 | 112.0 | 0.0777 | 0.013 | 24.0 | 0.0 | 0.0 |
| 6 | SC-1 | 0.00 | 0.00 | 116.0 | 0.0543 | 0.013 | 24.0 | 0.0 | 0.0 |
| 7 | SC-1 | 0.00 | 0.00 | 143.0 | 0.1540 | 0.013 | 24.0 | 0.0 | 0.0 |
| 8 | SC-1 | 0.00 | 0.00 | 67.0 | 0.0760 | 0.013 | 24.0 | 0.0 | 0.0 |
| 9 | SC-1 | 0.00 | 0.00 | 38.0 | 0.1090 | 0.013 | 36.0 | 0.0 | 0.0 |
| 10 | R2B | 128.70 | 125.00 | 182.0 | 0.0203 | 0.013 | 15.0 | 0.0 | 0.0 |
| 11 | R2C | 124.00 | 107.00 | 65.0 | 0.2615 | 0.013 | 15.0 | 0.0 | 0.0 |
| 12 | R2D | 106.20 | 104.80 | 132.0 | 0.0106 | 0.013 | 15.0 | 0.0 | 0.0 |
| 13 | R2E | 104.80 | 104.00 | 82.0 | 0.0098 | 0.013 | 15.0 | 0.0 | 0.0 |
| 14 | P4 | 129.70 | 128.70 | 135.0 | 0.0074 | 0.013 | 12.0 | 0.0 | 0.0 |

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 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

**Subcatchment SC-1: Landfill and East of** Runoff Area=433,139 sf 22.83% Impervious Runoff Depth=2.55"
Flow Length=1,329' Tc=20.7 min CN=80 Runoff=19.72 cfs 2.110 af

**Subcatchment SC-2: Civic Lot** Runoff Area=351,091 sf 2.53% Impervious Runoff Depth=2.13"
Flow Length=764' Tc=40.5 min CN=75 Runoff=9.77 cfs 1.430 af

**Subcatchment SC-3: North Corner of Site** Runoff Area=18,027 sf 1.85% Impervious Runoff Depth=2.21"
Flow Length=221' Tc=17.4 min CN=76 Runoff=0.76 cfs 0.076 af

**Subcatchment SC-4: East Portion of Civic** Runoff Area=79,438 sf 32.80% Impervious Runoff Depth=3.10"
Tc=5.0 min CN=86 Runoff=6.79 cfs 0.470 af

**Reach R2B: Pipe Reach** Avg. Flow Depth=0.60' Max Vel=7.39 fps Inflow=4.33 cfs 0.448 af
15.0" Round Pipe n=0.013 L=182.0' S=0.0203 '/' Capacity=9.21 cfs Outflow=4.33 cfs 0.448 af

**Reach R2C: Pipe Reach** Avg. Flow Depth=0.31' Max Vel=18.63 fps Inflow=4.33 cfs 0.448 af
15.0" Round Pipe n=0.013 L=65.0' S=0.2615 '/' Capacity=33.04 cfs Outflow=4.33 cfs 0.448 af

**Reach R2D: Pipe Reach** Avg. Flow Depth=0.73' Max Vel=5.77 fps Inflow=4.33 cfs 0.448 af
15.0" Round Pipe n=0.013 L=132.0' S=0.0106 '/' Capacity=6.65 cfs Outflow=4.33 cfs 0.448 af

**Reach R2E: Pipe Reach** Avg. Flow Depth=0.76' Max Vel=5.59 fps Inflow=4.33 cfs 0.448 af
15.0" Round Pipe n=0.013 L=82.0' S=0.0098 '/' Capacity=6.38 cfs Outflow=4.33 cfs 0.448 af

**Reach R2F: Riprap Ditch** Avg. Flow Depth=0.51' Max Vel=2.41 fps Inflow=4.33 cfs 0.448 af
n=0.040 L=115.0' S=0.0174 '/' Capacity=83.14 cfs Outflow=4.33 cfs 0.448 af

**Reach R2G: Downspout Riprap Ditch** Avg. Flow Depth=0.18' Max Vel=5.43 fps Inflow=4.33 cfs 0.448 af
n=0.040 L=71.0' S=0.2535 '/' Capacity=422.75 cfs Outflow=4.33 cfs 0.448 af

**Pond AP-1: Analysis Point 1 (Existing Pond)** Inflow=23.99 cfs 2.559 af
Primary=23.99 cfs 2.559 af

**Pond AP-2: Analysis Point 2** Inflow=9.77 cfs 1.430 af
Primary=9.77 cfs 1.430 af

**Pond AP-3: Analysis Point 3** Peak Elev=127.00' Storage=0.076 af Inflow=0.76 cfs 0.076 af
Outflow=0.00 cfs 0.000 af

**Pond P4: Low Area** Peak Elev=132.41' Storage=2,227 cf Inflow=6.79 cfs 0.470 af
Outflow=4.33 cfs 0.448 af

**Total Runoff Area = 20.241 ac Runoff Volume = 4.087 af Average Runoff Depth = 2.42"**
**84.78% Pervious = 17.161 ac 15.22% Impervious = 3.080 ac**

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 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

**Subcatchment SC-1: Landfill and East of** Runoff Area=433,139 sf 22.83% Impervious Runoff Depth=3.60"
Flow Length=1,329' Tc=20.7 min CN=80 Runoff=27.85 cfs 2.984 af

**Subcatchment SC-2: Civic Lot** Runoff Area=351,091 sf 2.53% Impervious Runoff Depth=3.11"
Flow Length=764' Tc=40.5 min CN=75 Runoff=14.41 cfs 2.090 af

**Subcatchment SC-3: North Corner of Site** Runoff Area=18,027 sf 1.85% Impervious Runoff Depth=3.21"
Flow Length=221' Tc=17.4 min CN=76 Runoff=1.11 cfs 0.111 af

**Subcatchment SC-4: East Portion of Civic** Runoff Area=79,438 sf 32.80% Impervious Runoff Depth=4.22"
Tc=5.0 min CN=86 Runoff=9.15 cfs 0.641 af

**Reach R2B: Pipe Reach** Avg. Flow Depth=0.62' Max Vel=7.48 fps Inflow=4.54 cfs 0.619 af
15.0" Round Pipe n=0.013 L=182.0' S=0.0203 '/' Capacity=9.21 cfs Outflow=4.54 cfs 0.619 af

**Reach R2C: Pipe Reach** Avg. Flow Depth=0.31' Max Vel=18.88 fps Inflow=4.54 cfs 0.619 af
15.0" Round Pipe n=0.013 L=65.0' S=0.2615 '/' Capacity=33.04 cfs Outflow=4.54 cfs 0.619 af

**Reach R2D: Pipe Reach** Avg. Flow Depth=0.76' Max Vel=5.83 fps Inflow=4.54 cfs 0.619 af
15.0" Round Pipe n=0.013 L=132.0' S=0.0106 '/' Capacity=6.65 cfs Outflow=4.54 cfs 0.619 af

**Reach R2E: Pipe Reach** Avg. Flow Depth=0.78' Max Vel=5.64 fps Inflow=4.54 cfs 0.619 af
15.0" Round Pipe n=0.013 L=82.0' S=0.0098 '/' Capacity=6.38 cfs Outflow=4.54 cfs 0.619 af

**Reach R2F: Riprap Ditch** Avg. Flow Depth=0.52' Max Vel=2.44 fps Inflow=4.54 cfs 0.619 af
n=0.040 L=115.0' S=0.0174 '/' Capacity=83.14 cfs Outflow=4.54 cfs 0.619 af

**Reach R2G: Downspout Riprap Ditch** Avg. Flow Depth=0.18' Max Vel=5.51 fps Inflow=4.54 cfs 0.619 af
n=0.040 L=71.0' S=0.2535 '/' Capacity=422.75 cfs Outflow=4.54 cfs 0.619 af

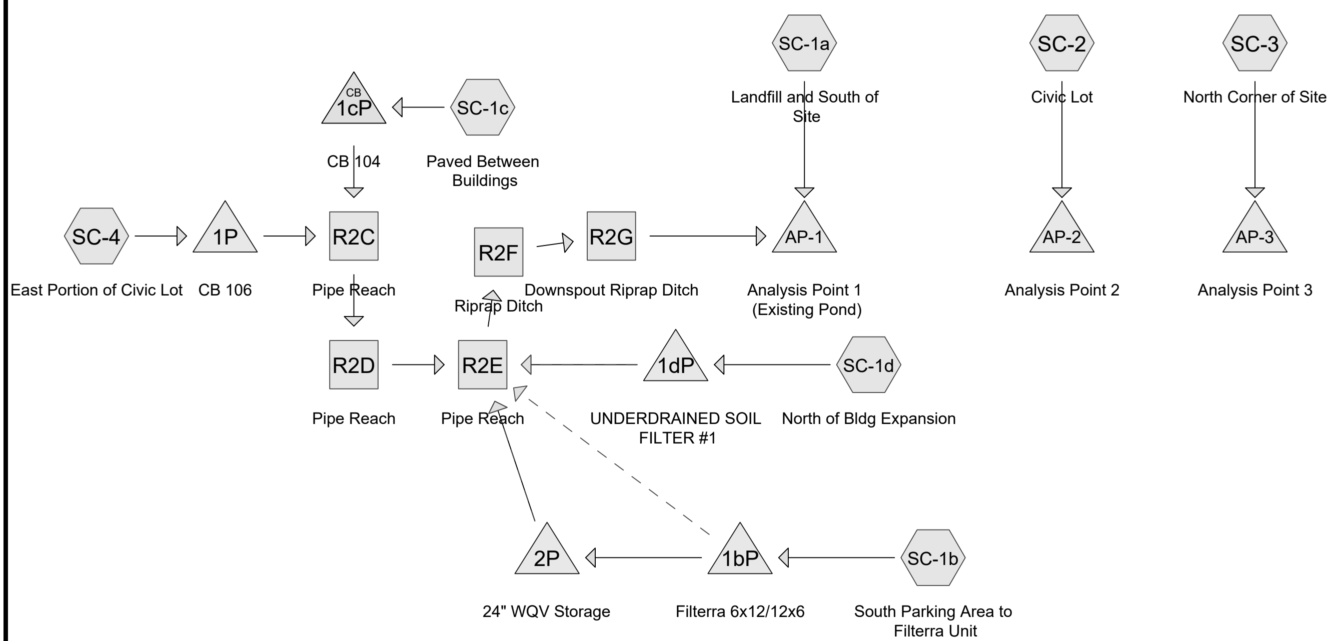
**Pond AP-1: Analysis Point 1 (Existing Pond)** Inflow=32.38 cfs 3.603 af
Primary=32.38 cfs 3.603 af

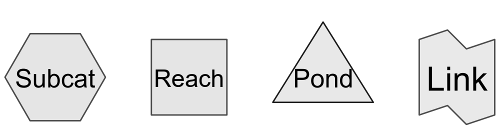
**Pond AP-2: Analysis Point 2** Inflow=14.41 cfs 2.090 af
Primary=14.41 cfs 2.090 af

**Pond AP-3: Analysis Point 3** Peak Elev=127.00' Storage=0.111 af Inflow=1.11 cfs 0.111 af
Outflow=0.00 cfs 0.000 af

**Pond P4: Low Area** Peak Elev=132.68' Storage=3,561 cf Inflow=9.15 cfs 0.641 af
Outflow=4.54 cfs 0.619 af

**Total Runoff Area = 20.241 ac Runoff Volume = 5.826 af Average Runoff Depth = 3.45"**
**84.78% Pervious = 17.161 ac 15.22% Impervious = 3.080 ac**




**Routing Diagram for Cumberland Public Works - Proposed HydroCAD**
Prepared by Sevee & Maher Engineers, Printed 2/7/2020
HydroCAD® 10.00-22 s/n 01260 © 2018 HydroCAD Software Solutions LLC

## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 0.045 | 39 | >75% Grass cover, Good, HSG A (SC-1a) |
| 0.409 | 61 | >75% Grass cover, Good, HSG B (SC-1a, SC-1b, SC-1c, SC-2, SC-4) |
| 1.363 | 74 | >75% Grass cover, Good, HSG C (SC-1d, SC-2, SC-3) |
| 0.659 | 80 | >75% Grass cover, Good, HSG D (SC-1d, SC-2) |
| 0.312 | 65 | Brush, Good, HSG C (SC-2) |
| 0.193 | 96 | Gravel (SC-4) |
| 0.893 | 71 | Meadow, non-grazed, HSG C (SC-2, SC-4) |
| 5.763 | 78 | Meadow, non-grazed, HSG D (SC-1a) |
| 0.532 | 98 | Paved parking, HSG C (SC-1d) |
| 2.327 | 98 | Pavement (SC-1a, SC-1b, SC-1c, SC-2, SC-4) |
| 0.484 | 98 | Roofs (SC-1a, SC-2, SC-3, SC-4) |
| 0.234 | 98 | Roofs, HSG C (SC-1c) |
| 0.819 | 32 | Woods/grass comb., Good, HSG A (SC-1a) |
| 0.160 | 58 | Woods/grass comb., Good, HSG B (SC-1a, SC-2) |
| 4.840 | 72 | Woods/grass comb., Good, HSG C (SC-1a, SC-2, SC-3) |
| 1.209 | 79 | Woods/grass comb., Good, HSG D (SC-1a, SC-2) |
| **20.241** | **77** | **TOTAL AREA** |

## Summary for Subcatchment SC-1a: Landfill and South of Site

Runoff = 5.86 cfs @ 12.29 hrs, Volume= 0.648 af, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.10"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 26,957 | 98 | Pavement |
| * | 4,450 | 98 | Roofs |
| * | 0 | 96 | Gravel surface |
| | 251,040 | 78 | Meadow, non-grazed, HSG D |
| | 0 | 65 | Brush, Good, HSG C |
| | 0 | 73 | Brush, Good, HSG D |
| | 1,940 | 39 | >75% Grass cover, Good, HSG A |
| | 12,461 | 61 | >75% Grass cover, Good, HSG B |
| | 0 | 74 | >75% Grass cover, Good, HSG C |
| | 0 | 80 | >75% Grass cover, Good, HSG D |
| | 35,681 | 32 | Woods/grass comb., Good, HSG A |
| | 4,094 | 58 | Woods/grass comb., Good, HSG B |
| | 13 | 72 | Woods/grass comb., Good, HSG C |
| | 11,905 | 79 | Woods/grass comb., Good, HSG D |
| | 348,541 | 74 | Weighted Average |
| | 317,134 | | 90.99% Pervious Area |
| | 31,407 | | 9.01% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 13.1 | 100 | 0.0100 | 0.13 | | **Sheet Flow, A TO B**<br>Grass: Short n= 0.150 P2= 3.10" |
| 1.8 | 133 | 0.0300 | 1.21 | | **Shallow Concentrated Flow, B to C**<br>Short Grass Pasture Kv= 7.0 fps |
| 1.9 | 257 | 0.0120 | 2.22 | | **Shallow Concentrated Flow, C - F**<br>Paved Kv= 20.3 fps |
| 0.3 | 152 | 0.0322 | 8.14 | 6.39 | **Pipe Channel, F to G**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.013 Corrugated PE, smooth interior |
| 0.1 | 112 | 0.0777 | 20.07 | 63.06 | **Pipe Channel, G to H**<br>24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'<br>n= 0.013 Corrugated PE, smooth interior |
| 0.1 | 116 | 0.0543 | 16.78 | 52.72 | **Pipe Channel, H to I**<br>24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'<br>n= 0.013 Corrugated PE, smooth interior |
| 0.1 | 143 | 0.1540 | 28.26 | 88.78 | **Pipe Channel, I to J**<br>24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'<br>n= 0.013 Corrugated PE, smooth interior |
| 0.1 | 67 | 0.0760 | 19.85 | 62.37 | **Pipe Channel, J to K**<br>24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'<br>n= 0.013 Corrugated PE, smooth interior |
| 0.0 | 38 | 0.1090 | 31.15 | 220.21 | **Pipe Channel, K to L**<br>36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75'<br>n= 0.013 Corrugated PE, smooth interior |

| | | | | | |
|---|---|---|---|---|---|
| 1.6 | 77 | 0.0260 | 0.81 | | **Shallow Concentrated Flow, L to M**<br>Woodland Kv= 5.0 fps |
| 19.1 | 1,195 | Total | | | |

## Summary for Subcatchment SC-1b: South Parking Area to Filterra Unit

Runoff = 1.14 cfs @ 12.07 hrs, Volume= 0.082 af, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.10"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 15,619 | 98 | Pavement |
| | 1,298 | 61 | >75% Grass cover, Good, HSG B |
| | 16,917 | 95 | Weighted Average |
| | 1,298 | | 7.67% Pervious Area |
| | 15,619 | | 92.33% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.0 | | | | | **Direct Entry, Tc MUST BE GREATER THAN OR EQUAL TO 5 MI** |

## Summary for Subcatchment SC-1c: Paved Between Buildings

Runoff = 1.83 cfs @ 12.07 hrs, Volume= 0.137 af, Depth= 2.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.10"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 10,207 | 98 | Roofs, HSG C |
| * | 15,332 | 98 | Pavement |
| | 500 | 61 | >75% Grass cover, Good, HSG B |
| | 26,039 | 97 | Weighted Average |
| | 500 | | 1.92% Pervious Area |
| | 25,539 | | 98.08% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.0 | | | | | **Direct Entry, Tc MUST BE GREATER THAN OR EQUAL TO 5 MI** |

## Summary for Subcatchment SC-1d: North of Bldg Expansion

Runoff = 2.05 cfs @ 12.08 hrs, Volume= 0.146 af, Depth= 2.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.10"

| Area (sf) | CN | Description |
|---|---|---|
| 23,172 | 98 | Paved parking, HSG C |
| 7,345 | 80 | >75% Grass cover, Good, HSG D |
| 4,769 | 74 | >75% Grass cover, Good, HSG C |
| 35,286 | 91 | Weighted Average |
| 12,114 | | 34.33% Pervious Area |
| 23,172 | | 65.67% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.7 | 50 | 0.0200 | 0.15 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |

## Summary for Subcatchment SC-2: Civic Lot

Runoff = 4.21 cfs @ 12.60 hrs, Volume= 0.652 af, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.10"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 188 | 98 | Pavement |
| * | 8,696 | 98 | Roofs |
| * | 0 | 96 | Gravel surface |
| | 11,042 | 71 | Meadow, non-grazed, HSG C |
| | 13,592 | 65 | Brush, Good, HSG C |
| | 2,057 | 61 | >75% Grass cover, Good, HSG B |
| | 49,028 | 74 | >75% Grass cover, Good, HSG C |
| | 21,358 | 80 | >75% Grass cover, Good, HSG D |
| | 2,880 | 58 | Woods/grass comb., Good, HSG B |
| | 201,158 | 72 | Woods/grass comb., Good, HSG C |
| | 40,766 | 79 | Woods/grass comb., Good, HSG D |
| | 350,765 | 74 | Weighted Average |
| | 341,881 | | 97.47% Pervious Area |
| | 8,884 | | 2.53% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 29.4 | 100 | 0.0100 | 0.06 | | **Sheet Flow, A to B** Grass: Bermuda n= 0.410 P2= 3.10" |
| 8.4 | 446 | 0.0310 | 0.88 | | **Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps |
| 2.7 | 218 | 0.0180 | 1.35 | 5.39 | **Channel Flow, C to D** Area= 4.0 sf Perim= 7.2' r= 0.56' n= 0.100 Earth, dense brush, high stage |
| 40.5 | 764 | Total | | | |

## Summary for Subcatchment SC-3: North Corner of Site

Runoff = 0.25 cfs @ 12.26 hrs, Volume= 0.027 af, Depth= 0.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.10"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 333 | 98 | Roofs |
| | 5,586 | 74 | >75% Grass cover, Good, HSG C |
| | 9,638 | 72 | Woods/grass comb., Good, HSG C |
| | 15,557 | 73 | Weighted Average |
| | 15,224 | | 97.86% Pervious Area |
| | 333 | | 2.14% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 16.5 | 100 | 0.0400 | 0.10 | | **Sheet Flow, A TO B**<br>Woods: Light underbrush n= 0.400 P2= 3.10" |
| 0.9 | 121 | 0.0248 | 2.36 | | **Shallow Concentrated Flow, B to C**<br>Grassed Waterway Kv= 15.0 fps |
| 17.4 | 221 | Total | | | |

## Summary for Subcatchment SC-4: East Portion of Civic Lot

Runoff = 3.84 cfs @ 12.17 hrs, Volume= 0.337 af, Depth= 1.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.10"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 8,393 | 96 | Gravel |
| * | 43,264 | 98 | Pavement |
| * | 7,584 | 98 | Roofs |
| | 1,507 | 61 | >75% Grass cover, Good, HSG B |
| | 27,845 | 71 | Meadow, non-grazed, HSG C |
| | 88,593 | 89 | Weighted Average |
| | 37,745 | | 42.60% Pervious Area |
| | 50,848 | | 57.40% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 10.5 | 100 | 0.0450 | 0.16 | | **Sheet Flow, A to B**<br>Grass: Dense n= 0.240 P2= 3.10" |
| 1.1 | 52 | 0.0120 | 0.77 | | **Shallow Concentrated Flow, B to C**<br>Short Grass Pasture Kv= 7.0 fps |
| 0.8 | 145 | 0.0240 | 3.14 | | **Shallow Concentrated Flow, C to D**<br>Paved Kv= 20.3 fps |
| 12.4 | 297 | Total | | | |

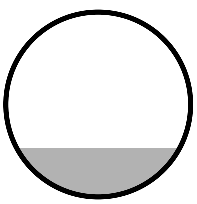
## Summary for Reach R2C: Pipe Reach

Inflow Area = 2.632 ac, 66.64% Impervious, Inflow Depth = 2.16" for 2-year event
Inflow = 5.04 cfs @ 12.13 hrs, Volume= 0.475 af
Outflow = 5.04 cfs @ 12.13 hrs, Volume= 0.475 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 19.46 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 6.38 fps, Avg. Travel Time= 0.2 min

Peak Storage= 17 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.33'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 33.04 cfs

15.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 65.0' Slope= 0.2615 '/'
Inlet Invert= 124.00', Outlet Invert= 107.00'



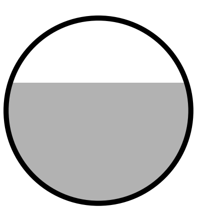
## Summary for Reach R2D: Pipe Reach

Inflow Area = 2.632 ac, 66.64% Impervious, Inflow Depth = 2.16" for 2-year event
Inflow = 5.04 cfs @ 12.13 hrs, Volume= 0.475 af
Outflow = 5.04 cfs @ 12.14 hrs, Volume= 0.475 af, Atten= 0%, Lag= 0.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.96 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 2.03 fps, Avg. Travel Time= 1.1 min

Peak Storage= 112 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.81'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 6.65 cfs

15.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 132.0' Slope= 0.0106 '/'
Inlet Invert= 106.20', Outlet Invert= 104.80'



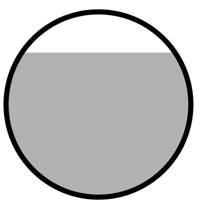
## Summary for Reach R2E: Pipe Reach

Inflow Area = 3.830 ac, 69.04% Impervious, Inflow Depth > 2.02" for 2-year event
Inflow = 6.07 cfs @ 12.12 hrs, Volume= 0.645 af
Outflow = 6.07 cfs @ 12.13 hrs, Volume= 0.645 af, Atten= 0%, Lag= 0.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.92 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.05 fps, Avg. Travel Time= 0.7 min

Peak Storage= 84 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.97'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 6.38 cfs

15.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 82.0' Slope= 0.0098 '/'
Inlet Invert= 104.80', Outlet Invert= 104.00'



## Summary for Reach R2F: Riprap Ditch

Inflow Area = 3.830 ac, 69.04% Impervious, Inflow Depth > 2.02" for 2-year event
Inflow = 6.07 cfs @ 12.13 hrs, Volume= 0.645 af
Outflow = 6.06 cfs @ 12.13 hrs, Volume= 0.645 af, Atten= 0%, Lag= 0.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.64 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 0.81 fps, Avg. Travel Time= 2.4 min

Peak Storage= 264 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.60'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 83.14 cfs

2.00' x 2.00' deep channel, n= 0.040 Mountain streams
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 115.0' Slope= 0.0174 '/'
Inlet Invert= 104.00', Outlet Invert= 102.00'

## Summary for Reach R2G: Downspout Riprap Ditch

Inflow Area = 3.830 ac, 69.04% Impervious, Inflow Depth > 2.02" for 2-year event
Inflow = 6.06 cfs @ 12.13 hrs, Volume= 0.645 af
Outflow = 6.06 cfs @ 12.14 hrs, Volume= 0.645 af, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 6.09 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.78 fps, Avg. Travel Time= 0.7 min

Peak Storage= 71 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.21'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 422.75 cfs

4.00' x 2.00' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 16.00'
Length= 71.0' Slope= 0.2535 '/'
Inlet Invert= 100.00', Outlet Invert= 82.00'

‡

## Summary for Pond 1bP: Filterra 6x12/12x6

Inflow Area = 0.388 ac, 92.33% Impervious, Inflow Depth = 2.55" for 2-year event
Inflow = 1.14 cfs @ 12.07 hrs, Volume= 0.082 af
Outflow = 1.14 cfs @ 12.07 hrs, Volume= 0.082 af, Atten= 0%, Lag= 0.2 min
Primary = 1.12 cfs @ 12.07 hrs, Volume= 0.082 af
Secondary = 0.01 cfs @ 12.07 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 126.81' @ 12.07 hrs Surf.Area= 347 sf Storage= 75 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.0 min ( 782.0 - 781.0 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 123.80' | 72 cf | **6.00'W x 12.00'L x 1.00'H Prismatoid** |
| #2 | 126.80' | 170 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |
| | | 242 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 126.80 | 200 | 0 | 0 |
| 127.00 | 1,500 | 170 | 170 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 123.80' | **140.000 in/hr Exfiltration over Surface area** |
| #2 | Secondary | 126.80' | **5.0' long x 5.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50<br>Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88 |

**Primary OutFlow** Max=1.12 cfs @ 12.07 hrs HW=126.81' TW=126.92' (Dynamic Tailwater)
└─**1=Exfiltration** (Exfiltration Controls 1.12 cfs)

**Secondary OutFlow** Max=0.01 cfs @ 12.07 hrs HW=126.81' TW=105.70' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 0.01 cfs @ 0.25 fps)

## Summary for Pond 1cP: CB 104

Inflow Area = 0.598 ac, 98.08% Impervious, Inflow Depth = 2.76" for 2-year event
Inflow = 1.83 cfs @ 12.07 hrs, Volume= 0.137 af
Outflow = 1.83 cfs @ 12.07 hrs, Volume= 0.137 af, Atten= 0%, Lag= 0.0 min
Primary = 1.83 cfs @ 12.07 hrs, Volume= 0.137 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 126.54' @ 12.07 hrs
Flood Elev= 130.50'

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 125.80' | **12.0" Round Culvert**<br>L= 125.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 125.80' / 121.40' S= 0.0352 '/' Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf |

**Primary OutFlow** Max=1.83 cfs @ 12.07 hrs HW=126.54' TW=124.31' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.83 cfs @ 2.93 fps)

## Summary for Pond 1dP: UNDERDRAINED SOIL FILTER #1

Inflow Area = 0.810 ac, 65.67% Impervious, Inflow Depth = 2.16" for 2-year event
Inflow = 2.05 cfs @ 12.08 hrs, Volume= 0.146 af
Outflow = 0.28 cfs @ 12.61 hrs, Volume= 0.091 af, Atten= 86%, Lag= 31.6 min
Primary = 0.28 cfs @ 12.61 hrs, Volume= 0.091 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 131.55' @ 12.61 hrs Surf.Area= 2,843 sf Storage= 3,304 cf

Plug-Flow detention time= 331.7 min calculated for 0.091 af (62% of inflow)
Center-of-Mass det. time= 230.0 min ( 1,033.3 - 803.4 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 130.00' | 11,188 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 130.00 | 1,407 | 0 | 0 |
| 131.00 | 2,331 | 1,869 | 1,869 |
| 131.50 | 2,814 | 1,286 | 3,155 |
| 132.00 | 3,091 | 1,476 | 4,632 |
| 132.50 | 4,392 | 1,871 | 6,502 |
| 133.00 | 14,351 | 4,686 | 11,188 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 127.70' | **12.0" Round Culvert**<br>L= 88.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 127.70' / 126.80' S= 0.0102 '/' Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf |
| #2 | Device 1 | 127.80' | **0.8" Vert. Orifice/Grate** C= 0.600 |
| #3 | Device 1 | 131.50' | **24.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |
| #4 | Secondary | 132.50' | **5.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |

**Primary OutFlow** Max=0.28 cfs @ 12.61 hrs HW=131.55' TW=105.26' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.28 cfs of 5.91 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.03 cfs @ 9.29 fps)
  └─**3=Orifice/Grate** (Weir Controls 0.25 cfs @ 0.75 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=130.00' TW=104.80' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Summary for Pond 1P: CB 106

Inflow Area = 2.034 ac, 57.40% Impervious, Inflow Depth = 1.99" for 2-year event
Inflow = 3.84 cfs @ 12.17 hrs, Volume= 0.337 af
Outflow = 3.84 cfs @ 12.17 hrs, Volume= 0.337 af, Atten= 0%, Lag= 0.1 min
Primary = 3.84 cfs @ 12.17 hrs, Volume= 0.337 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 130.43' @ 12.17 hrs Surf.Area= 13 sf Storage= 27 cf
Flood Elev= 131.80' Surf.Area= 113 sf Storage= 44 cf

Plug-Flow detention time= 0.8 min calculated for 0.337 af (100% of inflow)
Center-of-Mass det. time= 0.4 min ( 818.7 - 818.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 128.30' | 44 cf | **4.00'D x 3.50'H Vertical Cone/Cylinder** |
| #2 | 131.80' | 5,918 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |
| | | 5,962 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 131.80 | 100 | 0 | 0 |
| 132.00 | 1,513 | 161 | 161 |
| 133.00 | 10,000 | 5,757 | 5,918 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 128.90' | **15.0" Round Culvert**<br>L= 108.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 128.90' / 128.70' S= 0.0019 '/' Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf |

**Primary OutFlow** Max=3.84 cfs @ 12.17 hrs HW=130.43' TW=124.33' (Dynamic Tailwater)
**1=Culvert** (Barrel Controls 3.84 cfs @ 3.26 fps)

## Summary for Pond 2P: 24" WQV Storage

Inflow Area = 0.388 ac, 92.33% Impervious, Inflow Depth = 2.54" for 2-year event
Inflow = 1.12 cfs @ 12.07 hrs, Volume= 0.082 af
Outflow = 1.09 cfs @ 12.09 hrs, Volume= 0.080 af, Atten= 3%, Lag= 1.1 min
Primary = 0.05 cfs @ 12.09 hrs, Volume= 0.039 af
Secondary = 1.05 cfs @ 12.09 hrs, Volume= 0.040 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 126.93' @ 12.09 hrs Surf.Area= 922 sf Storage= 460 cf

Plug-Flow detention time= 85.6 min calculated for 0.080 af (97% of inflow)
Center-of-Mass det. time= 66.0 min ( 848.0 - 782.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 123.00' | 346 cf | **24.0" Round Pipe Storage**<br>L= 110.0' S= 0.0010 '/' |
| #2 | 125.00' | 2,162 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |
| | | 2,508 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Voids (%) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|---|
| 125.00 | 72 | 0.0 | 0 | 0 |
| 126.80 | 72 | 40.0 | 52 | 52 |
| 127.00 | 1,422 | 100.0 | 149 | 201 |
| 128.00 | 2,500 | 100.0 | 1,961 | 2,162 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 123.80' | **1.0" Vert. Orifice/Grate** C= 0.600 |
| #2 | Secondary | 126.80' | **10.0' long x 5.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00<br>2.50 3.00 3.50 4.00 4.50 5.00 5.50<br>Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65<br>2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88 |

**Primary OutFlow** Max=0.05 cfs @ 12.09 hrs HW=126.93' TW=105.74' (Dynamic Tailwater)
└─**1=Orifice/Grate** (Orifice Controls 0.05 cfs @ 8.46 fps)

**Secondary OutFlow** Max=1.04 cfs @ 12.09 hrs HW=126.93' TW=105.74' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 1.04 cfs @ 0.83 fps)

## Summary for Pond AP-1: Analysis Point 1 (Existing Pond)

Inflow Area = 11.831 ac, 28.44% Impervious, Inflow Depth > 1.31" for 2-year event
Inflow = 10.72 cfs @ 12.22 hrs, Volume= 1.294 af
Primary = 10.72 cfs @ 12.22 hrs, Volume= 1.294 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

## Summary for Pond AP-2: Analysis Point 2

Inflow Area = 8.052 ac, 2.53% Impervious, Inflow Depth = 0.97" for 2-year event
Inflow = 4.21 cfs @ 12.60 hrs, Volume= 0.652 af
Primary = 4.21 cfs @ 12.60 hrs, Volume= 0.652 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

## Summary for Pond AP-3: Analysis Point 3

Inflow Area = 0.357 ac, 2.14% Impervious, Inflow Depth = 0.92" for 2-year event
Inflow = 0.25 cfs @ 12.26 hrs, Volume= 0.027 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 127.00' @ 24.99 hrs Surf.Area= 100.034 ac Storage= 0.027 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 127.00' | 161.500 af | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (acres) | Inc.Store (acre-feet) | Cum.Store (acre-feet) |
|---|---|---|---|
| 127.00 | 100.000 | 0.000 | 0.000 |
| 128.00 | 223.000 | 161.500 | 161.500 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 128.00' | **8.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=127.00' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## 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 | SC-1a | 0.00 | 0.00 | 152.0 | 0.0322 | 0.013 | 12.0 | 0.0 | 0.0 |
| 2 | SC-1a | 0.00 | 0.00 | 112.0 | 0.0777 | 0.013 | 24.0 | 0.0 | 0.0 |
| 3 | SC-1a | 0.00 | 0.00 | 116.0 | 0.0543 | 0.013 | 24.0 | 0.0 | 0.0 |
| 4 | SC-1a | 0.00 | 0.00 | 143.0 | 0.1540 | 0.013 | 24.0 | 0.0 | 0.0 |
| 5 | SC-1a | 0.00 | 0.00 | 67.0 | 0.0760 | 0.013 | 24.0 | 0.0 | 0.0 |
| 6 | SC-1a | 0.00 | 0.00 | 38.0 | 0.1090 | 0.013 | 36.0 | 0.0 | 0.0 |
| 7 | R2C | 124.00 | 107.00 | 65.0 | 0.2615 | 0.013 | 15.0 | 0.0 | 0.0 |
| 8 | R2D | 106.20 | 104.80 | 132.0 | 0.0106 | 0.013 | 15.0 | 0.0 | 0.0 |
| 9 | R2E | 104.80 | 104.00 | 82.0 | 0.0098 | 0.013 | 15.0 | 0.0 | 0.0 |
| 10 | 1cP | 125.80 | 121.40 | 125.0 | 0.0352 | 0.013 | 12.0 | 0.0 | 0.0 |
| 11 | 1dP | 127.70 | 126.80 | 88.0 | 0.0102 | 0.013 | 12.0 | 0.0 | 0.0 |
| 12 | 1P | 128.90 | 128.70 | 108.0 | 0.0019 | 0.013 | 15.0 | 0.0 | 0.0 |

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 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

**Subcatchment SC-1a: Landfill and South** Runoff Area=348,541 sf 9.01% Impervious Runoff Depth=2.05"
Flow Length=1,195' Tc=19.1 min CN=74 Runoff=13.04 cfs 1.367 af

**Subcatchment SC-1b: South Parking Area** Runoff Area=16,917 sf 92.33% Impervious Runoff Depth=4.02"
Tc=5.0 min CN=95 Runoff=1.75 cfs 0.130 af

**Subcatchment SC-1c: Paved Between** Runoff Area=26,039 sf 98.08% Impervious Runoff Depth=4.25"
Tc=5.0 min CN=97 Runoff=2.76 cfs 0.212 af

**Subcatchment SC-1d: North of Bldg** Runoff Area=35,286 sf 65.67% Impervious Runoff Depth=3.59"
Flow Length=50' Slope=0.0200 '/' Tc=5.7 min CN=91 Runoff=3.32 cfs 0.243 af

**Subcatchment SC-2: Civic Lot** Runoff Area=350,765 sf 2.53% Impervious Runoff Depth=2.05"
Flow Length=764' Tc=40.5 min CN=74 Runoff=9.36 cfs 1.375 af

**Subcatchment SC-3: North Corner of Site** Runoff Area=15,557 sf 2.14% Impervious Runoff Depth=1.97"
Flow Length=221' Tc=17.4 min CN=73 Runoff=0.58 cfs 0.059 af

**Subcatchment SC-4: East Portion of Civic** Runoff Area=88,593 sf 57.40% Impervious Runoff Depth=3.39"
Flow Length=297' Tc=12.4 min CN=89 Runoff=6.44 cfs 0.575 af

**Reach R2C: Pipe Reach** Avg. Flow Depth=0.43' Max Vel=22.36 fps Inflow=8.24 cfs 0.786 af
15.0" Round Pipe n=0.013 L=65.0' S=0.2615 '/' Capacity=33.04 cfs Outflow=8.24 cfs 0.786 af

**Reach R2D: Pipe Reach** Avg. Flow Depth=1.25' Max Vel=6.18 fps Inflow=8.24 cfs 0.786 af
15.0" Round Pipe n=0.013 L=132.0' S=0.0106 '/' Capacity=6.65 cfs Outflow=7.11 cfs 0.786 af

**Reach R2E: Pipe Reach** Avg. Flow Depth=1.25' Max Vel=5.93 fps Inflow=10.32 cfs 1.099 af
15.0" Round Pipe n=0.013 L=82.0' S=0.0098 '/' Capacity=6.38 cfs Outflow=6.84 cfs 1.099 af

**Reach R2F: Riprap Ditch** Avg. Flow Depth=0.63' Max Vel=2.70 fps Inflow=6.84 cfs 1.099 af
n=0.040 L=115.0' S=0.0174 '/' Capacity=83.14 cfs Outflow=6.58 cfs 1.099 af

**Reach R2G: Downspout Riprap Ditch** Avg. Flow Depth=0.22' Max Vel=6.27 fps Inflow=6.58 cfs 1.099 af
n=0.040 L=71.0' S=0.2535 '/' Capacity=422.75 cfs Outflow=6.59 cfs 1.099 af

**Pond 1bP: Filterra 6x12/12x6** Peak Elev=126.84' Storage=84 cf Inflow=1.75 cfs 0.130 af
Primary=1.66 cfs 0.130 af Secondary=0.08 cfs 0.001 af Outflow=1.75 cfs 0.130 af

**Pond 1cP: CB 104** Peak Elev=126.83' Inflow=2.76 cfs 0.212 af
12.0" Round Culvert n=0.013 L=125.0' S=0.0352 '/' Outflow=2.76 cfs 0.212 af

**Pond 1dP: UNDERDRAINED SOIL FILTER #1** Peak Elev=131.73' Storage=3,814 cf Inflow=3.32 cfs 0.243 af
Primary=2.28 cfs 0.186 af Secondary=0.00 cfs 0.000 af Outflow=2.28 cfs 0.186 af

**Pond 1P: CB 106** Peak Elev=131.67' Storage=42 cf Inflow=6.44 cfs 0.575 af
15.0" Round Culvert n=0.013 L=108.0' S=0.0019 '/' Outflow=6.44 cfs 0.574 af

**Pond 2P: 24" WQV Storage** Peak Elev=126.96' Storage=501 cf Inflow=1.66 cfs 0.130 af
Primary=0.05 cfs 0.051 af Secondary=1.56 cfs 0.076 af Outflow=1.61 cfs 0.127 af

**Pond AP-1: Analysis Point 1 (Existing Pond)** Inflow=19.42 cfs 2.466 af
Primary=19.42 cfs 2.466 af

**Pond AP-2: Analysis Point 2** Inflow=9.36 cfs 1.375 af
Primary=9.36 cfs 1.375 af

**Pond AP-3: Analysis Point 3** Peak Elev=127.00' Storage=0.059 af Inflow=0.58 cfs 0.059 af
Outflow=0.00 cfs 0.000 af

**Total Runoff Area = 20.241 ac Runoff Volume = 3.960 af Average Runoff Depth = 2.35"**
**82.33% Pervious = 16.664 ac 17.67% Impervious = 3.577 ac**

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 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

**Subcatchment SC-1a: Landfill and South** Runoff Area=348,541 sf 9.01% Impervious Runoff Depth=3.02"
Flow Length=1,195' Tc=19.1 min CN=74 Runoff=19.40 cfs 2.012 af

**Subcatchment SC-1b: South Parking Area** Runoff Area=16,917 sf 92.33% Impervious Runoff Depth=5.21"
Tc=5.0 min CN=95 Runoff=2.24 cfs 0.169 af

**Subcatchment SC-1c: Paved Between** Runoff Area=26,039 sf 98.08% Impervious Runoff Depth=5.44"
Tc=5.0 min CN=97 Runoff=3.50 cfs 0.271 af

**Subcatchment SC-1d: North of Bldg** Runoff Area=35,286 sf 65.67% Impervious Runoff Depth=4.76"
Flow Length=50' Slope=0.0200 '/' Tc=5.7 min CN=91 Runoff=4.33 cfs 0.321 af

**Subcatchment SC-2: Civic Lot** Runoff Area=350,765 sf 2.53% Impervious Runoff Depth=3.02"
Flow Length=764' Tc=40.5 min CN=74 Runoff=13.94 cfs 2.025 af

**Subcatchment SC-3: North Corner of Site** Runoff Area=15,557 sf 2.14% Impervious Runoff Depth=2.92"
Flow Length=221' Tc=17.4 min CN=73 Runoff=0.87 cfs 0.087 af

**Subcatchment SC-4: East Portion of Civic** Runoff Area=88,593 sf 57.40% Impervious Runoff Depth=4.54"
Flow Length=297' Tc=12.4 min CN=89 Runoff=8.51 cfs 0.770 af

**Reach R2C: Pipe Reach** Avg. Flow Depth=0.47' Max Vel=23.65 fps Inflow=10.10 cfs 1.041 af
15.0" Round Pipe n=0.013 L=65.0' S=0.2615 '/' Capacity=33.04 cfs Outflow=10.10 cfs 1.041 af

**Reach R2D: Pipe Reach** Avg. Flow Depth=1.25' Max Vel=6.18 fps Inflow=10.10 cfs 1.041 af
15.0" Round Pipe n=0.013 L=132.0' S=0.0106 '/' Capacity=6.65 cfs Outflow=7.04 cfs 1.041 af

**Reach R2E: Pipe Reach** Avg. Flow Depth=1.25' Max Vel=5.93 fps Inflow=12.54 cfs 1.471 af
15.0" Round Pipe n=0.013 L=82.0' S=0.0098 '/' Capacity=6.38 cfs Outflow=6.64 cfs 1.471 af

**Reach R2F: Riprap Ditch** Avg. Flow Depth=0.62' Max Vel=2.69 fps Inflow=6.64 cfs 1.471 af
n=0.040 L=115.0' S=0.0174 '/' Capacity=83.14 cfs Outflow=6.48 cfs 1.471 af

**Reach R2G: Downspout Riprap Ditch** Avg. Flow Depth=0.22' Max Vel=6.23 fps Inflow=6.48 cfs 1.471 af
n=0.040 L=71.0' S=0.2535 '/' Capacity=422.75 cfs Outflow=6.48 cfs 1.471 af

**Pond 1bP: Filterra 6x12/12x6** Peak Elev=126.86' Storage=94 cf Inflow=2.24 cfs 0.169 af
Primary=2.07 cfs 0.167 af Secondary=0.16 cfs 0.002 af Outflow=2.23 cfs 0.169 af

**Pond 1cP: CB 104** Peak Elev=127.16' Inflow=3.50 cfs 0.271 af
12.0" Round Culvert n=0.013 L=125.0' S=0.0352 '/' Outflow=3.50 cfs 0.271 af

**Pond 1dP: UNDERDRAINED SOIL FILTER #1** Peak Elev=131.82' Storage=4,095 cf Inflow=4.33 cfs 0.321 af
Primary=3.82 cfs 0.264 af Secondary=0.00 cfs 0.000 af Outflow=3.82 cfs 0.264 af

**Pond 1P: CB 106** Peak Elev=132.15' Storage=538 cf Inflow=8.51 cfs 0.770 af
15.0" Round Culvert n=0.013 L=108.0' S=0.0019 '/' Outflow=7.29 cfs 0.770 af

**Pond 2P: 24" WQV Storage** Peak Elev=126.99' Storage=534 cf Inflow=2.07 cfs 0.167 af
Primary=0.05 cfs 0.058 af Secondary=1.95 cfs 0.106 af Outflow=2.00 cfs 0.164 af

**Pond AP-1: Analysis Point 1 (Existing Pond)** Inflow=25.78 cfs 3.483 af
Primary=25.78 cfs 3.483 af

**Pond AP-2: Analysis Point 2** Inflow=13.94 cfs 2.025 af
Primary=13.94 cfs 2.025 af

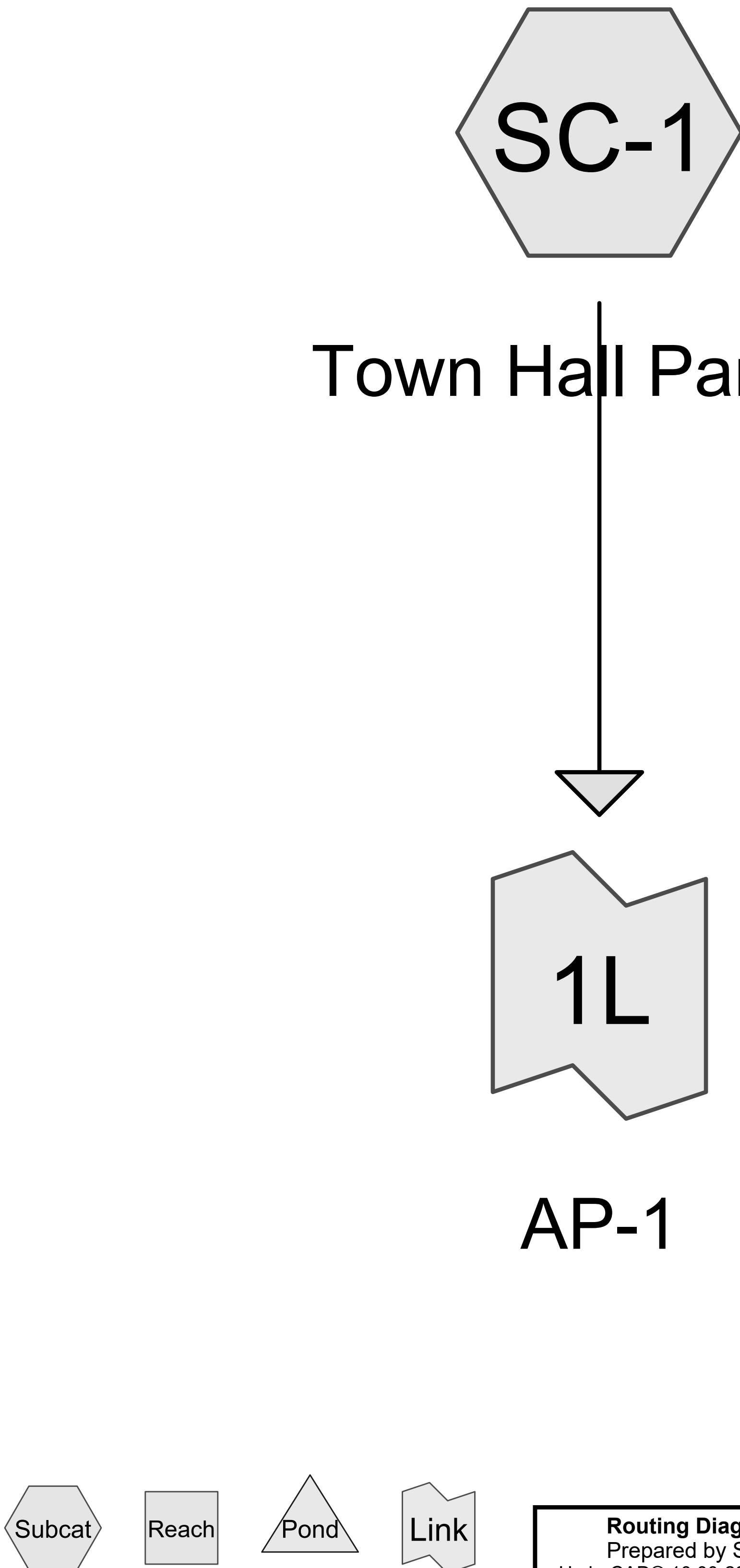
**Pond AP-3: Analysis Point 3** Peak Elev=127.00' Storage=0.087 af Inflow=0.87 cfs 0.087 af
Outflow=0.00 cfs 0.000 af

**Total Runoff Area = 20.241 ac Runoff Volume = 5.655 af Average Runoff Depth = 3.35"**
**82.33% Pervious = 16.664 ac 17.67% Impervious = 3.577 ac**

**APPENDIX C**

**TOWN OFFICE PARKING EXPANSION HYDROCAD CALCULATIONS**

SME
SEVEE & MAHER
ENGINEERS




**Routing Diagram for Town Hall Parking - Pre HydroCAD**
Prepared by Sevee & Maher Engineers, Printed 2/7/2020

## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 0.346 | 74 | >75% Grass cover, Good, HSG C (SC-1) |
| 0.586 | 48 | Brush, Good, HSG B (SC-1) |
| 0.271 | 98 | Paved parking, HSG C (SC-1) |
| 2.958 | 58 | Woods/grass comb., Good, HSG B (SC-1) |
| **4.161** | **61** | **TOTAL AREA** |

## Summary for Subcatchment SC-1: Town Hall Parking

Runoff = 0.85 cfs @ 12.40 hrs, Volume= 0.140 af, Depth= 0.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.10"

| Area (sf) | CN | Description |
|---|---|---|
| 25,520 | 48 | Brush, Good, HSG B |
| 15,086 | 74 | >75% Grass cover, Good, HSG C |
| 11,800 | 98 | Paved parking, HSG C |
| 128,856 | 58 | Woods/grass comb., Good, HSG B |
| 181,262 | 61 | Weighted Average |
| 169,462 | | 93.49% Pervious Area |
| 11,800 | | 6.51% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 14.7 | 100 | 0.0200 | 0.11 | | **Sheet Flow, A-B**<br>Grass: Dense n= 0.240 P2= 3.00" |
| 3.2 | 233 | 0.0600 | 1.22 | | **Shallow Concentrated Flow, C-D**<br>Woodland Kv= 5.0 fps |
| 0.8 | 427 | 0.0400 | 9.07 | 145.08 | **Channel Flow, C-D**<br>Area= 16.0 sf Perim= 14.5' r= 1.10'<br>n= 0.035 Earth, dense weeds |
| 18.7 | 760 | Total | | | |

## Summary for Link 1L: AP-1

Inflow Area = 4.161 ac, 6.51% Impervious, Inflow Depth = 0.40" for 2-year event
Inflow = 0.85 cfs @ 12.40 hrs, Volume= 0.140 af
Primary = 0.85 cfs @ 12.40 hrs, Volume= 0.140 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

## Summary for Subcatchment SC-1: Town Hall Parking

Runoff = 3.35 cfs @ 12.29 hrs, Volume= 0.394 af, Depth= 1.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.60"

| Area (sf) | CN | Description |
|---|---|---|
| 25,520 | 48 | Brush, Good, HSG B |
| 15,086 | 74 | >75% Grass cover, Good, HSG C |
| 11,800 | 98 | Paved parking, HSG C |
| 128,856 | 58 | Woods/grass comb., Good, HSG B |
| 181,262 | 61 | Weighted Average |
| 169,462 | | 93.49% Pervious Area |
| 11,800 | | 6.51% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 14.7 | 100 | 0.0200 | 0.11 | | **Sheet Flow, A-B**<br>Grass: Dense n= 0.240 P2= 3.00" |
| 3.2 | 233 | 0.0600 | 1.22 | | **Shallow Concentrated Flow, C-D**<br>Woodland Kv= 5.0 fps |
| 0.8 | 427 | 0.0400 | 9.07 | 145.08 | **Channel Flow, C-D**<br>Area= 16.0 sf Perim= 14.5' r= 1.10'<br>n= 0.035 Earth, dense weeds |
| 18.7 | 760 | Total | | | |

## Summary for Link 1L: AP-1

Inflow Area = 4.161 ac, 6.51% Impervious, Inflow Depth = 1.14" for 10-year event
Inflow = 3.35 cfs @ 12.29 hrs, Volume= 0.394 af
Primary = 3.35 cfs @ 12.29 hrs, Volume= 0.394 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

## Summary for Subcatchment SC-1: Town Hall Parking

Runoff = 5.96 cfs @ 12.28 hrs, Volume= 0.649 af, Depth= 1.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.80"

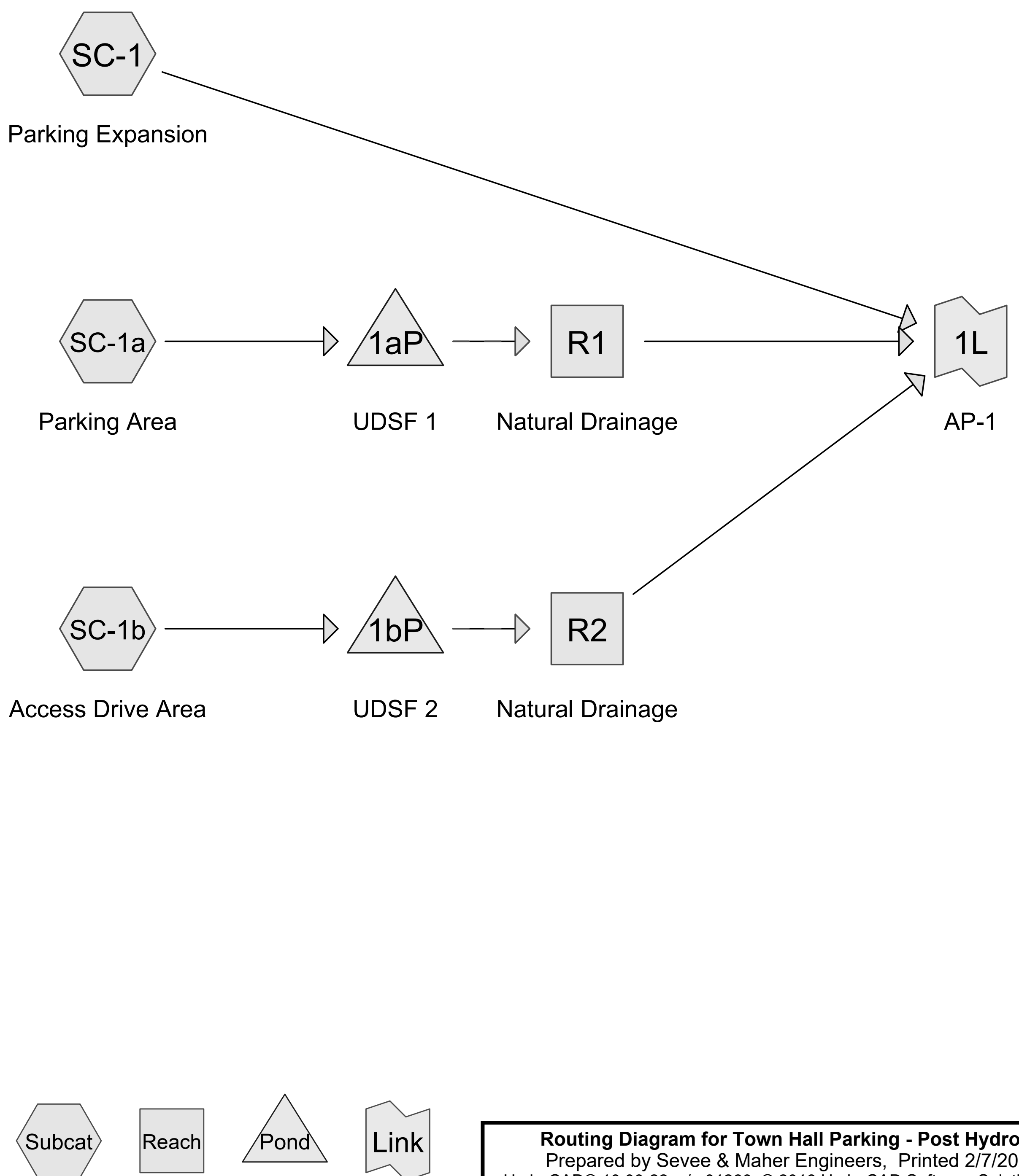
| Area (sf) | CN | Description |
|---|---|---|
| 25,520 | 48 | Brush, Good, HSG B |
| 15,086 | 74 | >75% Grass cover, Good, HSG C |
| 11,800 | 98 | Paved parking, HSG C |
| 128,856 | 58 | Woods/grass comb., Good, HSG B |
| 181,262 | 61 | Weighted Average |
| 169,462 | | 93.49% Pervious Area |
| 11,800 | | 6.51% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 14.7 | 100 | 0.0200 | 0.11 | | **Sheet Flow, A-B**<br>Grass: Dense n= 0.240 P2= 3.00" |
| 3.2 | 233 | 0.0600 | 1.22 | | **Shallow Concentrated Flow, C-D**<br>Woodland Kv= 5.0 fps |
| 0.8 | 427 | 0.0400 | 9.07 | 145.08 | **Channel Flow, C-D**<br>Area= 16.0 sf Perim= 14.5' r= 1.10'<br>n= 0.035 Earth, dense weeds |
| 18.7 | 760 | Total | | | |

## Summary for Link 1L: AP-1

Inflow Area = 4.161 ac, 6.51% Impervious, Inflow Depth = 1.87" for 25-year event
Inflow = 5.96 cfs @ 12.28 hrs, Volume= 0.649 af
Primary = 5.96 cfs @ 12.28 hrs, Volume= 0.649 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs




**Routing Diagram for Town Hall Parking - Post HydroCAD**
Prepared by Sevee & Maher Engineers, Printed 2/7/2020

## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 0.062 | 61 | >75% Grass cover, Good, HSG B (SC-1a) |
| 0.052 | 74 | >75% Grass cover, Good, HSG C (SC-1) |
| 0.721 | 98 | Paved parking, HSG C (SC-1, SC-1a, SC-1b) |
| 3.327 | 58 | Woods/grass comb., Good, HSG B (SC-1, SC-1a, SC-1b) |
| **4.161** | **65** | **TOTAL AREA** |

## Summary for Subcatchment SC-1: Parking Expansion

Runoff = 0.79 cfs @ 12.36 hrs, Volume= 0.123 af, Depth= 0.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.10"

| Area (sf) | CN | Description |
|---|---|---|
| 13,551 | 98 | Paved parking, HSG C |
| 130,762 | 58 | Woods/grass comb., Good, HSG B |
| 2,248 | 74 | >75% Grass cover, Good, HSG C |
| 146,561 | 62 | Weighted Average |
| 133,010 | | 90.75% Pervious Area |
| 13,551 | | 9.25% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 14.7 | 100 | 0.0200 | 0.11 | | **Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.00" |
| 3.2 | 233 | 0.0600 | 1.22 | | **Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps |
| 0.8 | 427 | 0.0400 | 9.07 | 145.08 | **Channel Flow, C-D** Area= 16.0 sf Perim= 14.5' r= 1.10' n= 0.035 Earth, dense weeds |
| 18.7 | 760 | Total | | | |

## Summary for Subcatchment SC-1a: Parking Area

Runoff = 0.94 cfs @ 12.08 hrs, Volume= 0.065 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.10"

| Area (sf) | CN | Description |
|---|---|---|
| 13,875 | 98 | Paved parking, HSG C |
| 9,159 | 58 | Woods/grass comb., Good, HSG B |
| 2,707 | 61 | >75% Grass cover, Good, HSG B |
| 25,741 | 80 | Weighted Average |
| 11,866 | | 46.10% Pervious Area |
| 13,875 | | 53.90% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.0 | | | | | **Direct Entry, Tc MUST BE GREATER THAN OR EQUAL TO 5 MI** |

## Summary for Subcatchment SC-1b: Access Drive Area

Runoff = 0.26 cfs @ 12.08 hrs, Volume= 0.019 af, Depth= 1.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.10"

| Area (sf) | CN | Description |
|---|---|---|
| 3,963 | 98 | Paved parking, HSG C |
| 4,997 | 58 | Woods/grass comb., Good, HSG B |
| 8,960 | 76 | Weighted Average |
| 4,997 | | 55.77% Pervious Area |
| 3,963 | | 44.23% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.0 | | | | | **Direct Entry, Tc MUST BE GREATER THAN OR EQUAL TO 5 MI** |

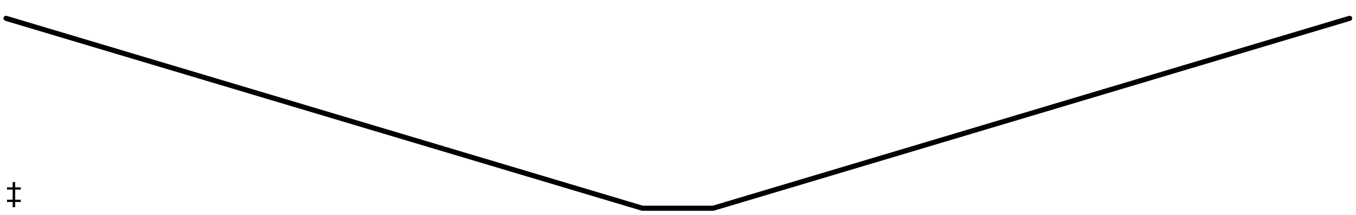
## Summary for Reach R1: Natural Drainage

Inflow Area = 0.591 ac, 53.90% Impervious, Inflow Depth > 0.98" for 2-year event
Inflow = 0.03 cfs @ 16.56 hrs, Volume= 0.048 af
Outflow = 0.03 cfs @ 16.82 hrs, Volume= 0.048 af, Atten= 0%, Lag= 16.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.35 fps, Min. Travel Time= 8.0 min
Avg. Velocity = 0.35 fps, Avg. Travel Time= 8.0 min

Peak Storage= 15 cf @ 16.69 hrs
Average Depth at Peak Storage= 0.01'
Bank-Full Depth= 3.00' Flow Area= 300.0 sf, Capacity= 1,532.48 cfs

10.00' x 3.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 30.0 '/' Top Width= 190.00'
Length= 165.0' Slope= 0.0079 '/'
Inlet Invert= 101.30', Outlet Invert= 100.00'




## Summary for Reach R2: Natural Drainage

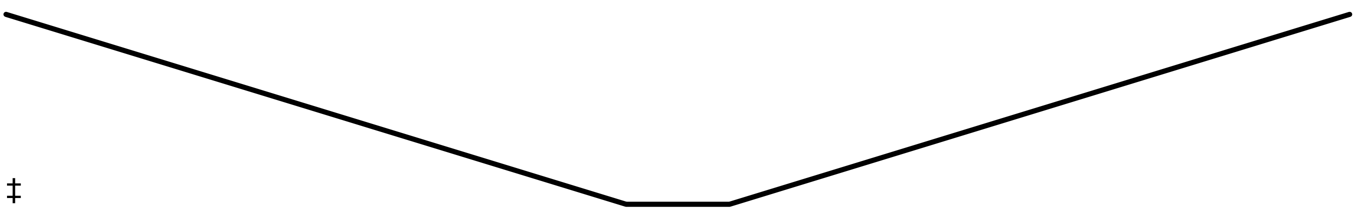
[79] Warning: Submerged Pond 1bP Primary device # 1 by 1.20'

Inflow Area = 0.206 ac, 44.23% Impervious, Inflow Depth > 0.01" for 2-year event
Inflow = 0.00 cfs @ 24.18 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 25.05 hrs, Volume= 0.000 af, Atten= 0%, Lag= 52.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.19 fps, Min. Travel Time= 11.9 min
Avg. Velocity = 0.19 fps, Avg. Travel Time= 11.9 min

Peak Storage= 0 cf @ 24.85 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 2.00' Flow Area= 140.0 sf, Capacity= 384.22 cfs

10.00' x 2.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 30.0 '/' Top Width= 130.00'
Length= 132.0' Slope= 0.0038 '/'
Inlet Invert= 100.50', Outlet Invert= 100.00'



‡

## Summary for Pond 1aP: UDSF 1

[44] Hint: Outlet device #2 is below defined storage

| | | | |
|---|---|---|---|
| Inflow Area = | 0.591 ac, 53.90% Impervious, Inflow Depth = 1.33" | for 2-year event | |
| Inflow = | 0.94 cfs @ 12.08 hrs, Volume= | 0.065 af | |
| Outflow = | 0.03 cfs @ 16.56 hrs, Volume= | 0.048 af, | Atten= 97%, Lag= 268.6 min |
| Primary = | 0.03 cfs @ 16.56 hrs, Volume= | 0.048 af | |
| Secondary = | 0.00 cfs @ 0.00 hrs, Volume= | 0.000 af | |

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 105.39' @ 16.56 hrs Surf.Area= 1,506 sf Storage= 1,704 cf

Plug-Flow detention time= 467.8 min calculated for 0.048 af (74% of inflow)
Center-of-Mass det. time= 375.4 min ( 1,218.9 - 843.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 104.00' | 2,703 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 104.00 | 956 | 0 | 0 |
| 105.00 | 1,339 | 1,148 | 1,148 |
| 105.50 | 1,552 | 723 | 1,870 |
| 106.00 | 1,778 | 833 | 2,703 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Secondary | 105.50' | **5.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |
| #2 | Primary | 101.80' | **0.8" Vert. Orifice/Grate** C= 0.600 |

**Primary OutFlow** Max=0.03 cfs @ 16.56 hrs HW=105.39' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 0.03 cfs @ 9.08 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=104.00' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Summary for Pond 1bP: UDSF 2

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 0.206 ac, 44.23% Impervious, Inflow Depth = 1.08" for 2-year event
Inflow = 0.26 cfs @ 12.08 hrs, Volume= 0.019 af
Outflow = 0.00 cfs @ 24.18 hrs, Volume= 0.000 af, Atten= 100%, Lag= 725.8 min
Primary = 0.00 cfs @ 24.18 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 101.50' @ 24.18 hrs Surf.Area= 291.264 ac Storage= 0.018 af

Plug-Flow detention time= 659.6 min calculated for 0.000 af (1% of inflow)
Center-of-Mass det. time= 453.3 min ( 1,309.8 - 856.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 101.50' | 1,074.622 af | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (acres) | Inc.Store (acre-feet) | Cum.Store (acre-feet) |
|---|---|---|---|
| 101.50 | 291.250 | 0.000 | 0.000 |
| 102.00 | 401.000 | 173.062 | 173.062 |
| 103.00 | 663.000 | 532.000 | 705.062 |
| 103.50 | 815.240 | 369.560 | 1,074.622 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 99.30' | **0.8" Vert. Orifice/Grate** C= 0.600 |
| #2 | Secondary | 103.00' | **10.1' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |

**Primary OutFlow** Max=0.02 cfs @ 24.18 hrs HW=101.50' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.02 cfs @ 7.09 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=101.50' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Summary for Link 1L: AP-1

Inflow Area = 4.161 ac, 17.32% Impervious, Inflow Depth > 0.49" for 2-year event
Inflow = 0.82 cfs @ 12.37 hrs, Volume= 0.171 af
Primary = 0.82 cfs @ 12.37 hrs, Volume= 0.171 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

## Summary for Subcatchment SC-1: Parking Expansion

Runoff = 2.91 cfs @ 12.28 hrs, Volume= 0.336 af, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.60"

| Area (sf) | CN | Description |
|---|---|---|
| 13,551 | 98 | Paved parking, HSG C |
| 130,762 | 58 | Woods/grass comb., Good, HSG B |
| 2,248 | 74 | >75% Grass cover, Good, HSG C |
| 146,561 | 62 | Weighted Average |
| 133,010 | | 90.75% Pervious Area |
| 13,551 | | 9.25% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 14.7 | 100 | 0.0200 | 0.11 | | **Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.00" |
| 3.2 | 233 | 0.0600 | 1.22 | | **Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps |
| 0.8 | 427 | 0.0400 | 9.07 | 145.08 | **Channel Flow, C-D** Area= 16.0 sf Perim= 14.5' r= 1.10' n= 0.035 Earth, dense weeds |
| 18.7 | 760 | Total | | | |

## Summary for Subcatchment SC-1a: Parking Area

Runoff = 1.83 cfs @ 12.07 hrs, Volume= 0.125 af, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.60"

| Area (sf) | CN | Description |
|---|---|---|
| 13,875 | 98 | Paved parking, HSG C |
| 9,159 | 58 | Woods/grass comb., Good, HSG B |
| 2,707 | 61 | >75% Grass cover, Good, HSG B |
| 25,741 | 80 | Weighted Average |
| 11,866 | | 46.10% Pervious Area |
| 13,875 | | 53.90% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.0 | | | | | **Direct Entry, Tc MUST BE GREATER THAN OR EQUAL TO 5 MI** |

## Summary for Subcatchment SC-1b: Access Drive Area

Runoff = 0.55 cfs @ 12.08 hrs, Volume= 0.038 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.60"

| Area (sf) | CN | Description |
|---|---|---|
| 3,963 | 98 | Paved parking, HSG C |
| 4,997 | 58 | Woods/grass comb., Good, HSG B |
| 8,960 | 76 | Weighted Average |
| 4,997 | | 55.77% Pervious Area |
| 3,963 | | 44.23% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.0 | | | | | **Direct Entry, Tc MUST BE GREATER THAN OR EQUAL TO 5 MI** |

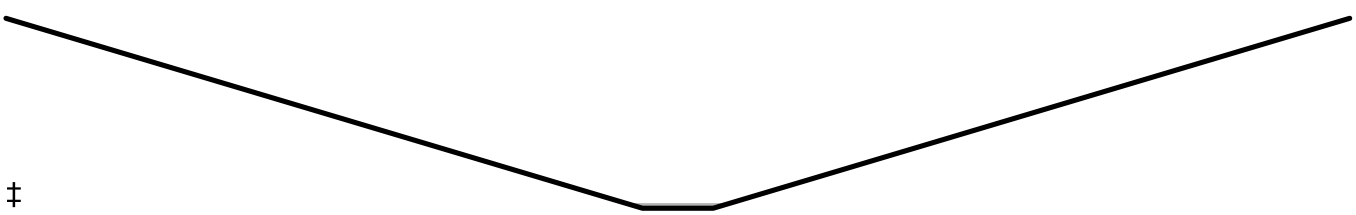
## Summary for Reach R1: Natural Drainage

Inflow Area = 0.591 ac, 53.90% Impervious, Inflow Depth > 2.03" for 10-year event
Inflow = 0.68 cfs @ 12.34 hrs, Volume= 0.100 af
Outflow = 0.63 cfs @ 12.48 hrs, Volume= 0.099 af, Atten= 7%, Lag= 8.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.63 fps, Min. Travel Time= 4.4 min
Avg. Velocity = 0.35 fps, Avg. Travel Time= 7.8 min

Peak Storage= 165 cf @ 12.41 hrs
Average Depth at Peak Storage= 0.08'
Bank-Full Depth= 3.00' Flow Area= 300.0 sf, Capacity= 1,532.48 cfs

10.00' x 3.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 30.0 '/' Top Width= 190.00'
Length= 165.0' Slope= 0.0079 '/'
Inlet Invert= 101.30', Outlet Invert= 100.00'



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## Summary for Reach R2: Natural Drainage

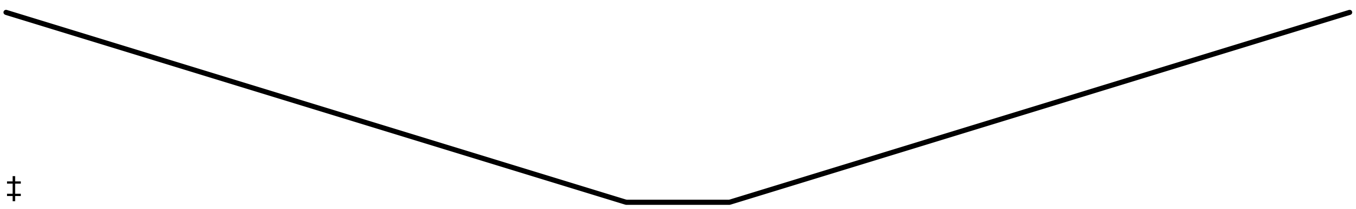
[79] Warning: Submerged Pond 1bP Primary device # 1 by 1.20'

Inflow Area = 0.206 ac, 44.23% Impervious, Inflow Depth > 0.01" for 10-year event
Inflow = 0.00 cfs @ 24.17 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 25.02 hrs, Volume= 0.000 af, Atten= 0%, Lag= 50.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.19 fps, Min. Travel Time= 11.9 min
Avg. Velocity = 0.19 fps, Avg. Travel Time= 11.9 min

Peak Storage= 0 cf @ 24.82 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 2.00' Flow Area= 140.0 sf, Capacity= 384.22 cfs

10.00' x 2.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 30.0 '/' Top Width= 130.00'
Length= 132.0' Slope= 0.0038 '/'
Inlet Invert= 100.50', Outlet Invert= 100.00'



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## Summary for Pond 1aP: UDSF 1

[44] Hint: Outlet device #2 is below defined storage

Inflow Area = 0.591 ac, 53.90% Impervious, Inflow Depth = 2.55" for 10-year event
Inflow = 1.83 cfs @ 12.07 hrs, Volume= 0.125 af
Outflow = 0.68 cfs @ 12.34 hrs, Volume= 0.100 af, Atten= 63%, Lag= 15.7 min
Primary = 0.03 cfs @ 12.34 hrs, Volume= 0.053 af
Secondary = 0.65 cfs @ 12.34 hrs, Volume= 0.047 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 105.64' @ 12.34 hrs Surf.Area= 1,615 sf Storage= 2,091 cf

Plug-Flow detention time= 264.5 min calculated for 0.100 af (80% of inflow)
Center-of-Mass det. time= 186.0 min ( 1,010.5 - 824.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 104.00' | 2,703 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 104.00 | 956 | 0 | 0 |
| 105.00 | 1,339 | 1,148 | 1,148 |
| 105.50 | 1,552 | 723 | 1,870 |
| 106.00 | 1,778 | 833 | 2,703 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Secondary | 105.50' | **5.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |
| #2 | Primary | 101.80' | **0.8" Vert. Orifice/Grate** C= 0.600 |

**Primary OutFlow** Max=0.03 cfs @ 12.34 hrs HW=105.64' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 0.03 cfs @ 9.39 fps)

**Secondary OutFlow** Max=0.65 cfs @ 12.34 hrs HW=105.64' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 0.65 cfs @ 0.93 fps)

## Summary for Pond 1bP: UDSF 2

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 0.206 ac, 44.23% Impervious, Inflow Depth = 2.21" for 10-year event
Inflow = 0.55 cfs @ 12.08 hrs, Volume= 0.038 af
Outflow = 0.00 cfs @ 24.17 hrs, Volume= 0.000 af, Atten= 100%, Lag= 725.8 min
Primary = 0.00 cfs @ 24.17 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 101.50' @ 24.17 hrs Surf.Area= 291.278 ac Storage= 0.037 af

Plug-Flow detention time= 725.2 min calculated for 0.000 af (1% of inflow)
Center-of-Mass det. time= 465.1 min ( 1,300.5 - 835.4 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 101.50' | 1,074.622 af | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (acres) | Inc.Store (acre-feet) | Cum.Store (acre-feet) |
|---|---|---|---|
| 101.50 | 291.250 | 0.000 | 0.000 |
| 102.00 | 401.000 | 173.062 | 173.062 |
| 103.00 | 663.000 | 532.000 | 705.062 |
| 103.50 | 815.240 | 369.560 | 1,074.622 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 99.30' | **0.8" Vert. Orifice/Grate** C= 0.600 |
| #2 | Secondary | 103.00' | **10.1' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |

**Primary OutFlow** Max=0.02 cfs @ 24.17 hrs HW=101.50' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.02 cfs @ 7.09 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=101.50' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Summary for Link 1L: AP-1

Inflow Area = 4.161 ac, 17.32% Impervious, Inflow Depth > 1.26" for 10-year event
Inflow = 3.14 cfs @ 12.38 hrs, Volume= 0.436 af
Primary = 3.14 cfs @ 12.38 hrs, Volume= 0.436 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

## Summary for Subcatchment SC-1: Parking Expansion

Runoff = 5.07 cfs @ 12.28 hrs, Volume= 0.548 af, Depth= 1.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.80"

| Area (sf) | CN | Description |
|---|---|---|
| 13,551 | 98 | Paved parking, HSG C |
| 130,762 | 58 | Woods/grass comb., Good, HSG B |
| 2,248 | 74 | >75% Grass cover, Good, HSG C |
| 146,561 | 62 | Weighted Average |
| 133,010 | | 90.75% Pervious Area |
| 13,551 | | 9.25% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 14.7 | 100 | 0.0200 | 0.11 | | **Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.00" |
| 3.2 | 233 | 0.0600 | 1.22 | | **Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps |
| 0.8 | 427 | 0.0400 | 9.07 | 145.08 | **Channel Flow, C-D** Area= 16.0 sf Perim= 14.5' r= 1.10' n= 0.035 Earth, dense weeds |
| 18.7 | 760 | Total | | | |

## Summary for Subcatchment SC-1a: Parking Area

Runoff = 2.58 cfs @ 12.07 hrs, Volume= 0.177 af, Depth= 3.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.80"

| Area (sf) | CN | Description |
|---|---|---|
| 13,875 | 98 | Paved parking, HSG C |
| 9,159 | 58 | Woods/grass comb., Good, HSG B |
| 2,707 | 61 | >75% Grass cover, Good, HSG B |
| 25,741 | 80 | Weighted Average |
| 11,866 | | 46.10% Pervious Area |
| 13,875 | | 53.90% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.0 | | | | | **Direct Entry, Tc MUST BE GREATER THAN OR EQUAL TO 5 MI** |

## Summary for Subcatchment SC-1b: Access Drive Area

Runoff = 0.80 cfs @ 12.07 hrs, Volume= 0.055 af, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=5.80"

| Area (sf) | CN | Description |
|---|---|---|
| 3,963 | 98 | Paved parking, HSG C |
| 4,997 | 58 | Woods/grass comb., Good, HSG B |
| 8,960 | 76 | Weighted Average |
| 4,997 | | 55.77% Pervious Area |
| 3,963 | | 44.23% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.0 | | | | | **Direct Entry, Tc MUST BE GREATER THAN OR EQUAL TO 5 MI** |

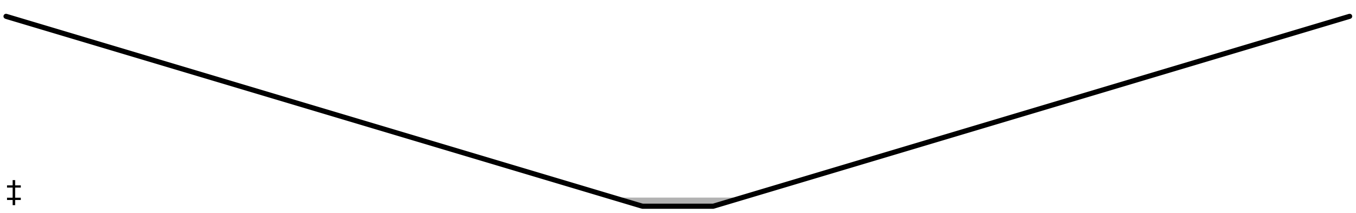
## Summary for Reach R1: Natural Drainage

Inflow Area = 0.591 ac, 53.90% Impervious, Inflow Depth > 3.05" for 25-year event
Inflow = 1.86 cfs @ 12.14 hrs, Volume= 0.150 af
Outflow = 1.62 cfs @ 12.25 hrs, Volume= 0.150 af, Atten= 13%, Lag= 6.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.85 fps, Min. Travel Time= 3.2 min
Avg. Velocity = 0.36 fps, Avg. Travel Time= 7.6 min

Peak Storage= 317 cf @ 12.20 hrs
Average Depth at Peak Storage= 0.14'
Bank-Full Depth= 3.00' Flow Area= 300.0 sf, Capacity= 1,532.48 cfs

10.00' x 3.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 30.0 '/' Top Width= 190.00'
Length= 165.0' Slope= 0.0079 '/'
Inlet Invert= 101.30', Outlet Invert= 100.00'



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## Summary for Reach R2: Natural Drainage

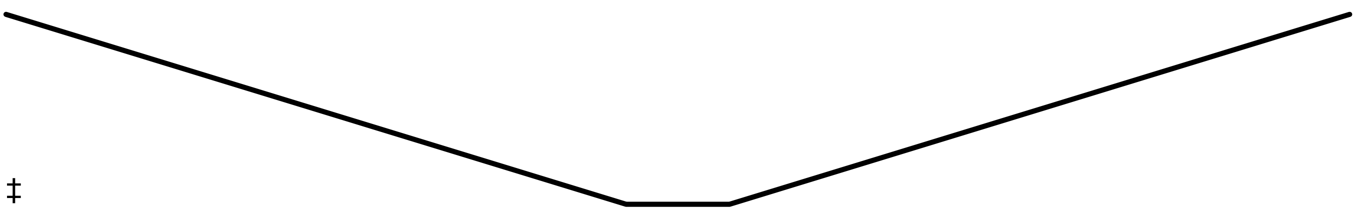
[79] Warning: Submerged Pond 1bP Primary device # 1 by 1.20'

Inflow Area = 0.206 ac, 44.23% Impervious, Inflow Depth > 0.02" for 25-year event
Inflow = 0.00 cfs @ 24.17 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 25.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 49.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.19 fps, Min. Travel Time= 11.9 min
Avg. Velocity = 0.19 fps, Avg. Travel Time= 11.9 min

Peak Storage= 0 cf @ 24.80 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 2.00' Flow Area= 140.0 sf, Capacity= 384.22 cfs

10.00' x 2.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 30.0 '/' Top Width= 130.00'
Length= 132.0' Slope= 0.0038 '/'
Inlet Invert= 100.50', Outlet Invert= 100.00'



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## Summary for Pond 1aP: UDSF 1

[44] Hint: Outlet device #2 is below defined storage

| | | | | |
|---|---|---|---|---|
| Inflow Area = | 0.591 ac, 53.90% Impervious, Inflow Depth = 3.60" for 25-year event | | | |
| Inflow = | 2.58 cfs @ | 12.07 hrs, Volume= | 0.177 af | |
| Outflow = | 1.86 cfs @ | 12.14 hrs, Volume= | 0.150 af, | Atten= 28%, Lag= 4.3 min |
| Primary = | 0.03 cfs @ | 12.14 hrs, Volume= | 0.055 af | |
| Secondary = | 1.83 cfs @ | 12.14 hrs, Volume= | 0.095 af | |

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 105.78' @ 12.14 hrs Surf.Area= 1,677 sf Storage= 2,316 cf

Plug-Flow detention time= 188.5 min calculated for 0.150 af (85% of inflow)
Center-of-Mass det. time= 122.9 min ( 937.5 - 814.6 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 104.00' | 2,703 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 104.00 | 956 | 0 | 0 |
| 105.00 | 1,339 | 1,148 | 1,148 |
| 105.50 | 1,552 | 723 | 1,870 |
| 106.00 | 1,778 | 833 | 2,703 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Secondary | 105.50' | **5.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |
| #2 | Primary | 101.80' | **0.8" Vert. Orifice/Grate** C= 0.600 |

**Primary OutFlow** Max=0.03 cfs @ 12.14 hrs HW=105.78' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 0.03 cfs @ 9.56 fps)

**Secondary OutFlow** Max=1.82 cfs @ 12.14 hrs HW=105.78' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 1.82 cfs @ 1.32 fps)

## Summary for Pond 1bP: UDSF 2

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 0.206 ac, 44.23% Impervious, Inflow Depth = 3.21" for 25-year event
Inflow = 0.80 cfs @ 12.07 hrs, Volume= 0.055 af
Outflow = 0.00 cfs @ 24.17 hrs, Volume= 0.000 af, Atten= 100%, Lag= 725.7 min
Primary = 0.00 cfs @ 24.17 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 101.50' @ 24.17 hrs Surf.Area= 291.291 ac Storage= 0.054 af

Plug-Flow detention time= 765.8 min calculated for 0.000 af (1% of inflow)
Center-of-Mass det. time= 470.9 min ( 1,295.5 - 824.6 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 101.50' | 1,074.622 af | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (acres) | Inc.Store (acre-feet) | Cum.Store (acre-feet) |
|---|---|---|---|
| 101.50 | 291.250 | 0.000 | 0.000 |
| 102.00 | 401.000 | 173.062 | 173.062 |
| 103.00 | 663.000 | 532.000 | 705.062 |
| 103.50 | 815.240 | 369.560 | 1,074.622 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 99.30' | **0.8" Vert. Orifice/Grate** C= 0.600 |
| #2 | Secondary | 103.00' | **10.1' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |

**Primary OutFlow** Max=0.02 cfs @ 24.17 hrs HW=101.50' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.02 cfs @ 7.09 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=101.50' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Summary for Link 1L: AP-1

Inflow Area = 4.161 ac, 17.32% Impervious, Inflow Depth > 2.01" for 25-year event
Inflow = 6.67 cfs @ 12.27 hrs, Volume= 0.698 af
Primary = 6.67 cfs @ 12.27 hrs, Volume= 0.698 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

APPENDIX D

PUBLIC WORKS REDEVELOPMENT TREATMENT CALCULATION SUMMARY

SME
SEVEE & MAHER
ENGINEERS
4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 / Fax: 207.829.5692
smemaine.com

# REDEVELOPMENT TREATMENT LEVEL CALCULATIONS

**Project Name:** Cumberland Municipal Site Upgrades
**Project Location:** Public Works, 23 Drowne Road, Cumberland
**Project No:** 19231
**By:** JRG
**Date:** 2/4/2020
**Checked By:** DPD
**Date:** 2/5/2020

**LISTING OF AREAS - EXISTING**

| Area | Pollutant Ranking 0 | 1 | 2 | 3 | 4 | 5 | Notes |
|---|---|---|---|---|---|---|---|
| Pavement | | | | | 25,932 | | |
| Gravel | | | | 38,269 | | | |
| Concrete | | | | 883 | | | |
| Buildings | | | | 3,377 | | | |
| Grass | | | 29,926 | | | | |
| Brush/Woods | 13,123 | | | | | | |
| **Total** | **13,123** | **0** | **29,926** | **42,529** | **25,932** | **0** | **111,510 TOTAL** |

**LISTING OF AREAS - PROPOSED**

| Area | Pollutant Ranking 0 | 1 | 2 | 3 | 4 | 5 | Notes |
|---|---|---|---|---|---|---|---|
| Pavement | | | | | 44,884 | | |
| Gravel | | | | 4,748 | | | |
| Concrete | | | | 987 | | | |
| Buildings | | | | 15,455 | | | |
| Dripline Filter | | | 869 | | | | |
| Walkway Pavement | | | 1,360 | | | | |
| Grass | | | 22,956 | | | | |
| Brush/Woods | 20,251 | | | | | | |
| **Total** | **20,251** | **0** | **25,185** | **21,190** | **44,884** | **0** | **111,510 TOTAL** |

**EXISTING POLLUTANT RANKING CALCULATIONS**

| Land Use Type (from MEDEP Chapter 500) | (Square Feet) | (Acres) | Pollutant Ranking | Total Score |
|---|---|---|---|---|
| Other Roads/Medium Use Parking Lots | 25,932 | 0.60 | 4 | 2.38 |
| Other Parking/Industrial Roofs | 42,529 | 0.98 | 3 | 2.93 |
| Other Rooftops/Lawn Areas | 29,926 | 0.69 | 2 | 1.37 |
| Walkways/Landscaped/Stormwater Treatment System | 0 | 0.00 | 1 | 0.00 |
| Forest; Meadow mowed no more than twice per year | 13,123 | 0.30 | 0 | 0.00 |
| **Total** | **111,510** | **2.56** | **EIR** | **6.68** |

**PROPOSED POLLUTANT RANKING CALCULATIONS**

| Land Use Type (from MEDEP Chapter 500) | Area to be Redeveloped | Area to be Redeveloped | Pollutant Ranking | Total Score |
|---|---|---|---|---|
| Other Roads/Medium Use Parking Lots | 44,884 | 1.03 | 4 | 4.12 |
| Other Parking/Industrial Roofs | 21,190 | 0.49 | 3 | 1.46 |
| Other Rooftops/Lawn Areas | 25,185 | 0.58 | 2 | 1.16 |
| Walkways/Landscaped/Stormwater Treatment System | 0 | 0.00 | 1 | 0.00 |
| Forest; Meadow mowed no more than twice per year | 20,251 | 0.46 | 0 | 0.00 |
| **Total** | **111,510** | **2.56** | **PIR** | **6.74** |

**EIR / Redeveloped Acres =** **2.61**
**PIR / Redeveloped Acres =** **2.63**
**Ranked Impact Change Due to Redevelopment =** **0.02**

**50% treatment is required per Table 3 of Chapter 500 = 55,755 Square Feet (1.27 acres)**

Total Redeveloped Area (from above table) = 111,510
Impervious Area Treated (from Stormwater Sizing Calculations) = 56,303

**Treatment Percentage Provided =** **50.5%**

## APPENDIX E

## PUBLIC WORKS BMP TREATMENT SIZING

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# STORMWATER TREATMENT SIZING CALCULATIONS

**Project Name:** Cumberland Municipal Site Upgrades

**Project Location:** Public Works, 23 Drowne Road

**Project No:** 19231

**By:** JRG

**Date:** 2/4/2020

**Checked By:** DPD

**Date:** 2/5/2020

**Stormwater Treatment: Undersdrained Soil Filter #1** Bus Parking Area

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | DEVELOPED AREA | = | 35,286 sf | |
| | | | IMPERVIOUS AREAS CAPTURED | = | 23,172 sf | |
| | | | NON-IMPERVIOUS AREAS CAPTURED | = | 12,114 sf | |
| | | | TOTAL AREA CAPTURED | = | 35,286 sf | |
| | | | REQUIRED TREATMENT VOLUME | | | |
| (1"/12") | 23,172 | + (0.4"/12") | 12,114 | = | 2,335 cf | 3,155 cf provided |
| | | | CHANNEL PROTECTION VOLUME (DEPTH) | = | 1.5 ft | 1.5 ft provided |
| | | | REQUIRED FILTER SURFACE AREA | | | |
| (0.05) | 23,172 | + (0.2) | 12,114 | = | 1,401 sf | 1,407 sf provided |

Note: Stone strip will serve as a sediment trap

**Stormwater Treatment: Roof Dripline Filter #1** East Side of Admin Building

ROOF AREAS CAPTURED = 2,050 sf
GRASS AREAS CAPTURED = N/A

MINIMUM STORAGE VOLUME
1 inch x Impervious Area = 171 cf

<u>PROPOSED FILTER SIZE</u> = 4 feet wide by 1.25 feet deep by 96 feet long
(with 40% voids in stone)

Storage Volume Provided = 192 cf

**Stormwater Treatment: Roof Dripline Filter #2** West Side of Admin Building

ROOF AREAS CAPTURED = 2,050 sf
GRASS AREAS CAPTURED = N/A

MINIMUM STORAGE VOLUME
1 inch x Impervious Area = 171 cf

<u>PROPOSED FILTER SIZE</u> = 4 feet wide by 1.25 feet deep by 86 feet long
(with 40% voids in stone)

ACTUAL VOLUME PROPOSED = 172 cf

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# STORMWATER TREATMENT SIZING CALCULATIONS

**Project Name:** Cumberland Municipal Site Upgrades

**Project Location:** Public Works, 23 Drowne Road

**Project No:** 19231

**By:** JRG

**Date:** 2/4/2020

**Checked By:** DPD

**Date:** 2/5/2020

| Name | Impervious Area (sf) | Landscaped Area (sf) | Developed Area (sf) | Treatment Area (Acres) | Filterra Model Number | Unit Treatment Area (Acres) |
|---|---|---|---|---|---|---|
| Filterra #1 at CB #3 | 15,619 | 1,298 | 16,917 | 0.388 | 6x12 | 0.420 |

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**TREATMENT SUMMARY FOR REDEVELOPMENT STANDARD**
**PUBLIC WORKS IMPROVEMENTS**

| | Subcatchment ID | Impervious Area (SF) | Landscaped Area (SF) | Redeveloped Area (SF) |
|---|---|---|---|---|
| **Total Project Treatment Area** | | 68,303 | 43,207 | 111,510 |
| **Required Treatment Area (50%)** | | 34,152 | 21,604 | **55,755** |
| Underdrained Soil Filter #1 | SC-1d | 23,172 | 12,114 | 35,286 |
| Roof Dripline Filter #1 | SC-1a | 2,050 | 0 | 2,050 |
| Roof Dripline Filter #2 | SC-1c | 2,050 | 0 | 2,050 |
| Filterra at CB #103 | SC-1b | 15,619 | 1,298 | 16,917 |
| **Total Area Treated** | | 42,891 | 13,412 | **56,303** |
| **Percent of Redeveloped Area Treated** | | | | **50.5%** |

# APPENDIX F

# TOWN OFFICE PARKING BMP TREATMENT SIZING

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**SME**
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smemaine.com

# STORMWATER TREATMENT SIZING CALCULATIONS

**Project Name:** Cumberland Town Office Parking Expan
**Project Location:** Tuttle Road
**Project No:** 19231
**By:** NMT
**Date:** 2/4/2020
**Checked By:** DPD
**Date:** 2/7/2020

**Stormwater Treatment: OPTION 1 Underdrained Soil Filter**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | DEVELOPED AREA | = | | sf | | |
| | | | IMPERVIOUS AREAS CAPTURED | = | 13,875 | sf | | |
| | | | NON-IMPERVIOUS AREAS CAPTURED | = | 2,707 | sf | | |
| | | | TOTAL AREA CAPTURED | = | 16,582 | sf | | |
| | | | REQUIRED TREATMENT VOLUME | | | | | |
| (1."/12") | 13,875 | + | (0.4"/12") 2,707 | = | 1,246 | cf | 1,870 | cf provided |
| | | | CHANNEL PROTECTION VOLUME (DEPTH) | = | 1.50 | ft | 1.5 | ft provided |
| | | | REQUIRED FILTER SURFACE AREA | | | | | |
| (0.05) | 13,875 | + | (0.2) 2,707 | = | 748 | sf | 956 | sf provided |
| | | | SEDIMENT TRAP VOLUME | | | | | |
| (10.00) | | lbs per acre: | ($90\ lb/ft^{3}$) | = | | cf | | |

**Stormwater Treatment: OPTION 2 Underdrained Soil Filter**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | DEVELOPED AREA | = | | sf | | |
| | | | IMPERVIOUS AREAS CAPTURED | = | 3,963 | sf | | |
| | | | NON-IMPERVIOUS AREAS CAPTURED | = | 4,997 | sf | | |
| | | | TOTAL AREA CAPTURED | = | 8,960 | sf | | |
| | | | REQUIRED TREATMENT VOLUME | | | | | |
| (1."/12") | 3,963 | + | (0.4"/12") 4,997 | = | 497 | cf | 705 | cf provided |
| | | | CHANNEL PROTECTION VOLUME (DEPTH) | = | 1.50 | ft | 1.5 | ft provided |
| | | | REQUIRED FILTER SURFACE AREA | | | | | |
| (0.05) | 3,963 | + | (0.2) 4,997 | = | 298 | sf | 298 | sf provided |
| | | | SEDIMENT TRAP VOLUME | | | | | |
| (10.00) | | lbs per acre: | ($90\ lb/ft^{3}$) | = | | cf | | |

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**TREATMENT SUMMARY FOR NEW DEVELOPMENT STANDARD**
**TOWN OFFICE PARKING EXPANSION**

| | Subcatchment ID | New Impervious Area (SF) | New Landscaped Area (SF) | New Development Area (SF) |
|---|---|---|---|---|
| **Total Project Areas** | | 18,804 | 6,983 | 25,787 |
| | | | | |
| **Required Treatment Area - 95% New Impervious 80% New Development** | | 17,864 | 5,586 | **12,894** |
| Underdrained Soil Filter #1 | SC-1a | 13,875 | 2,707 | 16,582 |
| Underdrain Soil Filter #2 | SC-1b | 3,963 | 4,997 | 8,960 |
| **Total Area Treated** | | 17,838 | 7,704 | **25,542** |
| **Percent of New Impervious Treated** | | **95%** | | |
| **Percent of New Development Area Treated** | | | | **99%** |

# APPENDIX G

# FILTERRA DESIGN REVIEW LETTERS

Contech Engineered Solutions LLC
71 US Rte 1, Suite F
Scarborough, ME 04074
Phone: (207) 885-6191
www.ContechES.com

Nicholas Thompson
SME
4 Blanchard Road, PO Box 85A
Cumberland, ME 04021

February 5, 2020

RE: Public Works Improvements, Cumberland, ME (Contech Reference No. 639,765)
Review of Filterra Design

Dear Mr. Thompson:

The purpose of this letter is to document Contech Engineered Solutions' review of the plans and the proposed application of the Filterra water quality unit for the Public Works Improvements, Cumberland, ME.

Contech Engineered Solutions (Contech) has reviewed the Filterra design for this project. We believe the Filterra configuration listed below to be an appropriate water quality solution for this site. The Filterra system is approved for use by MEDEP as an alternate to the General Standards of the Stormwater Rules (Chapter 500) if designed, installed, and maintained in accordance with the provisions noted in the February 2, 2017 approval letter from the MEDEP.

Based on our review, the Filterra was designed in accordance with the sizing design guidelines to treat 90% of the annual runoff volume prior to bypass. In order to adequately treat the runoff from this area, Contech recommends the following units:

| Subcatchment ID | Impervious Area | Pervious Area | Filterra Size | Model Name |
|---|---|---|---|---|
| South Parking Area | 0.358 ac | 0.030 ac | 6x12 | FT1206 |

Our systems require periodic maintenance to continue operating properly. Given typical runoff pollutant loading rates, Contech recommends maintenance inspections on an annual basis. Based on the location of the system, we anticipate replacement of the mulch layer every 12 months for the system to continue to remove pollutants. Contech will be responsible for two maintenance visits during the first year of operation as included in the purchase of the Filterra unit; subsequent years of maintenance shall be performed by a third party at the owner's expense.

This system is expected to operate in accordance with Contech's design intent. Please feel free to contact me if you have any questions or concerns.

Sincerely,

David Adams, PE
Contech Engineered Solutions, LLC.
(207) 885-6191
dadams@conteches.com

**APPENDIX H**

**POST-CONSTRUCTION STORMWATER MANAGEMENT PLAN**

SME
SEVEE & MAHER
ENGINEERS

# POST-CONSTRUCTION STORMWATER MANAGEMENT PLAN
# TOWN OF CUMBERLAND MUNICIPAL UPGRADES
# CUMBERLAND, MAINE

Prepared for

## TOWN OF CUMBERLAND
Maine

STATE OF MAINE
DANIEL
P.
DIFFIN
11841
LICENSED
PROFESSIONAL ENGINEER

February 2020


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Cumberland, Maine 04021
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ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

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**POST-CONSTRUCTION STORMWATER MANAGEMENT PLAN**
**TOWN OF CUMBERLAND MUNICIPAL UPGRADES**
**CUMBERLAND, MAINE**

## 1.0 SITE DESCRIPTION

The Town of Cumberland (Town) is proposing to permit historical and proposed development on four Town owned parcels at 23 Drowne Road, 290 Tuttle Road, and setback off Tuttle Road between the Town Forest and railroad in Cumberland, Maine. The proposed development on these properties includes improvements to the Cumberland Public Works facility, the expansion of the Town Hall parking lot, and construction of a Sand/Salt Shed to relocate the existing. This Post Construction Stormwater Management Plan shall apply to these three projects as described below.

Public Works Improvements Project

The Cumberland Public Works facility is located at 23 Drowne Road and is adjacent to a public Civic Lot at 3 Oak Street. The Public Works parcel is 9.2 acres and the Civic Lot is 4.4 acres in size. The existing facility includes the Public Works Garage, a cold storage building, a school bus maintenance building, an administrative trailer, sand/salt shed, school bus and staff parking, existing gravel compost pad, and a closed wood waste landfill. The existing wood waste landfill is also on the 9.2-acre property, but is excluded from the SLODA permit because it is permitted under the MEDEP Solid Waste Bureau.

The proposed redevelopment includes 8,500-square-foot expansion to the existing Public Works Garage for four school bus and mechanic bays, a proposed 4,100-square-foot Office Building, the reconfiguration and expansion of site parking for forty (40) school bus spaces and 76 vehicle parking spaces, the relocation of the existing cold storage building, and construction of stormwater treatment. The project will include the demolition of the existing bus maintenance garage, the sand/salt shed, and other miscellaneous buildings. In addition, the gravel compost pads on top of the landfill and gravel storage areas on the Civic Lot will be removed and the areas revegetated and seeded with a New England Meadow Mix to promote additional growth.

The existing garage and parking area built in 1973 included 3.0 acres total of impervious area, which predates MEDEP Stormwater Law. The proposed area defined as redevelopment will include approximately 1.8 acres of impervious area and 1.0 acre of revegetated areas. The project will also include maintenance of approximated 1.1 acres of existing pavement that will include removal of the pavement, slight adjustments to the grades less than 12 inches, and repaving.

The stormwater treatment for this project will include an underdrained soil filter, Filterra Tree Box Filter, and sections of Roof Dripline Filters along the proposed Office Building. Additional stormwater conveyance will include closed storm drain systems and overland flow.

Town Office Parking Expansion

The Town Office, Town Forest, and Town Landfill are located at 290 Tuttle Road on a parcel 109 acres in size. An existing school, built in 1950, on the property and its historical improvements will not be included in this permit because it is privately operated via a land lease from the Town which excludes it from common scheme of development. The Town Landfill is not included in this permit because it is permitted under the MEDEP Solid Waste Bureau. This application incudes the Town Office building and parking which was constructed in 1998 and met the standards for development at that time. In 2016, the Town Forest trails increased by 0.5 acre of impervious area.

The Town proposes to construct a parking expansion to serve as overflow during Town events and voting and additional parking for access to the Town ballfields. The parking expansion will include 36 spaces accessed via a 24-foot drive connected to the existing parking lot. A sidewalk connection will be made to the sidewalk on Tuttle Road and a small pedestrian accessway for the ballfield access. The proposed expansion will include an increase in impervious area of 0.6 acre on the property. The proposed improvements for the project are shown in the attached drawing set for Town Office Parking Expansion submitted with this application.

The stormwater treatment for this project will include an underdrained soil filter and Filterra Tree Box Filter. Additional stormwater measures include a catch basin, crushed stone drip strip for sediment pretreatment, and overland flow areas.

Relocated Sand/Salt Shed

A new Sand/Salt Shed will be constructed at the Town compost facility located between the Town Forest and railroad setback 2,100 feet off Tuttle Road on a 31.7-acre parcel. The sand/salt building will be used as storage for the Town sand and salt supply and will be used by snowplow trucks during the winter. The access road to the site and compost extent were constructed in 2019 under a permit from the Solid Waste Bureau. The proposed 8,000-square-foot sand/salt shed will be built within the footprint of the gravel pad approved for the Compost operations. Approximately 12,300 square feet of maneuvering area will be paved around the building for truck use and snow plowing. In total, the project will result in 20,300 square feet of impervious area to be covered under this application. The improvements for the Sand/Salt Shed are approved by the Town as shown on the attached Town of Cumberland Compost Pad and Sand/Salt Shed Relocation drawing set dated October 22, 2019.

Stormwater measures for this project will include maintenance of the paved areas around the Sand/Salt Shed.

## 2.0 FACILITY CONTACTS

| | |
|---|---|
| Facility: | Cumberland Town Public Works<br>23 Drowne Road<br>Cumberland, Maine 04021 |
| | Cumberland Town Hall<br>290 Tuttle Road<br>Cumberland, Maine 04021 |
| Owner Representative: | William R. Shane, P.E.<br>Town Manager<br>Town of Cumberland<br>207-829-5559 |
| Maintenance Responsibility: | Christopher Bolduc<br>Assistant Town Manager/Public Works Director<br>Town of Cumberland<br>207-829-5559 |
| Consultant/Designer: | Sevee & Maher Engineers<br>4 Blanchard Road<br>Cumberland, Maine 04021<br>207-829-5016<br>Daniel P. Diffin, P.E.<br>dpd@smemaine.com |

Town of Cumberland (Town) facility maintenance team are responsible after year 1 for inspection and maintenance and will have knowledge of erosion and stormwater control, including the standards and conditions in the permit. Post-Construction documentation and inspection logs will be maintained by the Town for a period well in excess of five years, as required by Chapter 500.

## 3.0 POST-CONSTRUCTION STORMWATER MANAGEMENT PLAN OVERVIEW AND OBJECTIVES

The Post-Construction Stormwater Management Plan (PSWMP) is an important component of the overall stormwater management system for the site. PSWMP addresses various maintenance activities that should occur after construction and site stabilization. Proper implementation of the PSWMP can minimize pollutant generation and transport and maintain the stormwater treatment system to ensure proper operation. This PSWMP includes three primary components:

1. Site Management Practices
2. Inspections
3. Routine Maintenance and Corrective Actions

### 3.1 Site Management Practices

Site management practices are aimed at reducing pollutants by minimizing use of certain materials, using alternative materials, or removing pollutants prior to discharge to the stormwater treatment system. These practices shall include:

a. Use slow release sulfur or plastic coated ureaform fertilizers (e.g., Nutralene).

b. Do not fertilize vegetated swales once vegetation is established.

c. Minimize use of pesticides by using a sound integrated pest management (IPM) approach to monitor and control the actual pests present.

d. Collect and remove autumn leaves to minimize transport to the stormwater treatment system.

e. Minimize use of de-icing materials and sand.

f. Routine sweeping of parking areas and driveways.

g. Fertilizers, pesticides and other hazardous materials should be stored in enclosed areas to avoid exposure to precipitation.

h. Material handling should be conducted to minimize risk of spillage and release to the stormwater treatment system.

### 3.2 Inspections

A series of routine inspections shall be completed to allow for the early identification of potential problems, and to guide routine maintenance activities. Inspections shall be carried out in accordance with the Schedule in Table 3. Dates and observations shall be recorded for each inspection on the attached 'Inspection Log'.

## 3.3 Routine Maintenance and Corrective Actions

Routine maintenance activities are designed to ensure proper function of the stormwater management system and minimize pollutant transport from the site. Routine maintenance activities must be completed according to the schedule (Table 3) provided in this plan. This schedule is the minimum amount of maintenance required, and maintenance that is more frequent may be needed when indicated by the inspections. Corrective actions (supplemental maintenance activities or repairs) should be started within the following work day and should be completed within 7 days of the inspection identifying the problem. Each maintenance activity will be recorded on the attached 'Maintenance and Repair Log'.

During construction, the Sitework Contractor (not yet selected by Bid process) shall be responsible for cleaning and maintaining stormwater components on the schedule outlined in Table 3.

Following completion of construction, the Town will be responsible for cleaning and maintaining stormwater components on the schedule outlined in Table 3.

Place removed sediments in an area of low erosion potential, either on-site or off-site, and seed with erosion control seed mix.

The following describes specific stormwater facilities maintenance requirements and minimum schedule of inspection and maintenance.

1. Open swales and ditches need to be inspected in the spring and fall, or after a major rainfall event, to assure that debris or sediments do not reduce the effectiveness of the system. Debris needs to be removed at that time. Sign of erosion or blockage shall be immediately repaired to assure a vigorous growth of vegetation for the stability of the structure and proper functioning. Swales that show newly formed channels or gullies will be immediately repaired by reseeding/sodding of bare spots, removal of trash, leaves and/or accumulated sediments, and the control of woody or other undesirable vegetation.
2. Vegetated ditches should be mowed at least once during the growing season. Larger brush or trees must not be allowed to become established in the channel. Any areas where the vegetation fails will be subject to erosion and should be repaired and revegetated.
3. If sediment in culverts or piped drainage systems exceeds 20 percent of the diameter of the pipe, it should be removed. This may be accomplished by hydraulic flushing or other mechanical means; however, care should be taken to not flush the sediments into the filter basins, or retention/detention pond as it will reduce the pond's capacity and hasten the time when it must be cleaned. Storm pipes should be inspected on an annual basis.

4. Catch basin sumps and the outlet control structures shall be cleaned of debris and sediment at least annually to minimize clogging and transportation of sediment during rainfall events.

**TABLE 1**

**CATCH BASIN INVENTORY**
**CUMBERLAND PUBLIC WORKS SITE**

| Catch Basin ID | Location |
|---|---|
| CB #101 | SOUTHEAST END OF UNDERDRAINED SOIL FILTER #1 |
| CB #102 | SOUTHWEST OF THE COLD STORAGE BUILDING |
| CB #103 | PUBLIC WORKS ENTRANCE |
| CB #104 | SOUTH SIDE OF ADMINISTRATOR REAR PARKING |
| CB #105 | NORTHSIDE OF ADMINISTRATOR REAR PARKING |
| CB #106 | NORTHWEST OF THE PUBLIC WORKS GARAGE |

**TABLE 2**

**CATCH BASIN INVENTORY**
**TOWN OFFICE PARKING EXPANSION**

| Catch Basin ID | Location |
|---|---|
| CATCH BASIN | ENTRANCE TO PARKING EXPANSION ACCESS DRIVE |

5. Paved surfaces shall be swept or vacuumed at least annually in the spring to remove winter sand and periodically during the year on an as-needed basis to minimize the transportation of sediment during rainfall events.

6. The vegetated Meadow Buffer areas shall be inspected annually for evidence of erosion or concentrated flows through or around the buffer. All eroded areas should be repaired, seeded, and mulched. Mowing shall occur no more than twice per year, buffers may not be maintained as a lawn.

7. The Underdrain Soil Filter shall be inspected semi-annually and following storm events greater than one-half inch of rainfall. The system should be inspected after every one-half inch of rainfall in the first few months to ensure proper function. Debris shall be removed from the reservoir course to ensure proper drainage.

8. The Roof Dripline Filters shall be inspected semi-annually and following major storm events. The system should be inspected after every major storm in the first few months to ensure proper function. Debris shall be removed from the reservoir course to ensure proper drainage. The Roof Dripline Filter may not be paved over or altered and a gutter shall not be installed on the roofline.

## 3.4 Housekeeping

1. Spill prevention. Provide controls to prevent pollutants from being discharged from materials on site, including storage practices to minimize exposure of the materials to stormwater, and appropriate spill prevention, containment, and response planning and implementation.
2. Groundwater protection. Do not handle or store, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater in areas of the site draining to an infiltration area. An “infiltration area” is any area of the site that by design or as a result of soils, topography, and other relevant factors accumulates runoff that infiltrates into the soil. Provide dikes, berms, sumps, and other forms of secondary containments that prevent discharge to groundwater to isolate portions of the site for the purposes of storage and handling of these materials.
3. Fugitive sediment and dust. Provide measures to ensure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil may not be used for dust control. If off-site tacking occurs, roadway must be swept immediately and no less than once a week prior to significant stormwater event.
4. Debris and other materials. Prevent litter, construction debris, and chemicals exposed to stormwater from becoming a pollutant source.
5. Trench or foundation de-watering. Trench de-watering is the removal of water from trenches, foundations, coffer dams, ponds, and other areas within the construction area that retain water after excavation. In most cases the collected water is heavily silted and hinders correct and safe construction practices. Remove the collected water from the ponded area and dispose of in accordance with notes on Drawing C-300 and the project specifications.
6. Non–stormwater discharges. Identify and prevent contamination by non-stormwater discharges.
7. Additional requirements. Additional requirements may be applied on a site-specific basis.

## 3.5 MEDEP 5-Year Re-certification

Submit a certification of the following to the department within three months of the expiration of each five-year interval from the date of issuance of the permit.

a. Identification and repair of erosion problems. All areas of the project site have been inspected for areas of erosion, and appropriate steps have been taken to permanently stabilize these areas.
b. Inspection and repair of stormwater control system. All aspects of the stormwater control system have been inspected for damage, wear, and malfunction, and appropriate steps have been taken to repair or replace the system, or portions of the system.

c. Maintenance. The erosion and stormwater maintenance plan for the site is being implemented as written, or modifications to the plan have been submitted to and approved by the department, and the maintenance log is being maintained.

**TABLE 3**

**TOWN OF CUMBERLAND PUBLIC WORKS, TOWN OFFICE PARKING EXPANSION, AND SAND/SALT SHED RELOCATION LONG-TERM INSPECTION AND MAINTENANCE PLAN**

| | Spring | Fall or Yearly | After a Major Storm | Every 2-5 Years |
|---|---|---|---|---|
| **Vegetated Areas** | | | | |
| Inspect all slopes and embankments. | X | | X | |
| Replant bare areas or areas with sparse growth. | X | | X | |
| Armor areas with rill erosion with an appropriate lining or divert the erosive flows to on-site areas able to withstand concentrated flows. | X | | X | |
| **Stormwater Channels** | | | | |
| Inspect ditches, swales and other open stormwater channels. | X | X | X | |
| Remove any obstructions and accumulated sediments or debris. | X | X | | |
| Control vegetated growth and woody vegetation. | | X | | |
| Repair any erosion of the ditch lining. | | X | | |
| Mow vegetated ditches. | | X | | |
| Remove woody vegetation growing through riprap. | | X | | |
| Repair any slumping side slopes. | | X | | |
| Replace riprap where underlying filter fabric or underdrain gravel is showing or where stones have dislodged. | | X | | |
| **Culverts** | | | | |
| Remove accumulated sediments and debris at the inlet, at the outlet, and within the conduit. | X | X | X | |
| Repair any erosion damage at the culvert's inlet and outlet. | X | X | X | |
| **Catch Basin Systems/Outlet Control Structures** | | | | |
| Remove and legally dispose of accumulated sediments and debris from the bottom of the basin, inlet grates, inflow channels to the basin, and pipes between basins. | X | X | | |
| Remove floating debris and floating oils (using oil absorptive pads) from any trap designed for such and dispose in a legal manner. | X | X | | |
| **Driveways and Parking Surfaces** | | | | |
| Clear accumulated winter sand in parking lots and along roadways. | X | | | |
| Sweep pavement to remove sediment. | X | | | |
| Grade road shoulders and remove excess sand either manually or by front-end loader. | X | | | |
| Ensure that stormwater is not impeded by accumulations of material or false ditches in the shoulder. | X | | | |

| | Spring | Fall or Yearly | After a Major Storm | Every 2-5 Years |
|---|---|---|---|---|
| Rake and replace Superhumus in areas where necessary. | | | | |
| **Roof Dripline Filter** | | | | |
| Inspect drip edge for debris and to ensure proper function. | X | X | X | |
| Remove accumulated sediment, plants, excessive growth, and weeds. | | X | | |
| **Grassed Underdrained Soil Filters** | | | | |
| Inspect soil filter to see that collected water drains within 24 hours. | X | X | X | |
| Rototill top 6” soil, or remove and replace the top 3” to 4” of filter soil with clean soil to the proper specification, when the bed fails to drain dry within 24 to 48 hours. | | | | X |
| Remove accumulated sediment, dead portions of plants, excessive growth, and weeds. | | X | | |
| Mow grass-covered filter bed no shorter than 6”, at a frequency of no more than 2 times per growing season, to maintain a high-grass meadow. Do not fertilize unless absolutely needed. | X | X | | |
| **Filterra Bioretention System** | | | | |
| Inspect unit and surrounding area and remove excess sediment, trash debris, sands, and/or leaf litter. | X | X | X | |
| Remove tree grate and erosion control stones and replace mulch. | | X | | X |
| Evaluate plant health; prune or replace as necessary. | | | | X |

The maintenance needs for most vegetative and stabilization measures may be found in the Maine Erosion and Sediment Control BMPs manual as published in 2016 (or latest version) and/or the Maine Stormwater Best Management Practices Manual.

**TOWN OF CUMBERLAND PUBLIC WORKS, TOWN OFFICE PARKING EXPANSION, AND SAND/SALT SHED RELOCATION**
**INSPECTION LOG**

| Date | Device/Area Inspected | Inspected By | Observations, Deficiencies & Recommended Corrective Actions |
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**TOWN OF CUMBERLAND PUBLIC WORKS, TOWN OFFICE PARKING EXPANSION, AND SAND/SALT SHED RELOCATION**
**MAINTENANCE AND REPAIR LOG**

| Date | Device or Area Maintained/ Repaired | Maintenance and/or Repair Completed By | Maintenance Completed/Corrective Actions Taken |
|---|---|---|---|
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# APPENDIX A

# FILTERRA OWNER'S MANUAL

# Filterra Owner's Manual

filterra®

Bioretention Systems

CONTECH®

ENGINEERED SOLUTIONS

# Table of Contents



## Enclosed

Local Area Filterra Plant List

# Introduction

Thank you for your purchase of the Filterra® Bioretention System. Filterra is a specially engineered stormwater treatment system incorporating high performance biofiltration media to remove pollutants from stormwater runoff. The system's biota (vegetation and soil microorganisms) then further breakdown and absorb captured pollutants. All components of the system work together to provide a sustainable long-term solution for treating stormwater runoff.

The Filterra system has been delivered to you with protection in place to resist intrusion of construction related sediment which can contaminate the biofiltration media and result in inadequate system performance. These protection devices are intended as a best practice and cannot fully prevent contamination. It is the purchaser's responsibility to provide adequate measures to prevent construction related runoff from entering the Filterra system.

Included with your purchase is Activation of the Filterra system by the manufacturer as well as a 1-year warranty from delivery of the system and 1-year of routine maintenance (mulch replacement, debris removal, and pruning of vegetation) up to twice during the first year after activation.

# Design and Installation

Each project presents different scopes for the use of Filterra systems. Information and help may be provided to the design engineer during the planning process. Correct Filterra box sizing (by rainfall region) is essential to predict pollutant removal rates for a given area. The engineer shall submit calculations for approval by the local jurisdiction. The contractor is responsible for the correct installation of Filterra units as shown in approved plans. A comprehensive installation manual is available at www.ContechES.com.

# Activation Overview

Activation of the Filterra system is a procedure completed by the manufacturer to place the system into working condition. This involves the following items:

- Removal of construction runoff protection devices
- Planting of the system's vegetation
- Placement of pretreatment mulch layer using mulch certified for use in Filterra systems.

Activation MUST be provided by the manufacturer to ensure proper site conditions are met for Activation, proper installation of the vegetation, and use of pretreatment mulch certified for use in Filterra systems.

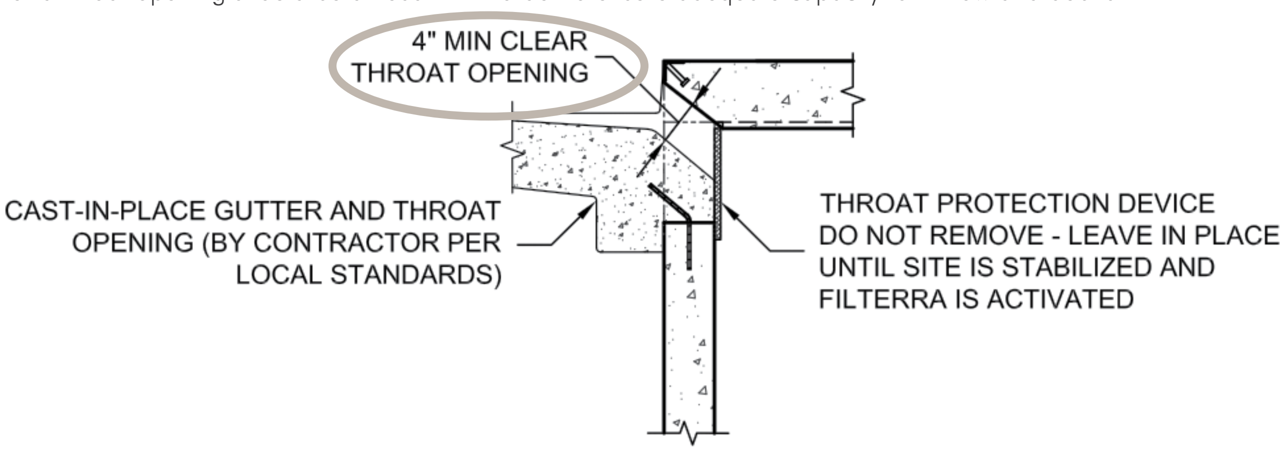
## Minimum Requirements

The minimum requirements for Filterra Activation are as follows:

1. The site landscaping must be fully stabilized, i.e. full landscaping installed and some grass cover (not just straw and seed) is required to reduce sediment transport. Construction debris and materials should be removed from surrounding area.

2. Final paving must be completed. Final paving ensures that paving materials will not enter and contaminate the Filterra system during the paving process, and that the plant will receive runoff from the drainage area, assisting with plant survival for the Filterra system.

3. Filterra throat opening should be at least 4" in order to ensure adequate capacity for inflow and debris.




An Activation Checklist is included on page 12 to ensure proper conditions are met for Contech to perform the Activation services. A charge of $500.00 will be invoiced for each Activation visit requested by Customer where Contech determines that the site does not meet the conditions required for Activation.

## Filterra Plant Selection Overview

A Plant List has been enclosed with this packet highlighting recommended plants for Filterra systems in your area. Keep in mind that plants are subject to availability due to seasonality and required minimum size for the Filterra system. Plants installed in the Filterra system are container plants (max 15 gallon) from nursery stock and will be immature in height and spread at Activation.

It is the responsibility of the owner to provide adequate irrigation when necessary to the plant of the Filterra system.

The "Planting Requirements for Filterra Systems" document is included as an appendix and discusses proper selection and care of the plants within Filterra systems.

## Warranty Overview

Refer to the Contech Engineered Solutions LLC Stormwater Treatment System LIMITED WARRANTY for further information. The following conditions may void the Filterra system's warranty and waive the manufacturer provided Activation and Maintenance services:

- Unauthorized activation or performance of any of the items listed in the activation overview
- Any tampering, modifications or damage to the Filterra system or runoff protection devices
- Removal of any Filterra system components
- Failure to prevent construction related runoff from entering the Filterra system
- Failure to properly store and protect any Filterra components (including media and underdrain stone) that may be shipped separately from the vault

## Routine Maintenance Guidelines

With proper routine maintenance, the biofiltration media within the Filterra system should last as long as traditional bioretention media. Routine maintenance is included by the manufacturer on all Filterra systems for the first year after activation. This includes a maximum of 2 visits to remove debris, replace pretreatment mulch, and prune the vegetation. More information is provided in the Operations and Maintenance Guidelines. Some Filterra systems also contain pretreatment or outlet bays. Depending on site pollutant loading, these bays may require periodic removal of debris, however this is not included in the first year of maintenance, and would likely not be required within the first year of operation.

These services, as well as routine maintenance outside of the included first year, can be provided by certified maintenance providers listed on the Contech website. Training can also be provided to other stormwater maintenance or landscape providers.

## Why Maintain?

All stormwater treatment systems require maintenance for effective operation. This necessity is often incorporated in your property's permitting process as a legally binding BMP maintenance agreement. Other reasons to maintain are:

- Avoiding legal challenges from your jurisdiction's maintenance enforcement program.
- Prolonging the expected lifespan of your Filterra media.
- Avoiding more costly media replacement.
- Helping reduce pollutant loads leaving your property.

Simple maintenance of the Filterra is required to continue effective pollutant removal from stormwater runoff before discharge into downstream waters. This procedure will also extend the longevity of the living biofilter system. The unit will recycle and accumulate pollutants within the biomass, but is also subjected to other materials entering the inlet. This may include trash, silt and leaves etc. which will be contained above the mulch layer. Too much silt may inhibit the Filterra's flow rate, which is the reason for site stabilization before activation. Regular replacement of the mulch stops accumulation of such sediment.

## When to Maintain?

Contech includes a 1-year maintenance plan with each system purchase. Annual included maintenance consists of a maximum of two (2) scheduled visits. Additional maintenance may be necessary depending on sediment and trash loading (by Owner or at additional cost). The start of the maintenance plan begins when the system is activated.

Maintenance visits are scheduled seasonally; the spring visit aims to clean up after winter loads including salts and sands while the fall visit helps the system by removing excessive leaf litter.

It has been found that in regions which receive between 30-50 inches of annual rainfall, (2) two visits are generally required; regions with less rainfall often only require (1) one visit per annum. Varying land uses can affect maintenance frequency; e.g. some fast food restaurants require more frequent trash removal. Contributing drainage areas which are subject to new development wherein the recommended erosion and sediment control measures have not been implemented may require additional maintenance visits.

Some sites may be subjected to extreme sediment or trash loads, requiring more frequent maintenance visits. This is the reason for detailed notes of maintenance actions per unit, helping the Supplier and Owner predict future maintenance frequencies, reflecting individual site conditions.

Owners must promptly notify the (maintenance) Supplier of any damage to the plant(s), which constitute(s) an integral part of the bioretention technology. Owners should also advise other landscape or maintenance contractors to leave all maintenance to the Supplier (i.e. no pruning or fertilizing) during the first year.

## Exclusion of Services

Clean up due to major contamination such as oils, chemicals, toxic spills, etc. will result in additional costs and are not covered under the Supplier maintenance contract. Should a major contamination event occur the Owner must block off the outlet pipe of the Filterra (where the cleaned runoff drains to, such as drop inlet) and block off the throat of the Filterra. The Supplier should be informed immediately.

## Maintenance Visit Summary

Each maintenance visit consists of the following simple tasks (detailed instructions below).

1. Inspection of Filterra and surrounding area
2. Removal of tree grate and erosion control stones
3. Removal of debris, trash and mulch
4. Mulch replacement
5. Plant health evaluation and pruning or replacement as necessary
6. Clean area around Filterra
7. Complete paperwork

## Maintenance Tools, Safety Equipment and Supplies

Ideal tools include: camera, bucket, shovel, broom, pruners, hoe/rake, and tape measure. Appropriate Personal Protective Equipment (PPE) should be used in accordance with local or company procedures. This may include impervious gloves where the type of trash is unknown, high visibility clothing and barricades when working in close proximity to traffic and also safety hats and shoes. A T-Bar or crowbar should be used for moving the tree grates (up to 170 lbs ea.). Most visits require minor trash removal and a full replacement of mulch. See below for actual number of bagged mulch that is required in each media bay size. Mulch should be a double shredded, hardwood variety. Some visits may require additional Filterra engineered soil media available from the Supplier.

| Box Length | Box Width | Filter Surface Area ($ft^2$) | Volume at 3” ($ft^3$) | # of 2 $ft^3$ Mulch Bags |
|---|---|---|---|---|
| 4 | 4 | 4 | 4 | 2 |
| 6 | 4 | 6 | 6 | 3 |
| 8 | 4 | 8 | 8 | 4 |
| 6 | 6 | 9 | 9 | 5 |
| 8 | 6 | 12 | 12 | 6 |
| 10 | 6 | 15 | 15 | 8 |
| 12 | 6 | 18 | 18 | 9 |
| 13 | 7 | 23 | 23 | 12 |

# Maintenance Visit Procedure

Keep sufficient documentation of maintenance actions to predict location specific maintenance frequencies and needs. An example Maintenance Report is included in this manual.

## 1. Inspection of Filterra and surrounding area

- Record individual unit before maintenance with photograph (numbered). Record on Maintenance Report (see example in this document) the following:

Record on Maintenance Report the following:

| | |
|---|---|
| Standing Water | yes \| no |
| Damage to Box Structure | yes \| no |
| Damage to Grate | yes \| no |
| Is Bypass Clear | yes \| no |

If yes answered to any of these observations, record with close-up photograph (numbered).

## 2. Removal of tree grate and erosion control stones

- Remove cast iron grates for access into Filterra box.
- Dig out silt (if any) and mulch and remove trash & foreign items.

## 3. Removal of debris, trash and mulch

Record on Maintenance Report the following:

| | |
|---|---|
| Silt/Clay | yes \| no |
| Cups/ Bags | yes \| no |
| Leaves | yes \| no |
| Buckets Removed | ________ |

- After removal of mulch and debris, measure distance from the top of the Filterra engineered media soil to the top of the top slab. Compare the measured distance to the distance shown on the approved Contract Drawings for the system. Add Filterra media (not top soil or other) to bring media up as needed to distance indicated on drawings.

Record on Maintenance Report the following:

| | |
|---|---|
| Distance to Top of Top Slab (inches) | ________ |
| Inches of Media Added | ________ |

## 4. Mulch replacement

- Add double shredded mulch evenly across the entire unit to a depth of 3”.
- Refer to Filterra Mulch Specifications for information on acceptable sources.
- Ensure correct repositioning of erosion control stones by the Filterra inlet to allow for entry of trash during a storm event.
- Replace Filterra grates correctly using appropriate lifting or moving tools, taking care not to damage the plant.

## 5. Plant health evaluation and pruning or replacement as necessary

- Examine the plant’s health and replace if necessary.
- Prune as necessary to encourage growth in the correct directions

Record on Maintenance Report the following:

| | |
|---|---|
| Height above Grate | ____________________ (ft) |
| Width at Widest Point | ____________________ (ft) |
| Health | healthy \| unhealthy |
| Damage to Plant | yes \| no |
| Plant Replaced | yes \| no |

## 6. Clean area around Filterra

- Clean area around unit and remove all refuse to be disposed of appropriately.

## 7. Complete paperwork

- Deliver Maintenance Report and photographs to appropriate location (normally Contech during maintenance contract period).
- Some jurisdictions may require submission of maintenance reports in accordance with approvals. It is the responsibility of the Owner to comply with local regulations.

## Maintenance Checklist

| Drainage System Failure | Problem | Conditions to Check | Condition that Should Exist | Actions |
|---|---|---|---|---|
| Inlet | Excessive sediment or trash accumulation. | Accumulated sediments or trash impair free flow of water into Filterra. | Inlet should be free of obstructions allowing free distributed flow of water into Filterra. | Sediments and/or trash should be removed. |
| Mulch Cover | Trash and floatable debris accumulation. | Excessive trash and/or debris accumulation. | Minimal trash or other debris on mulch cover. | Trash and debris should be removed and mulch cover raked level. Ensure bark nugget mulch is not used. |
| Mulch Cover | "Ponding" of water on mulch cover. | "Ponding" in unit could be indicative of clogging due to excessive fine sediment accumulation or spill of petroleum oils. | Stormwater should drain freely and evenly through mulch cover. | Recommend contact manufacturer and replace mulch as a minimum. |
| Vegetation | Plants not growing or in poor condition. | Soil/mulch too wet, evidence of spill. Incorrect plant selection. Pest infestation. Vandalism to plants. | Plants should be healthy and pest free. | Contact manufacturer for advice. |
| Vegetation | Plant growth excessive. | Plants should be appropriate to the species and location of Filterra. | | Trim/prune plants in accordance with typical landscaping and safety needs. |
| Structure | Structure has visible cracks. | Cracks wider than 1/2 inch or evidence of soil particles entering the structure through the cracks. | | Vault should be repaired. |
| *Maintenance is ideally to be performed twice annually.* | | | | |

## Filterra Inspection & Maintenance Log

Filterra System Size/Model:____________________ Location: ______________________________

| Date | Mulch & Debris Removed | Depth of Mulch Added | Mulch Brand | Height of Vegetation Above Grate | Vegetation Species | Issues with System | Comments |
|---|---|---|---|---|---|---|---|
| *1/1/17* | *5 – 5 gal Buckets* | *3"* | *Lowe's Premium Brown Mulch* | *4'* | *Galaxy Magnolia* | *- Standing water in downstream structure* | *- Removed blockage in downstream structure* |
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# Appendix 1 – Filterra® Activation Checklist

Project Name:__________________________________Company:__________________________________

Site Contact Name: __________________________________ Site Contact Phone/Email: ________________________

Site Owner/End User Name:______________________Site Owner/End User Phone/Email: ________________________

Preferred Activation Date: ______________________________(provide 2 weeks minimum from date this form is submitted)

| Site Designation | System Size | Final Pavement / Top Coat Complete | Landscaping Complete / Grass Emerging | Construction materials / Piles / Debris Removed | Throat Opening Measures 4" Min. Height | Plant Species Requested |
|---|---|---|---|---|---|---|
| | | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | |
| | | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | |
| | | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | |
| | | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | |
| | | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | |
| | | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | |
| | | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | |
| | | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | |
| | | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | ☐ Yes<br>☐ No | |

*Attach additional sheets as necessary.*

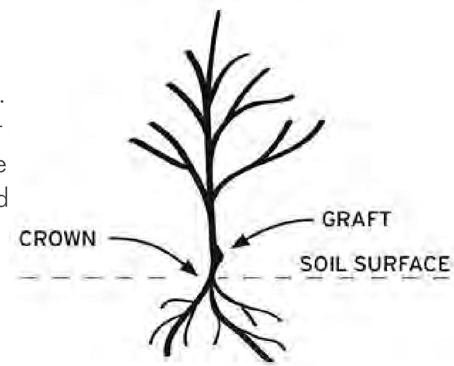
**NOTE**: A charge of $500.00 will be invoiced for each Activation visit requested by Customer where Contech determines that the site does not meet the conditions required for Activation. ONLY Contech authorized representatives can perform Activation of Filterra systems; unauthorized Activations will void the system warranty and waive manufacturer supplied Activation and 1st Year Maintenance.

________________________________________ ______________________

Signature Date

# Appendix 2 – Planting Requirements for Filterra® Systems

## Plant Material Selection




- Select plant(s) as specified in the engineering plans and specifications.
- Select plant(s) with full root development but not to the point where root bound.
- Use local nursery container plants only. Ball and burlapped plants are not permitted.
- For precast Filterra systems with a tree grate, plant(s) must not have scaffold limbs at least 14 inches from the crown due to spacing between the top of the mulch and the tree grate. Lower branches can be pruned away provided there are sufficient scaffold branches for tree or shrub development.
- For precast Filterra systems with a tree grate, at the time of installation, it is required that plant(s) must be at least 6″ above the tree grate opening at installation for all Filterra configurations. This DOES NOT apply to Full Grate Cover designs.
- Plant(s) shall not have a mature height greater than 25 feet.
- For standard 21″ media depth, a 7 – 15 gallon container size shall be used. Media less than 21″ (Filterra boxes only) will require smaller container plants.
- For precast Filterra systems, plant(s) should have a single trunk at installation, and pruning may be necessary at activation and maintenance for some of the faster growing species, or species known to produce basal sprouts.

## Plant Installation

- During transport protect the plant leaves from wind and excessive jostling.
- Prior to removing the plant(s) from the container, ensure the soil moisture is sufficient to maintain the integrity of the root ball. If needed, pre-wet the container plant.
- Cut away any roots which are growing out of the container drain holes. Plants with excessive root growth from the drain holes should be rejected.
- Plant(s) should be carefully removed from the pot by gently pounding on the sides of the container with the fist to loosen root ball. Then carefully slide out. Do not lift plant(s) by trunk as this can break roots and cause soil to fall off. Extract the root ball in a horizontal position and support it to prevent it from breaking apart. Alternatively the pot can be cut away to minimize root ball disturbance.
- Remove any excess soil from above the root flare after removing plant(s) from container.
- Excavate a hole with a diameter 4″ greater than the root ball, gently place the plant(s).
- If plant(s) have any circling roots from being pot bound, gently tease them loose without breaking them.
- If root ball has a root mat on the bottom, it should be shaved off with a knife just above the mat line.
- Plant the tree/shrub/grass with the top of the root ball 1″ above surrounding media to allow for settling.
- All plants should have the main stem centered in the tree grate (where applicable) upon completion of installation.
- With all trees/shrubs, remove dead, diseased, crossed/rubbing, sharply crotched branches or branches growing excessively long or in wrong direction compared to majority of branches.
- To prevent transplant shock (especially if planting takes place in the hot season), it may be necessary to prune some of the foliage to compensate for reduced root uptake capacity. This is accomplished by pruning away some of the smaller secondary branches or a main scaffold branch if there are too many. Too much foliage relative to the root ball can dehydrate and damage the plant.
- Plant staking may be required.

## Mulch Installation

- Only mulch that has been meeting Contech Engineered Solutions' mulch specifications can be used in the Filterra system.
- Mulch must be applied to a depth of 3" evenly over the surface of the media.

## Irrigation Requirements

- Each Filterra system must receive adequate irrigation to ensure survival of the living system during periods of drier weather.
- Irrigation sources include rainfall runoff from downspouts and/or gutter flow, applied water through the tree grate or in some cases from an irrigation system with emitters installed during construction.
- At Activation: Apply about one (cool climates) to two (warm climates) gallons of water per inch of trunk diameter over the root ball.
- During Establishment: In common with all plants, each Filterra plant will require more frequent watering during the establishment period. One inch of applied water per week for the first three months is recommended for cooler climates (2 to 3 inches for warmer climates). If the system is receiving rainfall runoff from the drainage area, then irrigation may not be needed. Inspection of the soil moisture content can be evaluated by gently brushing aside the mulch layer and feeling the soil. Be sure to replace the mulch when the assessment is complete. Irrigate as needed**.
- Established Plants: Established plants have fully developed root systems and can access the entire water column in the media. Therefore irrigation is less frequent but requires more applied water when performed. For a mature system assume 3.5 inches of available water within the media matrix. Irrigation demand can be estimated as 1" of irrigation demand per week. Therefore if dry periods exceed 3 weeks, irrigation may be required. It is also important to recognize that plants which are exposed to windy areas and reflected heat from paved surfaces may need more frequent irrigation. Long term care should develop a history which is more site specific.

** Five gallons per square yard approximates 1 inch of water Therefore for a 6' by 6' Filterra approximately 20-60 gallons of water is needed. To ensure even distribution of water it needs to be evenly sprinkled over the entire surface of the filter bed, with special attention to make sure the root ball is completely wetted. NOTE: if needed, measure the time it takes to fill a five gallon bucket to estimate the applied water flow rate then calculate the time needed to irrigate the Filterra. For example, if the flow rate of the sprinkler is 5 gallons/minute then it would take 12 minutes to irrigate a 6' by 6' filter.

## Notes

filterra®
Bioretention Systems

CONTECH®
ENGINEERED SOLUTIONS

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West Chester, OH 45069
info@conteches.com | 800-338-1122
www.ContechES.com

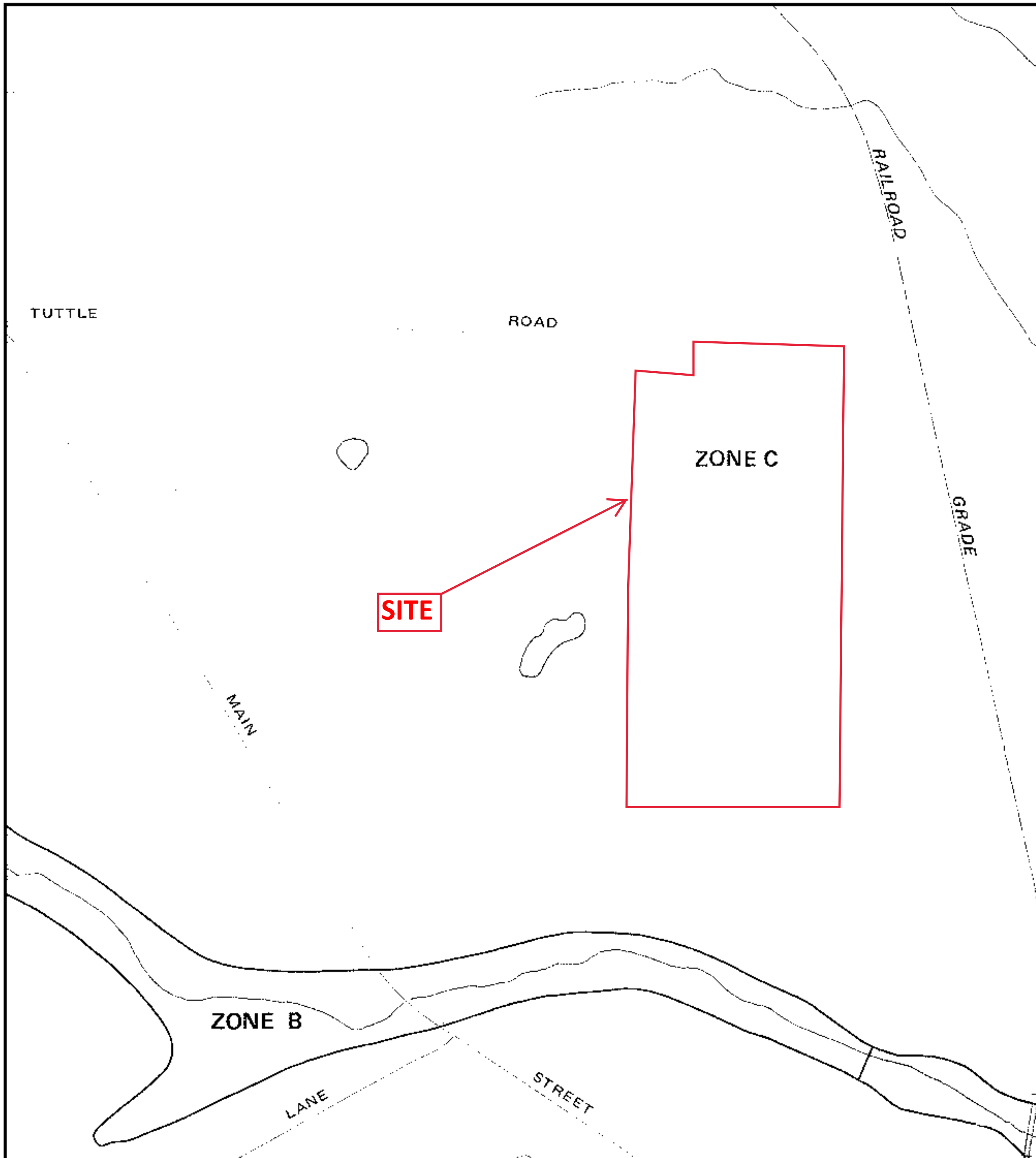


PDF 1/18

**ATTACHMENT G**

**FEMA FIRM MAP**

SME
SEVEE & MAHER
ENGINEERS




APPROXIMATE SCALE

800 0 800 FEET

NATIONAL FLOOD INSURANCE PROGRAM

# FIRM
## FLOOD INSURANCE RATE MAP

TOWN OF
**CUMBERLAND, MAINE**
CUMBERLAND COUNTY

PANEL 15 OF 25
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
230162 0015 B

EFFECTIVE DATE:
MAY 19, 1981

federal emergency management agency
federal insurance administration

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

**ATTACHMENT H**

**MHPC REVIEW LETTER**

SME
SEVEE & MAHER
ENGINEERS

SME
Sevee & Maher Engineers, Inc.

ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

June 9, 2016 16058.00

JUN 14 2016
0819-16

Mr. Kirk F. Mohney, State Historic Preservation Officer
Maine Historic Preservation Commission
65 State House Station
Augusta, Maine 04333

Subject: Town Of Cumberland
Cumberland, Maine Map R3 lot 51A
Natural Resources Protection Act Permit Application

Dear Mr. Shettleworth:

The Town Of Cumberland is seeking approval under the Natural Resources Protection Act (NRPA) for after-the-fact permitting for wetland impacts associated with the Town Forest Trail System. As shown on the attached Site Location Map, the property is located off of Tuttle Road and Drowne Road. The parcel encompasses approximately 109 acres and contains approximately 2.5 miles of recreational trails.

In accordance with the Maine Department of Environmental Protection and Army Corp of Engineers submission requirements, we are forwarding the attached copy of a Natural Resources Protection Act (NRPA) permit application to you. We would appreciate receiving any information from you relative to important archeological, cultural, or historical areas present in the project area.

Should you have any questions or require additional information, please contact me. Thank you in advance for your consideration.

Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Daniel P. Diffin, P.E.
Principal

Attachments

**Based on the information submitted, I have concluded that there will be no historic properties affected by the proposed undertaking, as defined by Section 106 of the National Historic Preservation Act. Consequently, pursuant to 36 CFR 800.4(d)(1), no further Section 106 consultation is required unless additional resources are discovered during project implementation pursuant to 36 CFR 800.13.**

Kirk F. Mohney
**Kirk F. Mohney,**
**~~Deputy~~ State Historic Preservation Officer**
**Maine Historic Preservation Commission**

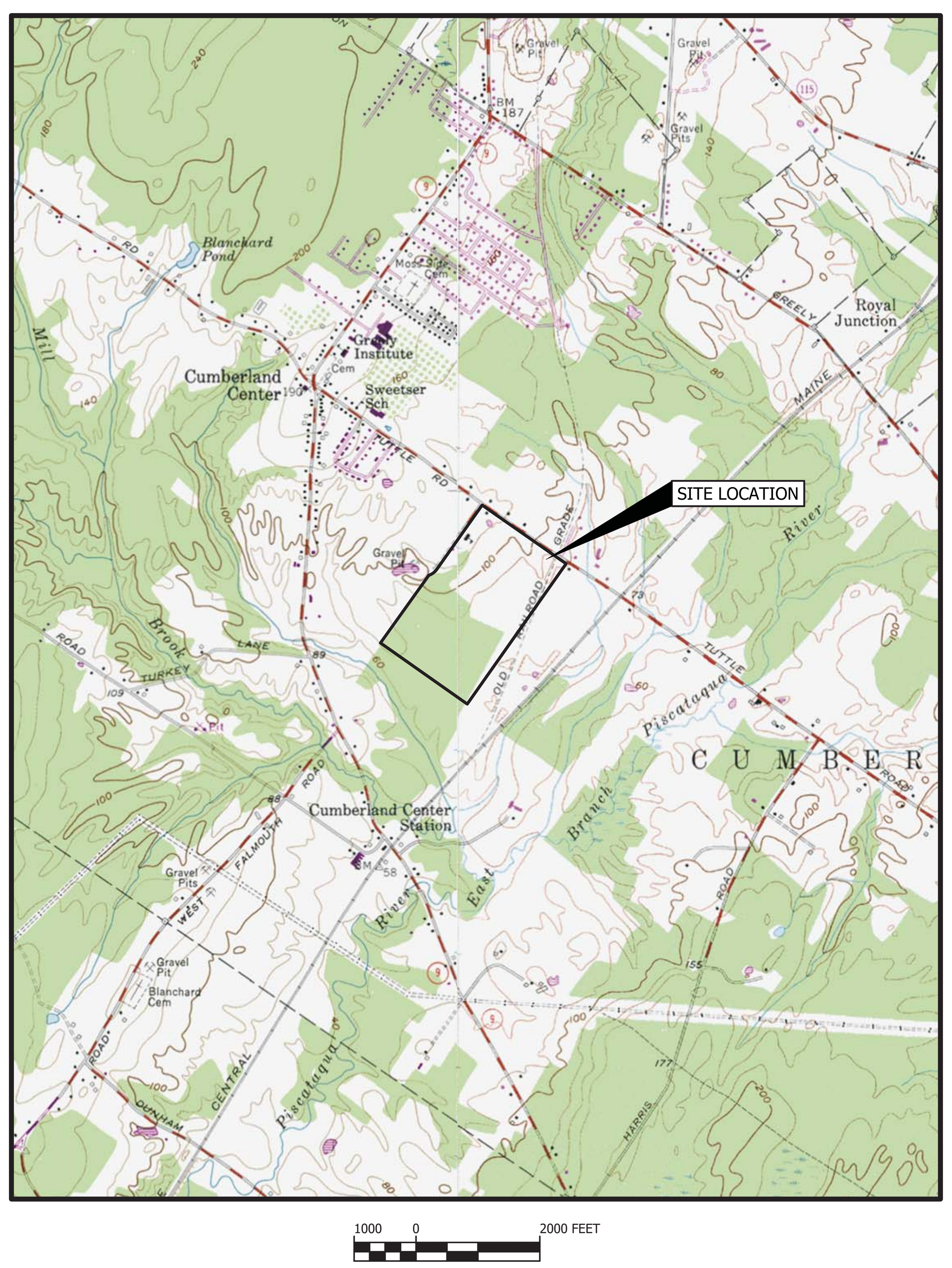
6/29/16
**Date**

N:\TCU\Town Forest\Maine DEP\Tier 1\20160609 MHPC.docx

# TOWN OF CUMBERLAND
# TOWN OFFICE PARKING EXPANSION
# TUTTLE ROAD
# CUMBERLAND, MAINE



LOCATION MAP





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STATE OF MAINE
DANIEL P. DIFFIN
11841
LICENSED PROFESSIONAL ENGINEER

APPROVED BY THE TOWN OF CUMBERLAND PLANNING BOARD

DATE

## GENERAL SITE NOTES:

1. EXISTING SITE FEATURES AND PROPERTY BOUNDARIES FROM SURVEY PERFORMED BY BOUNDARY POINTS MAINE LAND SURVEYORS OF CUMBERLAND, MAINE DATED MAY 2013. EXISTING TOPOGRAPHY FROM MAINE GIS DATA CATALOG, BASED OFF OF LIDAR INFORMATION COLLECTED BETWEEN NOVEMBER 10, 2006 AND SEPTEMBER 5TH, 2007. HORIZONTAL DATUM IS MAINE STATE PLANE, NAD83, WEST, US FOOT. VERTICAL DATUM IS NAVD 88. STANDARD PRACTICE DICTATES THAT PLANS COMPILED IN THIS MANNER SHOULD BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

1. WETLANDS FROM PLAN TITLED "CONCEPT PLAN" BY GORRILL PALMER OF SOUTH PORTLAND, MAINE, DATED JANUARY 2018.

2. ALL SITE AND CONSTRUCTION ACTIVITIES SHALL BE IN COMPLIANCE WITH MEDEP BEST MANAGEMENT PRACTICES AND EXISTING FEDERAL, STATE, AND LOCAL PERMITS AND PERMITTING REQUIREMENTS FOR THE SITE.

3. EXCAVATE AND STOCKPILE ON-SITE TOPSOIL. TOPSOIL IS TO REMAIN THE PROPERTY OF THE OWNER DURING CONSTRUCTION, AND SHALL NOT BE REMOVED FROM THE SITE. AFTER FINAL LOAM AND SEED EXCESS TOPSOIL SHALL BE REMOVED FROM SITE BY CONTRACTOR.

4. PAVEMENT EDGES SHALL BE TRUE TO LINE. SAWCUT EXISTING PAVEMENT IN SMOOTH STRAIGHT LINE WHERE NEW PAVEMENT JOINS, PROVIDE TACK COAT LAYER AS SPECIFIED.

5. PROVIDE TRAFFIC CONTROL SIGNAGE AND STRIPING AS SHOWN AND IN ACCORDANCE WITH U.S.D.O.T. MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MDOT MOST RECENT VERSION).

## GRADING NOTES:

1. ADD 6" LOAM, SEED AND MULCH TO DISTURBED AREAS UNLESS OTHERWISE NOTED. PROVIDE EROSION CONTROL MESH ON ALL SLOPES STEEPER THAN 3:1, AND ALONG DITCH CHANNELS.

2. MAINTAIN TEMPORARY EROSION CONTROL MEASURES FOR THE FULL DURATION OF CONSTRUCTION. INSPECT WEEKLY AND AFTER EACH STORM AND REPAIR AS NEEDED. REMOVE SEDIMENTS FROM THE SITE. PLACE IN AREA OF LOW EROSION POTENTIAL, AND STABILIZE WITH SEED AND MULCH.

3. PLACE TEMPORARY SOIL STABILIZATION WITHIN 7 DAYS OF INITIAL DISTURBANCE. PLACE PERMANENT SOIL STABILIZATION WITHIN 7 DAYS OF FINAL GRADING.

## UTILITY NOTES:

1. THE ACCURACY AND COMPLETENESS OF SUBSURFACE INFORMATION IS NOT GUARANTEED. VERIFY SITE CONDITIONS INCLUDING TEST PITS FOR LOCATIONS AND INVERTS OF UTILITIES AND REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO PROCEEDING WITH THAT PORTION OF THE WORK.

2. COORDINATE WORK ON UTILITY LINES OR WITHIN ROAD RIGHT-OF-WAY WITH THE UTILITY COMPANIES AND TOWN ROAD DEPARTMENT AND STATE MDOT.

3. ALL PIPING AND DRAINAGE STRUCTURES SHALL BE INSTALLED IN ACCORDANCE WITH THE TOWN OF CUMBERLAND MUNICIPAL STANDARDS.

## DIG SAFE NOTES:

PRIOR TO EXCAVATION, VERIFY THE UNDERGROUND UTILITIES, PIPES, STRUCTURES AND FACILITIES. PROVIDE THE FOLLOWING MINIMUM MEASURES:

1. PRE-MARK THE BOUNDARIES OF PLANNED EXCAVATION WITH WHITE PAINT, FLAGS OR STAKES, SO UTILITY CREWS KNOW WHERE TO MARK THEIR LINES.

2. CALL DIG SAFE, AT 811, AT LEAST THREE BUSINESS DAYS - BUT NO MORE THAN 30 CALENDAR DAYS - BEFORE STARTING WORK. DO NOT ASSUME SOMEONE ELSE WILL MAKE THE CALL.

3. IF BLASTING, NOTIFY DIG SAFE AT LEAST ONE BUSINESS DAY IN ADVANCE.

4. WAIT THREE BUSINESS DAYS FOR LINES TO BE LOCATED AND MARKED WITH COLOR-CODED PAINT, FLAGS OR STAKES. NOTE THE COLOR OF THE MARKS AND THE TYPE OF UTILITIES THEY INDICATE. TRANSFER THESE MARKS TO THE AS-BUILT DRAWINGS.

5. CONTACT THE LANDOWNER AND OTHER "NON-MEMBER" UTILITIES (WATER, SEWER, GAS, ETC.). FOR THEM TO MARK THE LOCATIONS OF THEIR UNDERGROUND FACILITIES. TRANSFER THESE MARKS TO THE AS-BUILT DRAWINGS.

6. RE-NOTIFY DIG SAFE AND THE NON-MEMBER UTILITIES IF THE DIGGING, DRILLING OR BLASTING DOES NOT OCCUR WITHIN 30 CALENDAR DAYS, OR IF THE MARKS ARE LOST DUE TO WEATHER CONDITIONS, SITE WORK ACTIVITY OR ANY OTHER REASON.

7. HAND DIG WITHIN 18 INCHES IN ANY DIRECTION OF ANY UNDERGROUND LINE UNTIL THE LINE IS EXPOSED. MECHANICAL METHODS MAY BE USED FOR INITIAL SITE PENETRATION, SUCH AS REMOVAL OF PAVEMENT OR ROCK.

8. DIG SAFE REQUIREMENTS ARE IN ADDITION TO TOWN, CITY, AND/OR STATE DOT STREET OPENING PERMIT REQUIREMENTS.

9. FOR COMPLETE DIG SAFE REQUIREMENTS, CALL THE PUC OR VISIT THEIR WEBSITE.

10. IF YOU DAMAGE, DISLOCATE OR DISTURB ANY UNDERGROUND UTILITY LINE, IMMEDIATELY NOTIFY THE AFFECTED UTILITY. IF DAMAGE CREATES SAFETY CONCERNS, CALL THE FIRE DEPARTMENT AND TAKE IMMEDIATE STEPS TO SAFEGUARD HEALTH AND PROPERTY.

11. ANY TIME AN UNDERGROUND LINE IS DAMAGED OR DISTURBED OR IF LINES ARE IMPROPERLY MARKED, YOU MUST FILE AN INCIDENT REPORT WITH THE P.U.C. FOR AN INCIDENT REPORT FORM VISIT WWW.STATE.ME.US/MPUC OR CALL THE PUC AT 1-800-452-4699.

## TYPICAL ABBREVIATIONS:

| | | | | | |
|---|---|---|---|---|---|
| ACCMP | ASPHALT COATED CMP | EA | EACH | NITC | NOT IN THIS CONTRACT |
| ACP | ASBESTOS CEMENT PIPE | EG | EXISTING GROUND OR GRADE | NTS | NOT TO SCALE |
| AC | ACRE | ELEC | ELECTRIC | N/F | NOW OR FORMERLY |
| AGG | AGGREGATE | EL | ELEVATION | NO OR # | NUMBER |
| ALUM | ALUMINUM | ELB | ELBOW | OC | ON CENTER |
| APPD | APPROVED | EOP | EDGE OF PAVEMENT | OD | OUTSIDE DIAMETER |
| APPROX | APPROXIMATE | EQUIP | EQUIPMENT | PC | POINT OF CURVE |
| ARMH | AIR RELEASE MANHOLE | EST | ESTIMATED | PD | PERIMETER DRAIN |
| ASB | ASBESTOS | EXC | EXCAVATE | PI | POINT OF INTERSECTION |
| ASP | ASPHALT | EXIST | EXISTING | PIV | POST INDICATOR VALVE |
| AUTO | AUTOMATIC | FI | FIELD INLET | PJ | PACK JOINT |
| AUX | AUXILIARY | FG | FINISH GRADE | PT | POINT OF TANGENT |
| AVE | AVENUE | FBRGL | FIBERGLASS | PERF | PERFORATED |
| AZ | AZIMUTH | FDN | FOUNDATION | PP | POWER POLE |
| BCCMP | BITUMINOUS COATED CMP | FLEX | FLEXIBLE | PSI | POUNDS PER SQUARE INCH |
| BM | BENCH MARK | FLG | FLANGE | PVC | POLYVINYL CHLORIDE |
| BIT | BITUMINOUS | FLR | FLOOR | PVMT | PAVEMENT |
| BLDG | BUILDING | FPS | FEET PER SECOND | QTY | QUANTITY |
| BOT | BOTTOM | FT OR ' | FEET | RCP | REINFORCED CONCRETE PIPE |
| BRG | BEARING | FTG | FOOTING | ROW | RIGHT OF WAY |
| BV | BALL VALVE | GA | GAUGE | RAD | RADIUS |
| CB | CATCH BASIN | GAL | GALLON | REQD | REQUIRED |
| CEN | CENTER | GALV | GALVANIZED | RT | RIGHT |
| CEM LIN | CEMENT LINED | GPD | GALLONS PER DAY | RTE | ROUTE |
| CMP | CORRUGATED METAL PIPE | GPM | GALLONS PER MINUTE | S | SLOPE |
| CO | CLEAN OUT | HDPE | HIGH DENSITY POLYETHYLENE | SCH | SCHEDULE |
| CF | CUBIC FEET | HORIZ | HORIZONTAL | SF | SQUARE FEET |
| CFS | CUBIC FEET PER SECOND | HP | HORSEPOWER | SHT | SHEET |
| CI | CAST IRON | HYD | HYDRANT | SMH | SANITARY MANHOLE |
| CL | CLASS | ID | INSIDE DIAMETER | ST | STREET |
| CONC | CONCRETE | IN OR " | INCHES | STA | STATION |
| CONST | CONSTRUCTION | INV | INVERT | SY | SQUARE YARD |
| CONTR | CONTRACTOR | INV EL | INVERT ELEVATION | TAN | TANGENT |
| CS | CURB STOP | LB | POUND | TDH | TOTAL DYNAMIC HEAD |
| CTR | CENTER | LC | LEACHATE COLLECTION | TEMP | TEMPORARY |
| CTS | COPPER TUBING SIZE | LD | LEAK DETECTION | TYP | TYPICAL |
| CU | COPPER | LF | LINEAR FEET | UD | UNDERDRAIN |
| CY | CUBIC YARD | LOC | LOCATION | V | VOLTS |
| D | DEGREE OF CURVE | LT | LEACHATE TRANSPORT | VA TEE | VALVE ANCHORING TEE |
| DBL | DOUBLE | MH | MANHOLE | VERT | VERTICAL |
| DEG OR ° | DEGREE | MJ | MECHANICAL JOINT | WG | WATER GATE |
| DEPT | DEPARTMENT | MATL | MATERIAL | W/ | WITH |
| DI | DUCTILE IRON | MAX | MAXIMUM | W/O | WITHOUT |
| DIA OR ☐ | DIAMETER | MFR | MANUFACTURE | YD | YARD |
| DIM | DIMENSION | MIN | MINIMUM | | |
| DIST | DISTANCE | MIP | MALE IRON PIPE | | |
| DN | DOWN | MISC | MISCELLANEOUS | | |
| DR | DRAIN | MON | MONUMENT | | |
| DWG | DRAWING | | | | |

## ZONING NOTES:

1. APPLICANT/OWNER: TOWN OF CUMBERLAND
2. PROJECT: TOWN OFFICE PARKING EXPANSION
3. ZONING DISTRICT: RR1 - RURAL RESIDENTIAL
4. ZONE STANDARDS:

| ZONE STANDARDS | REQUIRED | PROVIDED |
|---|---|---|
| MIN LOT SIZE | 4 ACRES | 109 ACRES |
| MIN ROAD FRONTAGE | 200 FEET | >200 FEET |
| PROPERTY SETBACKS | | |
| FRONT | 50 FEET | 10.8 FEET |
| SIDE | 30 FEET | >30 FEET |
| REAR | 75 FEET | >75 FEET |

5. PARCEL: TAX MAP R03, LOT 51A.
6. TOWN HALL PARKING SUMMARY:
   EXISTING TOWN HALL PARKING 88 SPACES
   PROPOSED TOWN HALL PARKING 36 SPACES
7. THE WORK AREA IS OUTSIDE OF THE 100-YEAR FLOODPLAIN.
8. OUTSIDE AGENCY APPROVALS:
   MEDEP SITE LOCATION OF DEVELOPMENT PERMIT
   MEDEP NATURAL RESOURCE PROTECTION ACE PERMIT BY RULE
   MEDOT DRIVEWAY ENTRANCE PERMIT

## LEGEND

EXISTING — PROPOSED

PROPERTY LINE
EDGE OF PAVEMENT
EDGE OF GRAVEL
CONTOUR (100)
SPOT GRADE (114.23)
FENCE (X)
STORM DRAIN (SD)
WATER LINE (W)
OVERHEAD UTILITY (OHU)
SEWER LINE (SD)
CULVERT
UTILITY POLE
GUARDRAIL
RIPRAP
WETLAND

## EROSION CONTROL LEGEND

CATCH BASIN PROTECTION WITH SILTSACK
SILT FENCE (SF)
CHECK DAM
STABILIZED ENTRANCE

| REV. | BY | DATE | STATUS |
|---|---|---|---|
| | DPD | 3/2020 | ISSUED TO TOWN FOR SITE PLAN REVIEW |
| | DPD | 2/2020 | ISSUED TO MEDEP FOR REVIEW |

STATE OF MAINE DANIEL P. DIFFIN 11841 LICENSED PROFESSIONAL ENGINEER

TOWN OF CUMBERLAND
TOWN OFFICE PARKING EXPANSION
TUTTLE ROAD
CUMBERLAND, MAINE

GENERAL NOTES, LEGEND, AND ABBREVIATIONS

SME SEVEE & MAHER ENGINEERS
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • smemaine.com

DESIGN BY: NMT
DRAWN BY: BWB
DATE: 1/2020
CHECKED BY: BDP
LMN: NONE
CTB: SME-STD

JOB NO. 19231.00 DWG FILE GEN-NOTES

C-100


NOTES:

1. SEE DWG C-100 FOR GENERAL NOTES AND PLAN REFERENCES.

| REV. | BY | DATE | STATUS |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | DPD | 3/2020 | ISSUED TO TOWN FOR SITE PLAN REVIEW |
| | DPD | 2/2020 | ISSUED TO MEDEP FOR REVIEW |

STATE OF MAINE
DANIEL P. DIFFIN
11841
LICENSED
PROFESSIONAL ENGINEER

# TOWN OF CUMBERLAND
# TOWN OFFICE PARKING EXPANSION
# TUTTLE ROAD
# CUMBERLAND, MAINE

## EXISTING CONDITIONS PLAN

SME
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4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • smemaine.com

DESIGN BY: NMT
DRAWN BY: BWB
DATE: 1/2020
CHECKED BY: BDP
LMN: EXCON
CTB: SME-STD

JOB NO. 19231.00 DWG FILE BASE

C-101


NOTES:

1. SEE DWG C-100 FOR GENERAL NOTES AND PLAN REFERENCES.
2. THERE IS NO PROPOSED LIGHTING IN THE PARKING LOT.

15 0 30 60 FEET

STATE OF MAINE DANIEL P. DIFFIN 11841 LICENSED PROFESSIONAL ENGINEER

# TOWN OF CUMBERLAND
# TOWN OFFICE PARKING EXPANSION
# TUTTLE ROAD
# CUMBERLAND, MAINE

## SITE LAYOUT PLAN

SME SEVEE & MAHER ENGINEERS
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4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • smemaine.com

| | |
|---|---|
| DESIGN BY: | NMT |
| DRAWN BY: | BWB |
| DATE: | 1/2020 |
| CHECKED BY: | BDP |
| LMN: | SITE |
| CTB: | SME-STD |

JOB NO. 19231.00 DWG FILE BASE C-102

| REV. | BY | DATE | STATUS |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | DPD | 3/2020 | ISSUED TO TOWN FOR SITE PLAN REVIEW |
| | DPD | 2/2020 | ISSUED TO MEDEP FOR REVIEW |


NOTES:

1. SEE DWG C-100 FOR GENERAL NOTES AND PLAN REFERENCES.

STATE OF MAINE
DANIEL P. DIFFIN
11841
LICENSED
PROFESSIONAL ENGINEER

TOWN OF CUMBERLAND
TOWN OFFICE PARKING EXPANSION
TUTTLE ROAD
CUMBERLAND, MAINE

GRADING, DRAINAGE, AND EROSION CONTROL PLAN

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4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • smemaine.com

| | |
|---|---|
| DESIGN BY: | NMT |
| DRAWN BY: | BWB |
| DATE: | 1/2020 |
| CHECKED BY: | BDP |
| LMN: | GRADE |
| CTB: | SME-STD |

JOB NO. 19231.00 DWG FILE BASE C-103

| REV. | BY | DATE | STATUS |
|---|---|---|---|
| | DPD | 3/2020 | ISSUED TO TOWN FOR SITE PLAN REVIEW |
| | DPD | 2/2020 | ISSUED TO MEDEP FOR REVIEW |

# EROSION CONTROL NOTES:

A. GENERAL

1. All soil erosion and sediment control will be done in accordance with: (1) the Maine Erosion and Sediment Control Handbook: Best Management Practices, Maine Department of Environmental Protection (MEDEP), October 2016.

2. The site Contractor (to be determined) will be responsible for the inspection and repair/replacement/maintenance of all erosion control measures, disturbed areas, material storage areas, and vehicle access points until all disturbed areas are stabilized.

3. Disturbed areas will be permanently stabilized within 7 days of final grading. Disturbed areas not to be worked upon within 14 days of disturbance will be temporarily stabilized within 7 days of the disturbance.

4. In all areas, removal of trees, bushes and other vegetation, as well as disturbance of topsoil will be kept to a minimum while allowing proper site operations.

5. Any suitable topsoil will be stripped and stockpiled for reuse as directed by the Owner. Topsoil will be stockpiled in a manner such that natural drainage is not obstructed and no off-site sediment damage will result. In any event, stockpiles will not be located within 100 feet of wetlands and will be at least 50 feet upgradient of the stockpile's perimeter silt fence. The sideslopes of the topsoil stockpile will not exceed 2:1. Silt fence will be installed around the perimeter of all topsoil stockpiles. Topsoil stockpiles will be surrounded with siltation fencing and will be temporarily seeded with Aroostook rye, annual or perennial ryegrass within 7 days of formation, or temporarily mulched.

6. Winter excavation and earthwork will be completed so as to minimize exposed areas while satisfactorily completing the project. Limit exposed areas to those areas in which work is to occur during the following 15 days and that can be mulched in one day. All areas will be considered denuded until the subbase gravel is installed in roadway areas or the areas of future loam and seed have been loamed, seeded, and mulched.

   Install any added measures necessary to control erosion/sedimentation. The particular measure used will be dependent upon site conditions, the size of the area to be protected, and weather conditions.

   To minimize areas without erosion control protection, continuation of earthwork operations on additional areas will not begin until the exposed soil surface on the area being worked has been stabilized.

B. TEMPORARY MEASURES

1. STABILIZED CONSTRUCTION ENTRANCE/EXIT

A crushed stone stabilized construction entrance/exit will be placed at any point of vehicular access to the site, in accordance with the detail shown on this sheet.

2. SILT FENCE

a. Silt fence will be installed prior to all construction activity, where soil disturbance may result in erosion. Silt fence will be erected at locations shown on the plans and/or downgradient of all construction activity.

b. Silt fences will be removed when they have served their useful purpose, but not before the upgradient areas have been permanently stabilized.

c. Silt fences will be inspected immediately after each rainfall and at least daily during prolonged rainfall. They will be inspected if there are any signs of erosion or sedimentation below them. Any required repairs will be made immediately. If there are signs of undercutting at the center or the edges, or impounding of large volumes of water behind them, they will be replaced with a temporary crushed stone check dam.

d. Sediment deposits will be removed after each storm event if significant build-up has occurred or if deposits exceed half the height of the barrier.

3. STONE CHECK DAMS

Stone check dams will be installed in grass-lined swales and ditches during construction. Remove stone check dams when they have served their useful purpose, but not before upgradient areas have been permanently stabilized.

4. EROSION CONTROL MIX SEDIMENT BARRIER

a. Where approved, erosion control mix sediment barriers may be used as a substitute for silt fence. See the details in this drawing set for specifications.

b. Rock Filter Berms: To provide more filtering capacity or to act as a velocity check dam, a berm's center can be composed of clean crushed rock ranging in size from the french drain stone to riprap.

5. TEMPORARY SEEDING

Stabilize disturbed areas that will not be brought to final grade and reduce problems associated with mud and dust production from exposed soil surface during construction with temporary vegetation.

6. TEMPORARY MULCHING

Use temporary mulch in the following locations and/or circumstances:

- In sensitive areas (within 100 feet of streams, wetlands and in lake watersheds) temporary mulch will be applied within 7 days of exposing spill or prior to any storm event.
- Apply temporary mulch within 14 days of disturbance or prior to any storm event in all other areas.
- Areas which have been temporarily or permanently seeded will be mulched immediately following seeding.
- Areas which cannot be seeded within the growing season will be mulched for over-winter protection and the area will be seeded at the beginning of the growing season.
- Mulch can be used in conjunction with tree, shrub, vine, and ground cover plantings.
- Mulch anchoring will be used on slopes greater than 5 percent in late fall (past October 15), and over-winter (October 15 - April 15).

The following materials may be used for temporary mulch:

a. Hay or Straw material shall be air-dried, free of seeds and coarse material. Apply 2 bales/1,000 sf or 1.5 to 2 tons/acre to cover 90% of ground surface.

b. Erosion Control Mix: It can be used as a stand-alone reinforcement:
   - on slopes 2 horizontal to 1 vertical or less;
   - on frozen ground or forested areas; and
   - at the edge of gravel parking areas and areas under construction.

c. Erosion control mix alone is not suitable:
   - on slopes with groundwater seepage;
   - at low points with concentrated flows and in gullies;
   - at the bottom of steep perimeter slopes exceeding 100 feet in INMTth;
   - below culvert outlet aprons; and around catch basins and closed storm systems.

d. Chemical Mulches and Soil Binders: Wide ranges of synthetic spray-on materials are marketed to protect the soil surface. These are emulsions that are mixed with water and applied to the soil. They may be used alone, but most often are used to hold wood fiber, hydro-mulches or straw to the soil surface.

e. Erosion Control Blankets and Mats: Mats are manufactured combinations of mulch and netting designed to retain soil moisture and modify soil temperature. During the growing season (April 15 to October 15) use mats indicated on drawings or North American Green (NAG) S75 (or mulch and netting) on:
   - the base of grassed waterways;
   - steep slopes (15 percent or greater); and
   - any disturbed soil within 100 feet of lakes, streams, or wetlands.

During the late fall and winter (October 15 to April 15) use heavy grade mats indicated on drawings for NAG SC250 on all areas noted above plus use lighter grade mats NAG S75 (or mulch and netting) on:
   - sideslopes of grassed waterways; and moderate slopes (between 8 and 15 percent).

C. TEMPORARY DUST CONTROL

To prevent the blowing and movement of dust from exposed soil surfaces, and reduce the presence of dust, use water or calcium chloride to control dusting by preserving the moisture level in the road surface materials.

D. CONSTRUCTION DE-WATERING

1. Water from construction de-watering operations shall be cleaned of sediment before reaching wetlands, water bodies, streams or site boundaries. Utilize temporary sediment basins, erosion control soil filter berms backed by staked hay bales, A Dirt Bag 55" sediment filter bag by ACF Environmental, or other approved Best Management Practices (BMP's).

2. In sensitive areas near streams or ponds, discharge the water from the de-watering operation into a temporary sediment basin created by a surrounding filter berm of uncompacted erosion control mix immediately backed by staked hay bales (see the site details). Locate the temporary sediment basin at lease 100 feet from the nearest water body, such that the filtered water will flow through undisturbed vegetated soil areas prior to reaching the water body or property line.

E. PERMANENT MEASURES

1. Riprapped Aprons: All storm drain pipe outlets and the inlet and outlet of culverts will have riprap aprons to protect against scour and deterioration.

2. Topsoil, Seed, and Mulch: All areas disturbed during construction, but not subject to other restoration (paving, riprap, etc.) will be loamed, limed, fertilized, seeded, and mulched.

   Seeded Preparation: Use stockpiled materials spread to the depths shown on the plans, if available. Approved topsoil substitutes may be used. Grade the site as needed.

   a. Seeding will be completed by August 15 of each year. Late season seeding may be done between August 15 and October 15. Areas not seeded or which do not obtain satisfactory growth by October 15, will be seeded with Aroostook Rye or mulched. After November 1, or the first killing frost, disturbed areas will be seeded at double the specified application rates, mulched, and anchored.

   PERMANENT SEEDING SPECIFICATIONS

| Mixture: | Roadside (lbs/acre) | Lawn (lbs/acre) |
|---|---|---|
| Kentucky Bluegrass | 20 | 55 |
| White Clover | 5 | 0 |
| Creeping Red Fescue | 20 | 55 |
| Perennial Ryegrass | 5 | 15 |

   b. Mulch in accordance with specifications for temporary mulching.

   c. If permanent vegetated stabilization cannot be established due to the season of the year, all exposed and disturbed areas not to undergo further disturbance are to have dormant seeding applied and be temporarily mulched to protect the site.

3. Ditches and Channels: All ditches on-site will be lined with North American Green S75 erosion control mesh (or an approved equal) upon installation of loam and seed.

F. WINTER CONSTRUCTION AND STABILIZATION

1. Natural Resource Protection: During winter construction, a double-row of sediment barriers (i.e., silt fence backed with hay bales or erosion control mix) will be placed between any natural resource and the disturbed area. Projects crossing the natural resource will be protected a minimum distance of 100 feet on either side from the resource.

2. Sediment Barriers: During frozen conditions, sediment barriers may consist of erosion control mix berms or any other recognized sediment barriers as frozen soil prevents the proper installation of hay bales or silt fences.

3. Mulching:

   - All areas will be considered to be denuded until seeded and mulched. Hay and straw mulch will be applied at a rate of twice the normal accepted rate.
   - Mulch will not be spread on top of snow.
   - After each day of final grading, the area will be properly stabilized with anchored hay or straw or erosion control matting.
   - Between the dates of November 1 and April 15, all mulch will be anchored by either mulch netting, emulsion chemical, tracking or wood cellulose fiber.

5. Soil Stockpiling: Stockpiles of soil or subsoil will be mulched for over-winter protection with hay or straw at twice the normal rate or with a 4-inch layer of erosion control mix. This will be done within 24 hours of stocking and re-established prior to any rainfall or snowfall. Any soil stockpiles shall not be placed (even covered with mulch) within 100 feet from any natural resources.

6. Seeding: Dormant seeding may be placed prior to the placement of mulch or erosion control blankets. If dormant seeding is used for the site, all disturbed areas will receive 4 inches of loam and seed at an application rate of three times the rate for permanent seeding. All areas seeded during the winter will be inspected in the spring for adequate catch. All areas insufficiently vegetated (less than 75 percent catch) will be revegetated by replacing loam, seed, and mulch.

   If dormant seeding is not used for the site, all disturbed areas will be revegetated in the spring.

7. Maintenance: Maintenance measures will be applied as needed during the entire construction season. After each rainfall OF 0.5" or greater, snow storm, or period of thawing and runoff, and at least once a week, the site Contractor will perform a visual inspection of all installed erosion control measures and perform repairs as needed to ensure their continuous function.

8. Identified repairs will be started no later than the end of the net work day and be completed within seven (7) calendar days.

   Following the temporary and/or final seeding and mulching, the Contractor will, in the spring, inspect and repair any damages and/or bare spots. An established vegetative cover means a minimum of 85 to 90 percent of areas vegetated with vigorous growth.

G. OVER-WINTER CONSTRUCTION EROSION CONTROL MEASURES

1. Stabilization of Disturbed Soil: By October 15, all disturbed soils on areas having a slope less than 15 percent will be seeded and mulched. If the Contractor fails to stabilize these soils by this date, then the Contractor shall stabilize the soil for late fall and winter, by using either temporary seeding or mulching.

2. Stabilization of Disturbed Slopes: All slopes to be vegetated will be completed by October 15. The Owner will consider any area having a grade greater than 15 percent (6.5H:1V) to be a slope. Slopes not vegetated by October 15 will receive one of the following actions to stabilize the slope for late fall and winter:

   a. Stabilize the soil with temporary vegetation and erosion control mesh.
   b. Stabilize the slope with erosion control mix.
   c. Stabilize the slope with stone riprap.

3. Stabilization of Ditches and Channels: All stone-lined ditches and channels to be used to convey runoff through the winter will be constructed and stabilized by November 15. Grass-lined ditches and channels will be complete by September 15. Grass-lined ditches not stabilized by September 15 shall be lined with either sod or riprap.

H. MAINTENANCE PLAN

1. Routine Maintenance: Inspection will be performed as outlined in the project's Erosion Control Plan. Inspection will be by a qualified person during all rainfall events to ensure that the facility performs as intended. Inspection priorities will include checking erosion controls for accumulation of sediments.

I. Housekeeping

1. Spill prevention. Controls must be used to prevent pollutants from being discharged from materials on site, including storage practices to minimize exposure of the materials to stormwater, and appropriate spill prevention, containment, and response planning and implementation.

2. Groundwater protection. During construction, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater may not be stored or handled in areas of the site draining to an infiltration area. An "infiltration area" is any area of the site that by design or as a result of soils, topography and other relevant factors accumulates runoff that infiltrates into the soil. Dikes, berms, sumps, and other forms of secondary containment that prevent discharge to groundwater may be used to isolate portions of the site for the purposes of storage and handling of these materials.

3. Fugitive sediment and dust. Actions must be taken to ensure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil may not be used for dust control. If off-site tracking occurs roadways should be swept immediately and no loss once a week and prior to significant storm events.

4. Debris and other materials. Litter, construction debris, and chemicals exposed to stormwater must be prevented from becoming a pollutant source.

5. Trench or foundation de-watering. Trench de-watering is the removal of water from trenches, foundations, coffer dams, ponds, and other areas within the construction area that retain water after excavation. In most cases the collected water is heavily silted and hinders correct and safe construction practices. The collected water must be removed from the ponded area, either through gravity or pumping, and must be spread through natural wooded buffers or removed to areas that are specifically designed to collect the maximum amount of sediment possible, like a cofferdam sedimentation basin. Avoid allowing the water to flow over disturbed areas of the site. Equivalent measures may be taken if approved by the department.

6. Authorized Non-stormwater discharges. Identify and prevent contamination by non-stormwater discharges. Where allowed non-stormwater discharges exist, they must be identified and steps should be taken to ensure the implementation of appropriate pollution prevention measures for the non-stormwater component(s) of the discharge. Authorized non-stormwater discharges are:

(a) Discharges from firefighting activity;

(b) Fire hydrant flushings;

(c) Vehicle washwater if detergents are not used and washing is limited to the exterior of vehicles (engine, undercarriage and transmission washing is prohibited);

(d) Dust control runoff in accordance with permit conditions and Appendix (C)(3);

(e) Routine external building washdown, not including surface paint removal, that does not involve detergents;

(f) Pavement washwater (where spills/leaks of toxic or hazardous materials have not occurred, unless all spilled material had been removed) if detergents are not used;

(g) Uncontaminated air conditioning or compressor condensate;

(h) Uncontaminated groundwater or spring water;

(i) Foundation or footer drain-water where flows are not contaminated;

(j) Uncontaminated excavation dewatering (see requirements in Appendix C(5));

(k) Potable water sources including waterline flushings; and

(l) Landscape irrigation.

7. Unauthorized non-stormwater discharges . The Department's approval under this Chapter does not authorize a discharge that is mixed with a source of non_stormwater, other than those discharges in compliance with Appendix C (6). Specifically, the Department's approval does not authorize discharges of the following:

(a) Wastewater from the washout or cleanout of concrete, stucco, paint, form release oils, curing compounds or other construction materials;

(b) Fuels, oils or other pollutants used in vehicle and equipment operation and maintenance;

(c) Soaps, solvents, or detergents used in vehicle and equipment washing; and

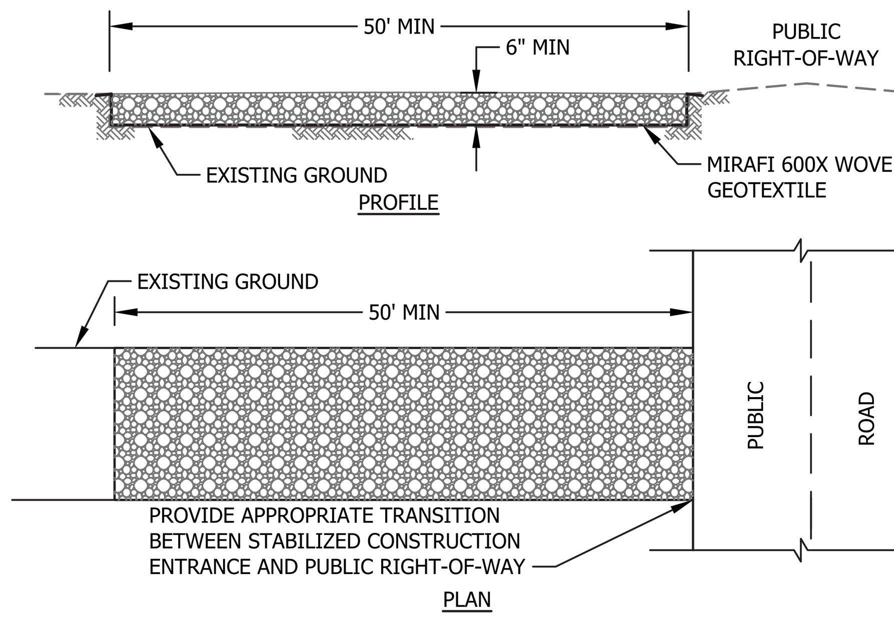
(d) Toxic or hazardous substances from a spill or other release.

8. Additional requirements. Additional requirements may be applied on a site-specific basis.

J. CONSTRUCTION SEQUENCE

In general, the expected sequence of construction for each phase is provided below. Construction is proposed to start in and end in 2020.

- Mobilization
- Install temporary erosion control measures
- Clearing and grubbing
- Site Grading
- Build underdrained soil filter
- Site stabilization, pavement, loam and seed, and landscaping

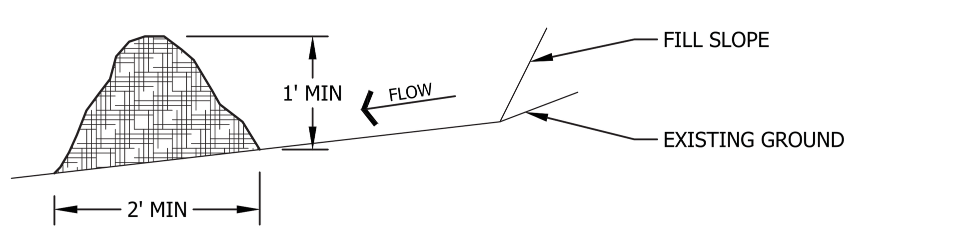



CONSTRUCTION SPECIFICATIONS

NOTES:
1. STONE SIZE - 2" TO 3" STONE OR RECLAIMED OR RECYCLED CONCRETE OR EQUIVALENT.
2. LENGTH - AS EFFECTIVE, BUT NOT LESS THAN 50 FEET.
3. THICKNESS - NOT LESS THAN SIX (6) INCHES.
4. WIDTH - 10 FEET MINIMUM, OR NOT LESS THAN FULL WIDTH OF ALL POINTS OF INGRESS OR EGRESS.
5. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC REPAIR AND TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.

## STABILIZED CONSTRUCTION ENTRANCE/EXIT

NTS




## EROSION CONTROL MIX SEDIMENT BARRIER

NOTES:

1. EROSION CONTROL MIX CAN BE MANUFACTURED ON OR OFF THE SITE. IT MUST CONSIST PRIMARILY OF ORGANIC MATERIAL SEPARATED AT THE POINT OF GENERATION, AND MAY INCLUDE: SHREDDED BARK, STUMP GRINDINGS, COMPOSTED BARK, OR FLUME GRIT AND FRAGMENTED WOOD GENERATED FROM WATER-FLUME LOG HANDLING SYSTEMS.
   WOOD CHIPS, GROUND CONSTRUCTION DEBRIS, REPROCESSED WOOD PRODUCTS OR BARK CHIPS WILL NOT BE ACCEPTABLE AS THE ORGANIC COMPONENT OF THE MIX.
   EROSION CONTROL MIX SHALL CONTAIN A WELL-GRADED MIXTURE OF PARTICLE SIZES AND MAY CONTAIN ROCKS LESS THAN 4" IN DIAMETER.
   EROSION CONTROL MIX MUST BE FREE OF REFUSE, PHYSICAL CONTAMINANTS, AND MATERIAL TOXIC TO PLANT GROWTH.
   THE MIX COMPOSITION SHALL MEET THE FOLLOWING STANDARDS:
   A. ORGANIC MATERIAL: BETWEEN 20% - 100% (DRY WEIGHT BASIS)
   B. PARTICLE SIZE: BY WEIGHT, 100% PASSING 6" SCREEN, 70-85% PASSING 0.75" SCREEN
   C. THE ORGANIC PORTION NEEDS TO BE FIBROUS AND ELONGATED.
   D. LARGE PORTIONS OF SILTS, CLAYS OR FINE SANDS ARE NOT ACCEPTABLE IN THE MIX.
   E. SOLUBLE SALTS CONTENT SHALL BE LESS THAN 4.0 MMHOS/CM.
   F. PH: 5.0 - 8.0

2. ON SLOPES LESS THAN 5% OR AT THE BOTTOM OF SLOPES 2:1 OR LESS UP TO 20 FEET LONG, THE BARRIER MUST CONFORM TO THE ABOVE DIMENSIONS. ON THE LONGER OR STEEPER SLOPES, THE BARRIER SHOULD BE WIDER TO ACCOMMODATE THE ADDITIONAL FLOW.

3. THE BARRIER MUST BE PLACED ALONG A RELATIVELY LEVEL ELEVATION. IT MAY BE NECESSARY TO CUT TALL GRASSES OR WOODY VEGETATION TO AVOID CREATING VOIDS AND BRIDGES THAT WOULD ENABLE FINES TO WASH UNDER THE BARRIER THROUGH THE GRASS BLADES OR PLANT STEMS.

4. LOCATIONS WHERE OTHER BMP'S SHOULD BE USED:
   A. AT LOW POINTS OF CONCENTRATED FLOW
   B. BELOW CULVERT OUTLET APRONS
   C. WHERE A PREVIOUS STAND-ALONE EROSION CONTROL MIX APPLICATION HAS FAILED
   D. AT THE BOTTOM OF STEEP PERIMETER SLOPES THAT ARE MORE THAN 50 FEET FROM TOP TO BOTTOM (LARGE UPGRADIENT WATERSHED)
   E. AROUND CATCH BASINS AND CLOSED STORM DRAIN SYSTEMS.

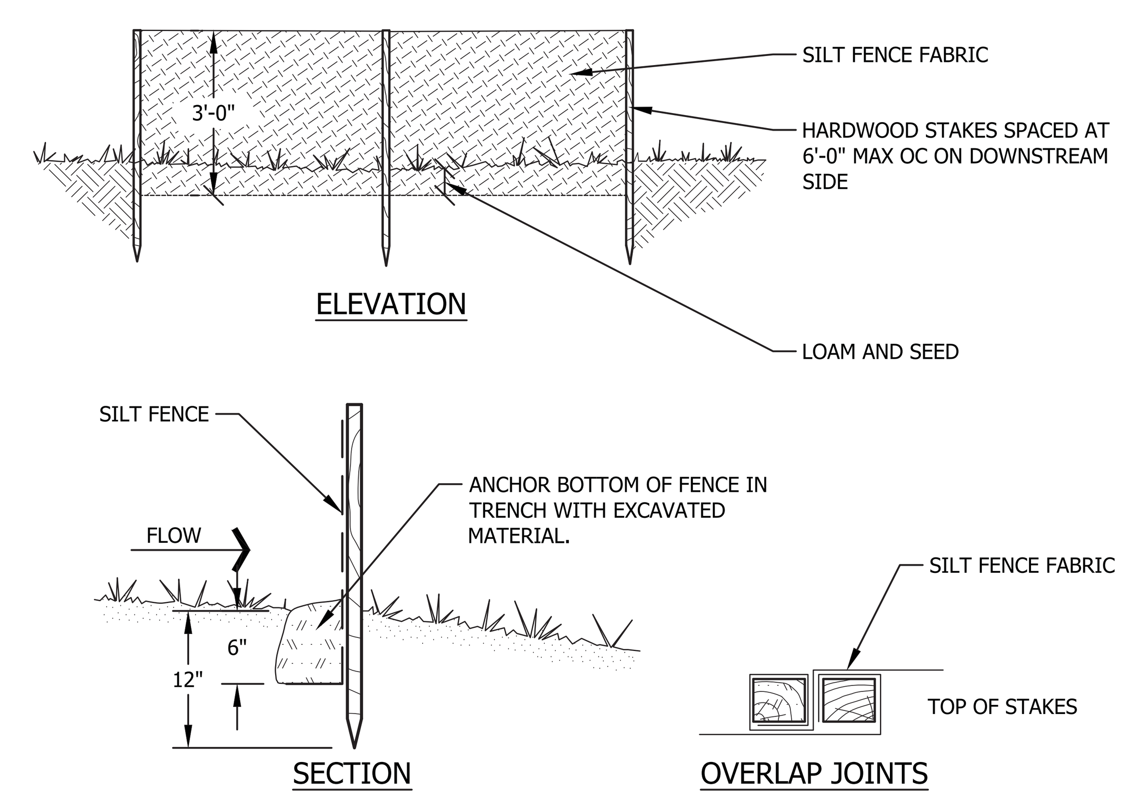
5. THE EROSION CONTROL MIX BARRIERS SHOULD BE INSPECTED REGULARLY AND AFTER EACH LARGE RAINFALL. REPAIR ALL DAMAGED SECTIONS OF BERM IMMEDIATELY BY REPLACING OR ADDING ADDITIONAL MATERIAL PLACED ON THE BERM TO THE DESIRED HEIGHT AND WIDTH.

6. IT MAY BE NECESSARY TO REINFORCE THE BARRIER WITH SILT FENCE OR STONE CHECK DAMS IF THERE ARE SIGNS OF UNDERCUTTING OR THE IMPOUNDMENT OF LARGE VOLUMES OF WATER.

7. SEDIMENT DEPOSITS SHOULD BE REMOVED WHEN THEY REACH APPROXIMATELY ONE-HALF THE HEIGHT OF THE BARRIER.

8. REPLACE SECTIONS OF BERM THAT DECOMPOSE, BECOME CLOGGED WITH SEDIMENT OR OTHERWISE BECOME INEFFECTIVE. THE BARRIER SHOULD BE RESHAPED AS NEEDED.

9. EROSION CONTROL MIX BARRIERS CAN BE LEFT IN PLACE AFTER CONSTRUCTION. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER BARRIER IS NO LONGER REQUIRED SHOULD BE SPREAD TO CONFORM TO THE EXISTING GRADE AND BE SEEDED AND MULCHED. WOODY VEGETATION CAN BE PLANTED INTO THE BARRIERS, OR THEY CAN BE OVER-SEEDED WITH LEGUMES. IF THE BARRIER NEEDS TO BE REMOVED, IT CAN BE SPREAD OUT INTO THE LANDSCAPE.

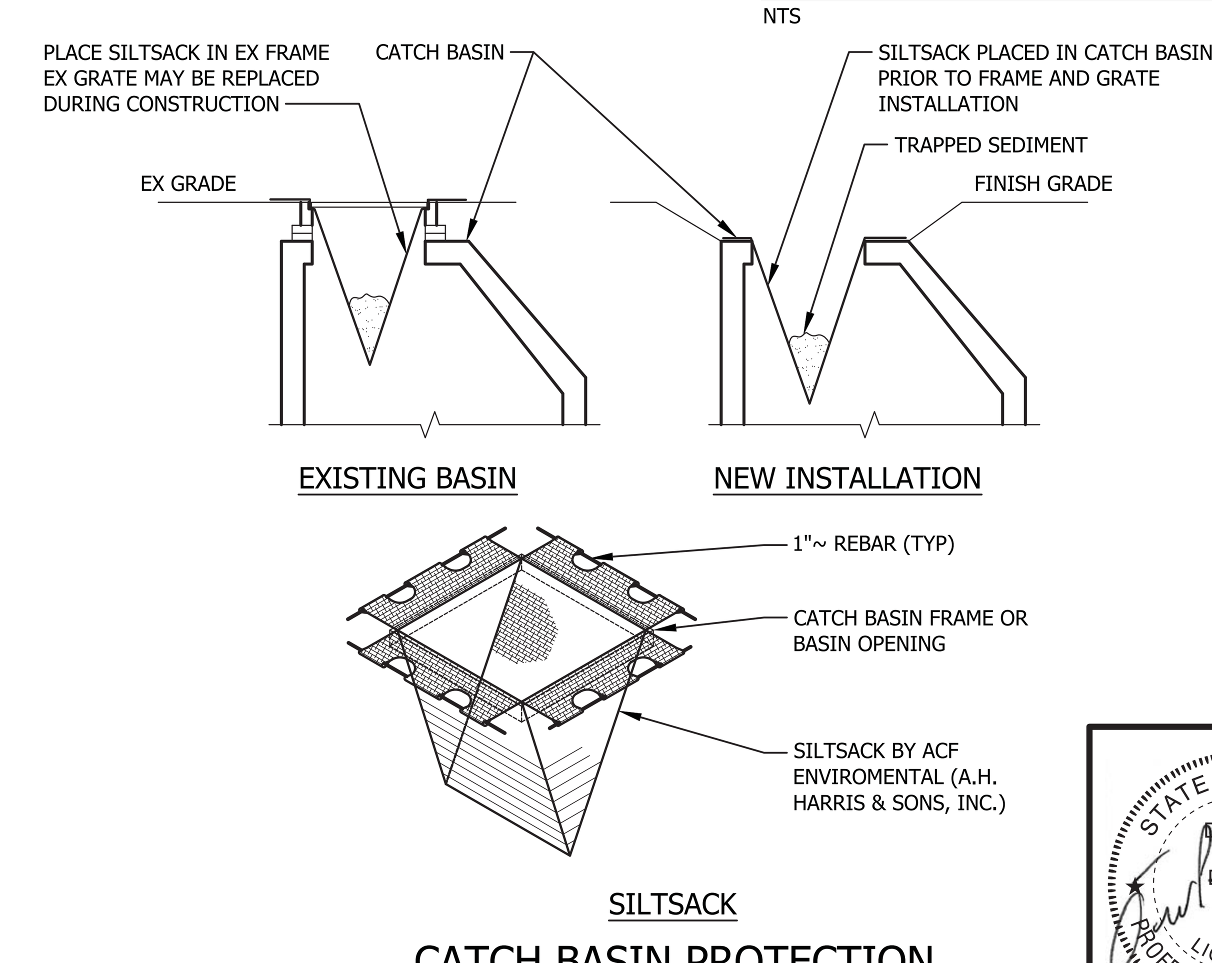



NOTE:
CONTRACTORS OPTION TO USE SEDIMENT BARRIER OR SILT FENCE FOR SLOPE PROTECTION.

## SILT FENCE

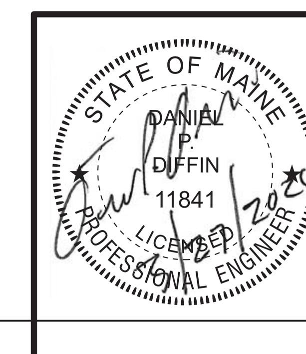
## SURFACE DRAINAGE SEDIMENT CONTROL

NTS




## CATCH BASIN PROTECTION

NTS




TOWN OF CUMBERLAND
TOWN OFFICE PARKING EXPANSION
TUTTLE ROAD
CUMBERLAND, MAINE

EROSION CONTROL NOTES AND DETAILS

| REV. | BY | DATE | STATUS |
|---|---|---|---|
| | DPD | 3/2020 | ISSUED TO MEDEP FOR REVIEW |
| | DPD | 2/2020 | ISSUED TO MEDEP FOR REVIEW |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| | |
|---|---|
| DESIGN BY: | NMT |
| DRAWN BY: | SJM |
| DATE: | 1/2020 |
| CHECKED BY: | BDP |
| LMN: | NONE |
| CTB: | SME-STD |

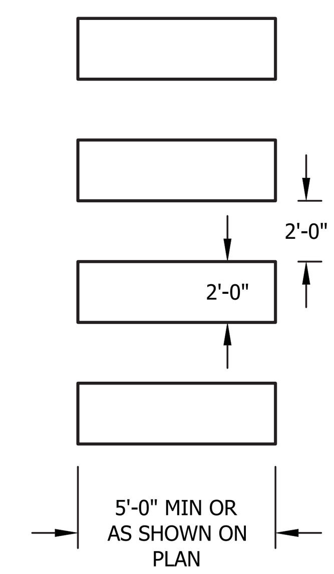
JOB NO. 19231.00 DWG FILE DETAILS

C-300

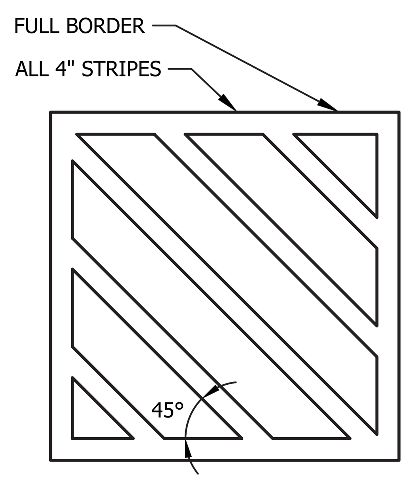
| CONSTRUCTION | USE |
|---|---|
| 1 1/4" HMA MDOT 9.5mm<br>2 1/4" HMA MDOT 19.0mm<br>3" COMPACTED AGGREGATE BASE, MDOT 703.06(a) TYPE A<br>15" COMPACTED AGGREGATE SUBBASE, MDOT 703.06(b) TYPE D<br>COMPACTED SUBGRADE | BITUMINOUS<br>PARKING LOT |
| 4" TOPSOIL, NO STONES OVER 3/4" DIA.<br>GRANULAR MATERIAL IN FILL AREAS<br>COMPACTED SUBGRADE | GRASS<br>ALL DISTURBED AREAS OTHER THAN PLAY FIELDS |

NOTES:
1. HMA = HOT MIX ASPHALT.
   MDOT = MAINE DEPARTMENT OF TRANSPORTATION.
2. ALL COURSE THICKNESS AFTER FINAL COMPACTION.

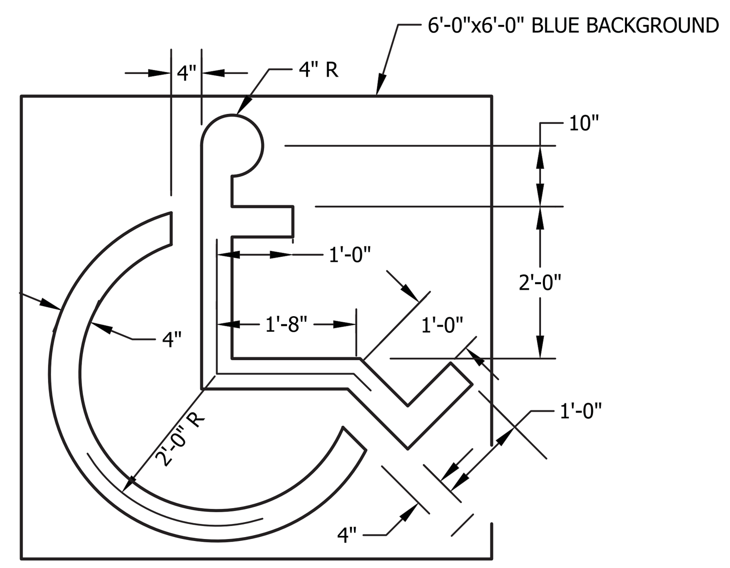
## SCHEDULE OF SURFACE FINISHES
NTS



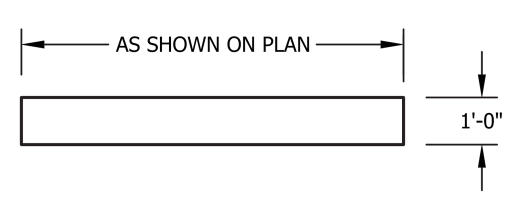

CROSSWALK



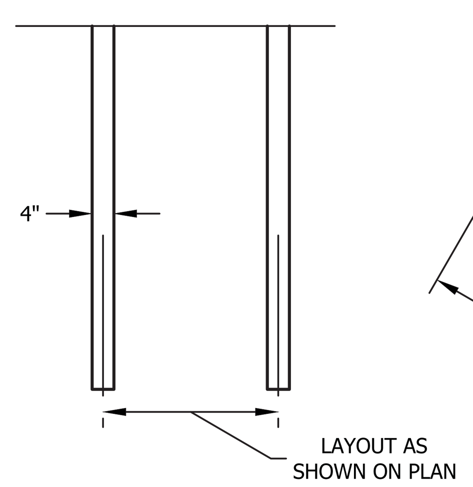

NO PARKING



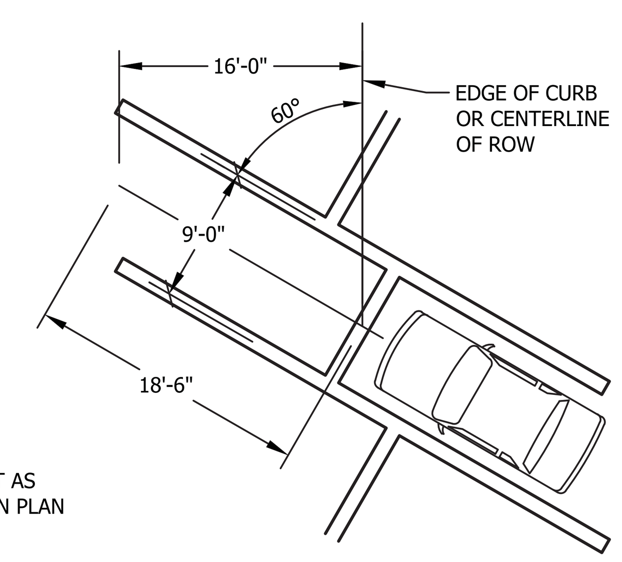

BARRIER FREE STALL SYMBOL




STOP LINE

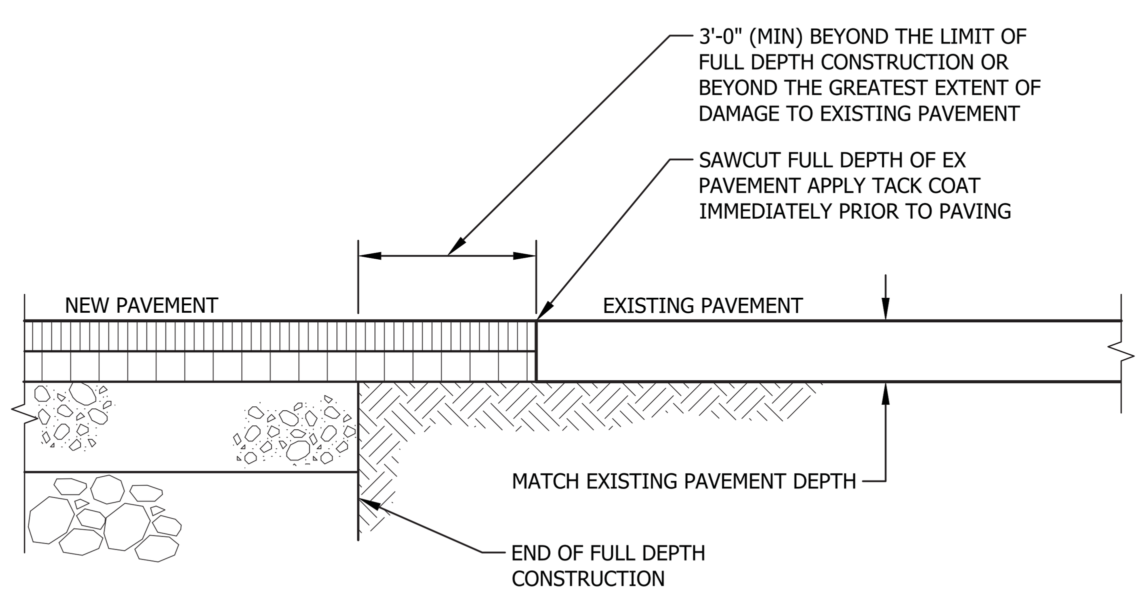



PARKING SPACE

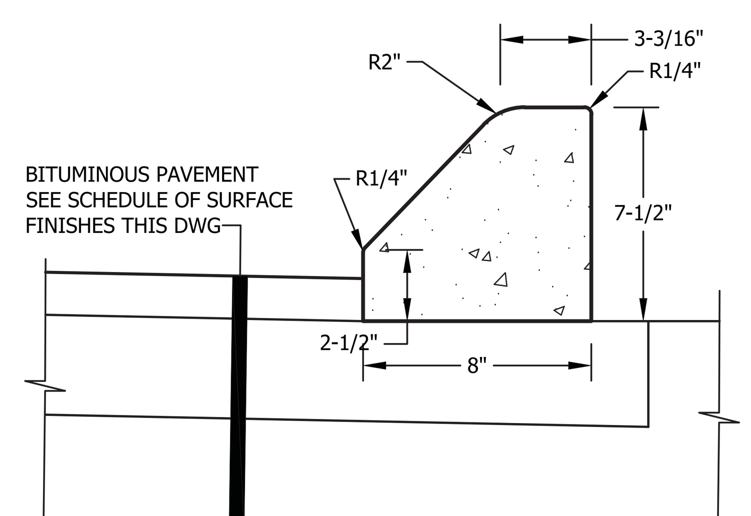



PARKING SPACE

## STRIPING DETAILS
NTS

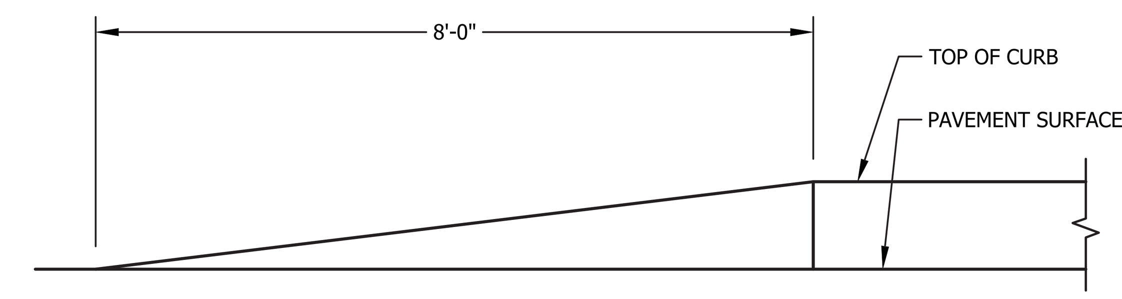



## PAVEMENT CUTTING AND MATCHING
NTS

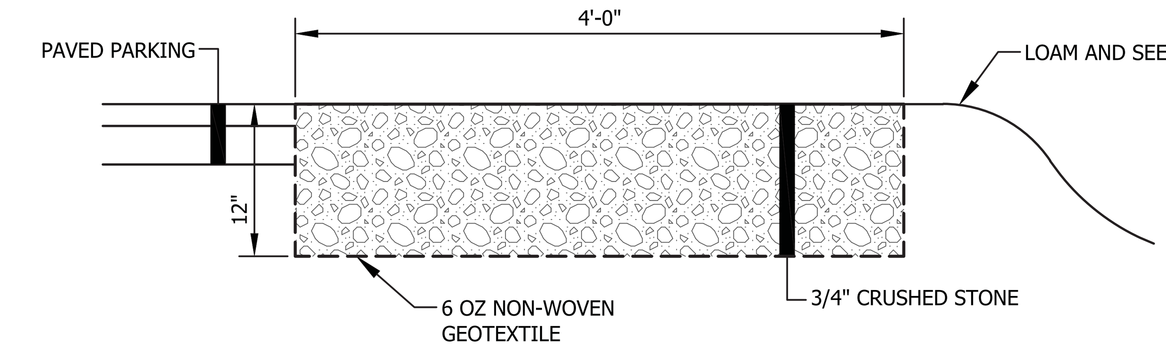



CONCRETE NOTES:
1. MINIMUM 28 DAY COMPRESSIVE STRENGTH: 4,000 PSI
2. AIR ENTRAINMENT: 4% TO 6%
3. REINFORCING: FIBERMESH OR EQUIVALENT GRACE PRODUCT
4. STRAND LENGTH 1-1/2", 1" TO 1-1/2 LB/CUBIC YARD
5. SLUMP: 1" TO 1-1/2"
6. FINISH:
   a. VERTICAL AND TOP FACES: SMOOTH SLIPFORM
   b. SLOPED FACES: BROOM
7. JOINTS: SAWCUT 10' OC 3" DEEP THE DAY AFTER PLACING
8. SEALER: SALTGUARD OR EQUAL WATER BASED SEALER

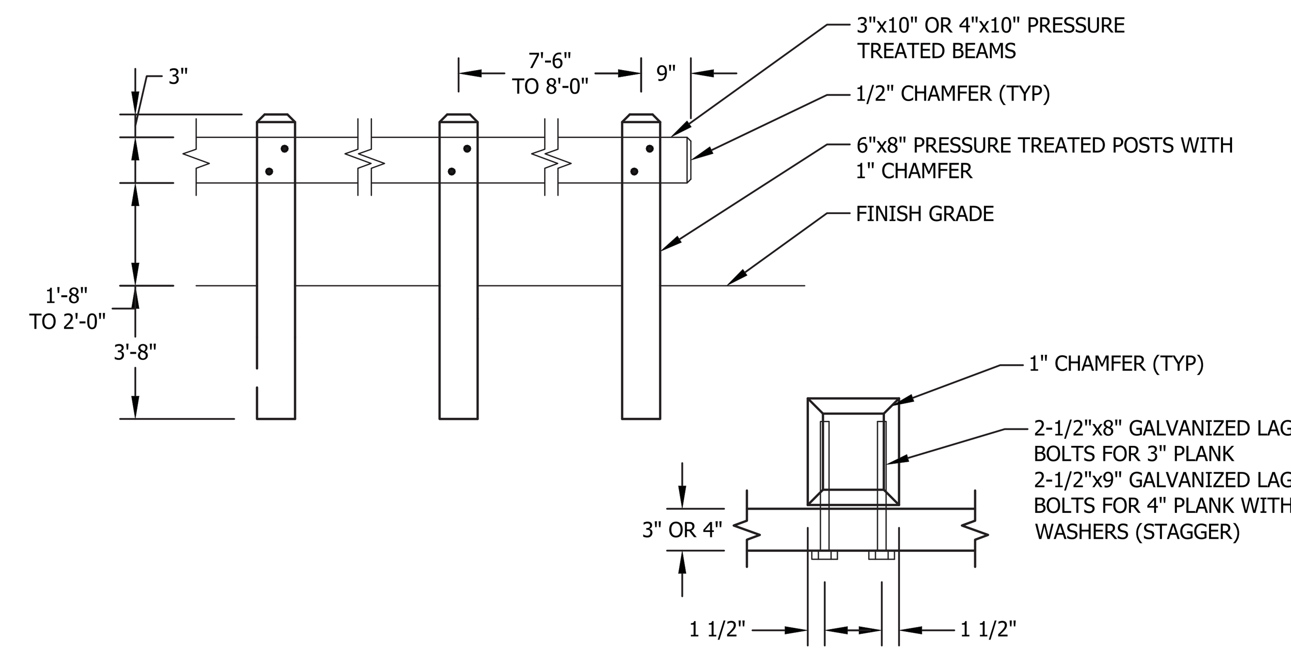
## SLIPFORM CONCRETE CURB
NTS



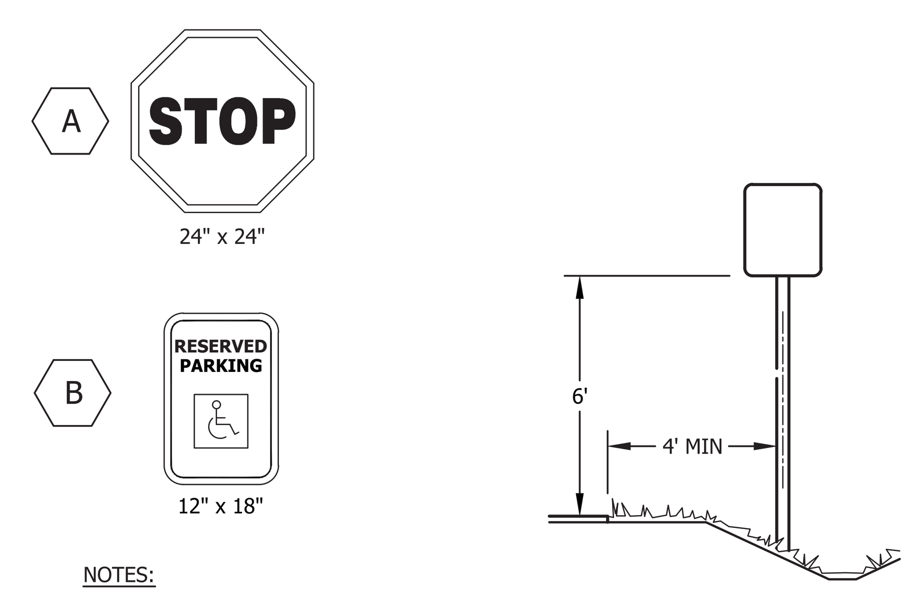

## CURB TIP DOWN
NTS




## CRUSHED STONE STRIP
NTS

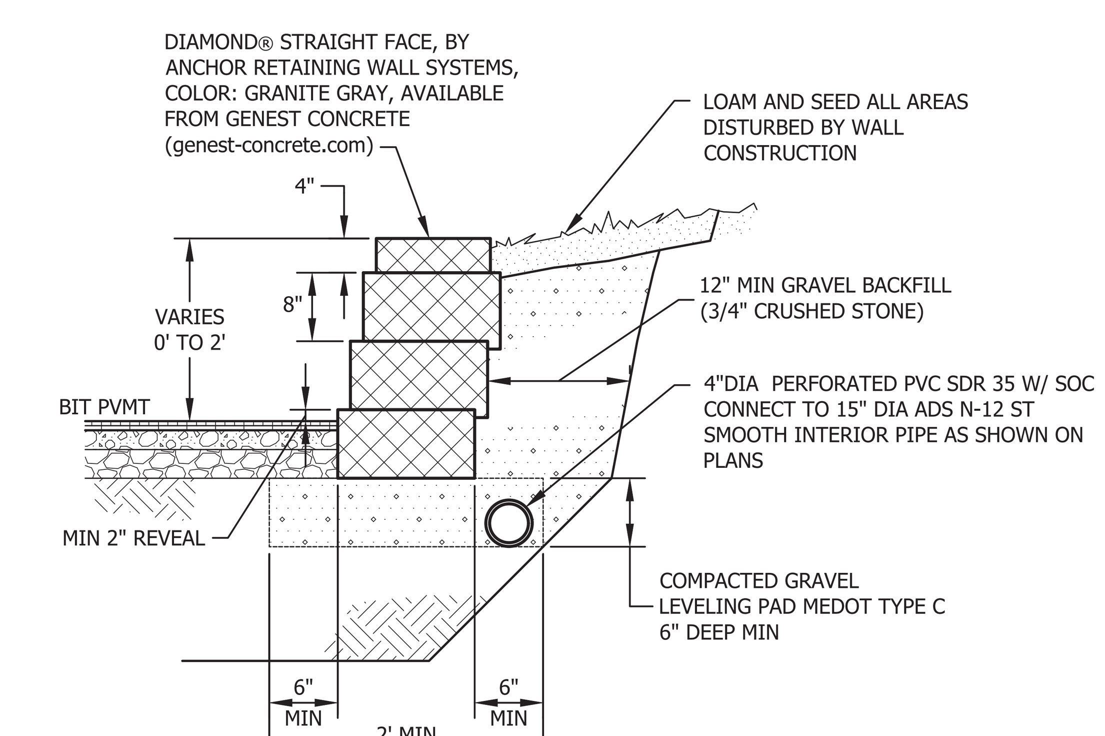



## WOOD GUARDRAIL
NTS




NOTES:
1. SIGNS SHALL BE FABRICATED AND INSTALLED IN ACCORDANCE WITH MAINE DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS, HIGHWAYS AND BRIDGES REVISION OF DECEMBER 2002, SECTION 645.
2. ALL PERMANENT SIGNS ON THIS PROJECT ARE CLASSIFIED UNDER SECTION 645.03(b) TYPE 1 REGULATORY WARNING AND ROUTE MARKER ASSEMBLY SIGNS.
3. SIGN MATERIAL SHALL BE AS SPECIFIED IN SECTION 719 OF THE MDOT STANDARD SPECIFICATIONS.
4. POSTS SHALL BE METAL CHANNELS AS SPECIFIED IN SECTION 720.08. ALTERNATE POSTS MAY BE 4"x6" WOOD AS SPECIFIED IN SECTION 720.12, AS APPROVED BY ENGINEER.
5. POSTS IN THE PUBLIC RIGHT-OF-WAY TO BE ON BREAKAWAY POSTS AS SPECIFIED IN SECTION 720 OF THE MDOT STANDARD SPECIFICATIONS.

## ROAD SIGN LEGEND
NTS




## SEGMENTAL RETAINING WALL
NTS

| REV. | BY | DATE | STATUS |
|---|---|---|---|
| | | | |
| | | | |
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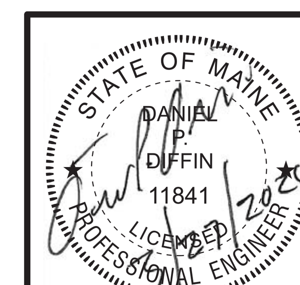
| | | | |
| | DPD | 3/2020 | ISSUED TO MEDEP FOR REVIEW |
| | DPD | 2/2020 | ISSUED TO MEDEP FOR REVIEW |




TOWN OF CUMBERLAND
TOWN OFFICE PARKING EXPANSION
TUTTLE ROAD
CUMBERLAND, MAINE

SECTIONS AND DETAILS

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| | |
|---|---|
| DESIGN BY: | NMT |
| DRAWN BY: | BWB |
| DATE: | 1/2020 |
| CHECKED BY: | BDP |
| LMN: | NONE |
| CTB: | SME-STD |

JOB NO. 19231.00 DWG FILE DETAILS

C-301

THE SANDY LOAM TOPSOIL SHALL BE TESTED AT A SOIL TESTING LAB AND:

- MATCH THE USDA SANDY LOAM TOPSOIL CLASSIFICATION
- HAVE 5-8% HUMIFIED ORGANIC MATTER
- HAVE A CLAY CONTENT OF LESS THAN 2%
- BE FREE OF STONES, STUMPS, ROOTS OR OTHER OBJECTS GREATER THAN 2".

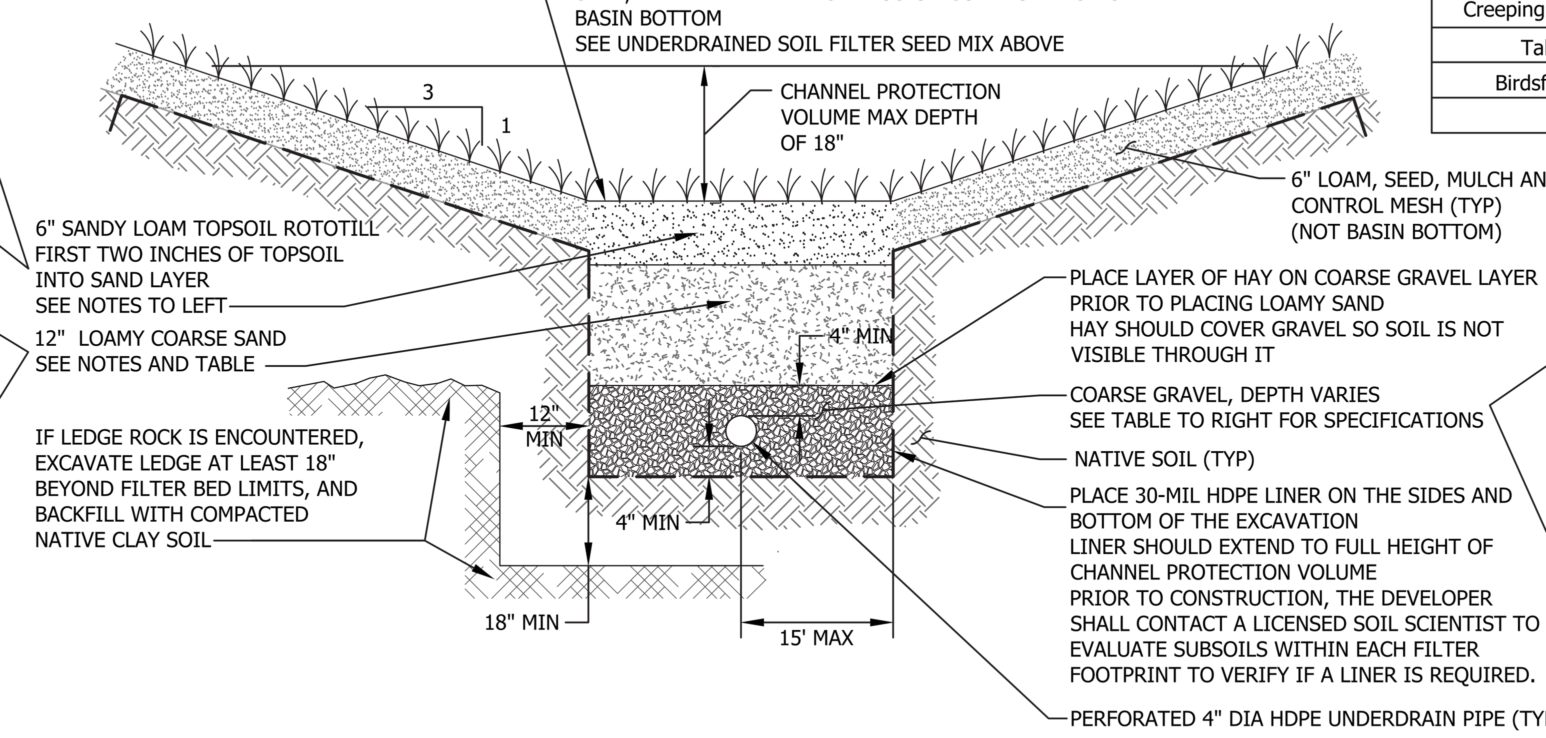
IF THE TOPSOIL DOES NOT CONTAIN SUFFICIENT NUTRIENT CONTENT TO SUPPORT GRASS GROWTH, SUPPLEMENT WITH SUPERHUMUS ORGANIC MATTER AND RETEST ORGANIC MATTER AND CLAY CONTENT.

NOTE:

1. FILTER OUTLET DISCHARGE SHALL BE CONTROLLED BY A 1.25-INCH DIAMETER CONSTRICTIVE ORIFICE TO OBTAIN A 24 TO 48 HOUR RELEASE TIME.

| SOIL FOR 12" LOAMY COARSE SAND LAYER (MEDOT #703.01) | |
|---|---|
| SIEVE SIZE | % BY WEIGHT |
| #10 | 85-100 |
| #20 | 70-100 |
| #60 | 15-40 |
| #200 | 8-15 |
| #200 (CLAY SIZE) | < 2.0 |

| UNDERDRAINED SOIL FILTER | |
|---|---|
| Name | LBS/ACRE |
| Creeping Red Fescue | 20 |
| Tall Fescue | 20 |
| Birdsfoot trefoil | 8 |
| Total | 48 |




| COARSE GRAVEL MEDOT SPECIFICATIONS FOR UNDERDRAINS (MEDOT #703.22) | |
|---|---|
| SIEVE SIZE | % PASSING BY WEIGHT |
| UNDERDRAIN TYPE B | |
| 1" | 95-100 |
| ½" | 75-100 |
| #4 | 50-100 |
| #20 | 15-80 |
| #50 | 0-15 |
| #200 | 0-5 |

CONSTRUCTION OVERSIGHT:

CONSTRUCTION SEQUENCE: THE SOIL FILTER MEDIA AND VEGETATION MUST NOT BE INSTALLED UNTIL THE AREA THAT DRAINS TO THE FILTER HAS BEEN PERMANENTLY STABILIZED WITH PAVEMENT OR OTHER STRUCTURE, 90% VEGETATION COVER, OR OTHER PERMANENT STABILIZATION UNLESS THE RUNOFF FROM THE CONTRIBUTING DRAINAGE AREA IS DIVERTED AROUND THE FILTER UNTIL STABILIZATION IS COMPLETE.

COMPACTION OF SOIL FILTER: FILTER SOIL MEDIA AND UNDERDRAIN BEDDING MATERIAL MUST BE COMPACTED TO BETWEEN 90% AND 92% STANDARD PROCTOR.

CONSTRUCTION OVERSIGHT: INSPECTION BY A PROFESSIONAL ENGINEER FAMILIAR WITH CONSTRUCTION REQUIREMENTS OF OF UNDERDRAINED SOIL FILTERS WILL OCCUR AT A MINIMUM:

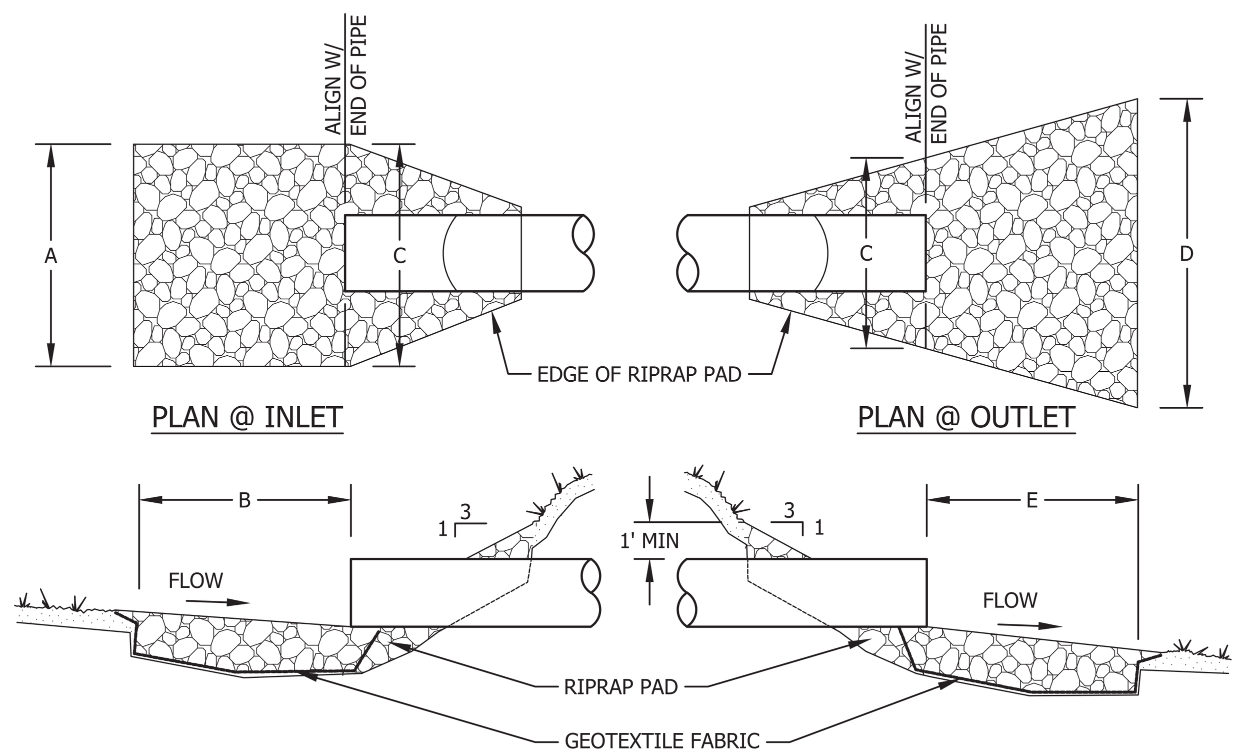
- AFTER THE PRELIMINARY CONSTRUCTION OF THE FILTER GRADES AND ONCE THE UNDERDRAIN PIPES ARE INSTALLED BUT NOT BACKFILLED,
- AFTER THE DRAINAGE LAYER IS CONSTRUCTED AND PRIOR TO THE INSTALLATION OF THE FILTER MEDIA,
- AFTER THE FILTER MEDIA HAS BEEN INSTALLED AND SEEDED.
- AFTER ONE YEAR TO INSPECT HEALTH OF THE VEGETATION AND MAKE CORRECTIONS, AND
- ALL THE MATERIAL USED FOR THE CONSTRUCTION OF THE FILTER BASIN MUST BE CONFIRMED AS SUITABLE BY THE DESIGN ENGINEER. TESTING MUST BE DONE BY A CERTIFIED LABORATORY TO SHOW THAT THEY ARE PASSING DEP SPECIFICATIONS.

TESTING AND SUBMITTALS: THE CONTRACTOR SHALL IDENTIFY THE LOCATION OF THE SOURCE OF EACH COMPONENT OF THE FILTER MEDIA. ALL RESULTS OF FIELD AND LABORATORY TESTING SHALL BE SUBMITTED TO THE PROJECT ENGINEER FOR CONFIRMATION. THE CONTRACTOR SHALL:

- SELECT SAMPLES OF EACH TYPE OF MATERIAL TO BE BLENDED FOR THE MIXED FILTER MEDIA AND SAMPLES OF THE UNDERDRAIN BEDDING MATERIAL. SAMPLES MUST BE A COMPOSITE OF THREE DIFFERENT LOCATIONS (GRABS) FROM THE STOCKPILE OR PIT FACE. SAMPLE SIZE REQUIRED WILL BE DETERMINED BY THE TESTING LABORATORY.
- PERFORM A SIEVE ANALYSIS CONFORMING TO ASTM C136 (STANDARD TEST METHOD FOR SIEVE ANALYSIS OF FINE AND COARSE AGGREGATES 1996A) ON EACH TYPE OF THE SAMPLE MATERIAL.

## TYPICAL UNDERDRAINED SOIL FILTER DETAIL

NTS




PLAN @ INLET

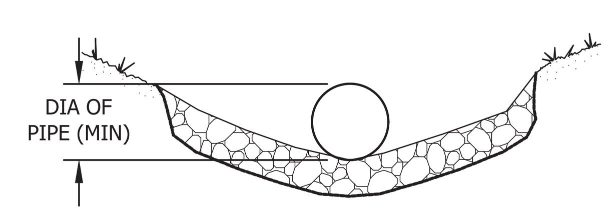
PLAN @ OUTLET

SECTION @ INLET

SECTION @ OUTLET

RIPRAP PAD MUST BE INSTALLED WITHIN 48 HOURS OF INSTALLING NEW PIPE OR CULVERT.

| PIPE | A | B | C | D | E | RIPRAP THICKNESS | $D_{50}$ |
|---|---|---|---|---|---|---|---|
| 12"~ | 3 FT. | 2 FT. | 3 FT. | 9 FT. | 8 FT. | 12" | 5" |
| 15"~ | 3.75 FT. | 2.5 FT. | 3.75 FT. | 11.5 FT. | 10 FT. | 18" | 8" |
| 18"~ | 4.5 FT. | 3 FT. | 4.5 FT. | 11.5 FT. | 10 FT. | 18" | 8" |
| 36"~ | 9 FT. | 6 FT. | 9 FT. | 12 FT. | 30 FT. | 28" | 14" |




CROSS SECTION

## RIPRAP INLET/OUTLET PROTECTION

NTS

STATE OF MAINE
DANIEL P. DIFFIN
11841
LICENSED
PROFESSIONAL ENGINEER

TOWN OF CUMBERLAND
TOWN OFFICE PARKING EXPANSION
TUTTLE ROAD
CUMBERLAND, MAINE

SECTIONS AND DETAILS

| REV. | BY | DATE | STATUS |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | DPD | 3/2020 | ISSUED TO MEDEP FOR REVIEW |
| | DPD | 2/2020 | ISSUED TO MEDEP FOR REVIEW |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Phone 207.829.5016 • Fax 207.829.5692 • smemaine.com


| | |
|---|---|
| DESIGN BY: | NMT |
| DRAWN BY: | BWB |
| DATE: | 1/2020 |
| CHECKED BY: | BDP |
| LMN: | NONE |
| CTB: | SME-STD |

JOB NO. 19231.00 DWG FILE DETAILS

C-302


## STORMWATER MANAGEMENT PLAN LEGEND

| | |
|---|---|
| 1 | SUBCATCHMENT DESIGNATION |
| | SUBCATCHMENT BOUNDARY |
| A B C | TIME OF CONCENTRATION SEGMENT DESIGNATION<br>TIME OF CONCENTRATION PATH |
| | SOIL TYPE BOUNDARY |
| BuC2 | SOIL TYPE DESIGNATION |
| Sht<br>L=50'<br>S=0.005 | TIME OF CONCENTRATION TYPE, LENGTH AND SLOPE |
| Sht | SHEET FLOW |
| Shc | SHALLOW CONCENTRATED FLOW |
| Ch | CHANNEL FLOW |
| | DRAINAGE REACH |
| 81 | REACH DESIGNATION (HYDROCAD) |
| 10 | POND/STRUCTURE DESIGNATION (HYDROCAD) |
| tc 1 | TIME OF CONCENTRATION WITH SUBCATCHMENT DESIGNATION |

20 0 40 80 FEET

| MAP UNIT SYMBOL | MAP UNIT NAME |
|---|---|
| BgB | Nicholville |
| BuB | Lamoine |
| BuC2 | Buxton |
| EmB | Elmwood |
| HnC | Hinckley-Suffield |
| Sn | Scantic |
| WmB | Windsor |

NOTES:

1. SEE DWG C-100 FOR GENERAL NOTES AND PLAN REFERENCES.
2. ALL SITE AND CONSTRUCTION ACTIVITIES SHALL BE IN COMPLIANCE WITH MEDEP BEST MANAGEMENT PRACTICES AND EXISTING FEDERAL, STATE, AND LOCAL PERMITS AND PERMITTING REQUIREMENTS FOR THE SITE.
3. SOIL TYPE DESIGNATIONS AND BOUNDARIES FROM A UNITED STATES DEPARTMENT OF AGRICULTURE NRCS CUSTOM SOIL REPORT FOR CUMBERLAND COUNTY AND PART OF OXFORD COUNTY MAINE DATED JANUARY 2, 2020.

| REV. | BY | DATE | STATUS |
|---|---|---|---|
| | | | |
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| | DPD | 3/2020 | ISSUED TO TOWN FOR SITE PLAN REVIEW |
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STATE OF MAINE
DANIEL P. DIFFIN
11841
LICENSED
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# TOWN OF CUMBERLAND
# TOWN OFFICE PARKING EXPANSION
# TUTTLE ROAD
# CUMBERLAND, MAINE

## STORMWATER MANAGEMENT PLAN
## PRE-DEVELOPMENT CONDITIONS

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|---|---|
| DESIGN BY: | NMT |
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| DATE: | 1/2020 |
| CHECKED BY: | BDP |
| LMN: | SMP-E |
| CTB: | SMP |

JOB NO. 19231.00 DWG FILE BASE

D-100


| MAP UNIT SYMBOL | MAP UNIT NAME |
|---|---|
| BgB | Nicholville |
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| REV. | BY | DATE | STATUS |
|---|---|---|---|
| | DPD | 3/2020 | ISSUED TO TOWN FOR SITE PLAN REVIEW |
| | DPD | 2/2020 | ISSUED FOR MEDEP REVIEW |

STATE OF MAINE
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TOWN OF CUMBERLAND
TOWN OFFICE PARKING EXPANSION
TUTTLE ROAD
CUMBERLAND, MAINE

STORMWATER MANAGEMENT PLAN
POST-DEVELOPMENT CONDITIONS

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JOB NO. 19231.00 DWG FILE BASE

D-101