To: **Cumberland Planning Board**
From: **Carla Nixon, Town Planner**
Date: **April 4, 2019**
Subject: **Amendment to Major Site Plan - Friends School - Route 1**

I. REQUEST:

The Owner and Applicant is the Friends School of Portland. The Applicant is proposing an amendment to a major site plan that was approved by the Planning Board on 12-17-13.

The amendment is for the construction of a 3,940 sf single story classroom addition, expansion of on-site parking and other minor changes to the approved site plan. The Applicants are also requesting re-approval of the 3,500 sf Community Hall and 28,000 sf Play Area 3 that was part of the 12-17-13 approval.

The 16.08 acre site is located at 11 US Route 1 as shown on Tax Assessor's Map R01, Lot 10 in the Low Density (LDR) Residential district. The use, a private school for grades K-8, is a permitted use in the district.

The Applicant is represented by Norman Chamberlain, P.E., of Walsh Engineers

The project requires Major Site Plan review because it involves the construction of a new structure greater than 3,000 square feet.

II. PROJECT OVERVIEW

Aquifer Protection Area: No.

Zoning: Low Density Residential (LDR); 2 acre minimum lot size required; if served by sewer: 1.5 acres.

Lot Size: 16.08 acres

Frontage: 508.57

Proposed Use: Private School (grades K-8); this is a permitted use in the zone.

Days & Hours of Operation: Typically M-F; 7:00 a.m. to 4:00 p.m. There are occasional evening and weekend events held at the school.

Employees: 14-16 were originally approved; the current application states there will be 30.

Students: 90 were originally approved; the current application states there will be 150.

Flood Map: # 2300450004B; Designation: Zone C (area of minimal flooding)

Financing: Private donations with commercial bridge loan if required.

Utilities: Public water and sewer are in place; a letter dated 3/20/19 was submitted with this amendment application from the Portland Water District stating that there will be no increase in demand, however the number of students and staff are increasing. A letter from the Town Manager stating that there will be additional sewer use units available is required. Underground electric (3 phase), telephone and cable from Route 1.

Signage: There is one sign at the entrance. The sign is lighted.

Natural Features: Wetlands and streams are shown on the plan.

Historical Features: There are stone walls on the site. They will not be disturbed.

Parking: 33 of the 61 spaces originally approved have been built. This amendment asks for an additional 48 spaces. A waiver is being requested.

Solid Waste: A fenced dumpster is located on the site.

Fire Protection: Site is 770' from a hydrant. There will be an alarm system and sprinklers installed. Plans are to be reviewed by the State Fire Marshall's Office.

Review Standards: Major Site Plan Review and Route 1 Design Guidelines

III. Waivers:

Note: Section 206.7.6 states that the Planning Board may waive any of the submission requirements based upon a written request by the applicant. A waiver may be granted only if the Board finds that the information is not required to determine compliance with the standards and criteria.

WAIVER REQUEST: Re: Parking. See Attachment 3 for information related to this request.

IV. Department Head Reviews:

Charles Rumsey, Police Chief: No concerns.

Dan Small, Fire Chief: Recommended Conditions of Approval

1) The building shall be equipped with a fire alarm system that is monitored by an approved fire alarm company. The system shall have a remote annunciator panel located at the main entrance that can be silenced with the push of one button from this location. The strobe or other visual alarm signaling devices shall remain active when the system is silenced. The alarm system shall identify the exact location of each individual initiation device with plain text at the fire alarm panel.

2) The building shall be equipped with a hinged key box approved by the fire department. The key box shall be electronically connected to the fire alarm system to show a trouble signal whenever the box is in the open position.

3) The building shall meet the requirements of the National Fire Protection Association Life Safety Code. These requirements cannot be determined until a complete set of building drawings are reviewed. For this type of building the requirements typically address, but may not be limited to: building exiting, emergency lighting and fire extinguishers.

4) Any fuel storage shall meet the appropriate standard of the National Fire Protection Association. Attention to building and property line set back requirements should be included as part of the site plan review.

5) The fire protection sprinkler system shall meet the requirements of the National Fire Protection Association. The fire department connection shall be equipped with a 4" locking coupling that is located at the front of the building in an area that is approved by the fire department. The sprinkler system shall send a water flow signal to the fire alarm panel whenever water is moving throughout the system. The fire department shall receive a copy of the sprinkler system drawings that have been approved and permitted by the State Fire Marshals' Office.

6) Access to the building shall be adequate enough to accommodate fire department vehicles.

V. Town Planner's Review Comments:

1. Please provide actual square footage increase for the building addition. I see two numbers in the application materials: 3,950 sf and 4,295 sf.

2. Please provide actual number of parking spaces to be added. Again, there is a reference to 50 spaces and another to 48 spaces.

3. Please provide elevation drawings for the three sides of the addition.

4. Please provide a letter from Bill Bray that states an amendment to the DOT Traffic Movement Permit is not required. Also have him explain that there is no need to amend the DOT Entrance Permit.

5. Please provide a letter from TD Bank that they have met with the Applicant, understand the costs of the project and are willing to provide financing for the anticipated amount of the bridge loan. This does not need to be a commitment letter.

6. Please provide more information on the construction plan that will avoid the need to blast.

7. Please provide lighting fixture cut sheets.

8. Please provide a revised lighting plan that clearly shows the existing and proposed exterior building and site lighting. Also address the slight trespass of light on the northerly boundary line with Hawks Ridge.

9. Please provide letter from MDEP/ACE regarding possible violation of wetland disturbance during Phase 1 construction. I will need to assess whether conditional approval by the Planning Board could be given with this issue outstanding.

VI. Town Engineer's Review:

April 2, 2019

Ms. Carla Nixon, Town Planner
Town of Cumberland
290 Tuttle Road
Cumberland, Maine 04021

Subject: Peer Review for Friends School of Portland
Site Plan Application Amendment
11 U.S. Route One, Cumberland, Maine

Dear Ms. Nixon:

As requested, Sevee & Maher Engineers, Inc. (SME) has conducted a peer review of the Site Plan Application Amendment for the proposed classroom addition, expansion of on-site parking and other

minor changes to the site plan. The application materials received by SME were prepared by Walsh Engineering Associates (Walsh), and include the Site Plan Amendment Application and associated drawings.

PROJECT DESCRIPTION

The applicant proposes to construct a 4,295-square-foot single-story classroom addition, expand on-site parking for a net gain of 48 spaces, and other minor changes to the approved site plan. In addition, the applicant is seeking re-approval of the 3,500-square-foot Community Hall and 28,000-square-foot Play Area 3 east of the building. These facilities were formerly approved in 2013 and have not yet been constructed. The site is located in the Low-Density Residential (LDR) District and will continue to be accessed through the existing curb cut on Route 1.

In general, the applicant has supplied a set of drawings and supporting documents that are appropriate for this type of project.

BASIS OF REVIEW

This project is being reviewed as a Planning Board Site Plan Review Application as outlined in the "Site Plan Review Ordinance," most recently amended and adopted on January 9, 2012 and amended on March 26, 2012. The comments below relate to the appropriate Ordinance Sections.

Chapter 229: Site Plan Review

Section 10.A. – Utilization of the Site.

1. The parking lot proposed to the south appears to be larger than originally approved in 2013. The additional spaces shown beyond those previously approved appear to result in additional impact within the 75-foot stream setback to the east. Please confirm that this additional impact will not require an amendment to the original NRPA permit.

Section 10.B – Traffic, circulation and parking.

1. SME recommends the Applicant provide additional evaluation of the waiver request for the total number of parking spaces. For example, what would the Town Ordinance require for parking and what is the current observed demand during pick-up and drop-off and daily use?
2. Please provide additional spot grades for the existing pavement at the two new ADA parking spaces north of the building. It is unclear if the slope of the existing pavement is below the 2% maximum slope for accessible spaces.
3. SME recommends the applicant add a stop bar and a one-way sign where the proposed southern parking lot intersects with the one-way turnaround.
4. Please provide a formal determination from the MEDOT or traffic engineer confirming that the increase in students and teachers will not require an amendment to the traffic movement or driveway entrance permits.
5. Please clarify how ADA access to the classroom addition will be provided.

Section 10.C – Stormwater management and erosion control.

1. The project is within the Town's Urbanized Area and requires compliance with Chapter 242 Stormwater Management of the Town's Ordinances. SME recommends the applicant revise the Inspection and Maintenance of Stormwater Management Facilities Plan to include the requirement for annual reporting to the Town.

2. The time of concentration for Subcatchment 11aS and 13aS are below the recommended minimum of 5.0 minutes for modelling completed using HydroCAD. SME recommends the applicant revise the times of concentrations and provide updated peak flows.
3. Please revise the Post Development Drainage Plan, D2.0 with the proposed pavement, storm drainage, and grading.
4. The invert of the 4" underdrain shown on sheet C-2.1 is listed at 72.75. This would place the pipe 6" below the bottom of the soil filter. Please revise the invert to match the detail for Underdrained Soil Filter #3.
5. The snow storage area at the end of the proposed parking lot appears to block surface drainage from the parking lot and adjacent swale from draining to the filter. SME recommends the applicant consider installing a drainage structure as an outlet in the winter/spring months, or indicating that snow storage is not allowed in the swale area just south of the parking lot.
6. Please clarify if the existing mound to the south of the new classroom building will be removed. The 85-foot contour crosses several existing contours.
7. SME recommends that Planning Board approval be conditioned on approval of the amended Stormwater Management Permit from the MEDEP.

Section 10.D – Water, sewer and fire protection.

1. Please clarify if water usage at the site will increase due to the additional students and staff. The project review letter from the PWD states that there will be no increase in water usage as a result of this project. It also discusses a change of use for the water service.
2. SME recommends that the applicant provide an ability to serve letter from the Town of Cumberland for the increase in sewer usage.

Section 10.E – Water Protection – SME has reviewed and has no comments.

Section 10.F – Floodplain Management – SME has reviewed and has no comments.

Section 10.G – Historic and Archaeological Resources – SME has reviewed and has no comments.

Section 10.H – Exterior Lighting

1. Please revise the lighting plan to more clearly define where the property boundaries and proposed lights will be placed. SME recommends the Applicant evaluate light placement and fixture type to reduce the light levels beyond the northern property line. It appears that there is a location where light levels will be as high as 0.7-foot candles on the abutting property.
2. Please provide cut sheets for light fixtures for review. Fixtures should be full cut-off.

Section 10.I – Buffering and Landscaping – SME has reviewed and has no comments.

Section 10.J – Noise – SME has reviewed and has no comments.

Section 10.K – Storage of Materials – SME has reviewed and has no comments.

Section 10.L – Capacity of the Applicant

1. SME recommends the Applicant provide a letter from TD Bank demonstrating that there is funding available for the project.

Section 10.M – Design and Performance Standards – SME has reviewed and has no comments.

Chapter 315: Zoning – SME has reviewed and has no comments

Please call me with any questions, or if you would like, I could meet with you to discuss our comments.

Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Daniel P. Diffin, P.E.
Vice President/Senior Civil Engineer

cc: Norman Chamberlain II, P.E. – Walsh Engineering Associates, Inc.

VII. Findings of Fact

Sec. 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.

A. Utilization of the Site

Utilization of the Site - The plan for the development, including buildings, lots, and support facilities, must reflect the natural capabilities of the site to support development. Environmentally sensitive areas, including but not limited to, wetlands, steep slopes, floodplains, significant wildlife habitats, fisheries, scenic areas, habitat for rare and endangered plants and animals, unique natural communities and natural areas, and sand and gravel aquifers must be maintained and preserved to the maximum extent. The development must include appropriate measures for protecting these resources, including but not limited to, modification of the proposed design of the site, timing of construction, and limiting the extent of excavation.

The layout of the campus has been designed to minimize impact to environmentally sensitive areas such as wetlands and steep slopes.

The Planning Board finds the standards of this section have been met.

B. Traffic, Circulation and Parking

(1) Traffic Access and Parking: Vehicular access to and from the development must be safe and convenient. ***Bill Bray, PTE of Traffic Solutions, has reviewed the traffic plan and has found that access to and from the site is safe and meets all applicable design standards. Adequate sight distances are shown on the plans.***

(a) Any driveway or proposed street must be designed so as to provide the minimum sight distance according to the Maine Department of Transportation standards, to the maximum extent possible.

(b) Points of access and egress must be located to avoid hazardous conflicts with existing turning movements and traffic flows.

(c) The grade of any proposed drive or street must be not more than +3% for a minimum of two (2) car lengths, or forty (40) feet, from the intersection.

(d) The intersection of any access/egress drive or proposed street must function: (a) at a Level of Service D, or better, following development if the project will generate one thousand (1,000) or more vehicle trips per twenty-four (24) hour period; or (b) at a level which will allow safe access into and out of the project if less than one thousand (1,000) trips are generated.

(e) Where a lot has frontage on two (2) or more streets, the primary access to and egress from the lot must be provided from the street where there is less potential for traffic congestion and for traffic and pedestrians hazards. Access from other streets may be allowed if it is safe and does not promote short cutting through the site. ***N/A***

(f) Where it is necessary to safeguard against hazards to traffic and pedestrians and/ or to avoid traffic congestion, the applicant shall be responsible for providing turning lanes, traffic directional islands, and traffic controls within public streets.

(g) Accessways must be designed and have sufficient capacity to avoid queuing of entering vehicles on any public street.

(h) The following criteria must be used to limit the number of driveways serving a proposed project:

1. No use which generates less than one hundred (100) vehicle trips per day shall have more than one (1) two-way driveway onto a single roadway. Such driveway must be no greater than thirty (30) feet wide.

No use which generates one hundred (100) or more vehicle trips per day shall have more than two (2) points of entry from and two (2) points of egress to a single roadway. The combined width of all accessways must not exceed sixty (60) feet.

(2) Accessway Location and Spacing

Accessways must meet the following standards:

a. Private entrance / exits must be located at least fifty (50) feet from the closest unsignalized intersection and one hundred fifty (150) feet from the closest signalized intersection, as measured from the point of tangency for the corner to the point of tangency for the accessway. This requirement may be reduced if the shape of the site does not allow conformance with this standard.

b. Private accessways in or out of a development must be separated by a minimum of seventy-five (75) feet where possible.

3. Internal Vehicular Circulation

The layout of the site must provide for the safe movement of passenger, service, and emergency vehicles through the site.

a. Projects that will be served by delivery vehicles must provide a clear route for such vehicles with appropriate geometric design to allow turning and backing.
b. Clear routes of access must be provided and maintained for emergency vehicles to and around buildings and must be posted with appropriate signage (fire lane - no parking).
c. The layout and design of parking areas must provide for safe and convenient circulation of vehicles throughout the lot.
d. All roadways must be designed to harmonize with the topographic and natural features of the site insofar as practical by minimizing filling, grading, excavation, or other similar activities which result in unstable soil conditions and soil erosion, by fitting the development to the natural contour of the land and avoiding substantial areas of excessive grade and tree removal, and by retaining existing vegetation during construction. The road network must provide for vehicular, pedestrian, and cyclist safety, all season emergency access, snow storage, and delivery and collection services.

(4) Parking Layout and Design

Off street parking must conform to the following standards:

a. Parking areas with more than two (2) parking spaces must be arranged so that it is not necessary for vehicles to back into the street.
b. All parking spaces, access drives, and impervious surfaces must be located at least fifteen (15) feet from any side or rear lot line, except where standards for buffer yards require a greater distance. No parking spaces or asphalt type surface shall be located within fifteen (15) feet of the front property line. Parking lots on adjoining lots may be connected by accessways not exceeding twenty-four (24) feet in width.
c. Parking stalls and aisle layout must conform to the following standards.

Parking Angle	Stall Width	Skew Width	Stall Depth	Aisle Width	
90°	9'-0"		18'-0"	24'-0"	2-way
60°	8'-6"	10'-6"	18'-0"	16'-0"	1-way
45°	8'-6"	12'-9"	17'-6"	12'-0"	1-way
30°	8'-6"	17'-0"	17'-0"	12'-0"	1 way

d. In lots utilizing diagonal parking, the direction of proper traffic flow must be indicated by signs, pavement markings or other permanent indications and maintained as necessary.
e. Parking areas must be designed to permit each motor vehicle to proceed to and from the parking space provided for it without requiring the moving of any other motor vehicles.

f. Provisions must be made to restrict the "overhang" of parked vehicles when it might restrict traffic flow on adjacent through roads, restrict pedestrian or bicycle movement on adjacent walkways, or damage landscape materials.

(5) Building and Parking Placement

(6) Pedestrian Circulation

The site plan must provide for a system of pedestrian ways within the development appropriate to the type and scale of development. This system must connect the major building entrances/ exits with parking areas and with existing sidewalks, if they exist or are planned in the vicinity of the project. The pedestrian network may be located either in the street right-of-way or outside of the right-of-way in open space or recreation areas. The system must be designed to link the project with residential, recreational, and commercial facilities, schools, bus stops, and existing sidewalks in the neighborhood or, when appropriate, to connect the amenities such as parks or open space on or adjacent to the site.

Additional information has been requested.

The Board finds the standards of this section have NOT been met.

C. Stormwater Management and Erosion Control

(1) Stormwater Management. Adequate provisions must be made for the collection and disposal of all stormwater that runs off proposed streets, parking areas, roofs, and other surfaces, through a stormwater drainage system and maintenance plan, which must not have adverse impacts on abutting or downstream properties.

(a) To the extent possible, the plan must retain stormwater on the site using the natural features of the site.

(b) Unless the discharge is directly to the ocean or major river segment, stormwater runoff systems must detain or retain water such that the rate of flow from the site after development does not exceed the predevelopment rate.

(c) The applicant must demonstrate that on - and off-site downstream channel or system capacity is sufficient to carry the flow without adverse effects, including but not limited to, flooding and erosion of shoreland areas, or that he / she will be responsible for whatever improvements are needed to provide the required increase in capacity and / or mitigation.

(d) All natural drainage ways must be preserved at their natural gradients and must not be filled or converted to a closed system unless approved as part of the site plan review.

(e) The design of the stormwater drainage system must provide for the disposal of stormwater without damage to streets, adjacent properties, downstream properties, soils, and vegetation.

(f) The design of the storm drainage systems must be fully cognizant of upstream runoff which must pass over or through the site to be developed and provide for this movement.

(g) The biological and chemical properties of the receiving waters must not be degraded by the stormwater runoff from the development site. The use of oil

and grease traps in manholes, the use of on-site vegetated waterways, and vegetated buffer strips along waterways and drainage swales, and the reduction in use of deicing salts and fertilizers may be required, especially where the development stormwater discharges into a gravel aquifer area or other water supply source, or a great pond.

The Town Engineer has reviewed the stormwater management plan and there are outstanding issues to be addressed by the Applicant.

The Planning Board finds the standards of this section have NOT been met.

2. Erosion Control

(a) All building, site, and roadway designs and layouts must harmonize with existing topography and conserve desirable natural surroundings to the fullest extent possible, such that filling, excavation and earth moving activity must be kept to a minimum. Parking lots on sloped sites must be terraced to avoid undue cut and fill, and / or the need for retaining walls. Natural vegetation must be preserved and protected wherever possible.

(b) Soil erosion and sedimentation of watercourses and water bodies must be minimized by an active program meeting the requirements of the Maine Erosion and Sediment Control Handbook for Construction: Best Management Practices, dated March 1991, and as amended from time to time.

Slope and wetland impacts were limited. Erosion control will be in conformance with the Maine Erosion and Sediment Control manual will be applied during construction. The Town Engineer has reviewed and approved the Erosion and Sedimentation Control Plan.

The Planning Board finds the standards of this section have been met.

D. Water, Sewer and Fire Protection

(1) Water Supply Provisions

The development must be provided with a system of water supply that provides each use with an adequate supply of water. If the project is to be served by a public water supply, the applicant must secure and submit a written statement from the supplier that the proposed water supply system conforms with its design and construction standards, will not result in an undue burden on the source of distribution system, and will be installed in a manner adequate to provide needed domestic and fire protection flows.

The project will continue to utilize public water. Additional information is required regarding sufficiency from the Portland Water District and Town Manager.

The Planning Board finds the standards of this section have NOT been met.

(2) Sewage Disposal Provisions

The development must be provided with a method of disposing of sewage which is in compliance with the State Plumbing Code. If provisions are proposed for on-site waste disposal, all such systems must conform to the Subsurface Wastewater Disposal Rules.

The project will continue to utilize public sewer. Additional information is required regarding sufficiency from the Portland Water District and Town Manager.

The Planning Board finds the standards of this section have NOT been met.

(3) Utilities

The development must be provided with electrical, telephone, and telecommunication service adequate to meet the anticipated use of the project. New utility lines and facilities must be screened from view to the extent feasible. If the service in the street or on adjoining lots is underground, the new service must be placed underground.

The existing electrical and telecommunication service will be connect to the building addition.

The Planning Board finds the standards of this section have been met.

4. Fire Protection

The building has been designed to meet all fire codes and will have sprinklers. Approval by the State Fire Marshall is a condition of approval.

With the proposed condition of approval, the Planning Board finds this standard has been met.

E. Water Protection

(1) Groundwater Protection. The proposed site development and use must not adversely impact either the quality or quantity of groundwater available to abutting properties or to the public water supply systems. Applicants whose projects involve on-site water supply or sewage disposal systems with a capacity of two thousand (2,000) gallons per day or greater must demonstrate that the groundwater at the property line will comply, following development, with the standards for safe drinking water as established by the State of Maine.

The project will connect to public water and sewer. The proposed use is an expansion to an environmentally-conscious K – 8 school. No obnoxious or toxic chemicals will be stored at the site. The property is not located in an Aquifer Protection Area. This use should have no adverse impact on the quality or quantity of groundwater.

The Planning Board finds the standards of this section have been met.

(2) Water Quality

All aspects of the project must be designed so that:

a. No person shall locate, store, discharge, or permit the discharge of any treated, untreated, or inadequately treated liquid, gaseous, or solid materials of such nature, quantity, obnoxious, toxicity, or temperature that may run off, seep, percolate, or wash into surface or groundwaters so as to contaminate, pollute, or harm such waters or cause nuisances, such as objectionable shore deposits, floating or submerged debris, oil or scum, color, odor, taste, or unsightliness or be harmful to human, animal, plant, or aquatic life.
b. All storage facilities for fuel, chemicals, chemical or industrial wastes, and biodegradable raw materials, must meet the standards of the Maine Department of Environmental Protection and the State Fire Marshall's Office.

No substances described above will be stored or discharged in a way that could contaminate surface or groundwater.

The Planning Board finds the standards of this section have been met.

(3) Aquifer Protection (if applicable)

If the site is located within the Town Aquifer Protection Area a positive finding by the board that the proposed plan will not adversely affect the aquifer, is required.

The parcel is not located in the Aquifer Protection Area.

The Planning Board finds the standards of this section have been met.

F. Floodplain Management

If any portion of the site is located within a special flood hazard area as identified by the Federal Emergency Management Agency, all use and development of that portion of the site must be consistent with the Town's Floodplain management provisions.
The property is not located in a flood hazard area.

The Planning Board finds the standards of this section have been met.

G. Historic and Archaeological Resources

If any portion of the site has been identified as containing historic or archaeological resources, the development must include appropriate measures for protecting these resources, including but not limited to, modification of the proposed design of the site, timing of construction, and limiting the extent of excavation.

A letter from the Maine Historic Preservation Commission is on file from the original site plan approval stating that the site is not in a historically sensitive area.

The Planning Board finds the standards of this section have been met.

H. Exterior Lighting

The proposed development must have adequate exterior lighting to provide for its safe use during nighttime hours, if such use is contemplated. All exterior lighting must be designed and shielded to avoid undue glare, adverse impact on neighboring properties and rights - of way, and the unnecessary lighting of the night sky.

Additional information is required on the proposed lighting plan.

The Planning Board finds the standards of this section have NOT been met.

I. Buffering and Landscaping

(1) Buffering of Adjacent Uses

The development must provide for the buffering of adjacent uses where there is a transition from one type of use to another use and for the screening of mechanical equipment and service and storage areas. The buffer may be provided by distance, landscaping, fencing, changes in grade, and / or a combination of these or other techniques.

(2) Landscaping:
There are no proposed changes to the landscaping plan due to the minimal change in the amount of pavement.

The applicant has submitted a landscaping plan that utilizes the natural site vegetation and grading for buffering as well as additional plantings around the existing building and entrance circle.

The Planning Board finds the standards of this section have been met.

J. Noise

The development must control noise levels such that it will not create a nuisance for neighboring properties.

The school and parking areas are located away from residential abutters. There will be plantings to provide a visual and noise buffer. The proposed addition to a private school will not generate any additional noise beyond what was approved as part of the original site plan.

The Planning Board finds the standards of this section have been met.

K. Storage of Materials

.1 Exposed nonresidential storage areas, exposed machinery, and areas used for the storage or collection of discarded automobiles, auto parts, metals or other articles of salvage or refuse must have sufficient setbacks and screening (such as a stockade fence or a dense evergreen hedge) to provide a visual

buffer sufficient to minimize their impact on abutting residential uses and users of public streets.

.2 All dumpsters or similar large collection receptacles for trash or other wastes must be located on level surfaces which are paved or graveled. Where the dumpster or receptacle is located in a yard which abuts a residential or institutional use or a public street, it must be screened by fencing or landscaping.

.3 Where a potential safety hazard to children is likely to arise, physical screening sufficient to deter small children from entering the premises must be provided and maintained in good condition.

There will be no outside storage of materials or machinery requiring screening. The existing dumpster will be relocated when the Community Hall is constructed and be installed on a concrete slab and screened with a fence.

The Planning Board finds the standards of this section have been met.

L. Capacity of the Applicant

The applicant must demonstrate that he / she has the financial and technical capacity to carry out the project in accordance with this ordinance and the approved plan.

Technical Capacity: The Applicant has retained the services of a professional engineer, architect, landscape architect, surveyor and soils scientist.

The school has received donations and other funding for the improvements covered in this amendment application, however additional information regarding a bridge loan is requested.

The Planning Board finds the standards of this section have NOT been met.

(M) Design and Performance Standards

(1) Route 100 Design Standards (if applicable)
All development in the Village Center Commercial, Village Office Commercial I and II, and the MUZ Districts shall be consistent with the Town of Cumberland Route 100 Design Standards; in making determination of consistency, the Planning Board may utilize peer review analysis provided by qualified design professionals.

N/A

(2) Route 1 Design Guidelines (if applicable)

All development in the Office Commercial North and Office Commercial South districts is encouraged to be consistent with the Route 1 Design Guidelines.

Planner's Note: This project is located in the LDR district, but does have frontage on Route 1. The applicant has provided Findings of Fact for the Route 1 Design Guidelines as follows:

1.4.1 –Vehicular Access – Route One Curb Cuts

No new entrances are proposed.

1.6.2 – Parking – Landscaping

Developers are encouraged to separate every ten parking spaces by a landscaped plot to break up long runs of parking.

The Applicant states that in an effort to limit impacts and keep the development in as small a footprint as possible, landscaping is not shown within the limits of the parking areas, however existing vegetation around parking areas will remain untouched wherever possible.

1.6.3 – Parking – Snow Storage

Provisions should be made for snow storage in the design of all parking areas and these areas should be indicated on the site plan.

Snow storage locations have been shown on the site plan.

1.7.2 – Service Area Design

Service areas should be separated from other vehicle movements, parking areas and pedestrian routes. Wood fencing is always preferred as an enclosure.

A fenced dumpster for trash and recycling will be relocated on site.

1.8.1 – Open Space – Internal Walkways

At a minimum, bituminous concrete should be used as the primary material for internal walkways, except that for entrance areas and other special features the use of brick or special paving shall be encouraged.

This has been provided for.

1.8.2 – Open Space – Landscaping

Trees within the 75' buffer between Rt. 1 and the building should be maintained if possible.

Trees within this buffer area will not be affected by this amendment.

1.11.2 – Utilities – Electric, Telephone, Cable

Wired connections to be made underground wherever possible.

Electric and telecommunications will be located underground as show on the plans.

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 and substantially completed within the specified period, the approval shall be null and void. The applicant may request an extension of the approval deadline 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 (2), six (6) month extensions to the periods 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.

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 deminimus changes as so determined by the Town Planner which do not affect approval standards, is subject to review and approval of the Planning Board prior to implementation.

VIII. PROPOSED CONDITIONS OF APPROVAL

1. That all fees be paid prior to pre-construction conference.
2. That a performance guarantee in an amount acceptable to the Town Manager be provided prior to the preconstruction conference.
3. That a preconstruction conference be held prior to the start of construction.
4. That all clearing limits are staked and inspected by the Town Engineer prior to the preconstruction conference.
5. That a permit for blasting, if needed, be obtained from the Town.
6. That a Fire Marshal's Permit be obtained prior to submission of building permit application.

WALSH
ENGINEERING ASSOCIATES, INC.

Site Plan Amendment Application

For

Friends School of Portland
11 US Route One
Cumberland, Maine

March 25, 2019

Submitted to:
Town of Cumberland
290 Tuttle Rd
Cumberland, Maine 04021

Submitted by:
Walsh Engineering Associates, Inc.
One Karen Drive, Suite 2A
Westbrook, Maine 04092

Table of Contents

WALSH
ENGINEERING ASSOCIATES, INC.

File: 459

March 25, 2019

Ms. Carla Nixon
Town of Cumberland
290 Tuttle Rd
Cumberland, ME 04021

RE: Site Plan Application Amendment, Friends School of Portland, 11 US Route One

Dear Carla,

Attached is an application for a Site Plan Amendment to the Friends School of Portland on US Route One. The application s for a 3,950 square foot single story classroom addition, expansion of on-site parking and other minor changes to the approved site plan. The applicant is also requesting reapproval of the 3,500 square foot Community Hall and 28,000 square foot Play Area 3 east of the existing building, that was approved by the Cumberland Planning Board on December 17, 2013.

Please submit this application for review to the Cumberland Planning Board. As requested, we have included

Let us know if you have any questions.

Respectfully,

Norman G. Chamberlain II, PE
Walsh Engineering Associates, Inc.

cc. Jenny Rowe, Friends School of Portland. w/ enc.
File

Enc.

WALSH
ENGINEERING ASSOCIATES, INC.

PROJECT DESCRIPTION
Site Plan Application Amendment
Friends School of Portland, 11 US Route One

The Friends School of Portland intends to construct a new 4,295 square foot single story classroom addition and expand on site parking by 50 vehicles at its existing campus on US Route One. The proposed plan will add 25 students and 5 new faculty to the school, for a total of 150 students and 30 faculty. The applicant is also requesting reapproval of the 3,500 square foot Community Hall and 28,000 square foot Play Area 3 east of the existing building, that was approved by the Cumberland Planning Board on December 17, 2013. Neither the community hall or play area were constructed with the original development of the school.

WEA has addressed Approval Standards and Criteria under §229-10 of the Town of Cumberland Site Plan Review Ordinance as follows:

A. Utilization of the site: The school campus has been laid out to minimizes impacts to environmentally sensitive areas, such as wetlands, steep slopes, floodplains, etc., to the extent practicable. Wetland impacts will be kept to those approved by the Maine DEP and Army Corps of Engineers. Steep slopes shown on the site plans were created as part of the original development and are used by students for playing and sledding. There are no other mapped wildlife habitats or other protected areas on the property.

B. Traffic, Circulation and Parking:
   (1) The existing entrance to Route 1 received a Traffic Movement Permit from the Maine DOT in December 2013. At that time, it was determined that a left turn lane would not be required. It is our understanding that the proposed change to the site would not require a revision of that permit. However, since the school was built, Route One has been restriped in this area to have a center left turn lane and school zone signs have been installed on both approaches to the school entrance.
   (2) Accessway location and spacing will not be changed from the originally approved location.
   (3) Internal vehicular circulation will provide safe and convenient movement in both the existing and proposed parking areas.
   (4) All parking spaces and aisles conform to the minimum dimensions required by the ordinance.
      (a) An additional 48 parking spaces have been added to the site, for a total of 84 permanent spaces. The 7 parking spaces on the southeast side of the circle are shown as alternate. If these are not constructed, there will be 80 permanent parking spaces provided. The original approval of the site included the Community Hall and was granted a waiver for 61 permanent spaces and 31 overflow spaces available in play fields for special events. The applicant is requesting a waiver from the parking requirements for approval of the

80 or 84 permanent spaces and 31 overflow spaces, which is a 31% or 38% increase, respectively, in permanent spaces, for the proposed 20% increase in school population.

(5) The building and parking areas are located to conform with the rural character of Route 1 in this area. Screening is provided by trees in the Norton Brook buffer area.

(6) Pedestrian circulation is provided by sidewalks from parking lots to the main entrance of the school.

C. Stormwater Management and Erosion Control:

(1) The site has been designed to meet the requirements of Chapter 500 for water quality treatment using a combination of buffers, underground sand filters and grassed underdrained soil filters. A Stormwater Management Report has been prepared that shows post-development peak rates of runoff from the site do not exceed pre-development conditions. The pre-development condition is considered to be that which existed prior to the original school development.

(2) Erosion control: Erosion and sediment discharge from the site will be minimized using Best Management Practices as shown on the site plans and in the erosion control notes and details.

D. Water, Sewer and Fire Protection:

(1) Water: An ability to serve letter has been requested from the Portland Water District (see attached).

(2) Sewage Disposal: An ability to serve letter has been requested from the Town of Cumberland (see attached).

(3) Utilities: Existing electric and communications utilities serving the property will be used for the classroom and community hall additions.

(4) Fire Protection: The building has been designed to meet all fire codes and will also have fire sprinklers installed.

E. Water Protection:

(1) The proposed plan will discharge sewage to the municipal treatment system and will not adversely groundwater.

(2) No obnoxious or toxic chemicals will be stored at the site.

(3) The property is not located within an aquifer protection zone.

F. Floodplain Management: The property is not located within any identified Special Flood Hazard area as mapped by FEMA.

G. Historic and Archaeological Resources: No mapped historic or archaeological resources have been identified on the property.

H. Exterior Lighting: The lighting proposed for the site will not cause spill over onto adjacent properties or unnecessary lighting of the night sky. See proposed lighting plan.

I. Buffering and Landscaping:

(1) Buffering to adjacent properties is provided by the existing woods that surround the development.
(2) Landscaping is provided on site with trees and additional plantings around the existing building and entrance circle. See Landscaping Plans L1.0 and L2.0 for proposed plantings for the classroom addition.

J. Noise: The development of the school was previously approved by the Town of Cumberland. The classroom addition will not generate additional noise.

K. Storage of Materials:
(1) There will be no outside storage of materials or machinery requiring screening.
(2) The existing dumpster will relocated when the Community Hall is constructed and be installed on a concrete slab and screened with a fence.

L. Financial Capacity: The Friends School of Portland has received donations and other funding to construct the proposed classroom addition. Documentation of a bridge loan that has been obtained from a bank will be provided to the Town as soon as it is available.

M. Design and Performance Standards: Th proposed project is located in the Low Density Residential (LDR) zoning district and is not encouraged to meet the Design and Performance Standards.

SITE PLAN REVIEW
Town of Cumberland

Appendix C
Planning Board Site Plan Review Application

Applicant's name Friends School of Portland

Applicant's address 11 US Route One, Cumberland Foreside, ME 04110

Cell phone _____ Home phone _____ Office phone 207-781-6321

Email Address jenny@friendsschoolportland.org

Project address 11 US Route One

Project name Classroom & Community Hall Addition

Describe project Construction of a 4,295 sq. ft. classroom addition and parking for 50 additional cars.

Number of employees 150 students, 30 faculty

Days and hours of operation M-F

Project review and notice fee $2,150.00

Name of representative Walsh Engineering Associates, Inc

Contact information: Cell:_____ Office: 207-553-9898

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 _____

If you are not the owner, list owner's name, address and phone number _____

Boundary Survey
Submitted? Yes X No _____

Are there any deed restrictions or easements? Yes X No_____ If yes, provide information and show easement location on site plan.

Building Information
Are there existing buildings on the site? Yes X No_____ Number: 1
Will they be removed? Yes _____ No X (Note: A demolition permit is required 10 days prior to demolition.)

Will a new structure(s) be built on the site? Yes X No _____
Describe: Addition
Number of new buildings 2
Square footage 7,795
Number of floor levels including basement 2

Parking
Number of existing parking spaces 33 including 2 handicapped spaces
Number of new parking spaces 50
Number of handicapped spaces 2
Will parking area be paved? X Yes ___No

Entrance
Location: Existing, no change
Width_____Length _____
Is it paved? X 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

Water: Public water X Well_____(Show location on site plan.)

Sewer/septic: Public sewer X 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 X No _____
Show location of existing and proposed utilities on the site plan and indicate if they are above or below ground.

Signs
Number: 0 (Existing Sign on Route 1)
Size:_____
Material: _____
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 X Wetland X Pond _____ Lake _____ Stone walls _____
Are there any other historic or natural features? No

Lighting
Will there be any exterior lights? Yes X 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 X 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 __X__ 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 _520'__ Sprinklers? Yes __X__ No _____
Do you plan to have an alarm system? Yes__X__No_____Please contact the Fire/EMS Department at 829-4573 to discuss any Town or state requirements.

Trash
Will trash be stored inside _____ outside__X__. If outside, will a dumpster be used? Yes__X__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 Application Package

Financial Capacity
Please indicate how project will be financed. If obtaining a bank loan, provide a letter from the bank __See Application Package

- Zoning district: LDR - Low Density Residential
- Minimum lot size: 2 acres
- Classification of proposed use: School
- Parcel size: 21.28 acres
- Frontage: 508.6 +/-
- Setbacks: Front 50' Side 30' Rear 65'
- Board of Appeals Required? no
- Tax Map R01 Lot 10 Deed book 30255 Deed page 79
- Floodplain map number 2301620018C Designation C
- Vernal pool identified? n/a
- Is parcel in a subdivision? No
- Outside agency permits required:
  MDEP Tier 1 X MDEP Tier 2 _____ Army Corps of Engineers _____
  MDEP general construction (stormwater) permit (for disturbance of 1 acre or more) X
- MDOT entrance permit n/a
- MDOT traffic movement permit n/a
- Traffic study required n/a
- Hydrogeologic evaluation n/a
- Market study n/a
- Route 1 Design Guidelines? Yes
- Route 100, VMU or TCD Design Standards? n/a

Applicant's signature  For Applicant

Submission date: 3/25/19

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	Attachment 2	
Names and addresses of all consultants	Attachment 6	
Narrative describing existing conditions and the proposed project	Attachment 1	
Evidence of right, title or interest (deed, option, etc.)	Attachment 5	
Names and Addresses of all property owners within 200 feet	Attachment 8	
Boundaries of all contiguous property under control of owner	Boundary Survey Plan	
Tax map and lot numbers	Boundary Survey Plan	
Area of the parcel	21.28 Acres	
FEMA Floodplain designation & map #	Attachment 9	
Zoning classification	Sheet C1.0	
Evidence of technical and financial capability to carry out the project	Attachment 7	
Boundary survey	Boundary Survey Plan	
List of waiver requests on separate sheet with reason for request.	Attachment 3	
Proposed solid waste disposal plan	Attachment 1	
Existing Conditions Plan showing:		
Name, registration number and seal of person who prepared plan	Sheet C1.0	
North arrow, date, scale, legend	Sheet C1.0	
Area of the parcel	Boundary Survey Plan	
Setbacks and building envelope	Sheet C1.0	
Utilities, including sewer & water, culverts & drains, on-site sewage	Sheet C1.0	
Location of any septic systems	n/a	
Location, names, widths of existing public or private streets ROW's	Sheet C1.0	

Location, dimension of ground floor elevation of all existing buildings	Sheet C1.0	
Location, dimension of existing driveways, parking, loading, walkways	Sheet C1.0	
Location of intersecting roads & driveways within 200 feet of the site	Sheet C1.0	
Wetland areas	Sheet C1.0	
Natural and historic features such as water bodies, stands of trees, streams, graveyards, stonewalls, floodplains	Sheet C1.0	
Direction of existing surface water drainage across the site & off site	Sheet C1.0	
Location, front view, dimensions and lighting of existing signs	Attachment 11	
Location and dimensions of existing easements & copies of documents	Attachment 5 & Sheet C2.0	
Location of nearest fire hydrant or water supply for fire protection	Bldg is sprinkled, nearest hydrant is 520 ' on Skyview Drive	
Proposed Development Site Plan showing:		
Name of development	All Sheets	
Date	All Sheets	
North arrow	All Sheets	
Scale	All Sheets	
Legend	All Sheets	
Landscape plan	Sheets C1.0 & C2.0	
Stormwater management	See Separate Report	
Wetland delineation	Sheet C1.0	
Current & proposed stands of trees	Sheets C1.0, C2.0 & C2.1	
Erosion control plan	Sheets C2.1 & C3.0	
Landscape plan	Sheet L1.0 & L2.0	
Lighting/photometric plan	See Lighting Plan	
Location and dimensions of all proposed buildings	Sheet C2.1	
Location and size of utilities, including sewer, water, culverts and drains	Sheet C2.1	
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	n/a	

Location and dimensions of all accessways and loading and unloading facilities	Sheet C2.1	
Location and dimension of all existing and proposed pedestrian ways	Sheet C2.1	
Location, dimension and # of spaces of proposed parking areas, including handicapped spaces	Sheet C2.1	
Total floor area and ground coverage of each proposed building and structure	Sheet C2.1	
Proposed sign location and sign lighting	n/a	
Proposed lighting location and details	Sheet C2.1 & C3.3	
Covenants and deed restrictions proposed	n/a	
Snow storage location	Sheet C2.1	
Solid waste storage location and fencing/buffering	Sheet C3.3	
Location of all fire protection	Sprinklers	
Location of all temporary & permanent monuments	n/a	
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	n/a	
Hydro geologic evaluation	n/a	
Traffic Study	n/a	
Market Study	n/a	
Location of proposed recreation areas (parks, playgrounds, other public areas)	C2.0	
Location and type of outdoor furniture and features such as benches, fountains.	n/a	

To Whom It May Concern,

By this letter, the undersigned authorizes Walsh Engineering Associates, Inc. to act as the agent for the undersigned in the preparation and submission of all Federal, State, and Local City permit applications and relevant documents and correspondence for all necessary permits for the construction on the property at 11 US Route One, Cumberland Foreside, Maine to attend meetings and site visits; to appear before all boards, commissions, and committees, and to provide such other services as are necessary and appropriate in furtherance of the aforementioned project.

Sincerely,

Jenny Rowe

Jenny Rowe, Head of School

1/22/19

Date

Site Plan Review Ordinance Chapter 315, Section 57, Parking and Loading

(a) The applicant is requesting a waiver from the parking requirements. An additional 48 parking spaces have been added to the site, for a total of 84 permanent spaces. The 7 parking spaces on the southeast side of the circle are shown as alternate. If these are not constructed, there will be 80 permanent parking spaces provided. The original approval of the site included the Community Hall and was granted a waiver for 61 permanent spaces and 31 overflow spaces available in play fields for special events. The applicant is requesting a waiver from the parking requirements for approval of the 80 or 84 permanent spaces and 31 overflow spaces, which is a 31% or 38% increase, respectively, in permanent spaces, for the proposed 20% increase in school population.

WALSH
ENGINEERING ASSOCIATES, INC.
One Karen Dr., Suite 2A | Westbrook, Maine 04092
ph: 207.553.9898 | www.walsh-eng.com

COMMUNITY HALL & CLASSROOM ADDITION

FRIENDS SCHOOL OF PORTLAND
CUMBERLAND, ME 04021

Sheet Title:
LOCATION PLAN

Job No.:	459
Date:	1/30/2019
Scale:	1"=2,000'
Drawn:	RJS
Checked:	SC

WARRANTY DEED

NOW ALL PERSONS BY THESE PRESENTS, that **ANDREW C. SOULE and MARTHA C. SOULE, as Trustees of the CRAMAR REALTY TRUST**, under an Declaration of Trust dated July 11, 2002, recorded in the Cumberland County Registry of Deeds in Book 17947, Page 291, of Yarmouth, Maine, do hereby **GRANT** to **FRIENDS SCHOOL OF PORTLAND**, a Maine nonprofit corporation, whose mailing address is One Mackworth Island, Falmouth, ME 04105, with WARRANTY COVENANTS, the following described real estate in Cumberland, Maine:

MAINE REAL ESTATE TAX PAID

All that certain lot or parcel of land situated in the Town of Cumberland, County of Cumberland and State of Maine, being situated on the easterly side of U.S. Route One and westerly of, but not adjacent to Route 88, and being more particularly bounded and described on **Exhibit A**, attached hereto and incorporated herein by reference.

Reference is made to a Resignation of Trustee and Appointment of Successor Co-Trustees dated October 10, 2011, to be recorded herewith.

IN WITNESS WHEREOF, we, the said **ANDREW C. SOULE and MARTHA C. SOULE, as Trustees of the CRAMAR REALTY TRUST** have hereunto set our hands and seals on December 27, 2012.

WITNESS

to both

Andrew C. Soule, Trustee

Andrew C. Soule, as Trustee of the CRAMAR REALTY TRUST (and not individually)

Martha C Soule Trustee

Martha C. Soule, as Trustee of the CRAMAR REALTY TRUST (and not individually)

STATE OF MAINE
COUNTY OF CUMBERLAND, ss. December 27, 2012

Then personally appeared the above-named **ANDREW C. SOULE and MARTHA C. SOULE**, in their said capacities, and acknowledged the foregoing instrument to be their free act and deed.

Before me,

Notary Public/Attorney-at-Law
Print name: LESLIE E LOOMY, III

EXHIBIT A
DEED FROM CRAMAR REALTY TRUST TO FRIENDS SCHOOL OF PORTLAND

A certain lot or parcel of land situated on the southeasterly side of U.S. Route One in the Town of Cumberland, County of Cumberland, State of Maine; said parcel being bounded and described as follows:

Beginning at a granite monument found on the southeasterly sideline of U.S. Route One on the town line between Cumberland and Falmouth, and the northerly corner of land now or formerly of Amanda Proctor as described in a deed recorded in the Cumberland County Registry of Deeds in Book 11775, Page 119. Thence:

1) N 30°39'15" E by said U.S. Route One a distance of Two Hundred Ninety-Eight and 98/100 (298.98) feet to a granite monument found;

2) N 25°02'52" E by said U.S. Route One a distance of One Hundred and 50/100 (100.50) feet to a capped iron rod found;

3) N 30°45'30" E by said U.S. Route One a distance of One Hundred Nine and 09/100 (109.09) feet to a point and the westerly corner of land now or formerly of BDC, LLC as described in a deed recorded in said Registry in Book 20757, Pages 124 and 128;

4) S 67°14'13" E by said land of BDC, LLC a distance of Five Hundred Forty-Seven and 82/100 (547.82) feet to a capped iron pin found;

5) N 35°18'28" E by said land of BDC, LLC a distance of Forty and 58/100 (40.58) feet to a granite monument found and the westerly corner of land now or formerly of Martha C. Soule as described in a deed recorded in said Registry in Book 17849, Page 333;

6) S 67°05'13" E by said land of Soule a distance of Four Hundred Seventy-Six and 21/100 (476.21) feet to a granite monument found and the westerly corner of land now or formerly of R&N Enterprises, LLC as described in a deed recorded in said Registry in Book 23839, Page 116 and the northerly corner of land now or formerly of Kerry E. Oberg and Gwenne L. Oberg as described in a deed recorded in said Registry in Book 20921, Page 278;

7) S 19°48'04" W by said land of Oberg and by land now or formerly of Donald W. Hunt and Sylvia B. Hunt as described in a deed recorded in said Registry in Book 21671, Page 91 a distance of Three Hundred Eleven and 15/100 (311.15) feet to a stone found and the northerly corner of land now or formerly of Stephen Goodrich as described in a deed recorded in said Registry in Book 22072, Page 331;

8) S 18°30'53" W by said land of Goodrich a distance of Four Hundred Seventy-Eight and 69/100 (478.69) feet to a point on said Cumberland and Falmouth town line;

9) N 55°08'53" W by said town line and by land now or formerly of Donald B. Hincks as described in a deed recorded in said Registry in Book 15123, Page 89 and by land of said Proctor a distance of One Thousand One Hundred Seventy and 57/100 (1170.57) feet to the point of beginning.

The above premises are conveyed without the benefit of any reserved rights and easements granted (i) by Lawrence Crane to Andrew C. Soule and Martha C. Soule by deed dated December 31, 2001, recorded in the Cumberland County Registry of Deeds in Book 17151, Page 345, (ii) by Lawrence Crane to Grantees by deed dated December 29, 1999, recorded in said Registry in Book 15255, Page 83, (iii) by Lawrence Crane to Grantees by deed dated January 7, 2000, recorded in said Registry in 15272, Page 171, as corrected and re-recorded in Book 15328, Page 209. For reference, see a Release of Easements from the Trustees of Cramar Realty Trust to Martha C. Soule of even date herewith, and to be recorded prior to the within deed.

The within premises are conveyed subject to those grading and drainage rights taken by the State of Maine, Department of Transportation as set forth in a Notice of Layout and Taking dated June 27, 1990, recorded in said Registry of Deeds in Book 9237, Page 247.

The above described parcel contains 700,513 square feet, or 16.08 acres, and being a portion of land now or formerly of Andrew C. Soule and Martha C. Soule, Trustees of the Cramar Realty Trust as described in deeds recorded in the Cumberland County Registry of Deeds in Book 18526, Page 82 and Book 20757, Page 126.

Bearings are referenced to Grid North, Maine State Plane Coordinate System, West Zone.

Reference is herein made to a Plan of Boundary Survey and Existing Conditions made for Friends School of Portland by Titcomb Associates, Inc. dated November 14, 2012 and revised December 20, 2012.

Received
Recorded Register of Deeds
Dec 28,2012 11:14:29A
Cumberland County
Pamela E. Lovley

WARRANTY DEED

NOW ALL PERSONS BY THESE PRESENTS, that **MARTHA C. SOULE**, of Yarmouth, Maine, does hereby **GRANT** to **FRIENDS SCHOOL OF PORTLAND**, a Maine nonprofit corporation, whose mailing address is One Mackworth Island, Falmouth, ME 04105, with WARRANTY COVENANTS, the following described real estate in Cumberland, Maine:

MAINE REAL ESTATE TAX PAID

All that certain lot or parcel of land situated in the Town of Cumberland, County of Cumberland and State of Maine, being situated on the easterly side of U.S. Route One and westerly of, but not adjacent to Route 88, and being more particularly bounded and described on **Exhibit A**, attached hereto and incorporated herein by reference.

EXCEPTING and RESERVING from the within conveyed premises any and all appurtenant rights or easements to use any rights of way, easements or appurtenant rights to access the within conveyed lands over and across the grantor's remaining land and over and across Island Pond Road, so-called, and any private right of way or easement extending from said Road, including without limitation the 50' wide easement shown on the "Plan for a Private Way – Cutter Way" prepared by P. Reed recorded in said Registry in Plan Book 204, Page 108, to Route 88, all of which appurtenant rights and easements are expressly reserved by the grantor herein for the sole benefit of grantor's remaining land.

Reference is made to a Release Deed from the Trustees of Cramar Realty Trust to Martha C. Soule and Julia A. Sterling (f/k/a Littlefield) of even date herewith and to be recorded prior to this deed, which Release Deed releases certain rights and easements burdening the within conveyed premises.

The within conveyed premises are a portion of the lands conveyed to the grantor herein by deed from Lawrence Crane dated December 31, 2001, recorded in Book 17151, Page 345, and from Andrew C. Soule by deed dated July 5, 2002, recorded in Book 17849, Page 333.

IN WITNESS WHEREOF, I, the said **MARTHA C. SOULE** have hereunto set my hand and seal on December 27, 2012.

WITNESS

_____

_____

Martha C. Soule

STATE OF MAINE
COUNTY OF CUMBERLAND, ss. December 27, 2012

Then personally appeared the above-named **MARTHA C. SOULE** and acknowledged the foregoing instrument to be her free act and deed.

Before me,

Notary Public/Attorney-at-Law
Print name: LESLIE E LOOKY III

EXHIBIT A
DEED FROM MARTHA C. SOULE TO FRIENDS SCHOOL OF PORTLAND

A certain lot or parcel of land located on the easterly side of, but not adjacent to, U.S. Route One in the Town of Cumberland, County of Cumberland, State of Maine, bounded and described as follows:

Beginning at an iron pin found at the northwesterly corner of land now or formerly of Munjoy Hill EPM, LLC as described in a deed recorded in the Cumberland County Registry of Deeds in Book 29576, Page 123. Thence:

(1) S 20°17'03" W by said land of Munjoy Hill EPM, LLC, and by land now or formerly of R&N Enterprises, LLC as described in a deed recorded in said Registry in Book 23839, Page 116, a distance of Six Hundred Twenty-Three and 51/100 (623.51) feet to a 8" x 8" stone with drill hole found at the southwesterly corner of said land of R&N Enterprises, LLC, and the northwesterly corner of land now or formerly of Kerry E. Oberg and Gwenne L. Oberg as described in a deed recorded in said Registry in Book 20921, Page 278, and the northeasterly corner of land now or formerly of Andrew C. Soule and Martha C. Soule, Trustees of the Cramar Realty Trust, as described in a deed recorded in said Registry in Book 18526, Page 82;
(2) N 67°05'13" W by said land of Cramar Realty Trust a distance of Four Hundred Seventy-Six and 21/100 (476.21) feet to a 8" x 8" stone with drill hole found on the easterly sideline of land now or formerly of BDC, LLC as described in deeds recorded in said Registry in Book 20757, Pages 124 & 128;
(3) N 35°19'28" E by said land of BDC, LLC a distance of Five Hundred Fifteen and 44/100 (515.44) feet to an iron pin found and the southwesterly corner of land retained by the Grantor herein;
(4) S 86°36'58" E by said land to be retained by the Grantor herein a distance of Three Hundred Fifty-Seven and 38/100 (357.38) feet to the point of beginning.

The above described parcel contains 226,464 square feet, or 5.20 acres, and being a portion of a parcel of land now or formerly of Martha C. Soule as described in a deed recorded in the Cumberland County Registry of Deeds in Book 17849, Page 333. Bearings are referenced to Grid North, Maine State Plane Coordinate System, NAD 83, West Zone.

Reference is herein made to a Plan of Boundary Survey & Existing Conditions made for Friends School of Portland by Titcomb Associates dated November 14, 2012 and revised December 20, 2012.

Received
Recorded Register of Deeds
Dec 28,2012 11:15:29A
Cumberland County
Pamela E. Lovley

DECLARATION OF RESTRICTIONS
(Forested Buffer, No Disturbance)

THIS DECLARATION OF RESTRICTIONS is made this 9th day of May, 2014, by Friends School of Portland, 1 Mackworth Island, Falmouth, Cumberland County, Maine 04105, "Declarant", pursuant to a permit received from the Maine Department of Environmental Protection under the Stormwater Management Law and the Natural Resources Protection Act (see DEP #L-26058-NJ-A-N/L-26058-TC-B-N), to preserve three separate buffer areas on a parcel of land identified as Friends School of Portland, located in the Town of Cumberland on U.S Route One, "the Property" and designated as "Forest Buffer H," "Forest Buffer I," and "Forest Buffer J" on a plan entitled "Plan of Boundary Survey and Existing Conditions – Made For Friends School of Portland" prepared by Titcomb Associates, last dated April 1, 2014, the "Approved Plan," attached hereto and incorporated herein as Exhibit A, and on a plan entitled "Permitted Full Buildout Site Plan, Friends School of Portland" prepared by Blais Civil Engineers, dated January 10, 2014, attached hereto and incorporated herein as Exhibit B.

WHEREAS, the Declarant holds title to certain real property situated in Cumberland (town), Maine described in a deed from Andrew C. Soule and Martha C. Soule, as Trustees of the Cramar Realty Trust (name), to Friends School of Portland (name of Declarant) dated December 27, 2012, and recorded in Book 17947 Page 291 at the Cumberland County Registry of Deeds, herein referred to as the "property"; and

WHEREAS, Declarant desires to place certain restrictions, under the terms and conditions herein, over a portion of said real property (hereinafter referred to as the "Forest Buffer H," "Forest Buffer I," and "Forest Buffer J," and collectively referred to as the "Forest Buffer Area"), as depicted and described as on the Approved Plan.

WHEREAS, pursuant to the Stormwater Management Law, 38 M.R.S.A. Section 420-D and Chapter 500 of rules promulgated by the Maine Board of Environmental Protection ("Stormwater Management Rules"), Declarant has agreed to impose certain restrictions on the Restricted Buffer Area as more particularly set forth herein and has agreed that these restrictions may be enforced by the Maine Department of Environmental Protection or any successor (hereinafter the "MDEP"),

NOW, THEREFORE, the Declarant hereby declares that the Restricted Buffer Area is and shall forever be held, transferred, sold, conveyed, occupied and maintained subject to the conditions and restrictions set forth herein. The Restrictions shall run with the Restricted Buffer Area and shall be binding on all parties having any right, title or interest in and to the Restricted Buffer Area, or any portion thereof, and their heirs, personal representatives, successors, and assigns. Any present or future owner or occupant of the Restricted Buffer Area or any portion thereof, by the acceptance of a deed of conveyance of all or part of the Covenant Area or an instrument conveying any interest therein, whether or not the deed or instrument shall so express, shall be deemed to have accepted the Restricted Buffer Area subject to the Restrictions and shall agree to be bound by, to comply with and to be subject to each and every one of the Restrictions hereinafter set forth.

1. Restrictions on Restricted Buffer Area. Unless the owner of the Restricted Buffer Area, or any successors or assigns, obtains the prior written approval of the MDEP, the Restricted Buffer Area must remain undeveloped in perpetuity. To maintain the ability of the Restricted Buffer Area to filter and absorb stormwater, and to maintain compliance with the Stormwater Management Law and the

permit issued thereunder to the Declarant, the use of the Restricted Buffer Area is hereinafter limited as follows.

a. No soil, loam, peat, sand, gravel, concrete, rock or other mineral substance, refuse, trash, vehicle bodies or parts, rubbish, debris, junk waste, pollutants or other fill material will be placed, stored or dumped on the Restricted Buffer Area, nor shall the topography of the area be altered or manipulated in any way;

b. No trees may be cut or sprayed with biocides except for the normal maintenance of dead, windblown or damaged trees and for pruning of tree branches below a height of 12 feet provided two thirds of the tree's canopy is maintained;

c. No undergrowth, ground cover vegetation, leaf litter, organic duff layer or mineral soil may be disturbed except that one winding path, that is no wider than six feet and that does not provide a downhill channel for runoff, is allowed through the area;

d. No building or other temporary or permanent structure may be constructed, placed or permitted to remain on the Restricted Buffer Area, except for a sign, utility pole or fence;

e. No trucks, cars, dirt bikes, ATVs, bulldozers, backhoes, or other motorized vehicles or mechanical equipment may be permitted on the Restricted Buffer Area;

f. Any level lip spreader directing flow to the Restricted Buffer Area must be regularly inspected and adequately maintained to preserve the function of the level spreader.

Any activity on or use of the Restricted Buffer Area inconsistent with the purpose of these Restrictions is prohibited. Any future alterations or changes in use of the Restricted Buffer Area must receive prior approval in writing from the MDEP. The MDEP may approve such alterations and changes in use if such alterations and uses do not impede the stormwater control and treatment capability of the Restricted Buffer Area or if adequate and appropriate alternative means of stormwater control and treatment are provided.

2. Enforcement. The MDEP may enforce any of the Restrictions set forth in Section 1 above.

3. Binding Effect. The restrictions set forth herein shall be binding on any present or future owner of the Restricted Buffer Area. If the Restricted Buffer Area is at any time owned by more than one owner, each owner shall be bound by the foregoing restrictions to the extent that any of the Restricted Buffer Area is included within such owner's property.

4. Amendment. Any provision contained in this Declaration may be amended or revoked only by the recording of a written instrument or instruments specifying the amendment or the revocation signed by the owner or owners of the Restricted Buffer Area and by the MDEP.

5. Effective Provisions of Declaration. Each provision of this Declaration, and any agreement, promise, covenant and undertaking to comply with each provision of this Declaration, shall be deemed a land use restriction running with the land as a burden and upon the title to the Restricted Buffer Area.

6. Severability. Invalidity or unenforceability of any provision of this Declaration in whole or in part shall not affect the validity or enforceability of any other provision or any valid and enforceable part of a provision of this Declaration.

7. Governing Law. This Declaration shall be governed by and interpreted in accordance with the laws of the State of Maine.

Naomi C. Beal, President

STATE OF MAINE, Cumberland County, dated 9 MAY, 2014.

Personally appeared before me the above named Naomi C. Beal, President of Friends School of Portland, who swore to the truth of the foregoing to the best of her knowledge, information and belief and acknowledged the foregoing instrument to be her free act and deed and the free act and deed of said corporation.

Notary Public

PERRY H CLARK
ATTORNEY - AT LAW
MAINE BAR NO. 1730

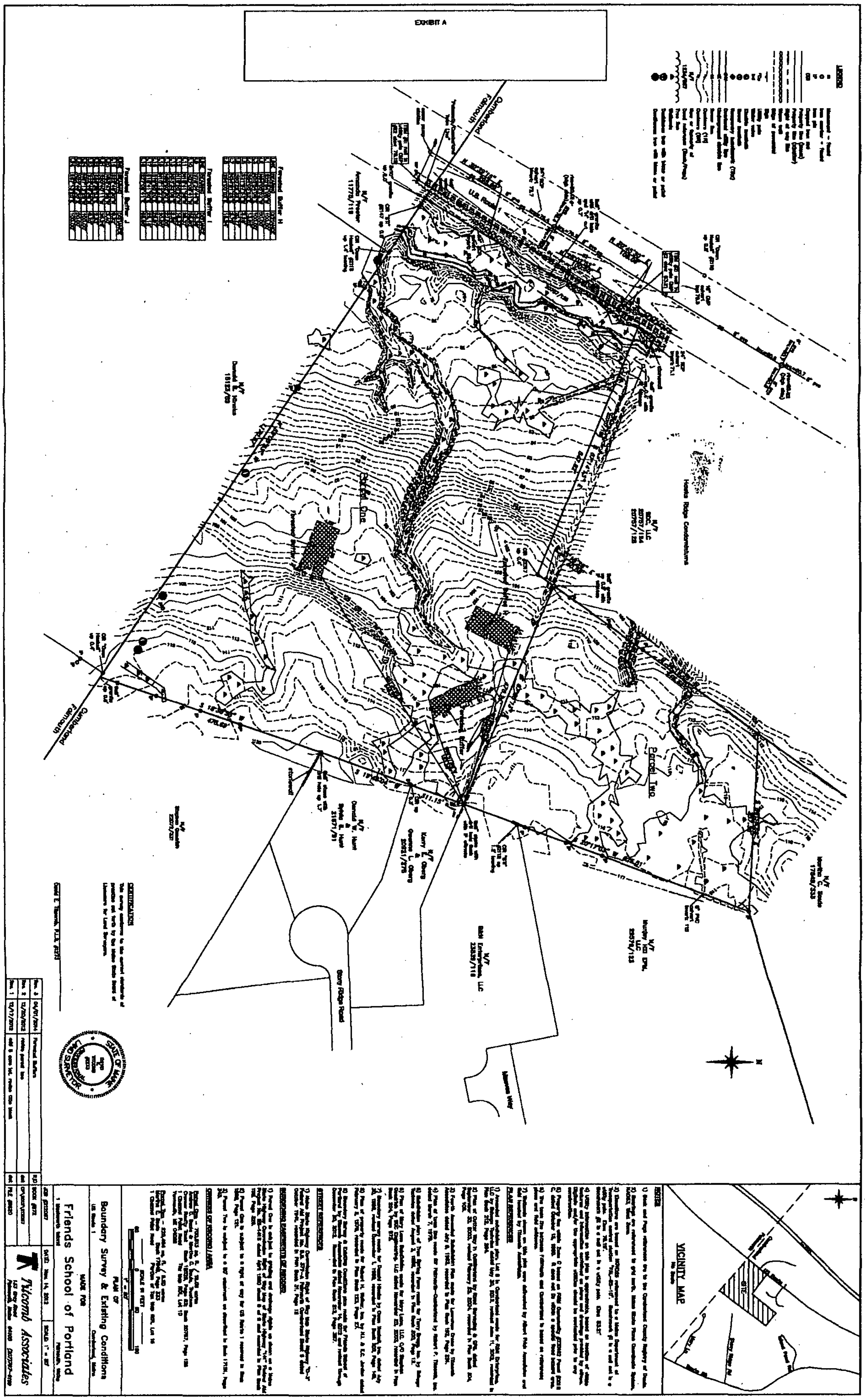
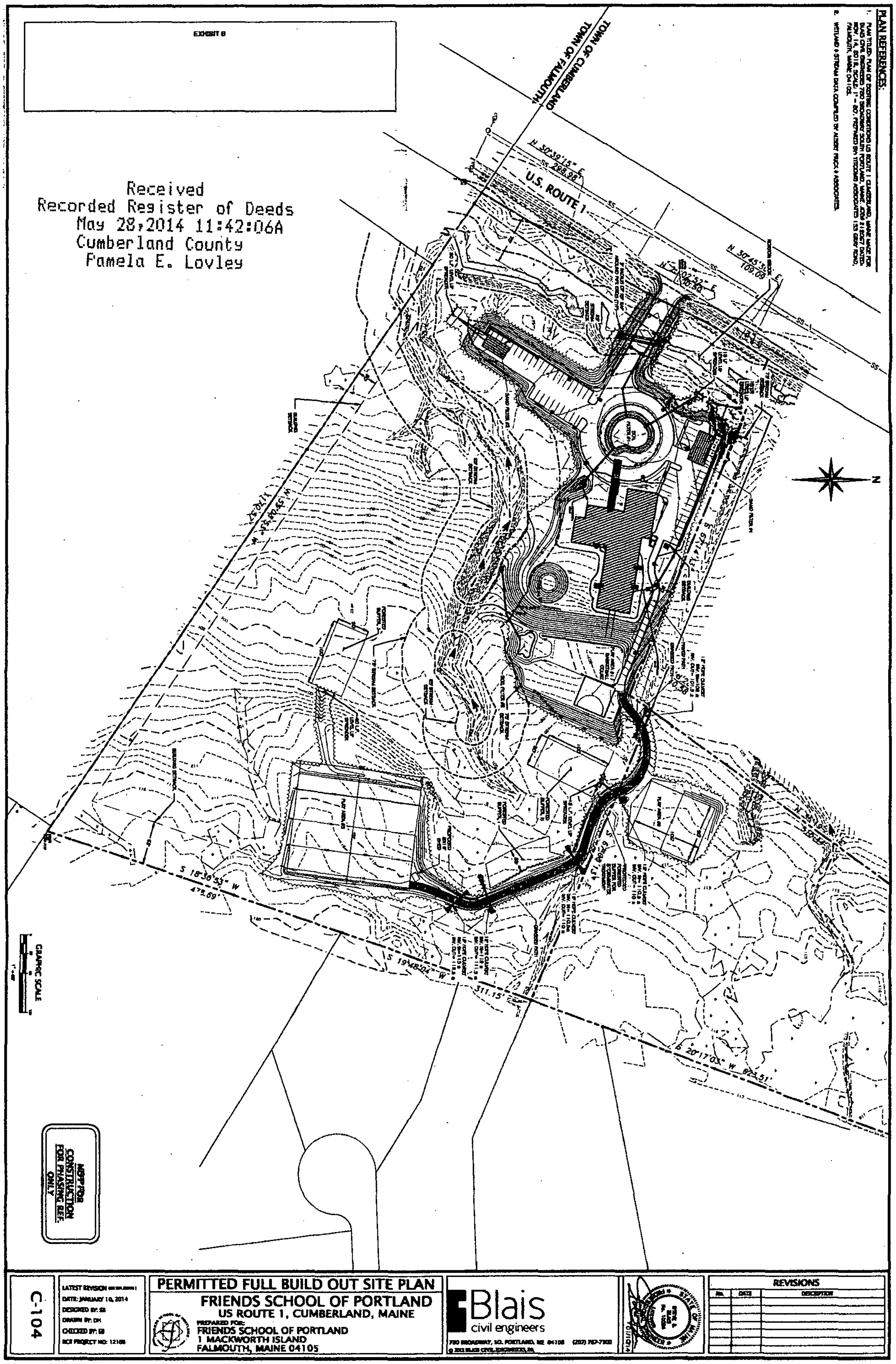


EXHIBIT A
LEGEND
Cumberland
Falmouth
U.S. Route 1
Parcel One
Parcel Two
Stony Ridge Road
VICINITY MAP
Friends School of Portland
Boundary Survey & Existing Conditions
Titcomb Associates



Easement

Underground Line

WO# 301203676

Form 1199, Rev. 07/08

Friends School of Portland, a Maine Non Profit with a mailing address of 1 Mackworth Island, Falmouth, ME, 04105 (Grantor(s)), for consideration given, grants to CENTRAL MAINE POWER COMPANY, a Maine Corporation with an office at 83 Edison Drive, Augusta, Maine 04336, and no telephone company, and their respective successors and assigns (collectively Grantees), with warranty covenants, the right and easement to erect, bury, maintain, rebuild, respace, patrol, operate, and remove and do all other actions involving electric and communication distribution equipment and facilities, consisting of wires and cables, together with all necessary fixtures and appurtenances under a portion of the surface of the land of the Grantor(s) in the City/Town of Cumberland, Cumberland County, Maine. The said equipment and facilities are attached to a line commencing at Pole/Pad 1H, Yarmouth Cut-Off, Cumberland and extending to include Pole(s)/Pad(s) manholes 1-3 Padmount 4, Friends School Line AKA: U.S. Route One. This easement affects land conveyed to the Grantor(s) in a deed from Martha C. Soule, dated December 28, 2012, and recorded in the Cumberland County Registry of Deeds in Book 30255 Page 84. This easement is an easement in gross and is not for the sole purpose of serving the Grantor(s) or Grantor's land. The rights granted herein include the right to keep the surface of ground above its underground cables and other electrical equipment free from structures, improvements and growth which, in the judgment of the Grantees, may interfere with the proper operation or maintenance of said underground cables; and the right to enter upon the land of the Grantor(s) for any and all of the foregoing purposes.

WITNESS the hand(s) and seal(s) of Grantor(s) duly authorized representatives on Sept. 5, 2014

Signed, Sealed and Delivered in the presence of:

Friends School of Portland

Jennifer M. Rowe

Jennifer Rowe, Head of School

State Of Maine

County Of Cumberland

The above-named Jennifer Rowe, personally appeared before me this 5 day of September, 2014 and acknowledged the foregoing instrument to be their free act and deed in their said capacity and the free act and deed of said Friends School of Portland.

Notary Public/Attorney

Printed Name: peter W. Nowak

My Commission Expires: 7/31/2019

Received
Recorded Register of Deeds
Oct 14,2014 09:27:34A
Cumberland County
Pamela E. Lovley

The following companies have been retained by the client.

Civil Engineering:
Walsh Engineering Associates, Inc.
One Karen Drive, Suite 2A
Westbrook, ME 04092

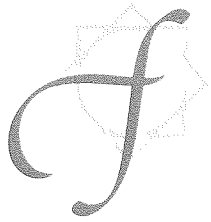
Architecture:
Kaplan Thompson Architects
102 Exchange Street
Portland, ME 04101

Structural Engineering:
Casco Bay Engineering
424 Fore Street
Portland, ME 04102

Landscape Architecture:
Soren Deniord Design Studio
43 Wellwood Road
Portland, ME 04103

Electrical Engineering:
Swiftcurrent Engineering Services
10 Forest Falls Drive
Yarmouth, ME 04096

Mechanical & Plumbing Engineering:
Integrated Energy Systems, PLLC
301 Middle Road
Falmouth, ME 04105



FRIENDS SCHOOL
OF PORTLAND

inquiry • reflection • action

To Whom It May Concern:

Friends School of Portland intends to raise the entire amount of the new project through pledges from a capital campaign. The pledges to the school can go out as far as 5 years, therefore we have spoken with TD Bank about a bridge loan to cover the cash needs during construction. The amount of the bridge loan is not determinable at the moment due to the unknown amount of cash that we will have on hand through pledges so far. We are continuously getting new pledges as well as collecting cash on those pledges. We have spoken to the bank many times over the past few months of our plan and they have responded with positive feedback regarding a bridge loan.

The amount of the project is $2,309,930; we have 51% of funds pledged to date.

TD Bank
America's Most Convenient Bank®

7 STATEMENT OF ACCOUNT

FRIENDS SCHOOL OF PORTLAND
11 US ROUTE 1
CUMBERLAND FORESIDE ME 04110-

Page: 1 of 2
Statement Period: Feb 01 2019-Feb 28 2019
Cust Ref #: 2427606255-716-7-###
Primary Account #: [redacted]

TD Small Business Money Market Plus

FRIENDS SCHOOL OF PORTLAND

ACCOUNT SUMMARY

Beginning Balance	894,733.53	Average Collected Balance	896,558.96
Electronic Deposits	34,924.56	Interest Earned This Period	1,031.61
Other Credits	1,031.61	Interest Paid Year-to-Date	2,170.03
Electronic Payments	32,142.31	Annual Percentage Yield Earned	1.51%
Ending Balance	898,547.39	Days in Period	28

DAILY ACCOUNT ACTIVITY

Electronic Deposits

POSTING DATE	DESCRIPTION	AMOUNT
02/11	eTransfer Credit, Online Xfer Transfer from CK	34,924.56 ✓
	Subtotal:	34,924.56

Other Credits

POSTING DATE	DESCRIPTION	AMOUNT
02/28	INTEREST PAID	1,031.61
	Subtotal:	1,031.61

Electronic Payments

POSTING DATE	DESCRIPTION	AMOUNT
02/11	eTransfer Debit, Online Xfer Transfer to CK	32,142.31 ✓
	Subtotal:	32,142.31

DAILY BALANCE SUMMARY

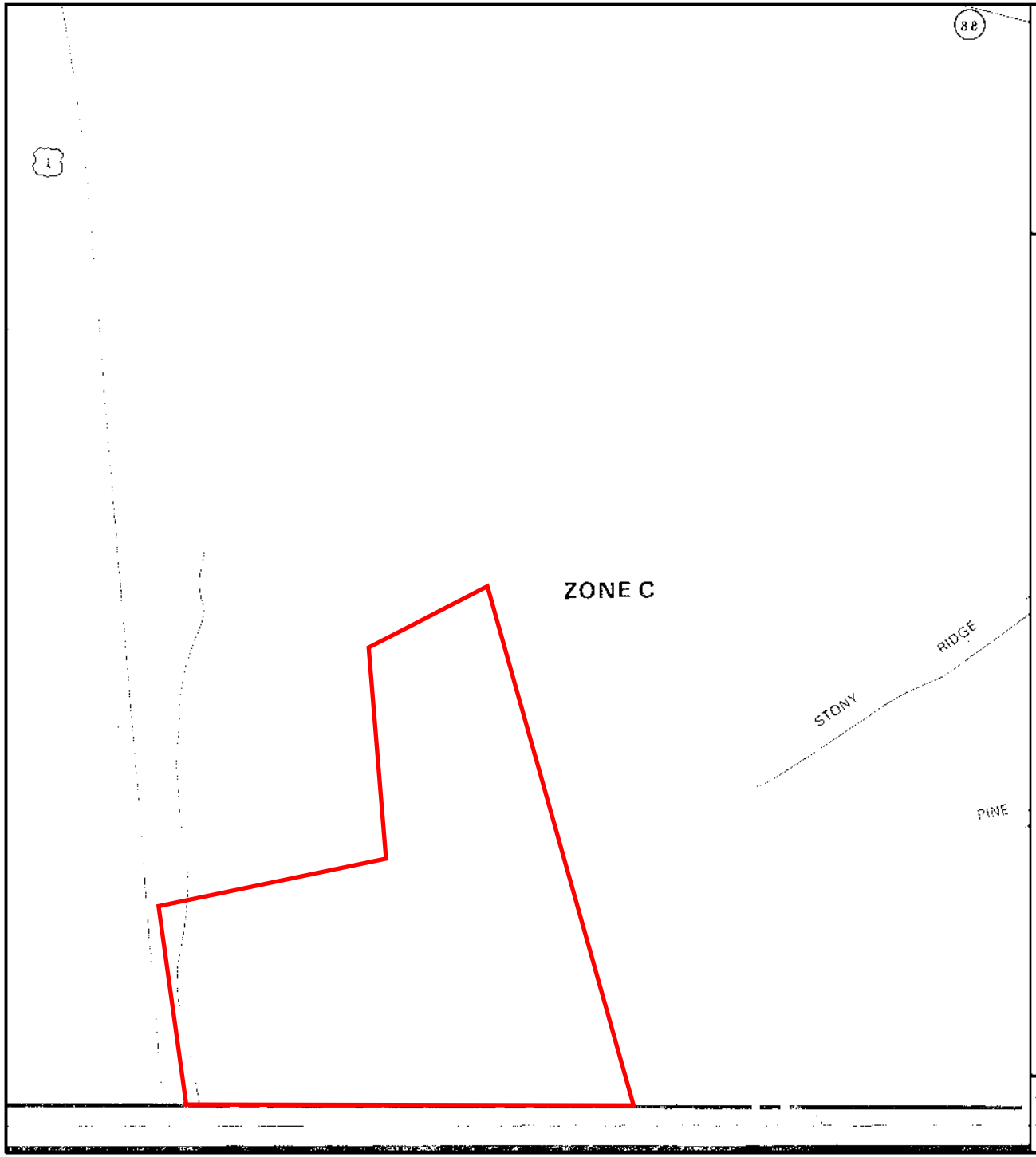
DATE	BALANCE	DATE	BALANCE
01/31	894,733.53	02/28	898,547.39
02/11	897,515.78		

As of 3/25/19 403,067.62 of this balance is dedicated to the New project which includes the parking Lot.

Cumberland Abutters List

ID	Owner Name	Co-Owner Name	Owner Address	Owner City	State	Zip
R01/11-1	CGM VENTURES LLC	C/O CHARLES TARTRE	4 MEDINAH CIRCLE	FALMOUTH	ME	04105
R01/11-2	INTEGRATIVE HEALTH CENTER OF MAINE, LLC		71 MELBOURNE ST	PORTLAND	ME	04101
R01/16/B	WILKERSON, JAMES A	CINELLI, CHRISTINA M	20 ISLAND POND RD	CUMBERLAND FSDE	ME	04110
U01/5I	MARY LANE HOMEOWNERS ASSOCIATION		875 PRINCES POINT	YARMOUTH	ME	04096
U01A/9/I	SOWLES PETER P	SOWLES ANNE M	28 STONY RIDGE ROAD	CUMB FORESIDE	ME	04110
U01A/9/J	MORAN, JOHN	BELLAVANCE, TRINA MARIE	30 STONY RIDGE ROAD	CUMBERLAND FSDE	ME	04110
U01A/9/K	OBERG KERRY E	OBERG GWENNE L	27 STONY RIDGE ROAD	CUMBERLAND FSDE	ME	04110
U02/5/E	PAINE, CYNTHIA A		60 MAEVES WAY	CUMBERLAND FSDE	ME	04110
U02/5/O	PAINE, CYNTHIA A		61 MAEVES WAY	CUMBERLAND CTR	ME	04110
U03/2/C	MUNJOY HILL EPM LLC		5 BRADLEY DRIVE	WESTBROOK	ME	04092
U04/8B/U01	GOTTO ANTONIO M JR	GOTTO ANITA S	3666 WICKERSHAM LANE	HOUSTON	TX	77027
U04/8B/U10	VOLK GAIL J		23 FALCON DRIVE	CUMBERLAND FSDE	ME	04110
U04/8B/U11	BERGER, JOHN H	BERGER, SUSAN L & BERGER, KRISTIE	27 FALCON DRIVE	CUMBERLAND FSDE	ME	04110
U04/8B/U12	GAUTHIER EMILE PAUL TRUSTEE	EMILE PAUL GUTHIER REVOCABLE TRUST	29 FALCON DR	CUMBERLAND FSDE	ME	04110
U04/8B/U13	THOMAS CAROLYN H		20 FALCON DRIVE	CUMBERLAND FSDE	ME	04110
U04/8B/U14	MCLEAN MARY ANN		22 FALCON DRIVE	CUMBERLAND FSDE	ME	04110
U04/8B/U02	GARON, LORALANE R.	CLOUDMAN, TIMOTHY K.	7 EAGLES WAY	CUMBERLAND FRDE	ME	04110
U04/8B/U03	CASSIDY JENNIFER L	CASSIDY BRUCE R	12 EAGLES WAY	CUMBERLAND FSDE	ME	04110
U04/8B/U04	WALSH JOAN E	WALSH ROBERT C	10 EAGLES WAY	CUMBERLAND FSDE	ME	04110
U04/8B/U05	GOBLE TERI L	GOBLE STEPHEN	6 EAGLES WAY	CUMBERLAND FSDE	ME	04110
U04/8B/U06	KNUPP ROBERT	KNUPP JUDITH A	4 EAGLES WAY	CUMBERLAND FSDE	ME	04110
U04/8B/U07	NASTRO TIMOTHY J	NASTRO ELLEN JANE	15 FALCON DRIVE	CUMBERLAND FSDE	ME	04110
U04/8B/U08	GRIFFIN, THOMAS	GRIFFIN, ELIZABETH	213 ROYALL POINT RD	YARMOUTH	ME	04096
U04/8B/U09	HINTZE ROBERT W - TRUSTEE	HINTZE BARBARA W - TRUSTEE	337 MARSH CREEK ROAD	VENICE	FL	34292

Falmouth Abutters List						
MBLU	**Owner Name**	**Co-Owner Name**	**Address 1**	**City**	**State**	**Zip**
U60/14	HINCKS DONALD B		50 OLD CLYDE PARK RD	LIVINGSTON	MT	59047
U61/10	KEEFER EVAN &	KEEFER DOMINIQUE B	71 HERSEY STREET	PORTLAND	ME	04103
U61/11	KINGRY DEBORAH A &	KINGRY KEVIN J	39 HEDGEROW DR	FALMOUTH	ME	04105
U61/19	PROCTOR AMANDA		29 CLINTON AVE APT 1	WINSLOW	ME	04902
U62/5/1	FORESIDE SELF STORAGE		430 US ROUTE 1	FALMOUTH	ME	04105



APPROXIMATE SCALE

400 0 400 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

TOWN OF
CUMBERLAND, MAINE
CUMBERLAND COUNTY

PANEL 18 OF 25
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
230162 0018 C

MAP REVISED:
OCTOBER 15, 1985

Federal Emergency Management Agency

Photo 1: Aerial view of campus looking west, classroom addition is off east end of building

Photo 2: Aerial view looking east, classroom addition is proposed for field

Photo 3: Aerial view looking south wet at circle and proposed expanded parking lot

Photo 4: Aerial view looking southwest at existing upper Play Area 2

(1) D.F. SIGN CABINET

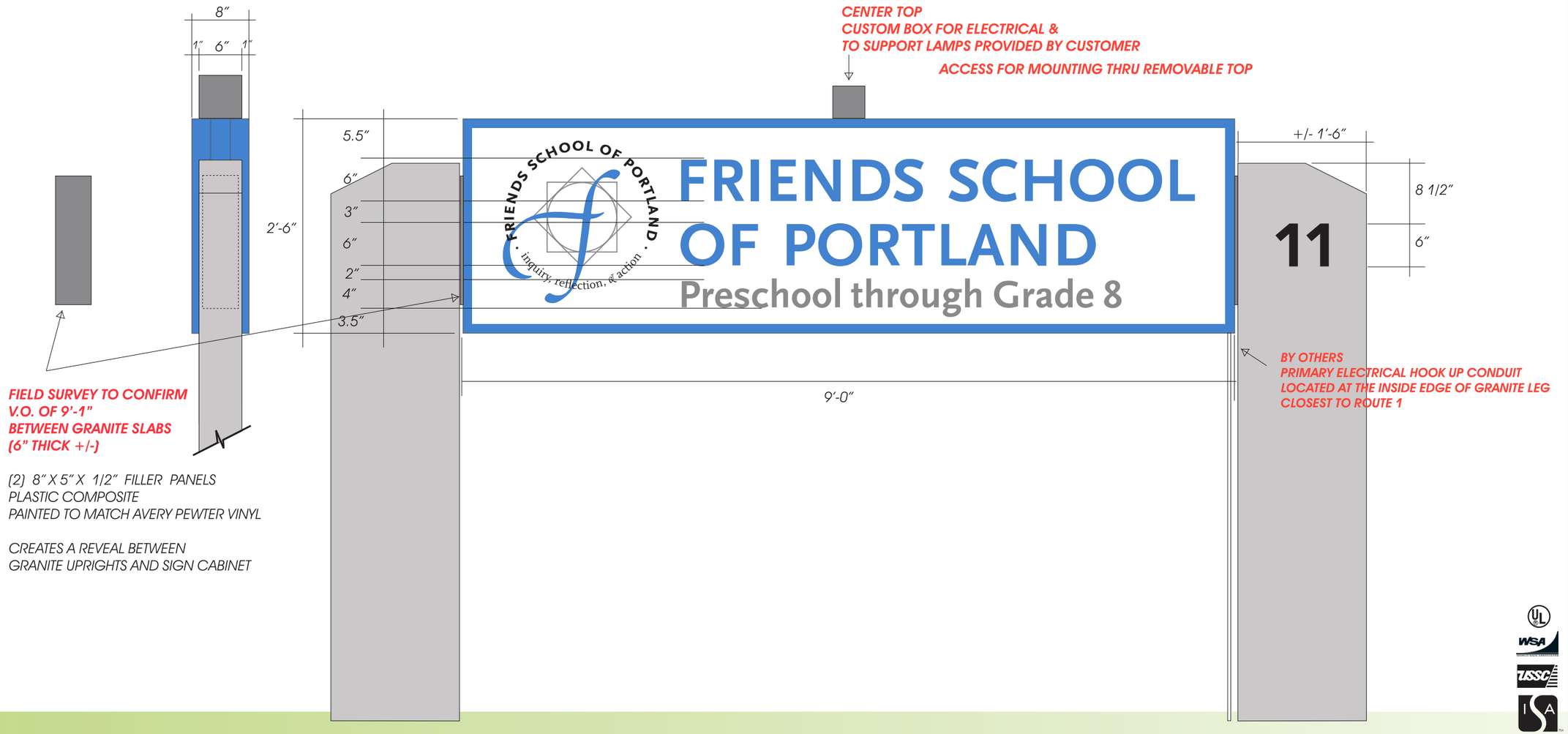
MED. DOUBLE FACE FILLER WITH EXTENDED MOLDING
FACES: __" METAL FACES
1 5/16" RETAINER AND ALL EXPOSED EDGES OF CABINET: TO MATCH OPAQUE AVERY PANTONE #285 BLUE VINYL

BACKGROUND: WHITE
COPY: OPAQUE VINYL

11 OVERALL ADDRESS NUMERAL DIMENSIONS 6" X 7.4"

(2) SETS OF CUT OUT ADDRESS NUMERALS - **LOCATED ON GRANITE UPRIGHTS CLOSEST TO RT. 1**

1/16" METAL CUT OUT LETTERS PAINTED: BLACK
MOUNTED 1/4" OFF GRANITE SLAB (BY OTHERS)



(2) 8"X 5"X 1/2" FILLER PANELS
PLASTIC COMPOSITE
PAINTED TO MATCH AVERY PEWTER VINYL

CREATES A REVEAL BETWEEN
GRANITE UPRIGHTS AND SIGN CABINET

WHITE

OPAQUE BLACK VINYL

OPAQUE VINYL
AVERY PANTONE #285

BEST MATCH TO SW 7067 CITYSCAPE

OPAQUE VINYL
AVERY PEWTER GREY

PLEASE NOTE:

THIS IS A PROGRESS PRINT - FIELD MEASUREMENTS MAY OR MAY NOT NEED TO BE VERIFIED.

THE ACCURACY OF THIS COLOR RENDERING IS LIMITED BY MEDIA AND OUTPUT DEVICES AND IS INTENDED FOR REPRESENTATIONAL USE ONLY. ACTUAL MANUFACTURING/GRAPHIC COLORS ALSO VARY DEPENDING ON PROCESSES & MATERIALS USED. 100% COLOR MATCHES OF SUBMITTED SPECIFICATIONS CAN NOT BE GUARANTEED.

IF AN ELECTRIC SIGN, THEN INSTALLATION MUST BE ACCOMPLISHED IN TOTAL COMPLIANCE WITH ARTICLE 600 OF THE NATIONAL ELECTRIC CODE,THE REQUIREMENTS OF UNDERWRITERS LABORATORY, CANADIAN STANDARDS ASSOCIATION AND/OR ANY APPLICABLE LOCAL CODES. THIS INCLUDES PROPER GROUNDING AND BONDING OF THE SIGN

ALL ELECTRICAL SIGNS REQUIRE ROUTINE MAINTENANCE.

CLIENT

ACCEPTANCE SIGNATURE DATE

BAILEY SIGN SALES REPRESENTATIVE

APPROVED DATE

Bailey sign incorporated
www.baileysign.com
9 Thomas Drive
Col. Westbrook Executive Park
Westbrook, ME 04092
207-774-2843 / 1-800-539-SIGN
Fax: 774-1193
E-Mail: sales@baileysign.com

CUSTOMER / SIGN LOCATION
WARREN CONSTRUCTION GROUP
FRIENDS SCHOOL OF PORTLAND
ROUTE I
CUMBERLAND, MAINE

SALESPERSON:	DE	DRAWN BY:	LWM
P.S. #		W.O. #	6846
SCALE	3/4" = 1'	DATE	7/21/15

REVISION # / DATE / NOTES / INITIALS

R1 7/30/15 ADD LIGHT BOX / MATERIAL THICKNESS SPECS

DRAWING #

07426 R1

SHEET _____ OF _____

PROGRESS DRAWING

Portland Water District

FROM SEBAGO LAKE TO CASCO BAY

March 20, 2019

Norman Chamberlain
Walsh Engineering Associates, Inc.
1 Karen Drive, Suite 2A
Westbrook, ME 04092

Re: 11 U.S. Route 1, CU
Ability to Serve with PWD Water

Dear Mr. Chamberlain:

The Portland Water District has received your change of use request for the noted site submitted on March 1, 2019. Please see below for existing site conditions and how to proceed with your project. **Please note that this change of use determination is based on information provided. Any changes affecting the site use or water system will require further review and approval by PWD.**

Existing Site Service

The following conditions of service apply:

- Since the water demand at this site is not anticipated to change, the existing service line at this site may be used to provide domestic water to the building. Our records show that the property is currently served with a 2-inch domestic water service with a 1-inch meter and a 6-inch fire service line. Portland Water District does not size fire services so please confirm the existing service is adequate with a licensed fire sprinkler designer.

The MEANS department can be reached by email at MEANS@pwd.org or by phone at (207)774-5961 Ext. 3199.

If the District can be of further assistance in this matter, please let us know.

Sincerely,
Portland Water District

Robert A. Bartels, P.E.
Senior Project Engineer

225 DOUGLASS STREET P.O. BOX 3553 PORTLAND, MAINE 04104-3553
PHONE: 207.774.5961 FAX: 207.761.8307 WEB: WWW.PWD.ORG

Norm Chamberlain

From: Norm Chamberlain
Sent: Wednesday, March 6, 2019 9:00 AM
To: 'wshane@cumberlandmaine.com'
Subject: Friends School Portland

Categories: 459 - Friends School

Bill,

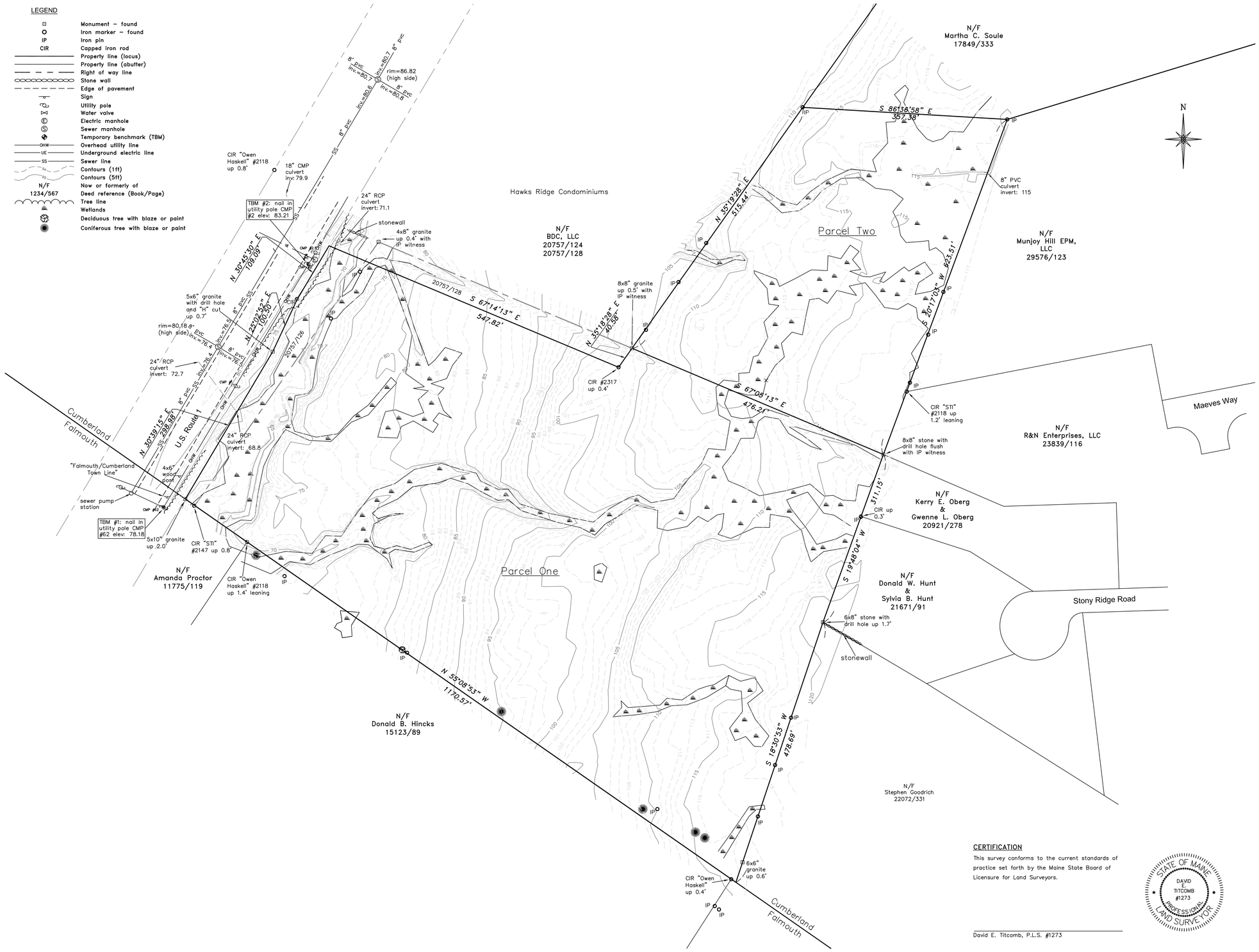
The Friends School will be submitting an application to the Planning Board for a classroom addition and parking lot expansion. The addition will accommodate 25 additional students and 5 staff. Can you send us an ability to serve letter for the addition?

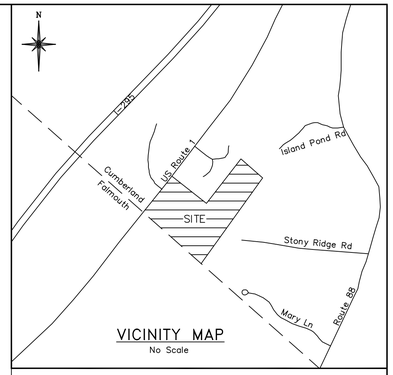
Thanks, Norm

Norman G. Chamberlain II, PE
Walsh Engineering Associates, Inc.
One Karen Drive, Suite 2A
Westbrook, ME 04092
P: 207-553-9898 x104
E: Norm@walsh-eng.com
W: www.walsh-eng.com

See attached drawings:

Plan of Boundary Survey and Existing Conditions (Nov. 14, 2012)
Plan of Existing Conditions (Sep. 4, 2018)
Sheet C1.0 – Existing Conditions & Removals Plan
Sheet C2.0 – Overall Development Plan
Sheet C2.1 – Layout & Utilities Plan
Sheet C2.2 – Grading & Drainage Plan
Sheet C2.3 – New Classrooms Blowup Plan
Sheet C3.0 – Details
Sheet C3.1 – Details
Sheet C3.2 – Details
Sheet C3.3 – Details
Sheet L1.0 – Landscaping Key Plan
Sheet L2.0 – Landscape Steps& Landings: Layout, Materials & Planting Plan
Lighting Layout Plan





VICINITY MAP
No Scale

NOTES

1) Book and Page references are to the Cumberland County Registry of Deeds.

2) Bearings are referenced to grid north, Maine State Plane Coordinate System, NAD83, West Zone.

3) Elevations are based on NGVD29 referenced to a Maine Department of Transportation control station "FAL–95–10". Benchmark #1 is a nail set in a utility pole. Elev: 78.18'.
Benchmark #2 is a nail set in a utility pole. Elev: 83.21'

4) Utility information on this plan is approximate, based on location of visible features and information contained on plans and drawings provided by others. DigSafe and/or the appropriate utilities should be contacted prior to any construction.

5) Property lies within Zone C based on FIRM Community #230162 Panel #0018 C, dated October 15, 1985. It does not lie within a special flood hazard area.

6) The town line between Falmouth and Cumberland is based on referenced plans and field evidence.

7) Wetlands shown on this plan were delineated by Albert Frick Associates and field located by Titcomb Associates.

PLAN REFERENCES

1) Amended subdivision plan, Lot 6 in Cumberland made for R&N Enterprises, LLC by Sebago Technics dated May 30, 2012, revised June 11, 2012, recorded in Plan Book 212, Page 264.

2) Plan of Cutter Way in Cumberland by Reed Surveying & GPS, dated September 30, 2003, revised February 25, 2004, recorded in Plan Book 204, Page 108.

3) Fourth Amended Subdivision Plan made for Lawrence Crane by Titcomb Associates dated July 8, 1992, recorded in Plan Book 192, Page 251.

4) Plan of town line made for Falmouth–Cumberland by Robert P. Titcomb, Inc. dated March 7, 1979.

5) Subdivision plan of True Spring Farm made for Terry Bragg, Inc. by Sebago Technics dated August 3, 1999, recorded in Plan Book 200, Page 12.

6) Plan of Mary Lane Subdivision made for Mary Lane, LLC. C/O Stephen Goodrich by SGC Engineering, LLC dated November 25, 2003, recorded in Plan Book 204, Page 572.

7) Boundary survey made for Donald Hincks by Owen Haskell, Inc. dated July 30, 1999, revised December 1, 1999, recorded in Plan Book 202, Page 149.

8) Plan of property made for Robert H. Walker, Inc. by H.I. & E.C. Jordan dated February 2, 1979, recorded in Plan Book 123, Page 27.

STREET REFERENCES

1) Maine State Highway Commission Right of Way Map State Highway "C–3" Federal Aid Project No. S.N. 377–A Falmouth Cumberland Sheet 6 dated October 1941, recorded in Plan Book 31, Page 12

BURDENING EASEMENTS OF RECORD

1) Parcel One is subject to grading and drainage rights as shown on a Maine State Highway Commission Right of Way Map of State Highway "141" Federal Aid Project No. RS–141S dated April 1990 sheet 5 of 9 and recorded in Plan Book 198, Page 326.

2) Parcel One is subject to a right of way for US Route 1 reserved in Book 1668, Page 121.

3) Parcel Two is subject to a 50' easement as described in Book 17151, Page 345.

OWNERS OF RECORD / AREA

Parcel One – 700,513 sq. ft. / 16.08 acres
Andrew C. Soule & Martha C. Soule, Trustees
Cramar Realty Trust Book 18526, Page 82; Book 20757, Page 126
1 Channel Point Road Tax Map R01, Lot 10
Yarmouth, ME 04096

Parcel Two – 226,464 sq. ft. / 5.20 acres
Martha C. Soule Book 17849, Page 333
1 Channel Point Road Portion of Tax Map R01, Lot 16

SCALE IN FEET
80 0 80 160
1" = 80'

CERTIFICATION

This survey conforms to the current standards of practice set forth by the Maine State Board of Licensure for Land Surveyors.

David E. Titcomb, P.L.S. #1273

STATE OF MAINE · DAVID E. TITCOMB #1273 · PROFESSIONAL LAND SURVEYOR

PLAN OF

Boundary Survey & Existing Conditions

US Route 1 Cumberland, Maine

MADE FOR

Friends School of Portland

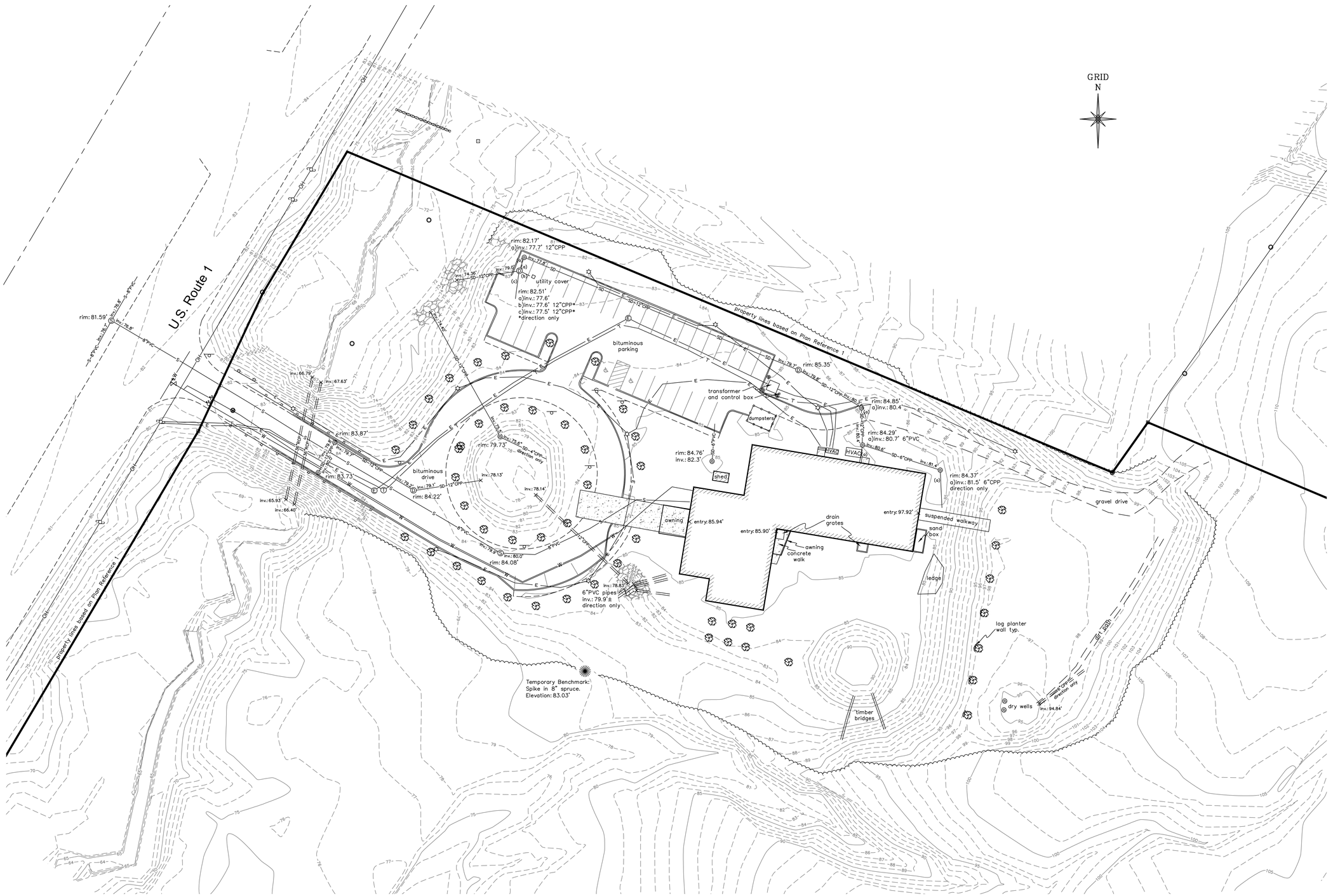
1 Mackworth Island Falmouth, Maine

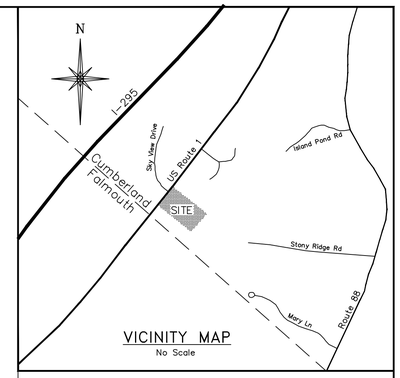
JOB #212067	DATE: Nov. 14, 2012	SCALE: 1" = 80'
BOOK #872		

Rev. 2	12/20/2012	revise parcel two	det
Rev. 1	12/17/2012	add 5 acre lot, revise title block	det

CP\2012\212067
FILE #9620

Titcomb Associates
133 Gray Road
Falmouth, Maine 04105 (207)797–9199





VICINITY MAP
No Scale

VICINITY MAP
No Scale

LEGEND

- Monument – found (plan ref. 1)
- Iron marker – found (plan ref. 1)
- Property line (locus)
- Property line (abutter)
- Right of way line
- Stone wall (plan ref. 1)
- Stockade fence
- Guard rail
- Edge of pavement
- Edge of gravel
- Curb
- Sign
- Lamp or light pole
- Utility pole
- Water valve
- Water shutoff
- Sewer manhole
- Electric manhole
- Telecom manhole
- Catch basin (round)
- Drain manhole
- Bollard
- Water manhole
- OH — Overhead utility line
- S — Sewer line
- SD — Storm drain
- 12"CPP — Culvert (pipe size and material)
- W — Underground water line
- E — Underground electric line
- T — Underground telecom
- 84 — Contours (1ft)
- 85 — Contours (5ft)
- Tree line
- Deciduous tree
- Coniferous tree
- Existing building
- Concrete
- Rip Rap

NOTES

1) Property lines shown and contours outside of improved area are based on plan reference 1.

2) Bearings are referenced to grid north, Maine State Plane Coordinate System, West Zone, NAD83.

3) Elevations are based on NGVD29 referenced to a Maine Department of Transportation control station "FAL–95–10".

4) Utility information on this plan is approximate, based on location of visible features and markings by others. DigSafe and/or the appropriate utilities should be contacted prior to any construction.

PLAN REFERENCES

1) Plan of Boundary Survey & Existing Conditions made for Friends School of Portland by Titcomb Associates dated November 14, 2012.

SCALE IN FEET

30 0 30 60

1" = 30'

CERTIFICATION

This is not a boundary survey. Property lines shown and contours outside of improved area are based on plan reference 1. Certification is to existing conditions only.

Nicholas S. Elliston, P.L.S. #2518

STATE OF MAINE · NICHOLAS S. ELLISTON #2518 · PROFESSIONAL LAND SURVEYOR

PLAN OF

Existing Conditions

11 US Route 1 — Cumberland, Maine

MADE FOR

Walsh Engineering Associates, Inc.

1 Karen Drive, Suite 2A — Westbrook, Maine

JOB #212067.2	DATE: September 4, 2018	SCALE: 1" = 30'
BOOK #872		
212067_ExCon2018.dwg		
FILE #9620		

Titcomb Associates
133 Gray Road, Falmouth, Maine 04105
(207)797-9199 www.titcombsurvey.com

PLAN REFERENCES:

1. TOPOGRAPHIC AND PROPERTY BOUNDARY INFORMATION TAKEN FROM A COMPILATION OF THE FOLLOWING:
   - 1.1. A PLAN TITLED "PLAN OF EXISTING CONDITIONS", PREPARED BY TITCOMB ASSOCIATES OF 133 GRAY ROAD, FALMOUTH, MAINE 04105, DATED SEPTEMBER 4, 2018.
   - 1.2. WETLAND LOCATIONS ARE TAKEN FROM A PLAN TITLED " BOUNDARY SURVEY & EXISTING CONDITIONS", PREPARED BY TITCOMB ASSOCIATES OF 133 GRAY ROAD, FALMOUTH, MAINE, 04105, DATED NOVEMBER 14, 2012.
   - 1.3. FIELD OBSERVATIONS BY WALSH ENGINEERING ASSOCIATES, INC. ON AUGUST 21, 2018.

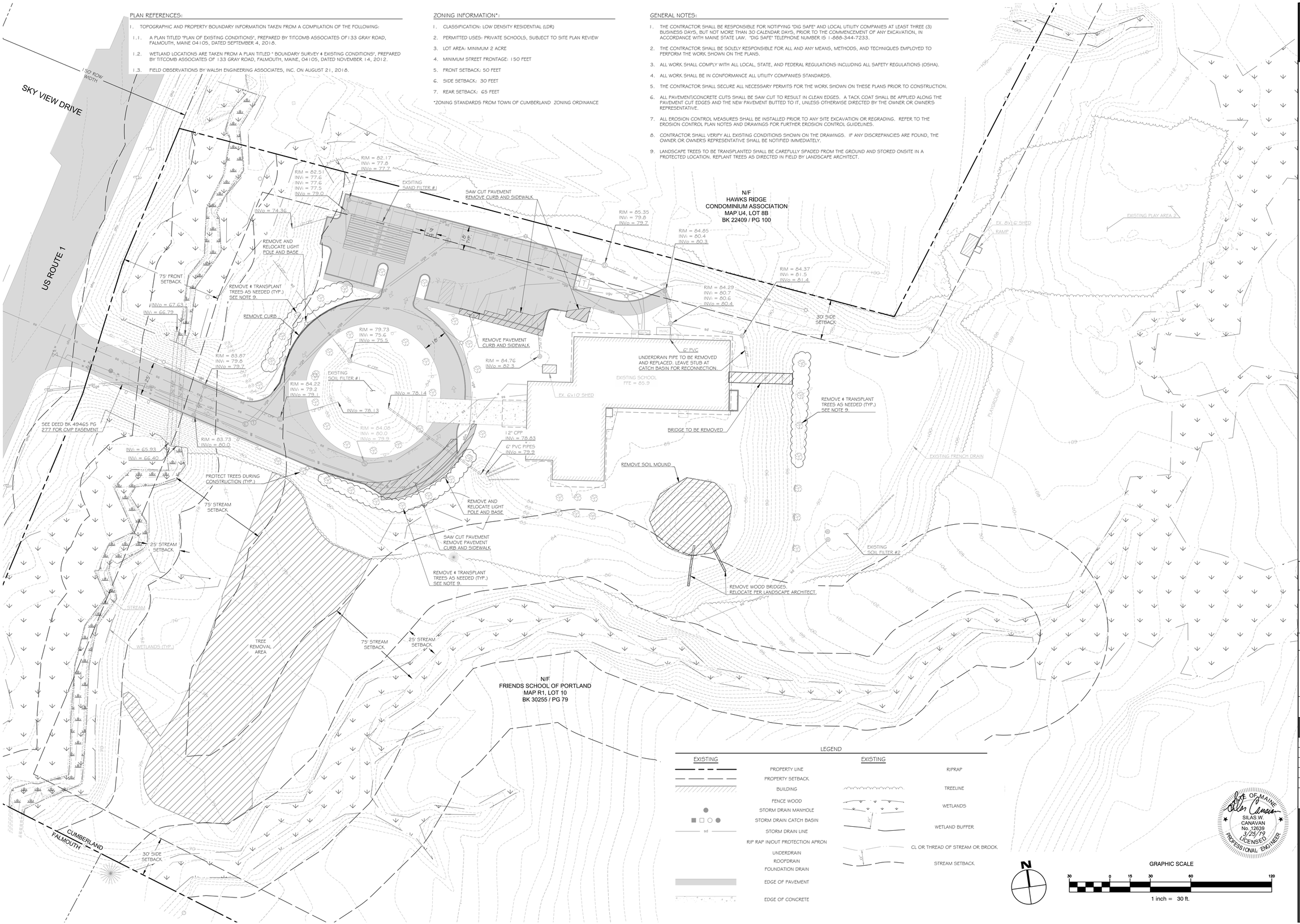
ZONING INFORMATION*:

1. CLASSIFICATION: LOW DENSITY RESIDENTIAL (LDR)
2. PERMITTED USES: PRIVATE SCHOOLS, SUBJECT TO SITE PLAN REVIEW
3. LOT AREA: MINIMUM 2 ACRE
4. MINIMUM STREET FRONTAGE: 150 FEET
5. FRONT SETBACK: 50 FEET
6. SIDE SETBACK: 30 FEET
7. REAR SETBACK: 65 FEET

*ZONING STANDARDS FROM TOWN OF CUMBERLAND ZONING ORDINANCE

GENERAL NOTES:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING "DIG SAFE" AND LOCAL UTILITY COMPANIES AT LEAST THREE (3) BUSINESS DAYS, BUT NOT MORE THAN 30 CALENDAR DAYS, PRIOR TO THE COMMENCEMENT OF ANY EXCAVATION, IN ACCORDANCE WITH MAINE STATE LAW. "DIG SAFE" TELEPHONE NUMBER IS 1-888-344-7233.
2. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL AND ANY MEANS, METHODS, AND TECHNIQUES EMPLOYED TO PERFORM THE WORK SHOWN ON THE PLANS.
3. ALL WORK SHALL COMPLY WITH ALL LOCAL, STATE, AND FEDERAL REGULATIONS INCLUDING ALL SAFETY REGULATIONS (OSHA).
4. ALL WORK SHALL BE IN CONFORMANCE ALL UTILITY COMPANIES STANDARDS.
5. THE CONTRACTOR SHALL SECURE ALL NECESSARY PERMITS FOR THE WORK SHOWN ON THESE PLANS PRIOR TO CONSTRUCTION.
6. ALL PAVEMENT/CONCRETE CUTS SHALL BE SAW CUT TO RESULT IN CLEAN EDGES. A TACK COAT SHALL BE APPLIED ALONG THE PAVEMENT CUT EDGES AND THE NEW PAVEMENT BUTTED TO IT, UNLESS OTHERWISE DIRECTED BY THE OWNER OR OWNERS REPRESENTATIVE.
7. ALL EROSION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO ANY SITE EXCAVATION OR REGRADING. REFER TO THE EROSION CONTROL PLAN NOTES AND DRAWINGS FOR FURTHER EROSION CONTROL GUIDELINES.
8. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS SHOWN ON THE DRAWINGS. IF ANY DISCREPANCIES ARE FOUND, THE OWNER OR OWNERS REPRESENTATIVE SHALL BE NOTIFIED IMMEDIATELY.
9. LANDSCAPE TREES TO BE TRANSPLANTED SHALL BE CAREFULLY SPADED FROM THE GROUND AND STORED ONSITE IN A PROTECTED LOCATION. REPLANT TREES AS DIRECTED IN FIELD BY LANDSCAPE ARCHITECT.



LEGEND

EXISTING		EXISTING	
	PROPERTY LINE		RIPRAP
	PROPERTY SETBACK		TREELINE
	BUILDING		WETLANDS
	FENCE WOOD		WETLAND BUFFER
	STORM DRAIN MANHOLE		CL OR THREAD OF STREAM OR BROOK
	STORM DRAIN CATCH BASIN		STREAM SETBACK
	STORM DRAIN LINE		
	RIP RAP IN/OUT PROTECTION APRON		
	UNDERDRAIN		
	ROOFDRAIN		
	FOUNDATION DRAIN		
	EDGE OF PAVEMENT		
	EDGE OF CONCRETE		

GRAPHIC SCALE

30 0 15 30 60 120

1 inch = 30 ft.

STATE OF MAINE
SILAS W. CANAVAN
No. 12639
3/25/19
LICENSED
PROFESSIONAL ENGINEER

Kaplan Thompson Architects
102 Exchange Street
Portland, ME 04101
(207) 842-2888
kaplanthompson.com

PROJECT

Classroom & Community Hall Addition

Friends School of Portland
11 US Route 1
Cumberland, ME 04021

STRUCTURAL
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424 Fore Street
Portland, ME 04101
p: 207 842-2800

LANDSCAPE
Soren Deniord Design Studio
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Portland, ME 04103
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Mechanical & Plumbing
Integrated Energy Systems, PLLC
301 Middle Road
Falmouth, ME 04105
p: 207-781-4263

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B	FOR SFM PERMIT			10/10/18
C	FOR CO COORD.			12/21/18
D	FOR CONSTRUCTION			02/22/19
E	SUBMITTED FOR TOWN REVIEW			02/27/19
F	SUBMITTED FOR TOWN PERMITTING			03/25/19

FOR SFM PERMIT

PROJECT NO:	FSP2
DESIGNED BY:	NGC
DRAWN BY:	CAR/JWG
PHASE:	PERMITTING

EXISTING CONDITIONS & REMOVALS PLAN

C1.0

SKY VIEW DRIVE

SKY VIEW DRIVE

US ROUTE 1

N/F
CGM VENTURES LLC
MAP R1, LOT 11-1
BK 29099 / PG 83

N/F
HAWKS RIDGE
CONDOMINIUM ASSOCIATION
MAP U4, LOT 8B
BK 22409 / PG 100

SAND FILTER #1

UGE

FUTURE
COMMUNITY HALL
3,500 SF
FFE = 86.0
(SEE ARCH. PLANS)

EXISTING SCHOOL
FFE = 85.9

NEW CLASSROOMS
FFE = 86.0
(SEE ARCH. PLANS)

EX. 6x10' SHED

SOIL FILTER #1

EX. 8x16' SHED

RAMP

EXISTING PLAY AREA 2

10' WIDE GRASSED PATH

PLAYGROUND

DEEDED
FORESTED
BUFFER H

DEEDED
FORESTED
BUFFER I

EXISTING FRENCH DRAIN

SOIL FILTER #2

N/F
MUNJOY HILL EPM LLC
MAP U3, LOT 2C
BK 29576 / PG 128

N/F
CYNTHIA A PAINE
MAP U2, LOT 5E
BK 34324 / PG 80

N/F
KERRY E OBERG
MAP U1A, LOT 9K
BK 20921 / PG 278

N/F
JOHN MORAN
MAP U1A, LOT 9J
BK 34100 / PG 25

SEE DEED BK 49465 PG
277 FOR CMP EASEMENT

75' STREAM
SETBACK

25' STREAM
SETBACK

STREAM

WETLANDS (TYP.)

EXISTING PARKING: 3
ALTERNATE PARKING: 4 ADDITIONAL
ALTERNATE TOTAL: 7 SPACES

30'

42'

30'

75' STREAM
SETBACK

25' STREAM
SETBACK

N/F
FRIENDS SCHOOL OF PORTLAND
MAP R1, LOT 10
BK 30255 / PG 79

CUMBERLAND
FALMOUTH

NEW SOIL
FILTER #3

NOTE: PLAY AREA 3, GRASSED PATH AND FORESTED BUFFERS I + J ARE TO BE INSTALLED AS SHOWN ON APPROVED BLAIS CIVIL ENGINEERS PLANS DATED DEC. 16, 2013.

PLAY AREA 3

DEEDED
FORESTED
BUFFER J

N/F
AMANDA PROCTOR
MAP U61, LOT 19
BK 11775 / PG 119

N/F
DONALD B HINKS
MAP U60, LOT 14
BK 15123 / PG 89

N/F
MARY LANE HOMEOWNERS
ASSOCIATION
MAP U1, LOT 51
BK 22072 / PG 331

PARKING COUNT		
	W/ ALT.	W/O ALT.
EXISTING	36	36
REMOVED	5	5
PROPOSED	53	49
TOTAL	84	80

LEGEND

EXISTING		PROPOSED
	PROPERTY LINE	
	PROPERTY SETBACK	
	BUILDING	
o — o	FENCE WOOD	o — o
	STORM DRAIN MANHOLE	
	STORM DRAIN CATCH BASIN	
sd	STORM DRAIN LINE	SD
	RIP RAP IN/OUT PROTECTION APRON	
	UNDERDRAIN	UD
	ROOFDRAIN	RD
	FOUNDATION DRAIN	FD
	EDGE OF PAVEMENT	
	EDGE OF CONCRETE	
	SLIPFORM CONCRETE CURB	

EXISTING		PROPOSED
	RIPRAP	
	TREELINE	
	WETLANDS	
	WETLAND BUFFER	
	CL OR THREAD OF STREAM OR BROOK	
	STREAM SETBACK	
	SILT FENCE	SF
	CONSTRUCTION ENTRANCE	

GRAPHIC SCALE

30 0 15 30 60 120

1 inch = 30 ft.

STATE OF MAINE
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No. 12639
3/25/19
LICENSED
PROFESSIONAL ENGINEER

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PROJECT

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Friends School of Portland
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FRIENDS SCHOOL OF PORTLAND
... inquiry, reflection, & action ...

STRUCTURAL
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FOR SFM PERMIT

PROJECT NO:	FSP2
DESIGNED BY:	NGC
DRAWN BY:	CAR/JWG
PHASE:	PERMITTING

OVERALL DEVELOPMENT PLAN

C2.0

LAYOUT, MATERIALS, AND UTILITY NOTES:

1. REFER TO SHEET C1.0 FOR PLAN REFERENCES AND GENERAL NOTES.
2. ALL DIMENSIONS, LOCATIONS AND CONTROLS SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION ACTIVITIES. ANY DISCREPANCIES SHALL BE REPORTED IMMEDIATELY TO THE OWNER OR OWNER'S REPRESENTATIVE.
3. DO NOT SCALE THE DRAWINGS FOR REQUIRED DIMENSIONS. ANY DISCREPANCIES IN DIMENSIONING SHALL BE REPORTED IMMEDIATELY TO THE OWNER'S REPRESENTATIVE.
4. ALL ANGLES ARE 90 DEGREES UNLESS OTHERWISE SHOWN.
5. ALL EDGES OF PAVING SHALL BE STAKED OUT BY THE CONTRACTOR AND REVIEWED BY THE OWNER'S REPRESENTATIVE PRIOR TO CONSTRUCTION.
6. PROVIDE A SMOOTH TRANSITION WHERE NEW WORK MEETS EXISTING.
7. ALL DISTURBED AREAS NOT OTHERWISE TREATED SHALL BE LOAMED AND SEEDED.
8. CENTERLINES OF DRIVEWAY AND WALKWAY, PROPOSED PARKING LOTS AND PROPOSED UTILITY LINES SHALL BE LOCATED AND LAID OUT BY PROFESSIONALLY LICENSED SURVEYOR.
9. SEE LANDSCAPING PLAN FOR NON-PAVED AREA SURFACE TREATMENTS AND CONCRETE PAVER PATTERN LAYOUTS.

SKY VIEW DRIVE
50' ROW WIDTH
US ROUTE 1
75' FRONT SETBACK
N/F
HAWKS RIDGE
CONDOMINIUM ASSOCIATION
MAP U4, LOT 8B
BK 22409 / PG 100
EXISTING SAND FILTER #1
ELECTRIC VEHICLE CHARGING PEDESTALS. REFER TO ELECTRICAL PLANS FOR DETAILS
PULL BOX
RELOCATE DUMPSTER, CONSTRUCT CONCRETE PAD W/ STOCKADE FENCE
RESTRIPE PARKING TO ADD TWO ADA SPACES (7 C3.3)
SAW CUT PAVEMENT CONSTRUCT BUTT JOINT (8 C3.1)
NEW TIMBER GUARD RAIL (5 C3.2)
BITUMINOUS CONCRETE PARKING SPACES (10 C3.1)
ADA PARKING SIGN (TYP.) (8 C3.3)
INSTALL JUNCTION. CONTRACTOR TO VERIFY EXISTING CONDUIT LOCATIONS
EXISTING SOIL FILTER #1
SLIPFORM CONCRETE CURB (9 C3.1)
RIM = 84.08
INVi = 80.0
INVo = 79.9
TIPDOWN
75' STREAM SETBACK
25' STREAM SETBACK
SOUTH PARKING LOT
42
BITUMINOUS CONCRETE PARKING LOT
SNOW STORAGE
STREAM
WETLANDS (TYP.)
RIPRAP APRON
INSTALL 6" PVC BALL VALVE
INVo = 70.40
6" PVC
L = 51.3'
S = 0.046
PROVIDE 6" PVC GATE VALVE IN STRUCTURE TO CONTROL DISCHARGE
INV. = 72.75
NEW SOIL FILTER #3
CUMBERLAND
FALMOUTH
30' SIDE SETBACK
FUTURE COMMUNITY HALL
3,500 SF
FFE = 86.0
(SEE ARCH. PLANS)
EXISTING SCHOOL
FFE = 85.9
EX. 6x10 SHED
SAW CUT PAVEMENT CONSTRUCT BUTT JOINT (6 C3.1)
NEW 6" PVC TYPE 'C' DRAIN (2 C3.3)
NEW CLASSROOMS
4,295 SF
FFE = 98.0
(SEE ARCH. PLANS)
SEE LANDSCAPE ARCHITECT PLANS FOR STONES
CLEANOUT INV. = 82.25
LANDSCAPE STEPS SEE SHEET L4.0
CLEANOUT INV. = 94.5±
ELECTRIC FOR STAIR MELT SYSTEM AND LIGHTING
NEW 6" PVC UNDERDRAIN (2 C3.3)
EXISTING FRENCH DRAIN
EXISTING SOIL FILTER #2
CONNECT TO EXISTING STORM DRAIN (INV. TBD)
1:1 RIPRAP SLOPE (6 C3.3)
INSTALL JUNCTION. CONTRACTOR TO VERIFY EXISTING CONDUIT LOCATIONS
CB 1
RIM = 83.75
INVo = 79.25
BITUMINOUS CONCRETE PARKING SPACES (10 C3.1)
12" HDPE
L = 20.0'
S = 0.012
INVo = 79.00
1,343 SF WETLAND IMPACTS
N/F
FRIENDS SCHOOL OF PORTLAND
MAP R1, LOT 10
BK 30255 / PG 79
30' SIDE SETBACK
33.27'
5' GRAVEL EGRESS PATH
EX. 8x16 SHED
RAMP
EXISTING PLAY AREA 2
10' WIDE GRASSED PATH
CLEANOUT INV. = 96.0±
CLEANOUT INV. = 95.5±
PLAYGROUND
DEEDED FORESTED BUFFER 1
DEEDED FORESTED BUFFER 2
PLAY AREA 3

LEGEND

EXISTING		PROPOSED
	PROPERTY LINE	
	PROPERTY SETBACK	
	BUILDING	
	FENCE WOOD	
	STORM DRAIN MANHOLE	
	STORM DRAIN CATCH BASIN	
sd	STORM DRAIN LINE	SD
	RIP RAP IN/OUT PROTECTION APRON	
	UNDERDRAIN	UD
	ROOFDRAIN	RD
	FOUNDATION DRAIN	FD
	EDGE OF PAVEMENT	
	EDGE OF CONCRETE	
	SLIPFORM CONCRETE CURB	

EXISTING		PROPOSED
	RIPRAP	
	TREELINE	
	WETLANDS	
	WETLAND BUFFER	
	CL OR THREAD OF STREAM OR BROOK	
	STREAM SETBACK	
	SILT FENCE	SF
	CONSTRUCTION ENTRANCE	

GRAPHIC SCALE
30 0 15 30 60 120
1 inch = 30 ft.

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FOR SFM PERMIT

PROJECT NO:	FSP2
DESIGNED BY:	NGC
DRAWN BY:	CAR/JWG
PHASE:	PERMITTING

STATE OF MAINE
SILAS W. CANAVAN
No. 12639
3/25/19
LICENSED PROFESSIONAL ENGINEER

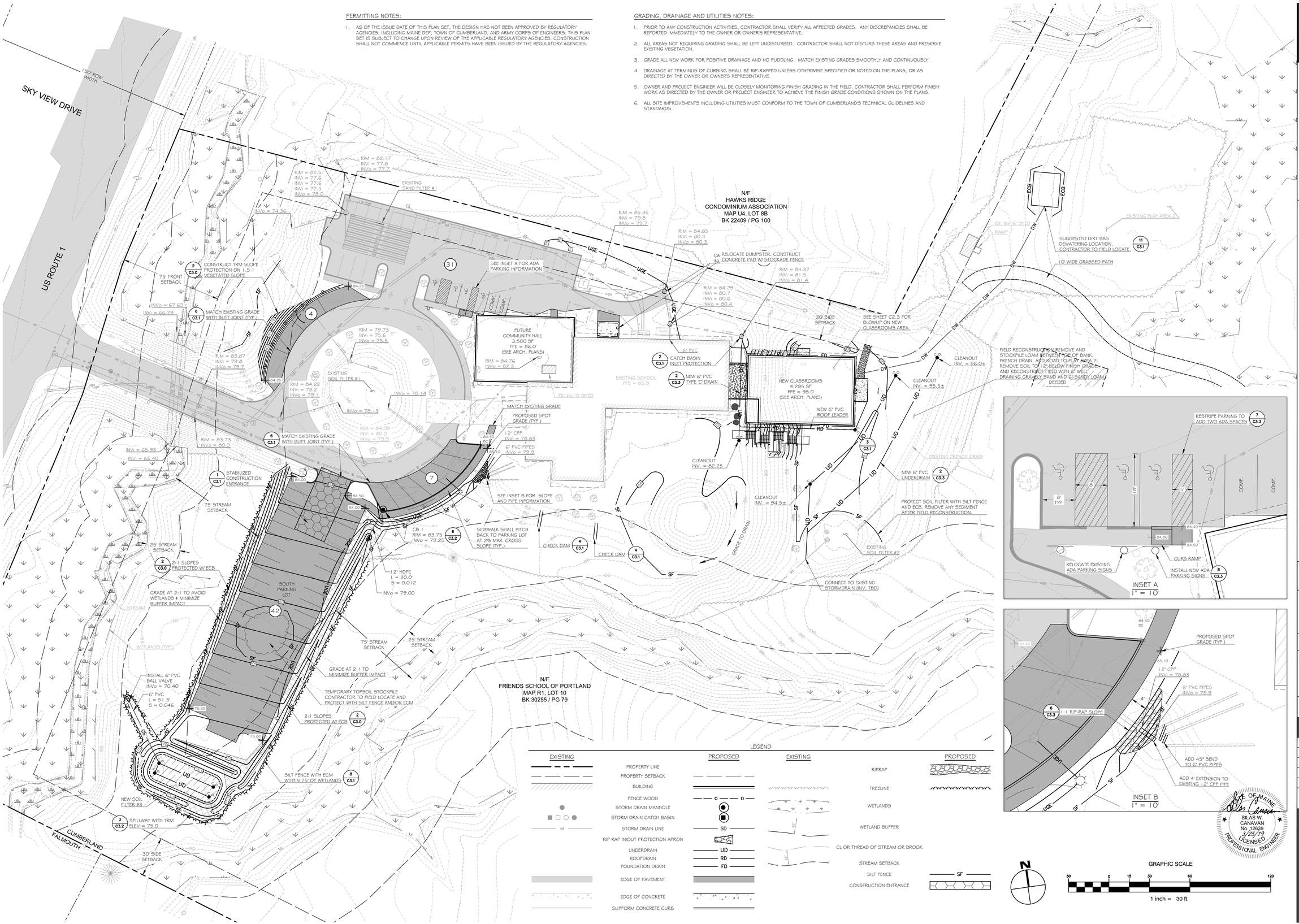
LAYOUT & UTILITIES PLAN
C2.1

PERMITTING NOTES:

1. AS OF THE ISSUE DATE OF THIS PLAN SET, THE DESIGN HAS NOT BEEN APPROVED BY REGULATORY AGENCIES, INCLUDING MAINE DEP, TOWN OF CUMBERLAND, AND ARMY CORPS OF ENGINEERS. THIS PLAN SET IS SUBJECT TO CHANGE UPON REVIEW OF THE APPLICABLE REGULATORY AGENCIES. CONSTRUCTION SHALL NOT COMMENCE UNTIL APPLICABLE PERMITS HAVE BEEN ISSUED BY THE REGULATORY AGENCIES.

GRADING, DRAINAGE AND UTILITIES NOTES:

1. PRIOR TO ANY CONSTRUCTION ACTIVITIES, CONTRACTOR SHALL VERIFY ALL AFFECTED GRADES. ANY DISCREPANCIES SHALL BE REPORTED IMMEDIATELY TO THE OWNER OR OWNER'S REPRESENTATIVE.
2. ALL AREAS NOT REQUIRING GRADING SHALL BE LEFT UNDISTURBED. CONTRACTOR SHALL NOT DISTURB THESE AREAS AND PRESERVE EXISTING VEGETATION.
3. GRADE ALL NEW WORK FOR POSITIVE DRAINAGE AND NO PUDDLING. MATCH EXISTING GRADES SMOOTHLY AND CONTINUOUSLY.
4. DRAINAGE AT TERMINUS OF CURBING SHALL BE RIP-RAPPED UNLESS OTHERWISE SPECIFIED OR NOTED ON THE PLANS, OR AS DIRECTED BY THE OWNER OR OWNER'S REPRESENTATIVE.
5. OWNER AND PROJECT ENGINEER WILL BE CLOSELY MONITORING FINISH GRADING IN THE FIELD. CONTRACTOR SHALL PERFORM FINISH WORK AS DIRECTED BY THE OWNER OR PROJECT ENGINEER TO ACHIEVE THE FINISH GRADE CONDITIONS SHOWN ON THE PLANS.
6. ALL SITE IMPROVEMENTS INCLUDING UTILITIES MUST CONFORM TO THE TOWN OF CUMBERLAND'S TECHNICAL GUIDELINES AND STANDARDS.



LEGEND

EXISTING		PROPOSED
	PROPERTY LINE	
	PROPERTY SETBACK	
	BUILDING	
	FENCE WOOD	
	STORM DRAIN MANHOLE	
	STORM DRAIN CATCH BASIN	
	STORM DRAIN LINE	SD
	RIP RAP IN/OUT PROTECTION APRON	
	UNDERDRAIN	UD
	ROOFDRAIN	RD
	FOUNDATION DRAIN	FD
	EDGE OF PAVEMENT	
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	RIPRAP	
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	WETLAND BUFFER	
	CL OR THREAD OF STREAM OR BROOK	
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GRADING & DRAINAGE PLAN

C2.2

PERMITTING NOTES:

1. AS OF THE ISSUE DATE OF THIS PLAN SET, THE DESIGN HAS NOT BEEN APPROVED BY REGULATORY AGENCIES, INCLUDING MAINE DEP, TOWN OF CUMBERLAND, AND ARMY CORPS OF ENGINEERS. THIS PLAN SET IS SUBJECT TO CHANGE UPON REVIEW OF THE APPLICABLE REGULATORY AGENCIES. CONSTRUCTION SHALL NOT COMMENCE UNTIL APPLICABLE PERMITS HAVE BEEN ISSUED BY THE REGULATORY AGENCIES.

RELOCATE DUMPSTER, CONSTRUCT CONCRETE PAD W/ STOCKADE FENCE

RIM = 85.35
INVi = 79.8
INVo = 79.7

RIM = 84.65
INVi = 80.4
INVo = 80.3

CATCH BASIN INLET PROTECTION (2/C3.1)

RIM = 84.29
INVi = 80.7
INVi = 80.6
INVo = 80.4

CATCH BASIN INLET PROTECTION (2/C3.1)

RIM = 84.37
INVi = 81.5
INVo = 81.4

CONNECT TO EXISTING 6" STUB INVi = 81.5

CONSTRUCT ECB SLOPE PROTECTION ON STEEP VEGETATED SLOPE (2/C3.0)

30' SIDE SETBACK

6" PVC

HVAC

HVAC

EXISTING SCHOOL
FFE = 85.9

(5/C3.3) CRUSHED STONE SURFACE

(2/C3.3) NEW 6" PVC TYPE 'C' DRAIN

STORAGE
FFE = 86.0

NEW CLASSROOMS
4,295 SF
FFE = 98.0
(SEE ARCH. PLANS)

SEE LANDSCAPE/ARCH. PLANS FOR DECK
TOP OF DECK = 88.0

FINISH GRADE ADJACENT TO DECK SHALL BE MAXIMUM OF 29" BELOW DECK SURFACE ELEVATION

STEPPING STONES TO BE FIELD LOCATED BY LANDSCAPE ARCH. (TYP.)

SEE PLANTING PLAN FOR ADDITIONAL DETAILS

GUTTER DOWNSPOUT (TYP.)

GUTTER DOWNSPOUT (TYP.)

GRADE TO DRAIN AWAY FROM BUILDING

CLEANOUT
INV. = 82.25

STAIR LANDING ELEVATIONS ARE APPROXIMATE. INSTALL PER DIRECTION OF LANDSCAPE ARCHITECT IN FIELD (TYP.)

FOUNDATION DRAIN FOR CONCRETE STAIRS SHALL TIE INTO BUILDING FOUNDATION DRAIN (TYP.)

(2/C3.0) CONSTRUCT ECB SLOPE PROTECTION ON STEEP VEGETATED SLOPE

NEW 6" PVC ROOF LEADER

CONCRETE PORCH SLAB, SEE STRUCTURAL DRAWINGS FOR DETAILS

CLEANOUT
INV. = 95.5±

GRADE TO DRAIN AWAY FROM BUILDING

GUTTER DOWNSPOUT (TYP.)

CLEANOUT
INV. = 96.0±

FIELD RECONSTRUCTION REMOVE AND STOCKPILE LOAM BETWEEN TOP OF BANK, FRENCH DRAIN, AND ROAD TO PLAY AREA 2. REMOVE SOIL TO 12" BELOW FINISH GRADE AND RECONSTRUCT FIELD WITH 6" WELL DRAINING GRAVELY SAND AND 6" SANDY LOAM. (3/C3.1)

PLAYGROUND

EXISTING FRENCH DRAIN

NEW 6" PVC UNDERDRAIN (2/C3.3)

CLEANOUT
INV. = 94.5±

GRADE TO DRAIN

LEGEND

EXISTING		PROPOSED
	PROPERTY LINE	
	PROPERTY SETBACK	
	BUILDING	
	FENCE WOOD	
	STORM DRAIN MANHOLE	
	STORM DRAIN CATCH BASIN	
sd	STORM DRAIN LINE	SD
	RIP RAP IN/OUT PROTECTION APRON	
	UNDERDRAIN	UD
	ROOFDRAIN	RD
	FOUNDATION DRAIN	FD
	EDGE OF PAVEMENT	
	EDGE OF CONCRETE	
	SLIPFORM CONCRETE CURB	

EXISTING		PROPOSED
	LANDSCAPE/RETAINING WALL	
	RIPRAP	
	TREELINE	
	WETLANDS	
	WETLAND BUFFER	
	CL OR THREAD OF STREAM OR BROOK	
	STREAM SETBACK	
	SILT FENCE	SF
	CONSTRUCTION ENTRANCE	

GRAPHIC SCALE
10 0 5 10 20 40
1 inch = 10 ft.

STATE OF MAINE
SILAS W CANAVAN
No. 12639
3/25/19
LICENSED PROFESSIONAL ENGINEER

Kaplan Thompson Architects
102 Exchange Street
Portland, ME 04101
(207) 842-2888
kaplanthompson.com

PROJECT

Classroom & Community Hall Addition

Friends School of Portland
11 US Route 1
Cumberland, ME 04021

STRUCTURAL
Casco Bay Engineering
424 Fore Street
Portland, ME 04101
p: 207 842-2800

LANDSCAPE
Soren Deniord Design Studio
43 Wellwood Road
Portland, ME 04103
p: 207-400-2450

ELECTRICAL
Swiftcurrent Engineering Services
10 Forest Falls Drive, Unit 8B
Yarmouth, ME 04096
p: 207-847-9280

CIVIL
Walsh Engineering Associates, Inc.
1 Karen Drive, Suite 2A
Westbrook, ME 04092
p: 207-553-9898

Mechanical & Plumbing
Integrated Energy Systems, PLLC
301 Middle Road
Falmouth, ME 04105
p: 207-781-4263

ISSUE NO	DESCRIPTION	CH ID	CHANGE NAME	DATE
A	PRICING SET			09/20/18
B	FOR SFM PERMIT			10/02/18
C	FOR CO COORD.			12/21/18
D	FOR CONSTRUCTION			02/22/19
E	SUBMITTED FOR CONSTRUCTION			02/27/19
F	SUBMITTED FOR TOWN PERMITTING			03/25/19

FOR SFM PERMIT

PROJECT NO:	FSP2
DESIGNED BY:	NGC
DRAWN BY:	CAR/JWG
PHASE:	PERMITTING

NEW CLASSROOMS BLOWUP PLAN

C2.3

EROSION AND SEDIMENTATION CONTROL NOTES:

INTRODUCTION

THE FOLLOWING PLAN FOR CONTROLLING SEDIMENTATION AND EROSION IN THIS PROJECT IS BASED ON CONSERVATION PRACTICES FOUND IN THE MAINE EROSION & SEDIMENT CONTROL BMPS MANUAL, OCTOBER 2016, AND MAINE EROSION AND SEDIMENT CONTROL PRACTICE FIELD GUIDE FOR CONTRACTORS, REVISED 2014, MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION. THE CONTRACTOR WHO IMPLEMENTS THIS PLAN SHALL BE FAMILIAR WITH THESE PUBLICATIONS AND ADHERE TO THEM AND THE PRACTICES PRESENTED HEREIN.
REFERENCE IS MADE TO THE GRADING AND DRAINAGE PLANS (C3.0 THROUGH C3.6) WITHIN THE PLAN SET, SHOWING THE LOCATIONS AND TYPES OF PROPOSED MEASURES TO BE IMPLEMENTED.

GENERAL EROSION AND SEDIMENTATION CONTROL PRACTICES

THE FOLLOWING IS A LIST OF GENERAL EROSION CONTROL PRACTICES THAT WILL BE USED TO PREVENT EROSION AND SEDIMENTATION BEFORE, DURING AND AFTER THE CONSTRUCTION OF THIS PROJECT. IN ADDITION, SPECIAL CARE SHALL BE USED AT ALL TIMES TO:
LIMIT DISTURBANCE AND, HENCE, EROSION
1) CORRECT ANY EROSION PROBLEMS IMMEDIATELY
2)REGULARLY MONITOR THE IMPLEMENTED PRACTICES, ESPECIALLY AFTER EVERY RAINFALL
3)REVEGETATE DISTURBED AREAS AS SOON AS POSSIBLE AFTER CONSTRUCTION
4)CONFORM TO ALL REQUIREMENTS/STANDARDS OF THE SITE'S MAINE DEP EROSION & SEDIMENT CONTROL BMP MANUAL.

SILT FENCE AND/OR EROSION CONTROL MIX SEDIMENT BARRIERS

SILT FENCE AND/OR EROSION CONTROL MIX SEDIMENT BARRIERS WILL BE INSTALLED ALONG THE DOWN GRADIENT SIDE OF THE PROPOSED GROUND DISTURBANCE AREAS PRIOR TO ANY CONSTRUCTION ACTIVITIES WHERE SLOPES EXCEED 8% OR THERE IS FLOWING WATER BOTH SILT FENCE AND EROSION CONTROL MATTING BERMS SHALL BE USED.

CATCH BASIN PROTECTION

CATCH BASIN PROTECTION WILL BE INSTALLED AT THE FIRST DOWNGRADIENT CATCH BASIN IN STREET ADJACENT TO ANY CONSTRUCTION ACTIVITIES AND IN ALL ONSITE CATCH BASINS UNTIL SITE HAS BEEN COMPLETELY STABILIZED.

CONSTRUCTION PHASE

THE FOLLOWING GENERAL PRACTICES WILL BE IMPLEMENTED TO PREVENT EROSION DURING CONSTRUCTION ON THIS PROJECT:

1. ONLY THOSE AREAS UNDER ACTIVE CONSTRUCTION WILL BE CLEARED AND LEFT IN AN UNTREATED OR UNVEGETATED CONDITION. ONCE CONSTRUCTION OF AN AREA IS COMPLETE, FINAL GRADING, LOAMING AND SEEDING SHALL OCCUR IMMEDIATELY (REFER TO "POST CONSTRUCTION REVEGETATION" SECTION). IF DURING FINAL GRADING, LOAMING AND SEEDING CAN NOT OCCUR IMMEDIATELY, IT SHALL BE DONE PRIOR TO ANY STORM EVENT AND WITHIN 15 DAYS OF COMPLETING CONSTRUCTION IN THE AREA. IF FINAL GRADING, LOAMING AND SEEDING CANNOT OCCUR WITHIN 7 DAYS, OR IF THE AREA IS NOT UNDER ACTIVE CONSTRUCTION FOR A PERIOD LONGER THAN 7 DAYS, SEE ITEM NO. 4 BELOW.
2. PRIOR TO THE START OF CONSTRUCTION IN A SPECIFIC AREA, SILT FENCING SHALL BE INSTALLED ON DOWNGRADIENT PORTIONS OF THE SITE AS LOCATED ON THE PLANS TO PROTECT AGAINST ANY CONSTRUCTION RELATED EROSION.
3. TOPSOIL WILL BE STOCKPILED WHEN NECESSARY IN AREAS WHICH HAVE MINIMUM POTENTIAL FOR EROSION AND WILL BE KEPT AS FAR AS POSSIBLE FROM EXISTING DRAINAGE AREAS AND WETLANDS. ALL STOCKPILES EXPECTED TO REMAIN LONGER THAN 7 DAYS SHALL BE:
   A. TREATED WITH ANCHORED MULCH (WITHIN 5 DAYS OF THE LAST DEPOSIT OF STOCKPILED SOIL).
   B. SEEDED WITH CONSERVATION MIX AND MULCHED IMMEDIATELY.
   C. STOCKPILES SHALL BE EITHER PLACED UPHILL OF AN EXISTING SEDIMENT BARRIER ON THE SITE OR ENCIRCLED BY A HAY BALE OR SILT FENCE BARRIER THE FIRST DAY THAT STOCKPILING COMMENCES.
4. ALL DISTURBED AREAS EXPECTED TO REMAIN LONGER THAN 7 DAYS SHALL BE:
   A. TREATED WITH STRAW AT A RATE OF 70-90 LBS. PER 1000 SQUARE FEET FROM 4/16 TO 10/1, OR AT A RATE OF 150-200 LBS. PER 1000 SQUARE FEET FROM 10/1 TO 4/15.
   B. SEEDED WITH CONSERVATION MIX OF PERENNIAL RYE GRASS (1.0 LBS/1000 SQ.FT.) AND MULCHED IMMEDIATELY. FROM 10/1 TO 4/15, FOLLOW THE SEEDING RATES AS OUTLINED BELOW IN SUB-SECTION 4.D. OF THE "POST CONSTRUCTION REVEGETATION" SECTION.
   C. MONITORED EVERY TWO WEEKS UNTIL SEEDING CAN OCCUR AND REMULCHED AS NEEDED TO PROTECT SLOPES.
5. ALL GRADING WILL BE HELD TO A MAXIMUM 3:1 SLOPE WHERE PRACTICAL. GREATER SLOPES MAY BE USED WHERE THE BANKS ARE PROTECTED WITH SOFT ARMOUR MATTING, EROSION CONTROL MATTING, OR RIPRAP. ALL SLOPES WILL BE STABILIZED WITH PERMANENT SEEDING IMMEDIATELY AFTER FINAL GRADING IS COMPLETE. (IT IS UNDERSTOOD THAT IMMEDIATELY MEANS WITHIN 5 DAYS OF THE COMPLETION OF WORK. SEE POST-CONSTRUCTION REVEGETATION FOR SEEDING SPECIFICATION).
6. APPLICATION RATE MUST BE 2 BALES (70-90 LBS.) PER 1,000 SQUARE FEET OR 1.5 TO 2 TONS (90-100 BALES) PER ACRE TO COVER 75 TO 90% OF THE GROUND SURFACE. DRIVE OVER WITH TRACKED CONSTRUCTION EQUIPMENT ON GRADES OF 5% AND LESS.
7. CONSTRUCTION TRAFFIC WILL BE DIRECTED OVER THE EXISTING SITE ENTRANCE. THE ROAD SHALL BE SWEPT AND VACUUMED DAILY SHOULD SEDIMENT BE TRACKED ONTO IT.
8. ALL AREAS DRAINING TO A STORMWATER FILTER OR BMP SHALL BE STABILIZED PRIOR TO CONSTRUCTION OF FILTER MEDIA TO PREVENT SEDIMENT FROM CLOGGING MEDIA.

DEWATERING

1. ALL DEWATERING DISCHARGE LOCATIONS SHALL BE LOCATED ON RELATIVELY FLAT GROUND AT LEAST 75' FROM STREAMS AND 25' FROM WETLANDS. THE CONTRACTOR SHALL UTILIZE DIRTBAGS, EROSION CONTROL MIX BERMS, OR SIMILAR METHODS FOR FILTRATION OF DEWATERING AND SHALL CONFORM TO THE MAINE EROSION AND SEDIMENT CONTROL BMPS G-1, G-2, AND G-3.

POST CONSTRUCTION REVEGETATION

THE FOLLOWING GENERAL PRACTICES WILL BE IMPLEMENTED TO PREVENT EROSION AS SOON AS AN AREA IS READY TO UNDERGO FINAL GRADING:

1. A MINIMUM OF 6" OF LOAM WILL BE SPREAD OVER DISTURBED AREAS AND GRADED TO A UNIFORM DEPTH AND NATURAL APPEARANCE.
2. LAWN AREAS: "PARK MIX" GRASS SEED BY ALLEN, STERLING & LOTHROP (FALMOUTH, MAINE), OR APPROVED EQUAL.
3. MULCH SHALL BE HAY OR STRAW MULCHES THAT ARE DRY AND FREE FROM UNDESIRABLE SEEDS AND COURSE MATERIALS.
   A. APPLICATION RATE MUST BE 2 BALES (70-90 LBS.) PER 1,000 SQUARE FEET OR 1.5 TO 2 TONS (90-100 BALES) PER ACRE TO COVER 75 TO 90% OF THE GROUND SURFACE.
   B. DRIVE OVER WITH TRACKED CONSTRUCTION EQUIPMENT ON GRADES OF 5% AND LESS.
   C. BLANKET WITH TACKED PHOTODEGRADABLE/BIODEGRADABLE NETTING ON GRADES GREATER THAN 5%.
4. HYDRO-MULCH SHALL CONSIST OF A MIXTURE OF ASPHALT, WOOD FIBRE OR PAPER FIBRE AND WATER, WHICH IS SPRAYED OVER A SEEDED AREA. HYDRO-MULCH SHALL NOT BE USED BETWEEN 10/1 AND 4/15.
5. CONSTRUCTION SHALL BE PLANNED TO ELIMINATE THE NEED FOR SEEDING BETWEEN OCTOBER 1ST AND APRIL 15TH. SHOULD SEEDING BE NECESSARY BETWEEN THESE DATES, THE FOLLOWING PROCEDURE SHALL BE FOLLOWED:
   A. ONLY UNFROZEN LOAM SHALL BE USED.
   B. LOAMING, SEEDING AND MULCHING WILL NOT BE DONE OVER SNOW OR ICE COVER. IF SNOW EXISTS, IT MUST BE REMOVED PRIOR TO PLACEMENT OF SEED.
   C. WHERE PERMANENT SEEDING IS NECESSARY, ANNUAL WINTER RYE (1.2 LBS/1000 S.F.) SHALL BE SOWN INSTEAD OF THE PREVIOUSLY NOTED SEEDING RATE.
   D. WHERE TEMPORARY SEEDING IS REQUIRED, ANNUAL WINTER RYE (2.5 LBS/1000 S.F.) SHALL BE SOWN INSTEAD OF THE PREVIOUSLY NOTED SEEDING RATE.
   E. FERTILIZING, SEEDING AND MULCHING SHALL BE DONE ON LOAM THE DAY THE LOAM IS SPREAD.
   F. HAY MULCH SHALL BE SECURED WITH PHOTODEGRADABLE/BIODEGRADABLE NETTING. TRACKING BY MACHINERY ALONE WILL NOT SUFFICE. WINTER MULCHING RATES, SHALL BE DOUBLE AS SPECIFIED ABOVE IN SUBSECTION 3.A OF THE "POST CONSTRUCTION REVEGETATION" SECTION, SHOULD BE APPLIED DURING THIS PERIOD.
6. FOLLOWING FINAL SEEDING, THE SITE WILL BE INSPECTED EVERY 30 DAYS UNTIL 90% COVER HAS BEEN ESTABLISHED. RESEEDING WILL BE CARRIED OUT BY THE CONTRACTOR WITHIN 10 DAYS OF NOTIFICATION BY THE DESIGN PROFESSIONAL THAT THE EXISTING CATCH IS INADEQUATE.

MONITORING SCHEDULE

THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING, MONITORING, MAINTAINING, REPAIRING, REPLACING AND REMOVING ALL OF THE EROSION AND SEDIMENTATION CONTROLS OR APPOINTING A QUALIFIED SUBCONTRACTOR TO DO SO. MAINTENANCE MEASURES WILL BE APPLIED AS NEEDED DURING THE ENTIRE CONSTRUCTION CYCLE. IMMEDIATELY FOLLOWING ANY SIGNIFICANT RAINFALL, AND AT LEAST ONCE A WEEK, A VISUAL INSPECTION WILL BE MADE OF ALL EROSION AND SEDIMENTATION CONTROLS AS FOLLOWS:

1. SILT FENCE SHALL BE INSPECTED AND REPAIRED. SEDIMENT TRAPPED BEHIND THESE BARRIERS SHALL BE EXCAVATED WHEN IT REACHES A DEPTH OF 6" AND REDISTRIBUTED TO AREAS UNDERGOING FINAL GRADING.
2. CONSTRUCTION ENTRANCE SHALL BE VISUALLY INSPECTED AND REPAIRED AS NEEDED. ANY AREAS SUBJECT TO RUTTING SHALL BE STABILIZED IMMEDIATELY. IF THE VOIDS OF THE CONSTRUCTION ENTRANCE BECOME FILLED WITH MUD, MORE CRUSHED STONE SHALL BE ADDED AS NEEDED. THE PUBLIC ROADWAY SHALL BE SWEPT AND VACUUMED SHOULD MUD BE DEPOSITED/TRACKED ONTO THEM.

STANDARDS FOR STABILIZING SITES FOR THE WINTER

THE FOLLOWING STANDARDS AND METHODOLOGIES SHALL BE USED FOR STABILIZING THE SITE DURING THE WINTER CONSTRUCTION PERIOD:

1. STANDARD FOR THE TIMELY STABILIZATION OF DISTURBED SLOPES (ANY AREA HAVING A GRADE GREATER THAN 25%) - THE CONTRACTOR WILL SEED AND MULCH ALL SLOPES TO BE VEGETATED BY SEPTEMBER 15TH. IF THE CONTRACTOR FAILS TO STABILIZE ANY SLOPE TO BE VEGETATED BY SEPTEMBER 15TH, THEN THE CONTRACTOR WILL TAKE ONE OF THE FOLLOWING ACTIONS TO STABILIZE THE SLOPE FOR LATE FALL AND WINTER.
   A. STABILIZE THE SOIL WITH TEMPORARY VEGETATION AND EROSION CONTROL MATS: BY OCTOBER 1ST THE CONTRACTOR WILL SEED THE DISTURBED SLOPE WITH WINTER RYE AT A RATE OF 3 POUNDS PER 1000 SQUARE FEET AND THEN INSTALL EROSION CONTROL MATS OR ANCHORED HAY MULCH OVER THE SEEDING AT TWICE THE RATE AS SPECIFIED ABOVE IN SUBSECTION 3.A OF THE "POST CONSTRUCTION REVEGETATION" SECTION. THE CONTRACTOR WILL MONITOR GROWTH OF THE RYE OVER THE NEXT 30 DAYS.
   B. STABILIZE THE SLOPE WITH WOOD-WASTE COMPOST: THE CONTRACTOR WILL PLACE A SIX-INCH LAYER OF WOOD-WASTE COMPOST ON THE SLOPE BY NOVEMBER 15TH. THE CONTRACTOR WILL NOT USE WOOD-WASTE COMPOST TO STABILIZE SLOPES HAVING GRADES GREATER THAN 50% (2H:IV) OR HAVING GROUNDWATER SEEPS ON THE SLOPE FACE.
   C. STABILIZE THE SLOPE WITH STONE RIPRAP: THE CONTRACTOR WILL PLACE A LAYER OF STONE RIPRAP ON THE SLOPE BY NOVEMBER 15TH. THE DEVELOPMENT'S OWNER WILL HIRE A REGISTERED PROFESSIONAL ENGINEER TO DETERMINE THE STONE SIZE NEEDED FOR STABILITY ON THE SLOPE AND TO DESIGN A FILTER LAYER FOR UNDERNEATH THE RIPRAP.

STANDARD FOR THE TIMELY STABILIZATION OF DISTURBED SOILS - BY SEPTEMBER 15TH THE CONTRACTOR WILL SEED AND MULCH ALL DISTURBED SOILS ON THE SITE. IF THE CONTRACTOR FAILS TO STABILIZE THESE SOILS BY THIS DATE, THEN THE CONTRACTOR WILL TAKE ON OF THE FOLLOWING ACTIONS TO STABILIZE THE SOIL FOR LATE FALL AND WINTER.

   A. STABILIZE THE SOIL WITH TEMPORARY VEGETATION: BY OCTOBER 1ST THE CONTRACTOR WILL SEED THE DISTURBED SOIL WITH WINTER RYE AT A SEEDING RATE OF 3 POUNDS PER 1000 SQUARE FEET, LIGHTLY MULCH THE SEEDED SOIL WITH HAY OR STRAW AT 75 POUNDS PER 1000 SQUARE FEET, AND ANCHOR THE MULCH WITH PLASTIC NETTING. THE CONTRACTOR WILL MONITOR GROWTH OF THE RYE OVER THE NEXT 30 DAYS. IF THE RYE FAILS TO GROW AT LEAST THREE INCHES OR FAILS TO COVER AT LEAST 75% OF THE DISTURBED SOIL BEFORE NOVEMBER, 1, THEN THE CONTRACTOR WILL MULCH THE AREA FOR OVER-WINTER PROTECTION AS DESCRIBED IN ITEM III OF THIS STANDARD.
   B. STABILIZE THE SOIL WITH SOD: THE CONTRACTOR WILL STABILIZE THE DISTURBED SOIL WITH PROPERLY INSTALLED SOD BY OCTOBER 1ST. PROPER INSTALLATION INCLUDES THE CONTRACTOR PINNING THE SOD ONTO THE SOIL WITH WIRE PINS, ROLLING THE SOD TO GUARANTEE CONTACT BETWEEN THE SOD AND UNDERLYING SOIL, AND WATERING THE SOD TO PROMOTE ROOT GROWTH INTO THE DISTURBED SOIL.
   C. STABILIZE THE SOIL WITH MULCH: BY NOVEMBER 15TH THE CONTRACTOR WILL MULCH THE DISTURBED SOIL BY SPREADING HAY OR STRAW AT A RATE OF AT LEAST 150 POUNDS PER 1000 SQUARE FEET ON THE AREA SO THAT NO SOIL IS VISIBLE THROUGH THE MULCH. IMMEDIATELY AFTER APPLYING THE MULCH, THE CONTRACTOR WILL ANCHOR THE MULCH WITH NETTING OR OTHER METHOD TO PREVENT WIND FROM MOVING THE MULCH OFF THE DISTURBED SOIL.

EROSION CONTROL REMOVAL

AN AREA IS CONSIDERED STABLE IF IT IS PAVED OR IF 80% GROWTH OF PLANTED SEEDS IS ESTABLISHED. ONCE AN AREA IS CONSIDERED STABLE, THE EROSION CONTROL MEASURES CAN BE REMOVED AS FOLLOWS:

1. SILT FENCE: SILT FENCE SHALL BE DISPOSED OF LEGALLY AND PROPERLY OFF-SITE. ALL SEDIMENT TRAPPED BEHIND THESE CONTROLS SHALL BE DISTRIBUTED TO AN AREA UNDERGOING FINAL GRADING OR REMOVED AND RELOCATED OFF-SITE.
2. STABILIZED CONSTRUCTION ENTRANCE: THE STABILIZED CONSTRUCTION ENTRANCE SHALL BE REMOVED ONCE THE COMPACTED ROADWAY BASE IN IN PLACE. STONE AND SEDIMENT FROM THE CONSTRUCTION ENTRANCE SHALL BE REDISTRIBUTED TO AN AREA UNDERGOING GRADING OR REMOVED AND RELOCATED OFFSITE.
3. MISCELLANEOUS: ONCE ALL THE TRAPPED SEDIMENTS HAVE BEEN REMOVED FROM THE TEMPORARY SEDIMENTATION DEVICES THE DISTURBED AREAS MUST BE REGRADED IN AN AESTHETIC MANNER TO CONFORM TO THE SURROUNDING TOPOGRAPHY. ONCE GRADED THESE DISTURBED AREAS MUST BE LOAMED (IF NECESSARY), FERTILIZED, SEEDED AND MULCHED IN ACCORDANCE WITH THE RATES PREVIOUSLY STATED.

THE ABOVE EROSION CONTROLS MUST BE REMOVED WITHIN 30 DAYS OF FINAL STABILIZATION OF THE SITE.
CONFORMANCE WITH THIS PLAN AND FOLLOWING THESE PRACTICES WILL RESULT IN A PROJECT THAT COMPLIES WITH THE STATE REGULATIONS AND THE STANDARDS OF THE NATURAL RESOURCES PROTECTION ACT, AND WILL PROTECT WATER QUALITY IN AREAS DOWNSTREAM FROM THE PROJECT.

MAINE CONSTRUCTION GENERAL PERMIT REQUIRED

SUBMISSION OF A MAINE CONSTRUCTION GENERAL PERMIT (MCGP) IS REQUIRED PRIOR TO COMMENCEMENT OF ANY EXCAVATION ACTIVITIES.

INSPECTION AND MAINTENANCE (APPENDIX B)

1. INSPECTION AND MAINTENANCE REQUIREMENTS: INSPECT DISTURBED AND IMPERVIOUS AREAS, EROSION AND STORMWATER CONTROL MEASURES, AREAS USED FOR STORAGE THAT ARE EXPOSED TO PRECIPITATION, AND LOCATIONS WHERE VEHICLES ENTER OR EXIT THE SITE. INSPECT THESE AREAS AT LEAST ONCE A WEEK AS WELL AS BEFORE AND AFTER A STORM EVENT AND PRIOR TO COMPLETION OF PERMANENT STABILIZATION MEASURES. A PERSON WITH KNOWLEDGE OF EROSION AND STORMWATER CONTROL, INCLUDING THE STANDARDS IN THE MCGP AND ANY DEPARTMENTAL COMPANION DOCUMENT TO THE MCGP, MUST CONDUCT THE INSPECTION. THIS PERSON MUST BE IDENTIFIED IN THE INSPECTION LOG. IF BEST MANAGEMENT PRACTICES (BMPS) NEED TO BE MODIFIED OR IF ADDITIONAL BMPS ARE NECESSARY, IMPLEMENTATION MUST BE COMPLETED WITHIN 7 CALENDAR DAYS AND PRIOR TO ANY STORM EVENT (RAINFALL). ALL MEASURES MUST BE MAINTAINED IN EFFECTIVE OPERATING CONDITION UNTIL AREAS AREA PERMANENTLY STABILIZED.
2. INSPECTION LOG (REPORT): A LOG (REPORT) MUST BE KEPT SUMMARIZING THE SCOPE OF THE INSPECTION, NAME(S) AND QUALIFICATIONS OF THE PERSONNEL MAKING THE INSPECTION, THE DATE(S) OF THE INSPECTION, AND MAJOR OBSERVATIONS RELATING TO OPERATION OF EROSION AND SEDIMENTATION CONTROLS AND POLLUTION PREVENTION MEASURES. MAJOR OBSERVATIONS MUST INCLUDE BMPS THAT NEED MAINTENANCE, BMPS THAT FAILED TO OPERATE AS DESIGNED OR PROVED INADEQUATE FOR A PARTICULAR LOCATION, AND LOCATIONS(S) WHERE ADDITIONAL BMPS ARE NEEDED. FOR EACH BMP REQUIRING MAINTENANCE, BMP NEEDING REPLACEMENT, AND LOCATION NEEDING ADDITIONAL BMPS, NOTE IN THE INSPECTION LOG THE CORRECT ACTION TAKEN AND WHEN IT WAS TAKEN. THE LOG MUST BE MADE ACCESSIBLE TO THE DEPARTMENT STAFF AND A COPY MUST BE PROVIDED UPON REQUEST. THE PERMITTEE SHALL RETAIN A COPY OF THE LOG FOR A PERIOD OF AT LEAST THREE YEARS FROM THE COMPLETION OF THE PERMANENT STABILIZATION.

HOUSEKEEPING (APPENDIX C)

1. SPILL PREVENTION: CONTROLS MUST BE USED TO PREVENT POLLUTANTS FROM CONSTRUCTION AND WASTE MATERIALS STORED ON SITE TO ENTER STORMWATER, WHICH INCLUDES STORAGE PRACTICES TO MINIMIZE EXPOSURE OF THE MATERIALS TO STORMWATER. THE SITE CONTRACTOR OR OPERATOR MUST DEVELOP, AND IMPLEMENT AS NECESSARY, APPROPRIATE SPILL PREVENTION, CONTAINMENT, AND RESPONSE PLANNING MEASURES.

NOTE: ANY SPILL OR RELEASE OF TOXIC OR HAZARDOUS SUBSTANCES MUST BE REPORTED TO THE DEPARTMENT. FOR OIL SPILLS, CALL 1-800-482-0777 WHICH IS AVAILABLE 24 HOURS A DAY. FOR SPILLS OF TOXIC OR HAZARDOUS MATERIAL, CALL 1-800-452-4664 WHICH IS AVAILABLE 24 HOURS A DAY. FOR MORE INFORMATION, VISIT THE DEPARTMENT'S WEBSITE AT: HTTP://WWW.MAINE.GOV/DEP/SPILLS/EMERGSPILLRESP/

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. ANY PROJECT PROPOSING INFILTRATION OF STORMWATER MUST PROVIDE ADEQUATE PRE-TREATMENT OF STORMWATER PRIOR TO DISCHARGE OF STORMWATER TO THE INFILTRATION AREA, OR PROVIDE FOR TREATMENT WITHIN THE INFILTRATION AREA, IN ORDER TO PREVENT THE ACCUMULATION OF FINES, REDUCTION IN INFILTRATION RATE, AND CONSEQUENT FLOODING AND DESTABILIZATION.

NOTE: LACK OF APPROPRIATE POLLUTANT REMOVAL BEST MANAGEMENT PRACTICES (BMPS) MAY RESULT IN VIOLATIONS OF THE GROUNDWATER QUALITY STANDARD ESTABLISHED BY 38 M.R.S.A. §465-C(1).

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, BUT OTHER WATER ADDITIVES MAY BE CONSIDERED AS NEEDED. A STABILIZED CONSTRUCTION ENTRANCE (SCE) SHOULD BE INCLUDED TO MINIMIZE TRACKING OF MUD AND SEDIMENT. IF OFF-SITE TRACKING OCCURS, PUBLIC ROADS SHOULD BE SWEPT IMMEDIATELY AND NO LESS THAN ONCE A WEEK AND PRIOR TO SIGNIFICANT STORM EVENTS. OPERATIONS DURING DRY MONTHS, THAT EXPERIENCE FUGITIVE DUST PROBLEMS, SHOULD WET DOWN UNPAVED ACCESS ROADS ONCE A WEEK OR MORE FREQUENTLY AS NEEDED WITH A WATER ADDITIVE TO SUPPRESS FUGITIVE SEDIMENT AND DUST.

NOTE: DEWATERING A STREAM WITHOUT A PERMIT FROM THE DEPARTMENT MAY VIOLATE STATE WATER QUALITY STANDARDS AND THE NATURAL RESOURCES PROTECTION ACT.

4. DEBRIS AND OTHER MATERIALS: MINIMIZE THE EXPOSURE OF CONSTRUCTION DEBRIS, BUILDING AND LANDSCAPING MATERIALS, TRASH, FERTILIZERS, PESTICIDES, HERBICIDES, DETERGENTS, SANITARY WASTE AND OTHER MATERIALS TO PRECIPITATION AND STORMWATER RUNOFF. THESE MATERIALS MUST BE PREVENTED FROM BECOMING A POLLUTANT SOURCE.

NOTE: TO PREVENT THESE MATERIALS FROM BECOMING A SOURCE OF POLLUTANTS, CONSTRUCTION AND POST-CONSTRUCTION ACTIVITIES RELATED TO A PROJECT MAY BE REQUIRED TO COMPLY WITH APPLICABLE PROVISION OF RULES RELATED TO SOLID, UNIVERSAL, AND HAZARDOUS WASTE, INCLUDING, BUT NOT LIMITED TO, THE MAINE SOLID WASTE AND HAZARDOUS WASTE MANAGEMENT RULES; MAINE HAZARDOUS WASTE MANAGEMENT RULES; MAINE OIL CONVEYANCE AND STORAGE RULES; AND MAINE PESTICIDE REQUIREMENTS.

5. EXCAVATION DEWATERING: EXCAVATION DEWATERING 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 REMOVED FROM THE PONDED AREA, EITHER THROUGH GRAVITY OR PUMPING, 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.

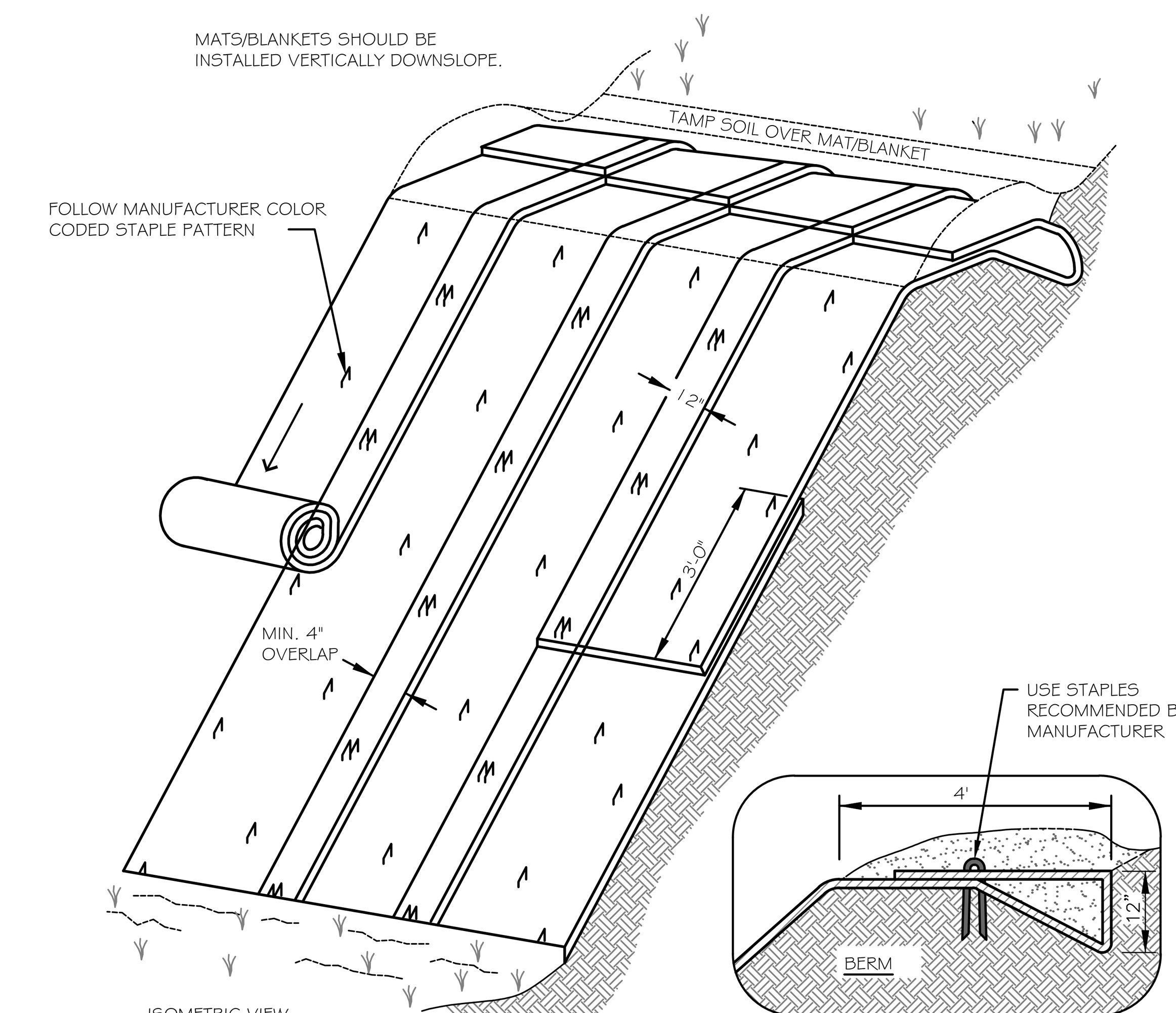
NOTE: DEWATERING CONTROLS ARE DISCUSSED IN THE "MAINE EROSION AND SEDIMENT CONTROL BMPS, MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION."

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:.
   - DISCHARGES FROM FIREFIGHTING ACTIVITY;
   - FIRE HYDRANT FLUSHINGS;
   - VEHICLE WASHWATER IF DETERGENTS ARE NOT USED AND WASHING IS LIMITED TO THE EXTERIOR OF VEHICLES (ENGINE, UNDERCARRIAGE, AND TRANSMISSION WASHING IS PROHIBITED);
   - DUST CONTROL RUNOFF IN ACCORDANCE WITH PERMIT CONDITIONS AND APPENDIX (C)(3);
   - ROUTINE EXTERNAL BUILDING WASHDOWN, NOT INCLUDING SURFACE PAINT REMOVAL, THAT DOES NOT INVOLVE DETERGENTS;
   - 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;
   - UNCONTAMINATED AIR CONDITIONING OR COMPRESSOR CONDENSATE;
   - UNCONTAMINATED GROUNDWATER OR SPRING WATER;
   - FOUNDATION OR FOOTER DRAIN-WATER WHERE FLOWS ARE NOT CONTAMINATED;
   - UNCONTAMINATED EXCAVATION DEWATERING (SEE REQUIREMENTS IN APPENDIX C(5));
   - POTABLE WATER SOURCES INCLUDING WATERLINE FLUSHINGS; AND
   - 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:
   - WASTEWATER FROM THE WASHOUT OR CLEANOUT OF CONCRETE, STUCCO, PAINT, FORM RELEASE OILS, CURING COMPOUNDS OR OTHER CONSTRUCTION MATERIALS;
   - FUELS, OILS OR OTHER POLLUTANTS USED IN VEHICLE AND EQUIPMENT OPERATION AND MAINTENANCE;
   - SOAPS, SOLVENTS, OR DETERGENTS USED IN VEHICLE AND EQUIPMENT WASHING; AND
   - TOXIC OR HAZARDOUS SUBSTANCES FROM A SPILL OR OTHER RELEASE.
8. ADDITIONAL REQUIREMENTS: ADDITIONAL REQUIREMENTS MAY BE APPLIED ON A SITE-SPECIFIC BASIS.

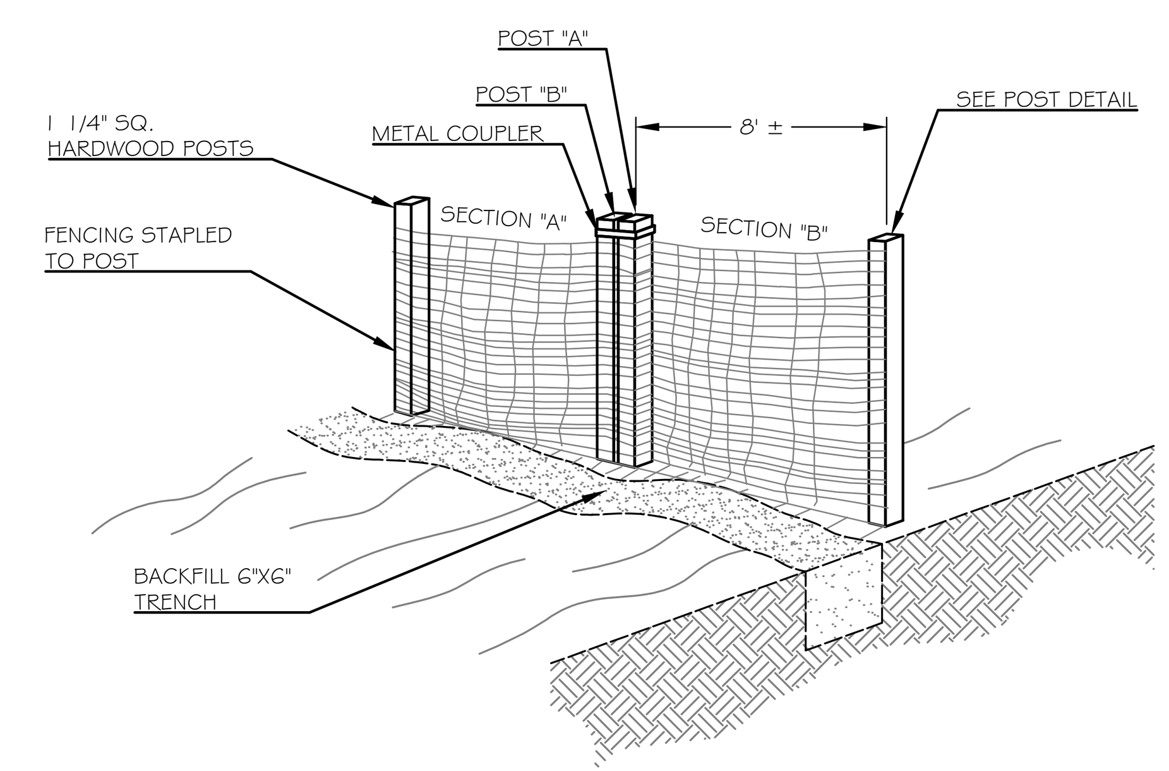
1 / C3.0 — EROSION AND SEDIMENTATION CONTROL NOTES
NOT TO SCALE

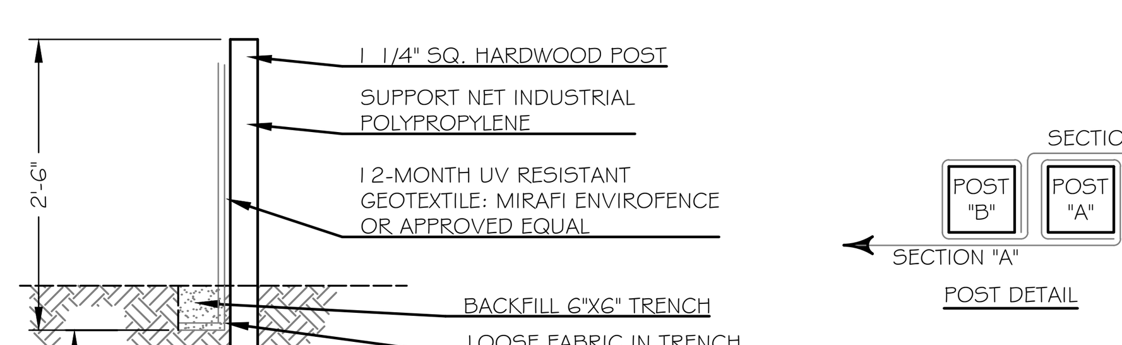
INSTALLATION INSTRUCTIONS:

1. TURF REINFORCEMENT MAT (TRM) MATERIAL SHALL BE ENKAMAT 7020, OR APPROVED EQUAL.
2. EROSION CONTROL BLANKET (ECB) SHALL BE BIONET S75BN SINGLE NET STRAW BLANKET BY NORTH AMERICAN GREEN OR APPROVED EQUAL.
3. FOR TRM INSTALLATION ONLY:
   3.1. APPLY 2" OF LOAM ONTO THE GROUND SURFACE.
   3.2. OVER TOP THE 2" OF LOAM, UNROLL MAT IN THE DIRECTION OF WATER FLOW.
4. MAT SHOULD LIE FLAT. DO NOT STRETCH MAT OVER GROUND. STRETCHING MAY CAUSE MAT TO BRIDGE DEPRESSIONS IN THE SURFACE AND ALLOW EROSION UNDERNEATH.
5. BURY TRANSVERSE TERMINAL ENDS OF MAT TO SECURE AND PREVENT EROSIVE FLOW UNDERNEATH.
6. SECURE MAT SNUGLY INTO ALL TRANSVERSE CHECK SLOTS.
7. BACKFILL AND COMPACT TRENCHES AND CHECK SLOTS AFTER STAKING THE MAT IN BOTTOM OF TRENCH.
8. OVERLAP ROLL ENDS BY THREE (3) FEET (MIN.) WITH UPSLOPE MAT ON TOP TO PREVENT UPLIFT OF MAT END BY WATER FLOW. IF INSTALLING IN THE DIRECTION OF A CONCENTRATED WATER FLOW, START NEW ROLLS IN A TRANSVERSE DITCH.
9. OVERLAP ADJACENT EDGES OF MAT BY THREE (3) INCHES (MIN.) AND STAKE.
10. USE WOOD STAKES OR STAPLES FOR PINNING MAT TO THE GROUND SURFACE, PER MANUFACTURER'S RECOMMENDATIONS.
11. IN ALL TRANSVERSE TERMINAL TRENCHES AND CHECK SLOTS, STAKE EACH MAT AT ITS CENTER AND OVERLAP EDGES BEFORE BACKFILLING AND COMPACTING.
12. STAKE OVERLAPS LONGITUDINALLY AT THREE (3) TO FIVE (5) FOOT INTERVALS.
13. WORK ADDITIONAL LOAM INTO THE MAT AND COVER THE MAT SURFACE WITH 1" OF LOAM, THEN SEED AND MULCH.



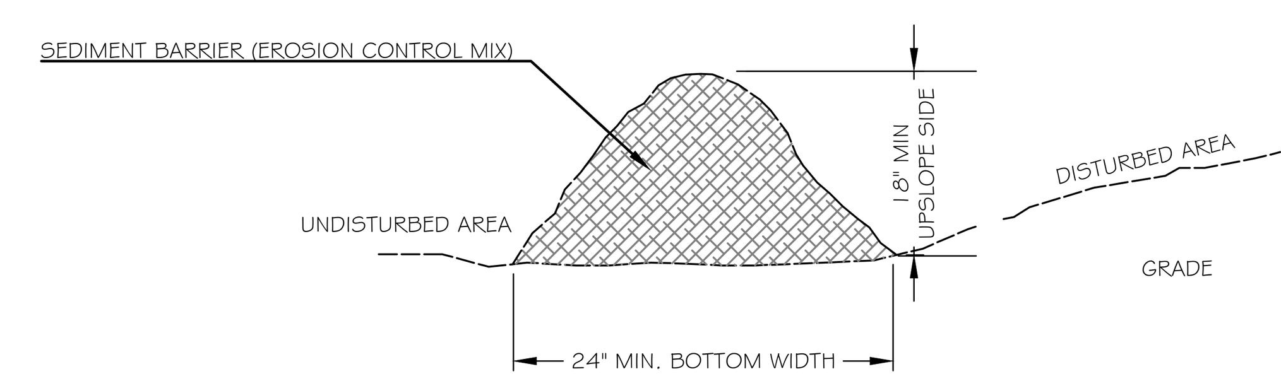
2 / C3.0 — STRAW MATTING (ECB) AND TRM EROSION CONTROL
NOT TO SCALE





NOTES:
1. INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
2. SILT FENCE SHALL BE MAINTAINED CONTINUALLY THROUGHOUT THE ENTIRE CONSTRUCTION CYCLE.
3. OPTIONALLY, A 2' WIDE BY 1' HIGH WINDROW OF EROSION CONTROL MIX MAY BE USED.

3 / C3.0 — PREFABRICATED SILT FENCE
NOT TO SCALE



NOTES

1. THE EROSION CONTROL MIX SHALL CONTAIN A WELL GRADED MIXTURE OF PARTICLE SIZES AND MAY CONTAIN ROCKS LESS THAN 4" DIAMETER. EROSION CONTROL MIX MUST BE FREE OF REFUSE, PHYSICAL CONTAMINANTS, AND MATERIAL TOXIC TO PLANT GROWTH.
2. MATERIAL SHALL MEET THE FOLLOWING REQUIREMENTS
   A. THE ORGANIC CONTENT SHALL BE BEWTEEN 80 AND 100% DRY WEIGHT BASIS
   B. PARTICLE SIZE BY WIEGHT SHALL BE 100% PASSING A 6" SCREEN AND A MAXIMUM OF 85% PASSING A 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 <4.0 MMHOS/CM
   F. THE pH SHOULD FALL BETWEEN 5.0 AND 8.0
3. PLACE BARRIER ALONG A RELATIVELY FLAT CONTOUR. CUT TALL GRASSES OR WOODY VEGETATION TO AVOID CREATING VOIDS AND BRIDGES WHERE FINES CAN WASH UNDER THE BARRIER THROUGH GRASS BLADES AND BRANCHES.
4. PLACEMENT OF BARRIER SHOULD BE:
   - AT TOE OF THE SLOPE.
   - FROZEN GROUND, BEDROCK OR ROOTED FORESTED AREAS.
   - THE EDGE OF GRAVEL AND AREAS UNDER CONSTRUCTION.
5. BARRIER SHALL NOT BE USED ADJACENT TO WETLANDS
6. REMOVE SEDIMENT DEPOSITS WHEN THEY REACH APPROXIMATELY ONE HALF THE HEIGHT OF THE BARRIER.
7. WHEN BARRIER IS DECOMPOSED, CLOGGED WITH SEDIMENT, ERODED OR INEFFECTIVE, IT MUST BE REPLACED OR REPAIRED. THE BARRIER SHOULD BE RESHAPED AS NECESSARY.

4 / C3.0 — SEDIMENT BARRIER (EROSION CONTROL MIX)
NOT TO SCALE

STATE OF MAINE — SILAS W. CANAVAN — No. 12639 — 3/25/19 — LICENSED PROFESSIONAL ENGINEER

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PROJECT
Classroom & Community Hall Addition
Friends School of Portland
11 US Route 1
Cumberland, ME 04021

Friends School of Portland — inquiry, reflection, & action

STRUCTURAL
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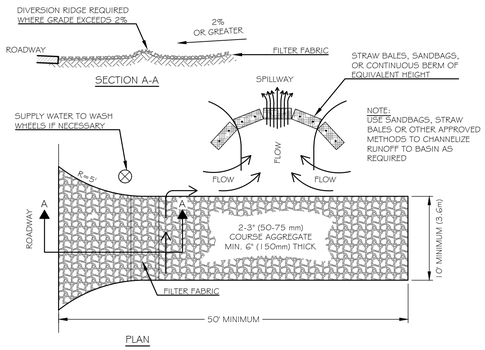
ISSUE NO.	DESCRIPTION	CH ID	CHANGE NAME	DATE
A	PRICING SET			09/20/18
B	FOR SFM PERMIT			10/02/18
C	FOR CD COORD			12/21/18
D	FOR CONSTRUCTION			02/22/19
E	SUBMITTED FOR PERMITTING			02/27/19
F	SUBMITTED FOR TOWN PERMITTING			03/25/19

FOR SFM PERMIT

PROJECT NO:	FSP2
DESIGNED BY:	NGC
DRAWN BY:	CAR/JWG
PHASE:	PERMITTING

SITE DETAILS
C3.0

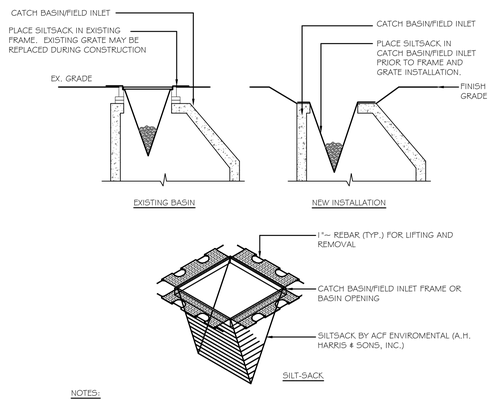


NOTES:

1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAYS. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEAN OUT OF ANY MEASURES USED TO TRAP SEDIMENT.
2. WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY.
3. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS ONTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.

1 / C3.1 — STABILIZED CONSTRUCTION ENTRANCE

NOT TO SCALE

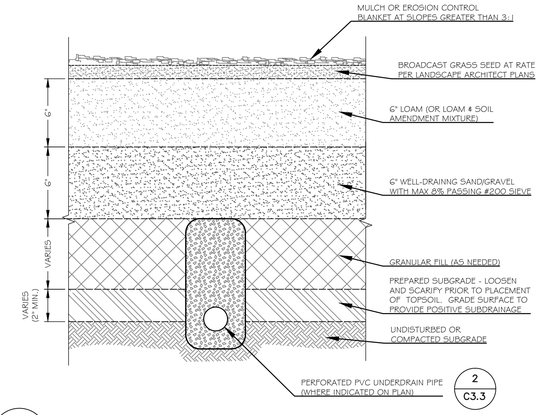


NOTES:

1. INSTALLATION PER MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS.
2. EMPTY AND REMOVE SEDIMENT FROM SILTSACK WHEN RESTRAINT CORD IS NO LONGER VISIBLE. CLEAN, RINSE AND REPLACE AS NEEDED.
3. CONTRACTOR SHALL INSPECT CATCH BASIN PROTECTION AFTER EACH MAJOR STORM EVENT AND CLEAN SILT AS NEEDED.
4. CIRCULAR UNITS SHALL BE USED FOR CIRCULAR CATCH BASIN GRATES.

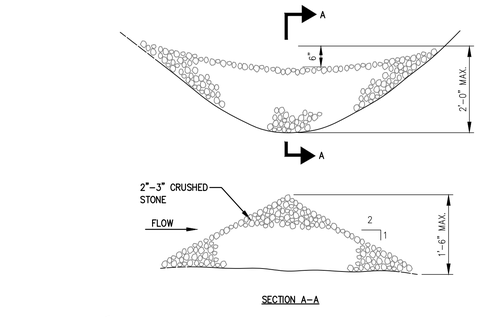
2 / C3.1 — CATCH BASIN PROTECTION DETAIL

NOT TO SCALE



3 / C3.1 — LOAM AND SEED DETAIL

NOT TO SCALE

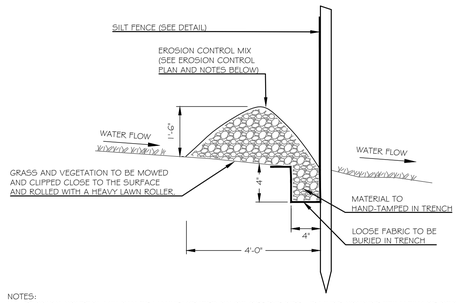


NOTE:

L = THE DISTANCE SUCH THAT POINTS 'A' AND 'B' ARE OF EQUAL ELEVATION.

4 / C3.1 — TEMP. STONE CHECK DAM DETAIL

NOT TO SCALE

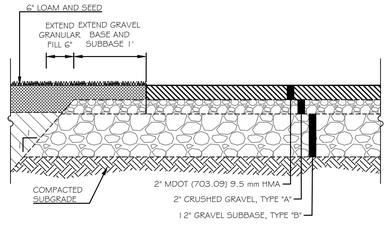


NOTES:

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, BARRIER MUST CONFORM TO THE ABOVE DIMENSIONS. ON THE LONGER OR STEEPER SLOPES, BARRIER SHOULD BE WIDER TO ACCOMODATE THE ADDITIONAL FLOW.
3. THE BARRIER MUST BE PLACED ALONG A RELATIVELY LEVEL CONTOUR. 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 BMPS 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. 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.

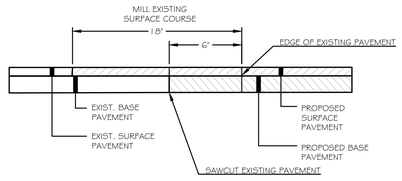
8 / C3.1 — EROSION CONTROL MIX SEDIMENT BARRIER

NOT TO SCALE



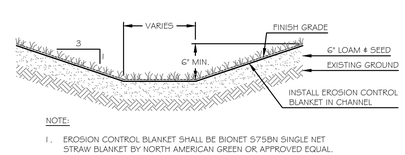
5 / C3.1 — PAVED SIDEWALK SECTION

NOT TO SCALE



6 / C3.1 — HMA PAVEMENT BUTT JOINT DETAIL

NOT TO SCALE

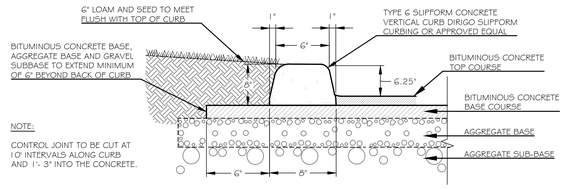


NOTE:

1. EROSION CONTROL BLANKET SHALL BE BIONET S75BN SINGLE NET STRAW BLANKET BY NORTH AMERICAN GREEN OR APPROVED EQUAL.

7 / C3.1 — TYPICAL GRASS SWALE SECTION

NOT TO SCALE

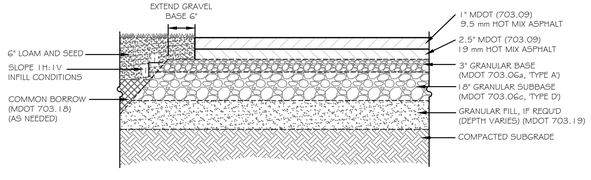


NOTE:

CONTROL JOINT TO BE CUT AT 10' INTERVALS ALONG CURB AND 1"- 3" INTO THE CONCRETE.

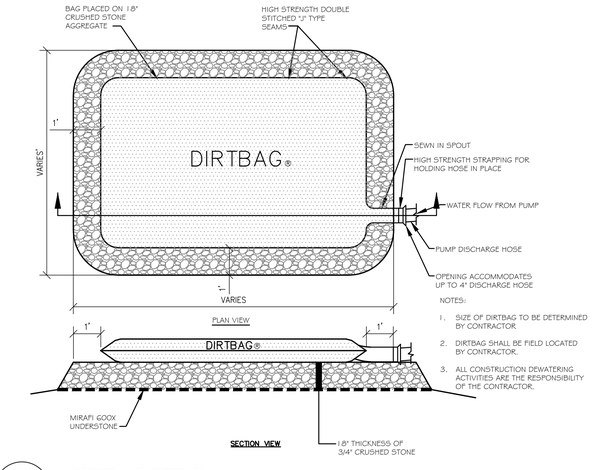
9 / C3.1 — VERTICAL CURB DETAIL (SLIPFORM CONCRETE)

NOT TO SCALE



10 / C3.1 — BITUMINOUS CONCRETE PAVEMENT SECTION

NOT TO SCALE



NOTES:

1. SIZE OF DIRTBAG TO BE DETERMINED BY CONTRACTOR
2. DIRTBAG SHALL BE FIELD LOCATED BY CONTRACTOR.
3. ALL CONSTRUCTION DEWATERING ACTIVITIES ARE THE RESPONSIBILITY OF THE CONTRACTOR.

11 / C3.1 — 'DIRTBAG' DETAIL

NOT TO SCALE

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PROJECT

Classroom & Community Hall Addition

Friends School of Portland
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Cumberland, ME 04021

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LANDSCAPE
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Mechanical & Plumbing
Integrated Energy Systems, PLLC
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Falmouth, ME 04105
p: 207-781-4263

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FOR SFM PERMIT

PROJECT NO:	FSP2
DESIGNED BY:	NGC
DRAWN BY:	CAR/JWG
PHASE:	PERMITTING

STATE OF MAINE
SILAS W. CANAVAN
No. 12639
3/25/19
LICENSED PROFESSIONAL ENGINEER

SITE DETAILS
C3.1

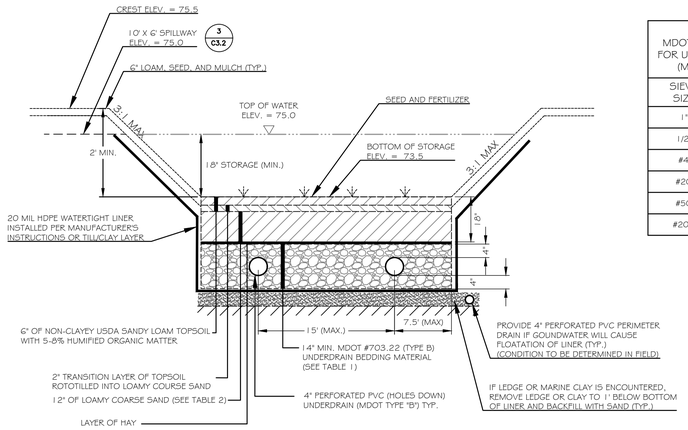


TABLE 1 MDOT SPECIFICATIONS FOR UNDERDRAIN TYPE B (MDOT #703.22)	
SIEVE SIZE	% BY WEIGHT
1"	90-100
1/2"	75-100
#4	50-100
#20	15-80
#50	0-15
#200	0-5

TABLE 2 MDEP LOAMY COARSE SAND GRADATION	
SIEVE SIZE	% BY WEIGHT
#10	85-100
#20	70-100
#60	15-40
#200	8-15
#200 CLAY SIZE	<2%

TABLE 3 SPECIFICATIONS FOR SANDY LOAM TO FINE SANDY LOAM	
SIEVE SIZE	% BY WEIGHT
#4	75-95
#10	60-90
#40	35-85
#200	20-70
#200 CLAY	<2.0

GRASSED UNDERDRAINED SOIL FILTER SCHEDULE	
UNDERDRAIN INVERT	70.83
UNDERDRAIN OUTLET INVERT	70.75
FILTER AREA (SQ. FT.)	1024
FILTER VOLUME (CU. FT.)	2118

GRASSED UNDERDRAINED SOIL FILTER NOTES:

1. THE SOIL BED SHALL BE 18" IN DEPTH AND CONSIST OF THE FOLLOWING:
   - 6" OF NON-CLAYEY USDA SANDY LOAM TOPSOIL WITH 5-8% HUMIFIED ORGANIC MATTER
   - 12" OF LOAMY COARSE SAND
2. BOTTOM 2" OF SANDY LOAM TOPSOIL SHALL BE ROTOTILLED INTO TOP SURFACE OF LOAMY COARSE SAND TO CREATE TRANSITION ZONE.
3. THE SOIL BED MATERIAL SHALL BE LIGHTLY COMPACTED (90% TO 92% STANDARD PROCTOR) USING WATER. IF HEAVY COMPACTION OCCURS, ROTOTILL AGAIN PRIOR TO SEEDING OR SODDING.
4. A 1" LAYER OF HAY SHALL BE PLACED BETWEEN THE BOTTOM OF THE SOIL BED AND THE TOP OF THE UNDERDRAIN MATERIAL.
5. THE FILTER SHOULD BE SEEDED WITH THE FOLLOWING SEED MIXTURE:
   - CREEPING RED FESCUE: 20LBS/ACRE
   - TALL FESCUE: 20LBS/ACRE
   - BIRDSFOOT TREFOIL: 8LBS/ACRE
   - TOTAL: 48LBS/ACRE
6. REFER TO GRADING PLANS FOR UNDERDRAIN LAYOUT.
7. THE MAXIMUM DISTANCE BETWEEN UNDERDRAIN PIPES SHALL BE 15 FEET.
8. GRASSED UNDERDRAINED SOIL FILTER MEDIA SHALL NOT BE INSTALLED UNTIL THE TRIBUTARY AREA HAS BEEN PERMANENTLY STABILIZED.

CONSTRUCTION OVERSIGHT

THE APPLICANT WILL RETAIN THE SERVICES OF A PROFESSIONAL ENGINEER TO INSPECT THE CONSTRUCTION AND STABILIZATION FOR ALL STORMWATER MANAGEMENT STRUCTURES. IF NECESSARY, THE INSPECTING ENGINEER WILL INTERPRET THE POND'S CONSTRUCTION PLAN FOR THE CONTRACTOR. ONCE ALL STORMWATER MANAGEMENT STRUCTURES ARE CONSTRUCTED AND STABILIZED, THE INSPECTING ENGINEER WILL NOTIFY THE DEPARTMENT IN WRITING WITHIN 30 DAYS TO STATE THAT THE POND HAS BEEN COMPLETED. ACCOMPANYING THE ENGINEER'S NOTIFICATION MUST BE A LOG OF THE ENGINEER'S INSPECTIONS GIVING THE DATE OF EACH INSPECTION, THE TIME OF EACH INSPECTION, AND THE ITEMS INSPECTED ON EACH VISIT, AND INCLUDE ANY TESTING DATA OR SIEVE ANALYSIS DATA OF EERY MINERAL SOIL AND SOIL MEDIA SPECIFIED IN THE PLANS AND USED ON SITE.

CONSTRUCTION SEQUENCE: THE SOIL FILTER MEDIA AND VEGETATION MUST NOT BE INSTALLED UNTIL THE AREA THAT DRAINS TO THE FILTER AS BEEN PERMANENTLY STABILIZED WITH PAVEMENT OR OTHER STRUCTURE, 90% VEGETATION COVER, OR OTHER PERMANENT STABILIZATION UNLESS RUNOFF FROM THE CONTRIBUTING DRAINAGE AREA IS DIVERTED AROUND THE FILTER UNTIL STABILIZATION IS COMPLETED.

COMPACTION OF SOIL FILTER: FILTER SOIL MEDIA AND UNDERDRAIN BEDDING MATERIAL MUST BE COMPACTED TO BETWEEN 90% AND 92% STANDARD PROCTOR. THE BED SHOULD BE INSTALLED IN AT LEAST 2 LIFTS OF 9 INCHES TO PREVENT POCKETS OF LOOSE MEDIA.

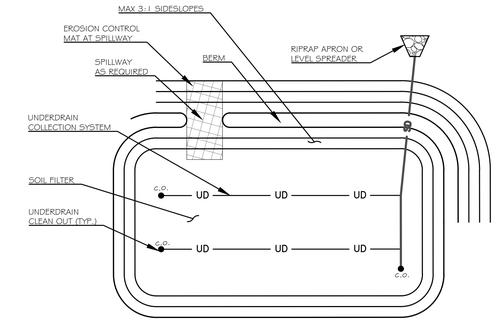
CONSTRUCTION INSPECTIONS: AT A MINIMUM, THE PROFESSIONAL ENGINEER'S INSPECTION WILL OCCUR:

- AFTER THE THE FILTER HAS BEEN CONSTRUCTED TO SUBGRADE.
- AFTER INSTALLATION OF THE FILTER LINER.
- AFTER INSTALLATION OF THE UNDERDRAIN PIPES HAVE BEEN INSTALLED BUT NOT BACKFILLED.
- AFTER THE DRAINAGE LAYER IS CONSTRUCTED AND PRIOR TO INSTALLATION OF THE SOIL FILTER MEDIA.
- AFTER THE SOIL FILTER MEDIA HAS BEEN INSTALLED, SEEDED AND MULCHED.
- AFTER ONE YEAR TO INSPECT VEGETATION AND MAKE CORRECTIONS.
- 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.

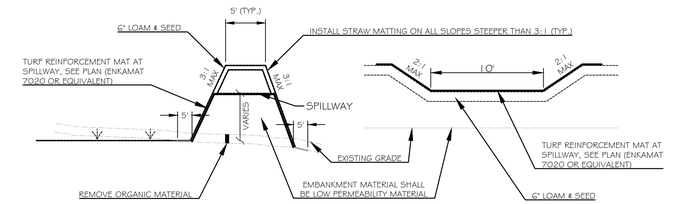
TESTING AND SUBMITTALS: THE CONTRACTOR SHALL IDENTIFY THE LOCATION OF THE SOURCE OF EACH COMPONENT OF THE FILTER MEDIA. ALL RESULTS OF FIELD AND LABORATORY TESTING SHALL BE SUBMITTED TO THE PROJECT ENGINEER FOR CONFIRMATION. THE CONTRACTOR SHALL:

- SUBMIT 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.
- PERFORM A PERMEABILITY TEST ON THE SOIL FILTER MEDIA MIXTURE CONFORMING TO ASTM D2434 WITH THE MIXTURE COMPACTED TO 90-92% OF MAXIMUM DRY DENSITY BASED ON ASTM D698.

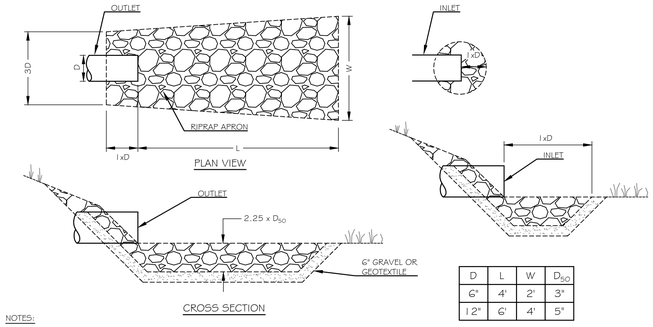
1 / C3.2 — GRASSED UNDERDRAIN SOIL FILTER TYPICAL CROSS SECTION
NOT TO SCALE



2 / C3.2 — UNDERDRAINED SOIL FILTER TYPICAL PLAN DETAIL
NOT TO SCALE



3 / C3.2 — TYPICAL EMBANKMENT/SPILLWAY DETAIL
NOT TO SCALE

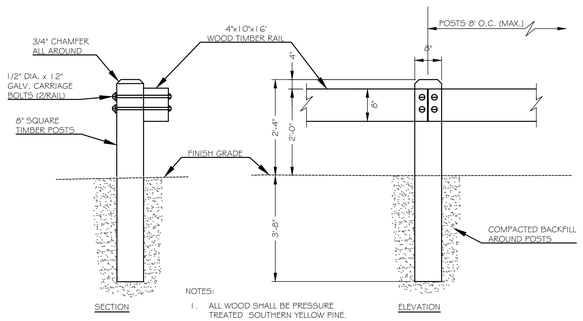


D	L	W	D50
6"	4'	2'	3"
12"	6'	4'	5"

NOTES:

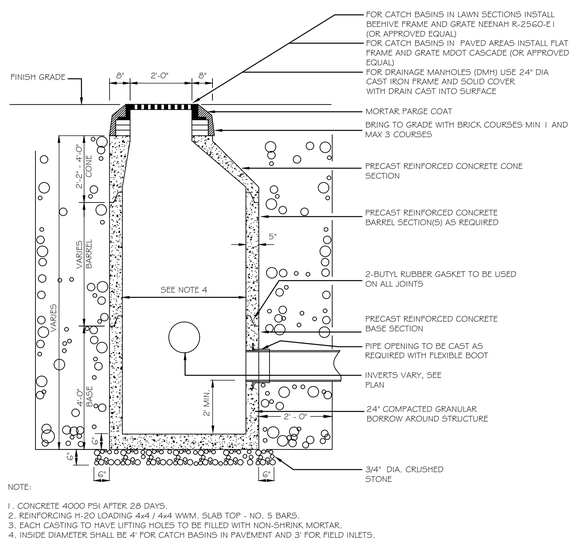
1. USE D_{50} NOTED ON TABLE UNLESS OTHERWISE SPECIFIED ON PLANS.
2. UNDERLAY RIPRAP WITH 6" OF GRAVEL OR GEOTEXTILE
3. USE WIDTHS NOTED ABOVE OR CONFORM TO NATURAL CHANNEL OR TOPOGRAPHY.
4. RIPRAP INLET PROTECTION SHALL BE A CIRCULAR APRON WITH A RADIUS OF 1X THE PIPE DIAMETER.

4 / C3.2 — RIPRAP APRON
NOT TO SCALE



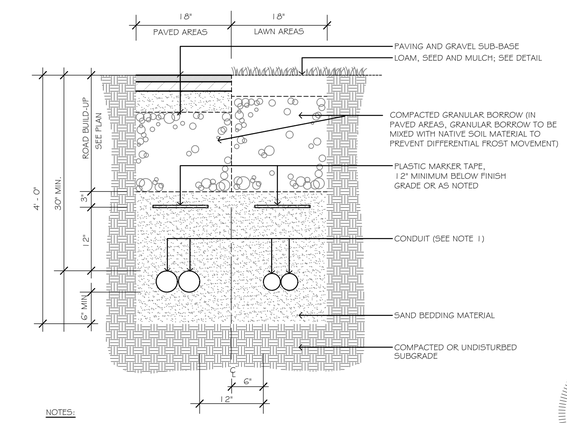
NOTES:
1. ALL WOOD SHALL BE PRESSURE TREATED SOUTHERN YELLOW PINE.

5 / C3.2 — WOODEN TIMBER GUARD RAIL SECTION
NOT TO SCALE



NOTE:
1. CONCRETE 4000 PSI AFTER 28 DAYS.
2. REINFORCING H-20 LOADING 4x4 / 4x4 WWM, SLAB TOP - NO. 5 BARS.
3. EACH CASTING TO HAVE LIFTING HOLES TO BE FILLED WITH NON-SHRINK MORTAR.
4. INSIDE DIAMETER SHALL BE 4' FOR CATCH BASINS IN PAVEMENT AND 3' FOR FIELD INLETS.

6 / C3.2 — PRECAST CONCRETE CATCH BASIN / DRAINAGE MANHOLE (ONSITE)
NOT TO SCALE



NOTES:
1. COORDINATE NUMBER & SIZE OF CONDUITS WITH ELECTRICAL PLANS.
2. ALL WORK SHALL COMPLY WITH THE RESPECTIVE UTILITY COMPANY STANDARDS.
3. SEE UTILITIES PLANS FOR CONDUIT LOCATIONS.
4. CONTRACTOR TO PROVIDE 1/4" POLYPROPYLENE PULL ROPES IN ALL CONDUITS.
5. CONTRACTOR SHALL PROVIDE PULL BOXES WHERE NECESSARY.
6. CONTRACTOR SHALL VERIFY CONDUIT SIZE AND QUANTITY WITH APPLICABLE UTILITY COMPANIES PRIOR TO CONSTRUCTION.

7 / C3.2 — UNDERGROUND UTILITY TRENCH SECTION
NOT TO SCALE

STATE OF MAINE — SILAS W. CANAVAN — No. 12639 — 3/25/19 — LICENSED PROFESSIONAL ENGINEER

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FOR SFM PERMIT

PROJECT NO:	FSP2
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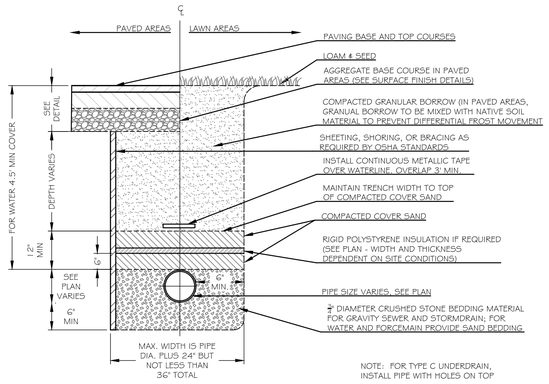
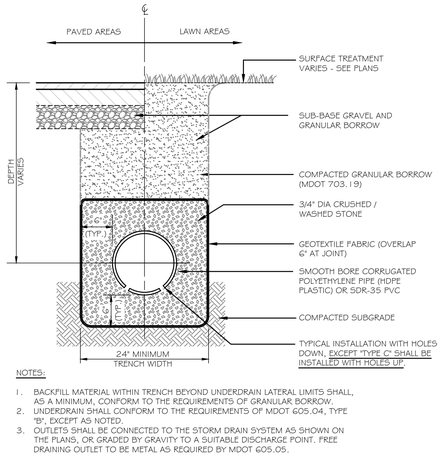
DRAWN BY:	CAR/JWG
PHASE:	PERMITTING

SITE DETAILS
C3.2



1 C3.3 TYPICAL PIPE TRENCHING DETAIL

NOT TO SCALE

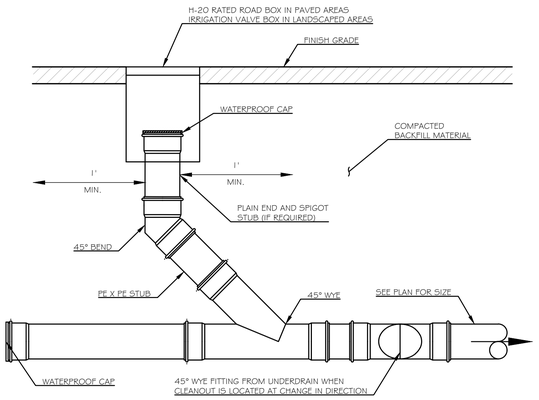


NOTES:

1. BACKFILL MATERIAL WITHIN TRENCH BEYOND UNDERDRAIN LATERAL LIMITS SHALL, AS A MINIMUM, CONFORM TO THE REQUIREMENTS OF GRANULAR BORROW.
2. UNDERDRAIN SHALL CONFORM TO THE REQUIREMENTS OF MDOT 605.04, TYPE 'B', EXCEPT AS NOTED.
3. OUTLETS SHALL BE CONNECTED TO THE STORM DRAIN SYSTEM AS SHOWN ON THE PLANS, OR GRADED BY GRAVITY TO A SUITABLE DISCHARGE POINT. FREE DRAINING OUTLET TO BE METAL AS REQUIRED BY MDOT 605.05.

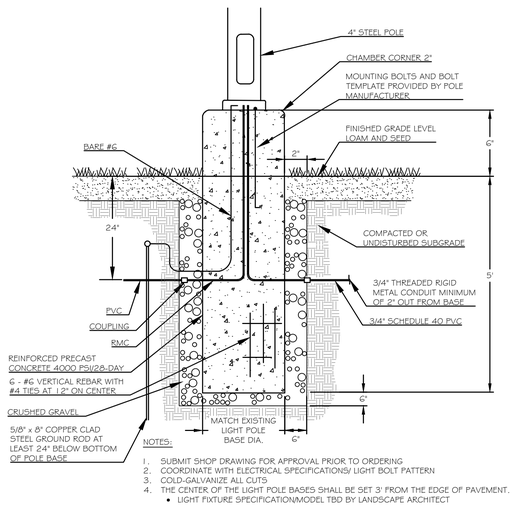
2 C3.3 UNDERDRAIN TRENCH DETAIL

NOT TO SCALE



3 C3.3 UNDERDRAIN CLEANOUT

NOT TO SCALE

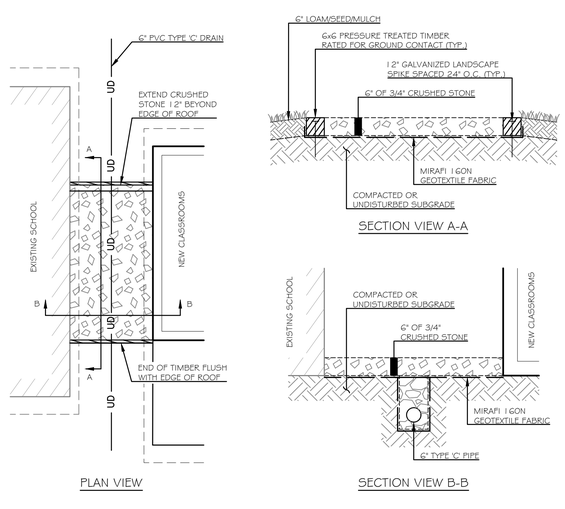


NOTES:

1. SUBMIT SHOP DRAWING FOR APPROVAL PRIOR TO ORDERING
2. COORDINATE WITH ELECTRICAL SPECIFICATIONS/ LIGHT BOLT PATTERN
3. COLD-GALVANIZE ALL CUTS
4. THE CENTER OF THE LIGHT POLE BASES SHALL BE SET 3' FROM THE EDGE OF PAVEMENT.
   - LIGHT FIXTURE SPECIFICATION/MODEL TBD BY LANDSCAPE ARCHITECT

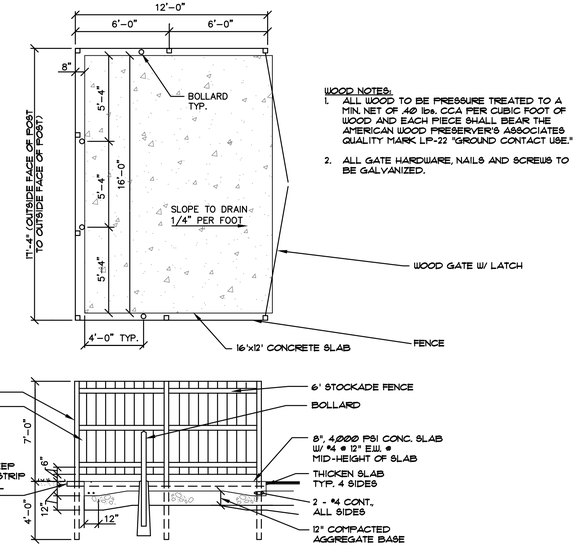
4 C3.3 CONCRETE LIGHT POLE BASE DETAIL

NOT TO SCALE



5 C3.3 CRUSHED STONE SURFACE DETAIL

NOT TO SCALE

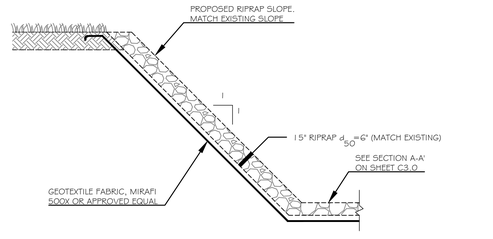


WOOD NOTES:

1. ALL WOOD TO BE PRESSURE TREATED TO A MIN. RET OF 40 lbs. CCA PER CUBIC FOOT OF WOOD AND EACH PIECE SHALL BEAR THE AMERICAN WOOD PRESERVER'S ASSOCIATES QUALITY MARK LP-22 "GROUND CONTACT USE."
2. ALL GATE HARDWARE, NAILS AND SCREWS TO BE GALVANIZED.

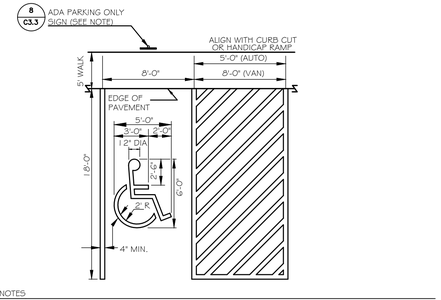
5 C3.3 DUMPSTER PAD DETAIL

NOT TO SCALE



6 C3.3 RIP-RAP SLOPE INSTALLATION DETAIL

NOT TO SCALE

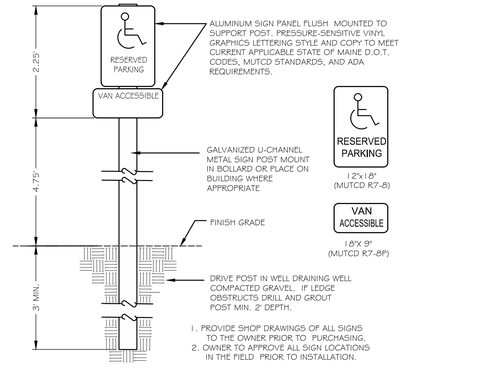


NOTES

1. ALL ACCESSIBLE PARKING SPACE SIGNS SHALL BE MUTCD R7-8, ' VAN ACCESSIBLE' PLAQUES (MUTCD R7-8P) SHALL BE PROVIDED FOR ALL SPACES WITH AN 8' WIDE (OR WIDER) AISLE
2. PAINT ALL PAVEMENT STRIPES AND LINES 4 INCHES WIDE (TYP.)
3. ALL ACCESSIBLE PARKING SPACES SHALL MEET MOST RECENT ADA STANDARDS FOR ACCESSIBLE DESIGN
4. VERIFY THAT ALL PARKING SPACES AND ACCESS AISLES DO NOT EXCEED 2% GRADE IN ANY DIRECTION

7 C3.3 ACCESSIBLE PARKING STALL DETAIL

NOT TO SCALE



1. PROVIDE SHOP DRAWINGS OF ALL SIGNS TO THE OWNER PRIOR TO PURCHASING.
2. OWNER TO APPROVE ALL SIGN LOCATIONS IN THE FIELD PRIOR TO INSTALLATION.

8 C3.3 SIGNAGE DETAIL

NOT TO SCALE

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FOR SFM PERMIT

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DRAWN BY:	CAR/JWG
PHASE:	PERMITTING

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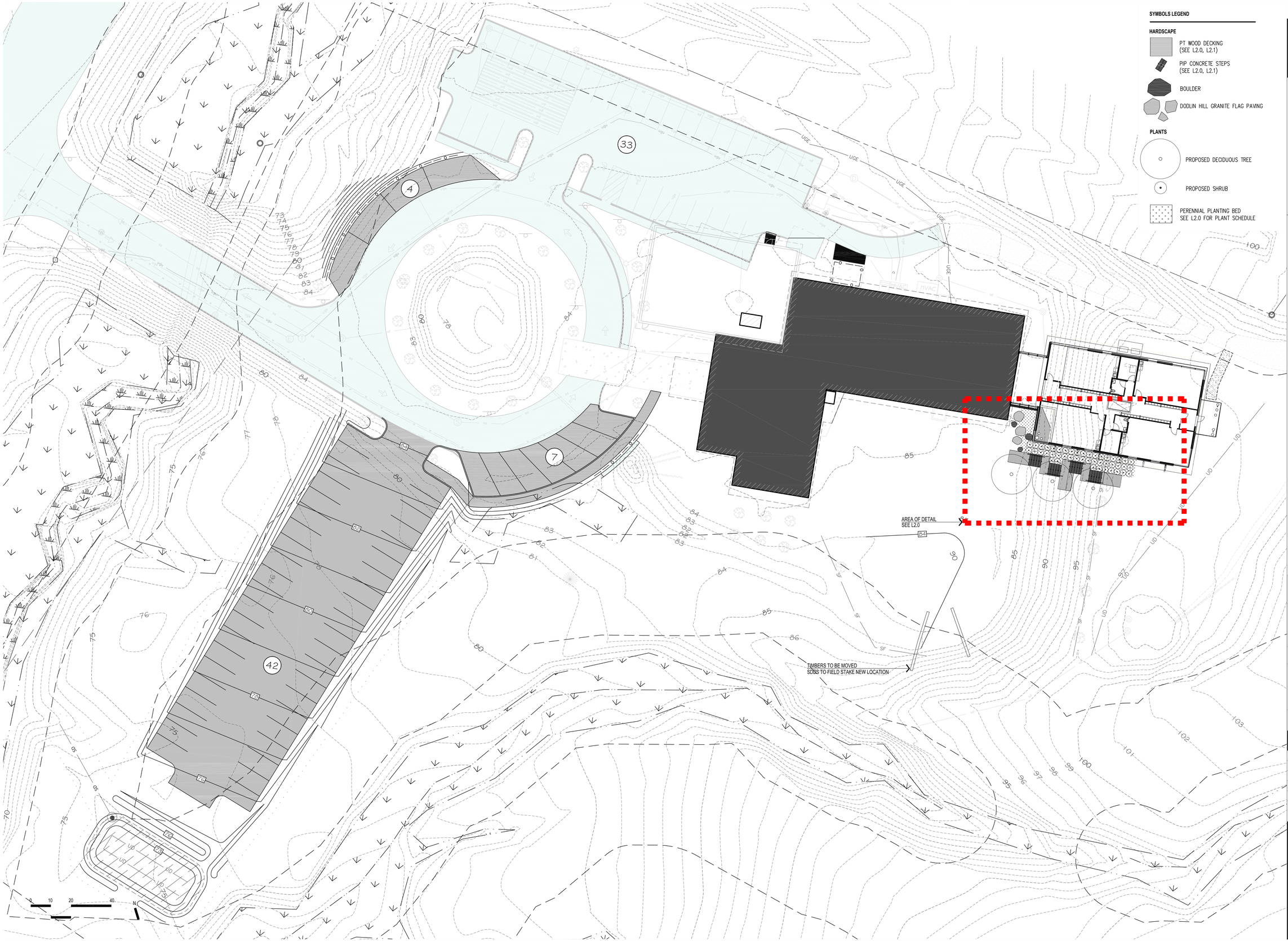

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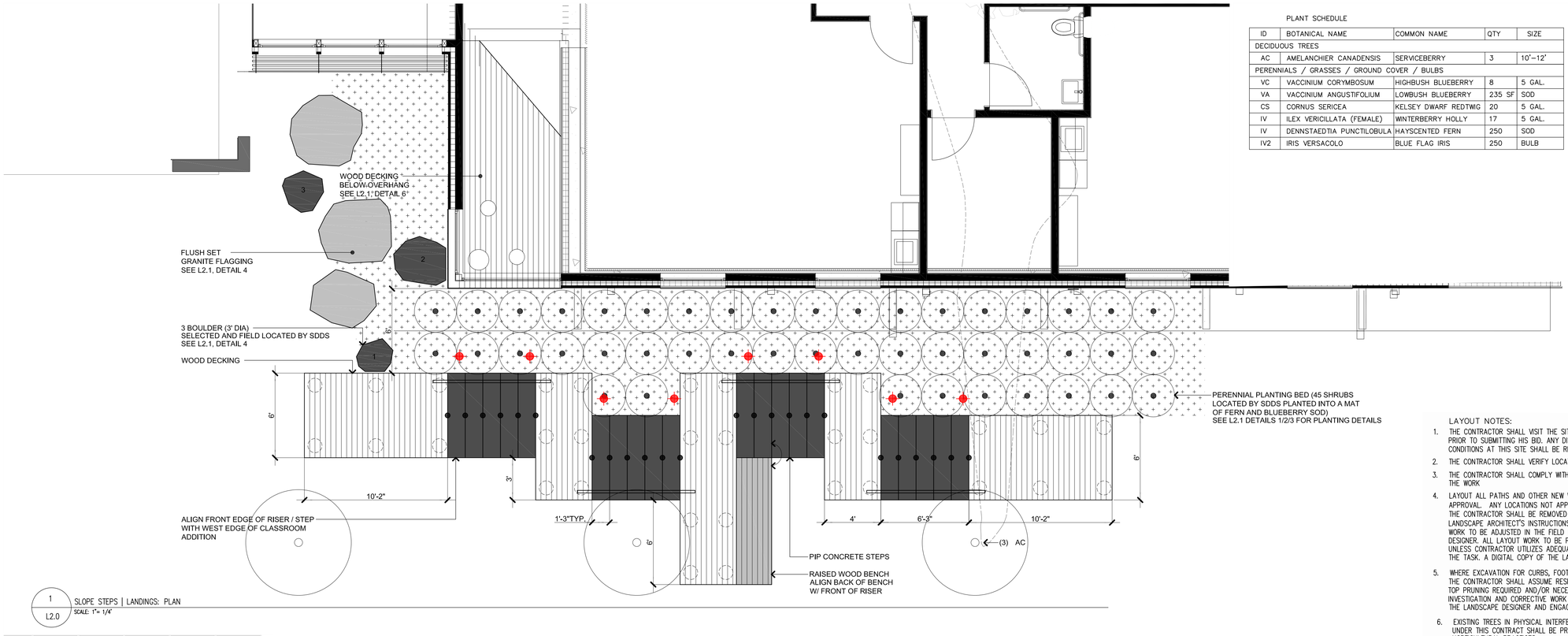
FOR CONSTRUCTION

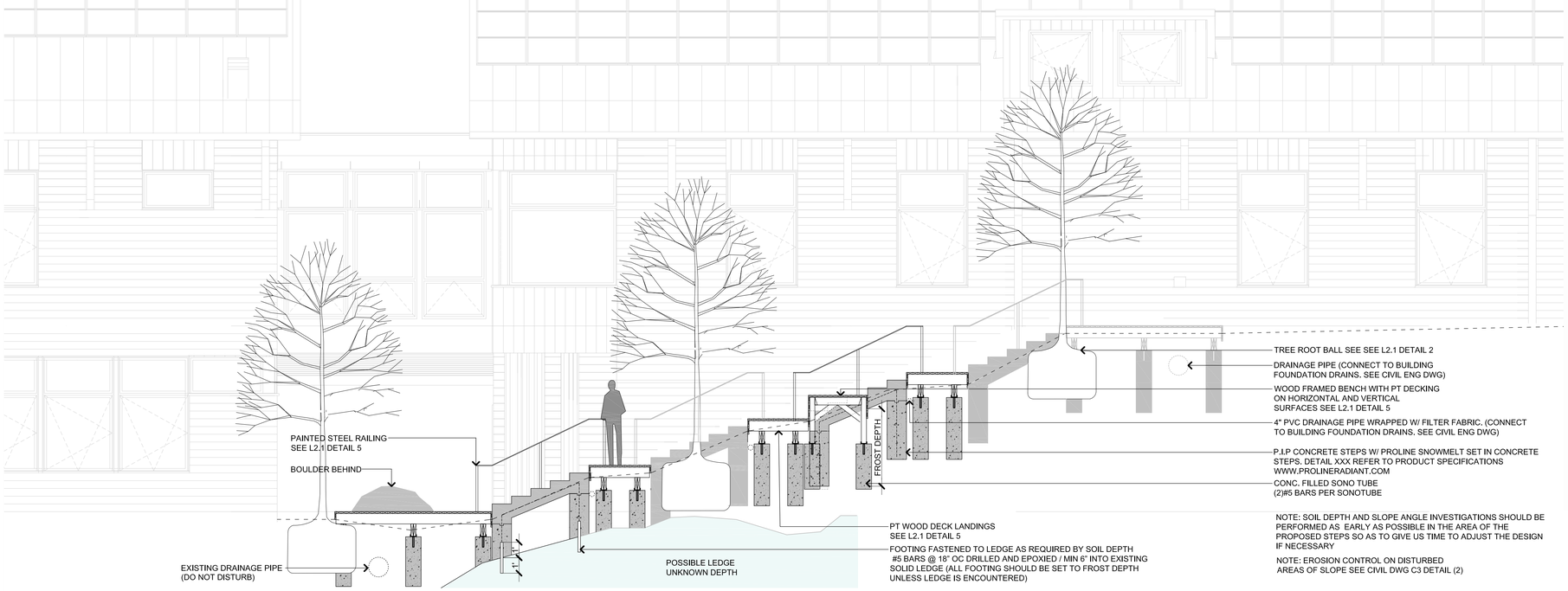
PROJECT NO:	FSP2
DATE:	
DESIGNED BY:	SD
DRAWN BY:	SD
PHASE:	CONSTRUCTION DOCUMENTS

LANDSCAPE KEY PLAN

L1.0



1 / L2.0 SLOPE STEPS | LANDINGS: PLAN
SCALE: 1"= 1/4"



NOTE: SOIL DEPTH AND SLOPE ANGLE INVESTIGATIONS SHOULD BE PERFORMED AS EARLY AS POSSIBLE IN THE AREA OF THE PROPOSED STEPS SO AS TO GIVE US TIME TO ADJUST THE DESIGN IF NECESSARY

NOTE: EROSION CONTROL ON DISTURBED AREAS OF SLOPE SEE CIVIL DWG C3 DETAIL (2)

2 / L2.0 SLOPE STEPS | LANDINGS: SECTION ELEVATION
SCALE: 1"= 1/4"

PLANT SCHEDULE

ID	BOTANICAL NAME	COMMON NAME	QTY	SIZE
DECIDUOUS TREES				
AC	AMELANCHIER CANADENSIS	SERVICEBERRY	3	10'–12'
PERENNIALS / GRASSES / GROUND COVER / BULBS				
VC	VACCINIUM CORYMBOSUM	HIGHBUSH BLUEBERRY	8	5 GAL.
VA	VACCINIUM ANGUSTIFOLIUM	LOWBUSH BLUEBERRY	235 SF	SOD
CS	CORNUS SERICEA	KELSEY DWARF REDTWIG	20	5 GAL.
IV	ILEX VERICILLATA (FEMALE)	WINTERBERRY HOLLY	17	5 GAL.
IV	DENNSTAEDTIA PUNCTILOBULA	HAYSCENTED FERN	250	SOD
IV2	IRIS VERSACOLO	BLUE FLAG IRIS	250	BULB

SYMBOLS LEGEND

HARDSCAPE

- PT WOOD DECKING (SEE L2.0, L2.1)
- PIP CONCRETE STEPS (SEE L2.0, L2.1)
- BOULDER
- DODLIN HILL GRANITE FLAG PAVING

PLANTS

- PROPOSED DECIDUOUS TREE
- PROPOSED SHRUB
- PERENNIAL PLANTING BED SEE L2.0 FOR PLANT SCHEDULE

LIGHT FIXTURE LEGEND

- 8– PATH LIGHT (BK LIGHT–STICK) SEE ELECTRICAL ENGINEER DRAWINGS FOR SPECS. / SWITCHING INFO

LAYOUT NOTES:

1. THE CONTRACTOR SHALL VISIT THE SITE AND FAMILIARIZE HIMSELF WITH THE EXISTING CONDITIONS PRIOR TO SUBMITTING HIS BID. ANY DISCREPANCIES BETWEEN THESE DRAWINGS AND ACTUAL CONDITIONS AT THIS SITE SHALL BE REPORTED TO THE LANDSCAPE DESIGNER (SDDS) IMMEDIATELY.
2. THE CONTRACTOR SHALL VERIFY LOCATIONS OF ALL EXISTING UTILITIES.
3. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE CODES AND REGULATIONS GOVERNING THE WORK
4. LAYOUT ALL PATHS AND OTHER NEW WORK PRIOR TO CONSTRUCTION FOR LANDSCAPE DESIGNERS' APPROVAL. ANY LOCATIONS NOT APPROVED BY THE LANDSCAPE ARCHITECT AND INSTALLED BY THE CONTRACTOR SHALL BE REMOVED AND REPLACED BY THE CONTRACTOR AS PER THE LANDSCAPE ARCHITECT'S INSTRUCTIONS AT NO ADDITIONAL COST TO THE OWNER. LAYOUT OF ALL WORK TO BE ADJUSTED IN THE FIELD TO MEET SITE CONDITIONS AS APPROVED BY THE LANDSCAPE DESIGNER. ALL LAYOUT WORK TO BE PERFORMED BY A LICENSED MAINE LAND SURVEYOR UNLESS CONTRACTOR UTILIZES ADEQUATE INSTRUMENTATION REQUIRED TO ACCURATELY PERFORM THE TASK. A DIGITAL COPY OF THE LAYOUT CAN BE AVAILABLE UPON REQUEST.
5. WHERE EXCAVATION FOR CURBS, FOOTINGS, PAVEMENTS, ETC. IS REQUIRED ADJACENT TO TREES, THE CONTRACTOR SHALL ASSUME RESPONSIBILITY FOR ANY REMEDIAL WORK, SUCH AS ROOT AND TOP PRUNING REQUIRED AND/OR NECESSARY TO PREVENT LOSS OF PLANT MATERIAL. ALL INVESTIGATION AND CORRECTIVE WORK SHALL BE DONE BY A CERTIFIED ARBORIST APPROVED BY THE LANDSCAPE DESIGNER AND ENGAGED BY THE CONTRACTOR.
6. EXISTING TREES IN PHYSICAL INTERFERENCE WITH THE WORK TO BE PERFORMED OR INSTALLED UNDER THIS CONTRACT SHALL BE PRUNED IN ACCORDANCE WITH ACCEPTABLE HORTICULTURAL PRACTICES.
7. CONTRACTOR TO FIELD MEASURE AND VERIFY ALL CONCRETE DIMENSIONS / ANGLES BASED ON AS–BUILT CONDITIONS. SUBMIT SHOP DRAWINGS FOR LANDSCAPE DESIGNER'S REVIEW PRIOR TO ORDERING.
8. SDDS TO FIELD SELECT AND OVERSEE PLACEMENT OF BOULDERS
9. REFER TO CIVIL DRAWINGS FOR ALL SITE DRAINAGE / GRADING
10. REFER TO ARCHITECTS DRAWINGS FOR BUILDING LAYOUT DIMENSIONS AND MATERIALS
11. ALL DISTURBED LAWN AREAS TO BE RE–ESTABLISHES (SEE CIVIL FOR PLANTING SPECIFICATIONS)

PLANTING NOTES

1. THE CONTRACTOR SHALL PREPARE PLANTING ZONES TO THE GRADES AND DEPTHS AS INDICATED ON THE DRAWING.
2. IF THE CONTRACTOR DETERMINES THE SUB–GRADE SOIL CONDITIONS ARE DELETERIOUS TO PLANT GROWTH OR WILL INHIBIT DRAINAGE, THE LANDSCAPE ARCHITECT SHALL BE NOTIFIED IMMEDIATELY AND PRIOR TO INSTALLATION OF PLANT MATERIAL.
3. TOPSOIL SHALL BE FREE FROM SUBSOIL, STONES LARGER THAN 1", OR ANY UNDESIRABLE MATERIAL; CONTAIN 5% ORGANIC MATTER AND HAVE A pH SUITABLE TO THE LOCAL GROWING CONDITIONS.
4. ALL PLANTS TO BE SELECTED AND SEALED IN THE FIELD BY SDDS. OR SELECTED BY THE LANDSCAPE CONTRACTOR, AND APPROVED BY LANDSCAPE ARCHITECT.
5. THE PLANT LIST IS PROVIDED AS A CONVENIENCE TO THE CONTRACTOR. IN THE EVENT OF A DISCREPANCY BETWEEN THE PLANT COUNT SHOWN IN THE SCHEDULE AND THE DRAWING, THE DRAWING SHALL TAKE PRECEDENCE.
6. ALL TRANSPLANTED SHRUBS SHALL BE 'HEELED IN' OR HEAVILY MULCHED IN A SHADED AREA AND WATERED AS NECESSARY UNTIL THEY CAN BE PLANTED.
7. FINAL LOCATION OF ALL PLANTS TO BE DETERMINED IN THE FIELD BY THE LANDSCAPE ARCHITECT PRIOR TO INSTALLATION OF PLANT MATERIAL.
8. PLANTS SHALL BEAR SAME RELATIONSHIP TO FINISHED GRADE AS THE BORE TO EXISTING GRADE IN THE NURSERY.
9. CUT AND REMOVE BURLAP FROM TOP 1/3 OF BALL. CUT AND REMOVE AT LEAST 1/3–1/2 OF WIRE BASKET. NYLON ROPE AND / OR NYLON BALLING MATERIAL IS NOT ACCEPTABLE.
10. PLANT PERENNIALS AND GROUNDCOVER IN 6" DEEP TOPSOIL BED CONSISTING OF 2/3 TOPSOIL AND 1/3 HUMUS.
11. TOPSOIL AND SEED ALL AREAS DISTURBED AS A RESULT OF ANY AND ALL DISTURBANCES, CONSTRUCTION, OR STORAGE OF EQUIPMENT WHETHER SUCH AREAS ARE SHOWN ON THE PLANS OR NOT WITH CONSERVATION MEADOW MIX. (SEE GRADING PLAN L3.0)
12. ALL PLANTS AND ENTIRE SHRUB BEDS TO RECEIVE 6" OF CASSSELA'S ORGANICS OR EQUAL (40% COMPOST / 60% LOAM) AND A 3" LAYER OF DOUBLE SHREDDED HARDWOODBARK MULCH.
13. UPON COMPLETION OF THE ONE (1) YEAR PLANT GUARANTEE PERIOD, THE LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR ADJUSTING OR REMOVING ALL STAKES. THIS SHALL BE DONE IN CONSULTATION WITH THE LANDSCAPE ARCHITECT.
14. ALL TREE PLANTING AND REMOVAL TO COMPLY WITH LOCAL AND STATE TREE ORDINANCES.
15. PLANTING ONLY TO OCCUR DURING MAINE PLANTING SEASON: MAY– JUNE 20TH OR, SEPT–OCT 20TH

Kaplan Thompson Architects
102 Exchange Street
Portland, ME 04101
(207) 842-2888
kaplanthompson.com

PROJECT

Community Hall & Classroom Addition

Friends School of Portland
Cumberland, ME 04021

STRUCTURAL
Casco Bay Engineering
424 Fore Street
Portland, ME 04102
p: 207 842-2800

LANDSCAPE
Soren Deniord Design Studio
43 Wellwood Road
Portland, ME 04103
p: 207-400-2450

ELECTRICAL
Swiftcurrent Engineering Services
10 Forest Falls Drive, Unit 8B
Yarmouth, ME 04096
p: 207-847-9280

CIVIL
Walsh Engineering Associates, Inc.
1 Karen Drive, Suite 2A
Westbrook, ME 04092
p: 207-553-9898

Mechanical & Plumbing
Integrated Energy Systems, PLLC
301 Middle Road
Falmouth, ME 04105
p: 207-781-4263

ISSUE NO.	DESCRIPTION	CH ID	CHANGE NAME	DATE
A	PRICING SET			05/20/18
B	FOR SPM PERMIT			10/02/18
C	FOR CO COORD.			12/21/18
D	FOR CONSTRUCTION			02/22/19

FOR CONSTRUCTION

PROJECT NO:	FSP2
DATE:	
DESIGNED BY:	SD
DRAWN BY:	SD
PHASE:	CONSTRUCTION DOCUMENTS

LANDSCAPE STEPS & LANDINGS: LAYOUT, MATERIALS & PLANTING PLAN

L2.0

PLAN VIEW

Calculation Summary					
Label	**Avg**	**Max**	**Min**	**Avg/Min**	**Max/Min**
SITE	0.49	3.2	0.0	N.A.	N.A.
PARKING	1.29	2.3	0.4	3.2	5.8

Luminaire Schedule (note fixture cataloge numbers are not complete)						
Type	**Symbol**	**Qty**	**Lum. Lumens**	**LLF**	**Lum. Watts**	**Description**
AA		3	8881	0.900	80.52	VP-S-36L-80-4K7-4W
ES4		1	8415	0.900	83.8	VP-S-36NB-80-4K-T2
ES5		4	8331	0.800	82.8	VP-S-36NB-80-4K-T3
ES6		2	8331	0.800	82.8	VP-S-36NB-80-4K-T3

NOTES:
1) EXACT MOUNTING DETAILS TO BE DETERMINED AT JOBSITE BY OTHERS.
2) CALCULATIONS MAY or MAY NOT SHOW THE EFFECT OF SHADOWING CAUSED BY BUILDINGS AND OBJECTS WITHIN THE CALCULATED SPACE OR IN THE SITE AREA.
3) READINGS SHOWN ARE INITIAL HORIZONTAL FOOTCANDLES ON A FLAT SITE WITHOUT REFLECTIONS OR OBSTRUCTIONS UNLESS OTHERWISE INDICATED.
4) THIS CALCULATION IS BASED ON LIMITED INFORMATION SUPPLIED BY OTHERS TO SWANEY LIGHTING ASSOCIATES AND STANDARD ASSUMPTIONS OF THE SPACE AND/OR SITE.
5) CONFORMANCE TO CODES AND OTHER LOCAL REQUIREMENTS AS DETERMINED BY THE AHJ ARE THE RESPONSIBILITY OF THE OWNER AND/OR THE OWNER'S REPRESENTATIVE.
6) THIS LAYOUT DRAWING MUST BE COORDINATED WITH THE SITE LOCATION FOR CORRECT FIXTURE ORIENTATION.
7) DOCUMENTS PRINTED OR PLOTTED FROM ELECTRONIC FILES MAY APPEAR AT OTHER THAN THE DESIRED OR ASSUMED GRAPHIC SCALES. IT IS THE RESPONSIBILITY OF THE RECIPIENT TO VERIFY THAT THE PRINTED OR PLOTTED-TO-SCALE DRAWING IS PRINTED TO SCALE.

TITLE
FRIENDS SCHOOL

LIGHTING LAYOUT

GENERATED FOR:
SWIFTCURRENT

SCALE **NOT TO SCALE**

site 2-14-19.AGI

Page 1 of 1

GENERATED BY SWANEY LIGHTING, SCARBOROUGH ME - 207-883-7100 - swaneylighting.com

Date:3/22/2019

SWANEY LIGHTING ASSOCIATES, INC.

WALSH
ENGINEERING ASSOCIATES, INC.

STORMWATER MANAGEMENT REPORT

For

Classroom Addition and Parking Lot Expansion
Friends School of Portland
Cumberland, Maine

February 27, 2019

Submitted to:
Maine Department of Environmental Protection
312 Canco Road
Portland, Maine

Submitted by:
Walsh Engineering Associates, Inc.
One Karen Drive, Suite 2A
Westbrook, Maine 04092

WALSH
ENGINEERING ASSOCIATES, INC.

STORMWATER MANAGEMENT REPORT

Classroom Addition and Parking Lot Expansion
Friends School of Portland
February 27, 2019

Introduction

Walsh Engineering Associates, Inc. (WEA) was retained by the Friends School of Portland to provide site design and stormwater management design services for a new classroom addition and parking lot expansion at its campus on Route One in Cumberland. These changes will be the subject of this proposed amendment to Stormwater Permit L-26058-NJ-A-N obtained in January 2014 by the School based on submittals prepared by Blais Civil Engineers (BCE) of South Portland, Maine.

The proposed development will increase impervious area from 1.20 acres to 1.49 acres and developed area from 4.83 acres to 5.35 acres. The project will need to meet both the Basic and General Standards, but will not need to meet the Flooding Standard of Chapter 500.

Pre-Development Conditions

The pre-development state of the site will be as it existed prior to the original development and as described in the BCE report dated December 4, 2013. BCE provided the DEP with a letter, dated July 27, 2015, that stated Subsurface Sand Filter #1 and Underdrained Soil Filters #1 and #2 were constructed in a manner that is consistent with Maine DEP standards and specifications. WEA has assumed that the sizes of the existing filters are as designed and shown on the BCE Water Quality Plan D-100.

Post-Development Conditions

The proposed project consists of several changes to the originally approved plan. This amendment includes construction of a 3,950 square foot, one story, classroom addition, a 42 vehicle parking lot south of the main entrance and 11 additional parking spaces at the entrance circle. The original Stormwater Permit included the parking lot south of the main entrance with a subsurface sand filter under the lot. This amendment proposes a slightly larger parking lot and includes runoff analysis from the additional parking on the southeast side of the circle.

Stormwater Quality

Stormwater will be treated in existing and proposed filters and in future buffers with level lip spreaders. Soil Filter #3 will be constructed in accordance with the enclosed design plans. Future fields and buffer areas will be constructed in accordance with the originally approved plans from BCE.

WEA has modified the impervious and developed areas noted on the BCE Water Quality Plan, D-100 in the following ways. The new areas and treatment calculations are shown in Table T-1, attached, and on Sheet D1.0 and are compared to areas and volumes as shown on the approved BCE Water Quality Plan D-100, dated December 10, 2013:

- **Area A:** This area is unchanged and the areas from BCE D-100 have been used.

- **Area C:** This area has been modified to:
    - Change the southern edge of the developed area to follow contours based on the as-built survey.
    - Remove the area under the proposed classroom building.
    - Remove the parallel parking area at the southeast side of the circle that will be redirected to Area B.
    - Still included is the future 3,350 square foot Gym/Community Hall building.
- **Underdrained Soil Filter #1:** This existing filter treats runoff from areas A and C. Table T-1 shows that the required filter area and volume based on the impervious and developed areas draining to it are less than the filter area and treatment volume provided in UDSF #1 as shown on BCE plan D-100.
- **Area B:** This area is a new design for the south parking lot and includes the expanded parking area to the southeast of the circle and some developed area based on the as-built survey. Table T-1 shows that the filter area and volume provided by the design for Underdrained Soil Filter #3 are adequate to treat the impervious and developed areas draining to it.
- **Area D:** This area was calculated based on the as-built survey and includes modifying the north parking lot when the future Gym/Community Hall building is constructed.
- **Area E:** This area was calculated based on the as-built survey and includes the impervious area for the new classroom building, mechanical equipment pad and walkway as non-linear development.
- **Subsurface Sand Filter #1:** Analysis of this sand filter indicates that the volume shown on BCE plan D-100, 1,488 cubic feet, corresponds to an elevation of 78.01 in the HydroCAD model. Chapter 7.3 of the Maine Stormwater Best Practices Manual states that the impoundment depth should not exceed 18". With the top of the filter media at elevation 77.18, this 18" depth would correspond to an elevation 78.68, which would provide a volume of 2,062 cubic feet. Our analysis concludes that the filter area and treatment volume provided by Sand Filter #1 exceed that required by the impervious and developed areas of D and E, including the new classroom building.
- **Area F and Underdrained Soil Filter #2:** The developed area of F was calculated based on the as-built survey and elimination of the proposed basketball court shown on the original design plans. It also includes a play area that is being used at the top of the slope, under the trees. Table T-1 shows that UDSF #2 is sized adequately for the area draining to it.
- **Area G:** This area has not been constructed and was not intended to be treated by the BCE plans. That will remain the case with this amendment and the areas used are from the BCE plans.
- **Area H:** An analysis based on aerial photography indicated that Play Area #2 was constructed about 50% larger than originally proposed and a small storage shed is located in the area. The original design plans showed this field being treated in Forested Buffer H, however the level spreader was never constructed for this buffer.
- **Area I:** This area has not been constructed and was intended to be treated by the BCE plans. That will remain the case with this amendment and the areas used are from the BCE plans.
- **Area J:** This area has not been constructed and was intended to be treated by the BCE plans. That will remain the case with this amendment and the areas used are from the BCE plans.

As can be seen in the table below from Table T-1, the proposed amended plan will meet the required minimum stormwater treatment levels.

Treatment Levels	Total Area (SF)	Treated Area (SF)	Treatment %
Non-Linear Development Areas			
Impervious Area (95%)	56,135	54,745	97.5%
Total Developed area (80%)	197,429	158,431	80.2%
Linear Development Areas			
Impervious Area (75%)	8,014	6,054	75.5%
Total Developed area (50%)	41,357	23,439	56.7%

Underdrained Soil Filter #3 is required to provide treatment for 1,551 cubic feet of stormwater. HydroCAD was used to develop a Water Quality storm that would generate 0.036 acre-feet of runoff, approximately the required treatment volume. This volume corresponds to an elevation 0f 74.68 feet, or 14.2 inches. An exfiltration rate of 0.6 in/hr will drain the pond in approximately 24 hours. The pond drawdown can be maintained at between 24 and 48 hours by adjusting the ball valve on the end of the underdrain outlet pipe.

Erosion Control

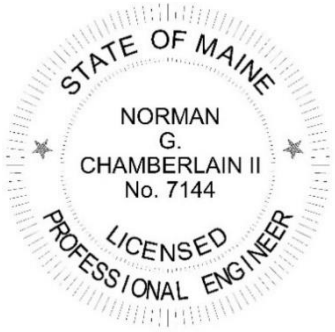
BMPs such as silt fence and/or filter berms of erosion control mix, riprap culvert outlet protection, erosion control mesh, turf reinforcement mat, mulch, and permanent seeding will be used to prevent erosion and downstream migration of sediment during construction. The locations of temporary and permanent erosion control measures are shown on Drawing C2.2 Grading & Drainage Plan.

Conclusions

The stormwater management plan for this project includes treatment of stormwater runoff in existing and proposed filters and buffers. Calculations show that the level of treatment meets the requirements found in Chapter 500

Respectfully,

Norman G. Chamberlain II, PE
Walsh Engineering Associates, Inc



The following material presents calculations and copies of source material used during the analysis for this study.

- Appendix A: Location Plan
- Appendix B: HydroCAD Output for Watershed D
- Appendix C: Table T-1 Stormwater Treatment Calculation

- Appendix D: Inspection and Maintenance Plan
- Appendix E: Blais Civil Engineers Previously Approved Plans
    - D-100 – Water Quality Plan
    - C-304 – Civil Site Details IV
- Appendix F: Walsh Engineering Associates Site Plans
    - D1.0 – Stormwater Treatment Analysis Plan

Appendix A:
Location Plan

WALSH
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ph: 207.553.9898 | www.walsh-eng.com

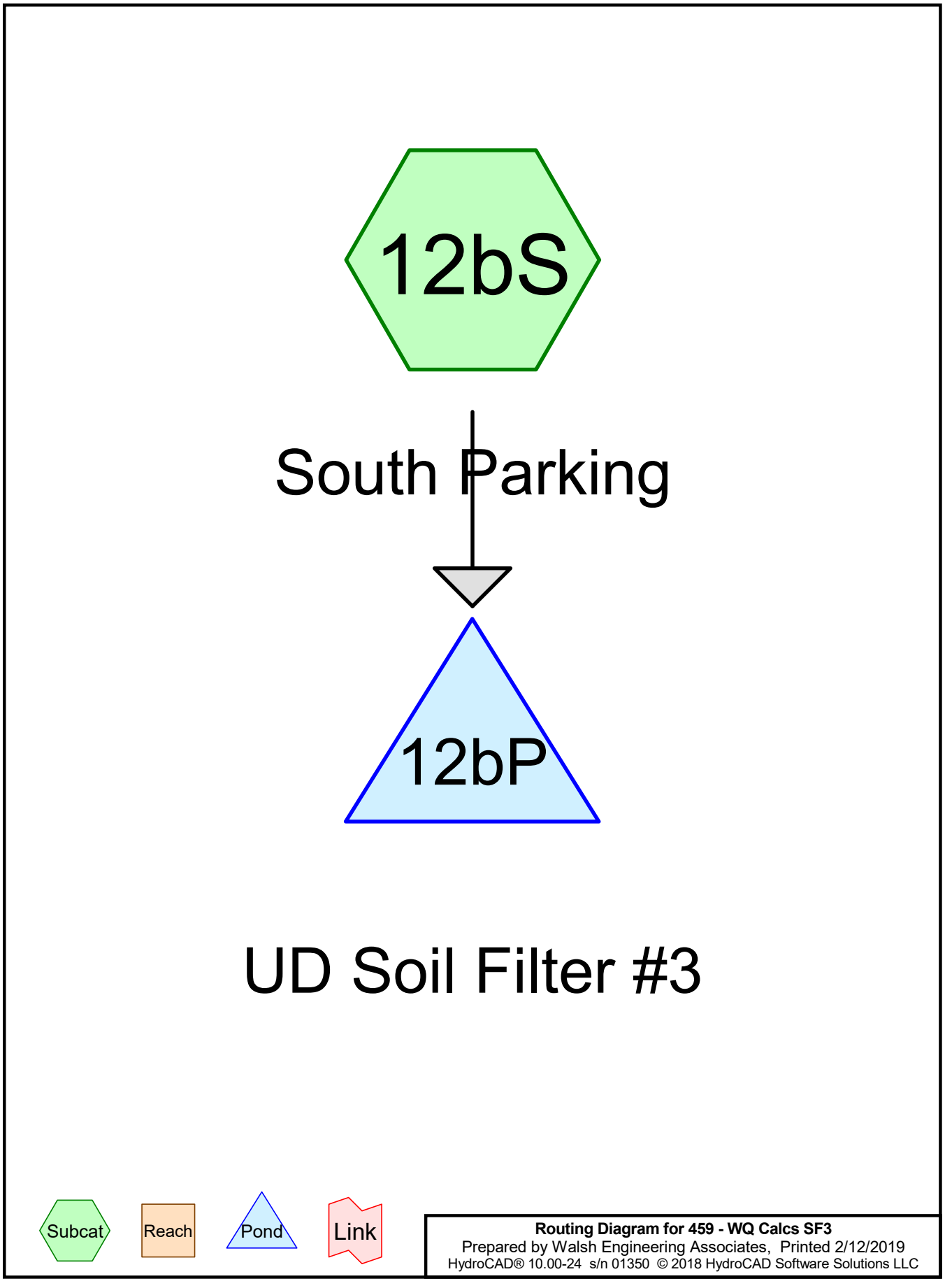
COMMUNITY HALL & CLASSROOM ADDITION

FRIENDS SCHOOL OF PORTLAND
CUMBERLAND, ME 04021

Sheet Title:
LOCATION PLAN

Job No.:	459
Date:	1/30/2019
Scale:	1"=2,000'
Drawn:	RJS
Checked:	SC

Appendix B:
HydroCAD Output for Watershed D


12bS
South Parking
12bP
UD Soil Filter #3
Subcat
Reach
Pond
Link
Routing Diagram for 459 - WQ Calcs SF3
Prepared by Walsh Engineering Associates, Printed 2/12/2019
HydroCAD® 10.00-24 s/n 01350 © 2018 HydroCAD Software Solutions LLC

Summary for Subcatchment 12bS: South Parking

~1,551 CF

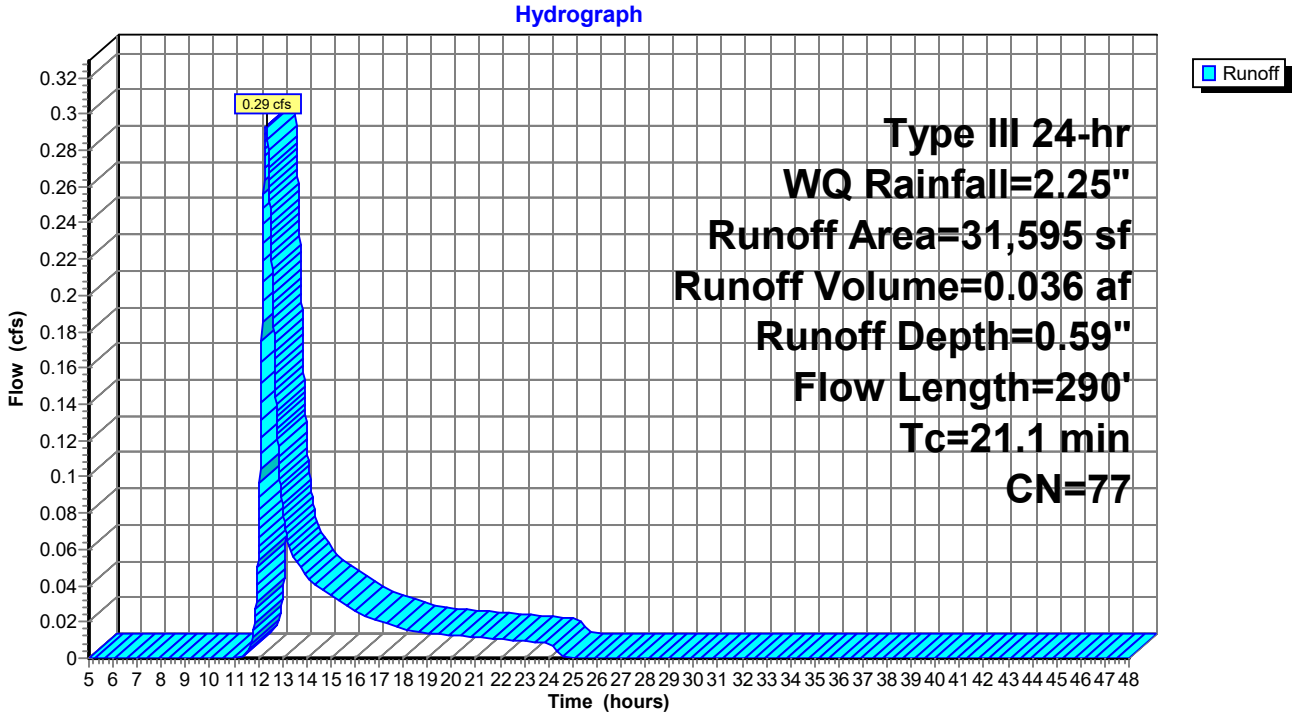
Runoff = 0.29 cfs @ 12.33 hrs, Volume= 0.036 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr WQ Rainfall=2.25"

Area (sf)	CN	Description
14,485	98	Paved parking, HSG B
10,568	61	>75% Grass cover, Good, HSG B
6,542	55	Woods, Good, HSG B
31,595	77	Weighted Average
17,110		54.15% Pervious Area
14,485		45.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.8	130	0.0400	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
1.3	160	0.0220	2.00	0.16	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=0.20' Z= 2.0 '/' Top.W=0.80' n= 0.022 Earth, clean & straight
21.1	290	Total			

Subcatchment 12bS: South Parking



Summary for Pond 12bP: UD Soil Filter #3

Inflow Area = 0.725 ac, 45.85% Impervious, Inflow Depth = 0.59" for WQ event
Inflow = 0.29 cfs @ 12.33 hrs, Volume= 0.036 af
Outflow = 0.02 cfs @ 17.24 hrs, Volume= 0.036 af, Atten= 93%, Lag= 294.8 min
Primary = 0.02 cfs @ 17.24 hrs, Volume= 0.036 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 74.25' @ 17.24 hrs Surf.Area= 1,385 sf Storage= 887 cf

Plug-Flow detention time= 537.8 min calculated for 0.036 af (100% of inflow)
Center-of-Mass det. time= 537.8 min (1,426.8 - 889.1)

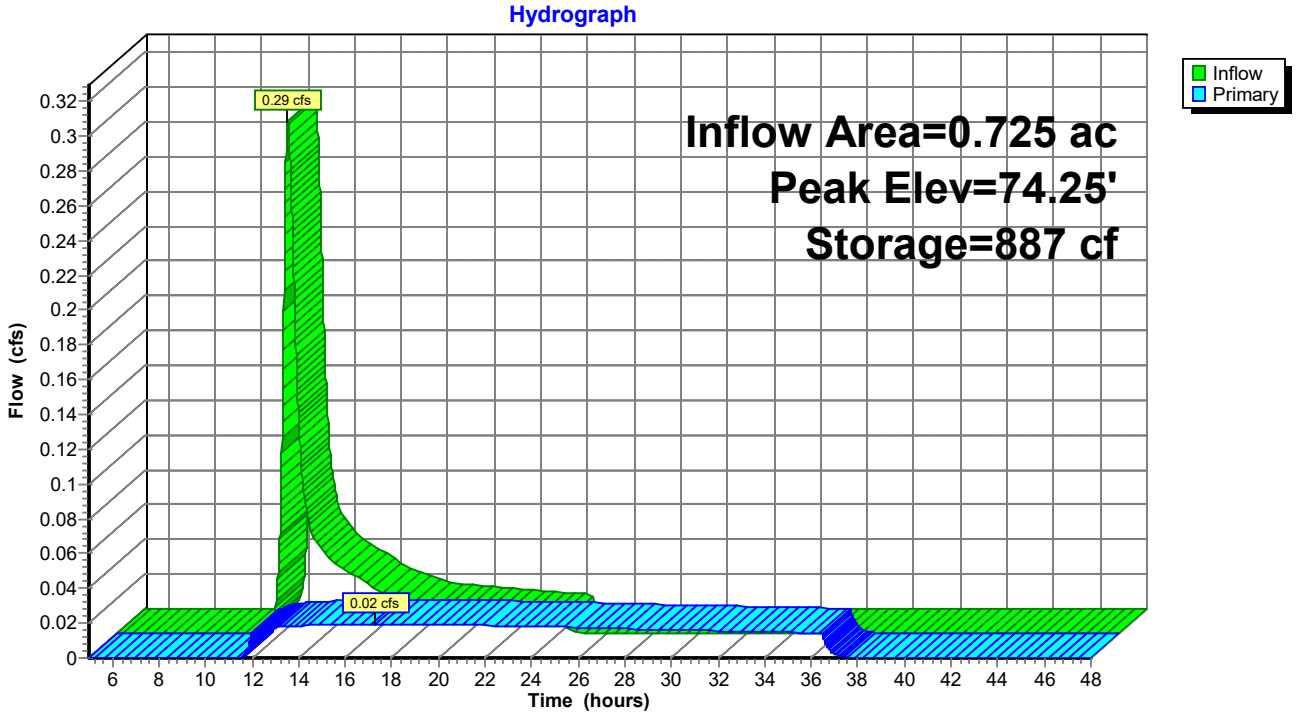
Volume	Invert	Avail.Storage	Storage Description
#1	73.50'	2,118 cf	**Custom Stage Data (Pyramidal)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
73.50	1,024	0	0	1,024
74.00	1,233	563	563	1,244
75.00	1,900	1,555	2,118	1,929

Device	Routing	Invert	Outlet Devices
#1	Primary	70.75'	**2.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	73.50'	**0.600 in/hr Exfiltration over Surface area**
#3	Primary	74.50'	**9.0' long (Profile 7) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.99 3.41 3.62

Primary OutFlow Max=0.02 cfs @ 17.24 hrs HW=74.25' (Free Discharge)
- **1=Orifice/Grate** (Passes 0.02 cfs of 0.19 cfs potential flow)
  - **2=Exfiltration** (Exfiltration Controls 0.02 cfs)
- **3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 12bP: UD Soil Filter #3



Stage-Area-Storage for Pond 12bP: UD Soil Filter #3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
73.50	1,024	0	74.01	1,239	576
73.51	1,028	10	74.02	1,245	588
73.52	1,032	21	74.03	1,251	601
73.53	1,036	31	74.04	1,257	613
73.54	1,040	41	74.05	1,263	626
73.55	1,044	52	74.06	1,269	638
73.56	1,048	62	74.07	1,275	651
73.57	1,052	73	74.08	1,281	664
73.58	1,056	83	74.09	1,287	677
73.59	1,060	94	74.10	1,293	690
73.60	1,064	104	74.11	1,299	703
73.61	1,068	115	74.12	1,305	716
73.62	1,072	126	74.13	1,312	729
73.63	1,076	137	74.14	1,318	742
73.64	1,081	147	74.15	1,324	755
73.65	1,085	158	74.16	1,330	768
73.66	1,089	169	74.17	1,336	782
73.67	1,093	180	74.18	1,342	795
73.68	1,097	191	74.19	1,349	809
73.69	1,101	202	74.20	1,355	822
73.70	1,105	213	74.21	1,361	836
73.71	1,109	224	74.22	1,367	849
73.72	1,114	235	74.23	1,374	863
73.73	1,118	246	74.24	1,380	877
73.74	1,122	257	74.25	1,386	891
73.75	1,126	269	74.26	1,393	905
73.76	1,130	280	74.27	1,399	919
73.77	1,134	291	74.28	1,405	933
73.78	1,139	303	74.29	1,412	947
73.79	1,143	314	74.30	1,418	961
73.80	1,147	325	74.31	1,424	975
73.81	1,151	337	74.32	1,431	989
73.82	1,156	349	74.33	1,437	1,004
73.83	1,160	360	74.34	1,444	1,018
73.84	1,164	372	74.35	1,450	1,032
73.85	1,168	383	74.36	1,457	1,047
73.86	1,173	395	74.37	1,463	1,062
73.87	1,177	407	74.38	1,470	1,076
73.88	1,181	419	74.39	1,476	1,091
73.89	1,185	430	74.40	1,483	1,106
73.90	1,190	442	74.41	1,489	1,121
73.91	1,194	454	74.42	1,496	1,136
73.92	1,198	466	74.43	1,502	1,151
73.93	1,203	478	74.44	1,509	1,166
73.94	1,207	490	74.45	1,515	1,181
73.95	1,211	502	74.46	1,522	1,196
73.96	1,216	514	74.47	1,529	1,211
73.97	1,220	527	74.48	1,535	1,226
73.98	1,224	539	74.49	1,542	1,242
73.99	1,229	551	74.50	1,549	1,257
74.00	1,233	563	74.51	1,555	1,273

Stage-Area-Storage for Pond 12bP: UD Soil Filter #3 (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
74.52	1,562	1,288
74.53	1,569	1,304
74.54	1,575	1,320
74.55	1,582	1,336
74.56	1,589	1,351
74.57	1,596	1,367
74.58	1,602	1,383
74.59	1,609	1,399
74.60	1,616	1,416
74.61	1,623	1,432
74.62	1,630	1,448
74.63	1,636	1,464
74.64	1,643	1,481
74.65	1,650	1,497
74.66	1,657	1,514
74.67	1,664	1,530
74.68	1,671	1,547
74.69	1,678	1,564
74.70	1,685	1,581
74.71	1,692	1,597
74.72	1,699	1,614
74.73	1,706	1,631
74.74	1,713	1,649
74.75	1,720	1,666
74.76	1,727	1,683
74.77	1,734	1,700
74.78	1,741	1,718
74.79	1,748	1,735
74.80	1,755	1,753
74.81	1,762	1,770
74.82	1,769	1,788
74.83	1,776	1,806
74.84	1,784	1,823
74.85	1,791	1,841
74.86	1,798	1,859
74.87	1,805	1,877
74.88	1,812	1,895
74.89	1,820	1,913
74.90	1,827	1,932
74.91	1,834	1,950
74.92	1,841	1,968
74.93	1,849	1,987
74.94	1,856	2,005
74.95	1,863	2,024
74.96	1,871	2,043
74.97	1,878	2,061
74.98	1,885	2,080
74.99	1,893	2,099
75.00	**1,900**	**2,118**

Appendix C:
Table T-1 Stormwater Treatment Calculations

WALSH
ENGINEERING ASSOCIATES, INC.

TABLE T-1
Stormwater Treatment Calculations
Friends School
Cumberland, Maine
February 2019

Watershed	Notes	Non-Linear Development Areas				Linear Development Areas				Total Impervious Area (SF)	Filter Design			
		Treated Area (SF)		Untreated Area (SF)		Treated Area (SF)		Untreated Area (SF)			Filter Area (sf) = IA(0.05) + LA(0.02)		Filter Volume (cf) = IA(0.083) + LA(0.033)	
		Impervious (IA)	Landscaped (LA)	Impervious (IA)	Landscaped (LA)	Impervious (IA)	Landscaped (LA)	Impervious (IA)	Landscaped (LA)		Required	Provided	Required	Provided
A	Areas from Blais Plans					2,730		1,960	6,510	4,690				
C	Updated Areas	24,085	36,967	1,240	2,749					25,325				
A & C	Total for Soil Filter #1	24,085	36,967	1,240	2,749	2,730	0	1,960	6,510	30,015	2,080	* 2120	3,446	* 4,007
B	New Design Soil Filter #3	14,485	10,568		3,837					14,485	936	1,024	1,551	2,118
D	Updated Areas	10,973	753		3,503					10,973				
E	Updated Areas	5,202				3,324	11,163			8,526				
D & E	Total for Sand Filter #1	16,175	753	0	3,503	3,324	11,163	0	0	19,499	1,213	* 1250	2,012	** 2,062
F	Updated Areas for Soil Filter #2		20,393							0	408	* 650	673	* 1,058
G	Area from Blais Plans						2,478		1,892	0				
H	Existing Areas from Aerial Photos			150	18,350					150				
I	Areas from Blais Plans						3,744		7,556	0				
J	Areas from Blais Plans		35,005		9,169					0				
		54,745	**103,686**	**1,390**	**37,608**	**6,054**	**17,385**	**1,960**	**15,958**	**64,149**				

Treatment Levels	Total Area (SF)	Treated Area (SF)	Treatment %
Non-Linear Development Areas			
Impervious Area (95%)	56,135	54,745	97.5%
Total Developed area (80%)	197,429	158,431	80.2%
Linear Development Areas			
Impervious Area (75%)	8,014	6,054	75.5%
Total Developed area (50%)	41,357	23,439	56.7%

* Areas and volumes from Blais design plans.

** The Blais design plans indicated 1,488 cf of storage which corresponds to an elevation of 78.01. The filter has a storage capacity of 2,062 cf at 78.68, 18" above the media in the filter.

Appendix D:
Inspection and Maintenance of Stormwater Management Facilities Plan

Appendix D:

Classroom Addition and Parking Lot Expansion
Friends School of Portland
Cumberland, Maine
February 27, 2019

INSPECTION AND MAINTENANCE OF STORMWATER MANAGEMENT FACILITIES PLAN

Stormwater Management Facilities include swales, paved surfaces, manholes and catch basins, drain pipe, riprapped aprons, level spreaders, wooded buffers, underdrained soil filters, a detention pond, a wet pond and a subsurface sand filter. Periodic inspection and maintenance of these site features and devices is necessary to prevent erosion, protect roadways and other paved areas, and remove pollutants from stormwater runoff.

This Plan specifically addresses stormwater features included in the amendment to the Stormwater Permit L-26058-NJ-A-N obtained in January 2014. Refer to the original permit and application for inspection and maintenance of other stormwater features on the site. The Friends School of Portland is responsible for the inspections and maintenance of stormwater facilities associates with this project.

RECERTIFICATION REQUIREMENT:

Within three months of the expiration of each five-year interval from the date of issuance of the permit, the Owner or Association shall certify the following to the Maine Department of Environmental Protection (the Department):

a) 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) 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 facilities.

c) 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 and kept on file with Town Engineers office.

d) A copy of the certification along with any required mitigation shall be provided to the Town Engineer.

SWALES, DITCHES, CURBS AND PAVED AREAS:

Swales, ditches, curbs and paved areas are easily inspected during a site walk or even a ride-by. Since visual inspection is easy, their condition should be assessed during and/or after significant rainfall events such as thunder showers and periods of heavy or extended rainfall and during periods of significant snowmelt. Any damage or unusual condition such as sedimentation of a ditch, erosion, damaged curb or dying vegetation should be recorded, dated and initialed by the inspector when observed. Even if there is no damage, the inspector should make record of these inspections at least twice annually.

Paved areas should be visually inspected monthly during the winter. The inspector should pay particular

attention to the build up of sand around catch basin grates and remove accumulations that block the free flow of surface runoff to the catch basins. The date and initials of the inspector should be recorded on the forms provided as well as a notation of any cleanup effort that was made and the approximate volume of sand that was removed.

Open swales and ditches shall be inspected twice per year (in spring and fall) to assure that debris and/or sediments do not reduce the effectiveness of the system. Debris and sediments shall be removed at that time. Any sign of erosion or blockage shall be immediately repaired to assure a vigorous growth of vegetation for the stability of the ditches and slopes proper function. Maintenance shall include, but not be limited to, mowing, trimming and removal of vegetation in the ditches and slopes as required in order to prevent vegetation from blocking or diverting storm flows, replacement of riprap channel lining to prevent scour of the channel invert, removing vegetation and debris from the culverts.

Vegetated ditches should be mowed at least monthly 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 reseeded and mulched immediately.

CATCH BASINS, FIELD INLETS AND DRAIN MANHOLES:

Catch Basins and field inlets are precast concrete structures with sumps and cast iron grates used to collect stormwater and trap heavy sediments. Drain Manholes are similar structures constructed with a channel instead of a sump and a solid cast iron cover instead of a grate. Drain Manholes exist at changes in direction and/or size of storm drain pipe. Catch Basins, field inlets and drain manholes provide access to the closed storm drain system for inspection and maintenance.

Throughout the winter / spring sanding period, inspect catch basins and field inlets monthly and after every significant rainfall event or period of heavy snowmelt. Clean catch basin and field inlet sumps when sediment level is within 12 inches of the outlet pipe invert. At a minimum, remove floating debris and hydrocarbons at the time of the inspection. The removed material must be disposed of in accordance with the Maine Solid Waste Disposal Rules. Confined space entry safety procedures shall be practiced should entry into these structures be required.

Record dates of inspections, observations and maintenance measures implemented (if any) on the forms provided and initial the entry.

DRAIN PIPES:

Drain pipes are road culverts and pipes connecting drain manholes. Inspect drain pipes when inspecting other stormwater maintenance facilities. At least annually make a visual inspection of the pipe. During the daylight you should be able to see light through most pipes as they have been laid to a straight line and grade. In some cases (e.g. pipe runs to a drain manhole, or is blocked) you will need a light to inspect pipes.

Remove any obstructions to flow; remove accumulated sediments and debris at the inlet, at the outlet, and within the conduit; and to repair any erosion damage at the pipe inlet and outlet. Sediment should

be removed when its level exceeds 20% of the pipe diameter. This may be accomplished by hydraulic flushing or any mechanical means; however, care should be taken to contain the sediment at the pipe outlet, and not flush the sediments into the stormwater filter or wetland areas.

Riprap aprons where stone is displaced should be replaced and chinked to assure stability. With time, additional riprap may be added. Vegetation growing through riprap should be removed on an annual basis.

Record inspections on the forms provided noting condition of pipe and any maintenance procedures implemented.

UNDERDRAINED SOIL FILTERS:

An underdrained soil filter is a landscaped depression with an underdrained soil bed or soil filter that exfiltrates the stormwater. The depression is designed to temporarily store runoff, which will drain through the soil filter into the underdrains; excess runoff will flow into structures or over earthen spillways.

There are three (3) Underdrained Soil Filters on the site. Two (2) were constructed as part of the original development of the school, Soil Filters #1 and #2. Details for the new Soil Filter #3 can be found on Detail 1 Sheet C3.2.

Soil Filter Inspection: The soil filter should be inspected after every major storm in the first few months to ensure proper function. Thereafter, the filter should be inspected at least once every six months to ensure that it is draining within 48 hours; and that, after storms that fill the system to overflow, it drains in no less than 24 hours. If the filter drains too rapidly, (i.e. prior to 24 hours), then the gate valve provided on the discharge pipe should be adjusted such that the filter completely drains within 24 to 72 hours.

Underdrain System: The soil filter outlet consists of a layer of planting loam and sand with a stone and perforated pipe underdrain. Outlet inspections shall include flushing of the underdrain through the cleanouts at the end of the pipes. Trash, sediment, and debris shall be removed from the vicinity of the outlet and must be disposed of in accordance with the Maine Solid Waste Disposal Rules.

Soil Filter Replacement: If the filter fails to drain within 72 hours, the surface of the pond shall be rototilled to promote aeration of the filter media and vegetation shall be re-established. If aeration of the surface soil fails to promote filtration of impounded water within 72 hours, then the filter media shall be replaced as necessary. The stone underdrain shall also be replaced at this time, along with the perforated pipe.

Sediment Removal: Sediment and plant debris should be removed from the pretreatment structure at least annually.

Mowing: Filters with grass cover should be mowed no more than 2 times per growing season to maintain grass heights less than 12 inches.

Fertilization: Fertilization of the underdrained filter area should be avoided unless absolutely necessary to establish vegetation.

Harvesting and Weeding: Harvesting and pruning of excessive growth will need to be done occasionally. Weeding to control unwanted or invasive plants may also be necessary. Add new mulch as necessary for bioretention cells.

Underdrained soil filters shall not be used for snow storage area. Vehicular equipment used to maintain or rehabilitate underdrained soil filters should work from the basin perimeter and not enter the basin area, as this will compact the soil surface and reduce the design infiltration rate. Record all maintenance on forms provided.

SUBSURFACE SAND FILTER AND DETENTION:

A subsurface sand filter is an underground treatment system comprised of chamber systems, storm drain diversion structures, and distribution piping. Similar to an underdrained soil filter, stormwater exfiltrates through the bottom of the structure through a sand filter, and is collected by an underdrain system.

There is one (1) subsurface sand filter located on site, located under the north parking lot, and was permitted and constructed as part of the original Stormwater Permit. Details and inspection and maintenance procedures for the sand filter can be found in the original design plans.

SEDIMENT DISPOSAL:

Any sediment or debris removed during maintenance of the stormwater system must be disposed of in accordance with the Maine Solid Waste Disposal Rules.

HOUSEKEEPING

1. Spill Prevention: Controls must be used to prevent pollutants from construction and waste materials stored on site to enter stormwater, which includes storage practices to minimize exposure of the materials to stormwater. The site contractor or operator must develop, and implement as necessary, appropriate spill prevention, containment, and response planning measures.

   Note: Any spill or release of toxic or hazardous substances must be reported to the department. For oil spills, call 1-800-482-0777 which is available 24 hours a day. For spills of toxic or hazardous material, call 1-800-452-4664 which is available 24 hours a day. For more information, visit the department's website at: http://www.maine.gov/dep/spills/emergspillresp/

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. Any project proposing infiltration of stormwater must provide

adequate pre-treatment of stormwater prior to discharge of stormwater to the infiltration area, or provide for treatment within the infiltration area, in order to prevent the accumulation of fines, reduction in infiltration rate, and consequent flooding and destabilization.

Note: Lack of appropriate pollutant removal best management practices (BMPs) may result in violations of the groundwater quality standard established by 38 M.R.S.A. §465-c(1).

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, but other water additives may be considered as needed. A stabilized construction entrance (SCE) should be included to minimize tracking of mud and sediment. If off-site tracking occurs, public roads should be swept immediately and no less than once a week and prior to significant storm events. Operations during dry months, that experience fugitive dust problems, should wet down unpaved access roads once a week or more frequently as needed with a water additive to suppress fugitive sediment and dust.

   Note: Dewatering a stream without a permit from the department may violate state water quality standards and the natural resources protection act.

4. Debris and Other Materials: Minimize the exposure of construction debris, building and landscaping materials, trash, fertilizers, pesticides, herbicides, detergents, sanitary waste and other materials to precipitation and stormwater runoff. These materials must be prevented from becoming a pollutant source.

   Note: To prevent these materials from becoming a source of pollutants, construction and post-construction activities related to a project may be required to comply with applicable provision of rules related to solid, universal, and hazardous waste, including, but not limited to, the Maine solid waste and hazardous waste management rules; Maine hazardous waste management rules; Maine oil conveyance and storage rules; and Maine pesticide requirements

5. Excavation Dewatering: Excavation dewatering 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 removed from the ponded area, either through gravity or pumping, 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.

   Note: Dewatering controls are discussed in the "Maine Erosion and Sediment Control BMPs, Maine Department of Environmental Protection."

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:

- Discharges from firefighting activity;
- Fire hydrant flushings;
- Vehicle washwater if detergents are not used and washing is limited to the exterior of vehicles (engine, undercarriage, and transmission washing is prohibited);
- Dust control runoff in accordance with permit conditions and appendix (c)(3);
- Routine external building washdown, not including surface paint removal, that does not involve detergents;
- 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;
- Uncontaminated air conditioning or compressor condensate;
- Uncontaminated groundwater or spring water;
- Foundation or footer drain-water where flows are not contaminated;
- Uncontaminated excavation dewatering (see requirements in appendix c(5));
- Potable water sources including waterline flushings; and
- 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:
    - wastewater from the washout or cleanout of concrete, stucco, paint, form release oils, curing compounds or other construction materials;
    - fuels, oils or other pollutants used in vehicle and equipment operation and maintenance;
    - soaps, solvents, or detergents used in vehicle and equipment washing; and
    - toxic or hazardous substances from a spill or other release.

8. Additional Requirements: Additional requirements may be applied on a site-specific basis.

Appendix D:

FRIENDS SCHOOL OF PORTLAND CUMBERLAND, MAINE			
INSPECTION / MAINTENANCE LOG			
SWALES, DITCHES, CURBS AND PAVED SURFACES			
I: INSPECTED - C: CLEANED - S: SWEPT - R: REPAIRED			
DATE	**INITIALS**	**ACTION**	**COMMENT**
5/10/19	RST	I, C	EXAMPLE: Removed sand around CB's 19 and 20. Heavy rain over the weekend.

Appendix D:

FRIENDS SCHOOL OF PORTLAND
CUMBERLAND, MAINE

INSPECTION / MAINTENANCE LOG

CATCH BASINS, FIELD INLETS, AND DRAIN MANHOLES

I: INSPECTED - C: CLEANED - R: REPAIRED

DATE	INITIALS	ACTION	COMMENT
6/13/19	JKL	I, C	EXAMPLE: Called ACME to clean catch basins.

Appendix D:

FRIENDS SCHOOL OF PORTLAND
CUMBERLAND, MAINE

INSPECTION / MAINTENANCE LOG

DRAIN PIPES

I: INSPECTED - C: CLEANED - R: REPAIRED

DATE	INITIALS	ACTION	COMMENT
4/19/18	JKL	I, C	EXAMPLE: Called ACME to clean debris from culvert inlets along Main Road and Loop Road.

Appendix D:

FRIENDS SCHOOL OF PORTLAND CUMBERLAND, MAINE				
INSPECTION / MAINTENANCE LOG				
UNDERDRAINED SOIL FILTERS				
I: INSPECTED - C: CLEANED - R: REPAIRED				
DATE	**INITIALS**	**Unit #**	**ACTION**	**COMMENT**
7/6/19	PQR	LA2	I, C	EXAMPLE: Cleared sediment and plant debris from inlet area, mowed filter area, crest, and sideslopes.

Appendix D:

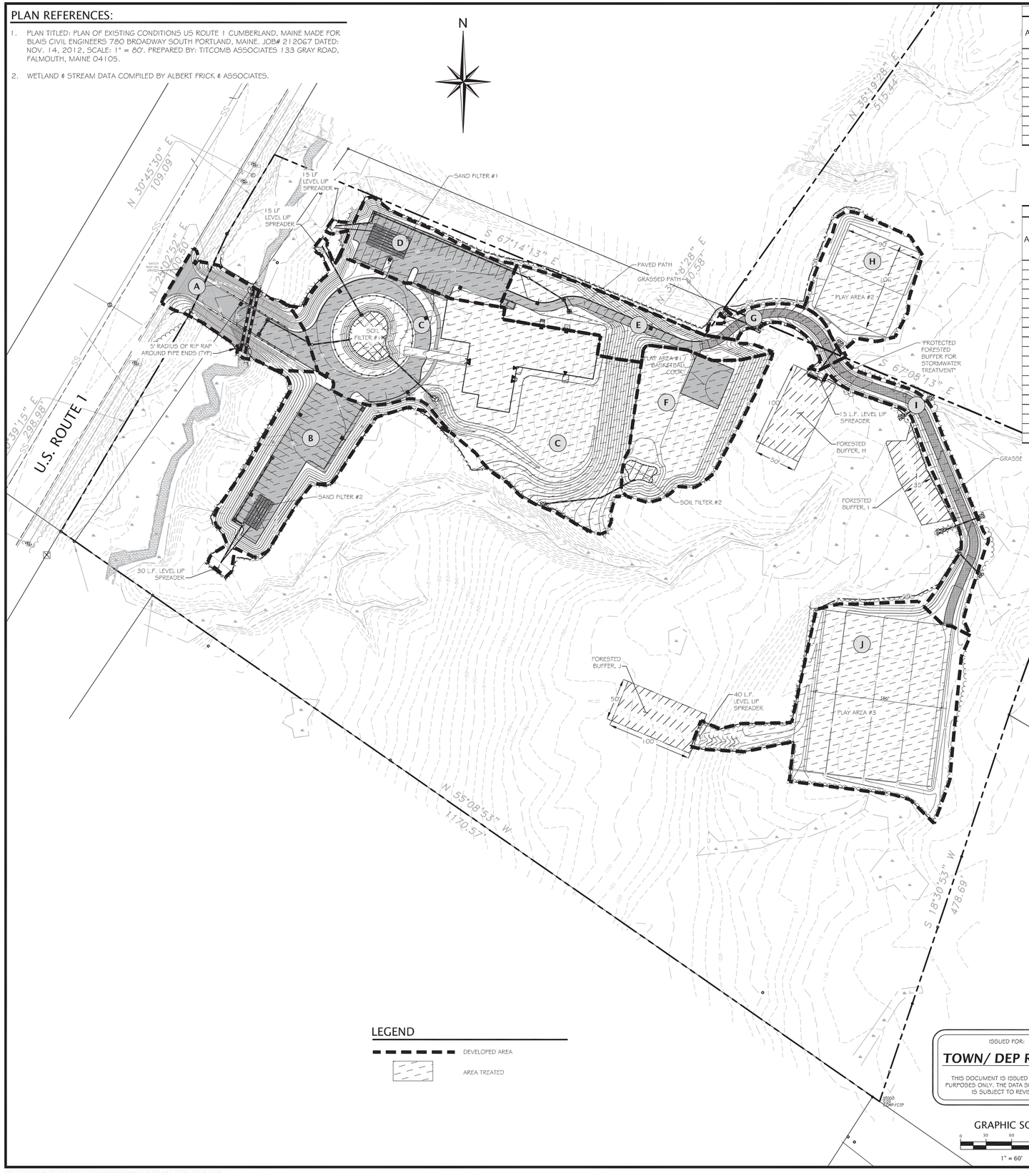
STORMWATER MANAGEMENT SYSTEM MAINTENANCE PROGRAM SUMMARY CHECKLIST					
		Frequency			
Item	Commentary	Month	Semi-Annual	Annual	Long-Term
All Pond and Filter side slopes	Inspect slopes for sloughing, erosion or undesirable tree growth. Mow slopes to control vegetation, repair any structure flaws identified	**X Mow Summer**		**X**	
All Pond and Filter Sediment Removal	Remove sediment when it occupies 15% of volume.				**X 5 Years**
Open Swale, Ditches & Inlet Structures	Inspect for debris accumulation, erosion and excessive vegetation. Mow monthly, remove debris, repair and revegetate any area of erosion	**X Mow**		**X**	
Pavement	Review for damage and buildup of debris and sand.	**X**	**X Sweep**		
Catchbasin and Drain Manholes	Inspect grates to assure optimum water flows into the structures. Inspect sumps for blockage and sediment accumulation. Clean out sumps .	**X Inspect**		**X Sediment removal**	
Pipes	Inspect for sediment build-up in pipe. Flush and remove as required.			**X**	
Underdrain Soil Filter	Mow twice per year. Inspect for erosion.		**X**		

Appendix E:
Blais Civil Engineers
Previously Approved Plans

PLAN REFERENCES:

1. PLAN TITLED: PLAN OF EXISTING CONDITIONS US ROUTE 1 CUMBERLAND, MAINE MADE FOR BLAIS CIVIL ENGINEERS 780 BROADWAY SOUTH PORTLAND, MAINE. JOB# 212067 DATED: NOV. 14, 2012, SCALE: 1" = 80'. PREPARED BY: TITCOMB ASSOCIATES 133 GRAY ROAD, FALMOUTH, MAINE 04105.

2. WETLAND & STREAM DATA COMPILED BY ALBERT FRICK & ASSOCIATES.



Required Treatment Summary

Area	Area Description	Non-Linear Impervious Area	Non-Linear % Req'd	Non-Linear Developed Area	Non-Linear % Req'd	Linear Impervious Area	Linear % Req'd	Linear Developed Area	Linear % Req'd	BMP
A	Driveway	N/A		N/A		4,690 SF		11,200 SF		Soil Filter #1
B	Southern Parking	9,542 SF		20,882 SF		N/A		N/A		Sand Filter #2
C	Building & Loop Drive	22,725 SF		66,127 SF		N/A		N/A		Soil Filter #1
D	Northern Parking	9,800 SF		13,310 SF		N/A		N/A		Sand Filter #1
E	Paved Path	N/A		N/A		3,170 SF		14,030 SF		Sand Filter #1
F	Play Area #1 & Basketball Court	2,355 SF		20,637 SF		N/A		N/A		Soil Filter #2
G	Grassed Path near Play Area #2	N/A		N/A		0 SF		4,370 SF		None
H	Play Area #2	0 SF		14,940 SF		N/A		N/A		Forested Buffer H
I	Grassed Path btwn Play Area #2 & #3	N/A		N/A		0 SF		11,300 SF		Forested Buffer I
J	Play Area #3	0 SF		44,174 SF		N/A		N/A		Forested Buffer J
	Total Areas	44,422 SF		180,070 SF		7,860 SF		40,900 SF		
	Total Areas (acres)	1.02 AC		4.13 AC		0.18 AC		0.94 AC		
	Total Areas Requiring Treatment	42,201 SF	95%	144,056 SF	80%	5,895 SF	75%	20,450 SF	50%	

Provided Treatment Summary

Area		Non-Linear Non-Linear Treated Impervious Area (sf)	Non-Linear % Treated	Non-Linear Non-Linear Treated Developed Area (sf)	Non-Linear % Treated	Linear Linear Treated Impervious Area (sf)	Linear % Treated	Linear Linear Treated Developed Area (sf)	Linear % Treated	BMP
A	Driveway	N/A	N/A	N/A	N/A	2,730 SF	34.7%	2,730 SF	6.7%	Soil Filter #1
B	Southern Parking	9,542 SF	21.5%	9,742 SF	5.4%	N/A	N/A	N/A	N/A	Sand Filter #2
C	Building & Loop Drive	22,725 SF	51.2%	63,007 SF	35.0%	N/A	N/A	N/A	N/A	Soil Filter #1
D	Northern Parking	9,800 SF	22.1%	11,000 SF	6.1%	N/A	N/A	N/A	N/A	Sand Filter #1
E	Paved Path	N/A	N/A	N/A	N/A	3,170 SF	40.3%	14,030 SF	34.3%	
F	Play Area #1 & Basketball Court	2,355 SF	5.3%	20,637 SF	11.5%	N/A	N/A	N/A	N/A	Soil Filter #2
G	Grassed Path near Play Area #2	N/A	N/A	N/A	N/A	0 SF	0.0%	0 SF	0.0%	None
H	Play Area #2	0 SF	0.0%	10,749 SF	6.0%	N/A	N/A	N/A	N/A	Forested Buffer H
I	Grassed Path btwn Play Area #2 & #3	N/A	N/A	N/A	N/A	0 SF	0.0%	3,774 SF	9.2%	Forested Buffer I
J	Play Area #3	0 SF	0.0%	35,005 SF	19.4%	N/A	N/A	N/A	N/A	Forested Buffer J
	Total Treatment Provided	44,422 SF	100.00%	150,140 SF	83.38%	5,900 SF	75.06%	20,534 SF	50.21%	

Notes: 1. Developed Area = Impervious Area + Landscaped Area

ISSUED FOR:

TOWN/ DEP REVIEW

THIS DOCUMENT IS ISSUED FOR REVIEW PURPOSES ONLY. THE DATA SHOWN HEREON IS SUBJECT TO REVISION.

GRAPHIC SCALE

0 30 60 120

1" = 60'

Sizing Tables

Area	BMP	Treated Landscaped/Lawn Area (sf)	Treated Impervious Area (sf)	Required WQ Volume (cf)	Provided WQ Volume (cf)	Required Filter Surface Area, Min (sf)	Provided Filter Area (sf)
A*	Soil Filter #1	*Treated by Soil Filter in Area C.*					
B	Sand Filter #2	200 SF	9,542 SF	799 CF	930 CF	481 SF	1,000 SF
C	Soil Filter #1	40,282 SF	25,455 SF	3,442 CF	4,007 CF	2,078 SF	2,120 SF
D/E	Sand Filter #1	12,060 SF	12,970 SF	1,474 CF	1,488 CF	890 SF	1,250 SF
F	Soil Filter #2	18,282 SF	2,355 SF	799 CF	1,058 CF	483 SF	650 SF
Area		Buffer Type	Slope (%)	Hydrologic		Required Buffer	Provided Buffer
G	None						
H	Forested Buffer H	Forested, Level Lip Spreader	<8%	Au, B		7'	15'
I	Forested Buffer I	Forested, Road Side	<8%	Au, B		35'	35'+
J	Forested Buffer J	Forested, Level Lip Spreader	9-15%	Au, B		35'	40'

Notes: 1. WQ Volume = (1.0" x Treated Impervious Area) + (0.4" x Treated Landscaped Area)
2. Underdrained Grassed Soil Filter Min Filter Area = 5% of Treated Impervious Area + 2% of Treated Landscaped/Lawn Area
3. Underground Storage Sand Filter Min Area = 5% of Treated Impervious Area + 2% of Treated Landscaped/Lawn Area

No.	DATE	REVISIONS DESCRIPTION
1	10/29/13	REVISED PER PEER REVIEW/DEP COMMENTS
2	11/08/13	REVISED PER DEP COMMENTS
3	11/26/13	REVISED PER PEER REVIEW/ DEP COMMENTS
4	12/04/13	REVISED PER DEP COMMENTS
5	12/10/13	REVISED PER DEP COMMENTS

STATE OF MAINE
STEVE G. BLAIS
No. 10084
PROFESSIONAL ENGINEER
LICENSED
12/16/13

Blais civil engineers
780 BROADWAY, SO. PORTLAND, ME 04106 (207) 767-7300

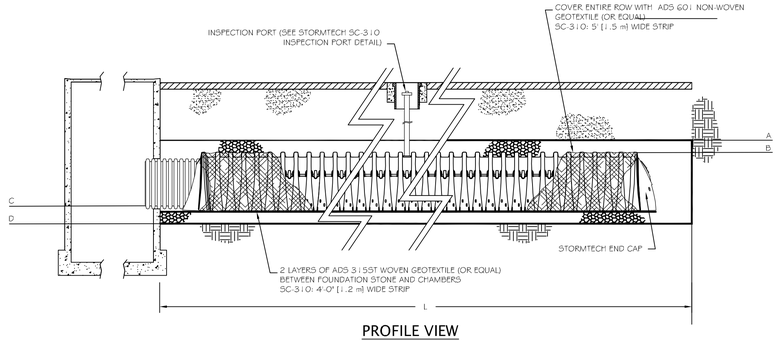
WATER QUALITY PLAN

FRIENDS SCHOOL OF PORTLAND
US ROUTE 1, CUMBERLAND, MAINE

PREPARED FOR:
FRIENDS SCHOOL OF PORTLAND
1 MACKWORTH ISLAND
FALMOUTH, MAINE 04105

LATEST REVISION (SE REV. BLOCK):
DATE: JANUARY 27, 2012
DESIGNED BY: SB
DRAWN BY: MV
CHECKED BY: SB
BCE PROJECT NO: 12166

D-100

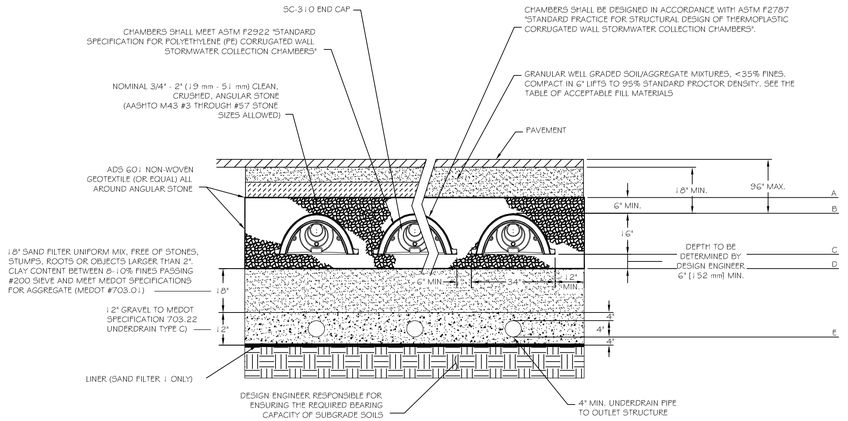


PROFILE VIEW

UNDERGROUND STORAGE SAND FILTER	A	B	C	D	E	L
SANDFILTER 1	79.51	79.01	77.68	77.18	74.98	50 LF
SANDFILTER 2	79.63	79.13	77.80	77.30	75.1	40 LF

1,488 cf @ 78.01
2,062 cf @ 78.68

1 StormTech ISOLATOR ROW DETAIL
NOT TO SCALE

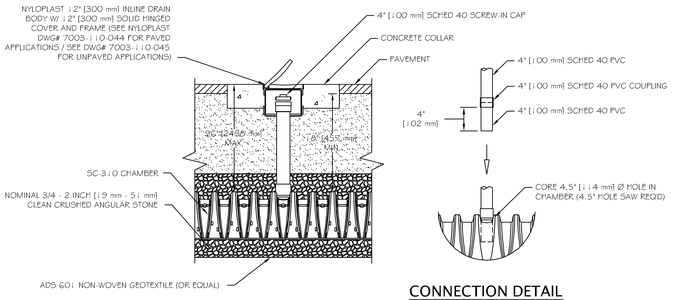


UNDERGROUND STORAGE SAND FILTER	A	B	C	D	E	L
SANDFILTER 1	79.51	79.01	77.68	77.18	74.98	50 LF
SANDFILTER 2	79.63	79.13	77.80	77.30	75.1	40 LF

NOTES:

1. THE INSTALLED CHAMBER SYSTEM SHALL PROVIDE THE LOAD FACTORS SPECIFIED IN THE AASHTO LFRD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12 FOR EARTH AND LIVE LOADS WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.

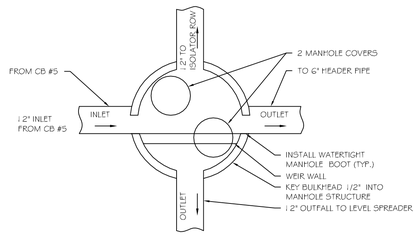
3 StormTech SC-310 TYPICAL CROSS SECTION
NOT TO SCALE

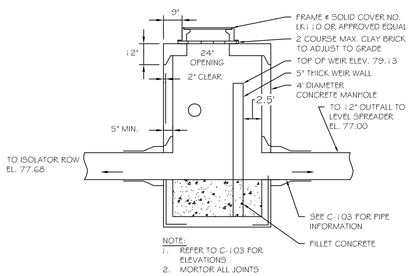


CONNECTION DETAIL
NTS

NOTES:
1. INSPECTION PORT MUST BE CONNECTED THROUGH KNOCK-OUT LOCATED AT CENTER OF CHAMBER.
2. ALL SCHEDULE 40 FITTINGS TO BE SOLVENT CEMENTED.

2 StormTech SC-310 INSPECTION PORT DETAIL
NOT TO SCALE

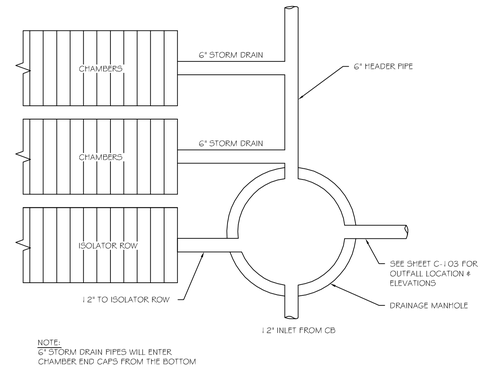




NOTE:
1. REFER TO C-103 FOR ELEVATIONS
2. MORTOR ALL JOINTS

DIVERSION STRUCTURE NOTES:
1. CONCRETE: 4,000 PAI AFTER 28 DAYS, MIN.
2. REINFORCING: H-20 LOADING, 4X4/ 4X4 W.W.M. SLAB TOP - NO. 5's @ 8" O.C.
3. SHIPLAP JOINTS SEALED WITH 1 STRIP OF 1" DIA. BUTYL RUBBER SEALANT.
4. EACH CASTING TO HAVE LIFTING HOLES CAST IN.
5. EACH SECTION TO BE LABELED AS NOTED
6. PRECAST UNITS SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM C-478, LATEST REVISION
7. LIMIT OF ROCK EXCAVATION SHALL BE 6" BELOW AND 2'-0" FROM THE EXTERIOR FACE OF THE STRUCTURE.
8. STONE BEDDING SHALL MEET THE REQUIREMENTS POF ASTM C-33 STONE SIZE NO. 67.
9. CATCH BASIN RIMS SHALL BE SET TO PROMOTE POSITIVE RUNOFF TO THE BASIN INLETS

4 4' DIA. PRECAST CONCRETE DIVERSION STRUCTURE - DMH #4
NOT TO SCALE



NOTE:
6" STORM DRAIN PIPES WILL ENTER CHAMBER END CAPS FROM THE BOTTOM

5 6" HEADER CONNECTION AT DMH 2 & 4
NOT TO SCALE

CONSTRUCTION OVERSIGHT REQUIRED FOR MDEP BMPS:

1. STORMTECH MANUFACTURED SYSTEMS: INSPECTION BY A PROFESSIONAL ENGINEER APPROVED BY THE MANUFACTURER SHALL CONSIST OF AN APPROPRIATE NUMBER OF VISITS TO THE SITE TO INSPECT THE SUBGRADE PREPARATION, GENERAL CONSTRUCTION, FILTER MATERIAL PLACEMENT AND COMPACTION, CHAMBER PLACEMENT, FABRIC LAYMENT, AND STORMWATER OVERFLOW BYPASS CONSTRUCTION FROM INITIAL GROUND DISTURBANCE TO FINAL STABILIZATION OF THE MEASURE. IN THE CASE OF THE STORMTECH SYSTEMS AN ADDITIONAL VISIT WILL BE NECESSARY TO SET THE UNITS PEAK OUTFLOW RATE APPROPRIATELY TO NO MORE THAN ONE GALLON PER MINUTE.

2. UNDERDRAINED SAND FILTER
   CONSTRUCTION SEQUENCE: THE SAND FILTER 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 COMPLETED.

   COMPACTION OF SAND FILTER: SAND FILTER AND UNDERDRAIN BEDDING MATERIAL MUST BE COMPACTED TO BETWEEN 92% AND 95% STANDARD PROCTOR. THE BED SHOULD BE INSTALLED IN AT LEAST 2 LIFTS OF 9 INCHES TO PREVENT POCKETS OF LOOSE MEDIA.

   CONSTRUCTION OVERSIGHT: INSPECTION BY A PROFESSIONAL ENGINEER WILL OCCUR AT A MINIMUM:
   - AFTER THE SUBGRADES ARE PREPARED,
   - AFTER THE UNDERDRAIN PIPES ARE INSTALLED BUT NOT BACKFILLED,
   - AFTER PRELIMINARY CONSTRUCTION OF THE SAND FILTER, AND
   - AFTER THE CHAMBER SYSTEM HAS BEEN INSTALLED.
   - ALL THE MATERIAL USED FOR THE CONSTRUCTION OF THE SAND FILTER 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 SAND FILTER. ALL RESULTS OF FIELD AND LABORATORY TESTING SHALL BE SUBMITTED TO THE PROJECT ENGINEER FOR CONFIRMATION. THE CONTRACTOR SHALL:
   - SELECT SAMPLES FOR SAMPLING OF EACH TYPE OF MATERIAL TO BE USED FOR THE FILTER 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 STM C136 (STANDARD TEST METHOD FOR SIEVE ANALYSIS OF FINE AND COURSE AGGREGATES 1996A) ON EACH TYPE OF THE SAMPLE MATERIAL. THE RESULTING SAND FILTER MEDIA MUST HAVE 8% TO 10% FINES PASSING THE #200 SIEVE AND MINIMAL CLAY CONTENT.

ISSUED FOR:
TOWN/ DEP REVIEW
THIS DOCUMENT IS ISSUED FOR REVIEW PURPOSES ONLY. THE DATA SHOWN HEREON IS SUBJECT TO REVISION.

REVISIONS

No.	DATE	DESCRIPTION
1	10/29/13	REVISED PER PEER REVIEW/DEP COMMENTS
2	11/26/13	REVISED PER PEER REVIEW/ DEP COMMENTS

STATE OF MAINE
STEVE G. BLAIS
No. 10084
PROFESSIONAL ENGINEER
LICENSED
11/26/13

BLAIS civil engineers
780 BROADWAY, SO. PORTLAND, ME 04106 (207) 767-7300

CIVIL SITE DETAILS IV
FRIENDS SCHOOL OF PORTLAND
US ROUTE 1, CUMBERLAND, MAINE
PREPARED FOR:
FRIENDS SCHOOL OF PORTLAND
1 MACKWORTH ISLAND
FALMOUTH, MAINE 04105

LATEST REVISION (SEE REV. BLOCK):
DATE: JANUARY 27, 2012
DESIGNED BY: SB
DRAWN BY: MV
CHECKED BY: SB
BCE PROJECT NO: 12166

C-304

Appendix F:
D1.0 – Stormwater Treatment Analysis Plan

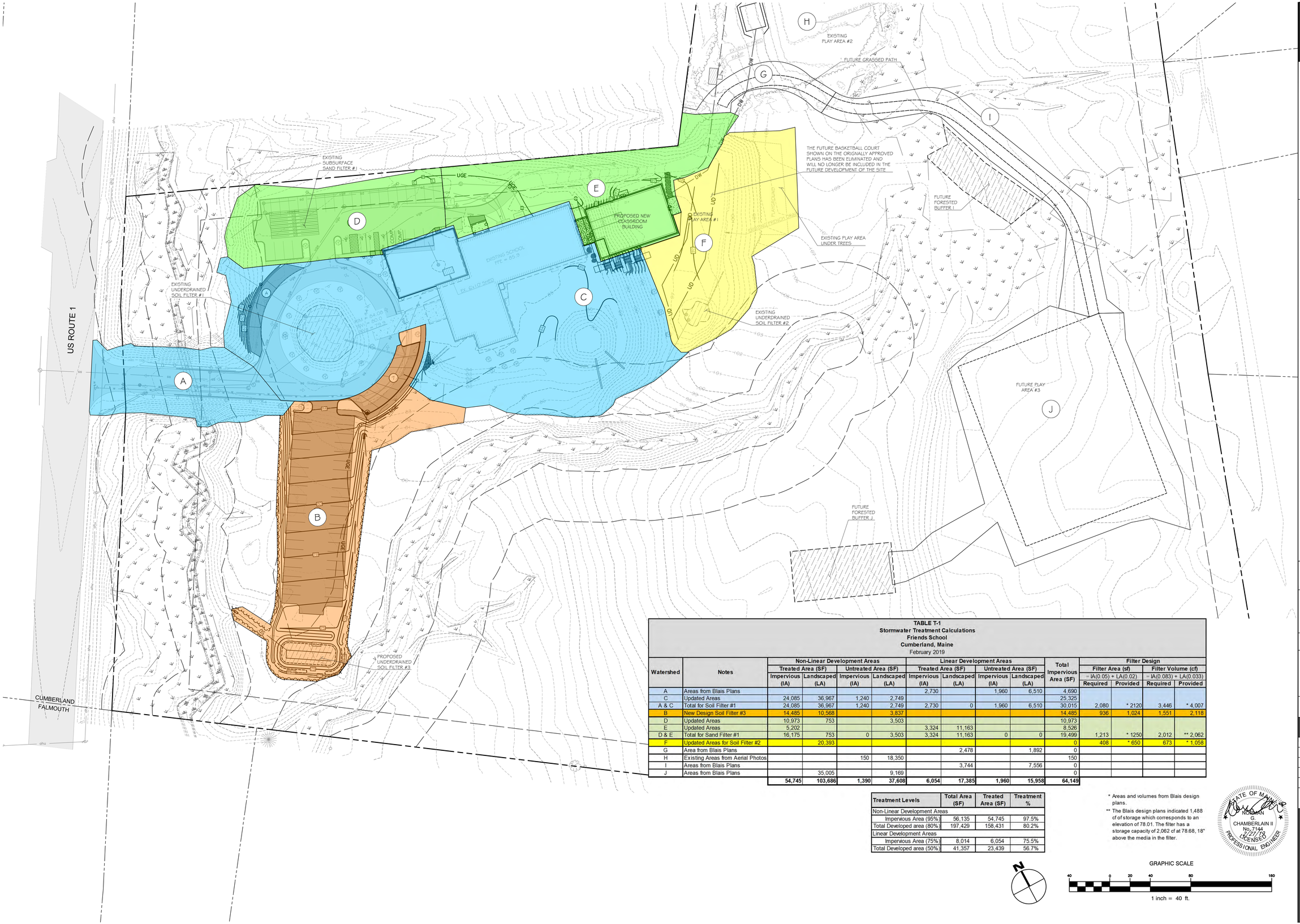


TABLE T-1
Stormwater Treatment Calculations
Friends School
Cumberland, Maine
February 2019

Watershed	Notes	Non-Linear Development Areas				Linear Development Areas				Total Impervious Area (SF)	Filter Design			
		Treated Area (SF)		Untreated Area (SF)		Treated Area (SF)		Untreated Area (SF)			Filter Area (sf) = IA(0.05) + LA(0.02)		Filter Volume (cf) = IA(0.083) + LA(0.033)	
		Impervious (IA)	Landscaped (LA)	Impervious (IA)	Landscaped (LA)	Impervious (IA)	Landscaped (LA)	Impervious (IA)	Landscaped (LA)		Required	Provided	Required	Provided
A	Areas from Blais Plans					2,730		1,960	6,510	4,690				
C	Updated Areas	24,085	36,967	1,240	2,749					25,325				
A & C	Total for Soil Filter #1	24,085	36,967	1,240	2,749	2,730	0	1,960	6,510	30,015	2,080	* 2120	3,446	* 4,007
B	New Design Soil Filter #3	14,485	10,568		3,837					14,485	936	1,024	1,551	2,118
D	Updated Areas	10,973	753		3,503					10,973				
E	Updated Areas	5,202				3,324	11,163			8,526				
D & E	Total for Sand Filter #1	16,175	753	0	3,503	3,324	11,163	0	0	19,499	1,213	* 1250	2,012	** 2,062
F	Updated Areas for Soil Filter #2		20,393							0	408	* 650	673	* 1,058
G	Area from Blais Plans						2,478		1,892	0				
H	Existing Areas from Aerial Photos			150	18,350					150				
I	Areas from Blais Plans						3,744		7,556	0				
J	Areas from Blais Plans		35,005		9,169					0				
		54,745	**103,686**	**1,390**	**37,608**	**6,054**	**17,385**	**1,960**	**15,958**	**64,149**				

Treatment Levels	Total Area (SF)	Treated Area (SF)	Treatment %
Non-Linear Development Areas			
Impervious Area (95%)	56,135	54,745	97.5%
Total Developed area (80%)	197,429	158,431	80.2%
Linear Development Areas			
Impervious Area (75%)	8,014	6,054	75.5%
Total Developed area (50%)	41,357	23,439	56.7%

* Areas and volumes from Blais design plans.

** The Blais design plans indicated 1,488 cf of storage which corresponds to an elevation of 78.01. The filter has a storage capacity of 2,062 cf at 78.68, 18" above the media in the filter.

STATE OF MAINE
NORMAN G. CHAMBERLAIN II
No. 7144
10/27/18
LICENSED
PROFESSIONAL ENGINEER

GRAPHIC SCALE
40 0 20 40 80 160
1 inch = 40 ft.

Kaplan Thompson Architects
102 Exchange Street
Portland, ME 04101
(207) 842-2888
kaplanthompson.com

PROJECT
Classroom & Community Hall Addition
Friends School of Portland
11 US Route 1
Cumberland, ME 04021

STRUCTURAL
Casco Bay Engineering
424 Fore Street
Portland, ME 04101
p: 207 842-2800

LANDSCAPE
Soren Deniord Design Studio
43 Wellwood Road
Portland, ME 04103
p: 207-400-2450

ELECTRICAL
Swiftcurrent Engineering Services
10 Forest Falls Drive, Unit 8B
Yarmouth, ME 04096
p: 207-847-9280

CIVIL
Walsh Engineering Associates, Inc.
1 Karen Drive, Suite 2A
Westbrook, ME 04092
p: 207-553-9898

Mechanical & Plumbing
Integrated Energy Systems, PLLC
301 Middle Road
Falmouth, ME 04105
p: 207-781-4263

ISSUE NO.	DESCRIPTION	CH'D	CHANGE NAME	DATE
A	PRICING SET			09/20/18
B	FOR SFM PERMIT			10/02/18
C	FOR CO COORD.			12/21/18
D	FOR CONSTRUCTION			02/22/19
E	SUBMITTED FOR PERMITTING			02/27/19

FOR SFM PERMIT

PROJECT NO: FSP2

DESIGNED BY: NGC

DRAWN BY: CAR/JWG

PHASE: PERMITTING

STORMWATER TREATMENT ANALYSIS PLAN
D1.0

WALSH
ENGINEERING ASSOCIATES, INC.

STORMWATER MANAGEMENT REPORT

For

Classroom Addition and Parking Lot Expansion
Friends School of Portland
Cumberland, Maine

February 27, 2019

Submitted to:
Town of Cumberland
290 Tuttle Road
Cumberland, Maine

Submitted by:
Walsh Engineering Associates, Inc.
One Karen Drive, Suite 2A
Westbrook, Maine 04092

WALSH
ENGINEERING ASSOCIATES, INC.

STORMWATER MANAGEMENT REPORT

Classroom Addition
Friends School of Portland
February 27, 2019

Introduction

Walsh Engineering Associates, Inc. (WEA) was retained by the Friends School of Portland to provide site design and stormwater management design services for a new classroom addition and parking at its campus on Route One in Cumberland. These changes will be the subject of this proposed amendment to the approved site plan obtained in December 2013 by the School based on submittals prepared by Blais Civil Engineers (BCE) of South Portland.

The proposed development will increase impervious area from 1.20 acres to 1.49 acres and developed area from 4.83 acres to 5.35 acres. The project will need to meet both the Basic and General Standards of Chapter 500 and will address flooding to meet the requirements of Chapter 242, Stormwater Management for the Town of Cumberland.

Methodology

The stormwater runoff analysis has been undertaken utilizing the HydroCAD Stormwater Modeling System software (Version 10.0) developed by the Applied Microcomputer Systems of Chocorua, New Hampshire. The program is based upon the TR-20 computer program and the TR-55 tabular method, both of which are based upon techniques developed by the USDA Soil Conservation Service. The analysis was performed for the 2, 10, and 25-year 24-hour frequency storm events for Cumberland County (3.1, 4.6, and 5.8 inches, respectively) with Type III distribution. Note that these values were changed by the Maine DEP in 2016. BCE used the older values in their 2013 report (3.0, 4.7, and 5.5 inches, respectively).

Pre-Development Conditions

The pre-development state of the site will be as it existed prior to the original development and as described in the BCE report dated December 4, 2013. BCE provided the DEP with a letter, dated July 27, 2015, that stated Subsurface Sand Filter #1 and Underdrained Soil Filters #1 and #2 were constructed in a manner that is consistent with Maine DEP standards and specifications. WEA has assumed that the sizes of the existing filters are as designed and shown on the BCE Water Quality Plan D-100 and modified the BCE HydroCAD model to account for changes in areas and impervious surfaces. Runoff from the site was analyzed at the two analysis points, POA #1, and POA #2, which are shown on the plans. Pre-development peak flow rates at those points are summarized in Table 1 for the 2, 10, and 25-year storm events and have been updated for the newer storm events.

Post-Development Conditions

The proposed project consists of several changes to the originally approved plan. This amendment includes construction of a 3,950 square foot, one story, classroom addition, a 42 vehicle parking lot south of the main entrance and 11 additional parking spaces of the entrance circle. The original Stormwater Permit included the parking lot south of the main entrance with a subsurface sand filter under the lot. This amendment proposes a slightly larger parking lot and includes runoff from the additional parking on the southeast side of the circle.

Stormwater Quantity

Stormwater peak flow rates from the site are attenuated by detention in the three soil filters and subsurface sand filter. As shown in Table 1, the peak runoff rates at each of the analysis points do not increase after construction of the proposed development for the 2, 10, and 25-year storm events. Based on these results, we do not anticipate any impact on downgradient drainage systems.

Table 1
Peak Flow Rate Comparison

Development Condition	Storm Event Runoff Rate (c.f.s.)		
	2 Year	10 Year	25 Year
POA #1 Pre-Development	2.7	9.9	17.5
POA #1 Post-Development	2.1	8.8	16.0
POA #2 Pre-Development	2.6	8.4	14.1
POA #2 Post-Development	2.6	8.4	14.1

Pre and Post-Development HydroCAD calculations can be found in Appendices B and C.

Stormwater Quality

Stormwater will be treated in existing and proposed filters and in future buffers with level lip spreaders. Soil Filter #3 will be constructed in accordance with the enclosed design plans. Future fields and buffer areas will be constructed in accordance with the originally approved plans from BCE.

WEA has modified the impervious and developed areas noted on the BCE Water Quality Plan, D-100 in the following ways. The new areas and treatment calculations are shown in Table T-1, attached, and on Sheet D1.0 and are compared to areas and volumes as shown on the approved BCE Water Quality Plan D-100, dated December 10, 2013:

- **Area A:** This area is unchanged and the areas from BCE D-100 have been used.
- **Area C:** This area has been modified to:

    - Change the southern edge of the developed area to follow contours based on the as-built survey.
    - Remove the area under the proposed classroom building.
    - Remove the parallel parking area at the southeast side of the circle that will be redirected to Area B.
    - Still included is the future 3,350 square foot Gym/Community Hall building.
- **Underdrained Soil Filter #1:** This existing filter treats runoff from areas A and C. Table T-1 shows that the required filter area and volume based on the impervious and developed areas draining to it are less than the filter area and treatment volume provided in UDSF #1 as shown on BCE plan D-100.
- **Area B:** This area is a new design for the south parking lot and includes the expanded parking area to the southeast of the circle and some developed area based on the as-built survey. Table T-1 shows that the filter area and volume provided by the design for Underdrained Soil Filter #3 are adequate to treat the impervious and developed areas draining to it.
- **Area D:** This area was calculated based on the as-built survey and includes modifying the north parking lot when the future Gym/Community Hall building is constructed.
- **Area E:** This area was calculated based on the as-built survey and includes the impervious area for the new classroom building, mechanical equipment pad and walkway as non-linear project.
- **Subsurface Sand Filter #1:** Analysis of this sand filter indicates that the volume shown on BCE plan D-100, 1,488 cubic feet, corresponds to an elevation of 78.01 in the HydroCAD model. Chapter 7.3 of the Maine Stormwater Best Practices Manual states that the impoundment depth should not exceed 18". With the top of the filter media at elevation 77.18, this 18" depth would correspond to an elevation 78.68, which would provide a volume of 2,062 cubic feet. Our analysis concludes that the filter area and treatment volume provided by Sand Filter #1 exceed that required by the impervious and developed areas of D and E, including the new classroom building.
- **Area F and Underdrained Soil Filter #2:** The developed area of F was calculated based on the as-built survey and elimination of the proposed basketball court shown on the original design plans. It also includes a play area that is being used at the top of the slope, under the trees. Table T-1 shows that UDSF #2 is sized adequately for the area draining to it.
- **Area G:** This area has not been constructed and was not intended to be treated by the BCE plans. That will remain the case with this amendment and the areas used are from the BCE plans.
- **Area H:** An analysis based on aerial photography indicated that Play Area #2 was constructed about 50% larger than originally proposed and a small storage shed is located in the area. The original design plans showed this field being treated in Forested Buffer H, however the level spreader was never constructed for this buffer.

- **Area I:** This area has not been constructed and was intended to be treated by the BCE plans. That will remain the case with this amendment and the areas used are from the BCE plans.
- **Area J:** This area has not been constructed and was intended to be treated by the BCE plans. That will remain the case with this amendment and the areas used are from the BCE plans.

As can be seen in the table below from Table T-1, the proposed amended plan will meet the required minimum stormwater treatment levels.

Treatment Levels	Total Area (SF)	Treated Area (SF)	Treatment %
Non-Linear Development Areas			
Impervious Area (95%)	56,135	54,745	97.5%
Total Developed area (80%)	197,429	158,431	80.2%
Linear Development Areas			
Impervious Area (75%)	8,014	6,054	75.5%
Total Developed area (50%)	41,357	23,439	56.7%

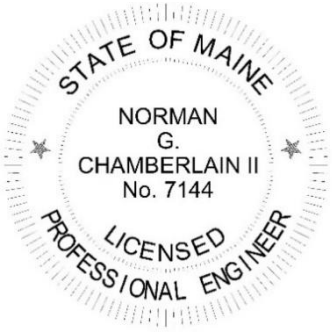
Erosion Control

BMPs such as silt fence and/or filter berms of erosion control mix, riprap culvert outlet protection, erosion control mesh, turf reinforcement mat, mulch, and permanent seeding will be used to prevent erosion and downstream migration of sediment during construction. The locations of temporary and permanent erosion control measures are shown on Drawing C2.2 Grading & Drainage Plan.

Conclusions

The stormwater management plan for this project includes treatment of stormwater runoff in existing and proposed filters and buffers. Calculations show that the level of treatment meets the requirements found in Chapter 500

Respectfully,



Norman G. Chamberlain II, PE
Walsh Engineering Associates, Inc.

SUPPORTING DATA AND CALCULATIONS

The following material presents calculations and copies of source material used during the analysis for this study.

- Appendix A: Location Plan
- Appendix B: Pre-Development HydroCAD Output
- Appendix C: Post-Development HydroCAD Output
- Appendix D: Table T-1 Stormwater Treatment Calculation
- Appendix E: Blais Civil Engineers Previously Approved Plans
    - D-100 – Water Quality Plan
    - D-101 – Pre-Development Drainage Plan
    - D-102 – Post-Development Drainage Plan
- Appendix F: Walsh Engineering Associates Plans
    - D1.0 – Stormwater Treatment Analysis Plan
    - D2.0 – Post Development Drainage Plan

Appendix A:
Location Plan

WALSH
ENGINEERING ASSOCIATES, INC.
One Karen Dr., Suite 2A | Westbrook, Maine 04092
ph: 207.553.9898 | www.walsh-eng.com

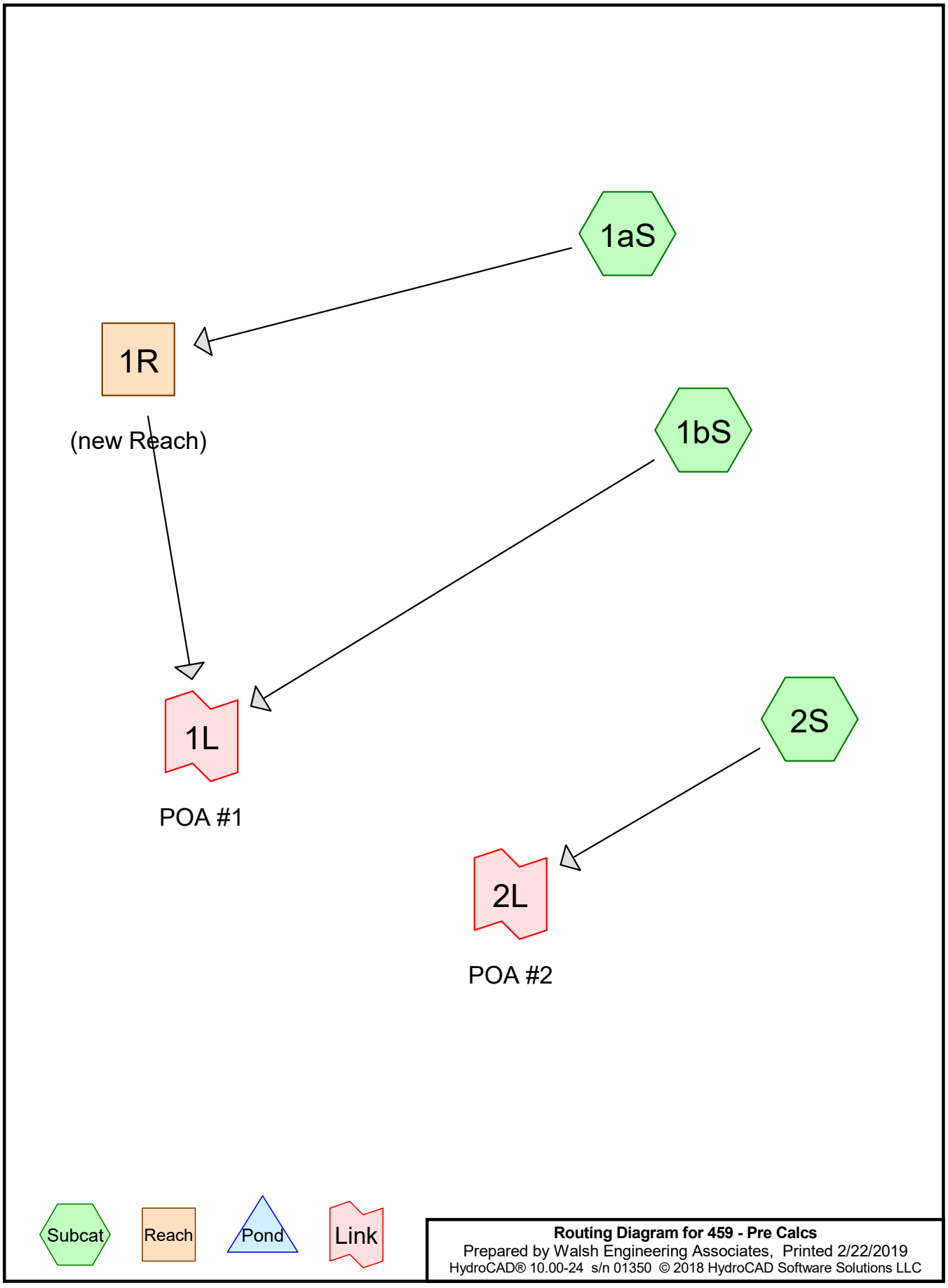
COMMUNITY HALL & CLASSROOM ADDITION

FRIENDS SCHOOL OF PORTLAND
CUMBERLAND, ME 04021

Sheet Title:
LOCATION PLAN

Job No.:	459
Date:	1/30/2019
Scale:	1"=2,000'
Drawn:	RJS
Checked:	SC

Appendix B:
Pre-Development HydroCAD Output



Routing Diagram for 459 - Pre Calcs
Prepared by Walsh Engineering Associates, Printed 2/22/2019

Time span=0.00-30.00 hrs, dt=0.08 hrs, 376 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 1aS: Runoff Area=233,463 sf 1.69% Impervious Runoff Depth=0.31"
Flow Length=721' Tc=22.4 min CN=58 Runoff=0.66 cfs 0.137 af

Subcatchment 1bS: Runoff Area=856,552 sf 4.69% Impervious Runoff Depth=0.40"
Flow Length=2,440' Tc=66.3 min CN=61 Runoff=2.28 cfs 0.662 af

Subcatchment 2S: Runoff Area=630,202 sf 9.00% Impervious Runoff Depth=0.51"
Flow Length=1,530' Tc=56.6 min CN=64 Runoff=2.65 cfs 0.619 af

Reach 1R: (new Reach) Avg. Flow Depth=0.12' Max Vel=1.12 fps Inflow=0.66 cfs 0.137 af
n=0.030 L=450.0' S=0.0089 '/' Capacity=69.25 cfs Outflow=0.63 cfs 0.137 af

Link 1L: POA #1 Inflow=2.68 cfs 0.799 af
Primary=2.68 cfs 0.799 af

Link 2L: POA #2 Inflow=2.65 cfs 0.619 af
Primary=2.65 cfs 0.619 af

Total Runoff Area = 39.491 ac Runoff Volume = 1.417 af Average Runoff Depth = 0.43"
94.14% Pervious = 37.177 ac 5.86% Impervious = 2.314 ac

Summary for Subcatchment 1aS:

Runoff = 0.66 cfs @ 12.53 hrs, Volume= 0.137 af, Depth= 0.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.08 hrs
Type III 24-hr 2-Year Rainfall=3.10"

	Area (sf)	CN	Description
*	19,905	77	Woods, Good, HSG D (wetland on-site)
*	209,618	55	Woods, Good, HSG B (on-site)
*	3,940	98	Paved parking, HSG B (Rt 1)
	233,463	58	Weighted Average
	229,523		98.31% Pervious Area
	3,940		1.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	65	0.0380	0.09		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.00"
0.6	55	0.0900	1.50		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
2.0	104	0.0288	0.85		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
1.1	118	0.1180	1.72		**Shallow Concentrated Flow, D to E** Woodland Kv= 5.0 fps
1.6	98	0.0400	1.00		**Shallow Concentrated Flow, E to F** Woodland Kv= 5.0 fps
4.0	194	0.0260	0.81		**Shallow Concentrated Flow, F to G** Woodland Kv= 5.0 fps
0.9	87	0.1150	1.70		**Shallow Concentrated Flow, G to H** Woodland Kv= 5.0 fps
22.4	721	Total			

Summary for Subcatchment 1bS:

Runoff = 2.28 cfs @ 13.13 hrs, Volume= 0.662 af, Depth= 0.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.08 hrs
Type III 24-hr 2-Year Rainfall=3.10"

	Area (sf)	CN	Description
*	334,578	65	2 acre lots, 12% imp, HSG B (off-site)
*	90,059	77	Woods, Good, HSG D (wetland on-site)
	431,915	55	Woods, Good, HSG B
	856,552	61	Weighted Average
	816,403		95.31% Pervious Area
	40,149		4.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.8	100	0.0500	0.06		**Sheet Flow, A to B** Woods: Dense underbrush n= 0.800 P2= 3.00"
3.6	200	0.0350	0.94		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
2.4	220	0.0950	1.54		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
28.0	750	0.0080	0.45		**Shallow Concentrated Flow, D to E** Woodland Kv= 5.0 fps
4.8	320	0.0500	1.12		**Shallow Concentrated Flow, E to F** Woodland Kv= 5.0 fps
0.7	850	0.0350	20.99	671.80	**Parabolic Channel, F to G** W=12.00' D=4.00' Area=32.0 sf Perim=14.9' n= 0.022 Earth, clean & straight
66.3	2,440	Total			

Summary for Subcatchment 2S:

Runoff = 2.65 cfs @ 12.93 hrs, Volume= 0.619 af, Depth= 0.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.08 hrs
Type III 24-hr 2-Year Rainfall=3.10"

	Area (sf)	CN	Description
*	425,200	65	2 acre lots, 12% imp, HSG B (off-site)
*	47,244	82	2 acre lots, 12% imp, HSG D (off-site)
*	9,606	77	Woods, Good, HSG D (wetland on-site)
*	148,152	55	Woods, Good, HSG B (on-site)
	630,202	64	Weighted Average
	573,509		91.00% Pervious Area
	56,693		9.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.3	80	0.0200	0.04		**Sheet Flow, A to B** Woods: Dense underbrush n= 0.800 P2= 3.00"
0.7	90	0.1800	2.12		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
23.6	1,360	0.0370	0.96		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
56.6	1,530	Total			

Summary for Reach 1R: (new Reach)

Inflow Area = 5.360 ac, 1.69% Impervious, Inflow Depth = 0.31" for 2-Year event
Inflow = 0.66 cfs @ 12.53 hrs, Volume= 0.137 af
Outflow = 0.63 cfs @ 12.73 hrs, Volume= 0.137 af, Atten= 5%, Lag= 12.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.08 hrs
Max. Velocity= 1.12 fps, Min. Travel Time= 6.7 min
Avg. Velocity = 0.54 fps, Avg. Travel Time= 13.8 min

Peak Storage= 252 cf @ 12.61 hrs
Average Depth at Peak Storage= 0.12'
Bank-Full Depth= 2.00' Flow Area= 12.7 sf, Capacity= 69.25 cfs

Custom cross-section, Length= 450.0' Slope= 0.0089 '/'
Constant n= 0.030 Stream, clean & straight
Inlet Invert= 67.00', Outlet Invert= 63.00'

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
-4.20	70.00	0.00
-3.00	69.00	1.00
-2.00	68.00	2.00
2.40	68.00	2.00
3.30	69.00	1.00
4.20	70.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	4.4	0	0.00
1.00	5.4	7.2	2,408	20.57
2.00	12.7	10.1	5,715	69.25

Summary for Link 1L: POA #1

Inflow Area = 25.023 ac, 4.04% Impervious, Inflow Depth = 0.38" for 2-Year event
Inflow = 2.68 cfs @ 13.07 hrs, Volume= 0.799 af
Primary = 2.68 cfs @ 13.07 hrs, Volume= 0.799 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.08 hrs

Summary for Link 2L: POA #2

Inflow Area = 14.467 ac, 9.00% Impervious, Inflow Depth = 0.51" for 2-Year event
Inflow = 2.65 cfs @ 12.93 hrs, Volume= 0.619 af
Primary = 2.65 cfs @ 12.93 hrs, Volume= 0.619 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.08 hrs

Time span=0.00-30.00 hrs, dt=0.08 hrs, 376 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 1aS: Runoff Area=233,463 sf 1.69% Impervious Runoff Depth=0.96"
Flow Length=721' Tc=22.4 min CN=58 Runoff=3.15 cfs 0.427 af

Subcatchment 1bS: Runoff Area=856,552 sf 4.69% Impervious Runoff Depth=1.14"
Flow Length=2,440' Tc=66.3 min CN=61 Runoff=8.44 cfs 1.861 af

Subcatchment 2S: Runoff Area=630,202 sf 9.00% Impervious Runoff Depth=1.33"
Flow Length=1,530' Tc=56.6 min CN=64 Runoff=8.38 cfs 1.600 af

Reach 1R: (new Reach) Avg. Flow Depth=0.33' Max Vel=2.04 fps Inflow=3.15 cfs 0.427 af
n=0.030 L=450.0' S=0.0089 '/' Capacity=69.25 cfs Outflow=3.09 cfs 0.427 af

Link 1L: POA #1 Inflow=9.88 cfs 2.288 af
Primary=9.88 cfs 2.288 af

Link 2L: POA #2 Inflow=8.38 cfs 1.600 af
Primary=8.38 cfs 1.600 af

Total Runoff Area = 39.491 ac Runoff Volume = 3.887 af Average Runoff Depth = 1.18"
94.14% Pervious = 37.177 ac 5.86% Impervious = 2.314 ac

Summary for Subcatchment 1aS:

Runoff = 3.15 cfs @ 12.38 hrs, Volume= 0.427 af, Depth= 0.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.08 hrs
Type III 24-hr 10-Year Rainfall=4.60"

	Area (sf)	CN	Description
*	19,905	77	Woods, Good, HSG D (wetland on-site)
*	209,618	55	Woods, Good, HSG B (on-site)
*	3,940	98	Paved parking, HSG B (Rt 1)
	233,463	58	Weighted Average
	229,523		98.31% Pervious Area
	3,940		1.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	65	0.0380	0.09		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.00"
0.6	55	0.0900	1.50		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
2.0	104	0.0288	0.85		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
1.1	118	0.1180	1.72		**Shallow Concentrated Flow, D to E** Woodland Kv= 5.0 fps
1.6	98	0.0400	1.00		**Shallow Concentrated Flow, E to F** Woodland Kv= 5.0 fps
4.0	194	0.0260	0.81		**Shallow Concentrated Flow, F to G** Woodland Kv= 5.0 fps
0.9	87	0.1150	1.70		**Shallow Concentrated Flow, G to H** Woodland Kv= 5.0 fps
22.4	721	Total			

Summary for Subcatchment 1bS:

Runoff = 8.44 cfs @ 13.00 hrs, Volume= 1.861 af, Depth= 1.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.08 hrs
Type III 24-hr 10-Year Rainfall=4.60"

	Area (sf)	CN	Description
*	334,578	65	2 acre lots, 12% imp, HSG B (off-site)
*	90,059	77	Woods, Good, HSG D (wetland on-site)
	431,915	55	Woods, Good, HSG B
	856,552	61	Weighted Average
	816,403		95.31% Pervious Area
	40,149		4.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.8	100	0.0500	0.06		**Sheet Flow, A to B** Woods: Dense underbrush n= 0.800 P2= 3.00"
3.6	200	0.0350	0.94		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
2.4	220	0.0950	1.54		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
28.0	750	0.0080	0.45		**Shallow Concentrated Flow, D to E** Woodland Kv= 5.0 fps
4.8	320	0.0500	1.12		**Shallow Concentrated Flow, E to F** Woodland Kv= 5.0 fps
0.7	850	0.0350	20.99	671.80	**Parabolic Channel, F to G** W=12.00' D=4.00' Area=32.0 sf Perim=14.9' n= 0.022 Earth, clean & straight
66.3	2,440	Total			

Summary for Subcatchment 2S:

Runoff = 8.38 cfs @ 12.84 hrs, Volume= 1.600 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.08 hrs
Type III 24-hr 10-Year Rainfall=4.60"

	Area (sf)	CN	Description
*	425,200	65	2 acre lots, 12% imp, HSG B (off-site)
*	47,244	82	2 acre lots, 12% imp, HSG D (off-site)
*	9,606	77	Woods, Good, HSG D (wetland on-site)
*	148,152	55	Woods, Good, HSG B (on-site)
	630,202	64	Weighted Average
	573,509		91.00% Pervious Area
	56,693		9.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.3	80	0.0200	0.04		**Sheet Flow, A to B** Woods: Dense underbrush n= 0.800 P2= 3.00"
0.7	90	0.1800	2.12		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
23.6	1,360	0.0370	0.96		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
56.6	1,530	Total			

Summary for Reach 1R: (new Reach)

Inflow Area = 5.360 ac, 1.69% Impervious, Inflow Depth = 0.96" for 10-Year event
Inflow = 3.15 cfs @ 12.38 hrs, Volume= 0.427 af
Outflow = 3.09 cfs @ 12.50 hrs, Volume= 0.427 af, Atten= 2%, Lag= 6.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.08 hrs
Max. Velocity= 2.04 fps, Min. Travel Time= 3.7 min
Avg. Velocity = 0.76 fps, Avg. Travel Time= 9.9 min

Peak Storage= 689 cf @ 12.43 hrs
Average Depth at Peak Storage= 0.33'
Bank-Full Depth= 2.00' Flow Area= 12.7 sf, Capacity= 69.25 cfs

Custom cross-section, Length= 450.0' Slope= 0.0089 '/'
Constant n= 0.030 Stream, clean & straight
Inlet Invert= 67.00', Outlet Invert= 63.00'

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
-4.20	70.00	0.00
-3.00	69.00	1.00
-2.00	68.00	2.00
2.40	68.00	2.00
3.30	69.00	1.00
4.20	70.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	4.4	0	0.00
1.00	5.4	7.2	2,408	20.57
2.00	12.7	10.1	5,715	69.25

Summary for Link 1L: POA #1

Inflow Area = 25.023 ac, 4.04% Impervious, Inflow Depth = 1.10" for 10-Year event
Inflow = 9.88 cfs @ 12.90 hrs, Volume= 2.288 af
Primary = 9.88 cfs @ 12.90 hrs, Volume= 2.288 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.08 hrs

Summary for Link 2L: POA #2

Inflow Area = 14.467 ac, 9.00% Impervious, Inflow Depth = 1.33" for 10-Year event
Inflow = 8.38 cfs @ 12.84 hrs, Volume= 1.600 af
Primary = 8.38 cfs @ 12.84 hrs, Volume= 1.600 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.08 hrs

Time span=0.00-30.00 hrs, dt=0.08 hrs, 376 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 1aS: Runoff Area=233,463 sf 1.69% Impervious Runoff Depth=1.63"
Flow Length=721' Tc=22.4 min CN=58 Runoff=6.00 cfs 0.730 af

Subcatchment 1bS: Runoff Area=856,552 sf 4.69% Impervious Runoff Depth=1.87"
Flow Length=2,440' Tc=66.3 min CN=61 Runoff=14.93 cfs 3.069 af

Subcatchment 2S: Runoff Area=630,202 sf 9.00% Impervious Runoff Depth=2.12"
Flow Length=1,530' Tc=56.6 min CN=64 Runoff=14.08 cfs 2.558 af

Reach 1R: (new Reach) Avg. Flow Depth=0.48' Max Vel=2.56 fps Inflow=6.00 cfs 0.730 af
n=0.030 L=450.0' S=0.0089 '/' Capacity=69.25 cfs Outflow=5.82 cfs 0.730 af

Link 1L: POA #1 Inflow=17.48 cfs 3.799 af
Primary=17.48 cfs 3.799 af

Link 2L: POA #2 Inflow=14.08 cfs 2.558 af
Primary=14.08 cfs 2.558 af

Total Runoff Area = 39.491 ac Runoff Volume = 6.357 af Average Runoff Depth = 1.93"
94.14% Pervious = 37.177 ac 5.86% Impervious = 2.314 ac

Summary for Subcatchment 1aS:

Runoff = 6.00 cfs @ 12.35 hrs, Volume= 0.730 af, Depth= 1.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.08 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	19,905	77	Woods, Good, HSG D (wetland on-site)
*	209,618	55	Woods, Good, HSG B (on-site)
*	3,940	98	Paved parking, HSG B (Rt 1)
	233,463	58	Weighted Average
	229,523		98.31% Pervious Area
	3,940		1.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	65	0.0380	0.09		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.00"
0.6	55	0.0900	1.50		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
2.0	104	0.0288	0.85		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
1.1	118	0.1180	1.72		**Shallow Concentrated Flow, D to E** Woodland Kv= 5.0 fps
1.6	98	0.0400	1.00		**Shallow Concentrated Flow, E to F** Woodland Kv= 5.0 fps
4.0	194	0.0260	0.81		**Shallow Concentrated Flow, F to G** Woodland Kv= 5.0 fps
0.9	87	0.1150	1.70		**Shallow Concentrated Flow, G to H** Woodland Kv= 5.0 fps
22.4	721	Total			

Summary for Subcatchment 1bS:

Runoff = 14.93 cfs @ 12.96 hrs, Volume= 3.069 af, Depth= 1.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.08 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	334,578	65	2 acre lots, 12% imp, HSG B (off-site)
*	90,059	77	Woods, Good, HSG D (wetland on-site)
	431,915	55	Woods, Good, HSG B
	856,552	61	Weighted Average
	816,403		95.31% Pervious Area
	40,149		4.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.8	100	0.0500	0.06		**Sheet Flow, A to B** Woods: Dense underbrush n= 0.800 P2= 3.00"
3.6	200	0.0350	0.94		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
2.4	220	0.0950	1.54		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
28.0	750	0.0080	0.45		**Shallow Concentrated Flow, D to E** Woodland Kv= 5.0 fps
4.8	320	0.0500	1.12		**Shallow Concentrated Flow, E to F** Woodland Kv= 5.0 fps
0.7	850	0.0350	20.99	671.80	**Parabolic Channel, F to G** W=12.00' D=4.00' Area=32.0 sf Perim=14.9' n= 0.022 Earth, clean & straight
66.3	2,440	Total			

Summary for Subcatchment 2S:

Runoff = 14.08 cfs @ 12.81 hrs, Volume= 2.558 af, Depth= 2.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.08 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	425,200	65	2 acre lots, 12% imp, HSG B (off-site)
*	47,244	82	2 acre lots, 12% imp, HSG D (off-site)
*	9,606	77	Woods, Good, HSG D (wetland on-site)
*	148,152	55	Woods, Good, HSG B (on-site)
	630,202	64	Weighted Average
	573,509		91.00% Pervious Area
	56,693		9.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.3	80	0.0200	0.04		**Sheet Flow, A to B** Woods: Dense underbrush n= 0.800 P2= 3.00"
0.7	90	0.1800	2.12		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
23.6	1,360	0.0370	0.96		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
56.6	1,530	Total			

Summary for Reach 1R: (new Reach)

Inflow Area = 5.360 ac, 1.69% Impervious, Inflow Depth = 1.63" for 25-Year event
Inflow = 6.00 cfs @ 12.35 hrs, Volume= 0.730 af
Outflow = 5.82 cfs @ 12.44 hrs, Volume= 0.730 af, Atten= 3%, Lag= 5.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.08 hrs
Max. Velocity= 2.56 fps, Min. Travel Time= 2.9 min
Avg. Velocity = 0.88 fps, Avg. Travel Time= 8.5 min

Peak Storage= 1,041 cf @ 12.39 hrs
Average Depth at Peak Storage= 0.48'
Bank-Full Depth= 2.00' Flow Area= 12.7 sf, Capacity= 69.25 cfs

Custom cross-section, Length= 450.0' Slope= 0.0089 '/'
Constant n= 0.030 Stream, clean & straight
Inlet Invert= 67.00', Outlet Invert= 63.00'

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
-4.20	70.00	0.00
-3.00	69.00	1.00
-2.00	68.00	2.00
2.40	68.00	2.00
3.30	69.00	1.00
4.20	70.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	4.4	0	0.00
1.00	5.4	7.2	2,408	20.57
2.00	12.7	10.1	5,715	69.25

Summary for Link 1L: POA #1

Inflow Area = 25.023 ac, 4.04% Impervious, Inflow Depth = 1.82" for 25-Year event
Inflow = 17.48 cfs @ 12.86 hrs, Volume= 3.799 af
Primary = 17.48 cfs @ 12.86 hrs, Volume= 3.799 af, Atten= 0%, Lag= 0.0 min

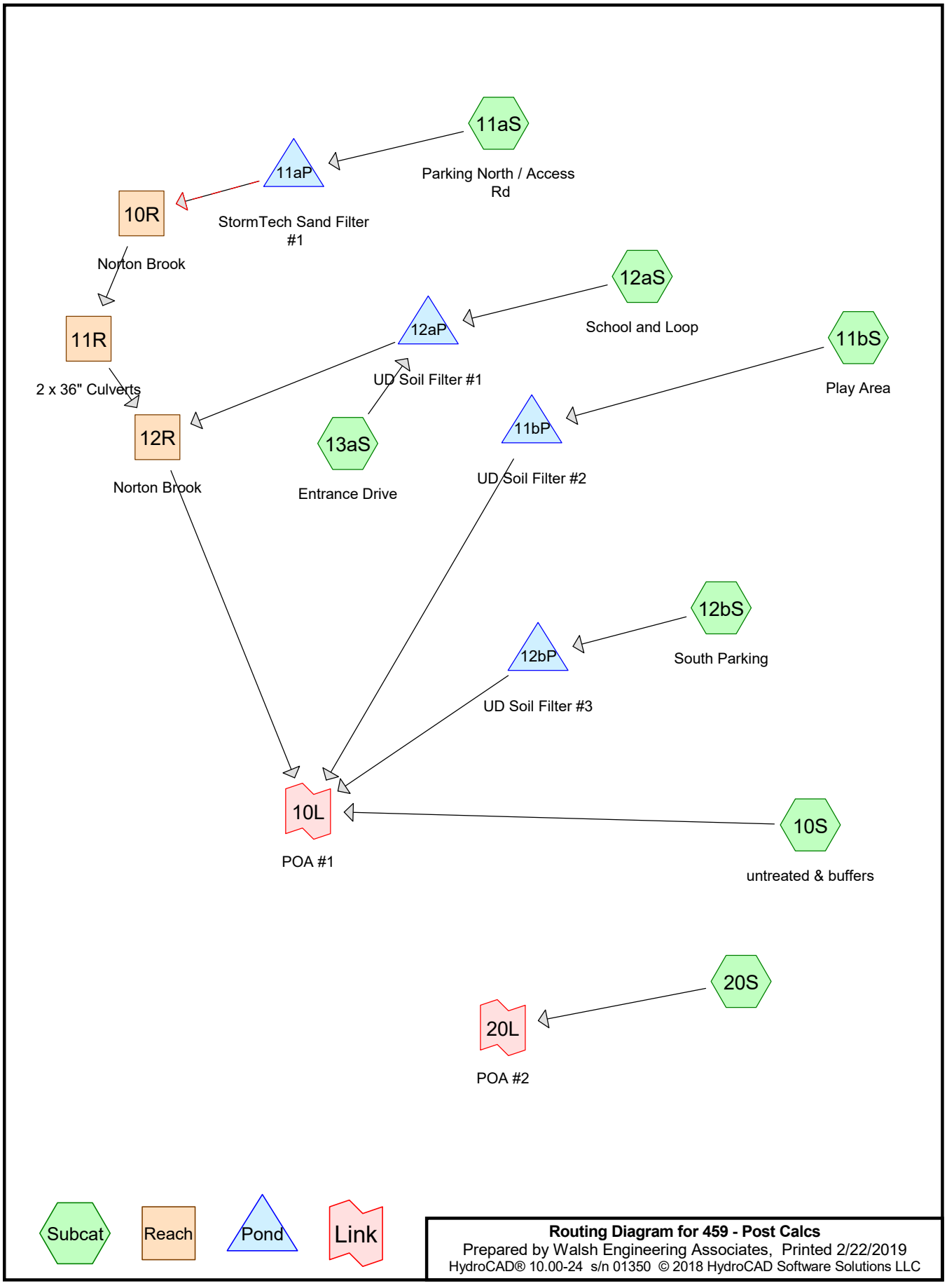
Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.08 hrs

Summary for Link 2L: POA #2

Inflow Area = 14.467 ac, 9.00% Impervious, Inflow Depth = 2.12" for 25-Year event
Inflow = 14.08 cfs @ 12.81 hrs, Volume= 2.558 af
Primary = 14.08 cfs @ 12.81 hrs, Volume= 2.558 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.08 hrs

Appendix C:
Post-Development HydroCAD Output



Routing Diagram for 459 - Post Calcs

Prepared by Walsh Engineering Associates, Printed 2/22/2019

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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 10S: untreated & buffers Runoff Area=910,886 sf 4.41% Impervious Runoff Depth=0.34"
Flow Length=2,520' Tc=67.9 min CN=59 Runoff=1.81 cfs 0.589 af

Subcatchment 11aS: Parking North / Runoff Area=32,975 sf 59.13% Impervious Runoff Depth=1.53"
Flow Length=434' Tc=3.2 min CN=83 Runoff=1.50 cfs 0.096 af

Subcatchment 11bS: Play Area Runoff Area=26,759 sf 0.00% Impervious Runoff Depth=0.37"
Flow Length=191' Tc=26.3 min CN=60 Runoff=0.10 cfs 0.019 af

Subcatchment 12aS: School and Loop Runoff Area=63,782 sf 42.09% Impervious Runoff Depth=1.14"
Flow Length=399' Tc=12.4 min CN=77 Runoff=1.53 cfs 0.139 af

Subcatchment 12bS: South Parking Runoff Area=31,595 sf 45.85% Impervious Runoff Depth=1.14"
Flow Length=290' Tc=22.0 min CN=77 Runoff=0.61 cfs 0.069 af

Subcatchment 13aS: Entrance Drive Runoff Area=4,000 sf 100.00% Impervious Runoff Depth=2.87"
Tc=2.5 min CN=98 Runoff=0.31 cfs 0.022 af

Subcatchment 20S: Runoff Area=630,202 sf 9.00% Impervious Runoff Depth=0.51"
Flow Length=1,530' Tc=56.6 min CN=64 Runoff=2.65 cfs 0.619 af

Reach 10R: Norton Brook Avg. Flow Depth=0.04' Max Vel=0.71 fps Inflow=0.11 cfs 0.076 af
n=0.030 L=120.0' S=0.0167 '/' Capacity=94.82 cfs Outflow=0.11 cfs 0.076 af

Reach 11R: 2 x 36" Culverts Avg. Flow Depth=0.06' Max Vel=1.79 fps Inflow=0.11 cfs 0.076 af
36.0" Round Pipe x 2.00 n=0.011 L=75.0' S=0.0133 '/' Capacity=182.04 cfs Outflow=0.11 cfs 0.076 af

Reach 12R: Norton Brook Avg. Flow Depth=0.10' Max Vel=1.31 fps Inflow=0.31 cfs 0.145 af
n=0.025 L=370.0' S=0.0121 '/' Capacity=488.91 cfs Outflow=0.31 cfs 0.145 af

Pond 11aP: StormTech Sand Filter #1 Peak Elev=79.13' Storage=2,322 cf Inflow=1.50 cfs 0.096 af
Primary=0.05 cfs 0.007 af Secondary=0.06 cfs 0.070 af Outflow=0.11 cfs 0.076 af

Pond 11bP: UD Soil Filter #2 Peak Elev=95.06' Storage=232 cf Inflow=0.10 cfs 0.019 af
Discarded=0.03 cfs 0.015 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.015 af

Pond 12aP: UD Soil Filter #1 Peak Elev=79.79' Storage=4,113 cf Inflow=1.66 cfs 0.161 af
Outflow=0.20 cfs 0.069 af

Pond 12bP: UD Soil Filter #3 Peak Elev=74.53' Storage=1,302 cf Inflow=0.61 cfs 0.069 af
Outflow=0.16 cfs 0.065 af

Link 10L: POA #1 Inflow=2.06 cfs 0.799 af
Primary=2.06 cfs 0.799 af

Link 20L: POA #2 Inflow=2.65 cfs 0.619 af
Primary=2.65 cfs 0.619 af

Total Runoff Area = 39.031 ac Runoff Volume = 1.553 af Average Runoff Depth = 0.48"
90.49% Pervious = 35.320 ac 9.51% Impervious = 3.712 ac

Summary for Subcatchment 10S: untreated & buffers

Runoff = 1.81 cfs @ 13.20 hrs, Volume= 0.589 af, Depth= 0.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

	Area (sf)	CN	Description
*	334,580	65	2 acre lots, 12% imp, HSG B (off-site)
*	6,570	77	Woods, Good, HSG D (wetland on-site)
*	569,736	55	Woods, Good, HSG B
	910,886	59	Weighted Average
	870,736		95.59% Pervious Area
	40,150		4.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.8	100	0.0500	0.06		**Sheet Flow, A to B** Woods: Dense underbrush n= 0.800 P2= 3.00"
3.6	200	0.0350	0.94		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
2.4	220	0.0950	1.54		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
28.0	750	0.0080	0.45		**Shallow Concentrated Flow, D to E** Woodland Kv= 5.0 fps
3.4	175	0.0300	0.87		**Shallow Concentrated Flow, E to F** Woodland Kv= 5.0 fps
0.1	30	0.0100	4.82	3.05	**Pipe Channel, F to G** 12.0" Round w/ 3.0" inside fill Area= 0.6 sf Perim= 3.0' r= 0.21' n= 0.011 Concrete pipe, straight & clean
2.9	195	0.0487	1.10		**Shallow Concentrated Flow, G to H** Woodland Kv= 5.0 fps
0.7	850	0.0350	20.99	671.80	**Parabolic Channel, H to I** W=12.00' D=4.00' Area=32.0 sf Perim=14.9' n= 0.022 Earth, clean & straight
67.9	2,520	Total			

Summary for Subcatchment 11aS: Parking North / Access Rd

Runoff = 1.50 cfs @ 12.05 hrs, Volume= 0.096 af, Depth= 1.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

	Area (sf)	CN	Description
*	19,499	98	Impervious
	13,476	61	>75% Grass cover, Good, HSG B
	32,975	83	Weighted Average
	13,476		40.87% Pervious Area
	19,499		59.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	9	0.2730	0.13		**Sheet Flow, A to B** Grass: Bermuda n= 0.410 P2= 3.00"
0.8	49	0.0200	0.99		**Shallow Concentrated Flow, B to C** Short Grass Pasture Kv= 7.0 fps
0.2	181	0.7600	17.70		**Shallow Concentrated Flow, C to D** Paved Kv= 20.3 fps
1.0	195	0.0100	3.27	1.28	**Pipe Channel, D to E** 12.0" Round w/ 6.0" inside fill Area= 0.4 sf Perim= 2.6' r= 0.15' n= 0.013 Corrugated PE, smooth interior
3.2	434	Total			

Summary for Subcatchment 11bS: Play Area

Runoff = 0.10 cfs @ 12.54 hrs, Volume= 0.019 af, Depth= 0.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
20,393	61	>75% Grass cover, Good, HSG B
6,366	55	Woods, Good, HSG B
26,759	60	Weighted Average
26,759		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					**Direct Entry, Open Field**
2.8	30	0.3300	0.18		**Sheet Flow, A to B** Grass: Bermuda n= 0.410 P2= 3.00"
3.5	161	0.0120	0.77		**Shallow Concentrated Flow, B to C** Short Grass Pasture Kv= 7.0 fps
26.3	191	Total			

Summary for Subcatchment 12aS: School and Loop

Runoff = 1.53 cfs @ 12.18 hrs, Volume= 0.139 af, Depth= 1.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

	Area (sf)	CN	Description
*	26,848	98	Impervious
	36,934	61	>75% Grass cover, Good, HSG B
	63,782	77	Weighted Average
	36,934		57.91% Pervious Area
	26,848		42.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	55	0.0800	0.12		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.00"
0.6	71	0.0850	2.04		**Shallow Concentrated Flow, B to C** Short Grass Pasture Kv= 7.0 fps
0.2	38	0.2630	3.59		**Shallow Concentrated Flow, C to D** Short Grass Pasture Kv= 7.0 fps
3.4	160	0.0125	0.78		**Shallow Concentrated Flow, D to E** Short Grass Pasture Kv= 7.0 fps
0.3	75	0.0100	4.25	1.67	**Pipe Channel, E to F** 12.0" Round w/ 6.0" inside fill Area= 0.4 sf Perim= 2.6' r= 0.15' n= 0.010 PVC, smooth interior
12.4	399	Total			

Summary for Subcatchment 12bS: South Parking

Runoff = 0.61 cfs @ 12.32 hrs, Volume= 0.069 af, Depth= 1.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

	Area (sf)	CN	Description
*	14,485	98	Impervious
	10,568	61	>75% Grass cover, Good, HSG B
	6,542	55	Woods, Good, HSG B
	31,595	77	Weighted Average
	17,110		54.15% Pervious Area
	14,485		45.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.7	130	0.0400	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.00"
1.3	160	0.0220	2.00	0.16	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=0.20' Z= 2.0 '/' Top.W=0.80' n= 0.022 Earth, clean & straight
22.0	290	Total			

Summary for Subcatchment 13aS: Entrance Drive

Runoff = 0.31 cfs @ 12.04 hrs, Volume= 0.022 af, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

	Area (sf)	CN	Description
*	4,000	98	Impervious
	4,000		100.00% Impervious Area

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

Summary for Subcatchment 20S:

Runoff = 2.65 cfs @ 12.90 hrs, Volume= 0.619 af, Depth= 0.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

	Area (sf)	CN	Description
*	425,200	65	2 acre lots, 12% imp, HSG B (off-site)
*	47,244	82	2 acre lots, 12% imp, HSG D (off-site)
*	9,606	77	Woods, Good, HSG D (wetland on-site)
*	140,402	55	Woods, Good, HSG B (on-site)
	7,750	61	>75% Grass cover, Good, HSG B
	630,202	64	Weighted Average
	573,509		91.00% Pervious Area
	56,693		9.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.3	80	0.0200	0.04		**Sheet Flow, A to B** Woods: Dense underbrush n= 0.800 P2= 3.00"
0.7	90	0.1800	2.12		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
23.6	1,360	0.0370	0.96		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
56.6	1,530	Total			

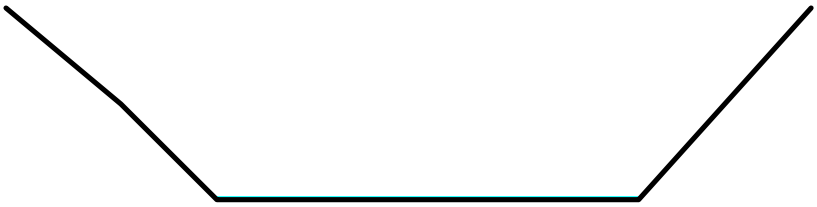
Summary for Reach 10R: Norton Brook

Inflow Area = 0.757 ac, 59.13% Impervious, Inflow Depth = 1.21" for 2-Year event
Inflow = 0.11 cfs @ 13.38 hrs, Volume= 0.076 af
Outflow = 0.11 cfs @ 13.46 hrs, Volume= 0.076 af, Atten= 0%, Lag= 5.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.71 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 0.57 fps, Avg. Travel Time= 3.5 min

Peak Storage= 19 cf @ 13.42 hrs
Average Depth at Peak Storage= 0.04'
Bank-Full Depth= 2.00' Flow Area= 12.7 sf, Capacity= 94.82 cfs

Custom cross-section, Length= 120.0' Slope= 0.0167 '/'
Constant n= 0.030 Stream, clean & straight
Inlet Invert= 69.00', Outlet Invert= 67.00'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)
-4.20	70.00	0.00
-3.00	69.00	1.00
-2.00	68.00	2.00
2.40	68.00	2.00
3.30	69.00	1.00
4.20	70.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	4.4	0	0.00
1.00	5.4	7.2	642	28.17
2.00	12.7	10.1	1,524	94.82

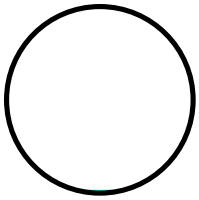
Summary for Reach 11R: 2 x 36" Culverts

Inflow Area = 0.757 ac, 59.13% Impervious, Inflow Depth = 1.21" for 2-Year event
Inflow = 0.11 cfs @ 13.46 hrs, Volume= 0.076 af
Outflow = 0.11 cfs @ 13.48 hrs, Volume= 0.076 af, Atten= 0%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.79 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.54 fps, Avg. Travel Time= 0.8 min

Peak Storage= 5 cf @ 13.47 hrs
Average Depth at Peak Storage= 0.06'
Bank-Full Depth= 3.00' Flow Area= 14.1 sf, Capacity= 182.04 cfs

A factor of 2.00 has been applied to the storage and discharge capacity
36.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 75.0' Slope= 0.0133 '/'
Inlet Invert= 67.00', Outlet Invert= 66.00'



Summary for Reach 12R: Norton Brook

Inflow Area = 2.313 ac, 49.97% Impervious, Inflow Depth = 0.75" for 2-Year event
Inflow = 0.31 cfs @ 13.51 hrs, Volume= 0.145 af
Outflow = 0.31 cfs @ 13.66 hrs, Volume= 0.145 af, Atten= 1%, Lag= 9.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.31 fps, Min. Travel Time= 4.7 min
Avg. Velocity = 0.92 fps, Avg. Travel Time= 6.7 min

Peak Storage= 88 cf @ 13.58 hrs
Average Depth at Peak Storage= 0.10'
Bank-Full Depth= 4.00' Flow Area= 43.3 sf, Capacity= 488.91 cfs

Custom cross-section, Length= 370.0' Slope= 0.0121 '/'
Constant n= 0.025 Earth, clean & winding
Inlet Invert= 66.00', Outlet Invert= 61.51'

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
-8.50	70.00	0.00
-6.00	67.00	3.00
-1.00	66.00	4.00
1.00	66.00	4.00
8.00	70.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	2.0	0	0.00
1.00	5.4	9.1	1,989	24.75
4.00	43.3	19.1	16,003	488.91

Summary for Pond 11aP: StormTech Sand Filter #1

Inflow Area = 0.757 ac, 59.13% Impervious, Inflow Depth = 1.53" for 2-Year event
Inflow = 1.50 cfs @ 12.05 hrs, Volume= 0.096 af
Outflow = 0.11 cfs @ 13.38 hrs, Volume= 0.076 af, Atten= 92%, Lag= 79.7 min
Primary = 0.05 cfs @ 13.38 hrs, Volume= 0.007 af
Secondary = 0.06 cfs @ 13.38 hrs, Volume= 0.070 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 79.13' @ 13.38 hrs Surf.Area= 2,772 sf Storage= 2,322 cf
Flood Elev= 82.00' Surf.Area= 2,772 sf Storage= 2,516 cf

Plug-Flow detention time= 364.7 min calculated for 0.076 af (79% of inflow)
Center-of-Mass det. time= 284.2 min (1,116.0 - 831.8)

Volume	Invert	Avail.Storage	Storage Description
#1	75.68'	900 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 2,250 cf Overall x 40.0% Voids
#2A	77.18'	901 cf	**28.17'W x 45.16'L x 2.33'H Field A** 2,968 cf Overall - 715 cf Embedded = 2,253 cf x 40.0% Voids
#3A	77.68'	715 cf	**ADS_StormTech SC-310** x 48 Inside #2 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 8 rows
		2,516 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
75.68	1,500	0	0
77.18	1,500	2,250	2,250

Device	Routing	Invert	Outlet Devices
#1	Primary	79.01'	**12.0" Round 12" Outfall to Level Spreader** L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 79.01' / 74.58' S= 0.1108 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Secondary	75.68'	**2.000 in/hr Underdrain over Surface area above 75.68'** Conductivity to Groundwater Elevation = -2.00' Excluded Surface area = 1,500 sf

Primary OutFlow Max=0.05 cfs @ 13.38 hrs HW=79.13' (Free Discharge)
↑—**1=12" Outfall to Level Spreader** (Inlet Controls 0.05 cfs @ 0.94 fps)

Secondary OutFlow Max=0.06 cfs @ 13.38 hrs HW=79.13' (Free Discharge)
↑—**2=Underdrain** (Controls 0.06 cfs)

Summary for Pond 11bP: UD Soil Filter #2

Inflow Area = 0.614 ac, 0.00% Impervious, Inflow Depth = 0.37" for 2-Year event
Inflow = 0.10 cfs @ 12.54 hrs, Volume= 0.019 af
Outflow = 0.03 cfs @ 13.96 hrs, Volume= 0.015 af, Atten= 69%, Lag= 85.1 min
Discarded = 0.03 cfs @ 13.96 hrs, Volume= 0.015 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 95.06' @ 13.96 hrs Surf.Area= 1,304 sf Storage= 232 cf

Plug-Flow detention time= 161.1 min calculated for 0.015 af (77% of inflow)
Center-of-Mass det. time= 66.5 min (1,010.3 - 943.7)

Volume	Invert	Avail.Storage	Storage Description
#1	93.50'	195 cf	**Media Storage (Prismatic)** Listed below (Recalc) 975 cf Overall x 20.0% Voids
#2	95.00'	1,498 cf	**Ponding Storage (Prismatic)** Listed below (Recalc)
		1,693 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
93.50	650	0	0
95.00	650	975	975

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
95.00	650	0	0
96.50	760	1,058	1,058
97.00	1,000	440	1,498

Device	Routing	Invert	Outlet Devices
#1	Discarded	93.50'	**2.000 in/hr Underdrain over Surface area above 93.50'** Conductivity to Groundwater Elevation = -2.00' Excluded Surface area = 650 sf
#2	Primary	96.50'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** 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 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.03 cfs @ 13.96 hrs HW=95.06' (Free Discharge)
↑—**1=Underdrain** (Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=93.50' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 12aP: UD Soil Filter #1

Inflow Area = 1.556 ac, 45.51% Impervious, Inflow Depth = 1.24" for 2-Year event
Inflow = 1.66 cfs @ 12.18 hrs, Volume= 0.161 af
Outflow = 0.20 cfs @ 13.52 hrs, Volume= 0.069 af, Atten= 88%, Lag= 80.4 min
Primary = 0.20 cfs @ 13.52 hrs, Volume= 0.069 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 79.79' @ 13.52 hrs Surf.Area= 2,970 sf Storage= 4,113 cf

Plug-Flow detention time= 307.1 min calculated for 0.069 af (43% of inflow)
Center-of-Mass det. time= 173.2 min (1,018.8 - 845.6)

Volume	Invert	Avail.Storage	Storage Description
#1	78.25'	15,379 cf	**Ponding (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
78.25	2,385	0	0
79.75	2,958	4,007	4,007
83.00	4,040	11,372	15,379

Device	Routing	Invert	Outlet Devices
#1	Primary	75.65'	**12.0" Round 12" Outfall to Level Spreader** L= 90.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 75.65' / 74.75' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	79.75'	**24.0" x 24.0" Horiz. CB 8** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.18 cfs @ 13.52 hrs HW=79.79' (Free Discharge)
↑—**1=12" Outfall to Level Spreader** (Passes 0.18 cfs of 5.69 cfs potential flow)
↑—**2=CB 8** (Weir Controls 0.18 cfs @ 0.62 fps)

Summary for Pond 12bP: UD Soil Filter #3

Inflow Area = 0.725 ac, 45.85% Impervious, Inflow Depth = 1.14" for 2-Year event
Inflow = 0.61 cfs @ 12.32 hrs, Volume= 0.069 af
Outflow = 0.16 cfs @ 12.99 hrs, Volume= 0.065 af, Atten= 74%, Lag= 40.0 min
Primary = 0.16 cfs @ 12.99 hrs, Volume= 0.065 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 74.53' @ 12.99 hrs Surf.Area= 1,568 sf Storage= 1,302 cf

Plug-Flow detention time= 415.3 min calculated for 0.065 af (94% of inflow)
Center-of-Mass det. time= 385.3 min (1,254.3 - 869.0)

Volume	Invert	Avail.Storage	Storage Description
#1	73.50'	2,118 cf	**Custom Stage Data (Pyramidal)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
73.50	1,024	0	0	1,024
74.00	1,233	563	563	1,244
75.00	1,900	1,555	2,118	1,929

Device	Routing	Invert	Outlet Devices
#1	Primary	70.75'	**2.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	73.50'	**0.750 in/hr Exfiltration over Surface area**
#3	Primary	74.50'	**9.0' long (Profile 7) Broad-Crested Rectangular Weir**
			Head (feet) 0.49 0.98 1.48
			Coef. (English) 2.99 3.41 3.62

Primary OutFlow Max=0.16 cfs @ 12.99 hrs HW=74.53' (Free Discharge)
- **1=Orifice/Grate** (Passes 0.03 cfs of 0.20 cfs potential flow)
  - **2=Exfiltration** (Exfiltration Controls 0.03 cfs)
- **3=Broad-Crested Rectangular Weir** (Weir Controls 0.13 cfs @ 0.50 fps)

Summary for Link 10L: POA #1

Inflow Area = 24.564 ac, 9.81% Impervious, Inflow Depth > 0.39" for 2-Year event
Inflow = 2.06 cfs @ 13.40 hrs, Volume= 0.799 af
Primary = 2.06 cfs @ 13.40 hrs, Volume= 0.799 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Link 20L: POA #2

Inflow Area = 14.467 ac, 9.00% Impervious, Inflow Depth = 0.51" for 2-Year event
Inflow = 2.65 cfs @ 12.90 hrs, Volume= 0.619 af
Primary = 2.65 cfs @ 12.90 hrs, Volume= 0.619 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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 10S: untreated & buffers Runoff Area=910,886 sf 4.41% Impervious Runoff Depth=1.01"
Flow Length=2,520' Tc=67.9 min CN=59 Runoff=7.62 cfs 1.768 af

Subcatchment 11aS: Parking North / Runoff Area=32,975 sf 59.13% Impervious Runoff Depth=2.81"
Flow Length=434' Tc=3.2 min CN=83 Runoff=2.76 cfs 0.178 af

Subcatchment 11bS: Play Area Runoff Area=26,759 sf 0.00% Impervious Runoff Depth=1.07"
Flow Length=191' Tc=26.3 min CN=60 Runoff=0.40 cfs 0.055 af

Subcatchment 12aS: School and Loop Runoff Area=63,782 sf 42.09% Impervious Runoff Depth=2.29"
Flow Length=399' Tc=12.4 min CN=77 Runoff=3.19 cfs 0.280 af

Subcatchment 12bS: South Parking Runoff Area=31,595 sf 45.85% Impervious Runoff Depth=2.29"
Flow Length=290' Tc=22.0 min CN=77 Runoff=1.26 cfs 0.139 af

Subcatchment 13aS: Entrance Drive Runoff Area=4,000 sf 100.00% Impervious Runoff Depth=4.36"
Tc=2.5 min CN=98 Runoff=0.47 cfs 0.033 af

Subcatchment 20S: Runoff Area=630,202 sf 9.00% Impervious Runoff Depth=1.33"
Flow Length=1,530' Tc=56.6 min CN=64 Runoff=8.39 cfs 1.600 af

Reach 10R: Norton Brook Avg. Flow Depth=0.22' Max Vel=2.22 fps Inflow=3.01 cfs 0.158 af
n=0.030 L=120.0' S=0.0167 '/' Capacity=94.82 cfs Outflow=2.28 cfs 0.158 af

Reach 11R: 2 x 36" Culverts Avg. Flow Depth=0.24' Max Vel=4.42 fps Inflow=2.28 cfs 0.158 af
36.0" Round Pipe x 2.00 n=0.011 L=75.0' S=0.0133 '/' Capacity=182.04 cfs Outflow=2.25 cfs 0.158 af

Reach 12R: Norton Brook Avg. Flow Depth=0.38' Max Vel=2.73 fps Inflow=3.56 cfs 0.379 af
n=0.025 L=370.0' S=0.0121 '/' Capacity=488.91 cfs Outflow=3.46 cfs 0.379 af

Pond 11aP: StormTech Sand Filter #1 Peak Elev=80.45' Storage=2,516 cf Inflow=2.76 cfs 0.178 af
Primary=2.95 cfs 0.075 af Secondary=0.06 cfs 0.082 af Outflow=3.01 cfs 0.158 af

Pond 11bP: UD Soil Filter #2 Peak Elev=96.50' Storage=1,256 cf Inflow=0.40 cfs 0.055 af
Discarded=0.04 cfs 0.050 af Primary=0.01 cfs 0.000 af Outflow=0.04 cfs 0.051 af

Pond 12aP: UD Soil Filter #1 Peak Elev=79.96' Storage=4,633 cf Inflow=3.38 cfs 0.313 af
Outflow=2.50 cfs 0.221 af

Pond 12bP: UD Soil Filter #3 Peak Elev=74.62' Storage=1,450 cf Inflow=1.26 cfs 0.139 af
Outflow=1.16 cfs 0.132 af

Link 10L: POA #1 Inflow=8.77 cfs 2.279 af
Primary=8.77 cfs 2.279 af

Link 20L: POA #2 Inflow=8.39 cfs 1.600 af
Primary=8.39 cfs 1.600 af

Total Runoff Area = 39.031 ac Runoff Volume = 4.052 af Average Runoff Depth = 1.25"
90.49% Pervious = 35.320 ac 9.51% Impervious = 3.712 ac

Summary for Subcatchment 10S: untreated & buffers

Runoff = 7.62 cfs @ 13.05 hrs, Volume= 1.768 af, Depth= 1.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

	Area (sf)	CN	Description
*	334,580	65	2 acre lots, 12% imp, HSG B (off-site)
*	6,570	77	Woods, Good, HSG D (wetland on-site)
*	569,736	55	Woods, Good, HSG B
	910,886	59	Weighted Average
	870,736		95.59% Pervious Area
	40,150		4.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.8	100	0.0500	0.06		**Sheet Flow, A to B** Woods: Dense underbrush n= 0.800 P2= 3.00"
3.6	200	0.0350	0.94		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
2.4	220	0.0950	1.54		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
28.0	750	0.0080	0.45		**Shallow Concentrated Flow, D to E** Woodland Kv= 5.0 fps
3.4	175	0.0300	0.87		**Shallow Concentrated Flow, E to F** Woodland Kv= 5.0 fps
0.1	30	0.0100	4.82	3.05	**Pipe Channel, F to G** 12.0" Round w/ 3.0" inside fill Area= 0.6 sf Perim= 3.0' r= 0.21' n= 0.011 Concrete pipe, straight & clean
2.9	195	0.0487	1.10		**Shallow Concentrated Flow, G to H** Woodland Kv= 5.0 fps
0.7	850	0.0350	20.99	671.80	**Parabolic Channel, H to I** W=12.00' D=4.00' Area=32.0 sf Perim=14.9' n= 0.022 Earth, clean & straight
67.9	2,520	Total			

Summary for Subcatchment 11aS: Parking North / Access Rd

Runoff = 2.76 cfs @ 12.05 hrs, Volume= 0.178 af, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

	Area (sf)	CN	Description
*	19,499	98	Impervious
	13,476	61	>75% Grass cover, Good, HSG B
	32,975	83	Weighted Average
	13,476		40.87% Pervious Area
	19,499		59.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	9	0.2730	0.13		**Sheet Flow, A to B** Grass: Bermuda n= 0.410 P2= 3.00"
0.8	49	0.0200	0.99		**Shallow Concentrated Flow, B to C** Short Grass Pasture Kv= 7.0 fps
0.2	181	0.7600	17.70		**Shallow Concentrated Flow, C to D** Paved Kv= 20.3 fps
1.0	195	0.0100	3.27	1.28	**Pipe Channel, D to E** 12.0" Round w/ 6.0" inside fill Area= 0.4 sf Perim= 2.6' r= 0.15' n= 0.013 Corrugated PE, smooth interior
3.2	434	Total			

Summary for Subcatchment 11bS: Play Area

Runoff = 0.40 cfs @ 12.42 hrs, Volume= 0.055 af, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
20,393	61	>75% Grass cover, Good, HSG B
6,366	55	Woods, Good, HSG B
26,759	60	Weighted Average
26,759		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					**Direct Entry, Open Field**
2.8	30	0.3300	0.18		**Sheet Flow, A to B** Grass: Bermuda n= 0.410 P2= 3.00"
3.5	161	0.0120	0.77		**Shallow Concentrated Flow, B to C** Short Grass Pasture Kv= 7.0 fps
26.3	191	Total			

Summary for Subcatchment 12aS: School and Loop

Runoff = 3.19 cfs @ 12.17 hrs, Volume= 0.280 af, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

	Area (sf)	CN	Description
*	26,848	98	Impervious
	36,934	61	>75% Grass cover, Good, HSG B
	63,782	77	Weighted Average
	36,934		57.91% Pervious Area
	26,848		42.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	55	0.0800	0.12		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.00"
0.6	71	0.0850	2.04		**Shallow Concentrated Flow, B to C** Short Grass Pasture Kv= 7.0 fps
0.2	38	0.2630	3.59		**Shallow Concentrated Flow, C to D** Short Grass Pasture Kv= 7.0 fps
3.4	160	0.0125	0.78		**Shallow Concentrated Flow, D to E** Short Grass Pasture Kv= 7.0 fps
0.3	75	0.0100	4.25	1.67	**Pipe Channel, E to F** 12.0" Round w/ 6.0" inside fill Area= 0.4 sf Perim= 2.6' r= 0.15' n= 0.010 PVC, smooth interior
12.4	399	Total			

Summary for Subcatchment 12bS: South Parking

Runoff = 1.26 cfs @ 12.30 hrs, Volume= 0.139 af, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

	Area (sf)	CN	Description
*	14,485	98	Impervious
	10,568	61	>75% Grass cover, Good, HSG B
	6,542	55	Woods, Good, HSG B
	31,595	77	Weighted Average
	17,110		54.15% Pervious Area
	14,485		45.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.7	130	0.0400	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.00"
1.3	160	0.0220	2.00	0.16	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=0.20' Z= 2.0 '/' Top.W=0.80' n= 0.022 Earth, clean & straight
22.0	290	Total			

Summary for Subcatchment 13aS: Entrance Drive

Runoff = 0.47 cfs @ 12.04 hrs, Volume= 0.033 af, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

	Area (sf)	CN	Description
*	4,000	98	Impervious
	4,000		100.00% Impervious Area

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

Summary for Subcatchment 20S:

Runoff = 8.39 cfs @ 12.83 hrs, Volume= 1.600 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

	Area (sf)	CN	Description
*	425,200	65	2 acre lots, 12% imp, HSG B (off-site)
*	47,244	82	2 acre lots, 12% imp, HSG D (off-site)
*	9,606	77	Woods, Good, HSG D (wetland on-site)
*	140,402	55	Woods, Good, HSG B (on-site)
	7,750	61	>75% Grass cover, Good, HSG B
	630,202	64	Weighted Average
	573,509		91.00% Pervious Area
	56,693		9.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.3	80	0.0200	0.04		**Sheet Flow, A to B** Woods: Dense underbrush n= 0.800 P2= 3.00"
0.7	90	0.1800	2.12		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
23.6	1,360	0.0370	0.96		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
56.6	1,530	Total			

Summary for Reach 10R: Norton Brook

Inflow Area = 0.757 ac, 59.13% Impervious, Inflow Depth = 2.50" for 10-Year event
Inflow = 3.01 cfs @ 12.07 hrs, Volume= 0.158 af
Outflow = 2.28 cfs @ 12.11 hrs, Volume= 0.158 af, Atten= 24%, Lag= 2.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.22 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 0.64 fps, Avg. Travel Time= 3.1 min

Peak Storage= 124 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.22'
Bank-Full Depth= 2.00' Flow Area= 12.7 sf, Capacity= 94.82 cfs

Custom cross-section, Length= 120.0' Slope= 0.0167 '/'
Constant n= 0.030 Stream, clean & straight
Inlet Invert= 69.00', Outlet Invert= 67.00'

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
-4.20	70.00	0.00
-3.00	69.00	1.00
-2.00	68.00	2.00
2.40	68.00	2.00
3.30	69.00	1.00
4.20	70.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	4.4	0	0.00
1.00	5.4	7.2	642	28.17
2.00	12.7	10.1	1,524	94.82

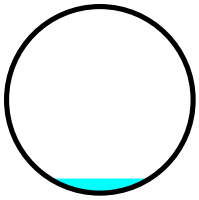
Summary for Reach 11R: 2 x 36" Culverts

Inflow Area = 0.757 ac, 59.13% Impervious, Inflow Depth = 2.50" for 10-Year event
Inflow = 2.28 cfs @ 12.11 hrs, Volume= 0.158 af
Outflow = 2.25 cfs @ 12.12 hrs, Volume= 0.158 af, Atten= 1%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.42 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.67 fps, Avg. Travel Time= 0.7 min

Peak Storage= 39 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.24'
Bank-Full Depth= 3.00' Flow Area= 14.1 sf, Capacity= 182.04 cfs

A factor of 2.00 has been applied to the storage and discharge capacity
36.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 75.0' Slope= 0.0133 '/'
Inlet Invert= 67.00', Outlet Invert= 66.00'



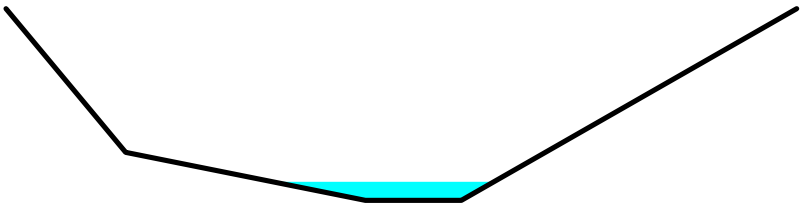
Summary for Reach 12R: Norton Brook

Inflow Area = 2.313 ac, 49.97% Impervious, Inflow Depth = 1.96" for 10-Year event
Inflow = 3.56 cfs @ 12.29 hrs, Volume= 0.379 af
Outflow = 3.46 cfs @ 12.36 hrs, Volume= 0.379 af, Atten= 3%, Lag= 4.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.73 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 1.07 fps, Avg. Travel Time= 5.8 min

Peak Storage= 470 cf @ 12.32 hrs
Average Depth at Peak Storage= 0.38'
Bank-Full Depth= 4.00' Flow Area= 43.3 sf, Capacity= 488.91 cfs

Custom cross-section, Length= 370.0' Slope= 0.0121 '/'
Constant n= 0.025 Earth, clean & winding
Inlet Invert= 66.00', Outlet Invert= 61.51'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)
-8.50	70.00	0.00
-6.00	67.00	3.00
-1.00	66.00	4.00
1.00	66.00	4.00
8.00	70.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	2.0	0	0.00
1.00	5.4	9.1	1,989	24.75
4.00	43.3	19.1	16,003	488.91

Summary for Pond 11aP: StormTech Sand Filter #1

Inflow Area = 0.757 ac, 59.13% Impervious, Inflow Depth = 2.81" for 10-Year event
Inflow = 2.76 cfs @ 12.05 hrs, Volume= 0.178 af
Outflow = 3.01 cfs @ 12.07 hrs, Volume= 0.158 af, Atten= 0%, Lag= 1.4 min
Primary = 2.95 cfs @ 12.07 hrs, Volume= 0.075 af
Secondary = 0.06 cfs @ 12.07 hrs, Volume= 0.082 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 80.45' @ 12.07 hrs Surf.Area= 2,772 sf Storage= 2,516 cf
Flood Elev= 82.00' Surf.Area= 2,772 sf Storage= 2,516 cf

Plug-Flow detention time= 233.6 min calculated for 0.158 af (89% of inflow)
Center-of-Mass det. time= 180.5 min (994.8 - 814.3)

Volume	Invert	Avail.Storage	Storage Description
#1	75.68'	900 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 2,250 cf Overall x 40.0% Voids
#2A	77.18'	901 cf	**28.17'W x 45.16'L x 2.33'H Field A** 2,968 cf Overall - 715 cf Embedded = 2,253 cf x 40.0% Voids
#3A	77.68'	715 cf	**ADS_StormTech SC-310** x 48 Inside #2 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 8 rows
		2,516 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
75.68	1,500	0	0
77.18	1,500	2,250	2,250

Device	Routing	Invert	Outlet Devices
#1	Primary	79.01'	**12.0" Round 12" Outfall to Level Spreader** L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 79.01' / 74.58' S= 0.1108 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Secondary	75.68'	**2.000 in/hr Underdrain over Surface area above 75.68'** Conductivity to Groundwater Elevation = -2.00' Excluded Surface area = 1,500 sf

Primary OutFlow Max=2.68 cfs @ 12.07 hrs HW=80.32' (Free Discharge)
1=12" Outfall to Level Spreader (Inlet Controls 2.68 cfs @ 3.41 fps)

Secondary OutFlow Max=0.06 cfs @ 12.07 hrs HW=80.34' (Free Discharge)
2=Underdrain (Controls 0.06 cfs)

Summary for Pond 11bP: UD Soil Filter #2

Inflow Area = 0.614 ac, 0.00% Impervious, Inflow Depth = 1.07" for 10-Year event
Inflow = 0.40 cfs @ 12.42 hrs, Volume= 0.055 af
Outflow = 0.04 cfs @ 15.96 hrs, Volume= 0.051 af, Atten= 89%, Lag= 212.6 min
Discarded = 0.04 cfs @ 15.96 hrs, Volume= 0.050 af
Primary = 0.01 cfs @ 15.96 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 96.50' @ 15.96 hrs Surf.Area= 1,412 sf Storage= 1,256 cf

Plug-Flow detention time= 401.3 min calculated for 0.051 af (92% of inflow)
Center-of-Mass det. time= 361.5 min (1,262.2 - 900.8)

Volume	Invert	Avail.Storage	Storage Description
#1	93.50'	195 cf	**Media Storage (Prismatic)** Listed below (Recalc) 975 cf Overall x 20.0% Voids
#2	95.00'	1,498 cf	**Ponding Storage (Prismatic)** Listed below (Recalc)
		1,693 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
93.50	650	0	0
95.00	650	975	975

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
95.00	650	0	0
96.50	760	1,058	1,058
97.00	1,000	440	1,498

Device	Routing	Invert	Outlet Devices
#1	Discarded	93.50'	**2.000 in/hr Underdrain over Surface area above 93.50'** Conductivity to Groundwater Elevation = -2.00' Excluded Surface area = 650 sf
#2	Primary	96.50'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** 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 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.04 cfs @ 15.96 hrs HW=96.50' (Free Discharge)
↑—**1=Underdrain** (Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 15.96 hrs HW=96.50' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.00 cfs @ 0.15 fps)

Summary for Pond 12aP: UD Soil Filter #1

Inflow Area = 1.556 ac, 45.51% Impervious, Inflow Depth = 2.41" for 10-Year event
Inflow = 3.38 cfs @ 12.17 hrs, Volume= 0.313 af
Outflow = 2.50 cfs @ 12.30 hrs, Volume= 0.221 af, Atten= 26%, Lag= 7.8 min
Primary = 2.50 cfs @ 12.30 hrs, Volume= 0.221 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 79.96' @ 12.30 hrs Surf.Area= 3,028 sf Storage= 4,633 cf

Plug-Flow detention time= 163.8 min calculated for 0.221 af (71% of inflow)
Center-of-Mass det. time= 66.5 min (896.1 - 829.6)

Volume	Invert	Avail.Storage	Storage Description
#1	78.25'	15,379 cf	**Ponding (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
78.25	2,385	0	0
79.75	2,958	4,007	4,007
83.00	4,040	11,372	15,379

Device	Routing	Invert	Outlet Devices
#1	Primary	75.65'	**12.0" Round 12" Outfall to Level Spreader** L= 90.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 75.65' / 74.75' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	79.75'	**24.0" x 24.0" Horiz. CB 8** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.50 cfs @ 12.30 hrs HW=79.96' (Free Discharge)
↑**1=12" Outfall to Level Spreader** (Passes 2.50 cfs of 5.83 cfs potential flow)
↑**2=CB 8** (Weir Controls 2.50 cfs @ 1.50 fps)

Summary for Pond 12bP: UD Soil Filter #3

Inflow Area = 0.725 ac, 45.85% Impervious, Inflow Depth = 2.29" for 10-Year event
Inflow = 1.26 cfs @ 12.30 hrs, Volume= 0.139 af
Outflow = 1.16 cfs @ 12.40 hrs, Volume= 0.132 af, Atten= 8%, Lag= 5.9 min
Primary = 1.16 cfs @ 12.40 hrs, Volume= 0.132 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 74.62' @ 12.40 hrs Surf.Area= 1,630 sf Storage= 1,450 cf

Plug-Flow detention time= 216.7 min calculated for 0.132 af (95% of inflow)
Center-of-Mass det. time= 190.8 min (1,039.3 - 848.5)

Volume	Invert	Avail.Storage	Storage Description
#1	73.50'	2,118 cf	**Custom Stage Data (Pyramidal)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
73.50	1,024	0	0	1,024
74.00	1,233	563	563	1,244
75.00	1,900	1,555	2,118	1,929

Device	Routing	Invert	Outlet Devices
#1	Primary	70.75'	**2.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	73.50'	**0.750 in/hr Exfiltration over Surface area**
#3	Primary	74.50'	**9.0' long (Profile 7) Broad-Crested Rectangular Weir**
			Head (feet) 0.49 0.98 1.48
			Coef. (English) 2.99 3.41 3.62

Primary OutFlow Max=1.16 cfs @ 12.40 hrs HW=74.62' (Free Discharge)
- **1=Orifice/Grate** (Passes 0.03 cfs of 0.20 cfs potential flow)
  - **2=Exfiltration** (Exfiltration Controls 0.03 cfs)
- **3=Broad-Crested Rectangular Weir** (Weir Controls 1.13 cfs @ 1.04 fps)

Summary for Link 10L: POA #1

Inflow Area = 24.564 ac, 9.81% Impervious, Inflow Depth > 1.11" for 10-Year event
Inflow = 8.77 cfs @ 12.98 hrs, Volume= 2.279 af
Primary = 8.77 cfs @ 12.98 hrs, Volume= 2.279 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Link 20L: POA #2

Inflow Area = 14.467 ac, 9.00% Impervious, Inflow Depth = 1.33" for 10-Year event
Inflow = 8.39 cfs @ 12.83 hrs, Volume= 1.600 af
Primary = 8.39 cfs @ 12.83 hrs, Volume= 1.600 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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 10S: untreated & buffers Runoff Area=910,886 sf 4.41% Impervious Runoff Depth=1.71"
Flow Length=2,520' Tc=67.9 min CN=59 Runoff=14.02 cfs 2.984 af

Subcatchment 11aS: Parking North / Runoff Area=32,975 sf 59.13% Impervious Runoff Depth=3.91"
Flow Length=434' Tc=3.2 min CN=83 Runoff=3.80 cfs 0.246 af

Subcatchment 11bS: Play Area Runoff Area=26,759 sf 0.00% Impervious Runoff Depth=1.79"
Flow Length=191' Tc=26.3 min CN=60 Runoff=0.72 cfs 0.092 af

Subcatchment 12aS: School and Loop Runoff Area=63,782 sf 42.09% Impervious Runoff Depth=3.31"
Flow Length=399' Tc=12.4 min CN=77 Runoff=4.61 cfs 0.403 af

Subcatchment 12bS: South Parking Runoff Area=31,595 sf 45.85% Impervious Runoff Depth=3.31"
Flow Length=290' Tc=22.0 min CN=77 Runoff=1.82 cfs 0.200 af

Subcatchment 13aS: Entrance Drive Runoff Area=4,000 sf 100.00% Impervious Runoff Depth=5.56"
Tc=2.5 min CN=98 Runoff=0.59 cfs 0.043 af

Subcatchment 20S: Runoff Area=630,202 sf 9.00% Impervious Runoff Depth=2.12"
Flow Length=1,530' Tc=56.6 min CN=64 Runoff=14.08 cfs 2.558 af

Reach 10R: Norton Brook Avg. Flow Depth=0.30' Max Vel=2.67 fps Inflow=4.65 cfs 0.226 af
n=0.030 L=120.0' S=0.0167 '/' Capacity=94.82 cfs Outflow=3.76 cfs 0.226 af

Reach 11R: 2 x 36" Culverts Avg. Flow Depth=0.30' Max Vel=5.15 fps Inflow=3.76 cfs 0.226 af
36.0" Round Pipe x 2.00 n=0.011 L=75.0' S=0.0133 '/' Capacity=182.04 cfs Outflow=3.74 cfs 0.226 af

Reach 12R: Norton Brook Avg. Flow Depth=0.53' Max Vel=3.23 fps Inflow=6.53 cfs 0.580 af
n=0.025 L=370.0' S=0.0121 '/' Capacity=488.91 cfs Outflow=6.43 cfs 0.580 af

Pond 11aP: StormTech Sand Filter #1 Peak Elev=81.87' Storage=2,516 cf Inflow=3.80 cfs 0.246 af
Primary=4.58 cfs 0.135 af Secondary=0.06 cfs 0.092 af Outflow=4.65 cfs 0.226 af

Pond 11bP: UD Soil Filter #2 Peak Elev=96.58' Storage=1,312 cf Inflow=0.72 cfs 0.092 af
Discarded=0.04 cfs 0.056 af Primary=0.41 cfs 0.031 af Outflow=0.45 cfs 0.087 af

Pond 12aP: UD Soil Filter #1 Peak Elev=80.06' Storage=4,952 cf Inflow=4.85 cfs 0.446 af
Outflow=4.60 cfs 0.354 af

Pond 12bP: UD Soil Filter #3 Peak Elev=74.66' Storage=1,519 cf Inflow=1.82 cfs 0.200 af
Outflow=1.80 cfs 0.193 af

Link 10L: POA #1 Inflow=15.99 cfs 3.788 af
Primary=15.99 cfs 3.788 af

Link 20L: POA #2 Inflow=14.08 cfs 2.558 af
Primary=14.08 cfs 2.558 af

Total Runoff Area = 39.031 ac Runoff Volume = 6.526 af Average Runoff Depth = 2.01"
90.49% Pervious = 35.320 ac 9.51% Impervious = 3.712 ac

Summary for Subcatchment 10S: untreated & buffers

Runoff = 14.02 cfs @ 12.98 hrs, Volume= 2.984 af, Depth= 1.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	334,580	65	2 acre lots, 12% imp, HSG B (off-site)
*	6,570	77	Woods, Good, HSG D (wetland on-site)
*	569,736	55	Woods, Good, HSG B
	910,886	59	Weighted Average
	870,736		95.59% Pervious Area
	40,150		4.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.8	100	0.0500	0.06		**Sheet Flow, A to B** Woods: Dense underbrush n= 0.800 P2= 3.00"
3.6	200	0.0350	0.94		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
2.4	220	0.0950	1.54		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
28.0	750	0.0080	0.45		**Shallow Concentrated Flow, D to E** Woodland Kv= 5.0 fps
3.4	175	0.0300	0.87		**Shallow Concentrated Flow, E to F** Woodland Kv= 5.0 fps
0.1	30	0.0100	4.82	3.05	**Pipe Channel, F to G** 12.0" Round w/ 3.0" inside fill Area= 0.6 sf Perim= 3.0' r= 0.21' n= 0.011 Concrete pipe, straight & clean
2.9	195	0.0487	1.10		**Shallow Concentrated Flow, G to H** Woodland Kv= 5.0 fps
0.7	850	0.0350	20.99	671.80	**Parabolic Channel, H to I** W=12.00' D=4.00' Area=32.0 sf Perim=14.9' n= 0.022 Earth, clean & straight
67.9	2,520	Total			

Summary for Subcatchment 11aS: Parking North / Access Rd

Runoff = 3.80 cfs @ 12.05 hrs, Volume= 0.246 af, Depth= 3.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	19,499	98	Impervious
	13,476	61	>75% Grass cover, Good, HSG B
	32,975	83	Weighted Average
	13,476		40.87% Pervious Area
	19,499		59.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	9	0.2730	0.13		**Sheet Flow, A to B** Grass: Bermuda n= 0.410 P2= 3.00"
0.8	49	0.0200	0.99		**Shallow Concentrated Flow, B to C** Short Grass Pasture Kv= 7.0 fps
0.2	181	0.7600	17.70		**Shallow Concentrated Flow, C to D** Paved Kv= 20.3 fps
1.0	195	0.0100	3.27	1.28	**Pipe Channel, D to E** 12.0" Round w/ 6.0" inside fill Area= 0.4 sf Perim= 2.6' r= 0.15' n= 0.013 Corrugated PE, smooth interior
3.2	434	Total			

Summary for Subcatchment 11bS: Play Area

Runoff = 0.72 cfs @ 12.41 hrs, Volume= 0.092 af, Depth= 1.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.80"

Area (sf)	CN	Description
20,393	61	>75% Grass cover, Good, HSG B
6,366	55	Woods, Good, HSG B
26,759	60	Weighted Average
26,759		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					**Direct Entry, Open Field**
2.8	30	0.3300	0.18		**Sheet Flow, A to B** Grass: Bermuda n= 0.410 P2= 3.00"
3.5	161	0.0120	0.77		**Shallow Concentrated Flow, B to C** Short Grass Pasture Kv= 7.0 fps
26.3	191	Total			

Summary for Subcatchment 12aS: School and Loop

Runoff = 4.61 cfs @ 12.17 hrs, Volume= 0.403 af, Depth= 3.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	26,848	98	Impervious
	36,934	61	>75% Grass cover, Good, HSG B
	63,782	77	Weighted Average
	36,934		57.91% Pervious Area
	26,848		42.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	55	0.0800	0.12		**Sheet Flow, A to B** Woods: Light underbrush n= 0.400 P2= 3.00"
0.6	71	0.0850	2.04		**Shallow Concentrated Flow, B to C** Short Grass Pasture Kv= 7.0 fps
0.2	38	0.2630	3.59		**Shallow Concentrated Flow, C to D** Short Grass Pasture Kv= 7.0 fps
3.4	160	0.0125	0.78		**Shallow Concentrated Flow, D to E** Short Grass Pasture Kv= 7.0 fps
0.3	75	0.0100	4.25	1.67	**Pipe Channel, E to F** 12.0" Round w/ 6.0" inside fill Area= 0.4 sf Perim= 2.6' r= 0.15' n= 0.010 PVC, smooth interior
12.4	399	Total			

Summary for Subcatchment 12bS: South Parking

Runoff = 1.82 cfs @ 12.30 hrs, Volume= 0.200 af, Depth= 3.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	14,485	98	Impervious
	10,568	61	>75% Grass cover, Good, HSG B
	6,542	55	Woods, Good, HSG B
	31,595	77	Weighted Average
	17,110		54.15% Pervious Area
	14,485		45.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.7	130	0.0400	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.00"
1.3	160	0.0220	2.00	0.16	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=0.20' Z= 2.0 '/' Top.W=0.80' n= 0.022 Earth, clean & straight
22.0	290	Total			

Summary for Subcatchment 13aS: Entrance Drive

Runoff = 0.59 cfs @ 12.04 hrs, Volume= 0.043 af, Depth= 5.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	4,000	98	Impervious
	4,000		100.00% Impervious Area

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

Summary for Subcatchment 20S:

Runoff = 14.08 cfs @ 12.82 hrs, Volume= 2.558 af, Depth= 2.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	425,200	65	2 acre lots, 12% imp, HSG B (off-site)
*	47,244	82	2 acre lots, 12% imp, HSG D (off-site)
*	9,606	77	Woods, Good, HSG D (wetland on-site)
*	140,402	55	Woods, Good, HSG B (on-site)
	7,750	61	>75% Grass cover, Good, HSG B
	630,202	64	Weighted Average
	573,509		91.00% Pervious Area
	56,693		9.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.3	80	0.0200	0.04		**Sheet Flow, A to B** Woods: Dense underbrush n= 0.800 P2= 3.00"
0.7	90	0.1800	2.12		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
23.6	1,360	0.0370	0.96		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
56.6	1,530	Total			

Summary for Reach 10R: Norton Brook

Inflow Area = 0.757 ac, 59.13% Impervious, Inflow Depth = 3.59" for 25-Year event
Inflow = 4.65 cfs @ 12.05 hrs, Volume= 0.226 af
Outflow = 3.76 cfs @ 12.07 hrs, Volume= 0.226 af, Atten= 19%, Lag= 1.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.67 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 0.67 fps, Avg. Travel Time= 3.0 min

Peak Storage= 169 cf @ 12.06 hrs
Average Depth at Peak Storage= 0.30'
Bank-Full Depth= 2.00' Flow Area= 12.7 sf, Capacity= 94.82 cfs

Custom cross-section, Length= 120.0' Slope= 0.0167 '/'
Constant n= 0.030 Stream, clean & straight
Inlet Invert= 69.00', Outlet Invert= 67.00'

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
-4.20	70.00	0.00
-3.00	69.00	1.00
-2.00	68.00	2.00
2.40	68.00	2.00
3.30	69.00	1.00
4.20	70.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	4.4	0	0.00
1.00	5.4	7.2	642	28.17
2.00	12.7	10.1	1,524	94.82

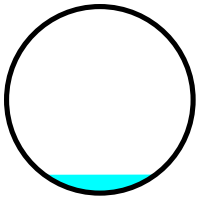
Summary for Reach 11R: 2 x 36" Culverts

Inflow Area = 0.757 ac, 59.13% Impervious, Inflow Depth = 3.59" for 25-Year event
Inflow = 3.76 cfs @ 12.07 hrs, Volume= 0.226 af
Outflow = 3.74 cfs @ 12.08 hrs, Volume= 0.226 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.15 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.73 fps, Avg. Travel Time= 0.7 min

Peak Storage= 55 cf @ 12.07 hrs
Average Depth at Peak Storage= 0.30'
Bank-Full Depth= 3.00' Flow Area= 14.1 sf, Capacity= 182.04 cfs

A factor of 2.00 has been applied to the storage and discharge capacity
36.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 75.0' Slope= 0.0133 '/'
Inlet Invert= 67.00', Outlet Invert= 66.00'



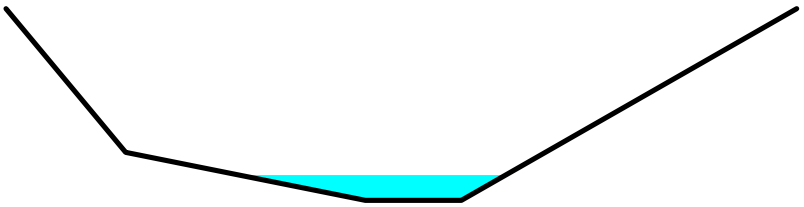
Summary for Reach 12R: Norton Brook

Inflow Area = 2.313 ac, 49.97% Impervious, Inflow Depth = 3.01" for 25-Year event
Inflow = 6.53 cfs @ 12.14 hrs, Volume= 0.580 af
Outflow = 6.43 cfs @ 12.21 hrs, Volume= 0.580 af, Atten= 2%, Lag= 4.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.23 fps, Min. Travel Time= 1.9 min
Avg. Velocity = 1.11 fps, Avg. Travel Time= 5.5 min

Peak Storage= 736 cf @ 12.18 hrs
Average Depth at Peak Storage= 0.53'
Bank-Full Depth= 4.00' Flow Area= 43.3 sf, Capacity= 488.91 cfs

Custom cross-section, Length= 370.0' Slope= 0.0121 '/'
Constant n= 0.025 Earth, clean & winding
Inlet Invert= 66.00', Outlet Invert= 61.51'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)
-8.50	70.00	0.00
-6.00	67.00	3.00
-1.00	66.00	4.00
1.00	66.00	4.00
8.00	70.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	2.0	0	0.00
1.00	5.4	9.1	1,989	24.75
4.00	43.3	19.1	16,003	488.91

Summary for Pond 11aP: StormTech Sand Filter #1

Inflow Area = 0.757 ac, 59.13% Impervious, Inflow Depth = 3.91" for 25-Year event
Inflow = 3.80 cfs @ 12.05 hrs, Volume= 0.246 af
Outflow = 4.65 cfs @ 12.05 hrs, Volume= 0.226 af, Atten= 0%, Lag= 0.1 min
Primary = 4.58 cfs @ 12.05 hrs, Volume= 0.135 af
Secondary = 0.06 cfs @ 12.05 hrs, Volume= 0.092 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 81.87' @ 12.05 hrs Surf.Area= 2,772 sf Storage= 2,516 cf
Flood Elev= 82.00' Surf.Area= 2,772 sf Storage= 2,516 cf

Plug-Flow detention time= 186.3 min calculated for 0.226 af (92% of inflow)
Center-of-Mass det. time= 144.8 min (949.8 - 805.0)

Volume	Invert	Avail.Storage	Storage Description
#1	75.68'	900 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 2,250 cf Overall x 40.0% Voids
#2A	77.18'	901 cf	**28.17'W x 45.16'L x 2.33'H Field A** 2,968 cf Overall - 715 cf Embedded = 2,253 cf x 40.0% Voids
#3A	77.68'	715 cf	**ADS_StormTech SC-310** x 48 Inside #2 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 8 rows
		2,516 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
75.68	1,500	0	0
77.18	1,500	2,250	2,250

Device	Routing	Invert	Outlet Devices
#1	Primary	79.01'	**12.0" Round 12" Outfall to Level Spreader** L= 40.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 79.01' / 74.58' S= 0.1108 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Secondary	75.68'	**2.000 in/hr Underdrain over Surface area above 75.68'** Conductivity to Groundwater Elevation = -2.00' Excluded Surface area = 1,500 sf

Primary OutFlow Max=4.58 cfs @ 12.05 hrs HW=81.86' (Free Discharge)
↑—**1=12" Outfall to Level Spreader** (Inlet Controls 4.58 cfs @ 5.83 fps)

Secondary OutFlow Max=0.06 cfs @ 12.05 hrs HW=81.86' (Free Discharge)
↑—**2=Underdrain** (Controls 0.06 cfs)

Summary for Pond 11bP: UD Soil Filter #2

Inflow Area = 0.614 ac, 0.00% Impervious, Inflow Depth = 1.79" for 25-Year event
Inflow = 0.72 cfs @ 12.41 hrs, Volume= 0.092 af
Outflow = 0.45 cfs @ 12.73 hrs, Volume= 0.087 af, Atten= 38%, Lag= 19.4 min
Discarded = 0.04 cfs @ 12.73 hrs, Volume= 0.056 af
Primary = 0.41 cfs @ 12.73 hrs, Volume= 0.031 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 96.58' @ 12.73 hrs Surf.Area= 1,447 sf Storage= 1,312 cf

Plug-Flow detention time= 281.5 min calculated for 0.087 af (95% of inflow)
Center-of-Mass det. time= 256.1 min (1,140.0 - 883.8)

Volume	Invert	Avail.Storage	Storage Description
#1	93.50'	195 cf	**Media Storage (Prismatic)** Listed below (Recalc) 975 cf Overall x 20.0% Voids
#2	95.00'	1,498 cf	**Ponding Storage (Prismatic)** Listed below (Recalc)
		1,693 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
93.50	650	0	0
95.00	650	975	975

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
95.00	650	0	0
96.50	760	1,058	1,058
97.00	1,000	440	1,498

Device	Routing	Invert	Outlet Devices
#1	Discarded	93.50'	**2.000 in/hr Underdrain over Surface area above 93.50'** Conductivity to Groundwater Elevation = -2.00' Excluded Surface area = 650 sf
#2	Primary	96.50'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** 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 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.04 cfs @ 12.73 hrs HW=96.58' (Free Discharge)
↑—**1=Underdrain** (Controls 0.04 cfs)

Primary OutFlow Max=0.40 cfs @ 12.73 hrs HW=96.58' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.40 cfs @ 0.66 fps)

Summary for Pond 12aP: UD Soil Filter #1

Inflow Area = 1.556 ac, 45.51% Impervious, Inflow Depth = 3.44" for 25-Year event
Inflow = 4.85 cfs @ 12.17 hrs, Volume= 0.446 af
Outflow = 4.60 cfs @ 12.21 hrs, Volume= 0.354 af, Atten= 5%, Lag= 2.6 min
Primary = 4.60 cfs @ 12.21 hrs, Volume= 0.354 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 80.06' @ 12.21 hrs Surf.Area= 3,062 sf Storage= 4,952 cf

Plug-Flow detention time= 127.3 min calculated for 0.354 af (79% of inflow)
Center-of-Mass det. time= 48.0 min (868.8 - 820.7)

Volume	Invert	Avail.Storage	Storage Description
#1	78.25'	15,379 cf	**Ponding (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
78.25	2,385	0	0
79.75	2,958	4,007	4,007
83.00	4,040	11,372	15,379

Device	Routing	Invert	Outlet Devices
#1	Primary	75.65'	**12.0" Round 12" Outfall to Level Spreader** L= 90.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 75.65' / 74.75' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	79.75'	**24.0" x 24.0" Horiz. CB 8** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.60 cfs @ 12.21 hrs HW=80.06' (Free Discharge)
↑—**1=12" Outfall to Level Spreader** (Passes 4.60 cfs of 5.91 cfs potential flow)
↑—**2=CB 8** (Weir Controls 4.60 cfs @ 1.83 fps)

Summary for Pond 12bP: UD Soil Filter #3

Inflow Area = 0.725 ac, 45.85% Impervious, Inflow Depth = 3.31" for 25-Year event
Inflow = 1.82 cfs @ 12.30 hrs, Volume= 0.200 af
Outflow = 1.80 cfs @ 12.34 hrs, Volume= 0.193 af, Atten= 1%, Lag= 2.1 min
Primary = 1.80 cfs @ 12.34 hrs, Volume= 0.193 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 74.66' @ 12.34 hrs Surf.Area= 1,659 sf Storage= 1,519 cf

Plug-Flow detention time= 153.5 min calculated for 0.193 af (97% of inflow)
Center-of-Mass det. time= 134.1 min (972.0 - 837.9)

Volume	Invert	Avail.Storage	Storage Description
#1	73.50'	2,118 cf	**Custom Stage Data (Pyramidal)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
73.50	1,024	0	0	1,024
74.00	1,233	563	563	1,244
75.00	1,900	1,555	2,118	1,929

Device	Routing	Invert	Outlet Devices
#1	Primary	70.75'	**2.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	73.50'	**0.750 in/hr Exfiltration over Surface area**
#3	Primary	74.50'	**9.0' long (Profile 7) Broad-Crested Rectangular Weir**
			Head (feet) 0.49 0.98 1.48
			Coef. (English) 2.99 3.41 3.62

Primary OutFlow Max=1.80 cfs @ 12.34 hrs HW=74.66' (Free Discharge)
- **1=Orifice/Grate** (Passes 0.03 cfs of 0.21 cfs potential flow)
  - **2=Exfiltration** (Exfiltration Controls 0.03 cfs)
- **3=Broad-Crested Rectangular Weir** (Weir Controls 1.77 cfs @ 1.21 fps)

Summary for Link 10L: POA #1

Inflow Area = 24.564 ac, 9.81% Impervious, Inflow Depth > 1.85" for 25-Year event
Inflow = 15.99 cfs @ 12.90 hrs, Volume= 3.788 af
Primary = 15.99 cfs @ 12.90 hrs, Volume= 3.788 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Link 20L: POA #2

Inflow Area = 14.467 ac, 9.00% Impervious, Inflow Depth = 2.12" for 25-Year event
Inflow = 14.08 cfs @ 12.82 hrs, Volume= 2.558 af
Primary = 14.08 cfs @ 12.82 hrs, Volume= 2.558 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Appendix D:
Table T-1 Stormwater Treatment Calculations

WALSH
ENGINEERING ASSOCIATES, INC.

TABLE T-1
Stormwater Treatment Calculations
Friends School
Cumberland, Maine
February 2019

Watershed	Notes	Non-Linear Development Areas				Linear Development Areas				Total Impervious Area (SF)	Filter Design			
		Treated Area (SF)		Untreated Area (SF)		Treated Area (SF)		Untreated Area (SF)			Filter Area (sf) = IA(0.05) + LA(0.02)		Filter Volume (cf) = IA(0.083) + LA(0.033)	
		Impervious (IA)	Landscaped (LA)	Impervious (IA)	Landscaped (LA)	Impervious (IA)	Landscaped (LA)	Impervious (IA)	Landscaped (LA)		Required	Provided	Required	Provided
A	Areas from Blais Plans					2,730		1,960	6,510	4,690				
C	Updated Areas	24,085	36,967	1,240	2,749					25,325				
A & C	Total for Soil Filter #1	24,085	36,967	1,240	2,749	2,730	0	1,960	6,510	30,015	2,080	* 2120	3,446	* 4,007
B	New Design Soil Filter #3	14,485	10,568		3,837					14,485	936	1,024	1,551	2,118
D	Updated Areas	10,973	753		3,503					10,973				
E	Updated Areas	5,202				3,324	11,163			8,526				
D & E	Total for Sand Filter #1	16,175	753	0	3,503	3,324	11,163	0	0	19,499	1,213	* 1250	2,012	** 2,062
F	Updated Areas for Soil Filter #2		20,393							0	408	* 650	673	* 1,058
G	Area from Blais Plans						2,478		1,892	0				
H	Existing Areas from Aerial Photos			150	18,350					150				
I	Areas from Blais Plans						3,744		7,556	0				
J	Areas from Blais Plans		35,005		9,169					0				
		54,745	**103,686**	**1,390**	**37,608**	**6,054**	**17,385**	**1,960**	**15,958**	**64,149**				

Treatment Levels	Total Area (SF)	Treated Area (SF)	Treatment %
Non-Linear Development Areas			
Impervious Area (95%)	56,135	54,745	97.5%
Total Developed area (80%)	197,429	158,431	80.2%
Linear Development Areas			
Impervious Area (75%)	8,014	6,054	75.5%
Total Developed area (50%)	41,357	23,439	56.7%

* Areas and volumes from Blais design plans.

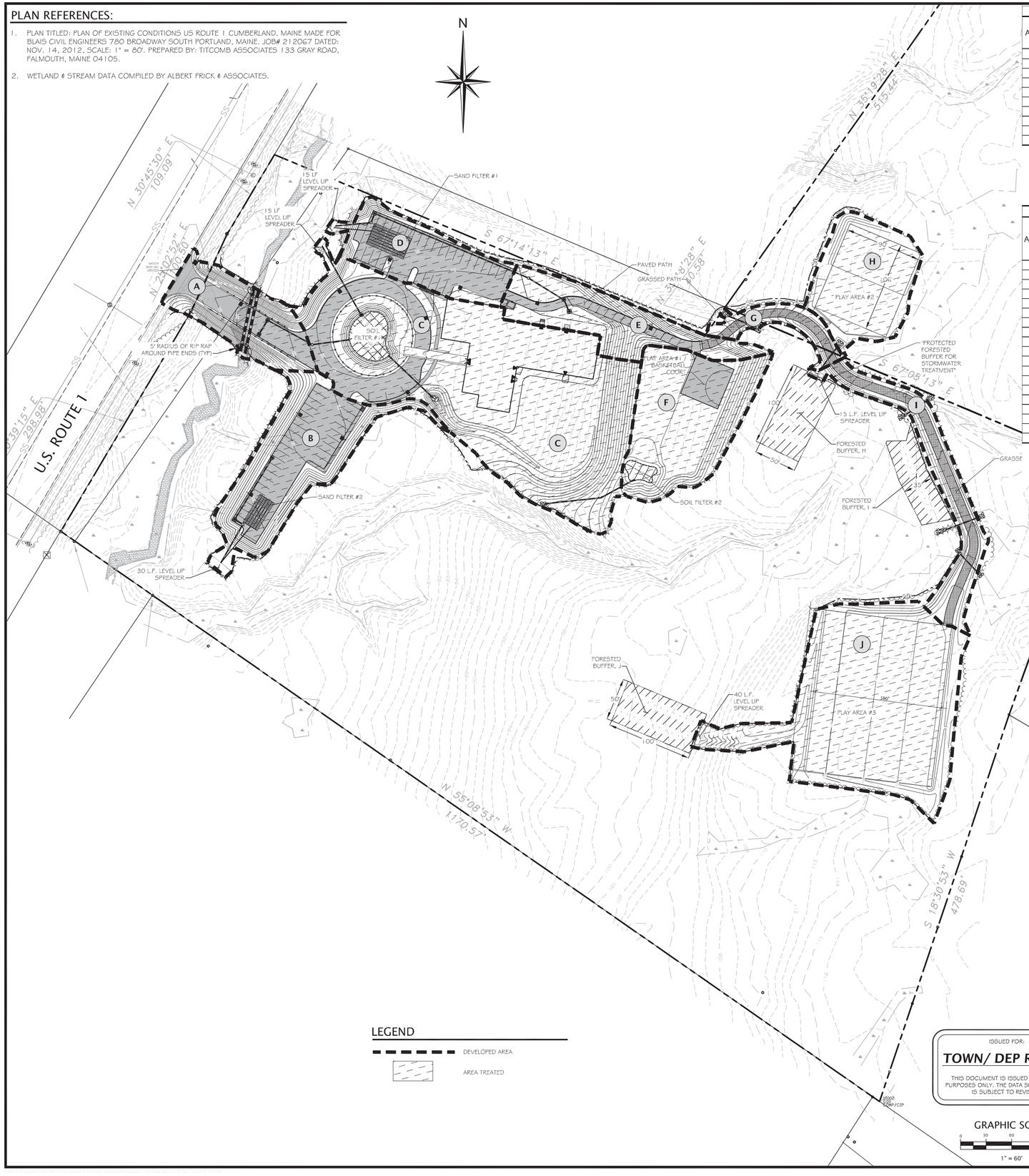
** The Blais design plans indicated 1,488 cf of storage which corresponds to an elevation of 78.01. The filter has a storage capacity of 2,062 cf at 78.68, 18" above the media in the filter.

Appendix E:
Blais Civil Engineers
Previously Approved Plans

PLAN REFERENCES:

1. PLAN TITLED: PLAN OF EXISTING CONDITIONS US ROUTE 1 CUMBERLAND, MAINE MADE FOR BLAIS CIVIL ENGINEERS 780 BROADWAY SOUTH PORTLAND, MAINE. JOB# 212067 DATED: NOV. 14, 2012, SCALE: 1" = 80'. PREPARED BY: TITCOMB ASSOCIATES 133 GRAY ROAD, FALMOUTH, MAINE 04105.

2. WETLAND & STREAM DATA COMPILED BY ALBERT FRICK & ASSOCIATES.



Required Treatment Summary

Area	Area Description	Non-Linear Impervious Area	Non-Linear % Req'd	Non-Linear Developed Area	Non-Linear % Req'd	Linear Impervious Area	Linear % Req'd	Linear Developed Area	Linear % Req'd	BMP
A	Driveway	N/A		N/A		4,690 SF		11,200 SF		Soil Filter #1
B	Southern Parking	9,542 SF		20,882 SF		N/A		N/A		Sand Filter #2
C	Building & Loop Drive	22,725 SF		66,127 SF		N/A		N/A		Soil Filter #1
D	Northern Parking	9,800 SF		13,310 SF		N/A		N/A		Sand Filter #1
E	Paved Path	N/A		N/A		3,170 SF		14,030 SF		Sand Filter #1
F	Play Area #1 & Basketball Court	2,355 SF		20,637 SF		N/A		N/A		Soil Filter #2
G	Grassed Path near Play Area #2	N/A		N/A		0 SF		4,370 SF		None
H	Play Area #2	0 SF		14,940 SF		N/A		N/A		Forested Buffer H
I	Grassed Path btwn Play Area #2 & #3	N/A		N/A		0 SF		11,300 SF		Forested Buffer I
J	Play Area #3	0 SF		44,174 SF		N/A		N/A		Forested Buffer J
	Total Areas	44,422 SF		180,070 SF		7,860 SF		40,900 SF		
	Total Areas (acres)	1.02 AC		4.13 AC		0.18 AC		0.94 AC		
	Total Areas Requiring Treatment	42,201 SF	95%	144,056 SF	80%	5,895 SF	75%	20,450 SF	50%	

Provided Treatment Summary

Area		Non-Linear Non-Linear Treated Impervious Area (sf)	Non-Linear % Treated	Non-Linear Non-Linear Treated Developed Area (sf)	Non-Linear % Treated	Linear Linear Treated Impervious Area (sf)	Linear % Treated	Linear Linear Treated Developed Area (sf)	Linear % Treated	BMP
A	Driveway	N/A	N/A	N/A	N/A	2,730 SF	34.7%	2,730 SF	6.7%	Soil Filter #1
B	Southern Parking	9,542 SF	21.5%	9,742 SF	5.4%	N/A	N/A	N/A	N/A	Sand Filter #2
C	Building & Loop Drive	22,725 SF	51.2%	63,007 SF	35.0%	N/A	N/A	N/A	N/A	Soil Filter #1
D	Northern Parking	9,800 SF	22.1%	11,000 SF	6.1%	N/A	N/A	N/A	N/A	Sand Filter #1
E	Paved Path	N/A	N/A	N/A	N/A	3,170 SF	40.3%	14,030 SF	34.3%	
F	Play Area #1 & Basketball Court	2,355 SF	5.3%	20,637 SF	11.5%	N/A	N/A	N/A	N/A	Soil Filter #2
G	Grassed Path near Play Area #2	N/A	N/A	N/A	N/A	0 SF	0.0%	0 SF	0.0%	None
H	Play Area #2	0 SF	0.0%	10,749 SF	6.0%	N/A	N/A	N/A	N/A	Forested Buffer H
I	Grassed Path btwn Play Area #2 & #3	N/A	N/A	N/A	N/A	0 SF	0.0%	3,774 SF	9.2%	Forested Buffer I
J	Play Area #3	0 SF	0.0%	35,005 SF	19.4%	N/A	N/A	N/A	N/A	Forested Buffer J
	Total Treatment Provided	44,422 SF	100.00%	150,140 SF	83.38%	5,900 SF	75.06%	20,534 SF	50.21%	

Notes: 1. Developed Area = Impervious Area + Landscaped Area

ISSUED FOR:

TOWN/ DEP REVIEW

THIS DOCUMENT IS ISSUED FOR REVIEW PURPOSES ONLY. THE DATA SHOWN HEREON IS SUBJECT TO REVISION.

GRAPHIC SCALE

0 30 60 120

1" = 60'

Sizing Tables

Area	BMP	Treated Landscaped/Lawn Area (sf)	Treated Impervious Area (sf)	Required WQ Volume (cf)	Provided WQ Volume (cf)	Required Filter Surface Area, Min (sf)	Provided Filter Area (sf)
A*	Soil Filter #1	*Treated by Soil Filter in Area C.*					
B	Sand Filter #2	200 SF	9,542 SF	799 CF	930 CF	481 SF	1,000 SF
C	Soil Filter #1	40,282 SF	25,455 SF	3,442 CF	4,007 CF	2,078 SF	2,120 SF
D/E	Sand Filter #1	12,060 SF	12,970 SF	1,474 CF	1,488 CF	890 SF	1,250 SF
F	Soil Filter #2	18,282 SF	2,355 SF	799 CF	1,058 CF	483 SF	650 SF
Area		Buffer Type	Slope (%)	Hydrologic		Required Buffer	Provided Buffer
G	None						
H	Forested Buffer H	Forested, Level Lip Spreader	<8%	Au, B		7'	15'
I	Forested Buffer I	Forested, Road Side	<8%	Au, B		35'	35'+
J	Forested Buffer J	Forested, Level Lip Spreader	9-15%	Au, B		35'	40'

Notes: 1. WQ Volume = (1.0" x Treated Impervious Area) + (0.4" x Treated Landscaped Area)
2. Underdrained Grassed Soil Filter Min Filter Area = 5% of Treated Impervious Area + 2% of Treated Landscaped/Lawn Area
3. Underground Storage Sand Filter Min Area = 5% of Treated Impervious Area + 2% of Treated Landscaped/Lawn Area

No.	DATE	REVISIONS DESCRIPTION
1	10/29/13	REVISED PER PEER REVIEW/DEP COMMENTS
2	11/08/13	REVISED PER DEP COMMENTS
3	11/26/13	REVISED PER PEER REVIEW/ DEP COMMENTS
4	12/04/13	REVISED PER DEP COMMENTS
5	12/10/13	REVISED PER DEP COMMENTS

STATE OF MAINE
STEVE G. BLAIS
No. 10084
PROFESSIONAL ENGINEER
LICENSED
12/16/13

Blais civil engineers
780 BROADWAY, SO. PORTLAND, ME 04106 (207) 767-7300

WATER QUALITY PLAN

FRIENDS SCHOOL OF PORTLAND
US ROUTE 1, CUMBERLAND, MAINE

PREPARED FOR:
FRIENDS SCHOOL OF PORTLAND
1 MACKWORTH ISLAND
FALMOUTH, MAINE 04105

LATEST REVISION (SE REV. BLOCK):
DATE: JANUARY 27, 2012
DESIGNED BY: SB
DRAWN BY: MV
CHECKED BY: SB
BCE PROJECT NO: 12166

D-100

N

LEGEND

- EXISTING SUBCATCHMENT LABEL (4S)
- EXISTING POND LABEL (4P)
- EXISTING REACH LABEL (3R)
- EXISTING REACH PATH
- EXISTING TIME OF CONCENTRATION (TC) PATH
- EXISTING SUBCATCHMENT DIVIDE
- EXISTING SOIL BOUNDARY
- EXISTING POINT OF ANALYSIS (POA# 1)
- DIRECTION OF FLOW
- PROPERTY LINE
- BUILDING SETBACK
- EXISTING MINOR CONTOUR (81)
- EXISTING MAJOR CONTOUR (80)
- STREAM SETBACK
- EXISTING STREAM
- EXISTING WETLANDS

NOTE:

1. OFF-SITE CONTOURS ARE AT 2' INTERVALS. ON-SITE CONTOURS ARE AT 1' INTERVALS.

SOILS INFORMATION:

Au	Au Gres loamy sand
BgB	Belgrade very fine sandy loam, 0-8 percent slopes
BuB	Buxton silt loam, 3-8 percent slopes
DeB	Deerfield loamy sand, 3-8 percent slopes
Ls	Limerick-Saco silt loams
Sz	Swanton fine sandy loam

PLAN REFERENCES:

1. PLAN TITLED: PLAN OF EXISTING CONDITIONS US ROUTE 1 CUMBERLAND, MAINE MADE FOR BLAIS CIVIL ENGINEERS 780 BROADWAY SOUTH PORTLAND, MAINE. JOB# 212067 DATED: NOV. 14, 2012. SCALE: 1" = 80'. PREPARED BY: TITCOMB ASSOCIATES 133 GRAY ROAD, FALMOUTH, MAINE 04105.
2. WETLAND & STREAM DATA COMPILED BY ALBERT FRICK & ASSOCIATES.

GRAPHIC SCALE
0 50 100 200
1" = 100'

ISSUED FOR:
TOWN/ DEP REVIEW
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REVISIONS

No.	DATE	DESCRIPTION
1	11/26/13	REVISED PER PEER REVIEW/ DEP COMMENTS
2	12/04/13	REVISED PER DEP COMMENTS

STATE OF MAINE
STEVE G. BLAIS
No. 10084
REGISTERED PROFESSIONAL ENGINEER
12/04/13

Blais civil engineers
780 BROADWAY, SO. PORTLAND, ME 04106 (207) 767-7300

PRE-DEVELOPMENT DRAINAGE PLAN
FRIENDS SCHOOL OF PORTLAND
US ROUTE 1, CUMBERLAND, MAINE

PREPARED FOR:
FRIENDS SCHOOL OF PORTLAND
1 MACKWORTH ISLAND
FALMOUTH, MAINE 04105

LATEST REVISION (SEE REV. BLOCK):
DATE: JANUARY 27, 2012
DESIGNED BY: SB
DRAWN BY: MV
CHECKED BY: SB
BCE PROJECT NO: 12166

D-101

PLAN REFERENCES:

1. PLAN TITLED: PLAN OF EXISTING CONDITIONS US ROUTE 1 CUMBERLAND, MAINE MADE FOR BLAIS CIVIL ENGINEERS 780 BROADWAY SOUTH PORTLAND, MAINE. JOB# 212067 DATED: NOV. 14, 2012, SCALE: 1" = 80'. PREPARED BY: TITCOMB ASSOCIATES 133 GRAY ROAD, FALMOUTH, MAINE 04105.
2. WETLAND & STREAM DATA COMPILED BY ALBERT FRICK & ASSOCIATES.

N

U.S. ROUTE 1

N 30°45'30" E 109.09'

S 39°15" E 298.98'

N 35°19'28" E 515.44'

S 20°17'03" W 623.51'

S 67°14'13" E

N 71°18'28" E 70.58'

S 67°05'13" E

S 19°48'04" W 311.15'

S 18°30'53" W 478.69'

N 55°08'53" W 120.57'

Au

Ls

Sz

DeB

SAND FILTER #1

SAND FILTER #2

SOIL FILTER #2

15 LF LEVEL LIP SPREADER

15 LF LEVEL LIP SPREADER

30 L.F. LEVEL LIP SPREADER

15 L.F. LEVEL LIP SPREADER

40 L.F. LEVEL LIP SPREADER

5' RADIUS OF RIP RAP AROUND PIPE ENDS (TYP)

PAVED PATH

GRASSED PATH

GRASSED PATH

PLAY AREA #1 / BASKETBALL COURT

PLAY AREA #2

PLAY AREA #3

90'

100'

150'

50'

35'

"PROTECTED FORESTED BUFFER FOR STORMWATER TREATMENT"

FORESTED BUFFER, H

FORESTED BUFFER, I

FORESTED BUFFER, J

10S

11aP

11aS

13aS

11R

10R

12aS

11bS

11bP

12R

12bS

13bS

12bP

20S

POA#1

POA#2

SEE SHEET D-101 FOR EXISTING CONDITIONS AND LIMIT OF TC PATH.

SEE SHEET D-101 FOR EXISTING CONDITIONS AND LIMIT OF TC PATH.

LEGEND

- SUBCATCHMENT LABEL
- POND LABEL
- REACH LABEL
- REACH PATH
- TIME OF CONCENTRATION (TC) PATH
- SUBCATCHMENT DIVIDE
- SUB-SUBCATCHMENT DIVIDE
- SOIL BOUNDARY
- POA# 1 — POINT OF ANALYSIS
- DIRECTION OF FLOW
- PROPERTY LINE
- BUILDING SETBACK
- 81 — EXISTING MINOR CONTOUR
- 80 — EXISTING MAJOR CONTOUR
- 81 — PROPOSED MINOR CONTOUR
- 80 — PROPOSED MAJOR CONTOUR
- STORM DRAIN PIPE
- RIPRAP
- STREAM SETBACK
- EXISTING STREAM

SOILS INFORMATION:

Au	Au Gres loamy sand
Ls	Limerick-Saco silt loams
Sz	Swanton fine sandy loam

GRAPHIC SCALE
0 30 60 120
1" = 60'

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3	11/26/13	REVISED PER PEER REVIEW/ DEP COMMENTS
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STATE OF MAINE
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PROFESSIONAL ENGINEER
LICENSED
12/16/13

Blais civil engineers
780 BROADWAY, SO. PORTLAND, ME 04106 (207) 767-7300

POST DEVELOPMENT DRAINAGE PLAN

FRIENDS SCHOOL OF PORTLAND
US ROUTE 1, CUMBERLAND, MAINE

PREPARED FOR:
FRIENDS SCHOOL OF PORTLAND
1 MACKWORTH ISLAND
FALMOUTH, MAINE 04105

LATEST REVISION (SEE REV. BLOCK):
DATE: JANUARY 27, 2012
DESIGNED BY: SB
DRAWN BY: MV
CHECKED BY: SB
BCE PROJECT NO: 12166

D-102

Appendix F:
D1.0 – Stormwater Treatment Analysis Plan
D2.0 – Post Development Drainage Plan

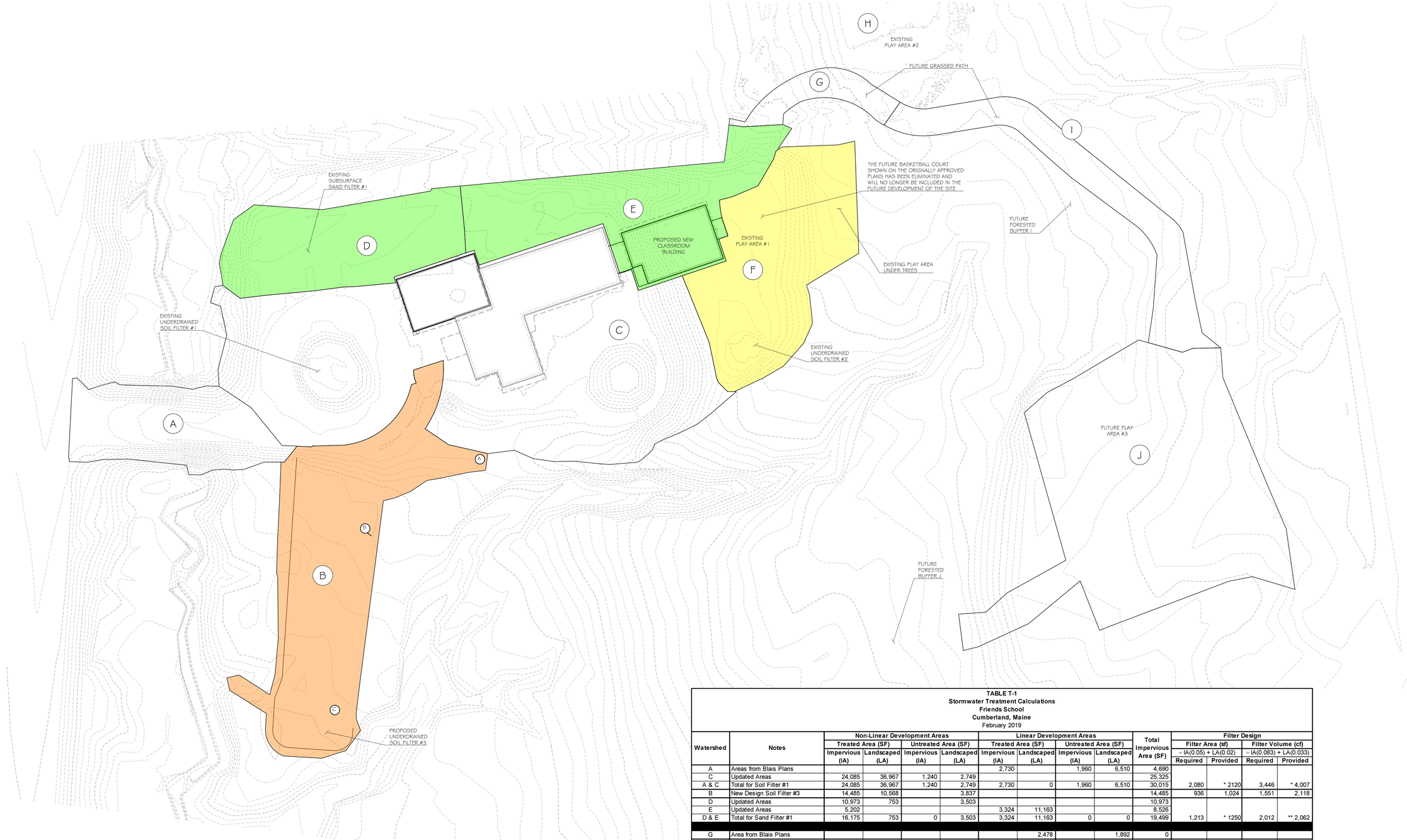

TABLE T-1
Stormwater Treatment Calculations
Friends School
Cumberland, Maine
February 2019

Watershed	Notes	Non-Linear Development Areas				Linear Development Areas				Total Impervious Area (SF)	Filter Design			
		Treated Area (SF)		Untreated Area (SF)		Treated Area (SF)		Untreated Area (SF)			Filter Area (sf) = IA(0.05) + LA(0.02)		Filter Volume (cf) = IA(0.083) + LA(0.033)	
		Impervious (IA)	Landscaped (LA)	Impervious (IA)	Landscaped (LA)	Impervious (IA)	Landscaped (LA)	Impervious (IA)	Landscaped (LA)		Required	Provided	Required	Provided
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Impervious Area (75%)	8,014	6,054	75.5%
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* Areas and volumes from Blais design plans.

** The Blais design plans indicated 1,488 cf of storage which corresponds to an elevation of 78.01. The filter has a storage capacity of 2,062 cf at 78.68, 18" above the media in the filter.

STATE OF MAINE
NORMAN G. CHAMBERLAIN II
No. 7144
LICENSED
PROFESSIONAL ENGINEER
02/27/19

GRAPHIC SCALE

40 0 20 40 80 160

1 inch = 40 ft.

Kaplan Thompson Architects
102 Exchange Street
Portland, ME 04101
(207) 842-2888
kaplanthompson.com

PROJECT

Classroom & Community Hall Addition

Friends School of Portland
11 US Route 1
Cumberland, ME 04021

FRIENDS SCHOOL OF PORTLAND
- inquiry, reflection, & action -

STRUCTURAL
Casco Bay Engineering
424 Fore Street
Portland, ME 04101
p: 207 842-2800

LANDSCAPE
Soren Deniord Design Studio
43 Wellwood Road
Portland, ME 04103
p: 207-400-2450

ELECTRICAL
Swiftcurrent Engineering Services
10 Forest Falls Drive, Unit 8B
Yarmouth, ME 04096
p: 207-847-9280

CIVIL
Walsh Engineering Associates, Inc.
1 Karen Drive, Suite 2A
Westbrook, ME 04092
p: 207-553-9898

Mechanical & Plumbing
Integrated Energy Systems, PLLC
301 Middle Road
Falmouth, ME 04105
p: 207-781-4263

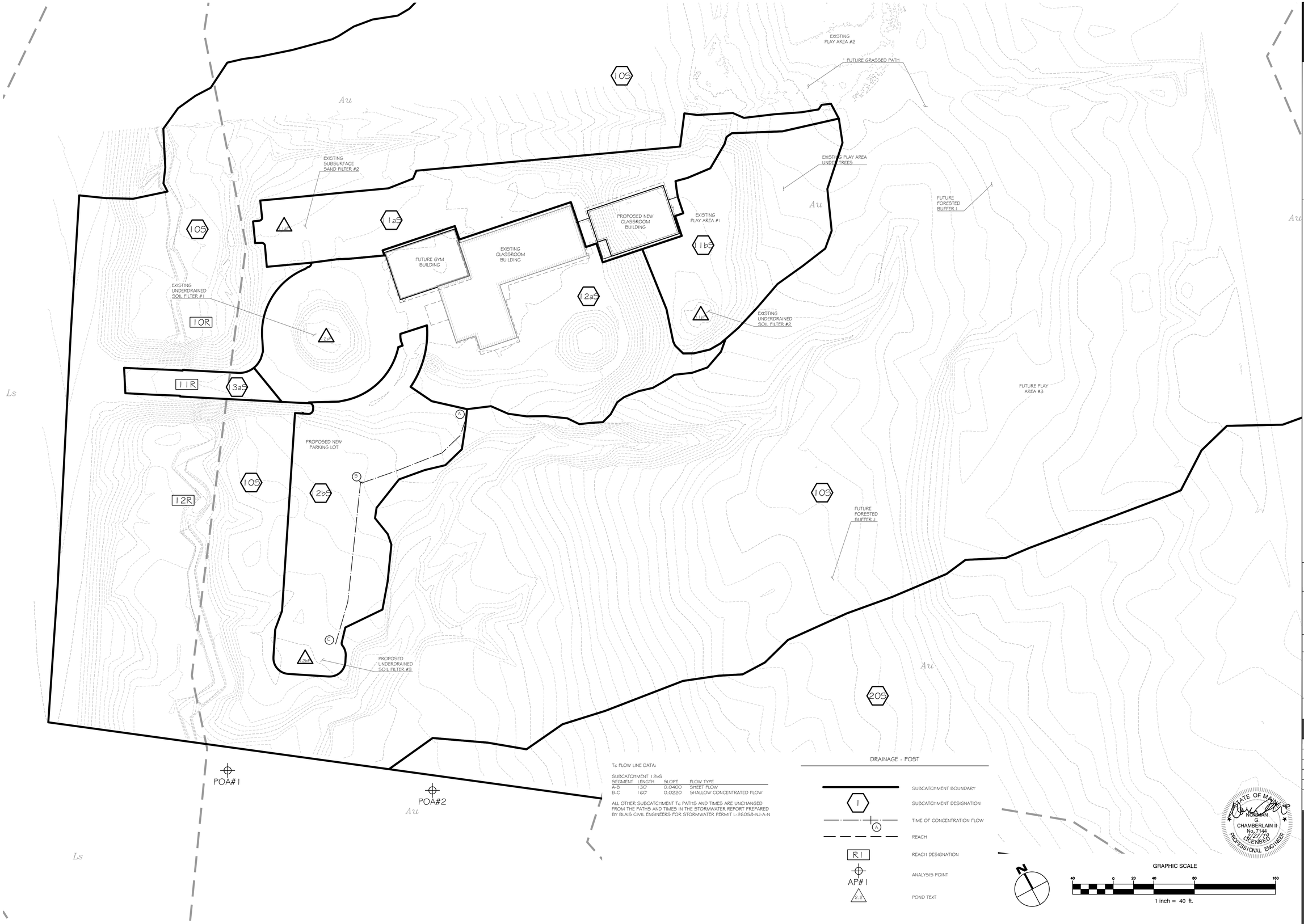
ISSUE NO	DESCRIPTION	CH'D	CHANGE NAME	DATE
A	PRICING SET			09/20/18
B	FOR SFM PERMIT			10/30/18
C	FOR CI COORD.			12/21/18
D	FOR CONSTRUCTION			02/22/19
E	SUBMITTED FOR PERMITTING			02/27/19

FOR SFM PERMIT

PROJECT NO:	FSP2
DESIGNED BY:	NGC
DRAWN BY:	CAR/JWG
PHASE:	PERMITTING

STORMWATER TREATMENT ANALYSIS PLAN

D1.0



Tc FLOW LINE DATA:

SUBCATCHMENT 12bS

SEGMENT	LENGTH	SLOPE	FLOW TYPE
A-B	130	0.0400	SHEET FLOW
B-C	160	0.0220	SHALLOW CONCENTRATED FLOW

ALL OTHER SUBCATCHMENT Tc PATHS AND TIMES ARE UNCHANGED FROM THE PATHS AND TIMES IN THE STORMWATER REPORT PREPARED BY BLAIS CIVIL ENGINEERS FOR STORMWATER PERMIT L-26058-NJ-A-N

DRAINAGE - POST

- SUBCATCHMENT BOUNDARY
- 1 — SUBCATCHMENT DESIGNATION
- A — TIME OF CONCENTRATION FLOW
- REACH
- R1 — REACH DESIGNATION
- AP#1 — ANALYSIS POINT
- 2.2 — POND TEXT

GRAPHIC SCALE

40 0 20 40 80 160

1 inch = 40 ft.

STATE OF MAINE — NORMAN C CHAMBERLAIN II No. 7144 12/21/18 LICENSED PROFESSIONAL ENGINEER

Kaplan Thompson Architects
102 Exchange Street
Portland, ME 04101
(207) 842-2888
kaplanthompson.com

PROJECT

Classroom & Community Hall Addition

Friends School of Portland
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Cumberland, ME 04021

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LANDSCAPE
Soren Deniord Design Studio
43 Wellwood Road
Portland, ME 04103
p: 207-400-2450

ELECTRICAL
Swiftcurrent Engineering Services
10 Forest Falls Drive, Unit 8B
Yarmouth, ME 04096
p: 207-847-9280

CIVIL
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p: 207-553-9898

Mechanical & Plumbing
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E	SUBMITTED FOR PERMITTING			02/27/19

FOR SFM PERMIT

PROJECT NO:	FSP2
DESIGNED BY:	NGC
DRAWN BY:	CAR/JWG
PHASE:	PERMITTING

POST-DEVELOPMENT DRAINAGE ANALYSIS PLAN

D2.0