Town of Brunswick, Maine

PLANNING BOARD

85 UNION STREET, BRUNSWICK, ME 04011

PLANNING BOARD AGENDA
BRUNSWICK TOWN HALL
85 UNION STREET
COUNCIL CHAMBERS
TUESDAY, FEBRUARY 25, 2020, 7:00 P.M.

1. **Case #19-039 Bowdoin College Barry Mills Hall & The Center for Arctic Studies:** The Planning Board will hold a **PUBLIC HEARING** and take action on a **Final Plan Major Development Review** application submitted by Sebago Technics on behalf of Bowdoin College to construct two (2) new academic buildings with 44,515 square feet of floor area and reconfigure the adjacent parking lot. The subject lot (Map U35, Lot A) is within the **GC1 (Growth College 1) Zoning District and the APO3 (Aquifer Protection Overlay 3) District**.

2. **Case #20-004 Hinton Recreational Dock, 98 Toads Landing:** The Planning Board will review and take action on a **Sketch/Final Plan Major Development Review** application submitted by Atlantic Environmental on behalf of Gregory and Sally Hinton to install a permanent pier and seasonal ramp and float to access coastal wetlands at 98 Toads Landing Rd. The subject lot (Map 36, Lot 28) is within the **RP1 (Rural Protection 1) Zoning District** and contains the following overlays: **RPSMO (Rural Protection Stormwater Management Overlay); SPO-RP (Shoreland Protection Overlay – Resource Protection Subdistrict)**; **and the FPO (Flood Protection Overlay).**

3. **Case #20-008 Marijuana Store, 4 Business Parkway:** The Planning Board will review and take action on a **Sketch Plan Major Development Review** application submitted by Sitelines, PA on behalf of GJoris LLC to construct a 3,100 square foot Marijuana Store at 4 Business Parkway. The subject lot (Map 17, Lot 66) is within the **GI (Growth Industrial) Zoning District.**

4. **Case #20-009 Marijuana Cultivation Facility, 43 Bibber Parkway:** The Planning Board will review and take action on a **Sketch Plan Major Development Review** application submitted by Sitelines, PA on behalf of Bibber Properties LLC for a Marijuana Cultivation Facility. The subject lot (Map 17, Lot 59) is within the **GI (Growth Industrial) Zoning District** and contains the following overlays: **SPO-SP (Shoreland Protection Overlay – Stream Protection Subdistrict and the SPO-RP (Shoreland Protection Overlay – Resource Protection Subdistrict)**.

Over →

This agenda is mailed to owners of property within 200 feet of proposed development sites and 300 feet for Conditional Use or Special Use Permits. Please call the Brunswick Department of Planning and Development (725-6660) with questions or comments. Individuals needing auxiliary aids for effective communications please call 725-6659 or TDD 725-5521. This meeting will be televised.

5. **<u>Case #20-010 Zoning Map Amendment, Old Portland Rd:</u>** The Planning Board will hold a **PUBLIC HEARING** and make a recommendation to the Town Council on a Zoning Map Amendment request by Sitelines, PA on behalf of Russell and Janet Douglas Survivor's Trust to modify the Shoreland Protection Overlay (SPO) boundaries. The portion of the SPO is centered within Map 17, Lot 1; and Map U34, Lots 15 and 19; and is located within the **GM3 (Growth Mixed Use 3) Zoning District** and the **SPO-SP (Shoreland Protection Overlay – Stream Protection) Subdistrict.**

6. **Other Business**

7. **Approval of Minutes**

8. **Adjourn**

PLANNING BOARD
Major Development Review
DRAFT Findings of Fact
Review Date: February 25, 2020

Project Name:	Bowdoin College Arctic Center
Project Location:	Coffin Street
Tax Map:	Map U35, Lot A
Zoning District:	GC1
Overlay Zoning:	APO3
Case Number:	19-039
Applicant / Owner:	Bowdoin College 3800 College Station Brunswick, ME 04011
Authorized Representative:	Sebago Technics, Inc. 75 John Roberts Road, Suite 4A South Portland, ME 04106

Staff reviewed the application and has determined it is complete.

DRAFT Motion 1: That the Final Site Plan application is deemed complete.

PROJECT SUMMARY

Staff review is based on the Major Development Review application for, "Barry Mills Hall & The Center for Arctic Studies" dated January 2020. The proposed activity is the construction of two (2) new academic buildings and associated parking area, landscaping, and pedestrian access ways. The proposed buildings are 11,845 square feet for Barry Mills Hall and 4,368 square feet the Center for Arctic Studies. The proposed activity is within the GC1 Zoning District and the subject parcel contains the APO3 Overlay Zoning District. The subject parcel is predominantly parking area with forested areas and lawn.

The Town of Brunswick's Staff Review Committee (SRC) reviewed the development proposal on February 12, 2020. The SRC meeting notes are included in the Planning Board packet. The Planning Board visited the subject lot on February 18, 2020.

Review Standards from Section 4.2 of the Town of Brunswick Zoning Ordinance

4.1 Applicability of Property Development Standards
The subject property is located within the GC1 Zoning District and contains the APO3 Overlay Zoning District. Based on the proposed dimensions depicted (and described) on plan sheet C3.1 entitled, "Overall Site Plan" and dated February 18, 2020, the proposed development complies with all applicable property development

standards set forth in Chapter 4 of the Zoning Ordinance. *The Board finds that the provisions of Section 4.1 are satisfied.*

4.2 Dimensional and Density Standards

The proposed development complies with all dimensional standards within GC1. Density is not applicable to the proposed development. *The Board finds that the provisions of Section 4.2 are satisfied.*

4.3 Natural and Historic Areas

4.3.1 Mapping of Natural and Historic Areas Requirements. The proposed development is primarily a parking lot with some forested and lawn areas on the Bowdoin College campus. Based on the information provided in the application, the applicant avoided the associated features important to the natural, scenic, and historic character of the Town or that add to the visual quality of the development to the greatest extent practicable.

4.3.2 Pollution. The proposed development will require stormwater treatment plans that comply with the Stormwater Management Law as part of an amendment to the applicant's Site Location of Development Law (Site Law) permit. The stormwater plans will be evaluated by the Maine Department of Environmental Protection (DEP) as part of the Site Law permit review to ensure no undue water pollution results from the development. The Town Engineer reviewed the plans and advised the long term maintenance plans include removing solids from porous asphalt that could clog and result in flooding to public land. As proposed, the porous asphalt maintenance plans will adequately mitigate any undue impact to the public storm drain system. No undue air pollution is anticipated. Based on the information provided, the proposed development will not result in undue water or air pollution.

4.3.3 Protection of Natural Vegetation. The proposed development is located partly in existing developed land but will result in some removal of mature trees as shown on the plan. Based on the information in the application and observations of staff, the proposed development was not found to occur within or cause harm to land not suitable for development and will not have an undue adverse effect on the area's scenic or natural beauty.

4.3.4 Protection of Significant Plant and Animal Habitat. The proposed development is not within the Wildlife Habitat Overlay, and no other mapped significant plant and animal habitats were identified during review. Therefore, the proposed development will not have an undue adverse effect on important plant and animal habitats identified by the Maine Department of Inland Fisheries and Wildlife or Town of Brunswick, or on rare and irreplaceable natural areas, such as rare and exemplary natural communities and rare plant habitat as identified by the Maine Natural Areas Program.

4.3.5 Steep Slopes: No steep slopes were identified on the subject parcel.

4.3.6 Erosion and Sedimentation. The proposed development is designed in accordance with the Maine Department of Environmental Protection's Best Management Practices (BMPs) to avoid causing unreasonable soil erosion or a

reduction in the land's capacity to hold water so that a dangerous or unhealthy situation results. An erosion and sedimentation control plan is provided.

4.3.7 Groundwater. The stormwater management plan is designed to meet the Maine DEP's BMP standards which avoid and minimize impacts to groundwater. Provided the stormwater management plans are approved by the Maine DEP as conditioned at subsection 4.5.4, the development will not, alone or in conjunction with existing activities, have an undue adverse effect on the quality or quantity of groundwater.

4.3.8 Surface waters, Wetlands, and Marine Resources. The plans and reports for stormwater management that were evaluated during review were prepared by qualified professionals. Based on the information provided, the proposed development will have no undue adverse effect on wetlands, waterbodies, and their shorelines within the watershed of the development site.

4.3.9 Historic and Archeological Resources. The proposed development will have no undue adverse effect on any historic or archeological resources.

The Board finds that the provisions of Section 4.3 are conditionally satisfied upon receipt of the Maine DEP approved Site Law permit and associated stormwater management plan.

4.4 Flood Hazard Areas

The proposed development is not located in a Flood Protection Overlay (FPO) District or Flood Hazard Area. *The Board finds flood hazard area standard at Section 4.4 is not applicable.*

4.5 Basic Municipal Services

4.5.1. Sewage Disposal. The applicant provided review correspondence from the Brunswick Sewer District that indicates the proposed development will provide for adequate sewage waste disposal and will not cause an unreasonable burden on municipal services.

4.5.2. Water Supply and Quality. The applicant provided review correspondence from the Brunswick-Topsham Water District that indicates the proposed development will have sufficient water available for the reasonably foreseeable needs of the development, and will have no undue adverse impact on existing water supplies.

4.5.3 Solid Waste Disposal. Based on the justification provided in the application, solid waste disposal fees will not be required by the Public Works Department for the proposed project.

4.5.4. Stormwater Management. The proposed development is designed to minimize the total area of impervious surface within the development site while accommodating safe egress and meeting the applicant's project goals. The applicant provided all technical stormwater management plans for staff review. The applicant must meet the Stormwater Management Law standards as part of a Site Law Amendment. Staff note stormwater management plans are provided for the record and are included in the Planning Board's digital packet but did not provide the associated paper plans in the Planning Board's paper packet. The plans are comprehensive and voluminous but the technical aspects and compliance with Stormwater Management Law standards were not evaluated by a third party engineer.

However, the Town Engineer has reviewed the plans in consultation with Maine DEP staff.

The Town Engineer advised that unless long term maintenance plans for the porous asphalt are provided, the proposed stormwater management plan for the proposed development will increase peak runoff that must be mitigated to avoid unreasonably burdening the public stormwater management system. In accordance with the Stormwater Management Law Rule, Chapter 500, the DEP must have town approval for any increased runoff to the town system. Further, Section 16-145 of the Brunswick Code of Ordinances states that, "the Public Works Department may deny or restrict the size of a new connection to the storm drainage system when it determines the town storm drainage system lacks adequate capacity to serve the proposed connection." In accordance with the Brunswick Zoning Ordinance at subsection 1.5, "nothing in this [Brunswick's] Ordinance shall be interpreted to supersede the provisions of a more restrictive local, state, or federal law, rule, Ordinance or regulation."

Town staff received a maintenance agreement from Bowdoin College that satisfied the Town Engineer's concerns for overburdening the capacity of the public stormwater system. *The Board finds that the provisions of Section 4.5 are conditionally satisfied provided evidence of DEP approval of the stormwater management plans are provided to the satisfaction of the Director of Planning and Development.*

4.6 Landscaping Requirements

Existing tree stands that buffer the site will be maintained and/or limbed to the extent shown on the site plan. Trees that must be removed for construction will be replaced at a higher replanting ratio than what was removed. Vegetated buffering on Coffin Street will be enhanced as shown on the landscape plans; however, the applicant requests administrative adjustment / alternative equivalent for parking and buffering requirements as depicted on the landscaping plans. Provided the administrative adjustment / alternative equivalent request for landscaping and buffering is approved, the proposed development enhances the proposed development and associated site improvements, and minimizes the developments effect on abutting properties. Existing vegetation and grades (topography) are maintained wherever practicable. However, the proposed landscaping plan is consistent with the existing development but does not comply with all of the specific standards of 4.6. *The Board finds that the provisions of Section 4.6 are satisfied conditioned upon the Planning Board's approval of the proposed alternative landscaping plans for 4.6 in accordance with subsection 4.17.*

4.7 Residential Recreation Requirements

The proposed development does not contain new dwelling units. Therefore, residential recreation requirements are not applicable. *The Board finds that the provisions of Section 4.7 is not applicable.*

4.8 Circulation and Access
The proposed development will contain pedestrian sidewalk connections to connect the proposed development existing access ways on campus and to points on College Street and Sills Drive. The proposed vehicle and pedestrian access is consistent with the standards at subsection 4.8. Based on the information provided, the development will not cause unreasonable congestion or unsafe conditions on highways or public roads, either existing or proposed, and the traffic associated with the development shall maintain the existing Level of Service on any public road within 200 feet of any existing or proposed curb-cut. *The Board finds that the provisions of Section 4.8 are satisfied.*

4.9 Parking and Loading
Parking for vehicles and bicycles will satisfy subsection 4.9 standards. The proposed parking stall dimensions and aisle width are smaller than the ordinance standard. The Town Engineer advised the proposed parking dimensions are consistent with other accepted practices. The Fire Chief advised the aisle width is acceptable for access but advised the project should be reviewed by the Deputy Fire Chief when possible. *The Board finds that the provisions of Section 4.9 is satisfied provided the parking dimensions are approved in accordance with Subsection 4.17.*

4.10 Lighting
The proposed lighting plan was reviewed by the SRC. The photometric plans and analysis indicate no light trespass beyond the property boundary. Further, the proposed lighting is within the Planning Board's usual advice for external light temperatures below 3,000 kelvin. Based on the available information, outdoor lighting will not adversely impact road safety or adjacent properties and uses. *The Board finds that the provisions of Section 4.10 are satisfied.*

4.11 Architectural Compatibility
The proposed development is compatible with its architectural surroundings in terms of its size, mass, and design and no additional design standards or guidelines apply to the zoning district in which it is located. *The Board finds that the provisions of Section 4.11 are note applicable.*

4.12 Neighborhood Protection Standards
Neighborhood Protection Standards apply to the GC1 Zoning District. However, no residences are close enough to the proposed development to require the standards at subsection 4.12. *The Board finds that the development satisfies the neighborhood protections standards at Section 4.12.*

4.13 Signs
No signs are proposed at this time. Therefore, the sign standards for compatibility in design and scale with surroundings and not unreasonably interfering with the safe

operation of adjoining roads, sidewalks, parking areas, or uses are not applicable. *The Board finds that the provisions of Section 4.13 are not applicable.*

4.14 Performance Standards
The proposed development will not exceed Section 4.14 standards. *The Board finds that the provisions of Section 4.14 are satisfied.*

4.15 Site Feature Maintenance
The proposed development contains new site features such as landscaping, pedestrian walkways, a stormwater management system, and outdoor lighting. In accordance with Section 4.15 standards, this finding serves to advise the applicant that site features constructed or installed as required by this development approval must be maintained in good repair, and replaced if damaged or destroyed, or in the case of living materials, if they die or are effectively destroyed after installation. *The Board finds that the provisions of Section 4.15 are satisfied.*

4.16 Financial and Technical Capacity
Bowdoin College hired a qualified firm to design the technical aspects of the proposed roadway and intends to fund the project with existing funds. *The Board finds that the applicant has adequate financial and technical capacity to meet this standard of the property development.*

4.17 Administrative Adjustments / Alternative Equivalent Compliance
Administrative adjustment / alternative equivalent compliance is proposed by the applicant at this time for buffering and parking standards. Staff advise the proposed landscaping is robust and may be an acceptable landscaping plan without additional buffering. Staff advise the applicant's parking stall and aisle width dimensions are acceptable. *The Board finds that the provisions of Section 4.17 are satisfied.*

DRAFT MOTIONS
CASE #19-039

Motion 2: That the Final Plan is approved with the following conditions:

1. That the Board's review and approval does hereby refer to these findings of fact, the plans and materials submitted by the applicant and the written and oral comments of the applicant, his representatives, reviewing officials, and members of the public as reflected in the public record. Any changes to the approved plan not called for in these conditions of approval or otherwise approved by the Director of Planning and Development as a minor modification shall require a review and approval in accordance with the Brunswick Zoning Ordinance.

2. Prior to starting construction, stormwater management plans shall be approved by the Maine DEP and the approved permit shall be provided to the Director of Planning and Development.

Town of Brunswick, Maine

DEPARTMENT OF PLANNING AND DEVELOPMENT

MEMORANDUM

TO: Brunswick Planning Board

FROM: Matt Panfil, AICP CUD, LEED AP BD+C, Director of Planning & Development

DATE: October 8, 2019

SUBJECT: Sketch Plan – Major Development Review – Barry Mills Hall and The Center for Arctic Studies

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DRAFT MOTIONS
SKETCH PLAN – MAJOR DEVELOPMENT REVIEW
BOWDOIN COLLEGE – BARRY MILLS HALL AND THE CENTER FOR ARCTIC STUDIES
CASE #19-039

Staff has reviewed the Sketch Plan application and determined that it is complete.

DRAFT MOTION 1: That the Planning Board deems the Sketch Plan to be complete.

The proposed development, located at the northwest corner of the intersection of College Street and Sills Drive (Map U35, Lot A) and within the Growth College 1 (GC1) Zoning District and the Aquifer Protection Overlay 3 (APO3) District, includes the following:

- Demolition of the Coe Health Infirmary Building
- The construction of two (2) new academic buildings totaling 44,515 square feet of floor area.
    - Mills Hall: One (1) 60-person cinema classroom; four (4) 24- to 60-seat flexible Classrooms; twelve (12) faculty offices; huddle spaces for faculty and student collaboration; and a catering prep and a 300-person capacity meeting room.
    - The Center for Arctic Studies: New Peary-MacMillan Arctic Museum (relocated from Hubbard Hall); archaeology research lab; archaeology teaching lab; one (1) classroom; and offices for museum staff.
- Redevelopment of the existing parking lot resulting in a 9,300 square foot increase of impervious surface.
- Relocation of the existing Sills Drive access point slightly north.

The Staff Review Committee (SRC) reviewed the proposed Sketch Plan on September 25, 2019. Notes from the SRC meeting are attached.

Waivers:

Based on the submitted Sketch Plan documents, the applicant will be requesting waivers from:

- *Table 4.8.2.A.(1): Minimum Parking Space Dimensional Standards* to reduce the parking aisle width from 26 feet to 24 feet and parking space depth from 18 feet 5 inches to 18 feet.

- Solid Waste Impact Fee: The new buildings will house existing programs and there is no proposed increase in student enrollment or faculty population. The Town Engineer has stated that they will waive the Solid Waste Impact Fee for this project.

- Landscaping Requirements: Specific waiver requests will be determined as the final Landscape Plan is prepared.

Aquifer Protection Overlay 3 (APO3) District:

The proposed development is located within the Aquifer Protection Overlay 3 (APO3) District. The APO3 District is the area within which leachable materials disposed of or applied into or onto land or water bodies can travel to the public water supply wells in more than 200 days. The proposed development is permissible within the APO3 District.

Density and Dimensional Standards:

The proposed development complies with the GC1 Zoning District's dimensional and density standards established in *Table 4.2.3: Dimensional and Density Standards for Growth Area Zoning Districts* of the Brunswick Zoning Ordinance.

Landscaping:

As indicated above, the applicant anticipates requesting landscape waivers as part of Final Plan Review. As proposed, the development will require the removal of 63 existing trees and the planting of 94 new trees.

Lighting:

Lighting specifications have been included in the application. The application indicates that lighting will be LED Color 3K.

Parking, Access, and Vehicular Circulation:

According to the applicant, the proposed development will not result in an increase in the overall student enrollment or faculty population. Although there is a reduction in on-site parking from 138 to 59 spaces (net -79 parking spaces) the loss will be offset by expansion of the Coffin Street Parking Lot (Case No. 19-009), which has 82 new parking spaces. Additional parking demand required by the new floor area is accommodated by the surplus parking spaces that are available on the Bowdoin campus. The proposed development includes a minimal shifting north of the existing Sills Drive access point. A Traffic Impact Statement is included with the application.

Pedestrian Improvements:

The SRC recommended additional sidewalks on the north side of the Sills Drive entrance to the area of the chiller pad in order to better connect the proposed development with buildings to the north.

Stormwater Management

The applicant has submitted an application to the Maine Department of Environmental Protection (DEP).

A Sketch Plan and associated documents, prepared by HGA of Minneapolis, MN, are included with the application. Although the documents are dated October 18, 2019, they were received by the Planning and Development Department on September 16, 2019.

DRAFT MOTION 2: That the Planning Board approves the Sketch Plan.

STERLING
Stormwater Maintenance Services

Stormwater Compliance Proposal

Job Name: Bowdoin College – Mills Hall and The Center for Arctic Studies

Location: Brunswick, ME **Quote Date: 2/11/2020**

Quote Number: 9112BAS **Contract Term: 5 Years**

Inspection, Maintenance, and Compliance Reporting Fees

Item #	Description[1]	Annual Total
1	Inspection of Stormwater Components	$2,600.00
2	Annual Maintenance of Filterra Units	$900.00
3	Compliance Reporting	$450.00
	Annual Total	$3,950.00

Other Maintenance Fees

Item #	Description[1]	Rate
4	Vacuum Truck Services	$225 per hour and $110 per ton disposal

Notes:

1. Service pertains to semi-annual inspection of numerous stormwater components including catch basins, drain manholes, an oil-water separator, conveyance pipe, (3) porous pavement areas, (6) filtration trenches, (2) grassed infiltration trenches, and two filterra units with associated R-tank storage.
2. Reporting will include photographic documentation of inspection findings and maintenance actions. Reporting service includes annual reporting to local jurisdiction as well as submittal to the Maine DEP to satisfy the 5-yr recertification program. Two reports will be submitted to the client on an annual basis to coincide with the semi-annual services.
3. Service pertains to maintenance of two Filterra units. Maintenance consists of removal of sediment, debris, and trash from each unit, removal of the existing mulch from each unit, installation of fresh mulch in each unit, and pruning of the tree for each unit as needed.
4. Service pertains to maintenance as needed for porous pavement, catch basins, oil water separator, conveyance pipe, and other components where vacuum truck is needed. Note that client is under no obligation to use our vacuum truck services as they may already have a contract with another company.

Terms & Conditions: IN ADDITION TO THE BOWDOIN COLLEGE GENERAL REQUIREMENTS:

1. Payment is agreed to be made within 30 days of receipt of invoice. Invoice will be sent along with the report on a semi-annual basis. The referenced services will be prorated to reflect portion completed on semi-annual basis.
2. Quote is valid for 30 days from the quote date listed above. Contract term commences upon date of 1st inspection and will run for five consecutive years from that date.
3. STERLING Stormwater Maintenance Services is not the manufacturer nor was it involved in the design of the above listed stormwater management systems and therefore accepts no responsibility for the actual performance of the storm water management systems.

As an authorized representative of the above referenced site, I hereby accept this contract and the associated terms and conditions:

Print Name: DON BORKOWSKI Sign Here: _____ Date: 2/12/20

SEBAGO TECHNICS

CIVIL ENGINEERING • SURVEYING • LANDSCAPE ARCHITECTURE

Development Review Application

to the

Town of Brunswick

for

Barry Mills Hall & The Center for Arctic Studies
Brunswick, Maine

on behalf of

Bowdoin College
Maine Street
Brunswick, Maine 04011

January 2020

75 John Roberts Road – Suite 4A, South Portland, ME 04106-6963 • 207-200-2100 • Fax: 207-856-2206

January 20, 2020
11001-12

Department of Planning and Development
Town of Brunswick
85 Union Street
Brunswick, ME 04011

Request for Development Review Submittal
Barry Mills Hall & The Center for Arctic Studies, Bowdoin College; Brunswick, ME

Dear Mr. Woolston;

On behalf of Bowdoin College, Sebago Technics, Inc. is requesting a Development Review with the Planning Board. Enclosed are schematic drawings and supporting materials for the proposed buildings and site improvements associated with the Barry Mills Hall and the Center for Arctic Studies facilities.

Project Description: The development site is a portion of the Bowdoin campus located near the intersection of Sills Drive and College Street on Lot U-35A (Brunswick Tax Map) and is currently developed as a parking lot. The site has frontage along Sills Drive and College Street with the main site access being proposed from the general vicinity of the existing lot access on Sills Drive. The existing access will be moved slightly north to accommodate the proposed site design. The project proposes the construction of two new academic buildings and associated parking. As part of the redevelopment of the site, the existing parking lot will be redesigned to accommodate the proposed two buildings. The buildings will be connected via a shared basement. Mills Hall is planned to include one 60-person cinema classroom, four 24 – 60 seat flexible classrooms, twelve faculty offices, huddle spaces for faculty and student collaboration, and a catering prep and large meeting space with a 300-person seating capacity. The Center for Arctic Studies building will include: a new home for the Peary-MacMillan Arctic Museum, which will be relocated from its existing location in Hubbard Hall; an archeology research lab; an archeology teaching lab; a classroom; and offices for museum staff. The two buildings will be a total of approximately 44,515 s.f. with Mill's Hall having an approximate 11,845 s.f. footprint and the Center for Arctic Studies a 4,368 s.f. footprint. The proposed buildings will fully conform to all town zoning height, size, and setback requirements. Please see the table on the accompanying site plan for more detailed dimensional standards.

Traffic/Parking: The site is already developed as a parking lot and the proposed development will not result in an increase in the overall student or faculty population. Therefore, the proposed project is not expected to cause an increase in vehicular traffic to the area or a change in traffic patterns. The total number of parking spaces at the site will be reduced from

136 spaces to 57 spaces, which is a net reduction of 79 parking spaces. As a result, it is anticipated that there will be a decrease in traffic volumes entering and exiting the site. The loss of the 79 spaces in the Dayton lot will be off-set by the expansion of the Coffin Street Lot (82 new spaces). Any required additional parking associated with the increase in building area can be accommodated by other parking lots on campus that have excess capacity. The parking table provided on the site plan identifies the record surplus of parking inventory. We have included a traffic impact statement memo with this submittal.

As discussed in our sketch plan meeting, we are requesting a waiver in regards to the size of the proposed parking aisle and parking spaces. We are requesting a reduction in the standard parking aisle space from 26' to 24' and a reduction of the standard parking space size of 18'5" to 18'. Additionally, the applicant wishes to request a waiver of the opaque landscape buffer standard.

Lighting: Lighting for the project will be Town preferred LED Color 3K and will not adversely impact road safety or adjacent properties. Lighting has been designed to not encroach on surrounding properties. Light placement along pathways and within the parking area has been designed to be sufficient for safety without being invasive and resulting in disabling glare. Please see the lighting information included with this submittal for additional information.

Solid waste: As discussed in our sketch plan meeting, we are requesting a waiver from the ordinance provisions regarding the solid waste impact fee. The proposed redevelopment of this site is not anticipated to generate a significant increase in solid waste. While the new academic buildings will create some new space on campus, that space will be utilized to house existing programs. There is no proposed increase in the student or faculty population utilizing the spaces. All solid waste generated at the buildings will be hauled and disposed of by a private contractor, at no burden to Town services.

Landscaping: The proposed project has been designed to preserve existing vegetation in as much as is practical. Tree preservation areas have been provided along College Street and Sills Drive. Additional plantings are proposed within the parking area, around the generator, and throughout the site. Bike racks have been placed at the College Street entrance of the Mills Hall and along the northwest side of the Center for Arctic Studies facing Smith Union. The applicant is sensitive to the tree removal in the area and has proposed to replace trees removed at a ratio of 1:1.25, a table depicting the trees anticipated to be removed and the number of proposed replanted trees has been added to the site plan. We believe this will allow for greater diversity in the future wooded buffer area and will provide better screening and understory development for this site.

As discussed in our sketch plan meeting, we are requesting waivers for opaque screening for the parking lot. The project will provide landscaping to buffer the parking area, however as the project does not face residential properties and for safety and visibility considerations, we are requesting flexibility to provide aesthetically pleasing landscape buffering without the height or opacity requirements. Please see the landscaping plans included with this submittal.

We look forward to meeting with the Town to present the project for Development Review. We have attached the following documentation in support of the Development Review request:

- Ten copies of the Development Review Application and associated submittal materials
- Five copies of the Stormwater Report
- One full size set and eight 11 x 17 sets of the project plans.
- Application fee $5,341.80 & Public Hearing fee $250.00
- CD of submittal materials

We appreciate your attention to this project and we look forward to its successful completion. Please contact me if you have any questions or require additional information.

Sincerely,

SEBAGO TECHNICS, INC.

Kylie S. Mason, RLA, LEED-AP
Maine Licensed Landscape Architect
Vice President, Project Delivery

Table of Contents

Application & Checklist

Exhibit 1 Location Map

Exhibit 2 Abutters List

Exhibit 3 Right Title and Interest

Exhibit 4 Financial Capacity/Draft Performance Guarantees

Exhibit 5 Disclosure of Required Permits

Exhibit 6 Stormwater Management

Exhibit 7 Water & Sewer

Exhibit 8 Statement from Fire Chief

Exhibit 9 Property Development Standards

Exhibit 10 Agency Response

Exhibit 11 FEMA

Exhibit 12 Traffic and Parking

Exhibit 13 Elevations

Exhibit 14 Lighting and Product Information

Exhibit 15 Soils

DEVELOPMENT REVIEW
APPLICATION

1. Development Review application type (refer to **Appendix D**):

	Minor Development Review
	Major Development Review: **Sketch Plan**
✓	Major Development Review: **Final Plan**
	Major Development Review: **Streamlined Final Plan**

2. Project Name: Barry Mills Hall & The Center for Arctic Studies

3. Project Applicant
   - Name: Bowdoin College
   - Address: 3800 College Station
     Brunswick, ME 04011-8447
   - Phone Number: 207-725-3947
   - Email: dborkows@bowdoin.edu

4. Project Owner (if different than applicant)
   - Name: same
   - Address:
   - Phone Number:
   - Email:

5. Authorized Representative
   - Name: Don Borkowski
   - Address: Bowdoin College
     Brunswick, ME 04011
   - Phone Number: 207-725-3947
   - Email: dborkows@bowdoin.edu

6. List of Design Consultants. Indicate the registration number, address and phone number, email for any additional project engineers, surveyors, architects, landscape architects or planners:
   1. Sebago Technics, Inc.
   2. HGA
   3. Stephen Stimson Associates

7. Physical location of property: Bowdoin campus, corner of Sills Dr/College St

8. Lot Size: a 110,000 s.f. (2.5 acre) portion of the 32 + acre Bowdoin Campus

9. Zoning District: GC1

10. Overlay Zoning District(s): Aquifer Protection 3

11. Indicate the interest of the applicant in the property and abutting property. For example, is the applicant the owner of the property and abutting property? If not, who owns the property subject to this application?

12. Assessor's Tax Map U35 Lot Number A of subject property.

13. Brief description of proposed use/subdivision: Construction of two new buildings: the Barry Mills Hall (class room, faculty offices, and large event space) and the Center for Arctic Studies (new location for the Peary-MacMillan Arctic Museum).

14. Describe specific physical improvements to be done: Construction of two new buildings and the redesign of the existing parking lot on site.

Owner Signature:

Applicant Signature (*if different*):

DEVELOPMENT REVIEW APPLICATION REQUIREMENTS

The submission requirements contained in **Appendix D** of the Brunswick Zoning Ordinance (attached in checklist format for each application category) shall apply to all Minor Development, Major Development, and Streamlined Major Development Review unless a waiver is granted. Proposed development applications shall be submitted to the Director of Planning and Development.

For each item listed in Appendix D the applicant shall either submit the requested information or request a waiver from the information requirement pursuant to Subsection 5.2.9.M of the Zoning Ordinance.

REQUIREMENTS FOR FINAL PLAN, STREAMLINED REVIEW & MINOR REVIEW APPLICATION SUBMITTAL		Final Plan	Streamlined	Minor
General	Application form and fee	X		
	Name of development	X		
	Existing zoning district and overlay designations	X		
	Location map	X		
	Names of current owner(s) of subject parcel and abutting parcels	X		
	Names of engineer and surveyor; and professional registration numbers of those who prepared the plan	X		
	Location of features, natural and artificial, such as water bodies, wetlands, streams, important habitats, vegetation, railroads, ditches and buildings	X		
	Documentation of Right, Title and Interest	X		
	Drafts of legal documents appropriate to the application, including: deeds, easements, conservation easements, deed restrictions or covenants, home/property owners association declarations and by-laws, and such other agreements or documents as are necessary to show the manner in which common areas will be owned, maintained, and protected	X		
	Draft performance guarantee or conditional agreement	X		
Survey, Topography, & Existing Conditions	Scale, date, north point, and area	X		
	A survey submitted (stamped for final plan submittal) by a professional surveyor with a current license by the State of Maine Board of Licensure for Professional Surveyors	X		
	Boundaries of all lots and tracts with accurate distances and bearings, locations of all permanent monuments property identified as existing or proposed	X		
	Existing easements associated with the development	X		
	Location of existing utilities; water, sewer, electrical lines, and profiles of underground facilities	X		
Survey, Topography, & Existing Conditions	Existing location, size, profile and cross section of sanitary sewers; description, plan and location of other means of sewage disposal with evidence of soil suitability	X		
	Topography with contour intervals of not more than two (2) feet	X		
	A Medium Intensity Soil Survey, available from the Cumberland County Soil and water Conservation District,. The Planning Board may require a Class A (high intensity) Soil Survey, prepared in accordance with the standards of the Maine Association of Professional Soil Scientists, if issues of water quality, wetlands or other natural constraints are noted.	X		
	Existing locations of sidewalks	X		
	A delineation of wetlands, floodplains, important habitats, and other environmentally sensitive areas	NA		
	Approximate locations of dedicated public open space, areas protected by conservation easements and recreation areas	NA		

REQUIREMENTS FOR FINAL PLAN, STREAMLINED REVIEW & MINOR REVIEW APPLICATION SUBMITTAL		Final Plan	Streamlined	Minor
Infrastructure - Proposed	Name, location, width of paving and rights-of-way, profile, cross-section dimensions, curve radii of existing and proposed streets; profiles of center-lines of proposed streets, at a horizontal scale of one (1) inch = 50 feet and vertical scale of one (1) = five (5) feet, with all evaluations referred to in U.S.G.S. datum	X		
	Proposed easements associated with the development	X		
	Kind, location, profile and cross-section of all proposed drainage facilities, both within and connections to the proposed development, and a storm-water management plan in accordance with Section	X		
	Location of proposed utilities; water, sewer, electrical lines, and profiles of underground facilities. Tentative locations of private wells.	X		
	Proposed location, size, profile and cross section of sanitary sewers; description, plan and location of other means of sewage disposal with evidence of soil suitability	X		
	Proposed locations, widths and profiles of sidewalks	X		
	Locations and dimensions of proposed vehicular and bicycle parking areas, including proposed shared parking arrangement if applicable.	X		
Infrastructure - Proposed	Grading, erosion control, and landscaping plan; proposed finished grades, slopes, swells, and ground cover or other means of stabilization	X		
	Storm water management plan for the proposed project prepared by a professional engineer	X		
	The size and proposed location of water supply and sewage disposal systems	X		
	Where a septic system is to be used, evidence of soil suitability	NA		
	A statement from the General Manager of the Brunswick Sewer District as to conditions under which the Sewer District will provide public sewer and approval of the proposed sanitary sewer infrastructure	X		
	A statement from the Fire Chief recommending the number, size and location of hydrants, available pressure levels, road layout and street and project name, and any other fire protection measures to be taken	X		
	A statement from the General Manager of the Brunswick and Topsham Water District as to conditions under which public water will be provided and approval of the proposed water distribution infrastructure	X		
Proposed Development Plan	Lighting plan showing details of all proposed lighting and the location of that lighting in relation to the site	X		
	Reference to special conditions stipulated by the Review Authority	NA		
	Proposed ownership and approximate location and dimensions of open spaces for conservation and recreation. Dedicated public open specs, areas protected by conservation easements, and existing and proposed open spaces or recreation areas and potential connectivity to adjoining open space.	X		
	When applicable, a table indicating the maximum number of lots permitted based upon the applicable dimensional requirements, the number of lots proposed, and the number of lots permitted to be further subdivided.	NA		
	Building envelopes showing acceptable locations for principal and accessory structures, setbacks and impervious coverage	X		

REQUIREMENTS FOR FINAL PLAN, STREAMLINED REVIEW & MINOR REVIEW APPLICATION SUBMITTAL		Final Plan	Streamlined	Minor
Proposed Development Plan	Disclosure of any required permits or, if a permit has already been granted, a copy of that permit	X		
	A statement from the General Manager of the Brunswick and Topsham Water District regarding the proposed development if located within an Aquifer Protection Zone	X		
	A plan of all new construction, expansion and/or redevelopment of existing facilities, including type, size, footprint, floor layout, setback, elevation of first floor slab, storage and loading areas	X		
	An elevation view of all sides of each building proposed indicating height, color, bulk, surface treatment, signage and other features as may be required by specific design standards	X		
	A circulation plan describing all pedestrian and vehicle traffic flow on surrounding road systems	X		
	A site landscaping plan indicating grade change, vegetation to be preserved, new plantings used to stabilize areas of cut and fill, screening, the size, locations and purpose and type of vegetation	X		
	Number of lots if a subdivision	NA		
	A plan showing all ten (10) inch caliper trees to be removed as a result of the development proposal	X		
	All applicable materials necessary for the Review Authority to review the proposal in accordance with the criteria of Chapter 5.	X		
	Any additional studies required by the Review Authority	NA		

AGENT AUTHORIZATION

APPLICANT/ OWNER	Name	Bowdoin attn: Don Borkowski			
PROPERTY DESCRIPTION	Physical Address	Applications for: Bary Mills Hall & Center for Arctic Studies - Brunswick, Maine	Map	U35	
			Lot	A	
APPLICANT'S AGENT INFORMATION	Name	Sebago Technics, Inc. attn: Kylie Mason			
	Phone	207-200-2071	Business Name & Mailing Address	SEBAGO TECHNICS, INC 75 John Roberts Road, Suite 4a South Portland, ME 04106	
		207-856-2206			
		kmason@sebagotechnics.com			

Said agent may represent me/us before the Town of Brunswick, Maine Department of Environmental Protection, and the U.S. Army Corps of Engineers to expedite and complete the approval of the proposed projects listed above.

09/14/19

APPLICANT SIGNATURE DATE

DONALD BORKOWSKI FOR BOWDOIN COLLEGE

PLEASE TYPE OR PRINT NAME HERE

Kylie S. Mason 9/16/2019

APPLICANT'S AGENT SIGNATURE DATE

KYLIE S. MASON

PLEASE TYPE OR PRINT NAME HERE

Exhibit 1

Location Map

SEBAGO TECHNICS

WWW.SEBAGOTECHNICS.COM
75 John Roberts Rd. - Suite 4A
South Portland, ME 04106
Tel. 207-200-2100

SITE LOCATION MAP
FOR: BOWDOIN COLLEGE

SCALE: 1:24,000

DATE: 08/15/2019

LOCATION: Bowdoin Arctic Center
Sills Drive
Brunswick, ME

INFORMATION: USGS Quadrangle: Brunswick

11001-12_LocationMap.mxd

PROJECT NUMBER: 11001-12

Barry Mills Hall and Center for Artic Studies

Brunswick, ME

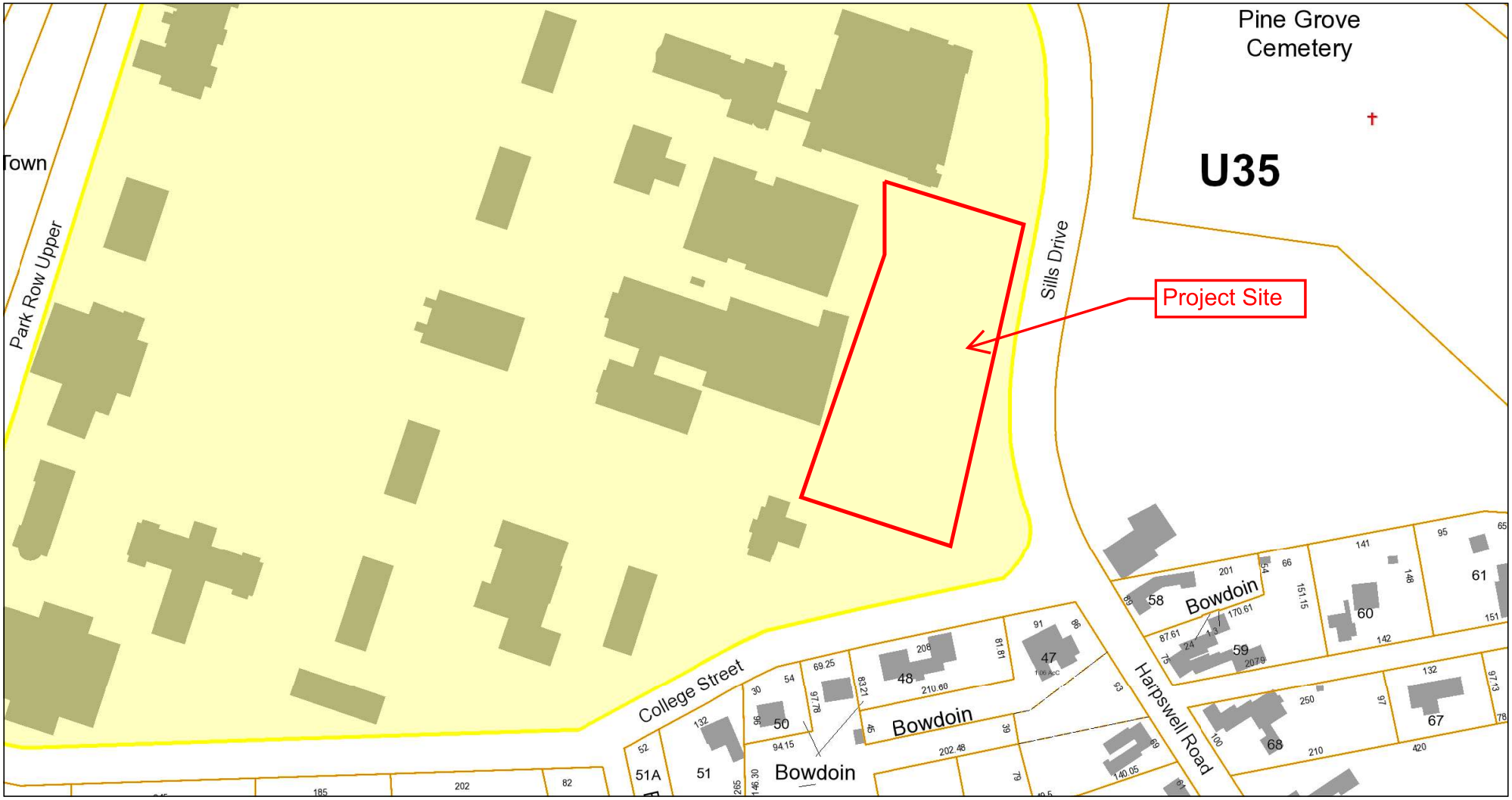
July 9, 2019

1 inch = 126 Feet

0 126 252 378

CAI Technologies
Precision Mapping. Geospatial Solutions.

www.cai-tech.com



Data shown on this map is provided for planning and informational purposes only. The municipality and CAI Technologies are not responsible for any use for other purposes or misuse or misrepresentation of this map.

Exhibit 2

Abutters

BARTLETT, FREDERICK S
10 HARPSWELL PL
BRUNSWICK, ME 04011

BOWDOIN COLLEGE
5600 COLLEGE STATION
BRUNSWICK, ME 04011

BOWDOIN COLLEGE
5600 COLLEGE STATION
BRUNSWICK, ME 04011

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5600 COLLEGE STATION
BRUNSWICK, ME 04011

BOWDOIN COLLEGE
5600 COLLEGE STATION
BRUNSWICK, ME 04011

HERRERA, GUILLERMO & JERA
45 HARPSWELL RD
BRUNSWICK, ME 04011

BOWDOIN COLLEGE
5600 COLLEGE STATION
BRUNSWICK, ME 04011

PETERSON, BIRGITTA
8 HARPSWELL PL
BRUNSWICK, ME 04011

BOWDOIN COLLEGE
5600 COLLEGE STATION
BRUNSWICK, ME 04011

PINE GROVE CEMETERY
PINE STREET
BRUNSWICK, ME 04011

BOWDOIN COLLEGE
5600 COLLEGE STATION
BRUNSWICK, ME 04011

POLAR BEAR PROPERTIES LLC
12 CHESTER ROAD
MONTCLAIR, NJ 07043

BOWDOIN COLLEGE
5600 COLLEGE STATION
BRUNSWICK, ME 04011

Exhibit 3

Right, Title, and Interest

Exhibit 3 - Title, Right or Interest

The subject site is within the 34-acre main campus area of Bowdoin College and is owned by Bowdoin College. The subject site area is part of a parcel that is described in a deed found in the Cumberland County Registry of Deed in book 181, page 455. It is also part of a parcel shown in the Town Assessor's database as parcel U35-A. Please see this Exhibit for a copy of the deed.

(106) 445

Know all Men by these Presents,

That We, Paul K. Gruenewald and Mary B. Gruenewald, husband and wife, both of Brunswick in the County of Cumberland and State of Maine

Gruenewald & to Bowdoin College Pres & Trs of War

in consideration of one dollar and other good and valuable considerations

paid by The President and Trustees of Bowdoin College, a corporation organized and existing under the laws of the State of Maine, and having a place of business in Brunswick in the County of Cumberland and State of Maine

the receipt whereof we do hereby acknowledge, do hereby give, grant, bargain, sell and convey, unto the said The President and Trustees of Bowdoin College, its successors and assigns forever, a certain lot or parcel of land with the buildings thereon, situated on the northerly side of Pine Street in said Brunswick, and being bounded and described as follows: Beginning at an iron bolt driven into the ground on the northerly line of said Pine Street, said bolt being marked 'G' and being one hundred feet westerly of an oak tree which marks the southeasterly corner of land now or formerly of Elizabeth D. Ward; thence running along the northerly line of Pine Street one hundred and seventy-two and one-half feet, more or less, to an iron bolt in the ground on the north line of Pine Street, said iron bolt being marked 'G'; thence running in a general northeasterly direction along land of Bowdoin College and land now or formerly of one Toothaker to a pine tree and an iron bolt driven into the ground which iron bolt is marked 'G'; thence running southerly along land now or formerly of Elizabeth D. Ward one hundred and forty-one feet to the point of beginning.

The above described premises are conveyed subject to an easement given by the Grantors herein to the Brunswick Sewer District by deed dated October 16, 1959 and recorded in the Cumberland County Registry of Deeds in Book 2510, Page 480.

Being the same premises conveyed to the Grantors herein by deed of Juan T. Bleau, et al, dated March 4, 1947 and recorded in said Registry of Deeds in Book 1858, Page 331.

To Have and to Hold the aforegranted and bargained premises with all the privileges and appurtenances thereof to the said The President and Trustees of Bowdoin College, its successors and assigns, to it and its use and behoof forever.

And we do COVENANT with the said Grantee, its successors and assigns, that we are lawfully seized in fee of the premises that they are free of all encumbrances:

that we have good right to sell and convey the same to the said Grantee to hold as aforesaid; and that we and our heirs shall and will WARRANT and DEFEND the same to the said Grantee, its successors and assigns forever, against the lawful claims and demands of all persons.

In Witness Whereof, We, the said Paul K. Gruenewald and Mary B. Gruenewald, husband and wife, each

joining in this deed as Grantors, and each relinquishing and conveying all right by descent and all other rights in the above described premises, have hereunto set our hands and seals this eighteenth day of September in the year of our Lord one thousand nine hundred and sixty-four.

Signed, Sealed and Delivered
in presence of

Howard E. Skillings

James P. Granger

Paul Carl Gruenewald

Mary B. Gruenewald

State of Maine, Cumberland, ss. September 18, 1964.

Personally appeared the above named Paul K. Gruenewald and acknowledged the above instrument to be his free act and deed.

Before me,

Stella M. Bernier
Notary Public.

My commission expires December 10, 1966

STELLA MARGUERITE BERNIER NOTARY PUBLIC MAINE

STATE OF MAINE

CUMBERLAND, ss. Received at 9 H — M P M on SEP 23 1964 REGISTRY OF DEEDS and recorded in Book 2853 Page 445

Attest Howard R. Thaxter Register

and Hatch in the quiet and peacable possession thereof wherefore I return this Execution satisfied in full.

Charges of Levying as follows.

Poundage	9.79 cents
The Justice forwarning & the appraisers	20
The appraisers time	3. 0
Recording the Exr.	1.50
Writing the return	50
	5.15.08

John Waite Sheriff.

Cumberland ss. June 2. 1798 Then received full satisfaction and possession of the Land & part of the House aforesaid with the appurtenances thereof by the hands of the above named Sheriff in full satisfaction of this Execution & Charges aforesaid

Rogers & Hatch.

Received June 7. 1798 and recorded from the original.

Attest Isaac Lyley Reg.

Wm Stanwood to Presidt & Trustees Bowdoin Collegt

Know all Men by these presents that I William Stanwood of Brunswick in the County of Cumberland and Commonwealth of Massachusetts Gentleman, for and in consideration of the sum of sixteen Dollars & sixty seven cents paid to me in hand by the President & Trustees of Bowdoin College, the receipt whereof I do hereby acknowledge do hereby give grant bargain sell & convey unto the said President & Trustees of Bowdoin College and their Successors forever, a certain tract or piece of Land situated laying in Brunswick aforesaid, being a part lot No. two on the east side of the twelve rod Road leading to Maquoit, bounded as follows, viz, beginning at lot No. one and running southerly by the twelve rod Road leading to Maquoit forty rods to lot No. three, thence by lot No. three easterly two hundred rods, thence northerly forming a right angle to lot No. one, thence westerly by lot No. one to the first bound, so as to contain fifty acres. To have and to hold the granted and bargained premises with the privileges and appurtenances thereof to the said President & Trustees of Bowdoin College and their successors in Office. And I do hereby covenant that I am possessed in fee of the above granted premises, and that I have good right to sell the same as aforesaid, that they are free of all incumbrances, and that I will warrant and defend the same to the Said President and Trustees of Bowdoin College and their successors in Office against the lawful claims and demands of all Persons from by or under me. In Witness whereof I have hereunto set my hand and seal this eighteenth day of May in the year of our Lord one thousand

thousand seven hundred and ninety eight.
Signed sealed & delivered in presence of Sam[l] Eaton, John Perry Jr. } Will[m] Stanwood Jr. (Seal)

Cumberland ss. May 18. 1798 The above named William Stanwood Jun[r] acknowledged the above-written Instrument to be his act & Deed. Before me Sam[l] Freeman Just. Peace
Recvd June 7. 1798 and recorded from the original.
Attest Isaac Ilsley Reg[r]

Daniel Brown to Pres[t] Bowdoin Collge

Know all Men by these presents that I Daniel Brown of Brunswick County of Cumberland and Commonwealth of Massachusetts Yeoman, for and in consideration of the sum of fifteen Dollars and sixty seven cents paid to me in hand by the President & Trustees of Bowdoin Collidge, the receipt whereof I do hereby acknowledge, do hereby give grant bargain sell and convey unto the Sd President and Trustees of Bowdoin Collidge and their successors forever, a certain piece of land situated and laying in Brunswick aforesaid, being part of lot No[o] one laying on the easterly side of the turnpike road Road leading to Magnoit, bounded as follows, viz, beginning at the northwest corner of lot No[o] two and running northerly by said turnpike road Road forty rods to the County Road leading to Bath, thence easterly by Sd Road two hundred rods, thence southerly forming a right angle to lot No[o] two, thence by said Lot No[o] two to the bound first mentioned, so as to contain fifty acres. To have and to hold the said granted and bargained premises with the privileges and appurtenances thereof to the said President and Trustees of Bowdoin Collidge and their Successors in Office. And I do hereby covenant that I am seized in fee of the premises above-mentioned, that they are free of all Incumbrances, and that I will warrant and defend the same to the said President and Trustees of Bowdoin Collidge and their successors in office against the lawful claims and demands of all persons, from, by or under me. In Witness whereof I have hereunto set my hand and Seal this eighteenth day of May in the year of our Lord one thousand seven hundred and ninety eight.
Signed sealed & delivered in presence of Sam[l] Eaton John Perry Jr. } Daniel Brown (Seal)

Cumberland ss. May 18. 1798 The above named Daniel Brown acknowledged the above written Instrument to be his act and Deed. Before me Sam[l] Freeman Just. Peace
Recvd June 7. 1798 and recorded from the original.
Attest Isaac Ilsley Reg[r]

CUMBERLAND LOAN AND BUILDING ASSOCIATION
CORPORATE SEAL BY Philip F. Turner, President.
BY William J. Knowlton, Treasurer.
Countersigned BY Sumner W. Johnson, Seal.

Signed, Sealed and Delivered in presence of

Bertha B. Huston

State of Maine. Cumberland, ss. Portland, May 2, 1921. Then personally appeared William J. Knowlton, Treasurer of said corporation and acknowledged the foregoing instrument to be his free act and deed and the free act and deed of the said Cumberland Loan and Building Association.

Before me, Alice M. McAlpine, Authorized to administer oaths and take acknowledgements of deeds.

Received May 3, 1921, at 12h, M. and recorded according to the original.

Townsend & to Pres, & Tr. of Bowdoin College

Warranty

KNOW ALL MEN BY THESE PRESENTS, That We, Fred L. Townsend, of Portland, and Viola D. Townsend, of Brunswick, in the County of Cumberland, and Ellen M. Cornish, of Rumford, in the County of Oxford, all in the State of Maine, in consideration of one dollar and other considerations, paid by The President and Trustees of Bowdoin College, a corporation, established by law, and located in Brunswick, in the County of Cumberland and State aforesaid, the receipt whereof we do hereby acknowledge, do hereby give, grant, bargain, sell and convey , unto the said Grantee, its successors and assigns forever, a certain lot or parcel of land, with the buildings thereon, situate in said Brunswick and lying on the northerly side of a street leading from Harpswell Street to Bath Street or road, so-called, and bounded as follows: Commencing at a point on the northerly line of said Street, six road easterly from the southeasterly corner of George Hammond's land; thence running easterly on the northerly line of said Street, eight rods to land of Corydon Curtis; thence northerly at right angles with said Street to land of William C. Dale; thence westerly, parallel with the northerly line of said Street, eight rods; thence at right angles southerly, parallel with the second described line, to the first mentioned bounds on the northerly line of the aforesaid Street, and being the same premises described in deedof Joseph H. Day and others to Charles E. Townsend, dated February 11th., 1887, recorded in Cumberland County Registry of Deeds, Book 582, Page 299, to which reference is hereby made for further description of said premises.

Also another parcel of land in said Brunswick described as follows: a triangular lot of land bounded on the north by the south line of the Whittier Athletic Field, on the south or southeast by the south or southeast line of land conveyed by Charles E. Townsend to said grantee, by deed of April 30, 1896, recorded in Cumberland County Registry of Deeds, Book 639, Page 203, and on the west by the west line of land of said grantors, being the first described lot herein, produced northerly to the line of the fence. Being the same premises described in deed from said grantee to Charles E. Townsend, dated July 24, 1914, recorded in Cumberland Registry of Deeds, Book 932, Page 68, to which reference is made for further

description of said premises, Said premises are conveyed subject to the reservations contained in the last named deed. The grantor in said deed is the grantee herein.

Our title to said premises is derived from and under the last will of Charles E. Townsend late of said Brunswick, deceased.

TO HAVE AND TO HOLD the aforegranted and bargained premises with all the privileges and appurtenances thereof, to the said Grantee, its successors and assigns, to its and their use and behoof forever.

And we do covenant with the said Grantee, its successors and assigns, that we are lawfully seized in fee of the premises that they are free of all incumbrances; that we have good right to sell and convey the same to the said Grantee to hold as aforesaid; and that we and our heirs, shall and willwarrant and defend the same to the said Grantee, its successors and assigns forever, against the lawful claims and demands of all persons.

IN WITNESS WHEREOF, We the said Grantors and Gertrude L. Townsend, wife of said Fred L. Townsend, Henry E. Cornish, husband of said Ellen M. Cornish, the said Viola D. Townsend being a widow, joining in this deed as Grantors, and relinquishing and conveying their right by descent and all other rights in the above described premises, have hereunto set our hands and seals this nineteenth day of April in the year of our Lord one thousand nine hundred and twenty-one.

U.S.I.R. $2.50 F.L.T. 4/19/21

Signed, Sealed and Delivered in presence of

A. E. Stearns to E.M.C.	Fred L. Townsend,	Seal.
A. E. Stearns to H.E.C.	Gertrude L. Townsend,	Seal.
W. N. Grant V.D.T.	Ellen M. Cornish,	Seal.
J. H. Rousseau to F.L. & G.L.T.	Henry E. Cornish,	Seal.
	Viola D. Townsend,	Seal.

State of Maine. Cumberland, ss. April 19th., 1921. Personally appeared the above named Fred L. Townsend and acknowledged the above instrument to be his free act and deed.

Before me, J. H. Rousseau, Justice of the Peace.

State of Maine. Oxford, ss. April 19, 1921. Personally appeared Ellen M. Cornish and acknowledged the above instrument to be her free act and deed.

Before me, Aretas E. Stearns, Notary Public, Notarial Seal.

Received May 3, 1921, at 12h, 30m, P.M. and recorded according to the original.

Skillin & to Hunt Assignment

KNOW ALL MEN BY THESE PRESENTS, That We, Leonard Percy Skillin and Eugene Carroll Skillin of Scarboro, in the County of Cumberland, and State of Maine, owners of a certain mortgage given by Sadie E. Thompson, of South Portland, in the County and State aforesaid, to Leonard Percy Skillin and Eugene Carroll Skillin dated March 17th., A.D. 1920, and recorded in Cumberland County Registry of Deeds, Book 1041, Page 119, in consideration of one dollar and other valuable consideration, paid by Lee B. Hunt of Gray in the County and State aforesaid, the receipt whereof is hereby acknowledged, do hereby sell, assign, transfer and convey unto the said Lee B. Hunt the said mortgage, the note, debt and

Know all Men by these Presents, That

I,Charles L.Bowker of Brunswick, in the County of Cumberland and State of Maine,

in consideration of one dollar and other valuable considerations, paid by The President and Trustees of Bowdoin College a corporation established by law, and located in said Brunswick, the receipt whereof I do hereby acknowledge, do hereby give, grant, bargain, sell and convey unto the said The President and Trustees of Bowdoin College its successors, and assigns forever, a certain lot or parcel of land ,with the buildings thereon, situate in said Brunswick, on the north side of Bowker Street,and bounded southerly by said Street, two rods and eight feet,westerly about nine rods, by land of C.E.Townsend, northerly about two rods and eight feet, by land of said grantee, and easterly about nine rods by land now of said grantee, but formerly of the heirs of Robert Bowker, The granted premises are the same conveyed by Samuel W.Woodward, to Robert H.Bowker, by warranty deed of September 1,1883,recorded in Cumberland Registry of Deeds,Book 498,Page 485, excepting a lot of land heretofore conveyed by me to said grantee, adjoining the granted premises on the north, and being two rods long, from north to south and two rods and eight feet wide, from east to west.Said Robert H.Bowker died intestate and the land and buildings conveyed by this deed, and the lot heretofore conveyed by me to said grantee, as aforesaid, descended to me as sole heir at law of said Robert H.Bowker,I also sell and convey hereby the easement of a right of way between said granted premises and a well on land of said Grantee, adjoining the granted premises on the east, and the easement of the right to use said well.

To Have and to Hold the aforegranted and bargained premises, with all the privileges and appurtenances thereof, to the said The President and Trustees of Bowdoin College ,its successors, heirs and assigns, to its and their use and behoof forever. And I do covenant with the said Grantee, its successors, heirs and assigns, that I am lawfully seized in fee of the premises; that they are free of all incumbrances; that I have good right to sell and convey the same to the said Grantee, to hold as aforesaid; and that I and my heirs, shall and will warrant and defend the same to the said Grantee, its successors, heirs and assigns forever, against the lawful claims and demands of all persons.

In Witness Whereof, I the said Grantor, being unmarried, have hereunto set my hand and seal this first day of July in the year of our Lord one thousand nine hundred and fourteen.

Signed, Sealed and Delivered in presence of

Thirty-one printed words stricken out.

Barrett Potter. Charles L.Bowker Seal.

State of Maine, CUMBERLAND, ss. July 1, 1914. Personally appeared the above named Charles L.Bowker, and acknowledged the above instrument to be his free act and deed.

Before me, Barrett Potter. *Justice of the Peace.*

Portland,Maine June 30,A.D. 1914, Form of this deed approved,Franklin C.Payson, Appointed for this purpose by The President and Trustees of Bowdoin College.

Received July 1, 1914, at 2 o'clock 50 m. P. M., and recorded according to the original.

Know all Men by these Presents, That

We, Edward N. Lamarke and Blanche L. Metcalfe, both of Bath, in the County of Sagadahoc and State of Maine, as executors and trustees under the will of Emma N. Lamarke

in consideration of forty-five dollars paid by the President and Trustees of Bowdoin College, a corporation created by law and located in Brunswick, in the County of Cumberland and State aforesaid.

the receipt whereof we do hereby acknowledge, do hereby remise, release, bargain, sell and convey, and ~~forever quit-claim~~ unto the said Grantee, its successors

~~heirs~~ and assigns forever, ~~all right, title and interest in and to~~ A triangular lot of land, situate in said Brunswick, eight or nine rods north of Bowker Street, and bounded and described as follows, to wit: Beginning at a stake driven into the ground on the south line of land of said grantee, and at the northwest corner of land conveyed to us in our said capacities by George L. Danforth, by his warranty deed of Oct. 1, 1889 recorded in Cumberland Registry of Deeds, Book 563, Page 140; thence about easterly on the dividing line between land of said grantee and land conveyed to us as aforesaid, five (5) rods, to a stake driven into the ground at the northeast corner of land conveyed to us as aforesaid; thence about southerly on the dividing line between last mentioned land and land formerly of C. C. Townsend, fourteen (14) feet, to a stake driven into the ground; and thence about westerly five (5) rods, more or less, in a straight line to the place of beginning; being a part of the land conveyed to us by the said Danforth, as aforesaid.

Lot make Estate of To Bowdoin College

To Have and to Hold the same, together with all the privileges and appurtenances thereunto belonging, to it the said Grantee, its successors ~~heirs~~ and assigns forever. And we do covenant with the said Grantee, its successors ~~heirs~~ and assigns, that we will warrant and forever defend the premises to it the said Grantee, its successors ~~heirs~~ and assigns forever, against the lawful claims and demands of all persons claiming by, through, or under ~~me~~ us, in our said capacities

In Witness Whereof, We the said Grantors have hereunto set our hands and seals this twenty-fourth day of September in the year of our Lord one thousand eight hundred and ninety-six

Signed, Sealed and Delivered in presence of

Joseph M. Swift

Blanche L. Metcalfe Seal.

Edward N. Lamarke Seal.

As executors and trustees as aforesaid

State of Maine.

Sagadahoc **Cumberland**, ss. Sept. 25th 1896.

Personally appeared the above named Edward N. Lamarke, Executor and Trustee and acknowledged the above instrument to be his free act and deed, in each capacity. Before me, Joseph M. Swift *Justice of the Peace.*

Received October 9 1896, at 8 o'clock 10 m. A. M., and recorded according to the original.

Attest, J. Fred Meech *Register.*

KNOW ALL MEN BY THESE PRESENTS: that I, Charles G.Woodman do hereby certify and declare that a Mortgage dated Oct. 21st, 1910, executed by Harry E. Lufkin and Elizabeth L. Lufkin parties of the first part therein, to Charles G. Woodman party of the second part therein, and recorded in the office of the County Recorded of the County of Cumberland, State of Maine, Registry of Deeds, in Book 862, at page 156, on the 22d day of Oct. 1910,together with the debt thereby secured, is fully paid, satisfied and discharged. Woodman ✓ to Lufkin & Discharge

IN WITNESS WHEREOF, I have hereunto set my hand and seal the 1st day of August 1912.

Witness: Robert W. McDonald Charles G. Woodman ----

State of California. County of Los Angeles, S. S. On this 1st day of Aug. in the year of our Lord one thousand nine hundred and twelve before me, Robert W. McDonald a Notary Public in and for said County and State, personally appeared Charles G. Woodman known to me to be the person whose name is subscribed to the within instrument, and acknowledged to me that he executed the same.

Witness my hand and official seal.

Robert W. McDonald

NOTARIAL SEAL. Notary Public in and for said County of Los Angeles, State of California.

Received September 23,1912, at 9h A. M. and recorded according to the original

---

KNOW ALL MEN BY THESE PRESENTS, That The City of Bath, in the County of Sagadahoc and State of Maine, a municipal corporation duly established by law, in consideration of four hundred dollars paid by"The President and Trustees of Bowdoin College", an incorporated body duly established by law and having its place of buisness at Brunswick in the County of Cumberland and State of Maine, the receipt whereof is hereby acknowledged, does hereby give, grant, bargain, sell and convey, unto the said "The President and Trustees of Bowdoin College", its successors and assigns forever, a triangular lot of land and buildings thereon situated in Brunswick, Maine, adjoining the Whittier Field on the East, and known as the "Minick" property; said premises being bounded on the North and East by the old Bath road, otherwise called the Board Road, Southerly by Bowker Street, Westerly by land of Bowdoin College known as the Athletic Field. See Cumberland County Registry of Deeds Volume 683, Pages 270 and 497, and deed of release from Mary Minick and Frank Minick to the City of Bath dated September 18, 1912, and to be recorded in said Registry of Deeds. Bath City of ✓to Bowdoin College Warranty

TO HAVE AND TO HOLD the aforegranted and bargained premises, with all the privileges and appurtenances thereof to the said Grantee, its successors and assigns to its and their use and behoof forever. And the said Grantor does covenant with the said Grantee, its successors and assigns, that it is lawfully seized in fee of the premises, that they are free of all incumbrances; that it does have good right to sell and convey the same to the said Grantee to hold as aforesaid; and that it and

its successors shall and will warrant and defend the same to the said Grantee, its successors and assigns forever, against the lawful claims and demands of all persons.

IN WITNESS WHEREOF, the said City of Bath has hereunto caused its corporate seal to be affixed and these presents to be signed in its name and behalf by its Treasurer, Charles S. Brown, hereunto duly authorized by vote of the City Council on September 4, 1912, a duly attested copy of which is appended to this deed, this nineteenth day of September in the year of our Lord one thousand nine hundred and twelve.

Signed, Sealed and Delivered
in presence of
Geo. W. Hunt

City of Bath Corporate Seal.
Charles S. Brown, its Treasurer.

State of Maine, Sagadahoc ss. September 19, 1912. Personally appeared the above named Charles S. Brown, Treasurer, and acknowledged the above instrument to be the free act and deed of said City of Bath.

Before me, Geo. W. Hunt, Justice of the Peace.

City of Bath.

In Board of Aldermen,

September 4, 1912.

Ordered: The Board of Common Council concurring,

THAT The City Treasurer is hereby authorized and instructed, in the name and on behalf of the City, to prepare and execute the deed of a triangular lot of land and buildings thereon situated in Brunswick, Maine, adjoining the Whittier Field on the East, and known as the "Minick" property, to Bowdoin College, of Brunswick, Maine, for the sum of Four Hundred Dollars ($400).

In Board of Aldermen. Sept. 4, 1912.

Order read and passed and sent down for concurrence.

Attest: Albert J. Grassy, City Clerk.

In Common Council. Sept. 4, 1912. Order Read and passed in concurrence.

Arthur G. Oliver, Clerk.

A true copy. Attest Albert J. Grassy, City Clerk. — Corporate Seal.

Received September 23, 1912, at 9h, -m, A.M. and recorded according to the original.

Bridgton Sav. Bk. to Fuller

Discharge

KNOW ALL MEN BY THESE PRESENTS, that Bridgton Savings Bank, a corporation of Bridgton, Maine, owner of a certain mortgage given by Samuel S. Fuller of said Bridgton in the County of Cumberland and State of Maine to it dated May 22d, A. D. 1909, and recorded in Cumberland County Registry of Deeds, Book 720, Page 275, does hereby acknowledge that it has received full payment and satisfaction of the same and of the debt thereby secured, and in consideration thereof it does hereby cancel and discharge said mortgage, and release unto the said Samuel S. Fuller, his heirs and assigns forever the premises therein

Know all Men by these Presents, That

I Charles E. Townsend of Brunswick in the County of Cumberland, and State of Maine,

in consideration of one dollar, paid by the President and Trustees of Bowdoin College, a corporation located in said Brunswick,

the receipt whereof ~~I~~ do hereby acknowledge, do hereby give, grant, bargain, sell and convey unto the said corporation, its successors

~~heirs~~ and assigns forever, a certain lot or parcel of land situate in said Brunswick, near Bowker Street, about eight rods long and exactly two rods wide, and bounded on the north by land of said corporation, on the east by land formerly of Robert Bowker, on the south by land of the said Townsend, and on the west by land formerly owned, or said to be owned, by one Alexander; being a strip of land two rods wide, on the north end of, and running entirely across, the land conveyed to the said Townsend by the said Robert Bowker, by warranty deed of October 28, 1873, recorded in Cumberland Registry of Deeds, Book 411, Page 28.

Townsend to Bowdoin Col

To Have and to Hold the aforegranted and bargained premises, with all the privileges and appurtenances thereof, to the said grantee, its successors ~~heirs~~ and assigns, to ——— their use and behoof forever. And I do covenant with the said Grantee, its successors ~~heirs~~ and assigns, that I am lawfully seized in fee of the premises; that they are free of all incumbrances;

that I have good right to sell and convey the same to the said Grantee to hold as aforesaid; and that I and my heirs, shall and will warrant and defend the same to the said Grantee, its successors ~~heirs~~ and assigns forever, against the lawful claims and demands of all persons.

In Witness Whereof, I the said Grantor, and Viola D. Townsend, wife of the said grantor,

in testimony of her relinquishment of her right of dower in the above described premises, have hereunto set our hands and seals this 30th day of April in the year of our Lord one thousand eight hundred and ninety-six.

Signed, Sealed and Delivered, in presence of
Garrett Potter

Charles E. Townsend Seal
Mrs. Viola D. Townsend Seal

State of Maine, CUMBERLAND, ss. April 30, 1896. Personally appeared the above-named Charles E. Townsend and acknowledged the above instrument to be his free act and deed.

Before me, Garrett Potter *Justice of the Peace.*

Received July 25 1896, at 8 o'clock 20 m., A M., and recorded according to the original.

Attest. G. Fred Munsell *Register.*

W. Johnson, thence, Southerly by said Libby or Johnson land, to the place of beginning.

And whereas said mortgage was by said Francis A. Libby assigned and transferred to Ina P. Farrington, late of Portland in said Cumberland County, deceased, by deed of assignment dated November 21, 1891, and recorded in said Registry of Deeds in Book 624 Page 16;

And whereas the condition of said mortgage of which we are the holders is broken.

Now therefore, by reason of the breach of said condition, we the undersigned, William L. Putnam and Thomas H. Haskell, as Executors of the last will and estate of said Ina P. Farrington, by this notice claim a foreclosure of said mortgage.

Dated at Portland, Maine, this thirtieth day of June, A. D. 1896.

William L. Putnam
Thos. H. Haskell } Executors.

July 11 w 3w

The above is a true copy of a printed notice, which was published three weeks successively in the Portland Weekly Advertiser a public newspaper printed and published at Portland in the County of Cumberland; the first publication of said notice being in the issue of said newspaper bearing date July 11, 1896; and the last publication of said notice being in the issue of said newspaper bearing date July 25, 1896.

Attest:

J. Fred Munch Register.

Received July 24, 1896, at 8 26 — M. P. M. and recorded according to the original.

Attest:

J. Fred Munch Register.

Bowker + 2d vs. Trus. of Bowdoin Col.

Warranty

Know all Men by these Presents, That Geo. E. Bowker and Charles L. Bowker of Brunswick, County of Cumberland, State of Maine, and Martha E. Melcher and Mary M. Melcher of Laconia, County of Belknap, State of N. H., in consideration of Eight Hundred Dollars, paid by President and Trustees of Bowdoin College Brunswick Me, the receipt whereof we do hereby acknowledge, do hereby give,

grant, bargain, sell, and convey unto the said President and Trustees of Bowdoin College, Brunswick, Me. their successors and assigns forever, a certain lot or parcel of land situated on Bowker St, in Brunswick, Me, and bounded and described as follows: Beginning on the North line of Bowker St. at the South east corner of land of said Charles L. Bowker, thence in said North line of said Street easterly about Five Hundred and Eighty feet (580 ft) to a stake driven into the ground; thence Northerly at right angles with said Street line about Nine Rods (9 Rods) to land of said President and Trustees of Bowdoin College, thence Westerly along line of land last mentioned about Five Hundred and Eighty feet (580 feet) to land of said Charles L. Bowker, and thence by his Easterly line to the place of beginning on said Bowker Street excepting the well on the land above described, and a convenient right of way to and from the same between said Well and said land of Charles L. Bowker.

To Have and to Hold the aforegranted and bargained premises with all the privileges and appurtenances thereof, to the said President and Trustees of Bowdoin College their successors and assigns, to their use, and behoof forever.

And we do covenant with the said Grantees their successors and assigns, that we are lawfully seized in fee of the premises; that they are free of all incumbrances; that we have good right to sell and convey the same to the said Grantees, to hold as aforesaid; and that we and our heirs shall and will warrant and defend the same to the said Grantees, their successors and assigns forever, against the lawful claims and demands of all persons.

In Witness Whereof, we the said Grantors, and Alice M. Bowker wife of the said George E. Bowker in testimony of her relinquishment of her right of dower in the above described premises, have hereunto set our hands and seals this third day of June in the year of our Lord one thousand eight hundred & ninety-six.

Signed, Sealed and Delivered
in Presence of

Henry A. Cobb
S. S. Lincoln
W. A. Plummer

to M Or

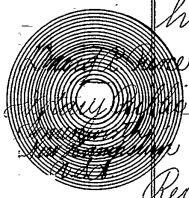
George E. Bowker Seal.
Charles L. Bowker Seal.
M. M. Melcher. Martha D. Melcher Seal.
Mary M. Melcher Seal.
Alice M. Bowker Seal.

State of N. H.
Belknap ss. June 3, 1896. Personally appeared the above named Martha B. Mulcher and Mary M. Mulcher and acknowledged the above instrument to be their free act and deed. Before me,

Stephen L. Jewett Notary Public

State of New Hampshire
Strafford, ss. Somersworth, June 5th. 1896.
Personally appeared the above named Charles L. Bowker and acknowledged the above instrument to be his free act and deed.
Before me.

David R. Pierce Notary Public.



Received July 25, 1896, at 8 H. 20 M. A. M. & recorded according to the original.
Attest.

J. Fred Munch Register.

Duering
To
Duering

Assignment.

Know all Men by these Presents
that I Helen B. Duering of Boston, County of Suffolk, Commonwealth of Mass. hold a certain mortgage given by Isaac H. Tapley to Helen B. Duering, dated July 3 A. D. 1896, and recorded with Cumberland Registry of Deeds, libro 638 folio 262 in consideration of Five Hundred dollars, paid by Charles H. Duering, the receipt whereof is hereby acknowledged, do hereby assign, transfer, and set over unto the said Charles H. Duering the said mortgage deed, the real estate thereby conveyed, and the note and claim thereby secured.

To Have and to Hold the same to the said Charles H. Duering and his heirs, and assigns, to their own use and behoof forever, subject nevertheless, to the conditions therein contained and to redemption according to law.

In Witness Whereof, I hereto set my hand and seal this twenty second day of July A. D. 1896.

Signed & Sealed in presence of
Fred R. Atwood Helen B. Duering Seal.

Commonwealth of Massachusetts
Suffolk ss Boston July 22, 1896. Then personally appeared the above-named Helen B. Duering and acknowledged the for-

Exhibit 4

Financial Capacity/Draft Performance Guarantees

Exhibit 4 – Financial Capacity/Draft Performance Guarantees

Please see this Exhibit for a letter dated August 20, 2019 from Matthew Orlando, Senior Vice President for Finance and Administration & Treasurer which illustrates the applicant's financial capacity.

Draft performance guarantees will be forwarded under separate cover.

Bowdoin

August 20, 2019

Matt Panfil
Director, Dept. of Planning & Development
Town of Brunswick
85 Union Street
Brunswick, ME 04011

Re: Mills Hall/Center for Arctic Studies

Dear Matt,

The construction cost estimate for Mills Hall and Center for Arctic Studies is $27,250,000. Bowdoin College has the financial capacity to complete this project. The source of funding for the buildings are debt proceeds and funded gifts. Upon completion, the College will have adequate resources to maintain the facility.

Please feel free to contact me or Don Borkowski, Associate Vice President and Director of Capital Projects, at 725-3947 should you have any questions. Thank you.

Regards,

Matthew Orlando
Senior Vice President for Finance and Administration & Treasurer

Cc: Don Borkowski

TREASURER'S OFFICE
Bowdoin College 5600 College Station, Brunswick, ME 04011-8447 207.725.3242 Fax 207.721.5161

Exhibit 5

Disclosure of Required Permits

Exhibit 5 – Disclosure of Required Permits

A Site Location of Development application has been submitted to the Maine Department of Environmental Protection for their review.

Exhibit 6

Stormwater Management

Exhibit 7

Water & Sewer

Exhibit 6 – Stormwater

The stormwater report has been submitted under separate cover.

BRUNSWICK & TOPSHAM
WATER DISTRICT
PO Box 489
Topsham, Maine 04086
Telephone (207) 729-9956
Fax (207) 725-6470

Alan J. Frasier, PE
General Manager

Craig W. Douglas, PE
Assistant General Manager

T.C. Schofield, PE
District Engineer

Daniel O. Knowles, CPA
Director of Finance and
Data Management Systems

Joshua S. Cobb, PE
Director of Operations

October 23, 2019

Paul Ostrowski, PE
Senior Project Engineer
Sebago Technics, Inc.
75 John Roberts Road, Suite 4A
South Portland, ME 04106

Transmitted Via email: postrowski@sebagotechnics.com

RE: Bowdoin College, Barry Mills Hall and Center for Artic Studies

Dear Mr. Ostrowski:

This letter is to inform you that the District has the ability to serve the referenced project and will provide service in accordance with Maine Public Utilities Commission and Brunswick & Topsham Water District Rules and Regulations.

The District requires the customer or its authorized agent to make application for all new service and meter installation requests. An application form can be found on our website www.btwater.org.

Feel free to contact me if you have any questions.

Yours truly,

T.C. Schofield

T.C. Schofield, PE
District Engineer

BRUNSWICK SEWER DISTRICT
10 PINE TREE ROAD
BRUNSWICK, ME 04011

brunswicksewer.org
facebook.com/brunswicksewer
info@brunswicksewer.org
(207) 729-0148

July 10, 2019

Matthew Orr, EI
Sebago Technics
75 John Roberts Road, Suite 4A
South Portland, ME 04106

RE: Bowdoin College Barry Mills Hall and Center for Artic Studies, Brunswick, ME

Dear Matthew,

This letter is in response to your request for a willingness and capacity to serve letter regarding the construction of Barry Mills Hall and Center for Artic Studies at Bowdoin College in Brunswick, Maine. I have reviewed the material provided and conclude that the **Brunswick Sewer District (BSD) has both the willingness and capacity to serve the proposed project.**

The project will be subject to the District's entrance charge program. **Prior to connecting to the sewer system, an entrance permit must be secured, and the entrance charge paid**. Based on the information you provided and the past flow of similar facility, the proposed construction will have an average daily flow (ADF) of 1,911 gallons. The entrance charge (fee) for the connection of the project will be $22,331.40 (1,911/175x$2,045). For more information on the entrance charge program, visit http://www.brunswicksewer.org/ecp.html. The online entrance permit is available at http://www.brunswicksewer.org/iwt.html.

The following conditions apply to construction:

1. All sewer-related construction will be performed to District standards.
2. All sewer construction will comply with provisions of the Maine Plumbing Code.
3. Design and construction of project sanitary sewers will exclude all non-sanitary ground, surface, foundation drain, floor drain, sump pump, and roof drain waters.
4. Horizontal clearance between utility infrastructures will be sufficient to allow future utility maintenance operations without disturbance to adjacent utility infrastructure.

If you have any questions or need additional information, please do not hesitate to contact me.

Sincerely,

Robert A. Pontau Jr., PE
Assistant General Manager

Exhibit 8

Statement from Fire Chief

Exhibit 8 – Statement from the Fire Chief

The applicant is in contact with the Fire Chief. All correspondence with the Fire Chief will be forward under separate cover.

Exhibit 9

Property Development Standards

Exhibit 9 – Property Development Standards

Chapter 4 – Property Development Standards

4.1 Applicability of Property Development Standards

The proposed development is in compliance with the applicable standards set forth in Chapter 4 of the Town of Brunswick Zoning Ordinance.

4.2 Dimensional and Density Standards

The proposed project site is located in the Growth College 1 (GC1) Zone. Dimensional information demonstrating compliance with the district standards is provided in the table on the Overall Site Plan, Sheet C3.1 of the attached plan set.

4.3 Natural and Historic Areas

4.3.1 Mapping of Natural and Historic Areas Requirements

There are no designated natural areas on the subject site. Initial review of the site by the Maine Historic Preservation Commission (MHPC) found no historic properties (Exhibit 10). Additional review by MHPC found that there is one building, the Dudley Coe Building, located within the project area that is listed on the National Registry of Historic Places as part of the Federal Street Historic District. This building is to be removed as part of the project. Per the request of the MHPC, STI is in the process of documenting the interior and exterior of the building as per the MHPC requirements of documentation.

The proposed project site does not include any active farmland and there are no wetlands on site.

4.3.2 Pollution

The proposed project will not result in the generation of undue water or air pollution. As detailed in the attached Stormwater Management report (Exhibit 6), the project meets the criteria of Chapter 500 for stormwater management. The project will be served by the public sewer system.

4.3.3 Protection of Natural Vegetation

The proposed project involves redevelopment of a previously developed site. The preservation of natural features has been maintained to the greatest extent possible within the proposed site design. The existing trees along College Road and Sills Drive have been incorporated into the landscape design when possible. Those trees that needed to be removed are proposed to be replaced in such a way to either meet or exceed the town requirements. Please see the Landscape plan (sheet L2.1) for more detailed information on the proposed improvements to the parcel.

4.3.4 Protection of Significant Plant and Animal Habitat

The proposed development will not have an undue adverse effect on important plant and animal habitats. No significant plant or animal habitats were identified on the subject site. The proposed project involves the redevelopment of a previously developed site. The project is not in a Wildlife

Protection Overlay District. Please see Exhibit 10 for correspondence with the Maine Natural Areas Program.

4.3.5 Steep Slopes

The proposed development site does not contain 5000 or more contiguous feet of slopes exceeding 25 percent. Topographical Site plans are included on sheets C.1 and C1.2 of the attached plan set.

4.3.6 Erosion and Sedimentation

The proposed development and site improvements will be constructed in accordance with the Maine Department of Environmental Protection's Best Management Practices. Please see the plan set for the Erosion Control plan (sheet C6.1).

4.3.7 Groundwater

The proposed project will not result in an adverse effect to the quality or quantity of ground water. There is no proposed groundwater extraction associated with this project. Please see Exhibit 6 and the plan set for the Stormwater Management plan.

4.3.8 Surface Waters, Wetlands, and Marine Resources

The proposed project will not result in an adverse impact to surface waters, wetlands, and marine resources. Please see Exhibit 6 and the plan set for the Stormwater Management plan.

4.3.9 Historic and Archeological Resources

A review request was submitted to the Maine Historic Preservation Commission (MHPC) on August 28, 2019 detailing the proposed project and removal of the Dudley Coe building as part of the project. Initial review of the site by the MHPC found no historic or archeological resources within the project area (Exhibit 10). While the project was in the process of being reviewed by the Maine Department of Environmental protection, MHPC requested, given the Coe building is listed on the National Registry of Historic Places as part of the Federal Street Historic District, that the building be documented. Per this request, Bowdoin is in the process of having the interior and exterior of the building documented as per the Commission's outlined requirements of documentation.

4.4 Flood Hazard Areas

The proposed project is not in a Flood Hazard Zone. Please see Exhibit 11 for a copy of the FEMA Flood Insurance Rate Map.

4.5 Basic and Municipal Services

4.5.1 Sewage Disposal

The proposed project will utilize public sewer. It is estimated that the proposed facilities will generate wastewater as follows:

The Center for Arctic Studies (calculated as a visitor center) – 411 gpd
(75 visitors x 5 gpd per visitor) + (3 employees x 12 gpd per employee) = 411 gpd

Barry Mills Hall (calculated as an auditorium) – 1500 gpd
300 seats x 5 gpd per seat = 1500 gpd

Total approximate usage: 1911 gpd

Please see Exhibit 7 for a letter dated July 10, 2019 confirming sewer capacity from the Brunswick Sewer District.

4.5.2 Water Supply and Quality

The proposed project will utilize public water. It is estimated that the proposed facilities will require approximately 1911 gpd of water, as follows:

The Center for Arctic Studies (calculated as a visitor center) – 411 gpd
(75 visitors x 5 gpd per visitor) + (3 employees x 12 gpd per employee) = 411 gpd

Barry Mills Hall (calculated as an auditorium) – 1500 gpd
300 seats x 5 gpd per seat = 1500 gpd

Total approximate usage: 1911 gpd

Please see Exhibit 7 for a letter dated October 23, 2019 confirming that The Brunswick & Topsham Water District has the ability to serve the site.

4.5.3 Solid Waste Disposal

As discussed at the Sketch Plan review, the applicant requests a waiver from the ordinance provisions regarding the solid waste impact fee. The proposed redevelopment of this site is not anticipated to generate a significant increase in solid waste. While the new academic buildings will create some new space on campus, that space will be utilized to house existing programs. There is no proposed increase in the student or faculty population utilizing the spaces. All solid waste generated at the buildings will be hauled and disposed of by a private contractor at no burden to Town services.

4.5.4 Stormwater Management

A Stormwater Management report has been prepared and provided to the Town (under separate cover) to address the potential impacts associated with the proposed modification in stormwater runoff characteristics associated with this project.

4.6 Landscaping Requirements

4.6.1 General Standard

The proposed project involves redevelopment of a previously developed site. The preservation of natural features has been maintained to the greatest extent possible within the proposed site

design. Please see the Landscape plans (Sheets L1.0 – L8.0) for more detailed information on the proposed improvements to the parcel.

4.6.2 Landscaping

Detailed information on landscaping and planting plans, including numbers and varieties of species, is included on the Landscape and Planting plans (Sheets L2.1, L5.0, L5.1, and L5.2) of the attached plan set.

4.6.3 Street Trees

Existing trees have been preserved in the proposed design to the greatest extent possible. Please see the Tree Protection and Landscape plan (Sheets L1.0, L2.0, and L2.1) for more detailed information.

4.6.4 Buffers

Tree preservation areas along College Road Sills Drive and have been incorporated into the landscape design. Please see the Tree Protection plan (Sheet L1.0) for more detailed information on the proposed improvements to the parcel.

4.6.5 Parking Lot and Entrance Landscaping

Please see the Landscape and Planting plans (Sheets L2.1 and L5.0) for detailed information on the parking lot and entrance landscaping. Additional information regarding parking lot landscaping is included in Section 4.9.3.

4.6.6 Landscaping Maintenance

The proposed landscaping will be maintained by Bowdoin College and will be in compliance to Subsection 4.15.2

4.7 Residential Recreation Requirements

Not applicable – no new dwelling units are proposed with this project.

4.8 Circulation and Access

The proposed project will not result in unreasonable congestion or unsafe conditions on highways or public roads. The project involves the redevelopment of a site with an existing parking lot and access drive on Sills Drive. The existing access driveway will be modified but there are no new access points or new streets proposed for the project. The proposed development will not result in an increase in the overall student or faculty population and therefore, is not expected to cause an increase in vehicular traffic to the area or a change in traffic patterns. As there will be a net decrease of parking spaces at the site it is anticipated that there will be a decrease in traffic volumes entering and exiting the site. Please see The Traffic Impact Statement included as part of Exhibit 12.

4.9 Parking and Loading

4.9.1 Minimum and Maximum Vehicle Parking Requirements

The proposed redevelopment will result in the total number of parking spaces at the site being reduced from 136 spaces to 57 spaces, which is a net reduction of 79 parking spaces. The loss of the 79 spaces in the proposed development area will be off-set by the expansion of the Coffin Street Lot (82 new spaces). Any required additional parking associated with the increase in building area can be accommodated by other parking lots on campus that have excess capacity. Location and layout of the parking areas are illustrated on the Site Plan (Sheet C3.2). Please note that the 57 spaces include 41 newly configured parking stalls and 16 spaces that will remain unchanged near Druckenmiller Hall. A table which identifies the record surplus of parking inventory is also included on the Site Plan, Sheet C3.2.

4.1.1 Minimum Bicycle Parking Requirements

Thirty-five Swerve bicycle racks, which accommodate 70 bicycles, are included as part of the site plan. The bike racks are located near the buildings as illustrated on the Site Plan (Sheet C3.2).

4.1.2 Design, Construction and Maintenance of Parking Areas

In accordance with Section 4.9.3.D. and as requested and discussed during Sketch Plan review, the College has asked for certain modifications/waivers of the parking area and landscaping design requirements. The design modifications include reduction of the parking stall depth by six inches from the standard of 18 feet 5 inches and a reduction of the aisle width by 2 feet, from the standard of 26 feet to 24 feet. The landscaping modification would be to allow perimeter landscaping along the street to be less than completely opaque. We believe the landscape plan adequately addresses the streetscape while allowing Bowdoin security to have visual access to the lot from the street.

4.10 Lighting

Outdoor lighting will not adversely impact road safety or the adjacent properties. Lighting has been designed to not encroach on the surrounding properties. Light placement along pathways and in parking areas have been designed to be sufficient for safety without being invasive and resulting in disabling glare. Please see Exhibit 14 for additional lighting information.

4.11 Architectural Compatibility

The proposed buildings have been designed to be compatible with the surrounding area and are in compliance with the American with Disabilities Act and the design standards of the zoning district. Please see the Site Plan (Sheet C3.2) and Exhibit 13 for architectural renderings and elevations.

4.12 Neighborhood Protection Standards

The proposed project area is surrounded by Bowdoin College property and there are no single or two-family dwellings located within the buffering distances noted in the Compatibility Standards of the Brunswick Ordinance.

4.13 Signs

There is minimal signage proposed for this project. All proposed signage will be compatible in design scale with the area and will be in conformance with the standards outline in the Town Zoning Ordinance.

4.14 Performance Standards

A. General Standards

The proposed development has been designed in accordance to the standards outlined in the Town Ordinance. Please see the plan set.

B. Specific Standard: General

All construction will occur during the hours of 7:00 am and 7:00 pm as outlined in the Town Ordinance.

C. Specific Standard: Noise

The proposed development will not result in noise levels greater than 60 dBA daytime or 50 dBA nighttime beyond the lot line of the property. Please see the plan set for additional information on the site layout.

D. Specific Standard: Smoke and Particulate Matter

The proposed development will not result in the generation of any smoke or particulate matter.

E. Specific Standard: Dust and Fumes

The proposed development will not result in the emission of dust, dirt, fly ash, fumes, vapors, or gasses that could cause injury to human health, animals, vegetation, or property. Please see the erosion control plan for more detailed information.

F. Specific Standard: Odor

The proposed project will not result in the generation of any offensive or harmful odors.

G. Specific Standard: Vibrations

The proposed development will not result in the generation of any perceptible vibrations.

H. Specific Standard: Unlicensed Motor Vehicles

No unlicensed motor vehicles will be kept at the site.

I. **Specific Standard: Motor Vehicle and Watercraft Parking in Required Setbacks**
No motor vehicles or watercraft will be parked on site.

J. **Specific Standard: Lighting and Glare**
The proposed lighting is in compliance with Section 4.10. Please see Exhibit 11 and the plan set for additional information.

4.15 Site Feature Maintenance

Bowdoin College will maintain all improvements proposed by this project.

4.16 Financial and Technical Capacity

The applicant has adequate financial and technical capacity to meet the standards of the proposed development. Please see Exhibit 4 for proof of financial capacity.

The proposed project site is located within the Aquifer Protection Overlay 3 (APO3) District. The performance standards for this overlay district are, as outlined in **Section 2.3 F of the Brunswick Zoning Ordinance**, as follows:

F (1) General Standards for Uses and Activities Subject to Development Review

a. **Management of Stormwater Runoff**
Please see Exhibit 6 for the Stormwater Management Plan.

b. **Groundwater Contaminants**
Please see Exhibit 6 for the Stormwater Management Plan.

F (2) Timber Harvesting

Not applicable. No timber harvesting is proposed.

F (3) Application of Fertilizers and Manure

Not applicable

F (4) Manure Storage

Not applicable

F (5) Animal Husbandry

Not applicable

F (6) Use of Pesticides

Not applicable

F (7) Subsurface Waste Disposal Systems

Not applicable. There is no proposed subsurface waste disposal system proposed for this project.

F (8) Storage Tanks

Not applicable. The proposed project does not involve either aboveground or underground storage tanks.

F (9) Application of Compost, Sludge Products, or Organic Fertilizer

Not applicable.

Exhibit 10

Agency Response

JANET T. MILLS
GOVERNOR

STATE OF MAINE
DEPARTMENT OF
INLAND FISHERIES & WILDLIFE
284 STATE STREET
41 STATE HOUSE STATION
AUGUSTA ME 04333-0041

JUDITH CAMUSO
COMMISSIONER

July 29, 2019

Paul Ostrowski
Sebago Technics
75 John Roberts Road
Suite 1A
South Portland, ME 04106

RE: Information Request - Barry Mills Hall and Center for Arctic Studies, Brunswick

Dear Paul:

Per your request received July 10, 2019, we have reviewed current Maine Department of Inland Fisheries and Wildlife (MDIFW) information for known locations of Endangered, Threatened, and Special Concern species; designated Essential and Significant Wildlife Habitats; and fisheries habitat concerns within the vicinity of the *Barry Mills Hall and Center for Arctic Studies Project* in Brunswick.

Our information indicates no locations of Endangered, Threatened, or Special Concern species within the project area that would be affected by your project. Additionally, our Department has not mapped any Essential or Significant Wildlife Habitats or fisheries habitats that would be directly affected by your project.

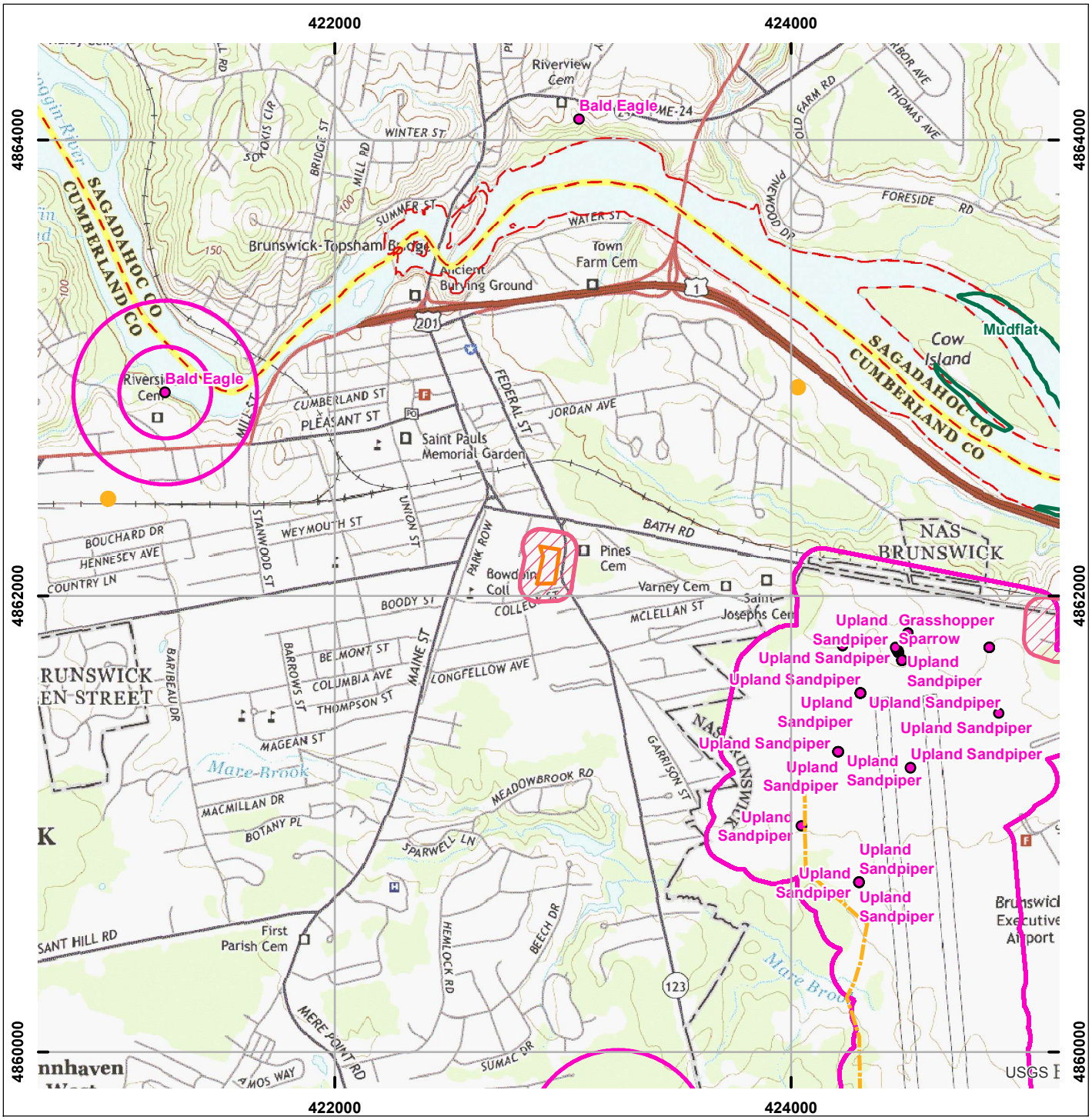
This consultation review has been conducted specifically for known MDIFW jurisdictional features and should not be interpreted as a comprehensive review for the presence of other regulated features that may occur in this area. Prior to the start of any future site disturbance we recommend additional consultation with the municipality, and other state resource agencies including the Maine Natural Areas Program and Maine Department of Environmental Protection in order to avoid unintended protected resource disturbance.

Please feel free to contact my office if you have any questions regarding this information, or if I can be of any further assistance.

Best regards,

Becca Settele
Wildlife Biologist

PHONE: (207) 287-5254
FISH AND WILDLIFE ON THE WEB: www.maine.gov/ifw
EMAIL ADDRESS: John.Perry@maine.gov



Environmental Review of Fish and Wildlife Observations and Priority Habitats

Project Name: Brunswick, Barry Mills Hall and Center for Arctic Studies (Version 1)

Maine Department of Inland Fisheries and Wildlife

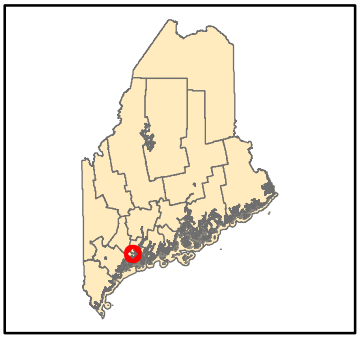
Miles

0 0.125 0.25 0.5 0.75 1

Projection: UTM, NAD83, Zone 19N

Date: 7/11/2019

- ProjectPoints
- ProjectLines
- ProjectPolys
- ProjectSearchAreas
- Deer Winter Area
- LUPC p-fw
- Cooperative DWAs
- Seabird Nesting Islands
- Shorebird Areas
- Inland Waterfowl/Wading Bird
- 2008 Iwwh (Shoreland Zoning)
- Tidal Waterfowl/Wading Bird
- Significant Vernal Pools
- Environmental Review Polygons
- Roseate Tern
- Piping Plover/Least Tern
- Aquatic ETSc (2.5 mi review)
- Rare Mussels (5 mi review)
- Maine Heritage Fish Waters
- Arctic Charr Habitat
- Redfin Pickerel/Swamp Darter Habitats (buffer100ft)
- Special Concern-occupied habitats(100ft buffer)
- Wild Lake Trout Habitats



STATE OF MAINE
DEPARTMENT OF AGRICULTURE, CONSERVATION & FORESTRY
177 STATE HOUSE STATION
AUGUSTA, MAINE 04333

JANET T. MILLS
GOVERNOR

AMANDA E. BEAL
COMMISSIONER

July 11, 2019

Paul Ostrowski
Sebago Technics
75 John Roberts Road, Suite 4A
South Portland, ME 04106

Via email: postrowski@sebagotechnics.com

Re: Rare and exemplary botanical features in proximity to: #11001-12, Barry Mills Hall and Center for Arctic Studies, Bowdoin College, Brunswick, Maine

Dear Mr. Ostrowski:

I have searched the Maine Natural Areas Program's Biological and Conservation Data System files in response to your request received July 10, 2019 for information on the presence of rare or unique botanical features documented from the vicinity of the project in Brunswick, Maine. Rare and unique botanical features include the habitat of rare, threatened, or endangered plant species and unique or exemplary natural communities. Our review involves examining maps, manual and computerized records, other sources of information such as scientific articles or published references, and the personal knowledge of staff or cooperating experts.

Our official response covers only botanical features. For authoritative information and official response for zoological features you must make a similar request to the Maine Department of Inland Fisheries and Wildlife, 284 State Street, Augusta, Maine 04333.

According to the information currently in our Biological and Conservation Data System files, there are no rare botanical features documented specifically within the project area. Based on the information in our files and the landscape context of this project, there is a low probability that rare or significant botanical features occur at this project location.

This finding is available and appropriate for preparation and review of environmental assessments, but it is not a substitute for on-site surveys. Comprehensive field surveys do not exist for all natural areas in Maine, and in the absence of a specific field investigation, the Maine Natural Areas Program cannot provide a definitive statement on the presence or absence of unusual natural features at this site.

The Maine Natural Areas Program (MNAP) is continuously working to achieve a more comprehensive database of exemplary natural features in Maine. We would appreciate the contribution of any information obtained should you decide to do field work. MNAP welcomes coordination with individuals or organizations proposing environmental alteration, or conducting environmental assessments. If, however, data provided by MNAP are to be published in any form, the Program should be informed at the outset and credited as the source.

MOLLY DOCHERTY, DIRECTOR
MAINE NATURAL AREAS PROGRAM
90 BLOSSOM LANE, DEERING BUILDING

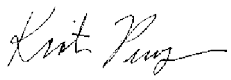
maine DEPARTMENT OF Agriculture Conservation & Forestry

PHONE: (207) 287-8044
WWW.MAINE.GOV/DACF/MNAP

The Maine Natural Areas Program has instituted a fee structure of $75.00 an hour to recover the actual cost of processing your request for information. You will receive an invoice for $150.00 for two hours of our services.

Thank you for using MNAP in the environmental review process. Please do not hesitate to contact me if you have further questions about the Natural Areas Program or about rare or unique botanical features on this site.

Sincerely,



Kristen Puryear | Ecologist | Maine Natural Areas Program
207-287-8043 | kristen.puryear@maine.gov

MAINE HISTORIC PRESERVATION COMMISSION
55 CAPITOL STREET
65 STATE HOUSE STATION
AUGUSTA, MAINE
04333

JANET T. MILLS
GOVERNOR

KIRK F. MOHNEY
DIRECTOR

RECEIVED
SEP 23 2019
BY:

September 17, 2019

Mr. Paul Ostrowski
Sebago Technics
75 John Roberts Rod, Suite 4A
South Portland, ME 04106

Project: MHPC #1216-19 Bowdoin College; Barry Mills Hall & Center for Arctic Studies New Academic Center and Home for Museum

Town: Brunswick, ME

Dear Mr. Ostrowski:

In response to your recent request, I have reviewed the information received September 12, 2019 to continue consultation on the above referenced project in accordance with the requirements of the Maine Department of Environmental Protection.

Based on the information submitted, I have concluded that there will be no historic properties (archaeological or architectural) adversely affected by the proposed undertaking, as defined by Section 106 of the National Historic Preservation Act.

Please contact Megan Rideout at (207) 287-2992 or megan.m.rideout@maine.gov if we can be of further assistance in this matter.

Sincerely,

Kirk F. Mohney

Kirk F. Mohney
State Historic Preservation Officer

PHONE: (207) 287-2132 FAX: (207) 287-2335

August 28, 2019
11001-12

Mr. Kirk Mohney, State Historic Preservation Officer
Maine Historic Preservation Commission
65 State House Station
Augusta, Maine 04333

Maine Historic Preservation Commission Project Review Request
Bowdoin College, Brunswick, ME
Barry Mills Hall and Center for Artic Studies
Applicant: Bowdoin College

Dear Mr. Mohney,

On behalf of Bowdoin College, Sebago Technics respectfully requests a project review of a 2.4 ± acre developed site located on the main campus. Bowdoin College is proposing a new academic center and home for the Peary-MacMillan Arctic Museum in the southeastern corner of the main campus, bounded by College Street and Sills Drive. The site of the proposed facility was the former Dayton Ice Arena which was built in 1956 and later demolished in 2009, as a new ice arena was built. The site of the former Dayton Arena was paved to allow for additional vehicular parking.

The proposed site design consists of the construction of a 4,368 square-feet, three-story museum and an 11,771 square-feet, two-story academic center. Additionally, improvements will be made to the site entrance, parking, pedestrian walkways, and utilities. As a part of the project, the Dudley Coe Building will be demolished. Timing for this work has not been finalized, but would need to be completed within five years of issuance of a SLDA permit from Maine DEP.

The proposed project is adjacent to and bordering 14 buildings which are 50 years of age or older. The only listed historic property located in the vicinity of the project location is Massachusetts Hall which is located within the main campus, and is not within a view shed of this project.

For your reference, I have enclosed a 7.5' USGS topographic quad map, project plan, and photos of all buildings which are over fifty years of age with a reference map. If you have any questions about the proposed development, please do not hesitate to contact me. I look forward to hearing from you.

Sincerely,

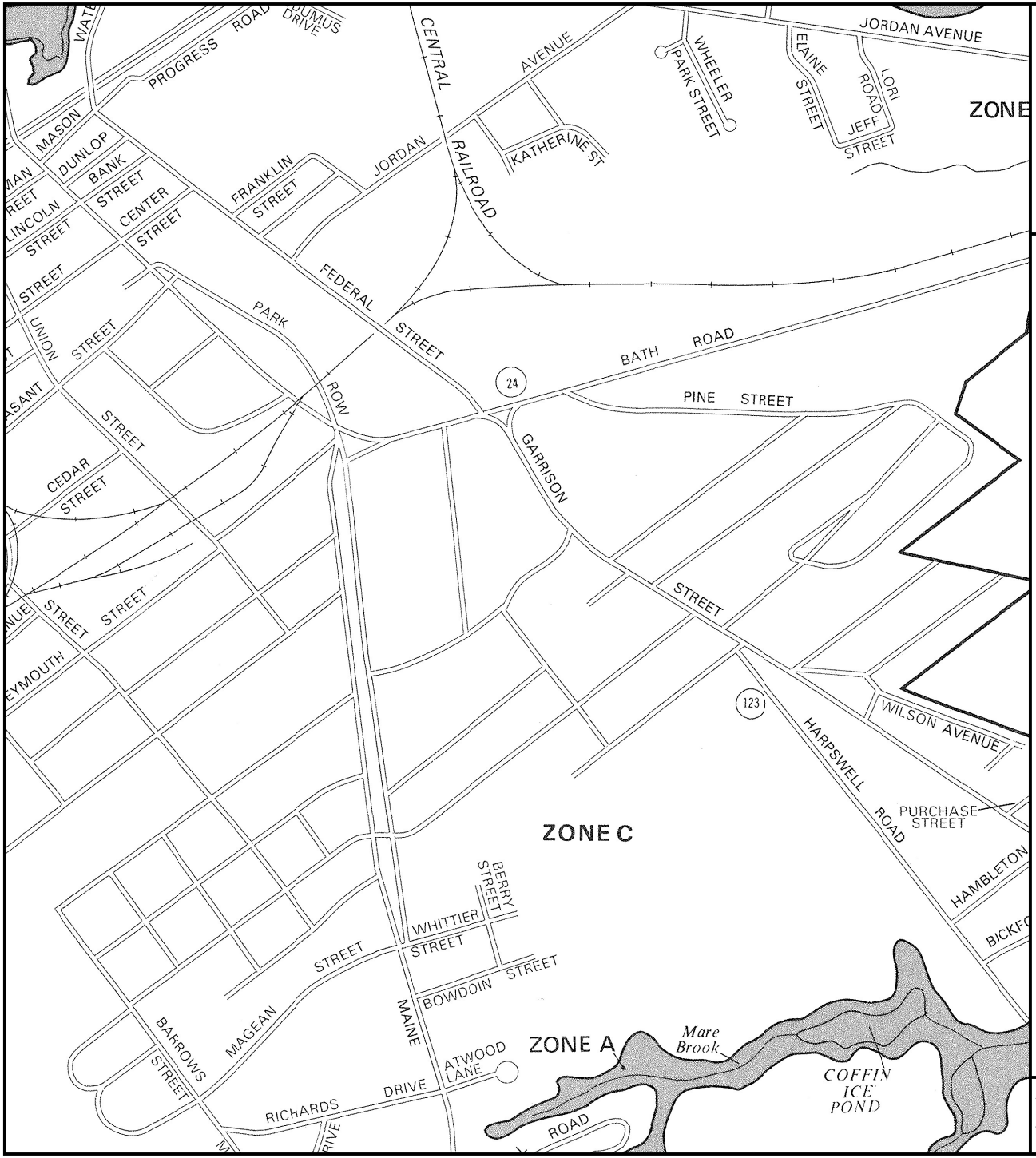
SEBAGO TECHNICS, INC.

Paul Ostrowski, P.E.
Senior Project Engineer

PDO/llg
Enc.

Exhibit 11

FEMA



APPROXIMATE SCALE

1000 0 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

TOWN OF

BRUNSWICK, MAINE

CUMBERLAND COUNTY

PANEL 15 OF 35

(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER

230042 0015 B

EFFECTIVE DATE:

JANUARY 3, 1986

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Exhibit 12

Traffic and Parking

Exhibit 12 – Traffic and Parking

The proposed project will not increase the student body or number of faculty on campus and therefore will not result in an increase of traffic on to or within the campus. Please see the Traffic Impact Statement memo from STI dated September 11, 2019 included as part of this Exhibit. Please see the site plan for the proposed parking layout.

Memorandum

11001-012

To: **Kylie Mason, RLA, LEED A.P.**

From: **Derek Caldwell, P.E., PTOE**

Date: **September 11, 2019**

Subject: **Traffic Impact Statement**
Barry Mills Hall and Center for Arctic Studies

Proposed Development

Bowdoin College is proposing the construction of a new 11,771 square foot two-story academic center, to be known as Barry Mills Hall, and a 4,368 square foot three-story building to house the relocated Peary-MacMillan Arctic Museum from its prior location in Hubbard Hall on Bowdoin's campus. The site is bordered by Sills Drive to the east and College Street to the south. Presently the site consists primarily of a paved parking lot, known as the Dayton Lot, with a driveway to Sills Drive.

As part of the project the existing parking lot and driveway would be demolished. A new driveway is to be constructed slightly to the north of the existing driveway. A new parking lot will also be constructed on the northern side of the development area. The number of parking spaces in total will be reduced from the current 138 spaces to 59 spaces, resulting in a net reduction of 79 parking spaces.

Traffic Impact

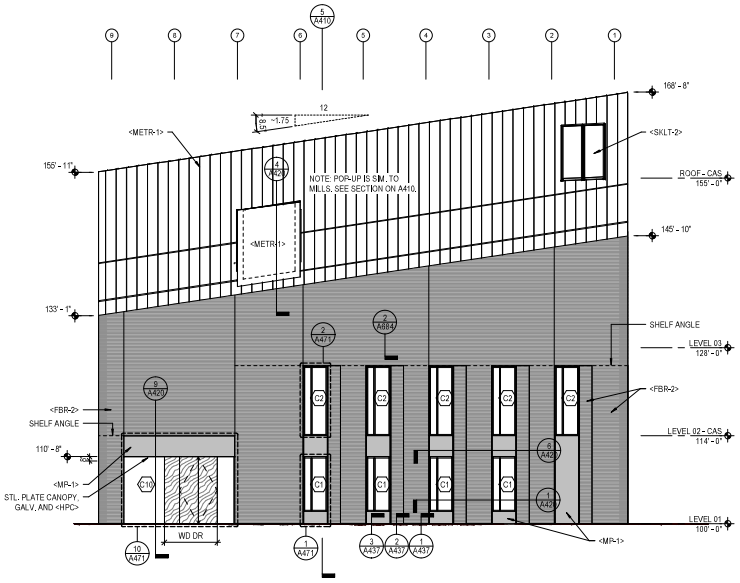
In general, the proposed development is not expected to cause an increase in vehicular traffic to the area or significantly change traffic patterns around the campus due to the fact that the proposed development will serve primarily students/faculty who would already be on campus, either parking in other areas or walking to the proposed buildings. The development is not to intended to increase student population or faculty levels. The Peary-MacMillan Museum/Arctic Studies Center is being relocated from its existing location within Hubbard Hall. Visitors to the museum are likely to park in designated areas and also walk to the museum as they currently do.

The net reduction in parking spaces would also result in a reduction in traffic volumes entering/exiting the driveway to Sills Drive. The loss in parking with the removal of the Dayton Lot is to be absorbed by other parking areas on campus which currently have excess capacity.

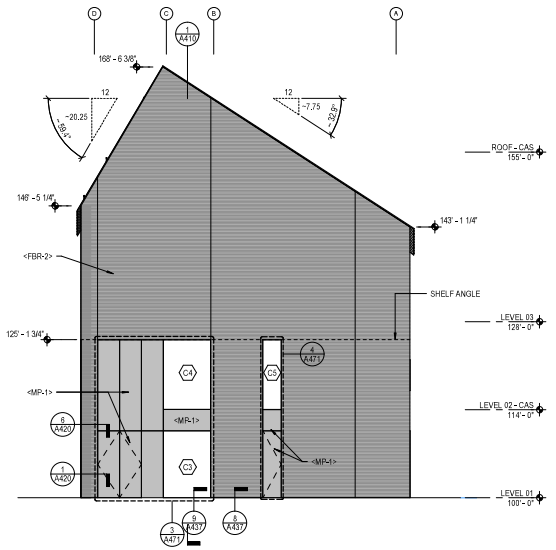
Exhibit 13

Elevations

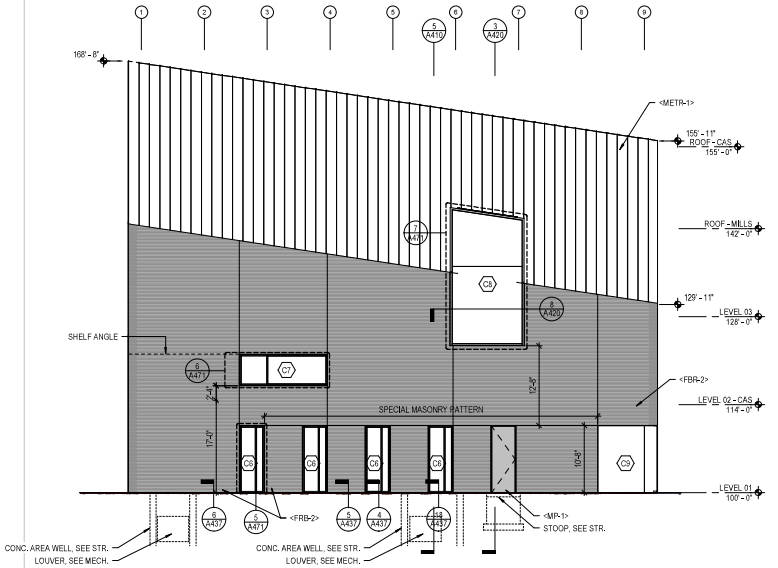
NOTE: ROOF SLOPES ARE ROUNDED OFF. LAY OUT STRUCTURAL FRAMING AND ENCLOSURE WITH PROVIDED WORKPOINTS.



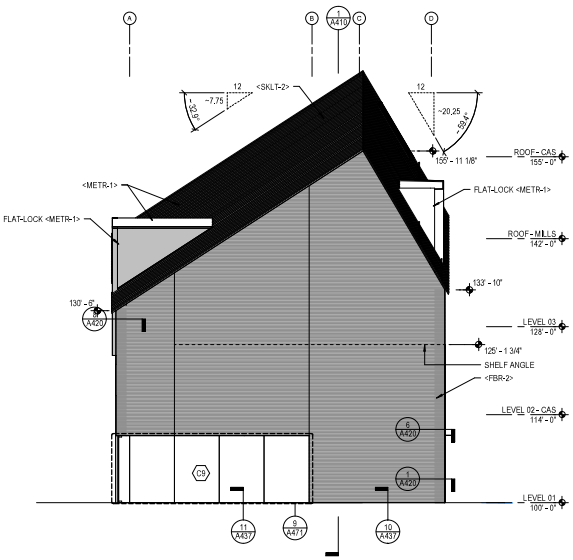
4 EAST ELEVATION - CENTER FOR ARTIC STUDIES
1/8" = 1'-0"



2 NORTH ELEVATION - CENTER FOR ARCTIC STUDIES
1/8" = 1'-0"



3 WEST ELEVATION - CENTER FOR ARCTIC STUDIES
1/8" = 1'-0"



1 SOUTH ELEVATION - CENTER FOR ARCTIC STUDIES
1/8" = 1'-0"

HGA
420 North 5th Street, Suite 100
Minneapolis, Minnesota 55401
Telephone 612.758.4000

CIVIL ENGINEER
SEBAGO TECHNICS INC
75 JOHN ROBERTS ROAD, SUITE 4A
SOUTH PORTLAND, ME 04106
207-856-2206

LANDSCAPE ARCHITECT
STIMSON STUDIO
288 NORFOLK STREET
CAMBRIDGE, MA 02139
617-876-8980

AV / ACOUSTIC CONSULTANT
ACENTECH
33 MOULTON STREET
CAMBRIDGE, MA 02138
617-499-8000

FOOD SERVICE CONSULTANT
FOODSERVICE DESIGN
603-969-9009

BOWDOIN COLLEGE

MILLS HALL AND THE CENTER FOR ARCTIC STUDIES

Bowdoin

KEYPLAN

NOT FOR CONSTRUCTION

NO	DESCRIPTION	DATE

ISSUANCE HISTORY - THIS SHEET

HGA NO: 4387-001-00

EXTERIOR ELEVATIONS CENTER FOR ARCTIC STUDIES

DATE: JANUARY 21, 2020

50% BP-2 CONSTRUCTION DOCUMENTS

A400

50% BP-2 CONSTRUCTION DOCUMENTS

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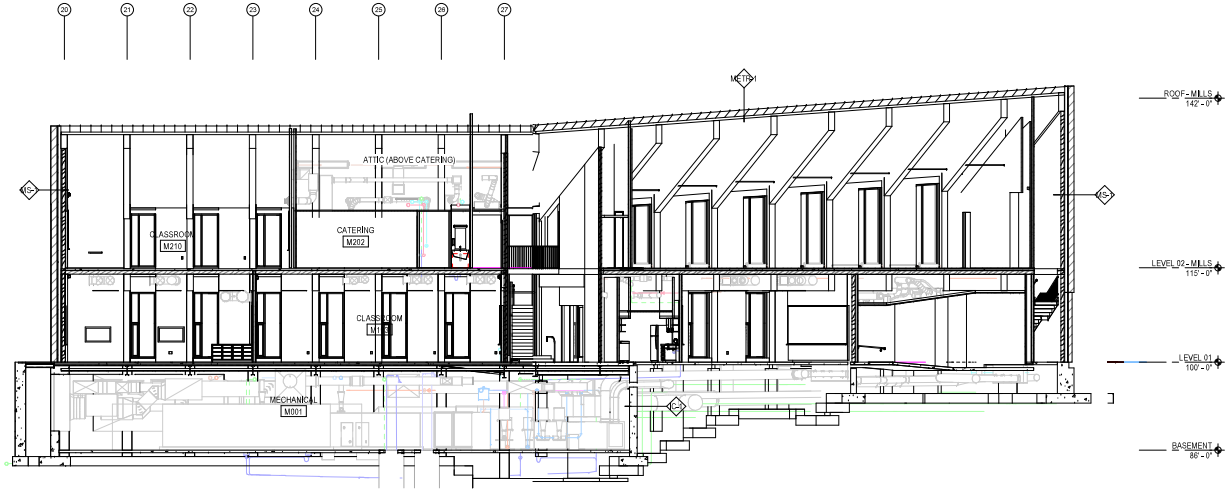
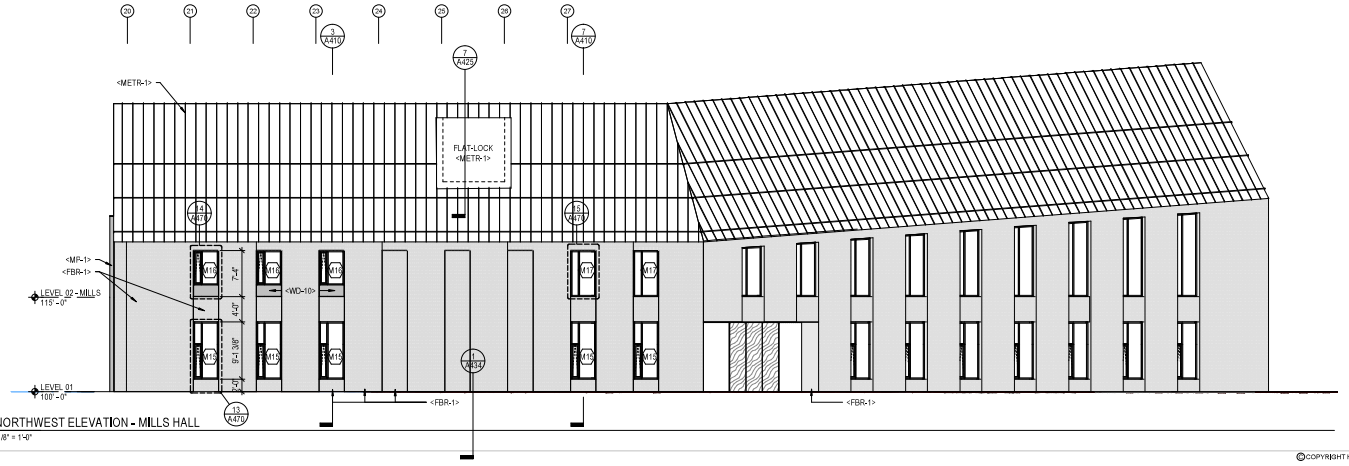


2 MILLS LONG SECTION LOOKING EAST
1/8" = 1'-0"



1 NORTHWEST ELEVATION - MILLS HALL
1/8" = 1'-0"

HGA
420 North 5th Street, Suite 100
Minneapolis, Minnesota 55401
Telephone 612.758.4000

CIVIL ENGINEER
SEBAGO TECHNICS INC
75 JOHN ROBERTS ROAD,
SUITE 4A
SOUTH PORTLAND, ME 04106
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617-499-8000

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FOODSERVICE DESIGN
603-969-9009

BOWDOIN COLLEGE

MILLS HALL AND THE CENTER FOR ARCTIC STUDIES

Bowdoin

KEYPLAN

NOT FOR CONSTRUCTION

NO	DESCRIPTION	DATE

ISSUANCE HISTORY - THIS SHEET

HGA NO: 4387-001-00

EXTERIOR ELEVATIONS & BUILDING SECTIONS

DATE: JANUARY 21, 2020

50% BP-2 CONSTRUCTION DOCUMENTS

A406

50% BP-2 CONSTRUCTION DOCUMENTS

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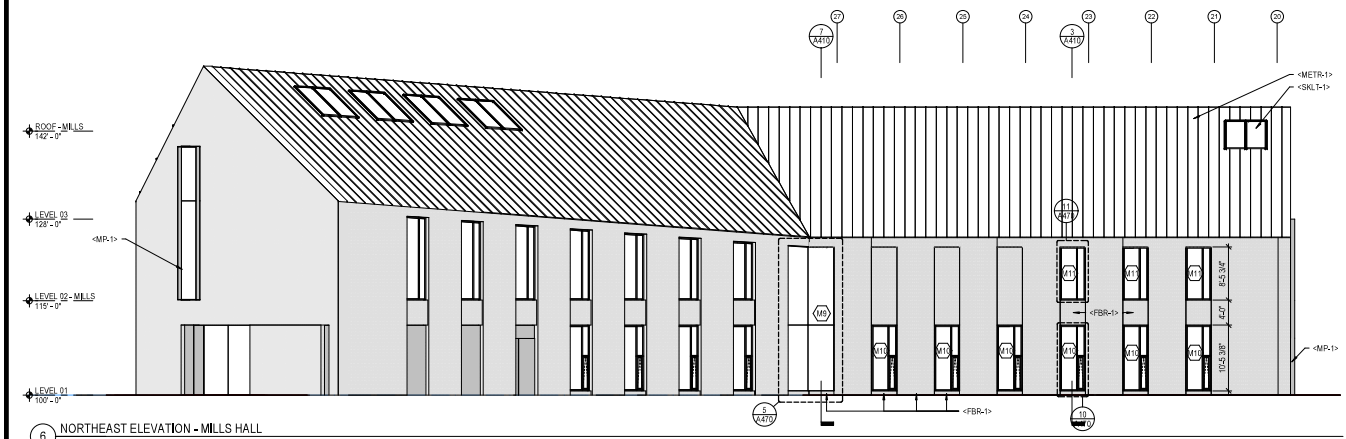
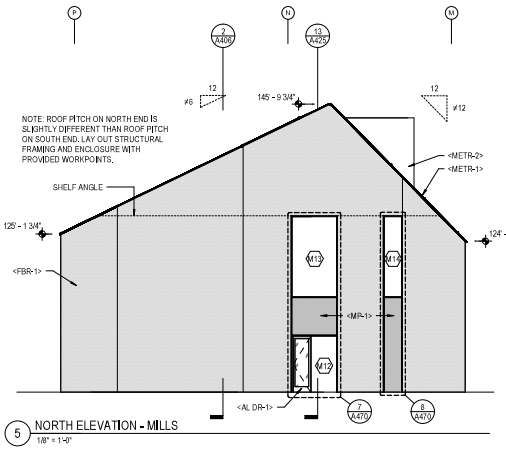
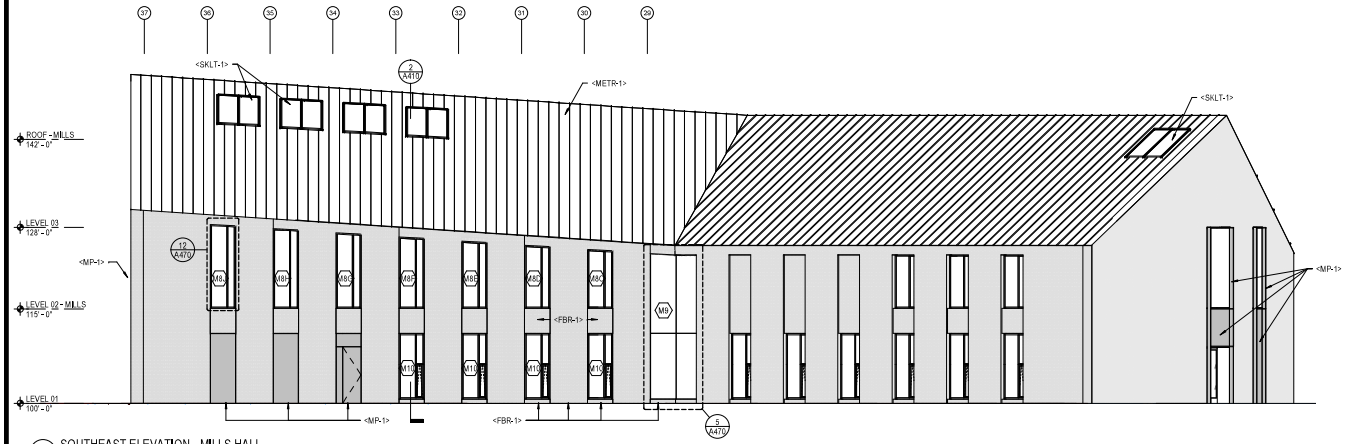


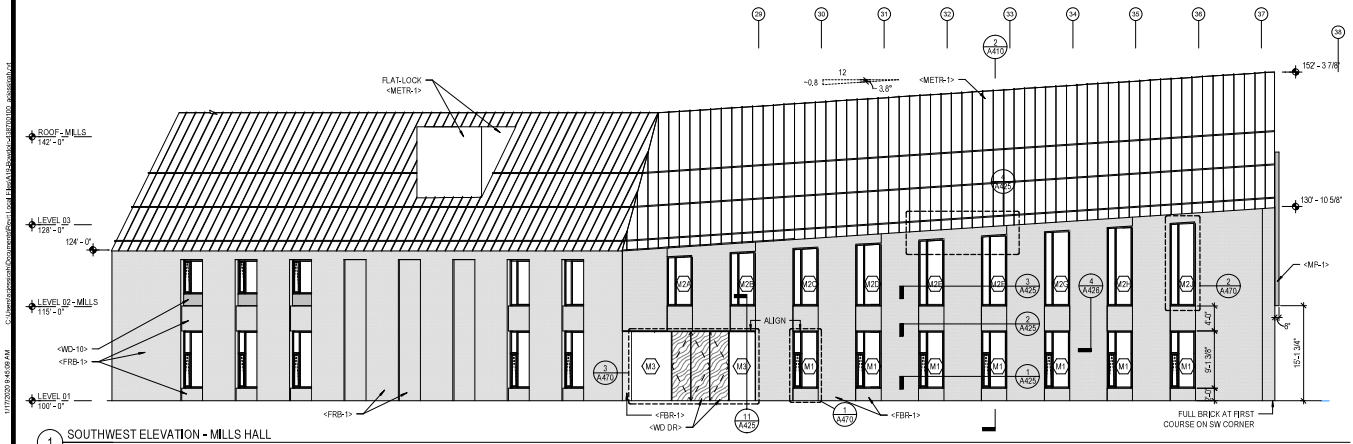
6 NORTHEAST ELEVATION - MILLS HALL
1/8" = 1'-0"



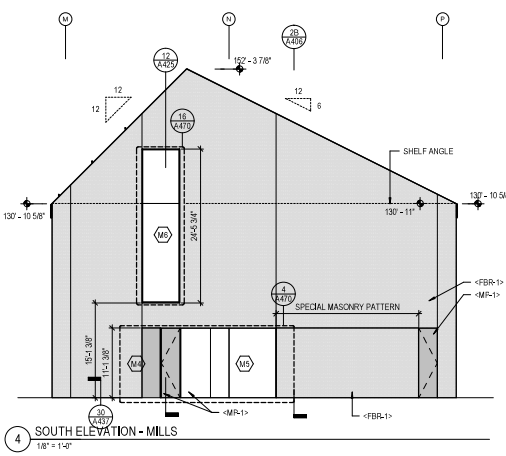
5 NORTH ELEVATION - MILLS
1/8" = 1'-0"



3 SOUTHEAST ELEVATION - MILLS HALL
1/8" = 1'-0"



1 SOUTHWEST ELEVATION - MILLS HALL
1/8" = 1'-0"



4 SOUTH ELEVATION - MILLS
1/8" = 1'-0"

HGA
420 North 5th Street, Suite 100
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Telephone 612.758.4000

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BOWDOIN COLLEGE

MILLS HALL AND THE CENTER FOR ARCTIC STUDIES

Bowdoin

KEYPLAN

NOT FOR CONSTRUCTION

NO	DESCRIPTION	DATE

HGA NO: 4387-001-00

EXTERIOR ELEVATIONS MILLS HALL

DATE: JANUARY 21, 2020

50% BP-2 CONSTRUCTION DOCUMENTS

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Author
11/17/2020 8:45:09 AM
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VIEW FROM POLAR LOOP

VIEW FROM COLLEGE STREET

VIEW FROM HARPSWELL ROAD

VIEW FROM CAMPUS

Exhibit 14

Lighting and Product Information

XW2

URBAN SERIES

URBAN LUMINAIRE

Cat.#	
Job	Type

BEACON design . performance . technology

Approvals

SPECIFICATIONS

Intended Use:

The Beacon Urban luminaire is available with a choice of different LED wattage configurations, shapes, sizes and optical distributions designed to replace HID lighting up to 400W MH or HPS.

Construction:

- The drivers shall be located in the top cast housing and shall be accessible without tools by hinging the lower shade assembly. The driver and all electrical components shall be on a tray.
- The lower shade shall be made from a one-piece aluminum spinning.
- The housing is designed for LED thermal management without the use of metallic screens, cages, or fans. The top casting shall be able to be pendent mounted in place with a stainless steel safety pin and then permanently held in place with four stainless steel bolts.

Electrical:

- 100V through 277V, 50 Hz to 60 Hz (UNV), or 347V or 480V input.
- Power factor is ≥0.90 at full load.
- Dimming drivers are standard with connections for external dimming equipment available upon request.
- Component-to-component wiring within the luminaire may carry no more than 80% of rated load and is listed by UL for use at 600VAC at 50°C or higher.
- Plug disconnects are listed by UL for use at 600 VAC, 13A or higher. 13A rating applies to primary (AC) side only.
- Fixture electrical compartment shall contain all LED driver components.
- Button photocell available.
- Ambient operating temperature -40°C to 40°C
- Surge protection - 20KA.
- Lifeshield™ Circuit - protects luminaire from excessive temperature. The device shall activate at a specific, factory-preset temperature, and progressively reduce power over a finite temperature range. A luminaire equipped with the device may be reliably operated in any ambient temperature up to 55°C (131°F). Operation shall be smooth and undetectable to the eye. Thermal circuit is designed to "fail on", allowing the luminaire to revert to full power in the event of an interruption of its power supply, or faulty wiring connection to the drivers. The device shall be able to co-exist with other 0-10V control devices (occupancy sensors, external dimmers, etc.).

Controls/Options:

- Available with Energeni for optional set dimming, timed dimming with simple delay, or timed dimming based on time of night visit: www.beaconproducts.com/products/energeni
- Urban can be specified with **SiteSync™** wireless control system for reduction in energy and maintenance cost while optimizing light quality 24/7. See ordering information or visit: www.hubbelllighting.com/products/sitesync/ for more details

Finish:

- IFS polyester powder-coat electrostatically applied and thermocured.
- IFS finish consists of a five stage pretreatment regimen with a polymer primer sealer and top coated with a thermoset super TGIC polyester powder coat finish.
- The finish meets the AAMA 605.2 performance specification which includes passing a 3000 hour salt spray test for corrosion resistance and resists cracking or loss of adhesion per ASTM D522 and resists surface impacts of up to 160 inch-pounds.

Certifications:

- DesignLights Consortium (DLC) qualified, consult DLC website for more details: http://www.designlights.org/QPL
- NRTL Certified, UL8750, UL 1598 and CSA22.2#250. 13-14 for wet locations
- IDA approved
- This product is approved by the Florida Fish and Wildlife Conservation Commission. Separate spec available at http://www.beaconproducts.com/products/urban

Warranty:

Five year limited warranty for more information visit: www.hubbelllighting.com/resources/warranty

CERTIFICATIONS/LISTINGS

C SP US

ida

*3000K and warmer CCTs only

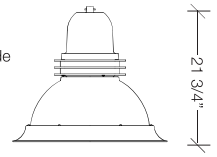
PRODUCT IMAGE(S)

Shown with arm

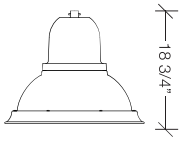
Shown with SiteSync™

STYLES

CAP - Round Shade

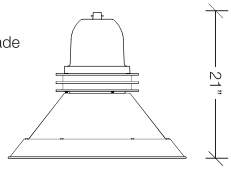


26" - CAP
Shown with optional 3RNW rings
EPA: 1.39 ft²
40 lbs

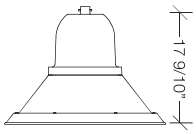


21" - CAP
EPA: 1.04 ft²
35 lbs

MRDS - Deep Shade

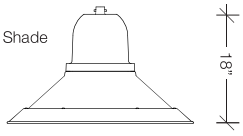


26" - MRDS
Shown with optional 3RNW rings
EPA: 1.25 ft²
40 lbs



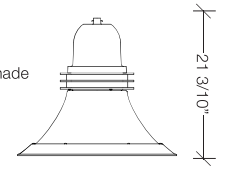
21" - MRDS
EPA: 1.00 ft²
35 lbs

MRSS - Shallow Shade

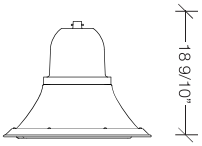


26" - MRSS
EPA: 1.17 ft²
40 lbs

MAR - Curved Shade



26" - MAR
Shown with optional 3RNW rings
EPA: 1.25 ft²
40 lbs



21" - MAR
EPA: 1.00 ft²
35 lbs

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HUBBELL Lighting

ORDERING INFORMATION

ORDERING EXAMPLE: URBCAP21/36NB-80/5K/UNV/T4/SWP/NRNW/BBT

URB | | | | | | | | | | | |

MODEL
- **URB** Urban

SERIES
- **CAP-21** 21" Capitol
- **MRDS-21** 21" Miramar deep shade
- **MAR-21** 21" Maritas
- **CAP-26** 26" Capitol
- **MRSS-26** 26" Miramar shallow shade
- **MRDS-26** 26" Miramar deep shade
- **MAR-26** 26" Maritas

LED COLOR[7]
- **3K** 3000K
- **4K** 4000K
- **5K** 5000K

VOLTAGE
- **UNV** 120-277V
- **347V** 347V
- **480V** 480V

ENGINE-WATTS
- **24NB-27** 27W, LED array
- **24NB-55** 55W, LED array
- **36NB-80** 80W, LED array
- **48NB-110**[1] 110W, LED array
- **60NB-136**[1] 136W, LED array

OPTICS[2]
- **T1** type I
- **T2** type II
- **T3** type III
- **T4** type IV
- **T4BLC** type IV, backlight control
- **T5R** type V, rectangular
- **T5QM** type V, square medium
- **T5W** type V, round wide

ELECTRICAL OPTIONS
- **PEC-120** button, 120V
- **PEC-208** button, 208V
- **PEC-240** button, 240V
- **PEC-277** button, 277V

STYLE
- **NRNW** No rings
- **3RNW** Three rings

SENSOR OPTION
- **MOB**[4,6,8] Motion sensor 33% or 50% dimming

CONTROL OPTIONS
- **GENI-XX**[5] energeni
- **SWP**[3,4] SiteSync Wireless Pre-Commission

FINISH
- **BBT** basic black textured
- **BMT** black matte textured
- **WHT** white textured
- **MBT** metallic bronze textured
- **BZT** bronze textured
- **DBT** dark bronze textured
- **GYS** gray smooth
- **DPS** dark platinum smooth
- **GNT** green textured
- **MST** metallic silver textured
- **MTT** metallic titanium textured
- **OWI** old world iron
- **RAL** _____

1 26" only
2 To rotate optics Left or Right 90 degrees, specify L or R after the optical distribution example:T4L
3 Must specify group and zone information at time of order. See www.hubbelllighting.com/controls/sitesync for further details.
4 Not available with other control or sensor options.
5 When ordering Energeni, specify the routine setting code (Example GENI-04). See Energeni brochure and instructions for setting table and options. Not available with sensor options.
6 Specify time delay; dimming level and mounting height.
7 This product is approved by the Florida Fish and Wildlife Conservation Commission. Separate spec available at
8 Only available on 24NB and 36NB configurations
http://cdn.beaconproducts.com/content/products/specs/specs_files/Urban_LED_spec_sheet_turtle.pdf

PROVIDE LAMINATED DOUGLAS FIR 5" SQUARE STRAIGHT WOOD POLE

PRECOMMISSIONED SITESYNC ORDERING INFORMATION: When ordering a fixture with the SiteSync lighting control option, additional information will be required to complete the order. The SiteSync Commissioning Form or alternate schedule information must be completed. This form includes Project location, Group information, and Operating schedules. For more detailed information please visit www.hubbelllighting.com/products/sitesync/ or contact Hubbell Lighting tech support at (800) 345-4928.

SiteSync fixtures with Motion control (SWPM) require the mounting height of the fixture for selection of the lens.

Examples: URB/CAP-26/60NB-136/3K/UNV/T5QM/SWP/NRNW/BBT SiteSync only
URB/CAP-26/60NB-136/3K/UNV/T5QM/SWPM-20F/NRNW/BBT SiteSync with Motion Control

SiteSync Lighting Control is available from our most popular brands in a broad range of award-winning product families.

Accessories and Services (Ordered Separately)

Catalog Number	Description
SWUSB*^	SiteSync interface software loaded on USB flash drive for use with owner supplied PC (Windows based only). Includes SiteSync license, software and USB radio bridge node.
SWTAB*^	Windows tablet and SiteSync interface software. Includes tablet with preloaded software, SiteSync license and USB radio bridge node.
SWBRG+	SiteSync USB radio bridge node only. Order if a replacement is required or if an extra bridge node is requested.

*When ordering SiteSync at least one of these two interface options must be ordered per project.
+ If needed, an additional Bridge Node can be ordered.

ELECTRICAL DATA

# OF LEDS	NUMBER OF DRIVERS	DRIVE CURRENT (mA)	INPUT VOLTAGE (V)	SYSTEM POWER (w)	CURRENT (Amps)
24	1	350mA	120	27	0.2
			277		0.1
			347		0.1
			480		0.1
24	2	700 mA	120	55	0.5
			277		0.2
			347		0.2
			480		0.1
36	1	700 mA	120	80	0.7
			277		0.3
			347		0.2
			480		0.2
48	1	700 mA	120	110	0.9
			277		0.4
			347		0.3
			480		0.2
60	1	700 mA	120	136	1.1
			277		0.5
			347		0.4
			480		0.3

PROJECTED LUMEN MAINTENANCE

AMBIENT TEMP.	0	25,000	50,000	[1]TM-21-11 60,000	100,000	Calculated L70 (HOURS)
25°C / 77°C	1.00	0.97	0.95	0.95	0.92	>470,000

[1] Projected per IESNA TM-21-11
Data references the extrapolated performance projections for the base model in a 40°C ambient, based on 10,000 hours of LED testing per IESNA LM-80-08.

AMBIENT TEMPERATURE		LUMEN MULTIPLIER
0°C	32°F	1.02
10°C	50°F	1.01
20°C	68°F	1.00
25°C	77°F	1.00
30°C	86°F	0.98
40°C	104°F	0.98

Use these factors to determine relative lumen output for average ambient temperatures from 0-40°C (32-104°F).

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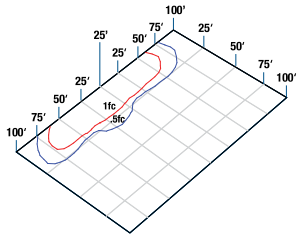
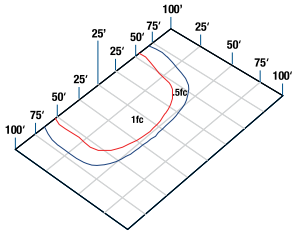
PHOTOMETRICS

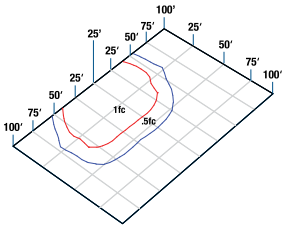
Type II
URB-60NB-136-5K-T2



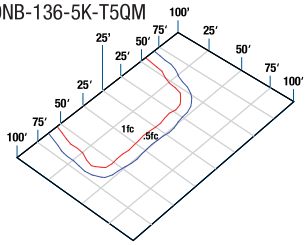
Type III
URB-60NB-136-5K-T3



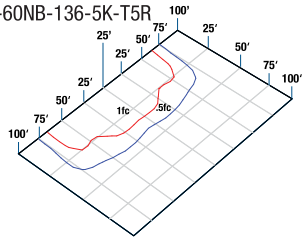
Type IV
URB-60NB-136-5K-T4



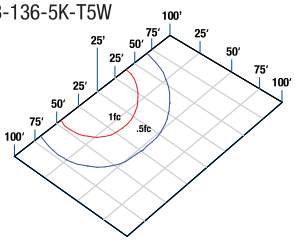
Type V Square Medium
URB-60NB-136-5K-T5QM



Type V Rectangular
URB-60NB-136-5K-T5R



Type V Round Wide
URB-60NB-136-5K-T5W



PERFORMANCE DATA

				5K (5000K nominal, 70 CRI)					4K (4000K nominal, 70 CRI)					3K (3000K nominal, 70 CRI)				
# LED'S	DRIVE CURRENT (MILLIAMPS)	SYSTEM WATTS (120-277V)	DISTRIBUTION TYPE	LUMENS	LPW[1]	B	U	G	LUMENS	LPW[1]	B	U	G	LUMENS	LPW[1]	B	U	G
24	350 mA	27 W	T2	2833	105	1	0	1	2805	104	1	0	1	2408	89	1	0	1
			T3	2805	104	1	0	1	2777	103	1	0	1	2392	89	1	0	1
			T4	3086	114	1	0	1	3055	113	1	0	1	2623	97	1	0	1
			T5QM	3085	114	2	0	0	3055	113	2	0	0	2623	97	1	0	0
			T5R	3142	115	2	0	2	3111	115	2	0	2	2670	99	2	0	2
			T5W	3044	113	2	0	1	3014	112	2	0	1	2600	96	2	0	1
24	700 mA	55 W	T2	5666	102	2	0	2	5610	101	2	0	2	4816	86	1	0	2
			T3	5610	101	1	0	2	5554	100	1	0	2	4784	86	1	0	2
			T4	6171	111	1	0	2	6110	109	1	0	2	5245	94	1	0	2
			T5QM	6171	111	3	0	1	6110	109	3	0	1	5245	94	2	0	1
			T5R	6283	113	3	0	3	6221	111	3	0	3	5341	96	3	0	3
			T5W	6087	109	3	0	1	6027	108	3	0	1	5201	93	3	0	1
36	700 mA	80 W	T2	8505	101	2	0	3	8415	100	2	0	3	7224	87	2	0	2
			T3	8415	100	2	0	2	8331	99	2	0	2	7175	86	2	0	2
			T4	9256	110	1	0	3	9164	109	1	0	3	7868	94	1	0	3
			T5QM	9257	110	3	0	1	9164	109	3	0	1	7868	94	3	0	1
			T5R	9425	112	3	0	3	9331	111	3	0	3	8011	96	3	0	3
			T5W	9131	109	3	0	2	9040	108	3	0	2	7801	93	3	0	2
48*	700 mA	110 W	T2	11332	102	3	0	3	11220	101	3	0	3	9633	87	2	0	3
			T3	11220	101	2	0	3	11108	100	2	0	3	9567	86	2	0	3
			T4	12342	111	2	0	3	12219	110	2	0	3	10491	95	2	0	3
			T5QM	12342	111	3	0	2	12219	111	3	0	2	10491	95	3	0	2
			T5R	12567	113	4	0	4	12441	112	4	0	4	10682	96	3	0	3
			T5W	12175	110	4	0	2	12053	109	4	0	2	10402	94	4	0	2
60*	700 mA	136 W	T2	14165	103	3	0	3	14025	102	3	0	3	12041	88	3	0	3
			T3	14025	102	3	0	3	13885	101	3	0	3	11959	87	3	0	3
			T4	15427	113	2	0	3	15274	111	2	0	3	13114	96	2	0	3
			T5QM	15427	113	4	0	2	15274	111	4	0	2	13314	96	3	0	2
			T5R	15708	115	4	0	4	15259	111	4	0	4	13352	97	4	0	4
			T5W	15218	111	4	0	2	15551	114	4	0	2	13002	95	4	0	2

[1]Lumen values are from photometric tests performed in accordance with IESNA LM-79-08. Data is considered to be representative of the configurations shown. Actual performance may differ as a result of end-user environment and application.

*AVAILABLE IN THE 26" URBAN ONLY

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HUBBELL Lighting

ELECTRICAL DATA

# OF LEDS	NUMBER OF DRIVERS	DRIVE CURRENT (mA)	INPUT VOLTAGE (V)	SYSTEM POWER (w)	CURRENT (Amps)
24	1	350mA	120	27	0.2
			277		0.1
			347		0.1
			480		0.1
24	2	700 mA	120	55	0.5
			277		0.2
			347		0.2
			480		0.1
36	1	700 mA	120	80	0.7
			277		0.3
			347		0.2
			480		0.2
48	1	700 mA	120	110	0.9
			277		0.4
			347		0.3
			480		0.2
60	1	700 mA	120	136	1.1
			277		0.5
			347		0.4
			480		0.3

PROJECTED LUMEN MAINTENANCE

AMBIENT TEMP.	0	25,000	50,000	[1]TM-21-11 60,000	100,000	Calculated L70 (HOURS)
25°C / 77°C	1.00	0.97	0.95	0.95	0.92	>470,000

[1] Projected per IESNA TM-21-11

Data references the extrapolated performance projections for the base model in a 40°C ambient, based on 10,000 hours of LED testing per IESNA LM-80-08.

AMBIENT TEMPERATURE		LUMEN MULTIPLIER
0°C	32°F	1.02
10°C	50°F	1.01
20°C	68°F	1.00
25°C	77°F	1.00
30°C	86°F	0.98
40°C	104°F	0.98

Use these factors to determine relative lumen output for average ambient temperatures from 0-40°C (32-104°F).

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YW1

KIM LIGHTING

PA7R
Pavilion™ Bollard kl_pa7r_spec.pdf

JOB _____ TYPE _____

NOTES _____ APPROVALS _____

FEATURES

- Traditional or Performance Optics
- Bluetooth enabled RGBW accent
- Integral NEMA 3R Enclosure
- Dual receptacle power panel
- PA System capability
- IP66

CERTIFICATIONS

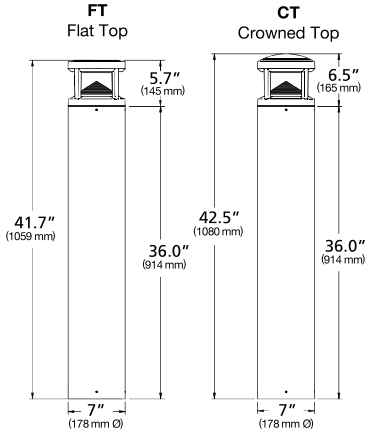
c UL us LISTED

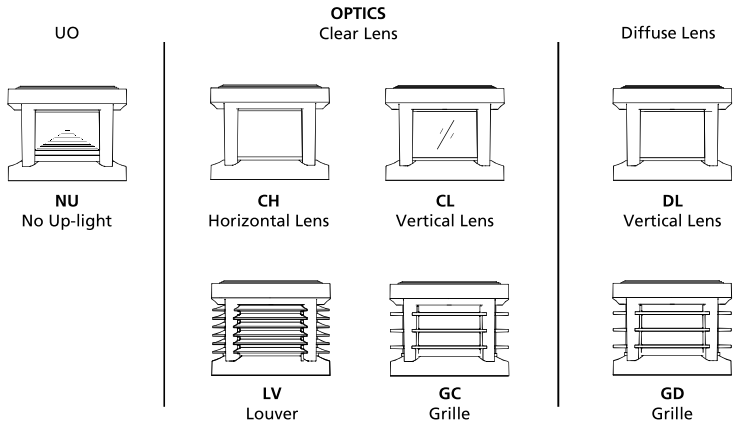
IDA DARK SKY APPROVED 2016

NU configurations in 3000K and warmer CCTs only

IK10

SPECIFICATIONS





ORDERING CODE

Model	Top	Optics	Distribution	Light Engine
PA7R Pavilion 7" Ø Round	**FT** Flat Top	**NU** No Up-light	**1** Type I	**12L-010-5K7** 14W (1000 nominal lm), 5000K, 70 CRI
	CT[1] Crowned Top	**CH** Clear Horizontal Lens	**2** Type II	**12L-010-4K7** 14W (1000 nominal lm), 4000K, 70 CRI
		CL[2] Clear Vertical Lens	**3** Type III	**12L-010-3K7** 14W (1000 nominal lm), 3000K, 70 CRI
		DL[2,3] Diffuse Vertical Lens	**3HS** Type III + House side shield	**12L-010-AMB** 14W, Amber 560 nm Monochromatic
		LV Louvers	**4** Type IV	**12L-020-5K7** 22W (2000 nominal lm), 5000K, 70 CRI
		GC Grille with clear vertical lens	**5** Type V	**12L-020-4K7** 22W (2000 nominal lm), 4000K, 70 CRI
		GD[3] Grille with diffuse vertical lens		**12L-020-3K7** 22W (2000 nominal lm), 3000K, 70 CRI
				12L-020-AMB 22W, Amber 560 nm Monochromatic

Body	Fixture Finish	Controls	Voltage	Options
24A 24" OAH, Aluminum	**BLS** Black Smooth	**SWP**[†,5] SiteSync pre-commission	**UNV** 120-277V	**EM**[8] Battery Backup
42A 42" OAH, Aluminum	**BLT** Black Textured	**MW**[6] Motion sensing (50% dim, 100% output upon detection)	**120**[7] 120V	**LR**[9] Luminous Accent
42BR-C 42" OAH, Brown Concrete	**DBS** Dark Bronze Smooth	SiteSync Accessories†	**277**[7] 208-277V	**SF**[10] Single Fuse
42CH-C 42" OAH, Charcoal Concrete	**GTT** Graphite Textured	**SWUSB** SiteSync Software on USB	**347**[7] 347V	**DF**[10] Double Fuse
42NG-C 42" OAH, Natural Gray Concrete	**LGS** Light Gray Smooth	**SWTAB** SiteSync Windows® Tablet	**480**[7] 480V	
42WH-C 42" OAH, White Concrete	**PSS** Platinum Silver Smooth	**SWBRG** SiteSync Wireless Bridge Node		
42SP-C 42" OAH, Custom Color Concrete	**VGS** Verde Green Smooth			
42A-ROP[4] 42" OAH, Aluminum + Dual Receptacle Outlet Panel and Cover	**WHS** White Smooth			
42A-ROP-L[4] 42" OAH, Aluminum + Dual Receptacle Outlet Panel and Locking Cover	**CC** Custom Color*			
42A-2GEB 42" OAH, Aluminum + Integral Recessed 2 Gang Electrical Box	*Consult factory			
42A-SG3 42" OAH, Aluminum + Speaker Grille Enclosure for 3" Ø speaker				

†PRECOMMISSIONED SITESYNC ORDERING INFORMATION: When ordering a fixture with the SiteSync lighting control option, additional information will be required to complete the order. The SiteSync Commissioning Form or alternate schedule information must be completed. This form includes Project location, Group information, and Operating schedules. For more detailed information please visit www.HubbellLighting.com/products/sitesync or contact Hubbell Lighting tech support at (800) 345-4928.

Examples:
PA7R/FT/NU3/12L-020-3K7/42A/TT/SWP/UNV/LR

1 Adds .6 / 15mm to OAH (over all height).
2 CL and DL configurations shall be IK04
3 Only Available with **1** Type I or **5** Type V distributions only.
4 For GFCI/USB limited voltage to 120VAC only.
5 Specify group and zone at time of order. See www.hubbell-lighting.com/sitesync for more details. Order at least one SiteSync interface accessory SWUSB or SWTAB. Each option contains SiteSync License, GUI, and Bridge Node.
6 24'Ø typical coverage area, not Available with **CH.**
7 Dedicated input voltage, required for **MW** Motions sensing.
8 -20°C min starting temperature, 90+ minute run time, output equivalent to 12L-010-#K7
9 Adds +5 watts and 1" / 254mm to overall height.
10 SF for 120, 277 and 347 input voltage, DF for 208, 240 and 480 input voltage.

Kim Lighting reserves the right to change specifications without notice.

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LUMINAIRE PERFORMANCE

LED #	Nominal Lumen Package	Nominal Wattage	Lens Options	Distribution	3000K					4000K					5000K				
					Lumen	BUG Rating			lm/w	Lumen	BUG Rating			lm/w	Lumen	BUG Rating			lm/w
						B	U	G			B	U	G			B	U	G	
12L	1,000	14	**NU** UO Optics	1	749	0	0	0	54	815	0	0	0	59	835	0	0	0	60
				2	860	0	0	0	62	936	0	0	0	67	958	0	0	0	69
				3	809	0	0	0	58	881	0	0	0	63	902	0	0	0	65
				3HS	684	0	0	0	49	744	0	0	0	53	762	0	0	0	55
				4	977	0	0	0	70	1063	0	0	0	76	1089	0	0	0	78
				5	908	1	0	0	65	988	1	0	0	71	1011	1	0	0	73
			CH Clear Horizontal Lens	1	1184	0	3	1	85	1288	0	3	1	92	1319	0	3	1	95
				2	1139	0	3	1	82	1239	0	3	1	89	1269	0	3	1	91
				3	1094	0	3	1	79	1190	0	3	1	85	1219	0	3	1	87
				3HS	960	0	3	1	69	1045	0	3	1	75	1070	0	3	1	77
				4	1152	0	3	1	83	1254	0	3	1	90	1284	0	3	1	92
				5	1225	1	3	1	88	1333	1	3	1	96	1365	1	3	1	98
			CL Clear Vertical Lens	1	1146	0	3	1	82	1247	0	3	1	90	1277	0	3	1	92
				2	1228	0	3	1	88	1336	1	3	1	96	1368	1	3	1	98
				3	1276	0	3	1	92	1389	1	3	1	100	1422	1	3	1	102
				3HS	1030	0	3	1	74	1121	0	3	1	80	1148	0	3	1	82
				4	1272	0	3	1	91	1384	0	3	1	99	1417	0	3	1	102
				5	1305	1	3	1	94	1420	1	3	1	102	1454	1	3	1	104
			DL Diffused Vertical Lens	1	1086	0	3	1	78	1182	0	3	1	85	1210	0	3	1	87
				5	1141	1	3	1	82	1241	1	3	1	89	1271	1	3	1	91
			LV External Louvers	1	489	0	3	1	35	533	0	3	1	38	545	0	3	1	39
				2	534	0	3	1	38	581	0	3	1	42	595	0	3	1	43
				3	550	0	3	1	40	599	0	3	1	43	613	0	3	1	44
				3HS	397	0	3	1	29	432	0	3	1	31	442	0	3	1	32
				4	577	0	3	1	41	628	0	3	1	45	643	0	3	1	46
				5	583	1	3	1	42	634	1	3	1	46	649	1	3	1	47
			GC Grille with Clear Lens	1	843	0	3	1	61	917	0	3	1	66	939	0	3	1	67
				2	829	0	3	1	60	903	0	3	1	65	924	0	3	1	66
				3	831	0	3	1	60	905	0	3	1	65	926	0	3	1	67
				3HS	694	0	3	1	50	755	0	3	1	54	773	0	3	1	56
				4	901	0	3	1	65	980	0	3	1	70	1004	0	3	1	72
				5	842	1	3	1	60	916	1	3	1	66	938	1	3	1	67
			GD Grille with Diffused Lens		728	0	3	1	52	792	0	3	1	57	811	0	3	1	58
					782	1	3	1	56	851	1	3	1	61	872	1	3	1	63

Kim Lighting reserves the right to change specifications without notice.

LUMINAIRE PERFORMANCE

LED #	Nominal Lumen Package	Nominal Wattage	Lens Options	Distribution	3000K					4000K					5000K				
					Lumen	BUG Rating			lm/w	Lumen	BUG Rating			lm/w	Lumen	BUG Rating			lm/w
						B	U	G			B	U	G			B	U	G	
12L	2,000	22	**NU** UO Optics	1	1044	0	0	0	48	1136	0	0	0	52	1164	0	0	0	54
				2	1199	0	0	0	55	1305	0	0	0	60	1336	0	0	0	62
				3	1128	0	0	1	52	1228	0	0	1	57	1257	0	0	1	58
				3HS	953	0	0	0	44	1037	0	0	0	48	1062	0	0	1	49
				4	1362	0	0	0	63	1482	0	0	1	68	1518	0	0	1	70
				5	1265	1	0	0	58	1377	1	0	0	63	1410	1	0	0	65
			CH Clear Horizontal Lens	1	1778	0	3	1	82	1935	0	3	1	89	1981	0	3	1	91
				2	1711	1	3	1	79	1862	1	3	1	86	1906	1	3	1	88
				3	1643	1	3	1	76	1788	1	3	1	82	1831	1	3	1	84
				3HS	1443	0	3	1	66	1570	0	3	1	72	1608	0	3	1	74
				4	1731	0	3	1	80	1884	0	3	1	87	1929	0	3	1	89
				5	1841	1	3	1	85	2003	1	3	1	92	2051	1	3	1	95
			CL Clear Vertical Lens	1	1852	0	4	1	85	2016	1	4	1	93	2064	1	4	1	95
				2	1984	1	3	1	91	2159	1	3	1	99	2211	1	3	1	102
				3	2062	1	3	1	95	2244	1	3	1	103	2298	1	3	1	106
				3HS	1665	0	3	1	77	1811	0	3	1	83	1855	0	3	1	85
				4	2055	0	3	1	95	2236	1	3	1	103	2290	1	3	1	106
				5	2109	1	3	1	97	2295	1	3	1	106	2350	1	3	1	108
			DL Diffused Vertical Lens	1	1639	1	3	2	76	1783	1	3	2	82	1826	1	3	2	84
				5	1721	1	3	2	79	1873	1	3	2	86	1918	1	3	2	88
			LV External Louvers	1	746	0	3	1	34	811	1	3	1	37	831	1	3	1	38
				2	814	1	3	1	37	885	1	3	1	41	907	1	3	1	42
				3	838	1	3	1	39	912	1	3	1	42	934	1	3	1	43
				3HS	605	0	3	1	28	658	0	3	1	30	674	0	3	1	31
				4	879	0	3	1	41	956	1	3	1	44	979	1	3	1	45
				5	888	1	3	1	41	966	1	3	1	45	989	1	3	1	46
			GC Grille with Clear Lens	1	1038	0	3	1	48	1130	0	3	1	52	1157	0	3	1	53
				2	1021	0	3	1	47	1111	1	3	1	51	1138	1	3	1	52
				3	1024	0	3	1	47	1114	1	3	1	51	1141	1	3	1	53
				3HS	854	0	3	1	39	930	0	3	1	43	952	0	3	1	44
				4	1109	0	3	1	51	1207	0	3	1	56	1236	0	3	1	57
				5	1037	1	3	1	48	1128	1	3	1	52	1155	1	3	1	53
			GD Grille with Diffused Lens		1036	0	3	1	48	1127	1	3	2	52	1154	1	3	2	53
					953	1	3	1	44	1037	1	3	1	48	1062	1	3	1	49

Kim Lighting reserves the right to change specifications without notice.

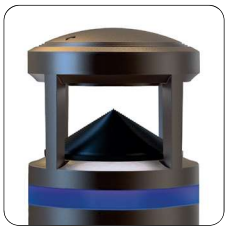
LUMINAIRE PERFORMANCE

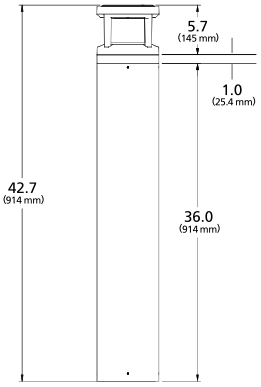
Electrical Characteristics												Dimming				
Current	System Watts	Line Voltage		Amps AC						Min. Power Factor	Max THD (%)	Dimming Range	Source current out		Absolute voltage	
		VAC	Hz	120	208	240	277	347	480				Min	Max	Min	Max
350mA	14	120-480	50/60	0.18	0.11	0.09	0.08	0.06	0.05	>0.9	20	10% to 100%	0mA	1mA	0V	10V
500mA	22			0.12	0.07	0.06	0.05	0.04	0.03							

TM-21 LIFETIME CALCULATION

Operating Hours						
Ambient Temp.	0	25,000	TM-21-11 36,000	50,000	100,000	Calculated L_{70} (hours)
25°C / 77°F	100%	98%	97%	95%	90%	'60khrs
40°C / 104°F	100%	98%	97%	95%	90%	

LUMINOUS ACCENT





The Luminous Accent option adds an additional 1" / 25.4mm to the overall fixture height and may be controlled via wired DMX RDM or Bluetooth wireless. The Luminous Accent shall be IK08.

HUBBELL LIGHTING RGBW REMOTE APP

The Hubbell Lighting RGBW Remote application may be downloaded free of charge from the Apple App Store or Google Play.

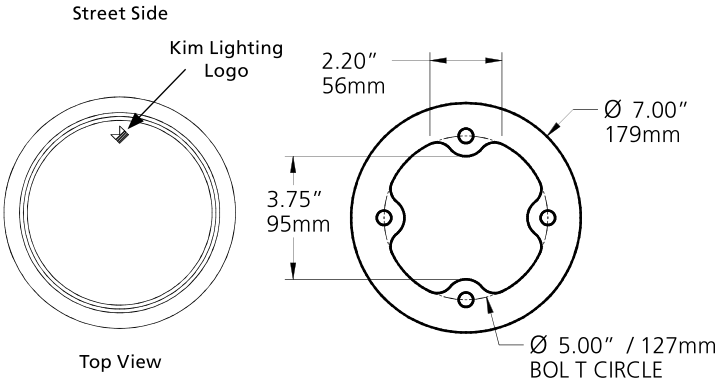
- Color selection and adjustment.
- Camera function for color matching.
- Intensity slider for dimming/ramping up.
- Save and rename up to 10 presets.
- Group and rename fixtures.
- Fixture is password protected, refer to instructions to set unique password.

Download on the App Store
ANDROID APP ON Google play

MOUNTING

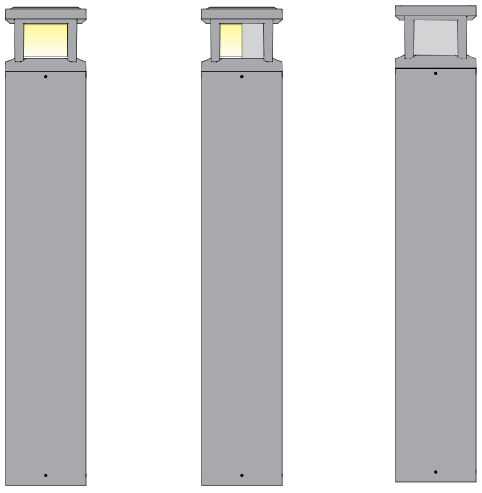
Aluminum Body

Once attached to base mounting plate, fixture may be rotated 20° in either direction and secured with set screws at base of the bollard body. KIM Lighting logo indicates 'street side' output.



SHIELDING

HS configurations feature factory installed 180° shield(s) that may also be installed in the field for any Optic configuration.



HSFront View | HS Side View | HS Back View

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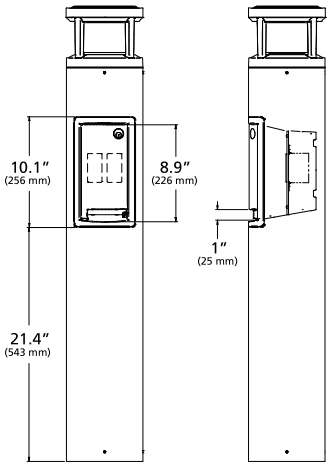
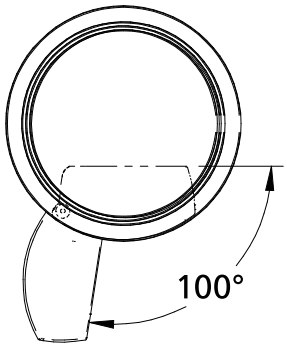
RECEPTACLE OUTLET PANEL

The Receptacle outlet panel shall be NEMA 3R rated for wet location(s) while in use and shall be compatible with any single receptacle outlet device with standard mounting holes. Door shall be self-closing. Tamper resistant lock must be specified at time of order. Devices and device wiring by others.



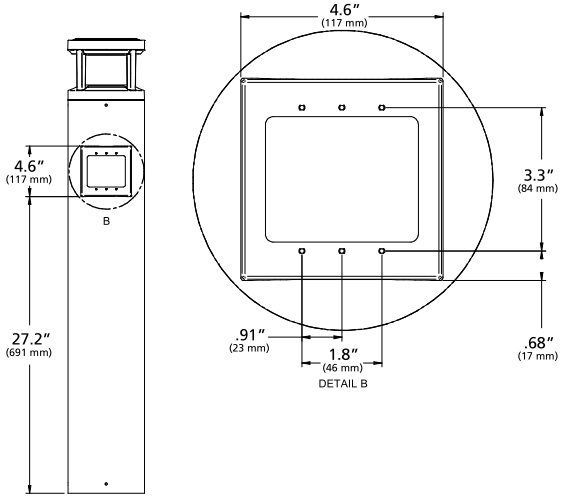
Range of Motion for access door



HUBBELL WIRING DEVICES USB DEVICES: http://ecatalog.hubbell-wiring.com/productinformation/viewcatalog.aspx?Dest=hubbell-wiring.com/press/catalog/A.pdf&Page=18

INTEGRAL ELECTRICAL BOX

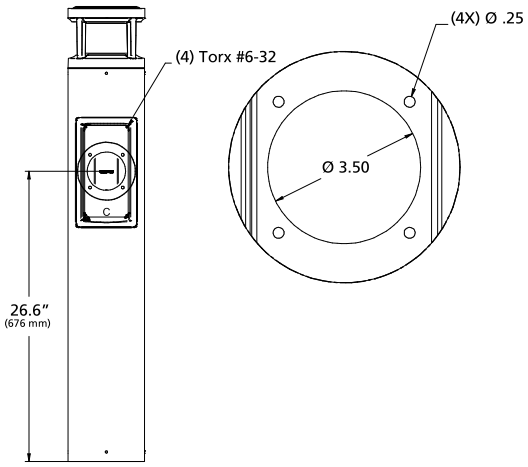
The integral 2 Gang electrical box shall be #″ deep and have standard mounting holes for installing either a single receptacle outlet device or a pair of single receptacle outlet device. Devices, device wiring, device hardware and bezel by others.



HUBBELL WIRING DEVICES GFCI DEVICES: http://ecatalog.hubbell-wiring.com/productinformation/viewcatalog.aspx?Dest=hubbell-wiring.com/press/catalog/K.pdf

SPEAKER GRILLE ENCLOSURE

The speaker grille enclosure shall accommodate a 3″Ø marine grade speaker rated for outdoor use. Grille shall be secured with (4) Torx # screws for accessibility. Mounting provisions as shown. Speaker, mounting hardware and wiring by others.



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SPECIFICATIONS

Housing:

- Castings shall be low copper aluminum alloy die-cast.
- Gaskets shall be molded silicone to prevent harmful ingress to the lamp and driver compartments.
- Optical system shall be IP66 rated.

Shaft:

- Aluminum shaft(s) shall be .125" thick extruded aluminum 6061 alloy.
- Concrete shaft(s) shall conform to current specifications for "Portland Cement." ASTM C150, Type I or II. Aggregates shall meet current requirements of "Specifications for Concrete Aggregates," ASTM C33. Water shall be clean and free from deleterious amounts of silt, oil, acids, alkalies or organic materials. Wire for reinforcement shall conform to ASTM A185. Steel for lugs and plates shall conform to ASTM A36, or A283 grade D.
- Concrete shaft(s) shall be medium sand-blasted with anti-graffiti sealer and material color shall be integral to the concrete mix.
- Concrete shaft(s) shall be cured to allow for completion of the hydration process, and result in a 28 day compressive strength of not less than 4,500 psi.
- Concrete shaft(s) shall be cast from fiberglass molds used to insure uniform parts. Mold parting lines maybe slightly visible in finished parts.

Optics:

- U0 configurations shall have an optically clear flat tempered glass lens, all other configurations shall have either an optically clear or high transmission diffused acrylic lens.
- Maximum surge current shall be 20KA and shall fail open at end of life to prevent harm to the electrical components from uncontrolled or excess incoming power
- Driver shall be rated for -40°C environment

Bluetooth:

- The Integral module shall enable the adjustment of the Luminous Accent to dim or change color to the desired setting when paired with Hubbell Lighting RGBW Remote App via celluar/tablet device.
- The integral module shall be compatible with Bluetood Low Energy (BLE) or Bluetooth Smart mobile devices operating on iOS8 or Android Gingerbread operating systems or newer.

DMX:

- 6 wires: Red (DMX+), Yellow (DMX-), Brown (DMX Ground), Black (Voltage), White (common), and Green (Ground)
- Single DMX universe with six slots/addresses of virtual control which are pre-programmed at the factory:

  DMX slot/address 1 = red

  DMX slot/address 2 = blue

  DMX slot/address 3 = green

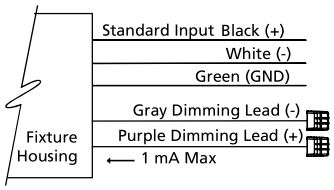
  DMX slot/address 4 = white

  DMX slot/address 5 = X tilt, a 127 means do nothing, a value between 1-63 means left, a value between 192-254 means right

  DMX slot/address 6 = Y tilt, a 127 means do nothing, a value between 1-63 means up, a value between 192-254 means down
- Fully DMX RDM compatable.

Controls

- Standard fixtures dimming range shall be from 10% to 100% and be compatible with 0-10V, user-defined, control devices. (Wiring illustration)
- Optional motion sensor shall be capable of detecting motion 360° around the bollard. When no motion is detected for the specified time, the sensor wattage to factory preset level, reducing the light level accordingly. When motion is detected by the sensor, the bollard shall return to full wattage and full light output. Please contact KIM Lighting if project requirements vary from standard configuration.
- Pavilion may be specified with SiteSync™ wireless control system for reduction in energy and maintenance costs while optimizing light quality 24/7. For more details, see ordering information or visit: www.hubbelllighting.com/sitesync



Electrical:

- High temperature fuse holders factory installed inside the fixture housing. Fuse is included.
- Battery Backup shall have an operating range of -20°C to 50°C with a typical recharge time of 32 hours.

Installation

- Aluminum shaft configurations shall have four 3/8" x 10" x 2" zinc plated L-hook anchor bolts shall to be installed with an included template. Nuts and washers shall be provided to level and secure the mounting plate to the anchor bolts.
- Aluminum shaft configurations shall have a mounting plate shall be able to be rotated 20° in either direction during installation for aiming adjustment.
- Concrete shaft configurations shall have four steel mounting tabs for installation on four 1/2" x 10" + 2" zinc electroplated L-hook anchor bolts. Each anchor bolt is supplied with two nuts, two washers, and a rigid pressed board template.
- Concrete shaft configurations shall be palletized with adequate hold-downs to prevent load movement in transit.

Finish:

- Fade and abrasion resistant, electrostatically applied, thermally cured, triglycidal isocyanurate (TGIC) polyester powder coat.
- Standard colors include (BL) Black, (DB) Dark Bronze, (GT) Graphite, (PS) Platinum Silver, (LG) Light Gray, (TT) Titanium, (WH) White, and (CC) Custom Color (Include RAL#).

Certifications and Listings:

- UL 1598 Standard for wet locations for Luminaires.
- UL 8750 Standard for Safety for Light Emitting Diode (LED) Equipment for use in Lighting Products.
- CSA C22.2#250.0 Luminaires.
- RoHS compliant.
- IP66 Certified.
- IDA approved, 3000K and warmer CCTs only.

Caution:

- Fixtures must be grounded in accordance with national, state and/or local electrical codes, Failure to do so may result in serious personal injury.

Warranty:

- For full warranty see http://www.hubbelllighting.com/resources/warranty

Bluetooth® DMX

ANDROID APP ON Google play

Download on the App Store

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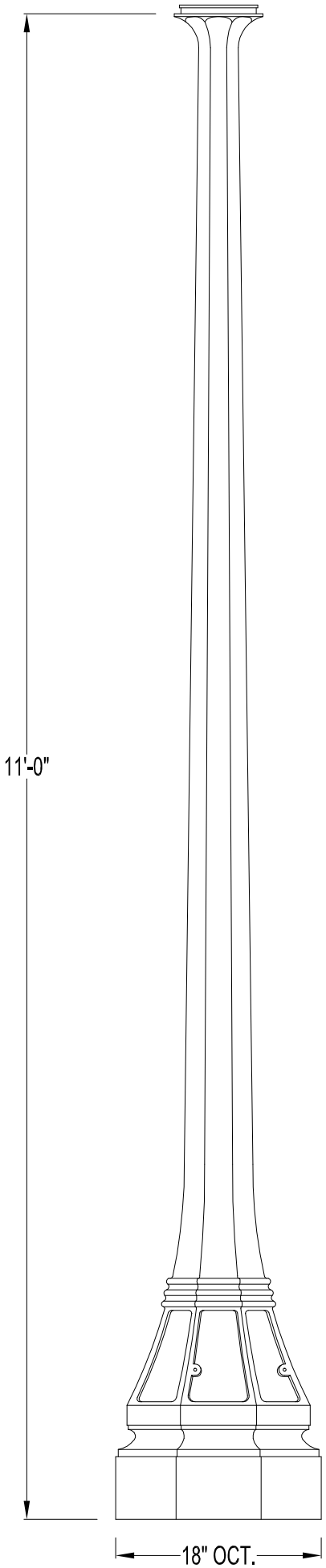
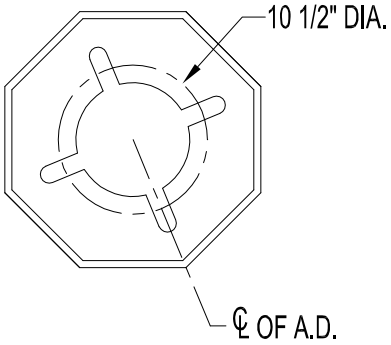


LAMP POST SPECIFICATIONS

STYLE:	EDGEWATER
HEIGHT:	11'-0"
BASE:	18" OCTAGONAL (FLAT TO FLAT)
MATERIAL:	☐ (A) 1 PIECE, CAST ALUMINUM ALLOY ANSI 356 PER A.S.T.M. B26-95
	☐ (I) 1 PIECE, CAST IRON PER A.S.T.M. A48-83 CLASS 30
	☐ (D) 1 PIECE, CAST DUCTILE IRON PER A536-84 GRADE 65-45-12
FINISH:	PRIME PAINT THEN FINISH SHERWIN WILLIAMS ACROLON - PLEASE ADVISE COLOR
ACCESS DOOR:	LOCATED IN BASE SECURED WITH TAMPER PROOF HEX SOCKET SECURITY MACHINE SCREWS
GROUND STUD PROVISIONS:	DRILL AND TAP INSIDE WALL OF BASE OPPOSITE ACCESS DOOR TO ACCOMMODATE A 1/4"-20 GROUND STUD (STUD SUPPLIED BY OTHERS)
ANCHOR BOLTS:	(4) 3/4" DIA. X 24" LONG + 3" HOOK (FULLY GALVANIZED WITH 1 GALVANIZED NUT AND 1 GALVANIZED WASHER PER BOLT)
BOLT PROJECTION:	3" REQUIRED
TENON:	____" DIA. X ____" HIGH



Spring City Electrical Mfg. Co.
SINCE 1843
HALL AND MAIN STREETS - P.O. BOX 19 - SPRING CITY, PA. 19475
PHONE (610) 948-4000 FAX (610) 948-5577
E-mail ADDRESS: sales@springcity.com

DESCRIPTION	_PSEDG-18-11.00	PDF

K56 CLEVELAND/ TUDOR - LED

One of the most versatile of all ornamental luminaires available in the first half of the 20th century, the K56 Cleveland/ Tudor offers the beauty of yesteryear with the superior LED lighting performance standards of today. Select from the Cleveland Style without spurs, or the Tudor Style with spurs. Add to the continuity of your space with a matching pendant to light pathways and roadways alike.

King Luminaire

PROJECT:_____

PREPARED BY: _____

DATE:_____

PRODUCT SPECIFICATIONS

R1/B3 LED ENGINE
Light engine shall be an array of 36, 42, 54 or 63 solid state Cree X-Series high power LEDs (light emitting diodes) mounted to a multi-sided, vertical heat sink of highly conductive aluminum. The LED emitters are mounted to removable circuit boards such that they are in full thermal contact with the vertical heat sink. The vertical heat sink is open at the bottom and vented at the top to provide appropriate dynamic airflow cooling for the LED array. The emitters are arranged in various patterns on each face of the vertical heat sink to provide the required light distribution.

The LED arrays include optical baffles constructed of optical grade ABS plastic with a vacuum metallized reflective surface or clear acrylic precision refractors over each diode. Both optical options are designed to efficiently control light distribution in IESNA Type IV & V for the B3 and Type III & V for the R1.

P4 LED ENGINE
Light engine shall include an array of Cree X-Series high power LEDs (light emitting diodes). The emitters shall be mounted to a metal core circuit board using SMT technology. The LEDs and circuit boards shall then be mounted to a high performance heat sink.

External light control shall consist of high precision refractive lenses mounted above the LED emitter arrays in such a way to achieve optimum uplight control. The lenses shall also control horizontal light distribution so that either Type II, III, IV or V IESNA distribution patterns are achieved.

LENS
The lens panels shall be made of polycarbonate or acrylic. The polycarbonate shall be a minimum of 3/16" thick and composed of Bayer Makrolon LTG 3123, General Electric Lexan 243, or equivalent. The acrylic shall be a minimum of 3/16" thick and composed of AtoHaas V825-UVA5A, ICI CP-75-UVA, Cyro S-10-343, or equivalent. This is available in either clear or rippled configurations.

LUMINAIRE CONSTRUCTION
All K56 Cleveland/Tudor cast components shall consist of a heavy grade A319 cast aluminum. The main body or capital, acts as an enclosure for the driver assembly and is of adequate thickness to give sufficient structural rigidity. The T-Style, K16 and K24 capital shall have an opening at the base tenon body to allow the luminaire to be mounted to a tenon of 3-1/2" maximum diameter. The R-Style, K5 and K6 capital lock to a 7" OD post top ring. The luminaire shall be locked in place by means of heavy duty, stainless-steel set-screws.

LUMINAIRE ASSEMBLY
The luminaire assembly is a self-contained unit consisting of a rugged cast aluminum body, and the LED light engine consisting of aluminum castings and the LED light engine. The LED light engine is of a modular design, and is able to be quickly removed from the luminaire assembly without the need to disassemble the luminaire assembly itself. The luminaire assembly is composed of octagonal cast top and bottom rings and eight cast aluminum struts comprising the housing. The hinged lid is cast aluminum and is secured to the main housing by a stainless steel rotary latch.

DRIVER
The LED universal dimmable driver will be class 2 and capable of 120 - 277V or 347 - 480V input voltage, greater than 0.9 power factor, and less than 20% total harmonic distortion. The case temperature of the driver can range from -40°C to 70°C. Each LED system comes with a standard surge protection designed to withstand up to 20kV/10kA of transient line surge as per IEEE C62.41.2 C High. An in-line ferrite choke is utilized to provide protection against EFT's.

PHOTOMETRICS
Fixtures are tested to IESNA LM79 specifications. These reports are available upon request.

CHROMATICITY
High output LEDs come standard at 3000K & 4000K (+/- 300K) with a minimum nominal 70 CRI. Additional CCT emitters are available upon request.

LUMEN MAINTENANCE
Reported (TM21) and Calculated (L70) reports are available upon request with a minimum calculated value of 100,000 hrs.

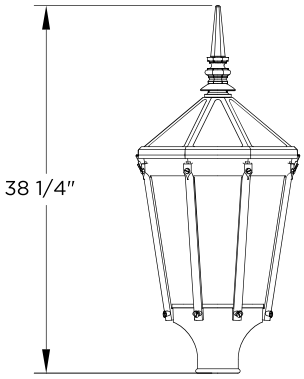
WIRING
All internal wiring and connections shall be completed so that it will be necessary only to attach the incoming supply connectors to Mate-N-Lok connectors. Mate-N-Lok shall be certified for 600V operation. Internal wire connectors shall be crimp connector only and rated at 1000V and 150°C. All wiring to be CSA certified and/or UL listed, type SFF-2, SEWF-2, or SEW-2 No. 14 gauge, 150°C, 600V, and color coded for the required voltage.

THERMALS
Fixtures tested by a DOE sanctioned test facility to determine the maximum in-situ solder-point or junction-point temperatures of the LED emitters. This report is available upon request.

FINISH
Housing is finished with a 13 step KingCoat™ SuperDurable polyester TGIC powder coat. Standard colors include strobe white, brown metal, marina blue, gate gray, Chicago bronze, standard gold, standard black, federal green and rain forest. Please see our website for a complete list of colors. RAL and custom color matches are available.

MISCELLANEOUS
All exterior hardware and fasteners, wholly or partly exposed, shall be stainless-steel alloy. All internal fasteners are stainless-steel or zinc coated steel. All remaining internal hardware is stainless steel, aluminum alloy, or zinc coated steel.

WARRANTY
The K56 Cleveland/Tudor LED luminaire comes with a 7 year limited warranty.



CERTIFICATION:
CSA US Listed
Suitable for wet locations
ISO 9001
IP66
ARRA Compliant
LM79 / LM80 Compliant

DRIVER INFO:
>0.9 Power Factor
<20% Total Harmonic Distortion
120 - 277V & 347 - 480V
-40°C Min. Case Temperature
70°C Max. Case Temperature
Surge Protection: ANSI C136.2
extreme level 20kV/10kA

EPA:
Contact King Luminaire

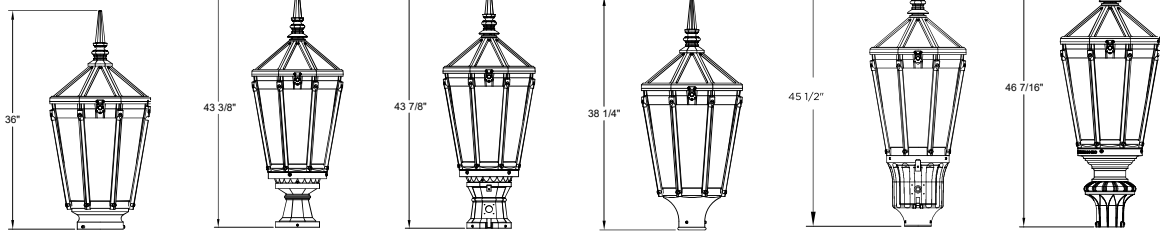
FIXTURE WEIGHT:
Contact King Luminaire

C US

Contact King Luminaire for product specifications that are exempt from CSA Certification
7-3-2019

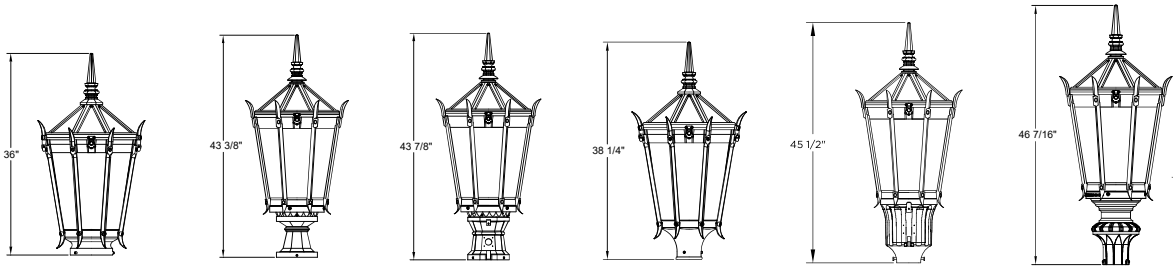
FIXTURE OPTIONS

Cleveland



R-Style (P4 only) 7" OD Ring | K5 7" OD Ring | K6 7" OD Ring | T-Style 3 1/2" Slipfitter | K24 3 1/2" Slipfitter | K16 3 1/2" Slipfitter

Tudor



R-Style (P4 only) 7" OD Ring | K5 7" OD Ring | K6 7" OD Ring | T-Style 3 1/2" Slipfitter | K24 3 1/2" Slipfitter | K16 3 1/2" Slipfitter

HOW TO ORDER

POLE ADAPTER/CAPITAL
- R - R-Style, 7" OD Ring (P4)
- K5 - K5 Capital, 7" OD Ring
- K6 - K6 Capital, 7" OD Ring
- T - T-Style, std 3 1/2" slipfitter
- K24 - K24 Capital, std 3 1/2" slipfitter
- K16 - K16 Capital, std 3 1/2" slipfitter

*K56 pendant version also available

IES LIGHTING CLASSIFICATION
- II - Type 2 (P4)
- III - Type 3 (B2, R1, P4)
- IV - Type 4 (B3, P4)
- V - Type 5 (B3, R1, P4)

SERIES
- 1036 (40 - 75W B3)
- 1042 (40 - 75W B2, R1)
- 1054 (100W B3)
- 1063 (100W B2)
- 1063 (100 - 120W R1)
- 7030 (40 - 100W P4)

LINE VOLTAGE
- 120V (120-277)
- 480V (347-480)*

*Select wattages available within this range, contact King Luminaire

PAINT COLOR
- GN - Federal Green
- BE - Blue
- GY - Gray
- BN - Brown
- BK - Black
- BZ - Bronze

*Additional options available on website

LUMINAIRE STYLE
- K56 - Cleveland/Tudor

WATTAGE
- 40, 60, 75, 100, 120*

*120 with R1 only

CCT
- 3K - 3000K
- 4K - 4000K

K56	-		-		-		-		-		-	(SSL)	-		-		-		-		-		-	

LANTERN TYPE
- S - Tudor (with spurs)
- C - Cleveland (without spurs)

OPTICAL OPTIONS
- B2 - B2 Optic (Baffled Array)
- B3 - B3 Optic (Baffled Array)
- R1 - R1 Optic (Refractive Array)
- P4 - P4 Optic (Flat Array)

LENS OPTIONS
- AR - Acrylic Rippled
- AC - Acrylic Clear
- PR - Polycarbonate Rippled
- PC - Polycarbonate Clear
- NL - No Lens (P4)

SOURCE
- SSL - Solid State

PHOTO CONTROL OPTIONS
- PR - Photo Receptacle c/w cover and PR. Available with K24 only.
- PE - Photo Receptacle c/w cover, PR and Photo Eye. Available with K24 and K6.
- PEBC - Photo Electric Buttoncell
- *leave blank if not required

FINIAL OPTIONS

Finial #6 is standard. Finials #4 & #5 (S/F PE) are available

*Additional options available on website

WATTAGE SELECTOR
- WS - Wattage Selector

* leave blank if not required

URBAN SERIES

URBAN LUMINAIRE

Cat.#	
Job	Type

BEACON design . performance . technology

Approvals

SPECIFICATIONS

Intended Use:

The Beacon Urban luminaire is available with a choice of different LED wattage configurations, shapes, sizes and optical distributions designed to replace HID lighting up to 400W MH or HPS.

Construction:

- The drivers shall be located in the top cast housing and shall be accessible without tools by hinging the lower shade assembly. The driver and all electrical components shall be on a tray.
- The lower shade shall be made from a one-piece aluminum spinning.
- The housing is designed for LED thermal management without the use of metallic screens, cages, or fans. The top casting shall be able to be pendent mounted in place with a stainless steel safety pin and then permanently held in place with four stainless steel bolts.

Electrical:

- 100V through 277V, 50 Hz to 60 Hz (UNV), or 347V or 480V input.
- Power factor is ≥0.90 at full load.
- Dimming drivers are standard with connections for external dimming equipment available upon request.
- Component-to-component wiring within the luminaire may carry no more than 80% of rated load and is listed by UL for use at 600VAC at 50°C or higher.
- Plug disconnects are listed by UL for use at 600 VAC, 13A or higher. 13A rating applies to primary (AC) side only.
- Fixture electrical compartment shall contain all LED driver components.
- Button photocell available.
- Ambient operating temperature -40°C to 40°C
- Surge protection - 20KA.
- Lifeshield™ Circuit - protects luminaire from excessive temperature. The device shall activate at a specific, factory-preset temperature, and progressively reduce power over a finite temperature range. A luminaire equipped with the device may be reliably operated in any ambient temperature up to 55°C (131°F). Operation shall be smooth and undetectable to the eye. Thermal circuit is designed to "fail on", allowing the luminaire to revert to full power in the event of an interruption of its power supply, or faulty wiring connection to the drivers. The device shall be able to co-exist with other 0-10V control devices (occupancy sensors, external dimmers, etc.).

Controls/Options:

- Available with Energeni for optional set dimming, timed dimming with simple delay, or timed dimming based on time of night visit: www.beaconproducts.com/products/energeni
- Urban can be specified with **SiteSync™** wireless control system for reduction in energy and maintenance cost while optimizing light quality 24/7. See ordering information or visit: www.hubbelllighting.com/products/sitesync/ for more details

Finish:

- IFS polyester powder-coat electrostatically applied and thermocured.
- IFS finish consists of a five stage pretreatment regimen with a polymer primer sealer and top coated with a thermoset super TGIC polyester powder coat finish.
- The finish meets the AAMA 605.2 performance specification which includes passing a 3000 hour salt spray test for corrosion resistance and resists cracking or loss of adhesion per ASTM D522 and resists surface impacts of up to 160 inch-pounds.

Certifications:

- DesignLights Consortium (DLC) qualified, consult DLC website for more details: http://www.designlights.org/QPL
- NRTL Certified, UL8750, UL 1598 and CSA22.2#250. 13-14 for wet locations
- IDA approved
- This product is approved by the Florida Fish and Wildlife Conservation Commission. Separate spec available at http://www.beaconproducts.com/products/urban

Warranty:

Five year limited warranty for more information visit: www.hubbelllighting.com/resources/warranty

CERTIFICATIONS/LISTINGS

C SP US

ida

*3000K and warmer CCTs only

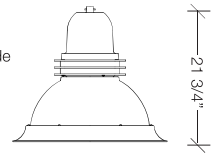
PRODUCT IMAGE(S)

Shown with arm

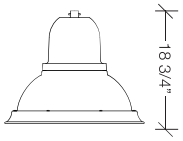
Shown with SiteSync™

STYLES

CAP - Round Shade

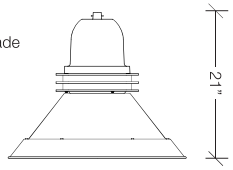


26" - CAP
Shown with optional 3RNW rings
EPA: 1.39 ft²
40 lbs

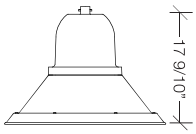


21" - CAP
EPA: 1.04 ft²
35 lbs

MRDS - Deep Shade

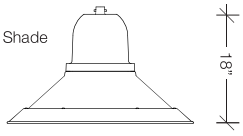


26" - MRDS
Shown with optional 3RNW rings
EPA: 1.25 ft²
40 lbs



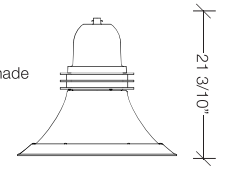
21" - MRDS
EPA: 1.00 ft²
35 lbs

MRSS - Shallow Shade

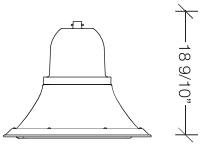


26" - MRSS
EPA: 1.17 ft²
40 lbs

MAR - Curved Shade



26" - MAR
Shown with optional 3RNW rings
EPA: 1.25 ft²
40 lbs



21" - MAR
EPA: 1.00 ft²
35 lbs

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HUBBELL Lighting

ORDERING INFORMATION

ORDERING EXAMPLE: URBCAP21/36NB-80/5K/UNV/T4/SWP/NRNW/BBT

URB | | | | | | | | | | | |

MODEL
- **URB** Urban

SERIES
- **CAP-21** 21" Capitol
- **MRDS-21** 21" Miramar deep shade
- **MAR-21** 21" Maritas
- **CAP-26** 26" Capitol
- **MRSS-26** 26" Miramar shallow shade
- **MRDS-26** 26" Miramar deep shade
- **MAR-26** 26" Maritas

LED COLOR[7]
- **3K** 3000K
- **4K** 4000K
- **5K** 5000K

VOLTAGE
- **UNV** 120-277V
- **347V** 347V
- **480V** 480V

ENGINE-WATTS
- **24NB-27** 27W, LED array
- **24NB-55** 55W, LED array
- **36NB-80** 80W, LED array
- **48NB-110**[1] 110W, LED array
- **60NB-136**[1] 136W, LED array

OPTICS[2]
- **T1** type I
- **T2** type II
- **T3** type III
- **T4** type IV
- **T4BLC** type IV, backlight control
- **T5R** type V, rectangular
- **T5QM** type V, square medium
- **T5W** type V, round wide

ELECTRICAL OPTIONS
- **PEC-120** button, 120V
- **PEC-208** button, 208V
- **PEC-240** button, 240V
- **PEC-277** button, 277V

STYLE
- **NRNW** No rings
- **3RNW** Three rings

SENSOR OPTION
- **MOB**[4,6,8] Motion sensor 33% or 50% dimming

CONTROL OPTIONS
- **GENI-XX**[5] energeni
- **SWP**[3,4] SiteSync Wireless Pre-Commission

FINISH
- **BBT** basic black textured
- **BMT** black matte textured
- **WHT** white textured
- **MBT** metallic bronze textured
- **BZT** bronze textured
- **DBT** dark bronze textured
- **GYS** gray smooth
- **DPS** dark platinum smooth
- **GNT** green textured
- **MST** metallic silver textured
- **MTT** metallic titanium textured
- **OWI** old world iron
- **RAL** _____

1 26" only
2 To rotate optics Left or Right 90 degrees, specify L or R after the optical distribution example:T4L
3 Must specify group and zone information at time of order. See www.hubbelllighting.com/controls/sitesync for further details.
4 Not available with other control or sensor options.
5 When ordering Energeni, specify the routine setting code (Example GENI-04). See Energeni brochure and instructions for setting table and options. Not available with sensor options.
6 Specify time delay; dimming level and mounting height.
7 This product is approved by the Florida Fish and Wildlife Conservation Commission. Separate spec available at
8 Only available on 24NB and 36NB configurations
http://cdn.beaconproducts.com/content/products/specs/specs_files/Urban_LED_spec_sheet_turtle.pdf

PROVIDE LAMINATED DOUGLAS FIR 5" SQUARE STRAIGHT WOOD POLE

PRECOMMISSIONED SITESYNC ORDERING INFORMATION: When ordering a fixture with the SiteSync lighting control option, additional information will be required to complete the order. The SiteSync Commissioning Form or alternate schedule information must be completed. This form includes Project location, Group information, and Operating schedules. For more detailed information please visit www.hubbelllighting.com/products/sitesync/ or contact Hubbell Lighting tech support at (800) 345-4928.

SiteSync fixtures with Motion control (SWPM) require the mounting height of the fixture for selection of the lens.

Examples: URB/CAP-26/60NB-136/3K/UNV/T5QM/SWP/NRNW/BBT SiteSync only
URB/CAP-26/60NB-136/3K/UNV/T5QM/SWPM-20F/NRNW/BBT SiteSync with Motion Control

SiteSync Lighting Control is available from our most popular brands in a broad range of award-winning product families.

Accessories and Services (Ordered Separately)

Catalog Number	Description
SWUSB*^	SiteSync interface software loaded on USB flash drive for use with owner supplied PC (Windows based only). Includes SiteSync license, software and USB radio bridge node.
SWTAB*^	Windows tablet and SiteSync interface software. Includes tablet with preloaded software, SiteSync license and USB radio bridge node.
SWBRG+	SiteSync USB radio bridge node only. Order if a replacement is required or if an extra bridge node is requested.

*When ordering SiteSync at least one of these two interface options must be ordered per project.
+ If needed, an additional Bridge Node can be ordered.

ELECTRICAL DATA

# OF LEDS	NUMBER OF DRIVERS	DRIVE CURRENT (mA)	INPUT VOLTAGE (V)	SYSTEM POWER (w)	CURRENT (Amps)
24	1	350mA	120	27	0.2
			277		0.1
			347		0.1
			480		0.1
24	2	700 mA	120	55	0.5
			277		0.2
			347		0.2
			480		0.1
36	1	700 mA	120	80	0.7
			277		0.3
			347		0.2
			480		0.2
48	1	700 mA	120	110	0.9
			277		0.4
			347		0.3
			480		0.2
60	1	700 mA	120	136	1.1
			277		0.5
			347		0.4
			480		0.3

PROJECTED LUMEN MAINTENANCE

AMBIENT TEMP.	0	25,000	50,000	[1]TM-21-11 60,000	100,000	Calculated L70 (HOURS)
25°C / 77°C	1.00	0.97	0.95	0.95	0.92	>470,000

[1] Projected per IESNA TM-21-11
Data references the extrapolated performance projections for the base model in a 40°C ambient, based on 10,000 hours of LED testing per IESNA LM-80-08.

AMBIENT TEMPERATURE		LUMEN MULTIPLIER
0°C	32°F	1.02
10°C	50°F	1.01
20°C	68°F	1.00
25°C	77°F	1.00
30°C	86°F	0.98
40°C	104°F	0.98

Use these factors to determine relative lumen output for average ambient temperatures from 0-40°C (32-104°F).

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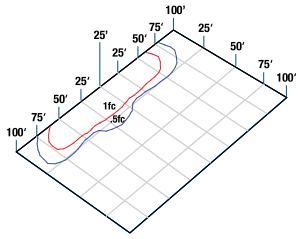
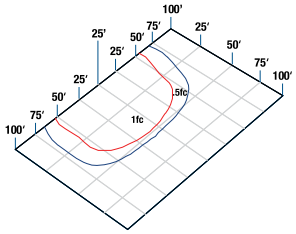
PHOTOMETRICS

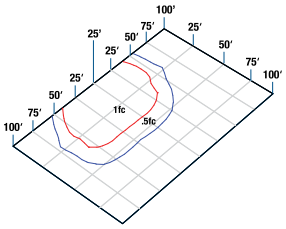
Type II
URB-60NB-136-5K-T2



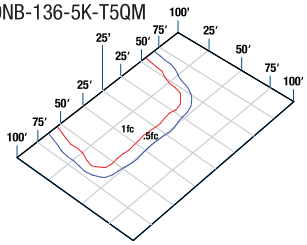
Type III
URB-60NB-136-5K-T3



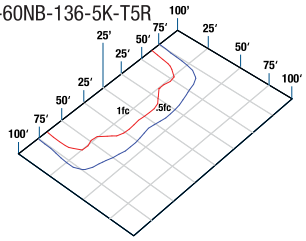
Type IV
URB-60NB-136-5K-T4



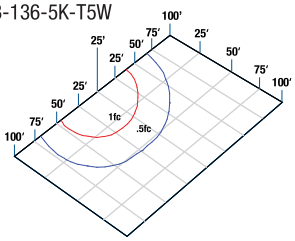
Type V Square Medium
URB-60NB-136-5K-T5QM



Type V Rectangular
URB-60NB-136-5K-T5R



Type V Round Wide
URB-60NB-136-5K-T5W



PERFORMANCE DATA

				5K (5000K nominal, 70 CRI)					4K (4000K nominal, 70 CRI)					3K (3000K nominal, 70 CRI)				
# LED'S	DRIVE CURRENT (MILLIAMPS)	SYSTEM WATTS (120-277V)	DISTRIBUTION TYPE	LUMENS	LPW[1]	B	U	G	LUMENS	LPW[1]	B	U	G	LUMENS	LPW[1]	B	U	G
24	350 mA	27 W	T2	2833	105	1	0	1	2805	104	1	0	1	2408	89	1	0	1
			T3	2805	104	1	0	1	2777	103	1	0	1	2392	89	1	0	1
			T4	3086	114	1	0	1	3055	113	1	0	1	2623	97	1	0	1
			T5QM	3085	114	2	0	0	3055	113	2	0	0	2623	97	1	0	0
			T5R	3142	115	2	0	2	3111	115	2	0	2	2670	99	2	0	2
			T5W	3044	113	2	0	1	3014	112	2	0	1	2600	96	2	0	1
24	700 mA	55 W	T2	5666	102	2	0	2	5610	101	2	0	2	4816	86	1	0	2
			T3	5610	101	1	0	2	5554	100	1	0	2	4784	86	1	0	2
			T4	6171	111	1	0	2	6110	109	1	0	2	5245	94	1	0	2
			T5QM	6171	111	3	0	1	6110	109	3	0	1	5245	94	2	0	1
			T5R	6283	113	3	0	3	6221	111	3	0	3	5341	96	3	0	3
			T5W	6087	109	3	0	1	6027	108	3	0	1	5201	93	3	0	1
36	700 mA	80 W	T2	8505	101	2	0	3	8415	100	2	0	3	7224	87	2	0	2
			T3	8415	100	2	0	2	8331	99	2	0	2	7175	86	2	0	2
			T4	9256	110	1	0	3	9164	109	1	0	3	7868	94	1	0	3
			T5QM	9257	110	3	0	1	9164	109	3	0	1	7868	94	3	0	1
			T5R	9425	112	3	0	3	9331	111	3	0	3	8011	96	3	0	3
			T5W	9131	109	3	0	2	9040	108	3	0	2	7801	93	3	0	2
48*	700 mA	110 W	T2	11332	102	3	0	3	11220	101	3	0	3	9633	87	2	0	3
			T3	11220	101	2	0	3	11108	100	2	0	3	9567	86	2	0	3
			T4	12342	111	2	0	3	12219	110	2	0	3	10491	95	2	0	3
			T5QM	12342	111	3	0	2	12219	111	3	0	2	10491	95	3	0	2
			T5R	12567	113	4	0	4	12441	112	4	0	4	10682	96	3	0	3
			T5W	12175	110	4	0	2	12053	109	4	0	2	10402	94	4	0	2
60*	700 mA	136 W	T2	14165	103	3	0	3	14025	102	3	0	3	12041	88	3	0	3
			T3	14025	102	3	0	3	13885	101	3	0	3	11959	87	3	0	3
			T4	15427	113	2	0	3	15274	111	2	0	3	13114	96	2	0	3
			T5QM	15427	113	4	0	2	15274	111	4	0	2	13314	96	3	0	2
			T5R	15708	115	4	0	4	15259	111	4	0	4	13352	97	4	0	4
			T5W	15218	111	4	0	2	15551	114	4	0	2	13002	95	4	0	2

[1]Lumen values are from photometric tests performed in accordance with IESNA LM-79-08. Data is considered to be representative of the configurations shown. Actual performance may differ as a result of end-user environment and application.

*AVAILABLE IN THE 26" URBAN ONLY

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HUBBELL Lighting

ELECTRICAL DATA

# OF LEDS	NUMBER OF DRIVERS	DRIVE CURRENT (mA)	INPUT VOLTAGE (V)	SYSTEM POWER (w)	CURRENT (Amps)
24	1	350mA	120	27	0.2
			277		0.1
			347		0.1
			480		0.1
24	2	700 mA	120	55	0.5
			277		0.2
			347		0.2
			480		0.1
36	1	700 mA	120	80	0.7
			277		0.3
			347		0.2
			480		0.2
48	1	700 mA	120	110	0.9
			277		0.4
			347		0.3
			480		0.2
60	1	700 mA	120	136	1.1
			277		0.5
			347		0.4
			480		0.3

PROJECTED LUMEN MAINTENANCE

AMBIENT TEMP.	0	25,000	50,000	[1]TM-21-11 60,000	100,000	Calculated L70 (HOURS)
25°C / 77°C	1.00	0.97	0.95	0.95	0.92	>470,000

[1] Projected per IESNA TM-21-11

Data references the extrapolated performance projections for the base model in a 40°C ambient, based on 10,000 hours of LED testing per IESNA LM-80-08.

AMBIENT TEMPERATURE		LUMEN MULTIPLIER
0°C	32°F	1.02
10°C	50°F	1.01
20°C	68°F	1.00
25°C	77°F	1.00
30°C	86°F	0.98
40°C	104°F	0.98

Use these factors to determine relative lumen output for average ambient temperatures from 0-40°C (32-104°F).

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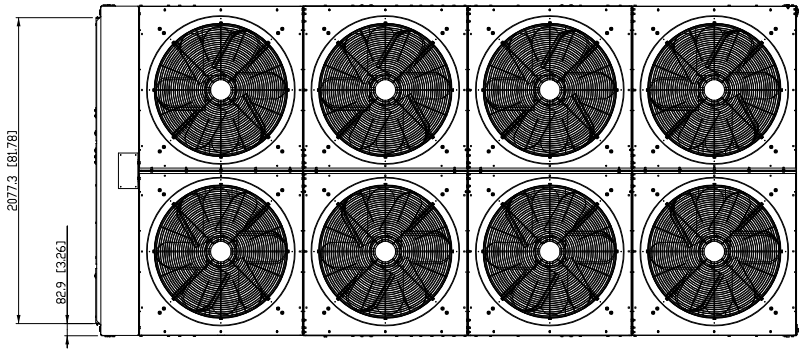
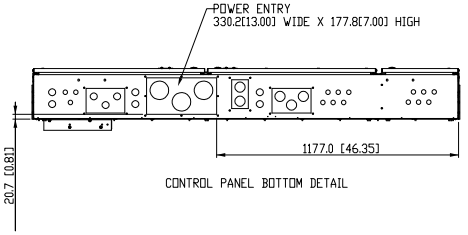
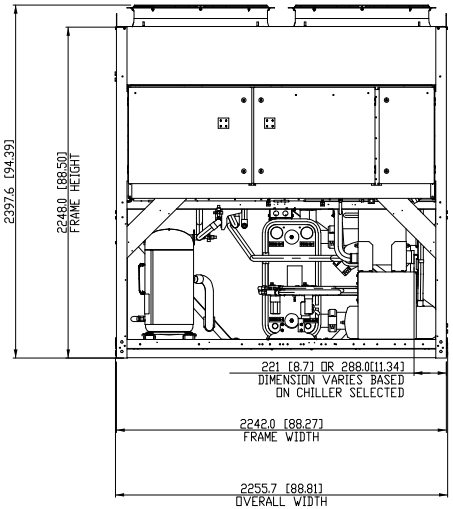
NOTE:

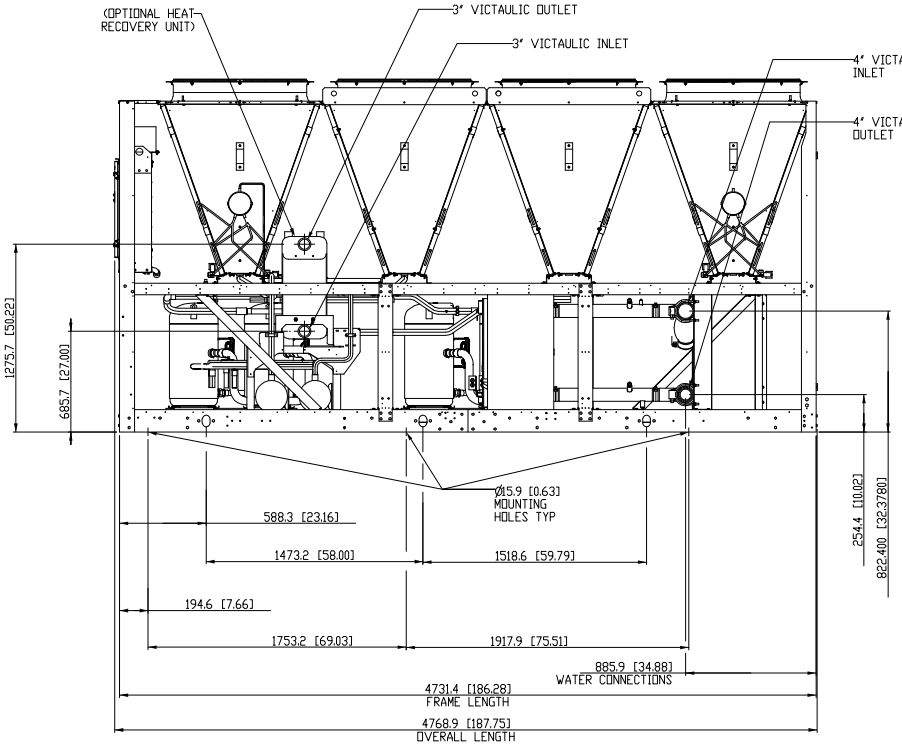
1. PLACEMENT ON A LEVEL SURFACE FREE OF OBSTRUCTIONS (INCLUDING SNOW, FOR WINTER OPERATION) OR AIR-CIRCULATION ENSURES RATE PERFORMANCE, RELIABLE OPERATION AND EASE OF MAINTENANCE. SITE RESTRICTIONS MAY COMPROMISED MINIMUM CLEARANCES INDICATED BELOW, RESULTING IN UNPREDICTABLE AIR FLOW PATTERNS AND POSSIBLE DIMINISHED PERFORMANCE. JOHNSON CONTROLS UNIT CONTROLS WILL OPTIMIZE OPERATION WITHOUT NUISANCE HIGH PRESSURE SAFETY CUTOUT. HOWEVER, THE SYSTEM DESIGNER MUST CONSIDER POTENTIAL PERFORMANCE DEGRADATION.
   1.1. RECOMMENDED MINIMUM CLEARANCES:
      1.1.1. SIDE TO WALL - 1828.8mm[72.00]
      1.1.2. REAR TO WALL - 1828.8mm[72.00]
      1.1.3. CONTROL PANEL TO WALL - 1219.2mm[48.00]
      1.1.4. TOP - NO OBSTRUCTIONS ALLOWED.
      1.1.5. DISTANCE BETWEEN ADJACENT UNITS - 3048mm[120.00]
      1.1.6. NO MORE THAT ONE ADJACENT WALL MAY BE HIGHER THAN UNIT.
2. WEIGHT AND CENTRE OF GRAVITY- REF TO AVM REPORT
3. INSTALLING CONTRACTOR MUST INCLUDE VENT AND DRAIN ACCOMMODATIONS IN CHILLED WATER PIPING NEAR EVAPORATOR.
4. NUMBER OF COMPRESSORS MAY VARY FROM DRAWING.
   4.1. REFER TO YORKWORKS REPORTS
5. OVERALL HEIGHT OF UNIT IS 2394.6mm-[94.27"] ON MONTERREY, MEXICO AND SAN ANTONIO, TEXAS BUILDS AND EUROPEAN BUILDS (VSD FANS ONLY).
6. OVERALL HEIGHT OF UNIT IS 2507.0mm-[98.70"] ON EUROPEAN BUILDS (STANDARD) FANS ONLY).

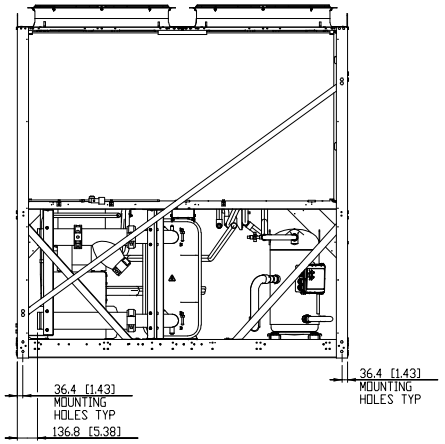




CONTROL PANEL BOTTOM DETAIL







THIS DRAWING PERTAINS TO THE FOLLOWING MODELS:		
YLAA 0125 HE	YLAA 0150 SE	YLAA 0517 HE
YLAA 0136 SE	YLAA 0155 SE	
YLAA 0139 HE	YLAA 0456 HE	
YLAA 0142 HE	YLAA 0516 HE	

REVISION	REV.	DATE	EC. NO.	DR.	CHK.	ENG.
	C	11-JAN-2018	IN17-0373	E.J	A.S	
	NEW UNIT MODELS ADDED TO TABLE.					

CONTINUED

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DRAWING TOLERANCES	
TOLERANCES IN TABLE APPLY UNLESS OTHERWISE SPECIFIED IN DIMENSIONS ON THE DRAWING	
XXX. (XXX.X)	±1.5mm (.059)
XXXX (XXX.XX)	±.75mm (.030)
XXXXX (XXX.XXX)	±.35mm (.014)
ANGLES	±1° 0'

NOTE
PRIMARY DIMENSIONS ARE THE STANDARD MILLIMETER, IMPERIAL INCH DIMENSIONS ARE SHOWN IN BRACKETS.

THIRD ANGLE

Johnson Controls

JOHNSON CONTROLS - BUILDING EFFICIENCY

507 EAST MICHIGAN STREET, MILWAUKEE, WI, 53202 USA

DO NOT SCALE

YLAA 8-FAN 50 & 60HZ WITH HEAT RECOVERY

DRAWN	M.LUPTON	06-DEC-2013
MODELER	M.LUPTON	06-DEC-2013
CHKD	A.SAYCH	06-DEC-2013
ENG		

MATERIAL N/A
ENG. STD. N/A
PART NO.
CUT SIZE N/A

SCALE: 0.200 | MASS (kg): 0.000 | A1 | CAGE NUMBER 66935 | DRAWING NUMBER 035-24059-010 | REVISION C | VERSION 4.0 | DRIG. NO: | SHEET 1 OF 1 | RELEASED

Three-phase pad-mounted compartmental type transformer

General

At Eaton, we are constantly striving to introduce new innovations to the transformer industry, bringing you the highest quality, most reliable transformers. Eaton's Cooper Power series Transformer Products are ISO 9001 compliant, emphasizing process improvement in all phases of design, manufacture, and testing. In order to drive this innovation, we have invested both time and money in the Thomas A. Edison Technical Center, our premier research facility in Franksville, Wisconsin. Such revolutionary products as distribution-class UltraSIL™ Polymer-Housed Evolution™ surge arresters and Envirotemp™ FR3™ fluid have been developed at our Franksville lab.

With transformer sizes ranging from 45 kVA to 12 MVA and high voltages ranging from 2400 V to 46 kV, Eaton has you covered. From fabrication of the tanks and cabinets to winding of the cores and coils, to production of arresters, switches, tap changers, expulsion fuses, current limit fuses, bushings (live and dead) and molded rubber goods, Eaton does it all. Eaton's Cooper Power series transformers are available with electrical grade mineral oil or Envirotemp™ FR3™ fluid, a less-flammable and bio-degradable fluid. Electrical codes recognize the advantages of using Envirotemp™ FR3™ fluid both indoors and outdoors for fire sensitive applications. The bio-based fluid meets Occupational Safety and Health Administration (OSHA) and Section 450.23 NEC Requirements.

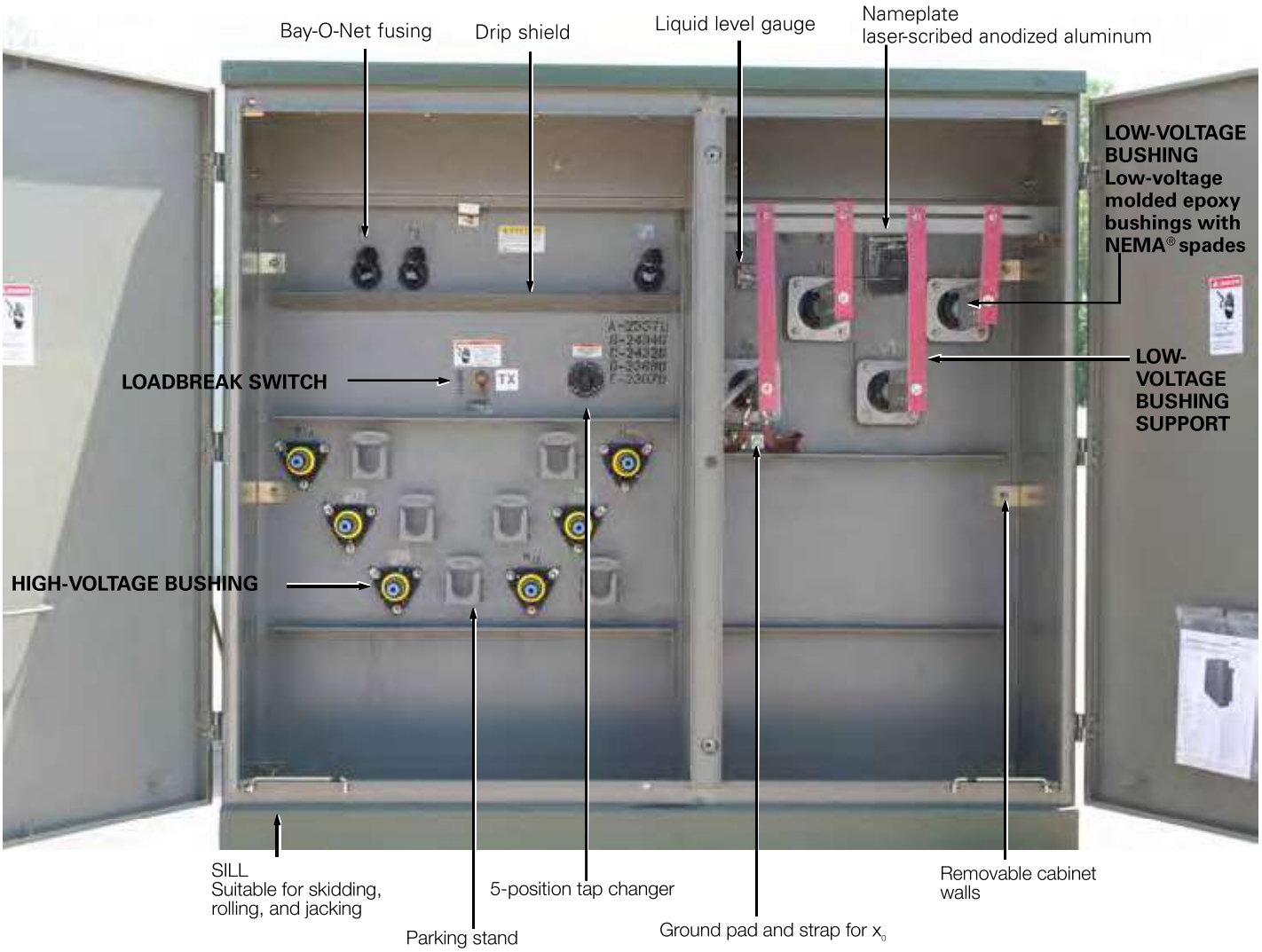

Figure 1. Three-phase pad-mounted compartmental type transformer.

Table 1. Product Scope

Type	Three Phase, 50 or 60 Hz, 65 °C Rise (55 °C, 55/65 °C), 65/75 °C, 75 °C
Fluid Type	Mineral oil or Envirotemp™ FR3™ fluid
Coil Configuration	2-winding or 4-winding or 3-winding (Low-High-Low), 3-winding (Low-Low-High)
Size	45 – 10,000 kVA
Primary Voltage	2,400 – 46,000 V
Secondary Voltage	208Y/120 V to 14,400 V
Specialty Designs	Inverter/Rectifier Bridge
	K-Factor (up to K-19)
	Vacuum Fault Interrupter (VFI)
	UL® Listed & Labeled and Classified
	Factory Mutual (FM) Approved®
	Solar/Wind Designs
	Differential Protection
	Seismic Applications (including OSHPD)
	Hardened Data Center

Table 2. Three-Phase Ratings

Three-Phase 50 or 60 Hz
kVA Available[1] 45, 75, 112.5, 150, 225, 300, 500, 750, 1000, 1500, 2000, 2500, 3000, 3750, 5000, 7500, 10000

[1]Transformers are available in the standard ratings and configurations shown or can be customized to meet specific needs.

Table 3. Impedance Voltage

	Low-voltage rating		
Rating (kVA)	**≤ 600 V**	**2400 Δ through 4800 Δ**	**6900 Δ through 13800GY/7970 or 13800 Δ**
45-75	2.70-5.75	2.70-5.75	2.70-5.75
112.5-300	3.10-5.75	3.10-5.75	3.10-5.75
500	4.35-5.75	4.35-5.75	4.35-5.75
750-2500	5.75	5.75	5.75
3750	5.75	5.75	6.00
5000		6.00	6.50

Note: The standard tolerance is ± 7.5%

Table 4. Audible Sound Levels

	NEMA® TR-1 Average
Self-Cooled, Two Winding kVA Rating	**Decibels (dB)**
45-500	56
501-700	57
701-1000	58
1001-1500	60
1501-2000	61
2001-2500	62
2501-3000	63
3001-4000	64
4001-5000	65
5001-6000	66
6001-7500	67
7501-10000	68

Table 5. Insulation Test Levels

KV Class	Induced Test 180 or 400 Hz 7200 Cycle	kV BIL Distribution	Applied Test 60 Hz (kV)
1.2	Twice Rated Voltage	30	10
2.5		45	15
5		60	19
8.7		75	26
15		95	34
25		125	40
34.5		150	50

Table 6. Temperature Rise Ratings 0-3300 Feet (0-1000 meters)

	Standard	Optional
Unit Rating (Temperature Rise Winding)	65 °C	55 °C, 55/65 °C, 75 °C
Ambient Temperature Max	40 °C	50 °C
Ambient Temperature 24 Hour Average	30 °C	40 °C
Temperature Rise Hotspot	80 °C	65 °C

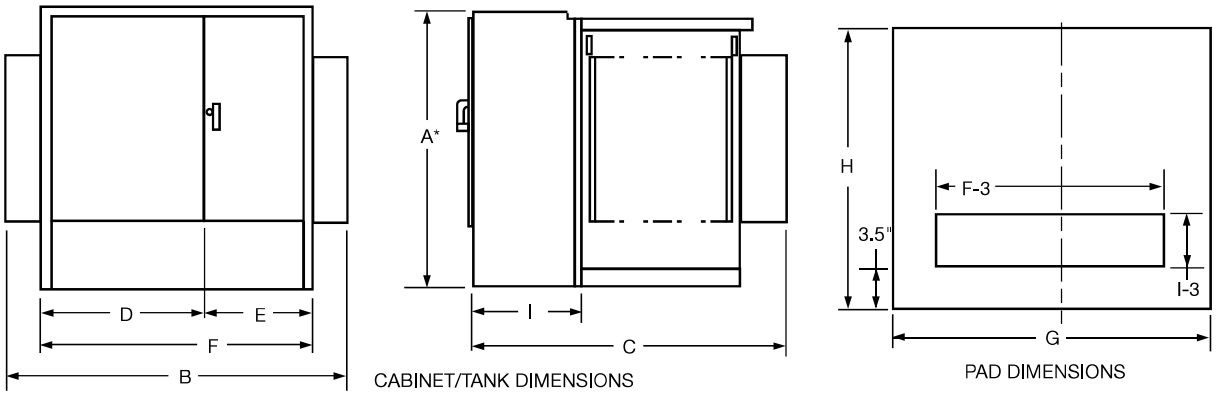

Figure 2. Transformer and pad dimensions.

* Add 9" for Bay-O-Net fusing.

Table 7. Fluid-filled—aluminum windings 55/65 °C Rise[1]

65° Rise	DEAD-FRONT—LOOP OR RADIAL FEED—BAY-O-NET FUSING OIL FILLED—ALUMINUM WINDINGS										
	OUTLINE DIMENSIONS (in.)									Gallons of	Approx. Total
kVA Rating	A*	B	C	D	E	F	G	H	I	Fluid	Weight (lbs.)
45	50	68	39	42	26	68	72	43	20	110	2,100
75	50	68	39	42	26	68	72	43	20	115	2,250
112.5	50	68	49	42	26	68	72	53	20	120	2,350
150	50	68	49	42	26	68	72	53	20	125	2,700
225	50	72	51	42	30	72	76	55	20	140	3,150
300	50	72	51	42	30	72	76	55	20	160	3,650
500	50	89	53	42	30	72	93	57	20	190	4,650
750	64	89	57	42	30	72	93	61	20	270	6,500
1000	64	89	59	42	30	72	93	63	20	350	8,200
1500	73	89	86	42	30	72	93	90	24	410	10,300
2000	73	72	87	42	30	72	76	91	24	490	12,500
2500	73	72	99	42	30	72	76	103	24	530	14,500
3000	73	84	99	46	37	84	88	103	24	620	16,700
3750	84	85	108	47	38	85	88	112	24	660	19,300
5000	84	96	108	48	48	96	100	112	24	930	25,000
7500	94	102	122	54	48	102	100	126	24	1,580	41,900

1 Weights, gallons of fluid, and dimensions are for reference only and not for construction. Please contact Eaton for exact dimensions.

* Add 9" for Bay-O-Net fusing.

Table 8. Fluid-Filled—Copper Windings 55/65 °C Rise[1]

65° Rise	DEAD-FRONT—LOOP OR RADIAL FEED—BAY-O-NET FUSING OIL FILLED—COPPER WINDINGS										
	OUTLINE DIMENSIONS (in.)									Gallons of	Approx. Total
kVA Rating	A*	B	C	D	E	F	G	H	I	Fluid	Weight (lbs.)
45	50	64	39	34	30	64	69	43	20	110	2,100
75	50	64	39	34	30	64	69	43	20	115	2,350
112.5	50	64	49	34	30	64	69	53	20	115	2,500
150	50	64	49	34	30	64	69	53	20	120	2,700
225	50	64	51	34	30	64	73	55	20	140	3,250
300	50	64	51	34	30	64	75	55	20	160	3,800
500	50	81	53	34	30	64	85	57	20	200	4,800
750	64	89	57	42	30	72	93	61	20	255	6,500
1000	64	89	59	42	30	72	93	63	20	300	7,800
1500	73	89	86	42	30	72	93	90	24	410	10,300
2000	73	72	87	42	30	72	76	91	24	420	11,600
2500	73	72	99	42	30	72	76	103	24	500	14,000
3000	73	84	99	46	37	84	88	103	24	720	18,700
3750	84	85	108	47	38	85	88	112	24	800	20,500
5000	84	96	108	48	48	96	100	112	24	850	25,000
7500	94	102	122	54	48	102	100	126	24	1,620	46,900

CAS

MILLS

[1] Weights, gallons of fluid, and dimensions are for reference only and not for construction. Please contact Eaton for exact dimensions.

* Add 9" for Bay-O-Net fusing.

Standard features

Connections and neutral configurations

- Delta - Wye: Low voltage neutral shall be a fully insulated X0 bushing with removable ground strap.
- Grounded Wye-Wye: High voltage neutral shall be internally tied to the low voltage neutral and brought out as the H0X0 bushing in the secondary compartment with a removable ground strap.
- Delta-Delta: Transformer shall be provided without a neutral bushing.
- Wye-Wye: High voltage neutral shall be brought out as the H0 bushing in the primary compartment and the low voltage neutral shall be brought as the X0- bushing in the secondary compartment.
- Wye-Delta: High voltage neutral shall be brought out as the H0 bushing in the primary compartment. No ground strap shall be provided (line to line rated fusing is required).

High and low voltage bushings

- 200 A bushing wells (15, 25, and 35 kV)
- 200 A, 35 kV Large Interface
- 600 A (15, 25, and 35 kV) Integral bushings (dead-front)
- Electrical-grade wet-process porcelain bushings (live-front)

Tank/cabinet features

- Bolted cover for tank access (45-2500 kVA)
- Welded cover with hand hole (>2500 kVA)
- Three-point latching door for security
- Removable sill for easy installation
- Lifting lugs (4)
- Stainless steel cabinet hinges and mounting studs
- Steel divider between HV and LV compartment
- 20" Deep cabinet (45-1000 kVA)
- 24" Deep cabinet (1500-7500 kVA)
- 30" Deep cabinet (34.5/19.92 kV)
- Pentahead captive bolt
- Stainless steel 1-hole ground pads (45-500 kVA)
- Stainless steel 2-hole ground pads (750-10,000 kVA)
- Parking Stands (dead-front)

Valves/plugs

- One-inch upper filling plug
- One-inch drain plug (45-500 kVA)
- One-inch combination drain valve with sampling device in low voltage compartment (750-10,000 kVA)
- Automatic pressure relief valve

Nameplate

- Laser-scribed anodized aluminum nameplate

Figure 3. Drain valve with sampler.

Figure 4. Automatic Pressure relief valve.

Figure 5. Liquid level gauge.

Figure 6. External Gauges.

Figure 7. External visible break with gauges.

Optional features

High and low voltage bushings

- 200 A (15, 25 kV) bushing inserts
- 200 A (15, 25 kV) feed thru inserts
- 200 A (15, 25 kV) (HTN) bushing wells with removable studs
- High-voltage 600 A (15, 25, 35 kV) deadbreak one-piece bushings
- Low voltage 6-, 8-holes spade
- Low voltage 12-, 16-, 20-holes spade (750-2500 kVA)
- Low voltage bushing supports

Tank/cabinet features

- Stainless steel tank base and cabinet
- Stainless steel tank base, cabinet sides and sill
- 100% stainless steel unit
- Service entrance (2 inch) in sill or cabinet side
- Touch-up paint (domestic)
- Copper ground bus bar
- Kirk-Key provisions
- Nitrogen blanket
- Bus duct cutout

Special designs

- Factory Mutual (FM)
- UL® Classified
- Triplex
- High altitude
- K-Factors
- Step-up
- Critical application
- Modulation transformers
- Seismic applications (including OSHPD)

Switches

- One, two, or three On/Off loadbreak switches
- 4-position loadbreak V-blade switch or T-blade switch
- Delta-wye switch
- 3-position V-Blade selector switch
- 100 A, 150 A, 300 A tap changers
- Dual voltage switch
- Visible break with VFI interrupter interlock
- External visible break (15, 25, and 35 kV, up to 3 MVA)
- External visible break with gauges (15, 25, and 35 kV, up to 3 MVA)

Gauges and devices

- Liquid level gauge (optional contacts)
- Pressure vacuum gauge (optional contacts and bleeder)
- Dial-type thermometer (optional alarm contacts)
- Cover mounted pressure relief device (optional alarm contacts)
- Ground connectors
- Hexhead captive bolt
- Molded case circuit breaker mounting provisions
- External gauges in padlockable box

Overcurrent protection

- Bay-O-Net fusing (Current sensing, dual sensing, dual element, high amperage overload)
- Bay-O-Net expulsion fuse in series with a partial range under-oil ELSP current limiting fuse (below 23 kV)
- Cartridge fusing in series with a partial range under-oil ELSP current limiting fuse (above 23 kV)
- MagneX™ interrupter with ELSP current-limiting fuse
- Vacuum Fault Interrupter (VFI)
- Visible break window
- Fuse/switch interlock

Valves/plugs

- Drain/sampling valve in high-voltage compartment
- Globe type upper fill valve

Overvoltage protection

- Distribution-, intermediate-, or station-class surge arresters
- Elbow arresters (for dead-front connections)

Metering/fan/control

- Full metering package
- Current Transformers (CTs)
- Metering Socket
- NEMA® 4 control box (optional stainless steel)
- NEMA® 7 control box (explosion proof)
- Fan Packages

Testing

- Customer test witness
- Customer final inspection
- Zero Sequence Impedance Test
- Heat Run Test
- ANSI® Impulse Test
- Audible Sound Level Test
- RIV (Corona) Test
- Dissolved Gas Analysis (DGA) Test
- 8- or 24-Hour Leak Test

Coatings (paint)

- ANSI® Bell Green
- ANSI® #61 Light Gray
- ANSI® #70 Sky Gray
- Special paint available per request

Nameplate

- Stainless steel nameplate

Decals and labels

- High voltage warning signs
- Mr. Ouch
- Bi-lingual warning
- DOE compliant
- Customer stock code
- Customer stenciling
- Shock and arc flash warning decal
- Non-PCB decal

Construction

Core

The three-legged, step-lap mitered core construction is manufactured using a high-quality cutting machine. For maximum efficiency, cores are precisely stacked, virtually eliminating gaps in the corner joints.

Five-legged wound core or shell-type triplex designs are used for wye-wye connected transformers, and other special transformer designs.

Cores are manufactured with precision cut, burr-free, grain-oriented silicon steel. Many grades of core steel are available for optimizing core loss efficiency.

Coils

Pad-mounted transformers feature a rectangular coil configuration with wire-wound, high-voltage primaries and sheet-wound secondaries. The design minimizes axial stress developed by short circuits and provides for magnetic balancing of tap connections.

Coils are wound using the highest quality winding machines providing exacting tension control and conductor placement for superior short-circuit strength and maximum efficiency.

Extra mechanical strength is provided by diamond pattern, epoxy-coated paper insulation, used throughout the coil, with additional epoxy at heavy stress points. The diamond pattern distribution of the epoxy and carefully arranged ducts, provide a network of passages through which cooling fluid can freely circulate.

Coil assemblies are heat-cured under calculated hydraulic pressure to ensure performance against short-circuit forces.

Core and coil assemblies

Pad-mounted transformer core and coil assemblies are braced with heavy steel ends to prevent the rectangular coil from distorting under short-circuit conditions. Plates are clamped in place using presses, and welded or bolted to form a solid core and coil assembly. Core and coil assemblies exceed ANSI® and IEEE® requirements for short-circuit performance. Due to the rigidity of the design, impedance shift after short-circuit is comparable to that of circular wound assemblies.

Tanks

Transformer tanks are designed for high strength and ease of handling, installation, and maintenance. Tanks are welded using precision-cut, hot rolled, pickled and oiled steel. They are sealed to protect the insulating fluid and other internal components.

Transformer tanks are pressure-tested to withstand 7 psig without permanent distortion and 15 psig without rupture.

Tank finish

An advanced multi-stage finishing process exceeds IEEE Std C57.12.28™-2014 standards. The eight-stage pre-treatment process assures coating adhesion and retards corrosion. It converts tank surfaces to a nonmetallic, water insoluble iron phosphate coating.

The paint method consists of two distinct layers of paint. The first is an epoxy primer (E-coat) layer which provides a barrier against moisture, salt and corrosives. The two-component urethane final coat seals and adds ultraviolet protection.

Vacuum processing

Transformers are dried and filled with filtered insulating fluid under vacuum, while secondary windings are energized. Coils are heated to drive out moisture, ensuring maximum penetration of fluid into the coil insulation system.

Insulating fluid

Eaton's Cooper Power series transformers are available with electrical-grade mineral insulating oil or Envirotemp™ FR3™ fluid. The highly refined fluids are tested and degassed to assure a chemically inert product with minimal acid ions. Special additives minimize oxygen absorption and inhibit oxidation. To ensure high dielectric strength, the fluid is re-tested for dryness and dielectric strength, refiltered, heated, dried, and stored under vacuum before being added to the completed transformer.

Eaton's Cooper Power series transformers filled with Envirotemp™ FR3™ fluid enjoy unique fire safety, environmental, electrical, and chemical advantages, including insulation life extending properties.

A bio-based, sustainable, natural ester dielectric coolant, Envirotemp™ FR3™ fluid quickly and thoroughly biodegrades in the environment and is non-toxic per acute aquatic and oral toxicity tests.

Building for Environmental and Economic Sustainability (BEES) total life cycle assessment software, utilized by the US Dept. of Commerce, reports its overall environmental performance impact score at 1/4th that reported for mineral oil. Envirotemp™ FR3™ fluid has also earned the EPA Environmental Technology Verification of transformer materials.

With a fire point of 360 °C, Envirotemp™ FR3™ fluid is FM Approved® and Underwriters Laboratories (UL®) Classified "Less-Flammable" per NEC® Article 450-23, fitting the definition of a Listed Product per NEC®.

Figure 8. VFI transformer with visible break.

Pad-mounted VFI transformer

Eaton's Cooper Power series VFI transformer combines a conventional distribution transformer with the proven Vacuum Fault Interrupter (VFI). This combination provides both voltage transformation and transformer over current protection in one space saving and money saving package. The pad-mounted VFI transformer protects the transformer and provides proper coordination with upstream protective devices. When a transformer fault or overload condition occurs, the VFI breaker trips and isolates the transformer.

The three-phase VFI breaker has independent single-phase initiation, but is three-phase mechanically gang-tripped. A trip signal on any phase will open all three phases. This feature eliminates single-phasing of three phase loads. It also enables the VFI breaker to be used as a three-phase load break switch.

Due to the resettable characteristics of the VFI breaker, restoring three-phase service is faster and easier.

The sealed visible break window and switch is an option that can be installed to provide visible break contact. This feature provides enhanced safety and allows an operator to see if the loadbreak switch contacts are in an open or closed position before performing maintenance.

Envirotran™ FM Approved special protection transformer

Eaton's Cooper Power series Envirotran™ transformer is FM Approved and suitable for indoor locations. Factory Mutual Research Corporation's (FMRC) approval of the Envirotran transformer line makes it easy to comply with and verify compliance with Section 450.23, 2008 NEC, Less-Flammable Liquid-Filled Transformer Requirements for both indoor and outdoor locations.

Envirotran FM Approved transformers offer the user the benefit of a transformer that can be easily specified to comply with NEC, and makes FM Safety Data Sheet compliance simpler, while also providing maximum safety and flexibility for both indoor and outdoor installations.

Because the "FM Approved" logo is readily visible on the transformer and its nameplate, NEC compliance is now easily verifiable by the inspector.

Envirotran FM Approved transformers are manufactured under strict compliance with FMRC Standard 3990 and are filled with FM Approved Envirotemp™ FR3™ fluid, a fire-resistant dielectric coolant.

FM APPROVED

Special application transformers

Data Center transformer

With focus rapidly shifting from simply maximizing uptime and supporting demand to improving energy utilization, the data center industry is continually looking for methods to increase its energy efficiency and reliability. Utilizing cutting edge technology, Eaton's Cooper Power series Hardened Data Center (HDC) transformers are the solution. Designed with special attention given to surge protection, HDC liquid-filled transformers provide superior performance under the harshest electrical environments. Contrary to traditional dry-type units, HDC transformers provide unsurpassed reliability, overloadability, operational life, efficiency, thermal loading and installed footprint. These units have reliably served more than 100 MW of critical data center capacity for a total of more than 6,000,000 hours without any reported downtime caused by a thermal or short-circuit coil failure.

The top priority in data center operations is uninterrupted service. Envirotran HDC transformers from Eaton, having substantially higher levels of insulation, are less susceptible to voltage surges. Eaton has experienced zero failures due to switching transients. The ANSI® and IEEE® standard impulse withstand ratings are higher for liquid-filled transformers, making them less susceptible to insulation failure. The Envirotran HDC transformer provides ultimate protection by increasing the BIL rating one level higher than standard liquid-filled transformer ratings. The cooling system of liquid-filled transformers provides better protection from severe overloads—overloads that can lead to significant loss of life or failure.

Data center design typically includes multiple layers of redundancy, ensuring maximum uptime for the critical IT load. When best in class transformer manufacturing lead times are typically weeks, not days, an unexpected transformer failure will adversely affect the facility's reliability and profitability. Therefore, the ability to determine the electrical and mechanical health of a transformer can reduce the probability of costly, unplanned downtime. Routine diagnostic tests, including key fluid properties and dissolved gas analysis (DGA), can help determine the health of a liquid-filled transformer. Although sampling is not required for safe operation, it will provide the user with valuable information, leading to scheduled repair or replacement, and minimizing the duration and expense of an outage. With a dry-type transformer, there is no reliable way to measure the health or likelihood of an impending failure.

Solar transformer

As a result of the increasing number of states that are adopting aggressive Renewable & Alternative Energy Portfolio Standards, the solar energy market is growing—nearly doubling year over year. Eaton, a key innovator and supplier in this expanding market, is proud to offer its Cooper Power series Envirotran transformers specifically designed for Solar Photovoltaic medium-voltage applications. Eaton is working with top solar photovoltaic developers, integrators and inverter manufacturers to evolve the industry and change the way we distribute power.

In accordance with this progressive stance, every Envirotran Solar transformer is filled with non-toxic, biodegradable Envirotemp™ FR3™ dielectric fluid, made from renewable seed oils. On top of its biodegradability, Envirotemp™ FR3™ fluid substantially extends the life of the transformer insulation, saving valuable resources. What better way to distribute green power than to use a green transformer. In fact, delaying conversion to Envirotran transformers places the burden of today's environmental issues onto tomorrow's generations. Eaton can help you create a customized transformer, based on site specific characteristics including: temperature profile, site altitude, solar profile and required system life. Some of the benefits gained from this custom rating include:

- Reduction in core losses
- Improved payback on investment
- Reduction in footprint
- Improved fire safety
- Reduced environmental impact

For the solar photovoltaic industry, Eaton is offering standard step up transformers and dual secondary designs, including 4-winding, 3-winding (Low-High-Low) and 3-winding (Low-Low-High) designs.

Wind transformer

Eaton is offering custom designs for renewable energy power generation. Eaton manufactures its Cooper Power series Generator Step-Up (GSU) transformers for installation at the base of every wind turbine. Additionally, grounding transformers are available for wind power generation.

DOE efficiency

The United States Department of Energy (DOE) has mandated efficiency values for most liquid type, medium voltage transformers. As a result, all applicable Eaton's Cooper Power series transformers 2500 kVA and below conform to efficiency levels as specified in the DOE ruling "10 CFR Part 431 Energy Conservation Program".

Underwriters Laboratories® (UL®) Listed and Labeled/ Classified

The Envirotran transformer from Eaton can be specified as UL® Listed & Labeled, and/or UL® Classified. Underwriters Laboratories (UL®) listing is a verification of the design and construction of the transformer to the ANSI® and IEEE® standards. UL® listing generally is the most efficient, cost-effective solution for complying with relevant state and local electrical codes. UL® Combination Classification/Listing is another way in which to comply with Section 450.23, 2008 NEC® requirements. This combines the UL® listed transformer with a UL® Classified Less-Flammable Liquid and complies with the use restrictions found within the liquid Classification.

c UL US LISTED

K-Factor transformer

With a drastic increase in the use of ferromagnetic devices, arcing devices, and electric power converters, higher frequency loads have increased significantly. This harmonic loading has the potential to generate higher heat levels within a transformer's windings and leads by as much as 300%. Harmonic loading has the potential to induce premature failure in standard-design distribution transformers.

In addition to standard UL® "K-Factor" ratings, transformers can be designed to customer-provided specifications detailing precise loading scenarios. Onsite measurements of magnitude and frequency, alongside harmonic analysis of the connected load can be performed by Eaton engineers or a third party consultant. These field measurements are used to determine exact customer needs and outline the transformer specifications.

Eaton will design harmonic-resistant transformers that will be subjected to the unique harmonic loads. These units are designed to maintain normal temperature rise under harmonic, full-load conditions. Standard UL® "K-Factor" designs can result in unnecessary costs when the "next-highest" K-Factor must be selected for a calculated design factor. To save the customer these unnecessary costs, Eaton can design the transformer to the specific harmonic spectrum used in the application. Eaton's Cooper Power series K-factor transformers are filled with mineral oil or Envirotemp™ FR3™ fluid and enjoy the added benefits of dielectric cooling such as higher efficiencies than dry-type transformers.

Modulation transformer

Bundled with an Outboard Modulation Unit (OMU) and a Control and Receiving Unit (CRU), a Modulation Transformer Unit (MTU) is designed to remotely achieve two way communication.

The use of an MTU reduces travel time and expense versus traditional meter reading performed by high voltage electricians. Additionally, with MTU it is possible to manage and evaluate energy consumption data, providing reduced metering costs and fewer tenant complaints.

An MTU utilizes existing utility infrastructure, therefore eliminating the need to engineer and construct a dedicated communication network.

Figure 9. Modular transformer.

Inverter/rectifier bridge

Eaton complements its range of applications for transformers by offering dual winding designs. These designs are intended for connection to 12-pulse rectifier bridges.

Product attributes

To set us apart from other transformer manufactures, Eaton includes the following guarantees with every three-phase pad-mounted transformer.

Engineered to order (ETO)

Providing the customer with a well developed, cost-effective solution is the number one priority at Eaton. Using customer specifications, Eaton will work with the customer from the beginning to the end to develop a solution to fit their needs. Whether it is application specific, site specific, or a uniquely specified unit, Eaton will provide transformers with the best in class value and performance, saving the customer time and money.

Made in the U.S.A.

Eaton's three-phase pad-mounted transformers are produced right here in the United States of America. Our manufacturing facilities are positioned strategically for rapid shipment of products. Furthermore, should the need arise, Eaton has a broad network of authorized service repair shops throughout the United States.

Superior paint performance

Protecting transformers from nature's elements worldwide, Eaton's E-coat system provides unrivaled transformer paint life, and exceeds IEEE Std C57.12.28™-2014 and IEEE Std C57.12.29™-2005 standards. In addition to the outside of the unit, each transformer receives a gray E-coat covering in the interior of the tank and cabinet, providing superior rust resistance and greater visibility during service.

If the wide range of standard paint selections does not suit the customer's needs, Eaton will customize the paint color to meet their requirements.

Rectangular coil design

Eaton utilizes a rectangular coil design. This winding technique results in a smaller overall unit footprint as well as reducing the transformer weight. The smaller unit size does not hinder the transformer performance in the least. Units have proven short circuit withstand capabilities up to 10 MVA.

Testing

Eaton performs routing testing on each transformer manufactured including the following tests:

- Insulation Power Factor: This test verifies that vacuum processing has thoroughly dried the insulation system to required limits.
- Ratio, Polarity, and Phase Relation: Assures correct winding ratios and tap voltages; checks insulation of HV and LV circuits. Checks entire insulation system to verify all live-to-ground clearances.
- Resistance: This test verifies the integrity of internal high-voltage and low-voltage connections; provides data for loss upgrade calculations.
- Routine Impulse Tests: The most severe test, simulating a lightning surge. Applies one reduced wave and one full wave to verify the BIL rating.
- Applied Potential: Applied to both high-voltage and low-voltage windings, this test stresses the entire insulation system to verify all live-to-ground clearances.
- Induced Potential: 3.46 times normal plus 1000 volts for reduced neutral designs.
- Loss Test: These design verification tests are conducted to assure that guaranteed loss values are met and that test values are

within design tolerances. Tests include no-load loss and excitation current along with impedance voltage and load loss.

- Leak Test: Pressurizing the tank to 7 psig assures a complete seal, with no weld or gasket leaks, to eliminate the possibility of moisture infiltration or fluid oxidation.

Design performance tests

The design performance tests include the following:

- Temperature Rise: Our automated heat run facility ensures that any design changes meet ANSI® and IEEE® temperature rise criteria.
- Audible Sound Level: Ensures compliance with NEMA® requirements.
- Lightning Impulse: To assure superior dielectric performance, this test consists of one reduced wave, two chopped waves and one full wave in sequence, precisely simulating the harshest conditions.

Thomas A Edison Research and Test Facility

We are constantly striving to introduce new innovations to the transformer industry, bringing you the highest quality transformer for the lowest cost. Eaton's Cooper Power series Transformer Products are ISO 9001 compliant, emphasizing process improvement in all phases of design, manufacture, and testing. We have invested millions of dollars in the Thomas A. Edison Technical Center, our premier research facility in Franksville, Wisconsin affirming our dedication to introducing new innovations and technologies to the transformer industry. This research facility is fully available for use by our customers to utilize our advanced electrical and chemical testing labs.

Three-phase pad-mounted compartmental type transformer

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For Eaton's Cooper Power series three-phase transformer product information call 1-877-277-4636 or visit: www.eaton.com/cooperpowerseries.

Powering Business Worldwide

Picture shown may not reflect actual package

C18 SOUND ATTENUATED ENCLOSURES

Griffin 50 Hz/60 Hz

These sound attenuated, factory installed enclosures incorporate internally mounted super critical level silencers, designed for safety and aesthetic value on fabricated steel skid bases. Optional UL listed tanks are available. These enclosures are of extremely rugged construction to withstand exposure to the elements of weather, and provide weather protection.

FEATURES

ROBUST/HIGHLY CORROSION RESISTANT CONSTRUCTION

- Approved for use with UL 2200 listed generator set packages
- Environmentally friendly, polyester powder baked paint
- 14 gauge steel
- Zinc plated or stainless steel fasteners
- Internally mounted super critical exhaust silencing system
- Factory installed

EXCELLENT ACCESS

- Large cable entry area for installation ease
- Accommodates optional rear-mounted breaker
- Double doors on both sides
- Vertically hinged doors allow 180° opening rotation
- Lube oil and coolant drains piped to exterior
- Radiator fill cover

SECURITY AND SAFETY

- Lockable access doors with standard key utilization
- Cooling fan and battery charging alternator fully guarded
- Fuel fill, oil fill, coolant and battery can only be reached via lockable access
- Stub-up cover sheets for “rodent proofing”
- Externally mounted emergency stop button
- Insulation has UL 94-HFI flame rating
- Designed for spreader-bar lifting to ensure safety
- Control panel viewing window

OPTIONS

- Yellow, white, beige or ASA 61 gray paint
- Interior lighting system
- Skid base with dragging and fork pockets
- UL listed integral fuel tank
- UL listed sub-base fuel tank
- Dual breakers (60 Hz only) (second breaker mounted right hand side
- Seismic Certification per Applicable Building Codes: IBC 2000, IBC 2003, IBC 2006, IBC 2009, CBC 2007
- Tested and Analyzed in Accordance With: ASCE 7-98, ASCE 7-02, ASCE 7-05, ICC-ES AC-156
- Special Seismic Certification OSHPD Pre-Approval OSP-0084-10
- IBC certifiable for 90 mph wind loading
- Anchoring details are site specific, and are dependent on many factors such as generator set size, weight, and concrete strength. IBC Certification requires that the anchoring system used is reviewed and approved by a Professional Engineer

ENCLOSURES

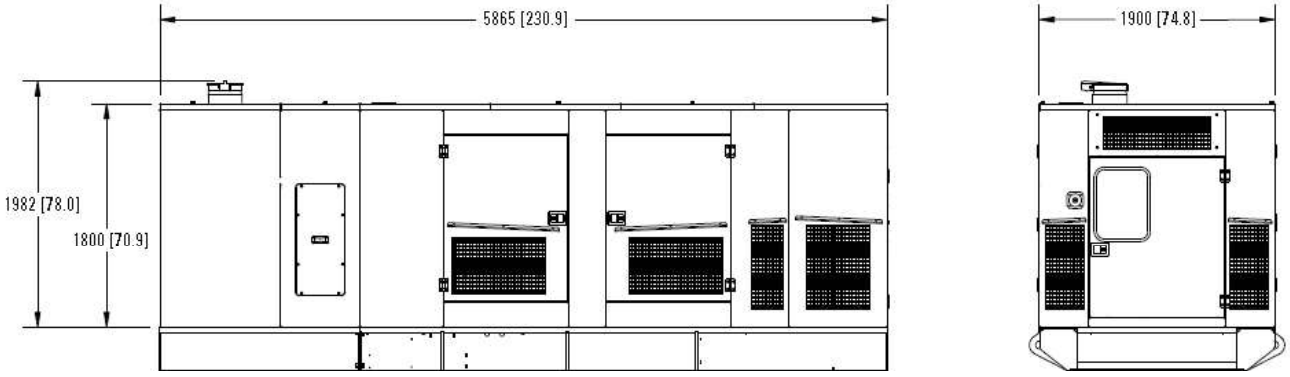
ENCLOSURE OPERATING CHARACTERISTICS

60 Hz SA Enclosure 1 Breaker			Ambient Capability*		Airflow Rate		Sound Pressure Levels dBA @ Full Load			Exhaust Back Pressure	
ekW	kVA	PP/SB	°C	°F	m^3/s	cfm	1 m	7 m	15 m	in/H_20	kPa
600	750	SB	46	114	9.8	20,765	85.7	76.6	70.6	12.45	3.10
545	681	PP	51	124	9.8	20,765	85.2	76.1	70.1	6.02	1.50
550	688	SB	50	123	9.8	20,765	85.2	76.1	70.1	6.22	1.55
500	625	PP	55	132	9.8	20,765	84.8	75.7	69.7	5.30	1.32

60 Hz SA Enclosure 2 Breaker			Ambient Capability*		Airflow Rate		Sound Pressure Levels dBA @ Full Load			Exhaust Back Pressure	
ekW	kVA	PP/SB	°C	°F	m^3/s	cfm	1 m	7 m	15 m	in/H_20	kPa
600	750	SB	45	113	9.6	20,341	85.7	76.6	70.6	12.45	3.10
545	681	PP	50	123	9.6	20,341	85.2	76.1	70.1	6.02	1.50
550	688	SB	49	122	9.6	20,341	85.2	76.1	70.1	6.22	1.55
500	625	PP	54	131	9.6	20,341	84.8	75.7	69.7	5.30	1.32

50 Hz SA Enclosure			Ambient Capability*		Airflow Rate		Sound Pressure Levels dBA @ Full Load			Exhaust Back Pressure	
ekW	kVA	PP/SB	°C	°F	m^3/s	cfm	1 m	7 m	15 m	in/H_20	kPa
560	700	SB	52	126	7.1	15,044	84.7	76.4	70.4	4.82	1.20
508	635	PP	52	126	7.1	15,044	84.5	76.5	70.5	3.68	0.92
520	650	SB	56	133	7.1	15,044	84.6	76.5	70.5	3.90	0.97
473	591	PP	55	131	7.1	15,044	84.4	76.5	70.5	3.08	0.77
480	600	SB	59	138	7.1	15,044	84.4	76.5	70.5	3.19	0.80
436	545	PP	58	136	7.1	15,044	84.3	76.5	70.5	2.56	0.64
440	550	SB	62	144	7.1	15,044	84.3	76.5	70.5	2.61	0.65
400	500	PP	61	142	7.1	15,044	84.1	76.4	70.4	2.14	0.53

* Ambient measured with Cat® Extended Life Coolant



Approximate weight of enclosure package: 6,082 kg (13,380 lbs)
Enclosure weight includes: Sound attenuated enclosure, exhaust system, extended base, and generator set. Exact weight is dependent upon options.

Caterpillar is pleased to offer these additional generator set enclosure colors: white, bright beige, and ASA 61 gray. (Caterpillar yellow is standard color.)

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ELECTRIC POWER - Technical Spec Sheet
STANDARD

C18

550 ekW/ 688 kVA/ 60 Hz/ 1800 rpm/ 480 V/ 0.8 Power Factor

Rating Type: STANDBY

Emissions: U.S. EPA Stationary Emergency Use Only

Image shown may not reflect actual configuration

C18

550 ekW/ 688 kVA

60 Hz/ 1800 rpm/ 480 V

	Metric	English
Package Performance		
Genset Power Rating with Fan @ 0.8 Power Factor	550 ekW	
Genset Power Rating	688 kVA	
Aftercooler (Separate Circuit)	N/A	N/A
Fuel Consumption		
100% Load with Fan	151.1 L/hr	39.9 gal/hr
75% Load with Fan	118.1 L/hr	31.2 gal/hr
50% Load with Fan	86.1 L/hr	22.7 gal/hr
25% Load with Fan	44.2 L/hr	11.7 gal/hr
Cooling System[1]		
Engine Coolant Capacity	20.8 L	5.5 gal
Radiator Water Capacity High Temp Circuit	61 L	16 gal
Radiator Water Capacity Low Temp Circuit	N/A	N/A
Radiator Total Capacity	61 L	16 gal
Inlet Air		
Combustion Air Inlet Flow Rate	46.3 m³/min	1634.9 cfm
Max. Allowable Combustion Air Inlet Temp	50 ° C	121 ° F
Exhaust System		
Exhaust Stack Gas Temperature	520.6 ° C	969.1 ° F
Exhaust Gas Flow Rate	128.9 m³/min	4551.5 cfm
Exhaust System Backpressure (Maximum Allowable)	10.0 kPa	40.0 in. water

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Heat Rejection		
Heat Rejection to Jacket Water	180 kW	10236 Btu/min
Heat Rejection to Exhaust (Total)	595 kW	33837 Btu/min
Heat Rejection to Aftercooler	141 kW	8019 Btu/min
Heat Rejection to Atmosphere from Engine	77 kW	4379 Btu/min
Heat Rejection to Atmosphere from Generator	33 kW	1854 Btu/min

Alternator[2]	
Motor Starting Capability @ 30% Voltage Dip	1445 skVA
Current	827 amps
Frame Size	LC6114G
Excitation	SE
Temperature Rise	130 ° C

Emissions (Nominal)[3]		
NOx	2703.5 mg/Nm³	5.5 g/hp-hr
CO	161.0 mg/Nm³	0.3 g/hp-hr
HC	4.6 mg/Nm³	0.0 g/hp-hr
PM	13.2 mg/Nm³	0.0 g/hp-hr

DEFINITIONS AND CONDITIONS

1. For ambient and altitude capabilities consult your Cat dealer. Air flow restriction (system) is added to existing restriction from factory.

2. UL 2200 Listed packages may have oversized generators with a different temperature rise and motor starting characteristics. Generator temperature rise is based on a 40° C ambient per NEMA MG1-32.

3. Emissions data measurement procedures are consistent with those described in EPA CFR 40 Part 89, Subpart D & E and ISO8178-1 for measuring HC, CO, PM, NOx. Data shown is based on steady state operating conditions of 77° F, 28.42 in HG and number 2 diesel fuel with 35° API and LHV of 18,390 btu/lb. The nominal emissions data shown is subject to instrumentation, measurement, facility and engine to engine variations. Emissions data is based on 100% load and thus cannot be used to compare to EPA regulations which use values based on a weighted cycle.

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Rating Type: STANDBY

Emissions: U.S. EPA Stationary Emergency Use Only

Applicable Codes and Standards:
AS1359, CSA C22.2 No100-04, UL142,UL489, UL869, UL2200,
NFPA37, NFPA70, NFPA99, NFPA110, IBC, IEC60034-1, ISO3046, ISO8528,
NEMA MG1-22,NEMA MG1-33, 2006/95/EC, 2006/42/EC, 2004/108/EC.

Note: Codes may not be available in all model configurations. Please consult your local Cat Dealer representative for availability.

STANDBY: Output available with varying load for the duration of the interruption of the normal source power. Average power output is 70% of the standby power rating. Typical operation is 200 hours per year, with maximum expected usage of 500 hours per year.

Ratings are based on SAE J1349 standard conditions. These ratings also apply at ISO3046 standard conditions

Fuel Rates are based on fuel oil of 35º API [16º C (60º F)] gravity having an LHV of 42 780 kJ/kg (18,390 Btu/lb) when used at 29º C (85º F) and weighing 838.9 g/liter (7.001 lbs/U.S. gal.). Additional ratings may be available for specific customer requirements, contact your Cat representative for details. For information regarding Low Sulfur fuel and Biodiesel capability, please consult your Cat dealer.

Performance No.: DM8517-04

Feature Code: C18DE6D

Generator Arrangement: 4183869

Date: 03/07/2019

Source Country: U.S.

The International System of Units (SI) is used in this publication. CAT, CATERPILLAR, their respective logos, ADEM, EUI, S•O•S, "Caterpillar Yellow" and the "Power Edge" trade dress, as well as corporate and product identity used herein, are trademarks of Caterpillar and may not be used without permission.

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C18 Generator Set

Electric Power

Caterpillar is leading the power generation marketplace with Power Solutions engineered to deliver unmatched flexibility, expandability, reliability, and cost-effectiveness.

Specifications

Generator Set Specifications	
Minimum Rating	455 ekW
Maximum Rating	600 ekW
Emissions/Fuel Strategy	U.S. EPA Cert., Tier 2
Voltage	208 to 600 Volts
Frequency	60 Hz
Speed	1800 rpm
Duty Cycle	Standby, Prime

Engine Specifications		
Engine Model	C18 ATAAC, I-6, 4-Stroke Water-Cooled Diesel	
Bore	145 mm	5.71 in
Stroke	183 mm	7.2 in
Displacement	18.1 in^3	1106.4 l
Compression Ratio	14.5:1	
Aspiration	Air to Air Aftercooled	
Fuel System	Electronic unit injection	
Governor Type	Adem™A4	

Generator Set Dimensions		
Length - Maximum	218.5 mm	5550 in
Width - Maximum	2056 mm	80.9 in
Height - Maximum	2737 mm	107.8 in

Benefits and Features

Cat Generator Set Package

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- Cat generator set packages have been fully prototype tested
- Accepts 100% block load in one step and meets NFPA 110 loading requirements
- Conform to ISO 8528-5 steady state and transient response requirements

Cat Diesel Engine

- Reliable, rugged, durable design
- Field-proven in thousands of applications worldwide
- Four-stroke-cycle diesel engine combines consistent performance and excellent fuel economy with minimum weight

SR5 Alternator

- Superior motor starting capability minimizes need for oversizing alternator
- Designed to match performance and output characteristics of Cat diesel engines
- Robust Class H insulation

EMCP Control Panel

- User-friendly interface and navigation
- Scalable system to meet a wide range of installation requirement
- Expansion modules and site-specific programming for specific customer requirements

Cooling System

- Designed to operate in standard ambient temperatures up to 55°C (131°F)
- Contact your Cat Dealer for specific ambient and altitude capabilities

Certifications

Cat dealers provide extensive post-sale support including maintenance and repair agreements. Cat dealers have over 1,800 dealer branch stores operating in 200 countries. The Caterpillar S•O•S℠ program cost effectively detects internal engine component condition, even the presence of unwanted fluids and combustion by-products

One Safe Source

- Components used in the generator set are selected based on seamless design integration to provide the optimum performance
- The generator set is fully assembled at a Caterpillar facility following our quality guidelines
- Each generator set package is tested before leaving the Caterpillar facility
- Cat product support, including dealer service, parts and warranty covers the entire Cat power system

World Wide Product Support

- Cat dealers have over 1,800 dealer branch stores operating in 200 countries
- Your local Cat dealer provides extensive post-sale support, including maintenance and repair agreements

Standard Equipment

Air Inlet

- Air Cleaner

Air Inlet System

- Turbocharger
- Light duty air cleaner
- Aftercooler core

Cooling

- Caterpillar extended life coolant

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- Fan drive, battery charging alternator drive
- Coolant drain line with valve
- Radiator and cooling fan with guard
- Package mounted radiator

Exhaust

- Exhaust flange outlet

Exhaust System

- Stainless steel exhaust flex gaskets, raincap and SAE exhaust flange for customer use; shipped loose

Fuel System

- Standard 8 hour open set fuel tank

Fuel

- Secondary fuel filter
- Fuel priming pump
- Primary fuel filter with integral water separator

Generator and Attachments

- Matched to the performance and output characteristics of Cat engines
- Segregated low voltage (AC/DC) wiring panel
- Power center, IP22
- A frame generator - IP21 protection
- Integrated Voltage Regulator
- Mandatory Option circuit breaker, IEC, 3 pole, mounted in power centre
- Integrated Voltage Regulator

Generator

- IP23 Protection
- Matched to the performance and output characteristics of Cat engines
- Load adjustment module provides engine relief upon load impact and improves load acceptance and recovery time

Power Termination

- Bus Bar

Control System

- EMCP 4.2

Governing System

- Cat Electronic Governor (ADEM A4)

Control Panel

- EMCP 4 Genset Controller

Lube System

- Lubricating oil
- Oil drain valves

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Mounting System

- Captive linear vibration isolators between base and engine-generator. includes lifting provisions and termination points for coolant and lube oil drain lines

Mounting

- Rubber vibration isolators

Starting/Charging

- 24 Volt battery with rack and cables
- 24 volt starting motor
- Batteries

General

- Engine and alternator pre-paint, Caterpillar yellow
- Paint - Caterpillar Yellow except rails and radiators gloss black

Optional Equipment

Air Inlet System

- Single element air cleaner
- Dual element air cleaner

Exhaust

- Industrial, Residential, Critical Mufflers

Generator

- Oversize and premium generators
- Excitation: [ ] Permanent Magnet Excited (PM) [ ] Internally Excited (IE)
- Anti-condensation heater

Power Termination

- Circuit breakers, UL listed
- Circuit breakers, IEC compliant

Circuit Breakers

- 3 Pole (IEC-100% rated) circuit breakers - Motorised
- 4 Pole (IEC-100% rated) circuit breakers - Motorised
- Shunt trip for IEC breaker
- Power terminal strip
- Circuit breaker (IEC) auxiliary contacts
- 3 Pole (IEC-100% rated) circuit breakers - Package mounted
- Pad-lockable circuit breaker device
- 4 Pole (IEC-100% rated) circuit breakers - Package mounted

Control Panels

- Remote monitoring software
- Load share module

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- Local & remote annunciator modules
- EMCP (4.2) (4.3) (4.4)
- Digital I/O module

Control System

- Local alarm modules
- Volt free contact
- Local alarm horn
- Remote annunciator modules
- Oil temperature displays
- Protective devices: Earth fault relay - earth leageage ground fault relay - Overload shutdown via breaker - Low fuel level alarm - Low fuel level shutdown - high fuel level alarm - Fuel level sensor
- EMCP 4.4

Cooling System

- Low coolant temperature alarm
- Radiator duct flange

Enclosures

- Sound attenuated enclosures

Starting/Charging

- Jacket water heater
- Battery chargers
- Heavy-duty starting system
- Oversize batteries
- Charging alternator

Exhaust System

- 8 and 10 inch GP flanges
- 8 and 10 inch elbow kits
- Engine mounted muffler
- 10, 25 and 35 end in / end out Mufflers
- Manifold and Turbocharger guard

Fuel System

- Manual fuel transfer pump
- Fuel transfer system
- Integral - Duel wall fuel tank base

General

- Sound attenuated, weather protective or high ambient weather protective enclosure
- Integral & sub-base UL listed dual wall fuel tanks
- CSA Certification
- Automatic transfer switches (ATS)

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- The following options are based on regional and product configuration:
- Single or dual wall sub-base fuel tanks
- EU Certificate of Conformance (CE)
- EEC Declaration of Conformity
- UL 2200 package
- Single or dual wall integral fuel tanks
- Seismic Certification per applicable building codes: IBC 2000, IBC 2003, IBC 2006, IBC 2009, CBC 2007
- Narrow, Wide or Skid Base
- Enclosures: sound attenuated, weather protective

Generator and Attachments

- Space heaters
- A frame CIP generator
- Permanent magnet excitation
- LC frame generator
- A frame oversize generator
- Ingress protection
- LC frame CIP generator
- LC frame oversize generators

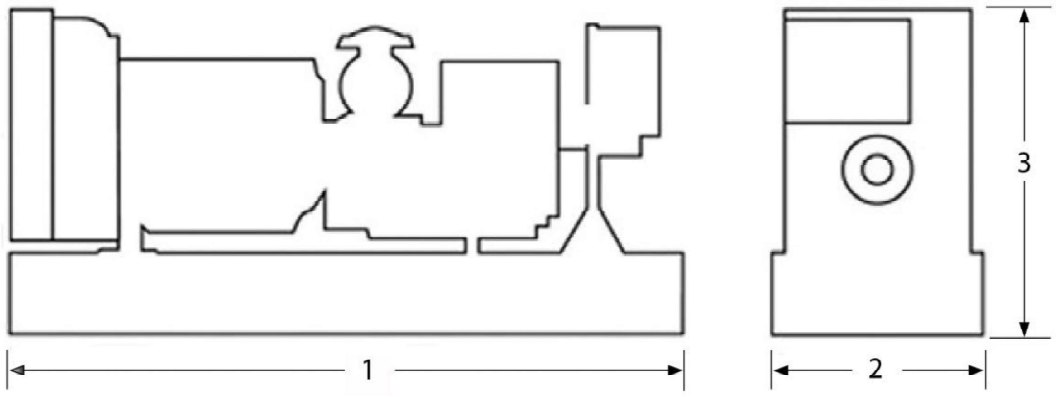
Lube System

- Manual sump pump

Starting and Charging

- Battery disconnect switch
- Jacket water heaters
- 5 Amp battery charger

Dimensional Art



Dimensions	Dimension 1	Dimension 2	Dimension 3
Packaged genset dimensions	4237 mm (166.8 in)	1536 mm (60.5 in)	2166 mm (85.3 in)

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ELECTRIC POWER - Technical Spec Sheet
STANDARD

C18

550 ekW/ 688 kVA/ 60 Hz/ 1800 rpm/ 480 V/ 0.8 Power Factor

Rating Type: STANDBY

Emissions: U.S. EPA Stationary Emergency Use Only

Image shown may not reflect actual configuration

C18

550 ekW/ 688 kVA

60 Hz/ 1800 rpm/ 480 V

	Metric	English
Package Performance		
Genset Power Rating with Fan @ 0.8 Power Factor	550 ekW	
Genset Power Rating	688 kVA	
Aftercooler (Separate Circuit)	N/A	N/A
Fuel Consumption		
100% Load with Fan	151.1 L/hr	39.9 gal/hr
75% Load with Fan	118.1 L/hr	31.2 gal/hr
50% Load with Fan	86.1 L/hr	22.7 gal/hr
25% Load with Fan	44.2 L/hr	11.7 gal/hr
Cooling System[1]		
Engine Coolant Capacity	20.8 L	5.5 gal
Radiator Water Capacity High Temp Circuit	61 L	16 gal
Radiator Water Capacity Low Temp Circuit	N/A	N/A
Radiator Total Capacity	61 L	16 gal
Inlet Air		
Combustion Air Inlet Flow Rate	46.3 m³/min	1634.9 cfm
Max. Allowable Combustion Air Inlet Temp	50 ° C	121 ° F
Exhaust System		
Exhaust Stack Gas Temperature	520.6 ° C	969.1 ° F
Exhaust Gas Flow Rate	128.9 m³/min	4551.5 cfm
Exhaust System Backpressure (Maximum Allowable)	10.0 kPa	40.0 in. water

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Rating Type: STANDBY

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Heat Rejection		
Heat Rejection to Jacket Water	180 kW	10236 Btu/min
Heat Rejection to Exhaust (Total)	595 kW	33837 Btu/min
Heat Rejection to Aftercooler	141 kW	8019 Btu/min
Heat Rejection to Atmosphere from Engine	77 kW	4379 Btu/min
Heat Rejection to Atmosphere from Generator	33 kW	1854 Btu/min

Alternator[2]	
Motor Starting Capability @ 30% Voltage Dip	1445 skVA
Current	827 amps
Frame Size	LC6114G
Excitation	SE
Temperature Rise	130 ° C

Emissions (Nominal)[3]		
NOx	2703.5 mg/Nm³	5.5 g/hp-hr
CO	161.0 mg/Nm³	0.3 g/hp-hr
HC	4.6 mg/Nm³	0.0 g/hp-hr
PM	13.2 mg/Nm³	0.0 g/hp-hr

DEFINITIONS AND CONDITIONS

1. For ambient and altitude capabilities consult your Cat dealer. Air flow restriction (system) is added to existing restriction from factory.

2. UL 2200 Listed packages may have oversized generators with a different temperature rise and motor starting characteristics. Generator temperature rise is based on a 40° C ambient per NEMA MG1-32.

3. Emissions data measurement procedures are consistent with those described in EPA CFR 40 Part 89, Subpart D & E and ISO8178-1 for measuring HC, CO, PM, NOx. Data shown is based on steady state operating conditions of 77° F, 28.42 in HG and number 2 diesel fuel with 35° API and LHV of 18,390 btu/lb. The nominal emissions data shown is subject to instrumentation, measurement, facility and engine to engine variations. Emissions data is based on 100% load and thus cannot be used to compare to EPA regulations which use values based on a weighted cycle.

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Rating Type: STANDBY

Emissions: U.S. EPA Stationary Emergency Use Only

Applicable Codes and Standards:
AS1359, CSA C22.2 No100-04, UL142,UL489, UL869, UL2200,
NFPA37, NFPA70, NFPA99, NFPA110, IBC, IEC60034-1, ISO3046, ISO8528,
NEMA MG1-22,NEMA MG1-33, 2006/95/EC, 2006/42/EC, 2004/108/EC.

Note: Codes may not be available in all model configurations. Please consult your local Cat Dealer representative for availability.

STANDBY: Output available with varying load for the duration of the interruption of the normal source power. Average power output is 70% of the standby power rating. Typical operation is 200 hours per year, with maximum expected usage of 500 hours per year.

Ratings are based on SAE J1349 standard conditions. These ratings also apply at ISO3046 standard conditions

Fuel Rates are based on fuel oil of 35º API [16º C (60º F)] gravity having an LHV of 42 780 kJ/kg (18,390 Btu/lb) when used at 29º C (85º F) and weighing 838.9 g/liter (7.001 lbs/U.S. gal.). Additional ratings may be available for specific customer requirements, contact your Cat representative for details. For information regarding Low Sulfur fuel and Biodiesel capability, please consult your Cat dealer.

Performance No.: DM8517-04

Feature Code: C18DE6D

Generator Arrangement: 4183869

Date: 03/07/2019

Source Country: U.S.

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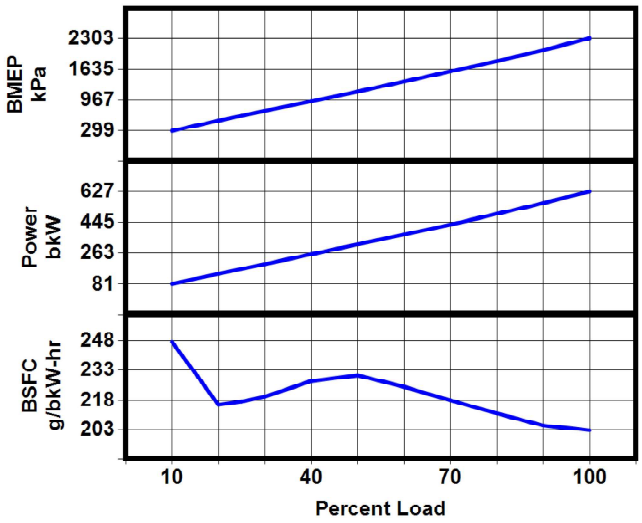
ELECTRIC POWER - Performance Data Sheet
STANDARD

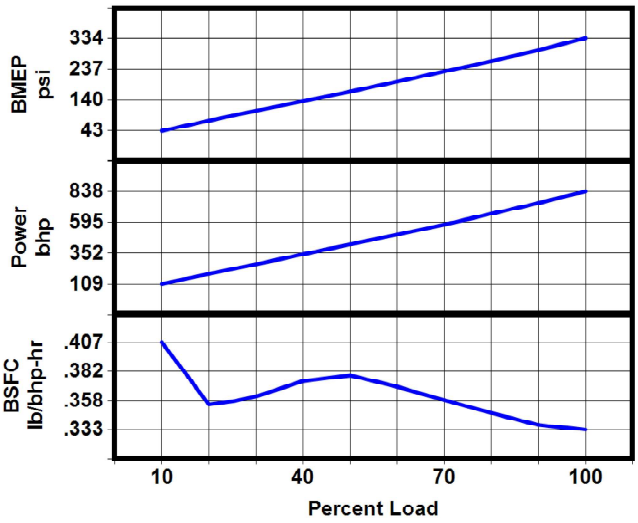
C18 DITA
550 ekW/60 Hz/1800 rpm/0.8 Power Factor

Rating Type: STANDBY

Emissions: U.S. EPA Stationary Emergency Use Only

Performance Number: DM8517-04





Metric

Gen Power ekW	Percent Load	Engine Power bkW	Engine BMEP kPa	BSFC g/bkW-hr	Fuel Rate L/hr
550	100	626.0	2302	202.5	151.1
495	90	557.9	2051	205.0	136.3
440	80	493.4	1814	211.1	124.2
413	75	462.2	1700	214.4	118.1
385	70	431.5	1587	217.9	112.1
330	60	371.7	1367	224.7	99.6
275	50	313.5	1153	230.3	86.1
220	40	256.4	943	227.5	69.5
165	30	199.4	733	219.8	52.3
138	25	170.6	627	217.2	44.2
110	20	141.4	520	215.6	36.3
55	10	81.4	299	247.4	24.0

English

Gen Power kVA	Percent Load	Engine Power bhp	Engine BMEP psi	BSFC lb/bhp-hr	Fuel Rate gph
688	100	839	334	.333	39.9
619	90	748	298	.337	36.0
550	80	662	263	.347	32.8
516	75	620	246	.353	31.2
481	70	579	230	.358	29.6
413	60	498	198	.369	26.3
344	50	420	167	.379	22.7
275	40	344	137	.374	18.4
206	30	267	106	.361	13.8
172	25	229	91	.357	11.7
138	20	190	75	.354	9.6
69	10	109	43	.407	6.3

Gen Power ekW	Intake Manifold Temp °C	Intake Manifold Press kPa	Intake Air Flow m³/min	Exhaust Manifold Temp °C	Exhaust Stack Temp °C	Exhaust Gas Flow m³/min
550	49.6	223.7	46.3	681.4	520.6	128.9
495	48.2	209.2	44.5	650.1	498.1	120.3
440	45.0	197.5	43.3	627.1	482.9	114.5
413	44.2	191.2	42.6	615.9	476.4	111.4
385	43.6	184.3	41.7	604.8	470.0	108.0
330	42.6	167.0	39.3	582.4	457.7	100.0
275	41.6	143.6	35.9	556.5	444.3	89.5
220	39.7	105.5	30.3	505.4	417.6	73.1
165	37.5	64.0	24.2	443.2	380.2	55.2
138	36.3	46.2	21.5	409.5	358.3	47.4
110	35.1	29.9	19.1	373.8	333.4	40.1
55	32.6	15.8	17.0	296.6	273.0	31.9

Gen Power kVA	Intake Manifold Temp °F	Intake Manifold Press in Hg	Intake Air Flow cfm	Exhaust Manifold Temp °F	Exhaust Stack Temp °F	Exhaust Gas Flow cfm
688	121.3	66.2	1634.9	1258.5	969.1	4551.5
619	118.8	62.0	1571.3	1202.2	928.6	4247.9
550	113.0	58.5	1529.0	1160.8	901.2	4043.1
516	111.6	56.6	1503.1	1140.6	889.5	3932.8
481	110.5	54.6	1472.5	1120.6	878.0	3813.5
413	108.7	49.5	1387.7	1080.3	855.9	3531.1
344	106.9	42.5	1267.5	1033.6	831.7	3160.0
275	103.4	31.2	1069.3	941.8	783.6	2579.6
206	99.5	18.9	852.8	829.8	716.4	1947.5
172	97.4	13.7	760.2	769.2	676.9	1672.2
138	95.2	8.9	675.6	704.9	632.1	1416.0
69	90.7	4.7	600.5	565.9	523.5	1124.7

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C18 DITA
550 ekW/60 Hz/1800 rpm/0.8 Power Factor

Rating Type: STANDBY

Emissions: U.S. EPA Stationary Emergency Use Only

Performance Number: DM8517-04

Heat Rejection Data

Metric

Gen Power ekW	Percent Load	Rejection to Jacket Water kW	Rejection to Atmos kW	Rejection to Exhaust kW	From Oil Cooler kW
550	100	180.0	77.0	595.0	80.9
495	90	163.0	68.2	541.0	72.9
440	80	149.0	60.7	503.0	66.3
413	75	141.9	57.3	484.4	63.1
385	70	135.0	54.3	466.0	59.9
330	60	122.0	50.1	423.0	53.2
275	50	110.0	47.1	371.0	45.9
220	40	97.4	43.2	293.0	37.1
165	30	83.9	37.0	210.3	27.8
138	25	76.4	28.6	175.4	23.5
110	20	69.1	20.7	143.4	19.4
55	10	56.1	12.1	99.4	12.8

English

Gen Power kVA	Percent Load	Rejection to Jacket Water Btu/min	Rejection to Atmos Btu/min	Rejection to Exhaust Btu/min	From Oil Cooler Btu/min
688	100	10236.4	4378.9	33837.1	4600.7
619	90	9269.9	3878.6	30766.9	4143.0
550	80	8473.5	3451.9	28605.1	3770.4
516	75	8072.2	3260.5	27548.6	3587.3
481	70	7677.3	3088.0	26501.0	3403.6
413	60	6938.1	2849.2	24056.0	3022.7
344	50	6255.1	2678.4	21095.7	2610.0
275	40	5538.1	2458.1	16665.0	2107.2
206	30	4769.3	2101.5	11961.6	1582.1
172	25	4345.9	1629.3	9974.2	1337.8
138	20	3929.8	1177.4	8156.9	1100.9
69	10	3192.2	690.9	5650.0	725.8

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GENERATOR DATA

GENERATOR DATA

Selected Model

Engine	C18	**Generator Frame:**	LC6114G	**Genset Rating(kW):**	550.0	**Line Voltage:**	480
Fuel	Diesel	**Generator Arrangement:**	4183869	**Genset Rating(kVA):**	687.5	**Phase Voltage:**	277.0
Frequency	60	**Excitation Type:**	Self Excited	**Pwr.Factor:**	0.8	**Rated Current:**	826.9
Duty	STANDBY	**Connection:**	SERIES STAR	**Application:**	EPG	**Status:**	Current
						Version:	41205 /40476 /41431 /8578

Spec Information

Generator Specification

Frame:	LC6114G	**Type**	LC	**No.of Bearings:**	1
Winding Type:	RANDOM WOUND			**Flywheel:**	14.0
Connection:	SERIES STAR			**Housing:**	1
Phases	3			**No.of Leads:**	12
Poles:	4			**Wires per Lead:**	2
Sync Speed:	1800			**Generator Pitch:**	0.6667

Generator Efficiency

Per Unit Load	kW	Efficiency %
0.25	137.5	92.6
0.5	275.0	94.7
0.75	412.5	94.8
1.0	550.0	94.4

Reactances	Per Unit	Ohms
SUBTRANSIENT - DIRECT AXIS X" d	0.1340	0.0449
SUBTRANSIENT - QUADRATURE AXIS X"q	0.1766	0.0592
TRANSIENT - SATURATED X'd	0.1904	0.0638
SYNCHRONOUS - DIRECT AXIS X'd	3.7490	1.2564
SYNCHRONOUS - QUADRATURE AXIS X'q	2.2487	0.7536
NEGATIVE SEQUENCE X'2	0.1552	0.0520
ZERO SEQUENCE X'0	0.0104	0.0035

Time Constants	Seconds
OPEN CIRCUIT TRANSIENT - DIRECT AXIS T'd0	1.9580
SHORT CIRCUIT TRANSIENT - DIRECT AXIS T'd	0.1000
OPEN CIRCUIT SUBSTRANSIENT - DIRECT AXIS T"d0	0.0130
SHORT CIRCUIT SUBSTRANSIENT - DIRECT AXIS T"d	0.0100
OPEN CIRCUIT SUBSTRANSIENT - QUADRATURE AXIS T"q0	0.1270
SHORT CIRCUIT SUBSTRANSIENT - QUADRATURE AXIS T"q	0.0100
EXCITER TIME CONSTANT Te	0.0300
ARMATURE SHORT CIRCUIT Ta	0.0150

Short Circuit Ratio:0.31	Stator Resistance=0.0095Ohms	Field Resistance=1.0266Ohms

Voltage Regulation

Voltage level adjustment:+/-	**5.0%**
Voltage regulation,steady state:+/-	**0.5%**
Voltage regulation with 3% speed change: +/-	**0.5%**
Waveform deviation line - line, no load: less than	**2.0%**
Telephone influence factor: less than	**50%**

Generator Excitation

	No Load	Full Load, Series	(rated)pf Parallel
Excitation Voltage:	8.67Volts	46.61Volts	Volts
Excitation Current:	0.85Amps	3.76Amps	Amps

GENERATOR DATA

Selected Model

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Duty	STANDBY	**Connection:**	SERIES STAR	**Application:**	EPG	**Status:**	Current
						Version:	41205 /40476 /41431 /8578

Generator Mechanical Information

Center Of Gravity

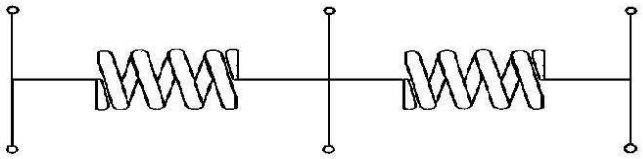
Dimension X	-514.0mm	-20.2IN.
Dimension Y	0.0mm	0.0IN.
Dimension Z	0.0mm	0.0IN.

* 'X' is measured from driven end of generator and parallel to rotor.Towards engine fan is positive.See General Information for details
* 'Y' is measured vertically from rotor center line.Up is positive
* 'Z' is measured to left and right of rotor center line.To the right is positive.

Generator WT =	1309Kg 2,886LB	* Rotor WT =	514Kg 1,133LB	* Stator WT=	795Kg 1,753LB

Rotor Balance =	0.0508mm deflection PTP
Overspeed Capacity =	125%of synchronous speed

Generator Torsional Data



J1= Coupling and Fan | **J2= Rotor TOTAL J = J1+J2+J3** | **J3= Exciter End**

K1=Shaft Stiffness between J1+J2(Diameter1) | **K2=Shaft Stiffness between J2+J3(Diameter2)**

J1	K1	Min Shaft Dia 1	J2	K2	Min Shaft Dia 2	J3
17.1LB IN.s²	47.9MLB IN./rad	4.5IN.	53.1LB IN.s²	38.5MLB IN./rad	4.3IN.	1.5IN.s²
1.93N m s²	5.41MN m/rad	115.0mm	6.0N m s²	4.35m/rad	110.0mm	0.17N m s²
			Total J			
			71.7LB IN.s²			
			8.1N m s²			

GENERATOR DATA

Selected Model

Engine	C18	**Generator Frame:**	LC6114G	**Genset Rating(kW):**	550.0	**Line Voltage:**	480
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Frequency	60	**Excitation Type:**	Self Excited	**Pwr.Factor:**	0.8	**Rated Current:**	826.9
Duty	STANDBY	**Connection:**	SERIES STAR	**Application:**	EPG	**Status:**	Current
						Version:	41205 /40476 /41431 /8578

Generator Cooling Requirements - Temperature -Insulation Data

Cooling Requirements:		**Temperature Data:**	(Ambient 40.0°C)
Heat Dissipated:	32.6kW	**Stator Rise:**	130.0°C
Air Flow:	66.0m³/min	**Rotor Rise:**	130.0°C

Insulation Class:H

Insulation Reg. as shipped:100.0 M Ω minimum at 40 °C

Thermal Limits of Generator

Frequency:	60.0Hz
Line to Line Voltage:	480.0Volts
B BR 80/40	552.0kVA
F BR -105/40	628.0kVA
H BR - 125/40	690.0kVA
F PR - 130/40	690.0kVA
H PR - 150/40	731.0kVA
H PR27 - 163/27	759.0kVA

GENERATOR DATA

Selected Model

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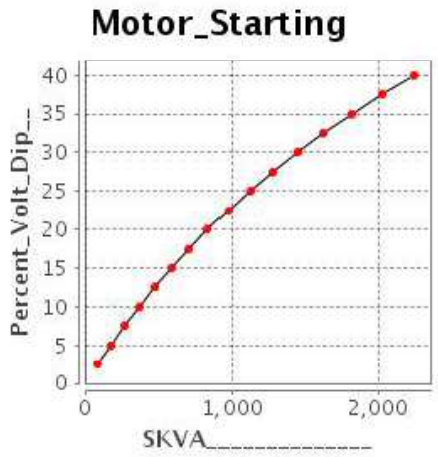
Duty	STANDBY	**Connection:**	SERIES STAR	**Application:**	EPG	**Status:**	Current
						Version:	41205 /40476 /41431 /8578

Starting Capability and Current Decrement

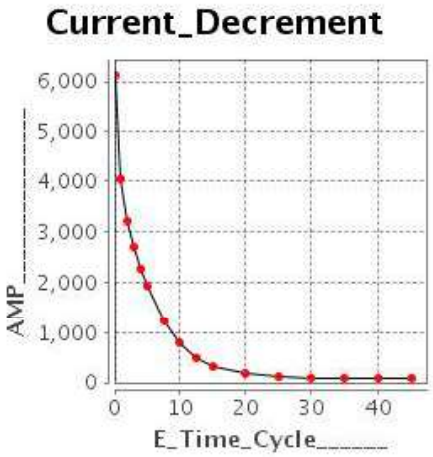
Motor Starting Capability (0.6 pf)

SKVA	Percent Volt Dip
86	2.5
177	5.0
273	7.5
375	10.0
482	12.5
595	15.0
715	17.5
843	20.0
979	22.5
1,124	25.0
1,279	27.5
1,445	30.0
1,624	32.5
1,816	35.0
2,023	37.5
2,248	40.0



Current Decrement Data

E Time Cycle	AMP
0.0	6,130
1.0	4,049
2.0	3,218
3.0	2,688
4.0	2,268
5.0	1,914
7.5	1,240
10.0	789
12.5	489
15.0	316
20.0	169
25.0	118
30.0	99
35.0	91
40.0	87
45.0	86



GENERATOR DATA

Instantaneous 3 Phase Fault Current: 6130.0Amps
Instantaneous Line- Line Fault Current: 4924.0Amps
Instantaneous Line- Neutral Fault Current: 8233.0Amps

GENERATOR DATA

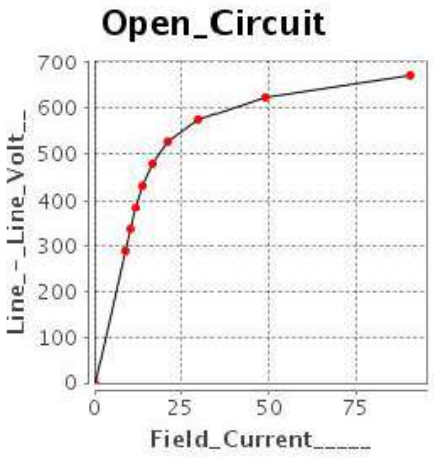
Selected Model

Engine	C18	**Generator Frame:**	LC6114G	**Genset Rating(kW):**	550.0	**Line Voltage:**	480
Fuel	Diesel	**Generator Arrangement:**	4183869	**Genset Rating(kVA):**	687.5	**Phase Voltage:**	277.0
Frequency	60	**Excitation Type:**	Self Excited	**Pwr.Factor:**	0.8	**Rated Current:**	826.9
Duty	STANDBY	**Connection:**	SERIES STAR	**Application:**	EPG	**Status:**	Current
						Version:	41205 /40476 /41431 /8578

Generator Output Characteristic Curves

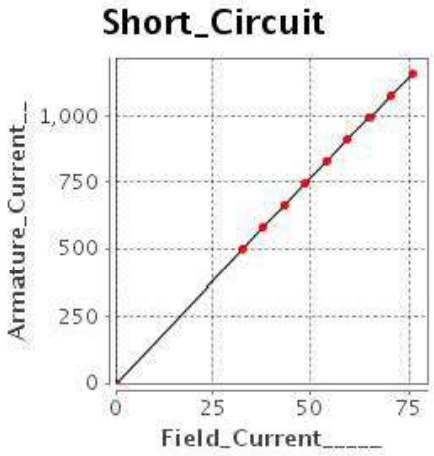
Open Circuit Curve

Field Current	Line - Line Volt
0.0	0
8.8	288
10.3	336
12.0	384
14.0	432
16.8	480
21.3	528
30.1	576
48.8	624
90.8	672



Short Circuit Curve

Field Current	Armature Current
0.0	0
32.5	496
37.9	579
43.4	662
48.8	744
54.2	827
59.6	910
65.0	992
70.4	1,075
75.9	1,158



GENERATOR DATA

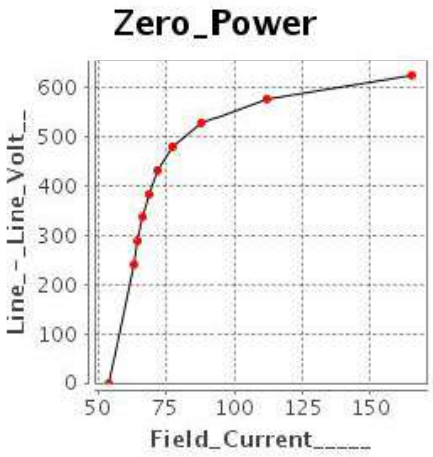
Selected Model

Engine	C18	**Generator Frame:**	LC6114G	**Genset Rating(kW):**	550.0	**Line Voltage:**	480
Fuel	Diesel	**Generator Arrangement:**	4183869	**Genset Rating(kVA):**	687.5	**Phase Voltage:**	277.0
Frequency	60	**Excitation Type:**	Self Excited	**Pwr.Factor:**	0.8	**Rated Current:**	826.9
Duty	STANDBY	**Connection:**	SERIES STAR	**Application:**	EPG	**Status:**	Current
						Version:	41205 /40476 /41431 /8578

Generator Output Characteristic Curves

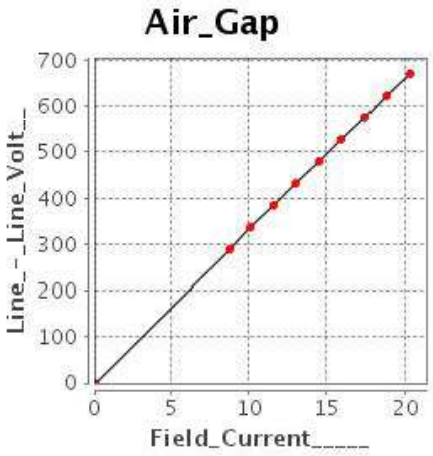
Zero Power Factor Curve

Field Current	Line - Line Volt
54.2	0
63.2	240
64.8	288
66.6	336
68.8	384
71.9	432
77.4	480
88.2	528
111.7	576
165.1	624



Air Gap Curve

Field Current	Line - Line Volt
0.0	0
8.7	288
10.1	336
11.6	384
13.0	432
14.5	480
15.9	528
17.4	576
18.8	624
20.3	672



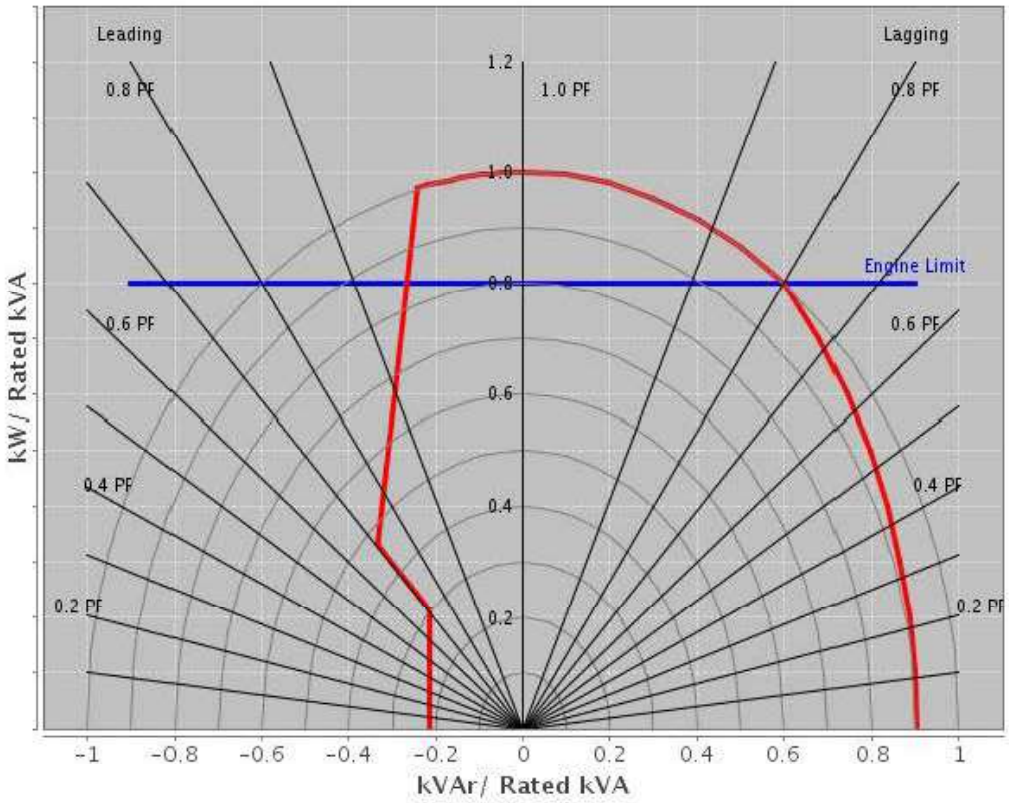
GENERATOR DATA

Selected Model

Engine	C18	**Generator Frame:**	LC6114G	**Genset Rating(kW):**	550.0	**Line Voltage:**	480
Fuel	Diesel	**Generator Arrangement:**	4183869	**Genset Rating(kVA):**	687.5	**Phase Voltage:**	277.0
Frequency	60	**Excitation Type:**	Self Excited	**Pwr.Factor:**	0.8	**Rated Current:**	826.9
Duty	STANDBY	**Connection:**	SERIES STAR	**Application:**	EPG	**Status:**	Current
						Version:	41205 /40476 /41431 /8578

Reactive Capability Curve

Operating Chart



GENERATOR DATA

Selected Model

Engine	C18	**Generator Frame:**	LC6114G	**Genset Rating(kW):**	550.0	**Line Voltage:**	480
Fuel	Diesel	**Generator Arrangement:**	4183869	**Genset Rating(kVA):**	687.5	**Phase Voltage:**	277.0
Frequency	60	**Excitation Type:**	Self Excited	**Pwr.Factor:**	0.8	**Rated Current:**	826.9
Duty	STANDBY	**Connection:**	SERIES STAR	**Application:**	EPG	**Status:**	Current
						Version:	41205 /40476 /41431 /8578

General Information

GENERATOR INFORMATION (DM7900)

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1. Motor Starting
Motor starting curves are obtained in accordance with IEC60034, and are displayed at 0.6 power factor.

2. Voltage Dip
Prediction of the generator synchronous voltage dip can be made by consulting the plot for the voltage dip value that corresponds to the desired motor starting kVA value.

3. Definitions
A) Generator Keys
Frame: abbreviation of generator frame size
Freq: frequency in hertz.
PP/SB: prime/standby duty respectively
Volts: line - line terminal voltage
kW: rating in electrical kilo watts
Model: engine sales model

B) Generator Temperature Rise
The indicated temperature rises are the IEC/NEMA limits for standby or prime power applications. The quoted rise figures are maximum limits only and are not necessarily indicative of the actual temperature rise of a given machine winding.

C) Centre of Gravity
The specified centre of gravity is for the generator only. For single bearing, and two bearing close coupled generators, the center of gravity is measured from the generator/engine flywheel-housing interface and from the centreline of the rotor Shaft.

For two bearing, standalone generators, the center of gravity is measured from the end of the rotor shaft and from the centerline of the rotor shaft.

D) Generator Current Decrement Curves
The generator current decrement curve indicates the generator armature current arising from a symmetrical three-phase fault at the generator terminals. Generators equipped with AREP or PMG excitation systems will sustain 300% of rated armature current for 10 seconds.

E) Generator Efficiency Curves
The efficiency curve is displayed for the generator only under the given conditions of rating, voltage, frequency and power factor. This is not the overall generating set efficiency curve.

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PERFORMANCE DATA[DM8517]

October 7, 2019

Performance Number: DM8517 **Change Level: 04**

SALES MODEL:	C18	COMBUSTION:	DIRECT INJECTION
BRAND:	CAT	ENGINE SPEED (RPM):	1,800
ENGINE POWER (BHP):	839	HERTZ:	60
GEN POWER W/O FAN (EKW):	571.0	FAN POWER (HP):	25.5
GEN POWER WITH FAN (EKW):	550.0	ASPIRATION:	TA
COMPRESSION RATIO:	14.5	AFTERCOOLER TYPE:	ATAAC
RATING LEVEL:	STANDBY	AFTERCOOLER CIRCUIT TYPE:	JW+OC, ATAAC
PUMP QUANTITY:	1	INLET MANIFOLD AIR TEMP (F):	120
FUEL TYPE:	DIESEL	JACKET WATER TEMP (F):	192.2
MANIFOLD TYPE:	DRY	TURBO CONFIGURATION:	PARALLEL
GOVERNOR TYPE:	ELEC	TURBO QUANTITY:	2
CAMSHAFT TYPE:	STANDARD	TURBOCHARGER MODEL:	S310S089 1.10A/R
IGNITION TYPE:	CI	CERTIFICATION YEAR:	2006
INJECTOR TYPE:	EUI	PISTON SPD @ RATED ENG SPD (FT/MIN):	2,161.4
REF EXH STACK DIAMETER (IN):	6		
MAX OPERATING ALTITUDE (FT):	5,577		

INDUSTRY	SUBINDUSTRY	APPLICATION
ELECTRIC POWER	STANDARD	PACKAGED GENSET
OIL AND GAS	LAND PRODUCTION	PACKAGED GENSET

General Performance Data

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	ENGINE OUTLET TEMP
EKW	%	BHP	PSI	LB/BHP-HR	GAL/HR	IN-HG	DEG F	DEG F	DEG F
550.0	100	839	334	0.333	39.9	66.2	121.3	1,258.5	969.1
495.0	90	748	298	0.337	36.0	62.0	118.8	1,202.2	928.6
440.0	80	662	263	0.347	32.8	58.5	113.0	1,160.8	901.2
412.5	75	620	246	0.353	31.2	56.6	111.6	1,140.6	889.5
385.0	70	579	230	0.358	29.6	54.6	110.5	1,120.6	878.0
330.0	60	498	198	0.369	26.3	49.5	108.7	1,080.3	855.9
275.0	50	420	167	0.379	22.7	42.5	106.9	1,033.6	831.7
220.0	40	344	137	0.374	18.4	31.2	103.4	941.8	783.6
165.0	30	267	106	0.361	13.8	18.9	99.5	829.8	716.4
137.5	25	229	91	0.357	11.7	13.7	97.4	769.2	676.9
110.0	20	190	75	0.354	9.6	8.9	95.2	704.9	632.1
55.0	10	109	43	0.407	6.3	4.7	90.7	565.9	523.5

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW RATE	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	WET EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)	DRY EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)
EKW	%	BHP	IN-HG	DEG F	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
550.0	100	839	72	398.5	1,634.9	4,551.5	7,185.3	7,464.7	1,566.3	1,408.6
495.0	90	748	67	380.3	1,571.3	4,247.9	6,517.3	6,769.4	1,504.5	1,353.0
440.0	80	662	64	366.3	1,529.0	4,043.1	6,086.3	6,315.9	1,460.7	1,313.6
412.5	75	620	62	358.9	1,503.1	3,932.8	5,870.3	6,088.8	1,433.3	1,288.9
385.0	70	579	60	351.0	1,472.5	3,813.5	5,648.4	5,855.7	1,401.7	1,260.5
330.0	60	498	54	330.8	1,387.7	3,531.1	5,148.1	5,332.3	1,319.7	1,186.8
275.0	50	420	47	302.3	1,267.5	3,160.0	4,525.1	4,684.3	1,203.1	1,082.0
220.0	40	344	35	252.3	1,069.3	2,579.6	3,561.3	3,690.0	1,020.1	917.4
165.0	30	267	22	196.6	852.8	1,947.5	2,532.6	2,629.2	814.2	732.2
137.5	25	229	16	172.6	760.2	1,672.2	2,099.7	2,181.4	723.4	650.5
110.0	20	190	11	150.4	675.6	1,416.0	1,707.3	1,774.5	637.7	573.5
55.0	10	109	7	126.8	600.5	1,124.7	1,224.6	1,269.0	562.4	505.8

Heat Rejection Data

GENSET POWER WITH	PERCENT LOAD	ENGINE POWER	REJECTION TO JACKET	REJECTION TO	REJECTION TO EXH	EXHUAST RECOVERY	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE	HIGH HEAT VALUE

PERFORMANCE DATA[DM8517]

October 7, 2019

FAN			WATER	ATMOSPHERE		TO 350F				ENERGY	ENERGY
EKW	%	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN
550.0	100	839	10,236	4,379	33,837	23,714	4,601	8,019	35,600	86,378	92,014
495.0	90	748	9,270	3,879	30,767	21,099	4,143	7,279	31,728	77,785	82,861
440.0	80	662	8,473	3,452	28,605	19,335	3,770	6,824	28,059	70,789	75,408
412.5	75	620	8,072	3,260	27,549	18,491	3,587	6,559	26,285	67,352	71,746
385.0	70	579	7,677	3,088	26,501	17,629	3,404	6,256	24,539	63,902	68,072
330.0	60	498	6,938	2,849	24,056	15,753	3,023	5,460	21,139	56,750	60,453
275.0	50	420	6,255	2,678	21,096	13,590	2,610	4,378	17,826	49,002	52,199
220.0	40	344	5,538	2,458	16,665	10,320	2,107	2,883	14,581	39,563	42,145
165.0	30	267	4,769	2,102	11,962	6,968	1,582	1,469	11,339	29,704	31,643
137.5	25	229	4,346	1,629	9,974	5,532	1,338	990	9,703	25,116	26,755
110.0	20	190	3,930	1,177	8,157	4,226	1,101	630	8,042	20,669	22,018
55.0	10	109	3,192	691	5,650	2,237	726	397	4,628	13,626	14,515

Emissions Data

RATED SPEED POTENTIAL SITE VARIATION: 1800 RPM

GENSET POWER WITH FAN		EKW	550.0	412.5	275.0	137.5	55.0
PERCENT LOAD		%	100	75	50	25	10
ENGINE POWER		BHP	839	620	420	229	109
TOTAL NOX (AS NO2)		G/HR	4,976	2,248	1,238	1,784	1,143
TOTAL CO		G/HR	518	270	239	238	471
TOTAL HC		G/HR	18	34	53	34	46
PART MATTER		G/HR	52.9	45.7	52.4	17.9	12.8
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	2,919.8	1,662.5	1,337.6	3,685.1	4,042.4
TOTAL CO	(CORR 5% O2)	MG/NM3	301.0	201.2	250.8	491.5	1,874.3
TOTAL HC	(CORR 5% O2)	MG/NM3	8.8	22.8	48.3	63.0	157.2
PART MATTER	(CORR 5% O2)	MG/NM3	25.6	29.6	46.0	30.6	45.8
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,422	810	652	1,795	1,969
TOTAL CO	(CORR 5% O2)	PPM	241	161	201	393	1,499
TOTAL HC	(CORR 5% O2)	PPM	16	43	90	118	294
TOTAL NOX (AS NO2)		G/HP-HR	5.97	3.65	2.96	7.82	10.49
TOTAL CO		G/HP-HR	0.62	0.44	0.57	1.04	4.32
TOTAL HC		G/HP-HR	0.02	0.06	0.13	0.15	0.42
PART MATTER		G/HP-HR	0.06	0.07	0.13	0.08	0.12
TOTAL NOX (AS NO2)		LB/HR	10.97	4.96	2.73	3.93	2.52
TOTAL CO		LB/HR	1.14	0.59	0.53	0.53	1.04
TOTAL HC		LB/HR	0.04	0.08	0.12	0.08	0.10
PART MATTER		LB/HR	0.12	0.10	0.12	0.04	0.03

RATED SPEED NOMINAL DATA: 1800 RPM

GENSET POWER WITH FAN		EKW	550.0	412.5	275.0	137.5	55.0
PERCENT LOAD		%	100	75	50	25	10
ENGINE POWER		BHP	839	620	420	229	109
TOTAL NOX (AS NO2)		G/HR	4,607	2,082	1,147	1,652	1,058
TOTAL CO		G/HR	277	144	128	127	252
TOTAL HC		G/HR	9	18	28	18	24
TOTAL CO2		KG/HR	393	309	224	115	64
PART MATTER		G/HR	27.2	23.4	26.9	9.2	6.6
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	2,703.5	1,539.3	1,238.6	3,412.2	3,743.0
TOTAL CO	(CORR 5% O2)	MG/NM3	161.0	107.6	134.1	262.8	1,002.3
TOTAL HC	(CORR 5% O2)	MG/NM3	4.6	12.1	25.6	33.3	83.2
PART MATTER	(CORR 5% O2)	MG/NM3	13.2	15.2	23.6	15.7	23.5
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,317	750	603	1,662	1,823
TOTAL CO	(CORR 5% O2)	PPM	129	86	107	210	802
TOTAL HC	(CORR 5% O2)	PPM	9	23	48	62	155
TOTAL NOX (AS NO2)		G/HP-HR	5.53	3.38	2.74	7.24	9.71
TOTAL CO		G/HP-HR	0.33	0.23	0.31	0.56	2.31
TOTAL HC		G/HP-HR	0.01	0.03	0.07	0.08	0.22
PART MATTER		G/HP-HR	0.03	0.04	0.06	0.04	0.06
TOTAL NOX (AS NO2)		LB/HR	10.16	4.59	2.53	3.64	2.33
TOTAL CO		LB/HR	0.61	0.32	0.28	0.28	0.56
TOTAL HC		LB/HR	0.02	0.04	0.06	0.04	0.05
TOTAL CO2		LB/HR	867	680	495	255	142
PART MATTER		LB/HR	0.06	0.05	0.06	0.02	0.01
OXYGEN IN EXH		%	9.5	11.3	12.7	13.9	16.2
DRY SMOKE OPACITY		%	0.7	0.8	0.9	0.6	0.5

BOSCH SMOKE NUMBER	0.37	0.49	0.60	0.33	0.17

Regulatory Information

EPA TIER 2	2006 - 2010			
GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 89 SUBPART D AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THE "MAX LIMITS" SHOWN BELOW ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE NON-ROAD REGULATIONS.				
Locality	**Agency**	**Regulation**	**Tier/Stage**	**Max Limits - G/BKW - HR**
U.S. (INCL CALIF)	EPA	NON-ROAD	TIER 2	CO: 3.5 NOx + HC: 6.4 PM: 0.20

EPA EMERGENCY STATIONARY	2011 - ---			
GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 60 SUBPART IIII AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THE "MAX LIMITS" SHOWN BELOW ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE EMERGENCY STATIONARY REGULATIONS.				
Locality	**Agency**	**Regulation**	**Tier/Stage**	**Max Limits - G/BKW - HR**
U.S. (INCL CALIF)	EPA	STATIONARY	EMERGENCY STATIONARY	CO: 3.5 NOx + HC: 6.4 PM: 0.20

Altitude Derate Data

ALTITUDE CORRECTED POWER CAPABILITY (BHP)

AMBIENT OPERATING TEMP (F)	30	40	50	60	70	80	90	100	110	120	130	140	NORMAL
ALTITUDE (FT)													
0	839	839	839	839	839	839	839	839	839	839	839	839	839
1,000	839	839	839	839	839	839	839	839	839	839	839	839	839
2,000	839	839	839	839	839	839	839	839	839	839	839	839	839
3,000	839	839	839	839	839	839	839	839	839	839	839	830	839
4,000	839	839	839	839	839	839	839	839	839	826	812	799	839
5,000	839	839	839	839	839	839	838	823	809	795	781	768	839
6,000	839	839	839	839	836	821	806	791	777	764	751	738	839
7,000	839	839	835	819	803	789	774	760	747	734	722	710	829
8,000	835	818	802	787	772	758	744	731	718	705	693	682	802
9,000	802	786	770	756	741	728	714	702	689	677	666	655	776
10,000	770	754	740	725	712	699	686	674	662	650	639	629	750
11,000	739	724	710	696	683	670	658	646	635	624	613	603	725
12,000	709	694	681	668	655	643	631	620	609	599	588	579	700
13,000	679	666	653	640	628	617	605	594	584	574	564	555	676
14,000	651	638	626	614	602	591	580	570	560	550	541	532	653
15,000	624	611	599	588	577	566	556	546	536	527	518	509	630

Cross Reference

Test Spec	Setting	Engine Arrangement	Engineering Model	Engineering Model Version	Start Effective Serial Number	End Effective Serial Number
0K7256	PP5701	2726915	GS338	-	EST00001	
NAP	NAP	4206877	GS338	-	FST00001	

Performance Parameter Reference

Parameters Reference:DM9600-11

PERFORMANCE DEFINITIONS

PERFORMANCE DEFINITIONS DM9600
APPLICATION:
Engine performance tolerance values below are representative of a typical production engine tested in a calibrated dynamometer test cell at SAE J1995 standard reference conditions. Caterpillar maintains ISO9001:2000 certified quality management systems for engine test Facilities to assure accurate calibration of test

equipment. Engine test data is corrected in accordance with SAE J1995. Additional reference material SAE J1228, J1349, ISO 8665, 3046-1:2002E, 3046-3:1989, 1585, 2534, 2288, and 9249 may apply in part or are similar to SAE J1995. Special engine rating request (SERR) test data shall be noted.

PERFORMANCE PARAMETER TOLERANCE FACTORS:

Power +/- 3%
Torque +/- 3%
Exhaust stack temperature +/- 8%
Inlet airflow +/- 5%
Intake manifold pressure-gage +/- 10%
Exhaust flow +/- 6%
Specific fuel consumption +/- 3%
Fuel rate +/- 5%
Specific DEF consumption +/- 3%
DEF rate +/- 5%
Heat rejection +/- 5%
Heat rejection exhaust only +/- 10%
Heat rejection CEM only +/- 10%

Heat Rejection values based on using treated water.

Torque is included for truck and industrial applications, do not use for Gen Set or steady state applications.

On C7 - C18 engines, at speeds of 1100 RPM and under these values are provided for reference only, and may not meet the tolerance listed.

These values do not apply to C280/3600. For these models, see the tolerances listed below.

C280/3600 HEAT REJECTION TOLERANCE FACTORS:

Heat rejection +/- 10%
Heat rejection to Atmosphere +/- 50%
Heat rejection to Lube Oil +/- 20%
Heat rejection to Aftercooler +/- 5%

TEST CELL TRANSDUCER TOLERANCE FACTORS:

Torque +/- 0.5%
Speed +/- 0.2%
Fuel flow +/- 1.0%
Temperature +/- 2.0 C degrees
Intake manifold pressure +/- 0.1 kPa

OBSERVED ENGINE PERFORMANCE IS CORRECTED TO SAE J1995 REFERENCE AIR AND FUEL CONDITIONS.

REFERENCE ATMOSPHERIC INLET AIR

FOR 3500 ENGINES AND SMALLER

SAE J1228 AUG2002 for marine engines, and J1995 JAN2014 for other engines, reference atmospheric pressure is 100 KPA (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative humidity at the stated aftercooler water temp, or inlet manifold temp.

FOR 3600 ENGINES

Engine rating obtained and presented in accordance with ISO 3046/1 and SAE J1995 JANJAN2014 reference atmospheric pressure is 100 KPA (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative humidity and 150M altitude at the stated aftercooler water temperature.

MEASUREMENT LOCATION FOR INLET AIR TEMPERATURE

Location for air temperature measurement air cleaner inlet at stabilized operating conditions.

REFERENCE EXHAUST STACK DIAMETER

The Reference Exhaust Stack Diameter published with this dataset is only used for the calculation of Smoke Opacity values displayed in this dataset. This value does not necessarily represent the actual stack diameter of the engine due to the variety of exhaust stack adapter options available. Consult the price list, engine order or general dimension drawings for the actual stack diameter size ordered or options available.

REFERENCE FUEL

DIESEL

Reference fuel is #2 distillate diesel with a 35API gravity; A lower heating value is 42,780 KJ/KG (18,390 BTU/LB) when used at 29 deg C (84.2 deg F), where the density is 838.9 G/Liter (7.001 Lbs/Gal).

GAS

Reference natural gas fuel has a lower heating value of 33.74 KJ/L (905 BTU/CU Ft). Low BTU ratings are based on 18.64 KJ/L (500 BTU/CU FT) lower heating value gas. Propane ratings are based on 87.56 KJ/L (2350 BTU/CU Ft) lower heating value gas.

ENGINE POWER (NET) IS THE CORRECTED FLYWHEEL POWER (GROSS) LESS EXTERNAL AUXILIARY LOAD

Engine corrected gross output includes the power required to drive standard equipment; lube oil, scavenge lube oil, fuel transfer, common rail fuel, separate circuit aftercooler and jacket water pumps. Engine net power available for the external (flywheel) load is calculated by subtracting the sum of auxiliary load from the corrected gross flywheel out put power. Typical auxiliary loads are radiator cooling fans, hydraulic pumps, air compressors and battery charging alternators. For Tier 4 ratings additional Parasitic losses would also include Intake, and Exhaust Restrictions.

ALTITUDE CAPABILITY

PERFORMANCE DATA[DM8517]

Altitude capability is the maximum altitude above sea level at standard temperature and standard pressure at which the engine could develop full rated output power on the current performance data set.
Standard temperature values versus altitude could be seen on TM2001.
When viewing the altitude capability chart the ambient temperature is the inlet air temp at the compressor inlet.
Engines with ADEM MEUI and HEUI fuel systems operating at conditions above the defined altitude capability derate for atmospheric pressure and temperature conditions outside the values defined, see TM2001.
Mechanical governor controlled unit injector engines require a setting change for operation at conditions above the altitude defined on the engine performance sheet. See your Caterpillar technical representative for non standard ratings.
REGULATIONS AND PRODUCT COMPLIANCE
TMI Emissions information is presented at 'nominal' and 'Potential Site Variation' values for standard ratings. No tolerances are applied to the emissions data. These values are subject to change at any time. The controlling federal and local emission requirements need to be verified by your Caterpillar technical representative.
Customer's may have special emission site requirements that need to be verified by the Caterpillar Product Group engineer.
EMISSION CYCLE LIMITS:
Cycle emissions Max Limits apply to cycle-weighted averages only. Emissions at individual load points may exceed the cycle-weighted limit.
EMISSIONS DEFINITIONS:
Emissions : DM1176
EMISSION CYCLE DEFINITIONS
1. For constant-speed marine engines for ship main propulsion, including,diesel-electric drive, test cycle E2 shall be applied, for controllable-pitch propeller sets
test cycle E2 shall be applied.
2. For propeller-law-operated main and propeller-law-operated auxiliary engines the test cycle E3 shall be applied.
3. For constant-speed auxiliary engines test cycle D2 shall be applied.
4. For variable-speed, variable-load auxiliary engines, not included above, test cycle C1 shall be applied.
HEAT REJECTION DEFINITIONS:
Diesel Circuit Type and HHV Balance : DM9500
HIGH DISPLACEMENT (HD) DEFINITIONS:
3500: EM1500
RATING DEFINITIONS:
Agriculture : TM6008
Fire Pump : TM6009
Generator Set : TM6035
Generator (Gas) : TM6041
Industrial Diesel : TM6010
Industrial (Gas) : TM6040
Irrigation : TM5749
Locomotive : TM6037
Marine Auxiliary : TM6036
Marine Prop (Except 3600) : TM5747
Marine Prop (3600 only) : TM5748
MSHA : TM6042
Oil Field (Petroleum) : TM6011
Off-Highway Truck : TM6039
On-Highway Truck : TM6038
SOUND DEFINITIONS:
Sound Power : DM8702
Sound Pressure : TM7080
Date Released : 07/10/19

AMERICAN MIDWEST POWER
3131 VICKSBURG LANE
MINNEAPOLIS, MINNESOTA 55447
PHONE (763) 551-1555 FAX (763) 551-9275

JOB NAME: EXAMPLE				QUOTE NUMBER: 22975 (TO)
CUSTOMER: GRAYBAR ELECTRIC				FILE NUMBER: X
SALES APPROVAL: INT: DATE:	DRAWN BY: ECP	DATE: 12/27/18	SCALE: 1:1	CUSTOMER NUMBER: X

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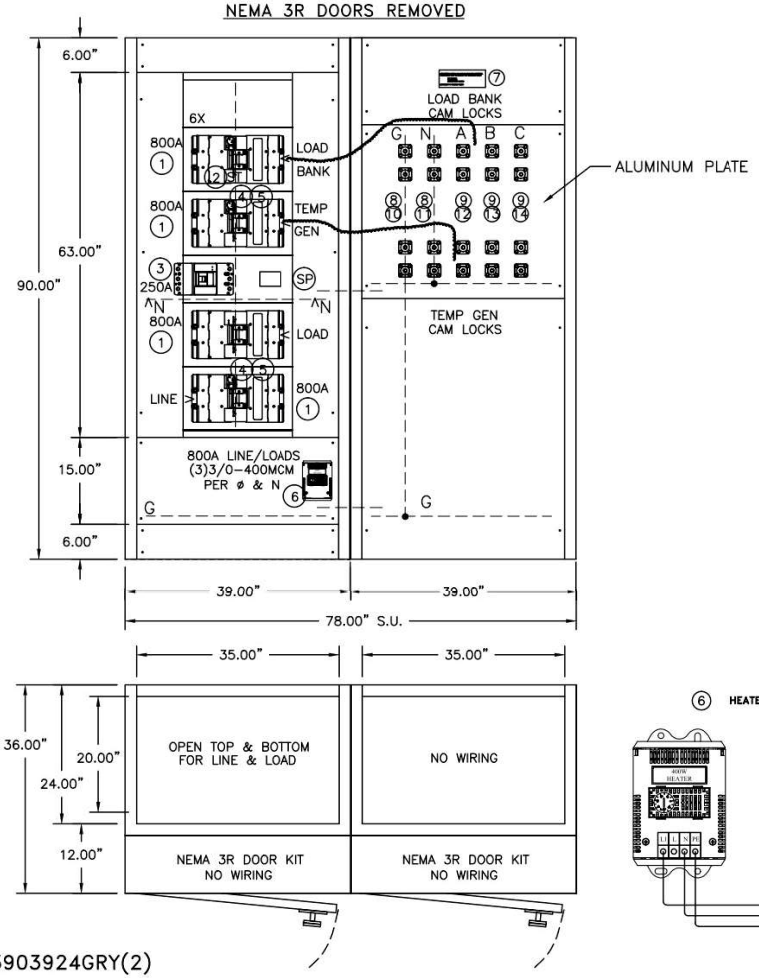
PAGE: 1 of 1

THIS IS A PRELIMINARY EXAMPLE OF CUSTOM BUILT EQUIPMENT. FINAL DIMENSIONS AND ENGINEERING WILL BE BASED ON CONTRACT DOCUMENT.

FRONT VIEWS

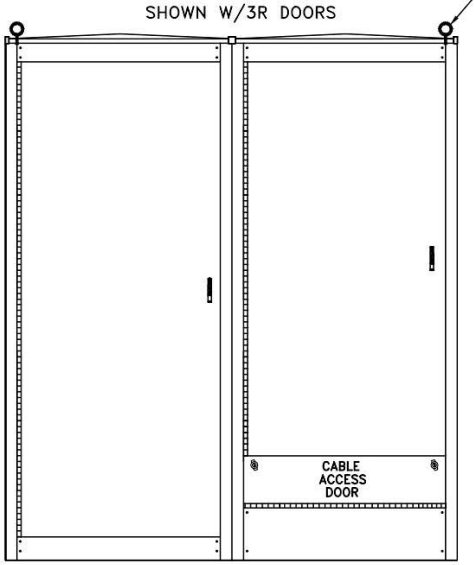
NEMA 3R DOORS REMOVED



FN3903924GRY(2)

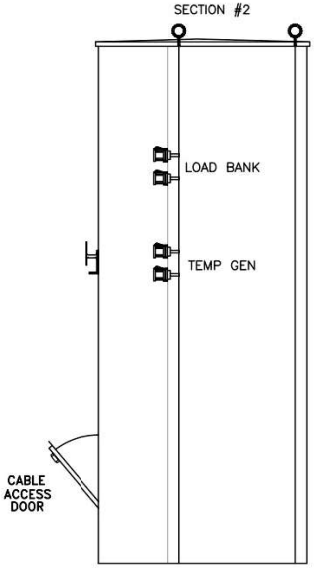
PLAN VIEW

SHOWN W/3R DOORS



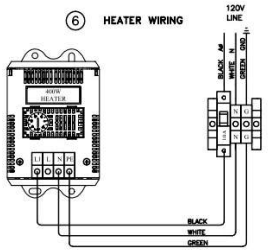
RIGHT VIEW

SECTION #2



COPPER BUS

⑥ HEATER WIRING



CONNECTIONS SHOULD BE MADE BY QUALIFIED PERSONNEL
CONNECTIONS MUST BE MADE IN THE FOLLOWING ORDER

1ST GROUND
2ND NEUTRAL
3RD A,B & C PHASES ⑦

DISCONNECT IN REVERSE ORDER

TYPE F SWITCHBOARD SPECIFICATION

FRONT ACCESSIBLE CLASS 1, NEMA 3R, DEADFRONT CONSTRUCTION FORMED FRAMING WITH PAN FORMED

COVER PLATES POWDER ASA 61 GRAY. PLATED CU BUS.
U.L. LISTED AND LABELED
PER U.L. 891. STANDARD FAULT CURRENT RATING: 50,000A; 60HZ.

DISTRIBUTION SECTION: ACCOMMODATES UP TO 1200A EATON TYPE FDP SWITCHES, EATON SERIES C MOLDED CLASS CBS, BOLTSWITCH TYPE T, PT & FR SWITCHES, MAXIMUM 48X UNITS PER SECTION (1X=1.375").

SEE AMP DRAWING 'AMPSTL' FOR LUG SIZES

BILL OF MATERIALS

ITEM	QTY	CATALOG NUMBER	DESCRIPTION	SUPPLIER
1	4	MDL3800F		EATON
1A	4	MT3800T		EATON
2	1	SNT4RP11K	SHUNT TRIP	EATON
3	1	LKD3250	250A 3P CIRCUIT BREAKER	EATON
4	2	KYK4	KEY INTERLOCK MOUNTING KIT	EATON
5	2	S105811Y	TYPE B4003 KEY INTERLOCK 3/8" PROJECTION	SUPERIOR
6	1	17040715034	400W 120V HTR W/STAT & FAN	PFANNENBERG
7	1	NP3X8C	CAMLOC CONNECTION LABEL	AMP
8	8	E1016-1600SX	MALE RECEPTACLE FOR NEUTRAL & GROUND	CROUSE HINDS
9	12	E1016-1631SX	FEMALE RECEPTACLE FOR PHASES	CROUSE-HINDS
10	4	E1016SC-35AMP	SNAP BACK COVER (GREEN) FOR GROUND	CROUSE-HINDS
11	4	E1016SC-38AMP	SNAP BACK COVER (WHITE) FOR NEUTRAL	CROUSE-HINDS
12	4	E1016SC-32AMP	SNAP BACK COVER (BLACK) FOR Aø	CROUSE-HINDS
13	4	E1016SC-36AMP	SNAP BACK COVER (RED) FOR Bø	CROUSE-HINDS
14	4	E1016SC-34AMP	SNAP BACK COVER (BLUE) FOR Cø	CROUSE-HINDS
15				

NOTES:

NON-SUSE

					DATE:	DRAWING NO:
800 A	208Y/120V	3ø-4W	50K AIC	CU BUS	12/27/18	X

Exhibit 15

Soils

R E P O R T

19-0483 S

December 16, 2019

Explorations and Geotechnical Engineering Services

Proposed Center for Arctic Studies
and Mills Hall
Bowdoin College
College Street and Harpswell Road
Brunswick, Maine

Prepared For:
Bowdoin College
Attention: Don Borkowski
3800 College Station
Brunswick, ME 04074

Prepared By:
S. W. Cole Engineering, Inc.
286 Portland Road
Gray, ME 04039
T: 207-657-2866

S.W.COLE ENGINEERING, INC.

- *Geotechnical Engineering*
- *Construction Materials Testing and Special Inspections*
- *GeoEnvironmental Services*
- *Test Boring Explorations*

www.swcole.com

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 Scope and Purpose 1
1.2 Site and Proposed Construction 1
2.0 EXPLORATION AND TESTING 2
2.1 Explorations 2
2.2 Testing 2
3.0 SUBSURFACE CONDITIONS 3
3.1 Soil and Bedrock 3
3.2 Groundwater 3
4.0 EVALUATION AND RECOMMENDATIONS 4
4.1 General Findings 4
4.2 Liquefaction 4
4.3 Site and Subgrade Preparation 5
4.4 Excavation and Dewatering 5
4.5 Foundations 6
4.6 Foundation Drainage 7
4.7 Slab-On-Grade 7
4.8 Entrance Slabs and Sidewalks 8
4.9 Site Retaining Wall 8
4.10 Backfill and Compaction 9
4.11 Weather Considerations 10
4.12 Paved Areas 10
4.13 Design Review and Construction Testing 11
5.0 CLOSURE 11

Appendix A Limitations
Appendix B Figures
Appendix C Logs and Key
Appendix D ConeTec SCPT Report

19-0483 S

December 16, 2019

Bowdoin College
Attn: Don Borkowski
3800 College Station
Brunswick, Maine 04011

Subject: Explorations and Geotechnical Engineering Services
Proposed Center for Arctic Studies and Mills Hall
Bowdoin College
College Street and Harpswell Road
Brunswick, Maine

Dear Don:

In accordance with our Agreement, dated May 23, 2019, we have performed subsurface explorations for the subject project. This report summarizes our findings and geotechnical recommendations and its contents are subject to the limitations set forth in Appendix A.

1.0 INTRODUCTION

1.1 Scope and Purpose

The purpose of our services was to obtain subsurface information at the site in order to develop geotechnical recommendations relative to foundations, earthwork and pavement associated with the proposed construction. Our scope of services included test boring explorations, seismic piezocone penetrometer testing, soils laboratory testing, a geotechnical analysis of the subsurface findings and preparation of this report.

1.2 Site and Proposed Construction

The site is located on the southeast corner of the intersection of College Street and Harpswell Road in Brunswick, Maine. Based on the information provided, we understand development plans call for demolition of existing site improvements for construction of two new buildings with a connecting tunnel over the site of the previously demolished Dayton (Ice Hockey) Arena. The proposed buildings include:

- Center for Artic Studies (CAS): a 2-story, mass timber or steel framed building with partial basement

- Mills Hall: a 3-story, mass timber or steel framed building with full basement

- Connecting Tunnel: a basement level, cast-in-place concrete, tunnel connecting the CAS and Mills Hall buildings

We understand structural loading may approach 250 kips for columns, 7.5 kips/ft for on-grade foundation walls and 14.5 kips/ft for basement foundation walls.

Proposed and existing site features are shown on the "Exploration Location Plan" attached as Sheet 1.

2.0 EXPLORATION AND TESTING

2.1 Explorations

Seven test borings (B-19-01 through B-19-07) were made at the site on June 5 and 6, 2019 by S. W. Cole Explorations, LLC. The exploration locations were selected and established in the field by S. W. Cole Engineering, Inc. (S.W.COLE). The approximate exploration locations are shown on the "Exploration Location Plan" attached in Appendix B. Logs of the test borings, with key to the notes and symbols used on the logs, are attached in Appendix C. The elevations shown on the logs were estimated based on topographic information shown on the "Exploration Location Plan".

One seismic piezocone penetration test (SCPT 19-01) was made at the site on June 11, 2019 by ConeTec, Inc. under subcontract to S.W.COLE. The SCPT report provided by ConeTec, including testing procedures, exploration location and evaluation, is attached in Appendix D.

2.2 Testing

The test borings were drilled using a combination of hollow-stem auger and cased wash-boring methods. The soils were sampled at 2 to 5 foot intervals using a split

spoon sampler and Standard Penetration Testing (SPT) methods. SPT blow counts are shown on the logs.

The SCPT performed by ConeTec included shear wave velocity testing at 3 meter intervals. The results of shear wave velocity testing are included in the ConeTec report attached in Appendix D.

3.0 SUBSURFACE CONDITIONS

3.1 Soil and Bedrock

Underlying topsoil or asphalt paving, the explorations encountered a soils profile generally consisting of uncontrolled fill overlying glaciomarine sands and clays overlying a refusal surface at a depth of about 104 feet below the ground surface. The principal strata encountered are summarized below. Not all the strata were encountered at each exploration; refer to the attached logs for more detailed subsurface information.

Uncontrolled Fill: The borings encountered uncontrolled fill consisting of loose to medium dense sand with varying portions of silt and gravel extending to depths of about 2.5 feet.

Glaciomarine Sand: Underlying the uncontrolled fill, the borings encountered loose to medium dense stratified glaciomarine sand with occasional silt seams. The borings were terminated in the glaciomarine sand at depths of 37 feet.

Glaciomarine Clay: A deposit of glaciomarine clay was encountered between a depth interval of about 79 to 99 feet in SCPT19-01.

Refusal: SCPT19-01 was terminated on a refusal surface (probable glacial till) at a depth of about 104 feet.

3.2 Groundwater

Saturated soils and free groundwater were observed in the explorations at depths ranging from 18 to 20 feet below the existing ground surface. Long term groundwater information is not available. It should be anticipated that groundwater levels will fluctuate, particularly in response to periods of snowmelt and precipitation, as well as changes in site use.

4.0 EVALUATION AND RECOMMENDATIONS

4.1 General Findings

Based on the subsurface findings, the proposed construction appears feasible from a geotechnical standpoint. The principle geotechnical considerations are:

- The existing fills, as well as any existing or relic foundations and utilities, are unsuitable for support of the proposed building and entrance slabs. These unsuitable materials must be completely removed and replaced with compacted Granular Borrow below the footprints of the proposed buildings and tunnel.

- Spread footing foundations, slab-on-grade floors, basement slabs and tunnel foundation bearing on properly prepared subgrades, as described herein, appear suitable for the proposed building.

- Existing uncontrolled fills and native sands below paved areas should be proof-rolled and densified. Areas that rut, pump or become soft should be removed and replaced with compacted Granular Borrow or Subbase Gravel.

- Subgrades across the site are anticipated to consist of uncontrolled granular fill and native sands. Excavation of bearing surfaces should be completed with a smooth-edged bucket to lessen subgrade disturbance. A thin layer of Crushed Stone should be placed over footing subgrades to help protect the native sands from drying and disturbance.

- Granular Borrow, Structural Fill, Crushed Stone, and pavement gravels will be required for construction.

4.2 Liquefaction

Liquefaction is typically observed in saturated deposits of loose sands and non-plastic silts subjected to ground shaking most commonly from earthquakes. The soils below the site contain zones of potentially liquefiable loose sands; as such, we performed an assessment of the liquefaction potential. Based on our assessment, we estimate a factor of safety against liquefaction of at least 1.3 for the design earthquake of magnitude (M) of 5.0, as reported by the U.S. Geologic Survey (http://geohazards.usgs.gov). A factor of

safety of 1.0 or less is required for the site soils to liquefy; therefore, it is our opinion that liquefaction mitigation is not required for the proposed construction considering the design earthquake.

4.3 Site and Subgrade Preparation

We recommend that site preparation begin with the construction of an erosion control system to protect adjacent drainage ways and areas outside the construction limits. Surficial organics, roots and topsoil, as well as existing pavements, utilities and relic foundations should be completely removed from areas of proposed fill and construction. As much vegetation as possible should remain outside the construction areas to lessen the potential for erosion and site disturbance.

Building Pad and Footings: Existing uncontrolled fills, relic foundations and utilities must be completely removed from beneath the proposed building footprint until undisturbed native sands are encountered. The extent of removal should extend 1 foot laterally outward from outside edge of perimeter footings for every 1-foot of excavation depth (1H:1V bearing splay). The overexcavated area should be backfilled with compacted Granular Borrow.

Footings should bear on at least 3-inches of compacted Crushed Stone to help protect the native sands from drying and disturbance. Basement floor slabs should be underlain by at least 6-inches of compacted Crushed Stone overlying a non-woven geotextile filter fabric; this layer of Crushed Stone should be hydraulically connected to the Crushed Stone provided below basement footings. Slab-on-grade floors should be underlain by at least 12-inches of compacted Structural Fill.

Paved Areas: Existing granular fills and native sands should be proof-rolled and densified below proposed paved areas with 3 passes of a vibratory roller with a static weight of at least 10 tons. Areas that become soft or continue to yield after proof-rolling should be removed and replaced with compacted Granular Borrow.

4.4 Excavation and Dewatering

Excavation work will generally encounter uncontrolled fills and native sands. Care must be exercised during construction to limit disturbance of the bearing soils. Final cuts to subgrade should be performed with a smooth-edged bucket to reduce soil disturbance.

Native sands which become disturbed during construction should be re-compacted. Earthwork and grading activities should occur during drier, non-freezing weather of Spring, Summer and Fall.

Sumping and pumping dewatering techniques should be adequate to control groundwater in excavations. Controlling the water levels to at least one foot below planned excavation depths will help stabilize subgrades during construction.

Excavations must be properly shored or sloped in accordance with OSHA Regulations to prevent sloughing and caving of the sidewalls during construction. Care must be taken to preclude undermining adjacent utilities, paved areas and structures. The design and planning of excavations, excavation support systems, and dewatering is the responsibility of the contractor.

4.5 Foundations

We recommend the proposed buildings be supported on spread footings founded on properly prepared subgrades as discussed herein. For foundations bearing on properly prepared subgrades, we recommend the following geotechnical parameters for design:

Geotechnical Parameters for Spread Footings and Foundation Walls	
Design Frost Depth	4.5 feet
Net Allowable Soil Bearing Pressure	2.0 ksf
Ultimate Modulus of Subgrade Reaction (Mat / Combined Footing)	42 pci
Base Friction Factor	0.35
Total Unit Weight of Backfill	125 pcf
At-Rest Lateral Earth Pressure Coefficient	0.5
Surcharge Lateral Earth Pressure Coefficient	0.5
Internal Friction Angle of Backfill	30°
Seismic Soil Site Class (IBC 2015 – Shear Wave Velocity Method)	D

We recommend design consider total post-construction settlement of 1-inch with differential settlement of ½-inch over 40 feet or between adjacent columns.

4.6 Foundation Drainage

We recommend an underdrain system be installed on the outside edge of perimeter and basement footings. For basements, the underdrain pipe should consist of 4-inch diameter, perforated SDR-35 foundation drain pipe bedded in Crushed Stone and wrapped in non-woven geotextile fabric. For the on-grade areas, the underdrain pipe should consist of 4-inch diameter, slotted HDPE foundation drain pipe bedded in Underdrain Sand. The underdrain pipe must have a positive gravity outlet protected from freezing, clogging and backflow. Surface grades should be sloped away from the building for positive surface water drainage. General underdrain details are illustrated in Appendix B.

4.7 Slab-On-Grade

On-grade floor slabs in heated areas may be designed using a subgrade reaction modulus of 100 pci (pounds per cubic inch) provided the slab is underlain by at least 12-inches of compacted Structural Fill for on-grade slabs or 6-inches of compacted Crushed Stone overlying non-woven geotextile for basement slabs, both placed over properly prepared subgrades. The structural engineer or concrete consultant must design steel reinforcing and joint spacing appropriate to slab thickness and function.

We recommend a sub-slab vapor retarder particularly in areas of the building where the concrete slab will be covered with an impermeable surface treatment or floor covering that may be sensitive to moisture vapors. The vapor retarder must have a permeance that is less than the floor cover or surface treatment that is applied to the slab. The vapor retarder must have sufficient durability to withstand direct contact with the sub-slab base material and construction activity. The vapor retarder material should be placed according to the manufacturer's recommended method, including the taping and lapping of all joints and wall connections. The architect and/or flooring consultant should select the vapor retarder products compatible with flooring and adhesive materials.

The floor slab should be appropriately cured using moisture retention methods after casting. Typical floor slab curing methods should be used for at least 7 days. The architect or flooring consultant should assign curing methods consistent with current applicable American Concrete Institute (ACI) procedures with consideration of curing method compatibility to proposed surface treatments, flooring and adhesive materials.

4.8 Entrance Slabs and Sidewalks

Entrance slabs and sidewalks adjacent to the building must be designed to reduce the effects of differential frost action between adjacent pavement, doorways, and entrances. We recommend that non-frost susceptible Structural Fill be provided to a depth of at least 4.5 feet below the top of entrance slabs. This thickness of Structural Fill should extend the full width of the entrance slab and outward at least 4.5 feet, thereafter transitioning up to the bottom of the adjacent sidewalk or pavement gravels at a 3H:1V or flatter slope. General details of this frost transition zone are attached in Appendix B.

For plaza slabs extending beyond immediate building entrances, we recommend extending the thickness of Structural Fill beneath the entire plaza slab thereafter transitioning up to the bottom of the adjacent sidewalk or pavement gravels at a 3H:1V or flatter slope. Alternatively, the entrance slab and plaza slab may be heated or insulated for frost protection. General details of this frost transition zone are shown on the "Foundation Detail Sketch" attached in Appendix B.

4.9 Site Retaining Wall

For proposed site retaining walls, we recommend wet-cast segmental retaining walls. We recommend the facing blocks be founded on a minimum 6-inch thick leveling course of compacted Crushed Stone overlying properly prepared subgrades. For design of Segmental Retaining Walls (SRW), such as Redi-Scapes or Redi-Rock, we recommend the following geotechnical parameters for design:

Geotechnical Parameters for Segmental Retaining Wall		
Wall Zone	**Unit Weight (pcf)**	**Friction Angle**
Reinforced Soil	130	34
Retained Soil	125	30
Foundation Soil	125	30

Design of the retaining wall and evaluation of base sliding, overturning and internal stability of the wall are the responsibility of the wall design engineer. The wall designer must account for construction surcharge loads and future live load conditions. We recommend SRW walls meet the requirements of current AASHTO LRFD design methodologies and material requirements.

4.10 Backfill and Compaction

We recommend the following fill and backfill materials: recycled products must also be tested in accordance with applicable environmental regulations and approved by a qualified environmental consultant.

Granular Borrow: Backfill for overexcavations and fill to raise grades in building and paved areas should be sand or silty sand meeting the requirements for MaineDOT 703.19 Granular Borrow.

Structural Fill: Fill to repair of soft areas, backfill for foundations, on-grade slab base material and material below exterior entrances and sidewalks should be clean, non-frost susceptible sand and gravel meeting the gradation requirements for Structural Fill as given below:

Structural Fill	
Sieve Size	**Percent Finer by Weight**
4 inch	100
3 inch	90 to 100
¼ inch	25 to 90
#40	0 to 30
#200	0 to 6

Crushed Stone: Crushed Stone, used beneath foundations, for basement underdrain aggregate and basement slab base should be washed ¾-inch crushed stone meeting the requirements of 2014 MaineDOT Standard Specification 703.22 Underdrain Backfill Material Type C.

Underdrain Sand: Sand used for on-grade underdrain aggregate should be clean, free-draining sand meeting the requirements of 2014 MaineDOT Standard Specification 703.22 Underdrain Backfill Material Type B.

Reuse of Site Soils: The native sands appear suitable for reuse as Granular Borrow. The uncontrolled fills may be reused in landscape areas.

Placement and Compaction: Fill should be placed in horizontal lifts and compacted such that the desired density is achieved throughout the lift thickness with 3 to 5 passes of the compaction equipment. Loose lift thicknesses for grading, fill and backfill

activities should not exceed 12 inches. We recommend that fill and backfill in building and paved areas be compacted to at least 95 percent of its maximum dry density as determined by ASTM D-1557. Crushed Stone should be compacted with 3 to 5 passes of a vibratory plate compactor having a static weight of at least 500 pounds.

4.11 Weather Considerations

Construction activity should be limited during freezing weather and the site soils may require thawing before construction activities may continue. The contractor should anticipate the need for water to temper fills in order to facilitate compaction. If construction takes place during cold weather, subgrades, foundations and floor slabs must be protected during freezing conditions. Concrete and fill must not be placed on frozen soil; and once placed, the concrete and soil beneath the structure must be protected from freezing.

4.12 Paved Areas

We anticipate paved areas will be subjected primarily to passenger vehicle and light delivery truck traffic with occasional heavy delivery truck traffic. Considering the site soils, and proposed usage, we offer the following pavement section for consideration. Materials are based on *2014 Maine Department of Transportation Standard Specifications*.

Recommended Pavement Section	
Layer	**Thickness**
9.5 mm Hot Mix Asphalt (50 Gyration Design)	1 ¼”
19.0 mm Hot Mix Asphalt (50 Gyration Design)	2 ¼”
MaineDOT 703.06 Type A, Crushed Aggregate Base	3”
MaineDOT 703.06 Type D, Crushed Aggregate Subbase	15”

The base and subbase materials should be compacted to at least 95 percent of their maximum dry density as determined by ASTM D-1557. Hot mix asphalt pavement should be compacted to 92 to 97 percent of its theoretical maximum density as determined by ASTM D-2041. A tack coat should be used between successive lifts of bituminous pavement.

It should be understood that frost penetration can approach 4.5 feet in this area. In the absence of full depth excavation of frost susceptible soils below paved areas and

subsequent replacement with non-frost susceptible compacted fill, frost penetration into the subgrade will occur and some heaving and distress of pavement must be anticipated.

4.13 Design Review and Construction Testing

S.W.COLE should be retained to review the construction documents prior to bidding to determine that our earthwork, foundation and pavement recommendations have been properly interpreted and implemented.

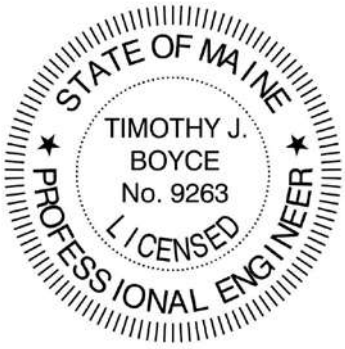
A soils and concrete testing program should be implemented during construction to observe compliance with the design concepts, plans, and specifications. S.W.COLE is available to observe earthwork activities, preparation of foundation and pavement subgrades, as well as testing and special inspection services for soils, concrete, asphalt, steel and spray-applied fireproofing construction materials.

5.0 CLOSURE

It has been a pleasure to be of assistance to you with this phase of your project. We look forward to working with you during the construction phase of the project.

Sincerely,

S. W. Cole Engineering, Inc.



Timothy J. Boyce, P.E.
Senior Geotechnical Engineer

TJB:pfk

Appendix A
Limitations

This report has been prepared for the exclusive use of Bowdoin College for specific application to the proposed Center for Arctic Studies and Mill Hall buildings located at College Street and Harpswell Road on the Bowdoin College campus in Brunswick, Maine. S. W. Cole Engineering, Inc. (S.W.COLE) has endeavored to conduct our services in accordance with generally accepted soil and foundation engineering practices. No warranty, expressed or implied, is made.

The soil profiles described in the report are intended to convey general trends in subsurface conditions. The boundaries between strata are approximate and are based upon interpretation of exploration data and samples.

The analyses performed during this investigation and recommendations presented in this report are based in part upon the data obtained from subsurface explorations made at the site. Variations in subsurface conditions may occur between explorations and may not become evident until construction. If variations in subsurface conditions become evident after submission of this report, it will be necessary to evaluate their nature and to review the recommendations of this report.

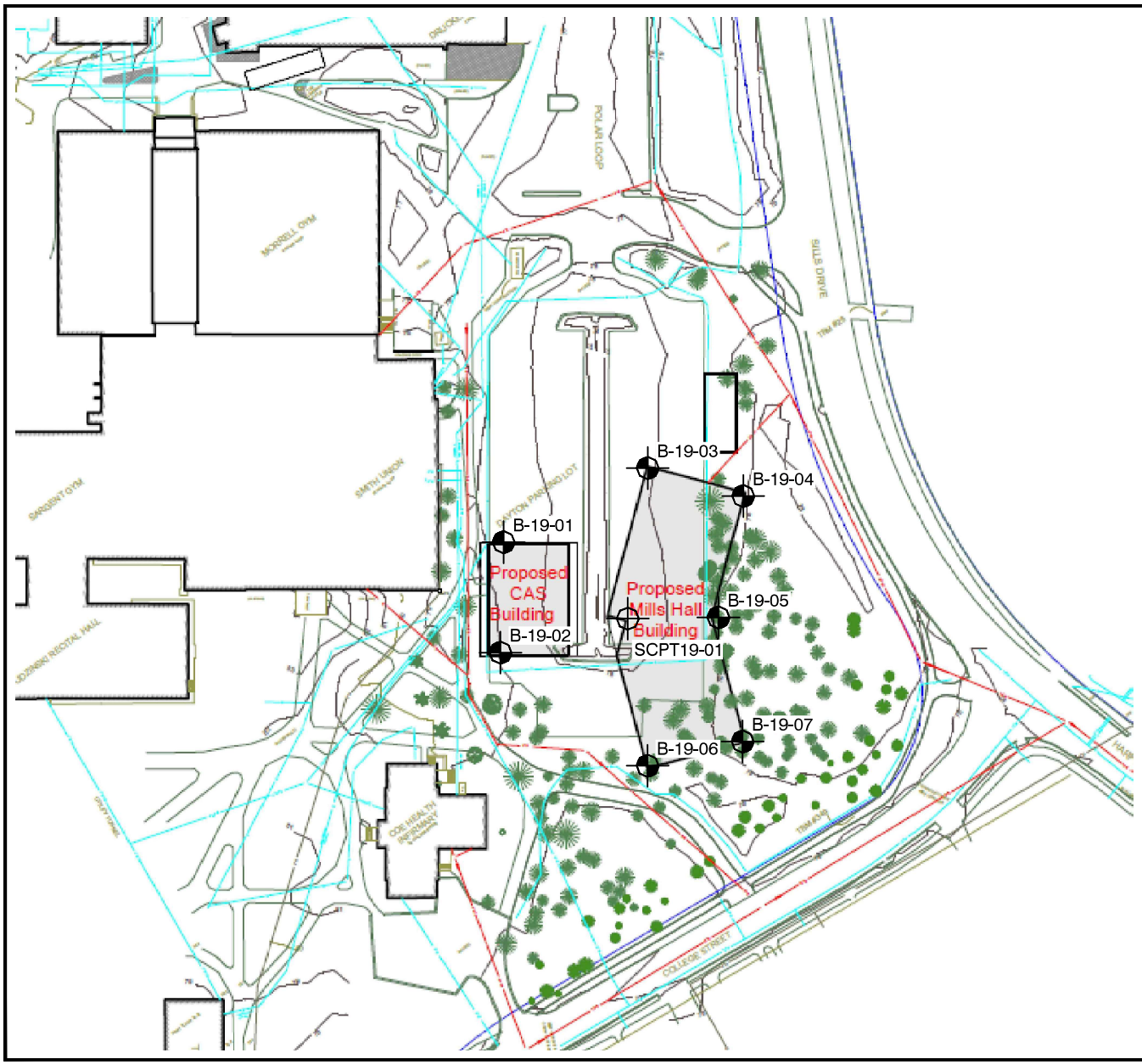
Observations have been made during exploration work to assess site groundwater levels. Fluctuations in water levels will occur due to variations in rainfall, temperature, and other factors.

S.W.COLE's scope of services has not included the investigation, detection, or prevention of any Biological Pollutants at the project site or in any existing or proposed structure at the site. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and the byproducts of any such biological organisms.

Recommendations contained in this report are based substantially upon information provided by others regarding the proposed project. In the event that any changes are made in the design, nature, or location of the proposed project, S.W.COLE should review such changes as they relate to analyses associated with this report. Recommendations contained in this report shall not be considered valid unless the changes are reviewed by S.W.COLE.

APPENDIX B

Figures



LEGEND:

APPROXIMATE BORING LOCATION

APPROXIMATE CONE PENETRATION TEST LOCATION

NOTES:

1. EXPLORATION LOCATION PLAN WAS PREPARED FROM A SCANNED SITE PLAN IMAGE AND IS NOT TO SCALE.
2. THE BORING LOCATIONS ARE APPROXIMATE.
3. THIS PLAN SHOULD BE USED IN CONJUNCTION WITH THE ASSOCIATED S. W. COLE ENGINEERING, INC. GEOTECHNICAL REPORT.
4. THE PURPOSE OF THIS PLAN IS ONLY TO DEPICT THE LOCATION OF THE EXPLORATIONS IN RELATION TO THE EXISTING CONDITIONS AND PROPOSED CONSTRUCTION AND IS NOT TO BE USED FOR CONSTRUCTION.

S.W.COLE ENGINEERING, INC.

BOWDOIN COLLEGE

EXPLORATION LOCATION PLAN

PROPOSED CENTER FOR ARCTIC STUDIES & MILLS HALL
BOWDOIN COLLEGE CAMPUS
BRUNSWICK, MAINE

Job No.:	19-0483	Scale:	Not to Scale
Date :	06/24/2019	Sheet:	1

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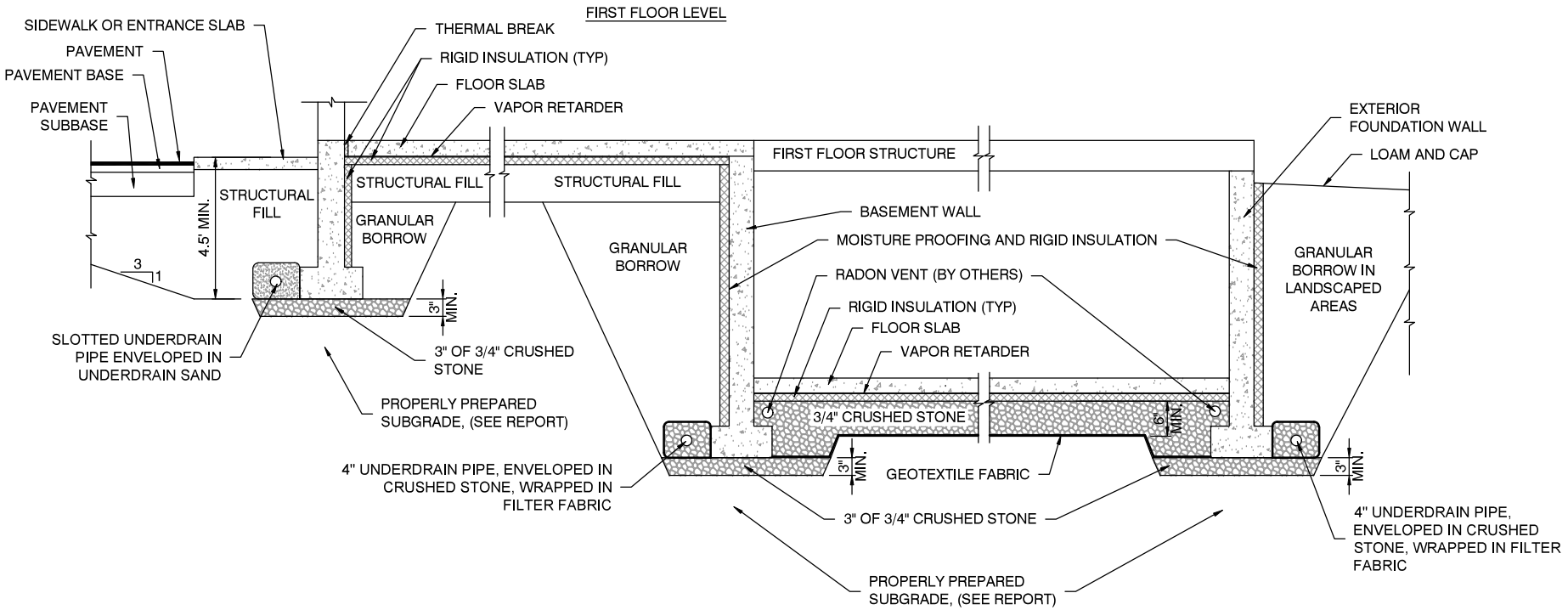

NOTE:

1. UNDERDRAIN INSTALLATION AND MATERIAL GRADATION RECOMMENDATIONS ARE CONTAINED WITHIN THIS REPORT.

2. DETAIL IS PROVIDED FOR ILLUSTRATIVE PURPOSES ONLY, NOT FOR CONSTRUCTION.

S.W.COLE ENGINEERING, INC.

BOWDOIN COLLEGE

UNDERDRAIN DETAIL

PROPOSED CENTER FOR ARCTIC STUDIES & MILLS HALL
BOWDOIN COLLEGE CAMPUS
BRUNSWICK, MAINE

Job No.:	19-0483	Scale:	Not to Scale
Date :	06/24/2019	Sheet:	2

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APPENDIX C

Exploration Logs and Key

BORING LOG

S.W.COLE ENGINEERING, INC.

CLIENT: Bowdoin College
PROJECT: Proposed Center for Arctic Studies & Mills Hall
LOCATION: Bowdoin College Campus, Brunswick, Maine

BORING NO.: B-19-01
SHEET: 1 of 1
PROJECT NO. 19-0483
DATE START: 6/6/2019
DATE FINISH: 6/6/2019

Drilling Information

LOCATION: See Exploration Location Plan
ELEVATION (FT): 79' Estimated
TOTAL DEPTH (FT): 37.0
LOGGED BY: Patrick Otto
DRILLING CO.: S. W. Cole Explorations, LLC
DRILLER: Matt Leonard
DRILLING METHOD: Cased Boring
RIG TYPE: Track Mounted Mobile Drill B-53
AUGER ID/OD: N/A / N/A
SAMPLER: Standard Split-Spoon
HAMMER TYPE: Automatic / Automatic
HAMMER WEIGHT (lbs): 140 / 140
CASING ID/OD: 4 in / 4 1/2 in
CORE BARREL:
HAMMER EFFICIENCY FACTOR:
HAMMER DROP (inch): 30 / 16
WATER LEVEL DEPTHS (ft): 6/6/2019 No free water observed, borehole open to 19' after drilling.
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_2O Depth	Remarks
			1D	D	0.3-2.3	24/14	13-16-14-12			2" Asphalt / medium dense, brown gravelly SAND, some silt (FILL)		
										1.5 Medium dense, brown SAND, some silt (FILL)		
			2D	D	2.3-4.3	24/18	7-9-8-9			2.5 Loose, light brown SAND, trace silt		
75	5		3D	D	5-7	24/16	4-4-5-4					
70	10		4D	D	10-12	24/18	3-2-4-4					
65	15		5D	D	15-17	24/10	3-3-5-4			14.0 Loose, brown SAND, trace gravel, trace silt		
60	20		6D	D	20-22	24/8	3-4-6-6			18.0 Medium dense to loose, brown SAND, trace silt		
55	25		7D	D	25-27	24/1	2-3-4-4					
50	30		8D	D	30-32	24/12	6-7-6-9			28.0 Medium dense, brown SAND, some silt with occasional silty clay layers		
45	35		9D	D	35-37	24/12	5-8-11-9					

Bottom of Exploration at 37.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING LOG

S.W.COLE ENGINEERING, INC.

CLIENT: Bowdoin College
PROJECT: Proposed Center for Arctic Studies & Mills Hall
LOCATION: Bowdoin College Campus, Brunswick, Maine

BORING NO.: B-19-02
SHEET: 1 of 1
PROJECT NO. 19-0483
DATE START: 6/6/2019
DATE FINISH: 6/6/2019

Drilling Information

LOCATION: See Exploration Location Plan
ELEVATION (FT): 79' Estimated
TOTAL DEPTH (FT): 37.0
LOGGED BY: Patrick Otto
DRILLING CO.: S. W. Cole Explorations, LLC
DRILLER: Matt Leonard
DRILLING METHOD: Cased Boring
RIG TYPE: Track Mounted Mobile Drill B-53
AUGER ID/OD: N/A / N/A
SAMPLER: Standard Split-Spoon
HAMMER TYPE: Automatic / Automatic
HAMMER WEIGHT (lbs): 140 / 140
CASING ID/OD: 4 in / 4 1/2 in
CORE BARREL:
HAMMER EFFICIENCY FACTOR:
HAMMER DROP (inch): 30 / 16
WATER LEVEL DEPTHS (ft): 6/6/2019 No free water observed, borehole open to 19' after drilling.
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_2O Depth	Remarks
			1D		0.3-2.3	24/15	11-14-12-7			2" Asphalt / medium dense, brown gravelly SAND, some silt (FILL)		
										1.8		
			2D		2.3-4.3	24/16	8-8-7-8			Medium dense, brown SAND, some silt (FILL)		
										2.5		
75										Loose, light brown SAND, some silt, trace gravel		
	5		3D		5-7	24/16	3-5-4-6					
70												
	10		4D		10-12	24/15	2-3-3-3					
										10.5		
65										Loose, light brown SAND, trace silt		
										14.0		
	15		5D		15-17	24/6	2-4-3-5			Loose, brown SAND, trace silt, trace gravel		
60												
	20		6D		20-22	24/6	3-3-4-5					
55										24.0		
	25		7D		25-27	24/10	3-5-8-12			Medium dense to loose, brown SAND, trace silt with occasional silt layers		
50												
	30		8D		30-32	24/9	3-4-4-7					
45												
	35		9D		35-37	24/15	3-3-6-10					
										Bottom of Exploration at 37.0 feet		

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING / WELL 19-0483.GPJ SWCE TEMPLATE.GDT 6/24/19

BORING LOG

S.W.COLE ENGINEERING, INC.

CLIENT: Bowdoin College
PROJECT: Proposed Center for Arctic Studies & Mills Hall
LOCATION: Bowdoin College Campus, Brunswick, Maine

BORING NO.: B-19-03
SHEET: 1 of 1
PROJECT NO. 19-0483
DATE START: 6/5/2019
DATE FINISH: 6/5/2019

Drilling Information

LOCATION: See Exploration Location Plan | **ELEVATION (FT):** 79' Estimated | **TOTAL DEPTH (FT):** 37.0 | **LOGGED BY:** Patrick Otto
DRILLING CO.: S. W. Cole Explorations, LLC | **DRILLER:** Matt Leonard | **DRILLING METHOD:** Cased Boring
RIG TYPE: Track Mounted Mobile Drill B-53 | **AUGER ID/OD:** N/A / N/A | **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / Automatic | **HAMMER WEIGHT (lbs):** 140 / 140 | **CASING ID/OD:** 4 in / 4 1/2 in | **CORE BARREL:**
HAMMER EFFICIENCY FACTOR: | **HAMMER DROP (inch):** 30 / 16
WATER LEVEL DEPTHS (ft): 6/5/2019 No free water observed, borehole open to 25' after drilling.
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_2O Depth	Remarks
			1D		0.5-2.5	24/15	10-12-11-11			2" Asphalt / medium dense, brown gravelly SAND, some silt (FILL)		
										1.5 Medium dense, brown SAND, some silt (FILL)		
			2D		2.5-4.5	24/18	9-8-8-7			2.5 Medium dense to loose, light brown SAND, some silt		
75	5		3D		5-7	24/18	4-5-8-7					
70	10		4D		10-12	24/15	2-6-5-7					
65	15		5D		15-17	24/12	3-3-5-4					
										18.0 Medium dense to loose, brown SAND, some silt with occasional silt layers		
60	20		6D		20-22	24/12	3-4-4-4					
55	25		7D		25-27	24/15	4-5-6-8					
50	30		8D		30-32	24/12	3-3-5-7					
										33.0 Loose, brown SAND with frequent silt layers		
45	35		9D		35-37	24/12	2-2-5-7					

Bottom of Exploration at 37.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING LOG

S.W.COLE ENGINEERING, INC.

CLIENT: Bowdoin College
PROJECT: Proposed Center for Arctic Studies & Mills Hall
LOCATION: Bowdoin College Campus, Brunswick, Maine

BORING NO.: B-19-04
SHEET: 1 of 1
PROJECT NO. 19-0483
DATE START: 6/6/2019
DATE FINISH: 6/6/2019

Drilling Information

LOCATION: See Exploration Location Plan | **ELEVATION (FT):** 78' Estimated | **TOTAL DEPTH (FT):** 37.0 | **LOGGED BY:** Patrick Otto
DRILLING CO.: S. W. Cole Explorations, LLC | **DRILLER:** Matt Leonard | **DRILLING METHOD:** Cased Boring
RIG TYPE: Track Mounted Mobile Drill B-53 | **AUGER ID/OD:** N/A / N/A | **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / Automatic | **HAMMER WEIGHT (lbs):** 140 / 140 | **CASING ID/OD:** 4 in / 4 1/2 in | **CORE BARREL:**
HAMMER EFFICIENCY FACTOR: | **HAMMER DROP (inch):** 30 / 16
WATER LEVEL DEPTHS (ft): ▽ 20 ft 6/6/2019 Free water at 20', borehole open to 37' after drilling.
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_2O Depth	Remarks
			1D		0-2	24/18	2-3-4-5			Loose, dark brown-gray sandy SILT, trace gravel with rootlets (Topsoil/Fill)		
75			2D		2-4	24/18	5-5-5-5			1.8 Loose to medium dense, brown SAND, some silt, trace gravel		
	5		3D		5-7	24/18	3-3-5-4			4.5 Loose to medium dense, light brown SAND, trace silt		
70												
	10		4D		10-12	24/20	4-3-4-4					
65												
	15		5D		15-17	24/12	3-4-6-7					
60										18.0 Loose to medium dense, brown SAND, some silt	▽	
	20		6D		20-22	24/10	2-3-4-12					
55												
	25		7D		25-27	24/12	3-3-5-6					
50												
	30		8D		30-32	24/10	4-6-7-12					
45										33.0 Loose, brown SAND, some silt with frequent silt seams/layers		
	35		9D		35-37	24/15	5-4-5-4					

Bottom of Exploration at 37.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING / WELL 19-0483.GPJ SWCE TEMPLATE.GDT 6/24/19

BORING LOG

S.W.COLE ENGINEERING, INC.

CLIENT: Bowdoin College
PROJECT: Proposed Center for Arctic Studies & Mills Hall
LOCATION: Bowdoin College Campus, Brunswick, Maine

BORING NO.: B-19-05
SHEET: 1 of 1
PROJECT NO. 19-0483
DATE START: 6/5/2019
DATE FINISH: 6/5/2019

Drilling Information

LOCATION: See Exploration Location Plan | **ELEVATION (FT):** 78' Estimated | **TOTAL DEPTH (FT):** 37.0 | **LOGGED BY:** Patrick Otto
DRILLING CO.: S. W. Cole Explorations, LLC | **DRILLER:** Matt Leonard | **DRILLING METHOD:** Cased Boring
RIG TYPE: Track Mounted Mobile Drill B-53 | **AUGER ID/OD:** N/A / N/A | **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / Automatic | **HAMMER WEIGHT (lbs):** 140 / 140 | **CASING ID/OD:** 4 in / 4 1/2 in | **CORE BARREL:**
HAMMER EFFICIENCY FACTOR: | **HAMMER DROP (inch):** 30 / 16
WATER LEVEL DEPTHS (ft): ▽ 20 ft 6/5/2019 Soils saturated at 20'. Borehole open to 19.4' after drilling.
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_2O Depth	Remarks
			1D		0-2	24/16	2-1-2-2			Very loose, brown sandy SILT (Topsoil)		
										1.5 Very loose, brown silty SAND		
75			2D		2-4	24/16	3-4-6-6			2.0 Medium dense to loose, brown SAND, trace silt, trace gravel		
	5		3D		5-7	24/15	4-4-4-4					
70										8.0 Loose to very loose, brown, trace silt, trace gravel at 25'		
	10		4D		10-12	24/20	3-3-2-3					
65												
	15		5D		15-17	24/15	3-3-4-4					
60											▽	
	20		6D		20-22	24/18	1 FOR 12"-2-2					
55												
	25		7D		25-27	24/16	5-9-13-16					
50										28.0 Medium dense, brown SAND, some silt to silty with frequent silt layers below 35'		
	30		8D		30-32	24/14	5-5-8-11					
45												
	35		9D		35-37	24/12	7-8-11-10					

Bottom of Exploration at 37.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING / WELL 19-0483.GPJ SWCE TEMPLATE.GDT 6/24/19

BORING LOG

S.W.COLE ENGINEERING, INC.

CLIENT: Bowdoin College
PROJECT: Proposed Center for Arctic Studies & Mills Hall
LOCATION: Bowdoin College Campus, Brunswick, Maine

BORING NO.: B-19-06
SHEET: 1 of 1
PROJECT NO. 19-0483
DATE START: 6/6/2019
DATE FINISH: 6/6/2019

Drilling Information

LOCATION: See Exploration Location Plan | **ELEVATION (FT):** 78' Estimated | **TOTAL DEPTH (FT):** 37.0 | **LOGGED BY:** Patrick Otto
DRILLING CO.: S. W. Cole Explorations, LLC | **DRILLER:** Matt Leonard | **DRILLING METHOD:** Cased Boring
RIG TYPE: Track Mounted Diedrich D-50 | **AUGER ID/OD:** N/A / N/A | **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / Automatic | **HAMMER WEIGHT (lbs):** 140 / 140 | **CASING ID/OD:** 4 in / 4 1/2 in | **CORE BARREL:**
HAMMER EFFICIENCY FACTOR: | **HAMMER DROP (inch):** 30 / 16
WATER LEVEL DEPTHS (ft): ▽ 20 ft 6/6/2019 Free water at 20', borehole open to 37' after drilling.
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_2O Depth	Remarks
			1D		0-2	24/18	2-2-3-4			Loose, dark sandy SILT with frequent silt layers (Topsoil/FILL)		
										1.8		
75			2D		2-4	24/16	3-5-5-5			Loose, rust brown silty SAND		
										2.5		
	5		3D		5-7	24/16	4-4-5-6			Medium dense to loose, brown SAND, some silt, trace gravel with rootlets to 4'		
										6.5		
70										Loose to medium dense, light brown SAND, trace silt		
	10		4D		10-12	24/15	2-3-3-4					
65												
	15		5D		15-17	24/10	4-5-6-8					
60												
	20		6D		20-22	24/10	2-4-5-5				▽	
55												
	25		7D		25-27	24/1	3-2-4-5					
50										28.0		
	30		8D		30-32	24/12	6-6-7-7			Loose to medium dense, brown SAND, some silt, trace gravel with occasional silt layers		
45												
										34.0		
	35		9D		35-37	24/12	3-2-5-7			Loose, brown silty SAND		
										Bottom of Exploration at 37.0 feet		

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING / WELL 19-0483.GPJ SWCE TEMPLATE.GDT 6/24/19

BORING LOG

S.W.COLE ENGINEERING, INC.

CLIENT: Bowdoin College
PROJECT: Proposed Center for Arctic Studies & Mills Hall
LOCATION: Bowdoin College Campus, Brunswick, Maine

BORING NO.: B-19-07
SHEET: 1 of 1
PROJECT NO. 19-0483
DATE START: 6/5/2019
DATE FINISH: 6/5/2019

Drilling Information

LOCATION: See Exploration Location Plan
ELEVATION (FT): 78' Estimated
TOTAL DEPTH (FT): 37.0
LOGGED BY: Patrick Otto
DRILLING CO.: S. W. Cole Explorations, LLC
DRILLER: Matt Leonard
DRILLING METHOD: Cased Boring
RIG TYPE: Track Mounted Mobile Drill B-53
AUGER ID/OD: N/A / N/A
SAMPLER: Standard Split-Spoon
HAMMER TYPE: Automatic / Automatic
HAMMER WEIGHT (lbs): 140 / 140
CASING ID/OD: 4 in / 4 1/2 in
CORE BARREL:
HAMMER EFFICIENCY FACTOR:
HAMMER DROP (inch): 30 / 16
WATER LEVEL DEPTHS (ft): 6/5/2019 No free water observed
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_2O Depth	Remarks
			1D		0-2	24/18	1-1-2-5			Very loose, dark brown silty SAND (Topsoil)		
										1.0 Loose, brown silty SAND,		
75			2D		2-4	24/15	4-5-5-7			1.9 Medium dense to loose, brown SAND, trace silt, trace gravel		
	5		3D		5-7	24/15	3-4-5-5					
70												
	10		4D		10-12	24/13	2-6-8-10					
65												
	15		5D		15-16.5	18/13	6-5-8			with occasional silt layers		
60										18.0 Loose to medium dense, brown SAND, trace silt		
	20		6D		20-22	24/7	2-3-3-6					
55												
	25		7D		25-27	24/12	4-4-7-9					
50												
	30		8D		30-32	24/14	4-4-6-8					
45												
	35		9D		35-37	24/18	2-2-4-6			34.0 Loose to medium dense, brown SAND, some silt with occasional silt layers		

Bottom of Exploration at 37.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING / WELL 19-0483.GPJ SWCE TEMPLATE.GDT 6/24/19

S.W.COLE ENGINEERING, INC. • Geotechnical Engineering • Field & Lab Testing • Scientific & Environmental Consulting

KEY TO NOTES & SYMBOLS
Test Boring and Test Pit Explorations

All stratification lines represent the approximate boundary between soil types and the transition may be gradual.

Key to Symbols Used:

w	-	water content, percent (dry weight basis)
q_u	-	unconfined compressive strength, kips/sq. ft. - laboratory test
S_v	-	field vane shear strength, kips/sq. ft.
L_v	-	lab vane shear strength, kips/sq. ft.
q_p	-	unconfined compressive strength, kips/sq. ft. – pocket penetrometer test
O	-	organic content, percent (dry weight basis)
W_L	-	liquid limit - Atterberg test
W_P	-	plastic limit - Atterberg test
WOH	-	advance by weight of hammer
WOM	-	advance by weight of man
WOR	-	advance by weight of rods
HYD	-	advance by force of hydraulic piston on drill
RQD	-	Rock Quality Designator - an index of the quality of a rock mass.
γ_T	-	total soil weight
γ_B	-	buoyant soil weight

Description of Proportions:

Trace:	0 to 5%
Some:	5 to 12%
"Y"	12 to 35%
And	35+%
With	Undifferentiated

Description of Stratified Soils

Parting:	0 to 1/16" thickness
Seam:	1/16" to 1/2" thickness
Layer:	½" to 12" thickness
Varved:	Alternating seams or layers
Occasional:	one or less per foot of thickness
Frequent:	more than one per foot of thickness

REFUSAL: **Test Boring Explorations** - Refusal depth indicates that depth at which, in the drill foreman's opinion, sufficient resistance to the advance of the casing, auger, probe rod or sampler was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

REFUSAL: **Test Pit Explorations** - Refusal depth indicates that depth at which sufficient resistance to the advance of the backhoe bucket was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

Although refusal may indicate the encountering of the bedrock surface, it may indicate the striking of large cobbles, boulders, very dense or cemented soil, or other buried natural or man-made objects or it may indicate the encountering of a harder zone after penetrating a considerable depth through a weathered or disintegrated zone of the bedrock.

APPENDIX D

ConeTec Inc. SCPT Report

PRESENTATION OF SITE INVESTIGATION RESULTS

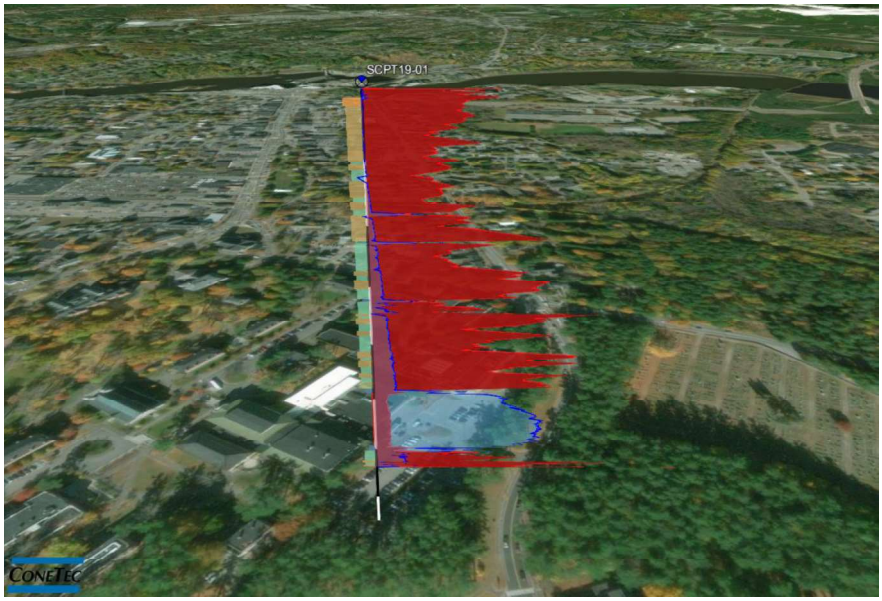
6150 College Street
Brunswick, Maine

Prepared for:

S.W. Cole Engineering

ConeTec Job No: 19-53070

Project Start Date: 11-Jun-2019
Project End Date: 11-Jun-2019
Report Date: 15-Jun-2019



Prepared by:

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www.conetecdataservices.com

Introduction

The enclosed report presents the results of a seismic piezocone penetration testing (SCPTu or SCPT) program carried out at the 6150 College Street site located in Brunswick, Maine. The site investigation program was conducted by ConeTec Inc. (ConeTec), under contract to S.W. Cole Engineering (S.W. Cole) of Gray, Maine.

A total of 1 seismic cone penetration test was completed at 1 location. The SCPT program was performed to evaluate the subsurface soil conditions. SCPT sounding locations were selected and numbered under supervision of S.W. Cole personnel (Mr. Patrick Otto).

Project Information

Project	
Client	S.W. Cole Engineering
Project	6150 College Street, Brunswick, ME
ConeTec project number	19-53070

A map from CESIUM including the CPT test locations is presented below.

Rig Description	Deployment System	Test Type
CPT Truck Rig	25 ton truck mounted (twin cylinders)	SCPT

Coordinates		
Test Type	Collection Method	EPSG Number
SCPT	GPS (GlobalSat MR-350)	32619 (WGS 84 / UTM North)

Cone Penetration Test (CPT)	
Depth reference	Ground surface at the time of the investigation.
Tip and sleeve data offset	0.1 meter. This has been accounted for in the CPT data files.
Pore pressure dissipation (PPD) tests	Three pore pressure dissipation tests were completed primarily to determine the phreatic surface.
Additional Comments	Shear wave velocity tests were conducted at one meter depth intervals at one location.
Additional plots	Advanced, seismic and Soil Behavior Type (SBT) scatter plots are included in the data release package.

Cone Description	Cone Number	Cross Sectional Area (cm^2)	Sleeve Area (cm^2)	Tip Capacity (bar)	Sleeve Capacity (bar)	Pore Pressure Capacity (psi)
542:T1500F15U500	542	15	225	1500	15	500

CPT Calculated Parameters	
Additional information	The Normalized Soil Behavior Type Chart based on Q_{tn} (SBT Qtn) (Robertson, 2009) was used to classify the soil for this project. A detailed set of calculated CPT parameters have been generated and are provided in Excel format files in the release folder. The CPT parameter calculations are based on values of corrected tip resistance (q_t) sleeve friction (f_s) and pore pressure (u_2). Effective stresses are calculated based on unit weights that have been assigned to the individual soil behavior type zones and the assumed equilibrium pore pressure profile. Soils were classified as either drained or undrained based on the Q_{tn} Normalized Soil Behavior Type Chart (Robertson, 2009). Calculations for both drained and undrained parameters were included for materials that classified as silt mixtures – clayey silt to silty clay (zone 4).

Limitations

This report has been prepared for the exclusive use of S.W. Cole Engineering (Client) for the project titled "6150 College Street, Brunswick, ME". The report's contents may not be relied upon by any other party without the express written permission of ConeTec. ConeTec has provided site investigation services, prepared the factual data reporting, and provided geotechnical parameter calculations consistent with current best practices. No other warranty, expressed or implied, is made.

The information presented in the report document and the accompanying data set pertain to the specific project, site conditions and objectives described to ConeTec by the Client. In order to properly understand the factual data, assumptions and calculations, reference must be made to the documents provided and their accompanying data sets, in their entirety.

The cone penetration tests (CPTu) are conducted using an integrated electronic piezocone penetrometer and data acquisition system manufactured by Adara Systems Ltd. of Richmond, British Columbia, Canada.

ConeTec's piezocone penetrometers are compression type designs in which the tip and friction sleeve load cells are independent and have separate load capacities. The piezocones use strain gauged load cells for tip and sleeve friction and a strain gauged diaphragm type transducer for recording pore pressure. The piezocones also have a platinum resistive temperature device (RTD) for monitoring the temperature of the sensors, an accelerometer type dual axis inclinometer and a geophone sensor for recording seismic signals. All signals are amplified down hole within the cone body and the analog signals are sent to the surface through a shielded cable.

ConeTec penetrometers are manufactured with various tip, friction and pore pressure capacities in both 10 cm^2 and 15 cm^2 tip base area configurations in order to maximize signal resolution for various soil conditions. The 15 cm^2 penetrometers do not require friction reducers as they have a diameter larger than the deployment rods. The 10 cm^2 piezocones use a friction reducer consisting of a rod adapter extension behind the main cone body with an enlarged cross sectional area (typically 44 mm diameter over a length of 32 mm with tapered leading and trailing edges) located at a distance of 585 mm above the cone tip.

The penetrometers are designed with equal end area friction sleeves, a net end area ratio of 0.8 and cone tips with a 60 degree apex angle.

All ConeTec piezocones can record pore pressure at various locations. Unless otherwise noted, the pore pressure filter is located directly behind the cone tip in the "u_2" position (ASTM Type 2). The filter is 6 mm thick, made of porous plastic (polyethylene) having an average pore size of 125 microns (90-160 microns). The function of the filter is to allow rapid movements of extremely small volumes of water needed to activate the pressure transducer while preventing soil ingress or blockage.

The piezocone penetrometers are manufactured with dimensions, tolerances and sensor characteristics that are in general accordance with the current ASTM D5778 standard. ConeTec's calibration criteria also meet or exceed those of the current ASTM D5778 standard. An illustration of the piezocone penetrometer is presented in Figure CPTu.

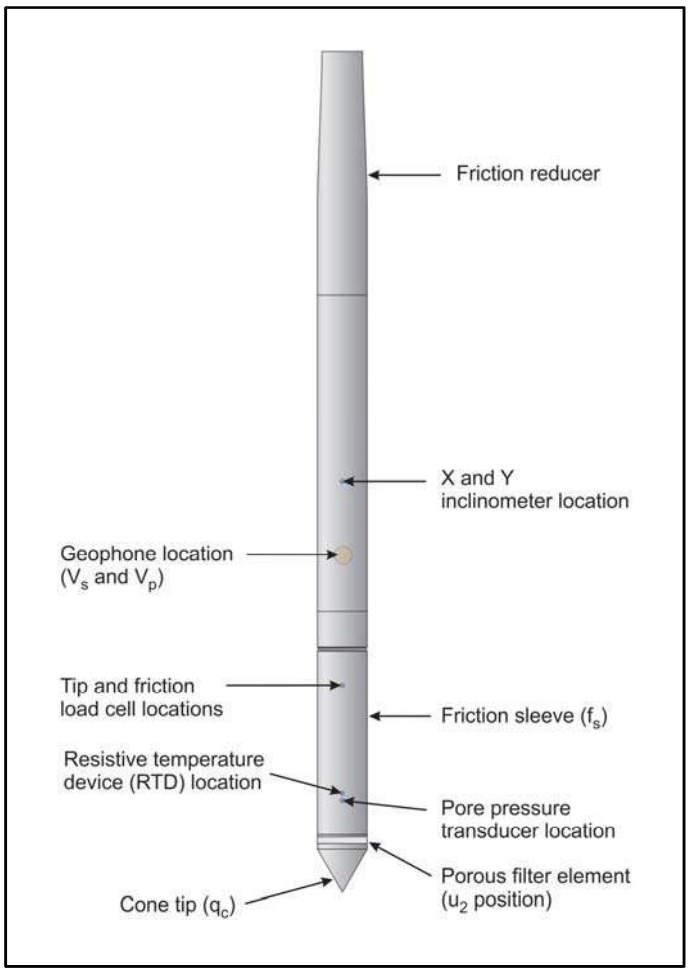


Figure CPTu. Piezocone Penetrometer (15 cm^2)

The ConeTec data acquisition systems consist of a Windows based computer and a signal conditioner and power supply interface box with a 16 bit (or greater) analog to digital (A/D) converter. The data is recorded at fixed depth increments using a depth wheel attached to the push cylinders or by using a spring loaded rubber depth wheel that is held against the cone rods. The typical recording intervals are either 2.5 cm or 5.0 cm depending on project requirements; custom recording intervals are possible. The system displays the CPTu data in real time and records the following parameters to a storage media during penetration:

- Depth
- Uncorrected tip resistance (q_c)
- Sleeve friction (f_s)
- Dynamic pore pressure (u)
- Additional sensors such as resistivity, passive gamma, ultra violet induced fluorescence, if applicable

All testing is performed in accordance to ConeTec's CPT operating procedures which are in general accordance with the current ASTM D5778 standard.

Prior to the start of a CPTu sounding a suitable cone is selected, the cone and data acquisition system are powered on, the pore pressure system is saturated with either glycerin or silicone oil and the baseline readings are recorded with the cone hanging freely in a vertical position.

The CPTu is conducted at a steady rate of 2 cm/s, within acceptable tolerances. Typically one meter length rods with an outer diameter of 1.5 inches are added to advance the cone to the sounding termination depth. After cone retraction final baselines are recorded.

Additional information pertaining to ConeTec's cone penetration testing procedures:

- Each filter is saturated in silicone oil or glycerin under vacuum pressure prior to use
- Recorded baselines are checked with an independent multi-meter
- Baseline readings are compared to previous readings
- Soundings are terminated at the client's target depth or at a depth where an obstruction is encountered, excessive rod flex occurs, excessive inclination occurs, equipment damage is likely to take place, or a dangerous working environment arises
- Differences between initial and final baselines are calculated to ensure zero load offsets have not occurred and to ensure compliance with ASTM standards

The interpretation of piezocone data for this report is based on the corrected tip resistance (q_t), sleeve friction (f_s) and pore water pressure (u). The interpretation of soil type is based on the correlations developed by Robertson (1990) and Robertson (2009). It should be noted that it is not always possible to accurately identify a soil type based on these parameters. In these situations, experience, judgment and an assessment of other parameters may be used to infer soil behavior type.

The recorded tip resistance (q_c) is the total force acting on the piezocone tip divided by its base area. The tip resistance is corrected for pore pressure effects and termed corrected tip resistance (q_t) according to the following expression presented in Robertson et al, 1986:

$$q_t = q_c + (1\text{-}a) \bullet u_2$$

where: q_t is the corrected tip resistance
q_c is the recorded tip resistance
u_2 is the recorded dynamic pore pressure behind the tip (u_2 position)
a is the Net Area Ratio for the piezocone (0.8 for ConeTec probes)

The sleeve friction (f_s) is the frictional force on the sleeve divided by its surface area. As all ConeTec piezocones have equal end area friction sleeves, pore pressure corrections to the sleeve data are not required.

The dynamic pore pressure (u) is a measure of the pore pressures generated during cone penetration. To record equilibrium pore pressure, the penetration must be stopped to allow the dynamic pore pressures to stabilize. The rate at which this occurs is predominantly a function of the permeability of the soil and the diameter of the cone.

The friction ratio (Rf) is a calculated parameter. It is defined as the ratio of sleeve friction to the tip resistance expressed as a percentage. Generally, saturated cohesive soils have low tip resistance, high

friction ratios and generate large excess pore water pressures. Cohesionless soils have higher tip resistances, lower friction ratios and do not generate significant excess pore water pressure.

A summary of the CPTu soundings along with test details and individual plots are provided in the appendices. A set of interpretation files were generated for each sounding based on published correlations and are provided in Excel format in the data release folder. Information regarding the interpretation methods used is included in an appendix.

For additional information on CPTu interpretations, refer to Robertson et al. (1986), Lunne et al. (1997), Robertson (2009), Mayne (2013, 2014) and Mayne and Peuchen (2012).

References

ASTM D5778-12, 2012, "Standard Test Method for Performing Electronic Friction Cone and Piezocone Penetration Testing of Soils", ASTM, West Conshohocken, US.

Lunne, T., Robertson, P.K. and Powell, J. J. M., 1997, “Cone Penetration Testing in Geotechnical Practice”, Blackie Academic and Professional.

Mayne, P.W., 2013, “Evaluating yield stress of soils from laboratory consolidation and in-situ cone penetration tests”, Sound Geotechnical Research to Practice (Holtz Volume) GSP 230, ASCE, Reston/VA: 406-420.

Mayne, P.W. and Peuchen, J., 2012, “Unit weight trends with cone resistance in soft to firm clays”, Geotechnical and Geophysical Site Characterization *4,* Vol. 1 (Proc. ISC-4, Pernambuco), CRC Press, London: 903-910.

Mayne, P.W., 2014, “Interpretation of geotechnical parameters from seismic piezocone tests”, CPT’14 Keynote Address, Las Vegas, NV, May 2014.

Robertson, P.K., Campanella, R.G., Gillespie, D. and Greig, J., 1986, “Use of Piezometer Cone Data”, Proceedings of InSitu 86, ASCE Specialty Conference, Blacksburg, Virginia.

Robertson, P.K., 1990, “Soil Classification Using the Cone Penetration Test”, Canadian Geotechnical Journal, Volume 27: 151-158.

Robertson, P.K., 2009, “Interpretation of cone penetration tests – a unified approach”, Canadian Geotechnical Journal, Volume 46: 1337-1355.

Shear wave velocity testing is performed in conjunction with the piezocone penetration test (SCPTu) in order to collect interval velocities. For some projects seismic compression wave (Vp) velocity is also determined.

ConeTec's piezocone penetrometers are manufactured with a horizontally active geophone (28 hertz) that is rigidly mounted in the body of the cone penetrometer, 0.2 meters behind the cone tip.

Shear waves are typically generated by using an impact hammer horizontally striking a beam that is held in place by a normal load. In some instances an auger source or an imbedded impulsive source maybe used for both shear waves and compression waves. The hammer and beam act as a contact trigger that triggers the recording of the seismic wave traces. For impulsive devices an accelerometer trigger may be used. The traces are recorded using an up-hole integrated digital oscilloscope which is part of the SCPTu data acquisition system. An illustration of the shear wave testing configuration is presented in Figure SCPTu-1.

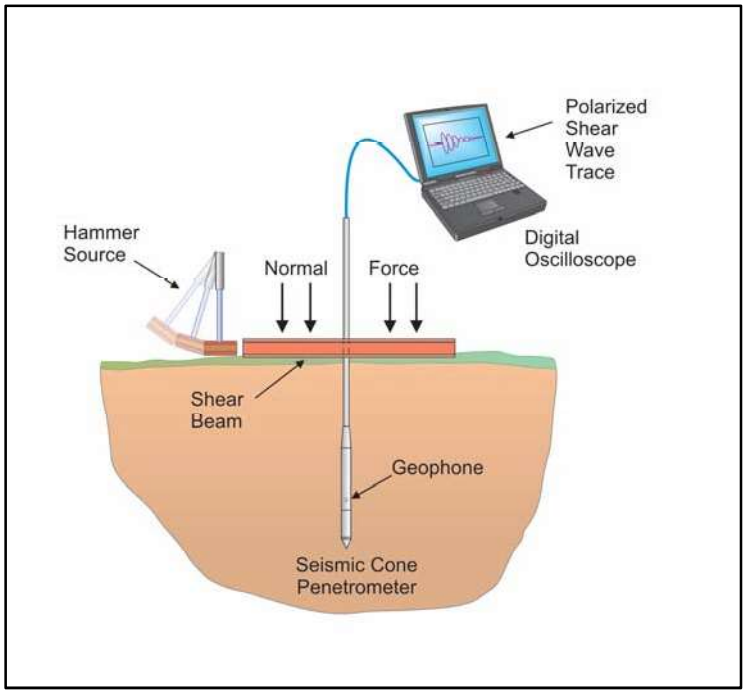


Figure SCPTu-1. Illustration of the SCPTu system

All testing is performed in accordance to ConeTec's SCPTu operating procedures.

Prior to the start of a SCPTu sounding, the procedures described in the Cone Penetration Test section are followed. In addition, the active axis of the geophone is aligned parallel to the beam (or source) and the horizontal offset between the cone and the source is measured and recorded.

Prior to recording seismic waves at each test depth, cone penetration is stopped and the rods are decoupled from the rig to avoid transmission of rig energy down the rods. Multiple wave traces are recorded for quality control purposes. After reviewing wave traces for consistency the cone is pushed to the next test depth (typically one meter intervals or as requested by the client). Figure SCPTu-2 presents an illustration of a SCPTu test.

For additional information on seismic cone penetration testing refer to Robertson et.al. (1986).

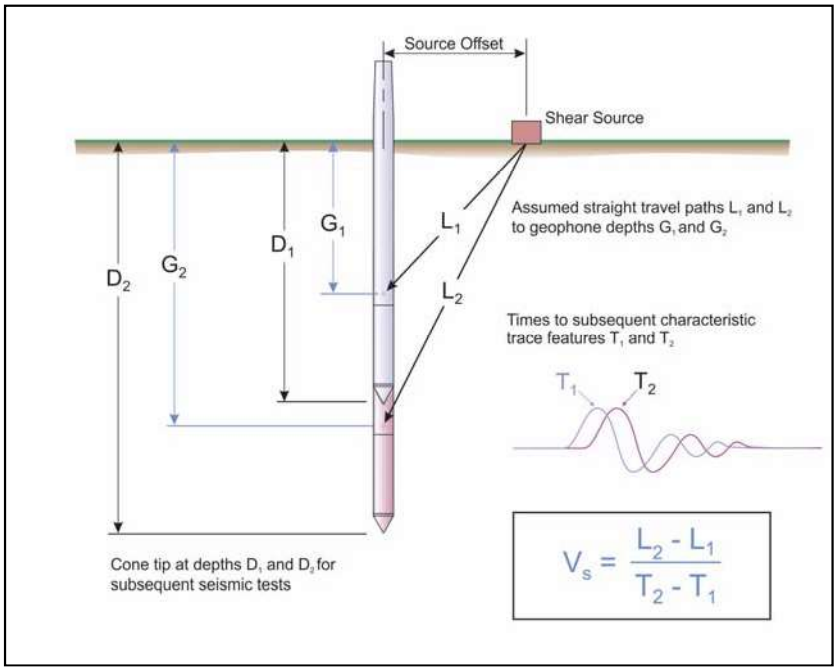


Figure SCPTu-2. Illustration of a seismic cone penetration test

Calculation of the interval velocities are performed by visually picking a common feature (e.g. the first characteristic peak, trough, or crossover) on all of the recorded wave sets and taking the difference in ray path divided by the time difference between subsequent features. Ray path is defined as the straight line distance from the seismic source to the geophone, accounting for beam offset, source depth and geophone offset from the cone tip.

The average shear wave velocity to a depth of 100 feet (30 meters) ($\bar{v}_s$) has been calculated and provided for all applicable soundings using the following equation presented in ASCE, 2010.

$$\bar{v}_s = \frac{\sum_{i=1}^{n} d_i}{\sum_{i=1}^{n} \frac{d_i}{v_{si}}}$$

where: $\bar{v}_s$ = average shear wave velocity ft/s (m/s)
d_i = the thickness of any layer between 0 and 100 ft (30 m)
v_{si} = the shear wave velocity in ft/s (m/s)
$\sum_{i=1}^{n} d_i$ = 100 ft (30 m)

Average shear wave velocity, $\bar{v}_s$ is also referenced to V_{s100} or V_{s30}.

The layer travel times refers to the travel times propagating in the vertical direction, not the measured travel times from an offset source.

Tabular results and SCPTu plots are presented in the relevant appendix.

References

American Society of Civil Engineers (ASCE), 2010, “Minimum Design Loads for Buildings and Other Structures”, Standard ASCE/SEI 7-10, American Society of Civil Engineers, ISBN 978-0-7844-1085-1, Reston, Virginia.

Robertson, P.K., Campanella, R.G., Gillespie D and Rice, A., 1986, “Seismic CPT to Measure In-Situ Shear Wave Velocity”, Journal of Geotechnical Engineering ASCE, Vol. 112, No. 8: 791-803.

The cone penetration test is halted at specific depths to carry out pore pressure dissipation (PPD) tests, shown in Figure PPD-1. For each dissipation test the cone and rods are decoupled from the rig and the data acquisition system measures and records the variation of the pore pressure (u) with time (t).

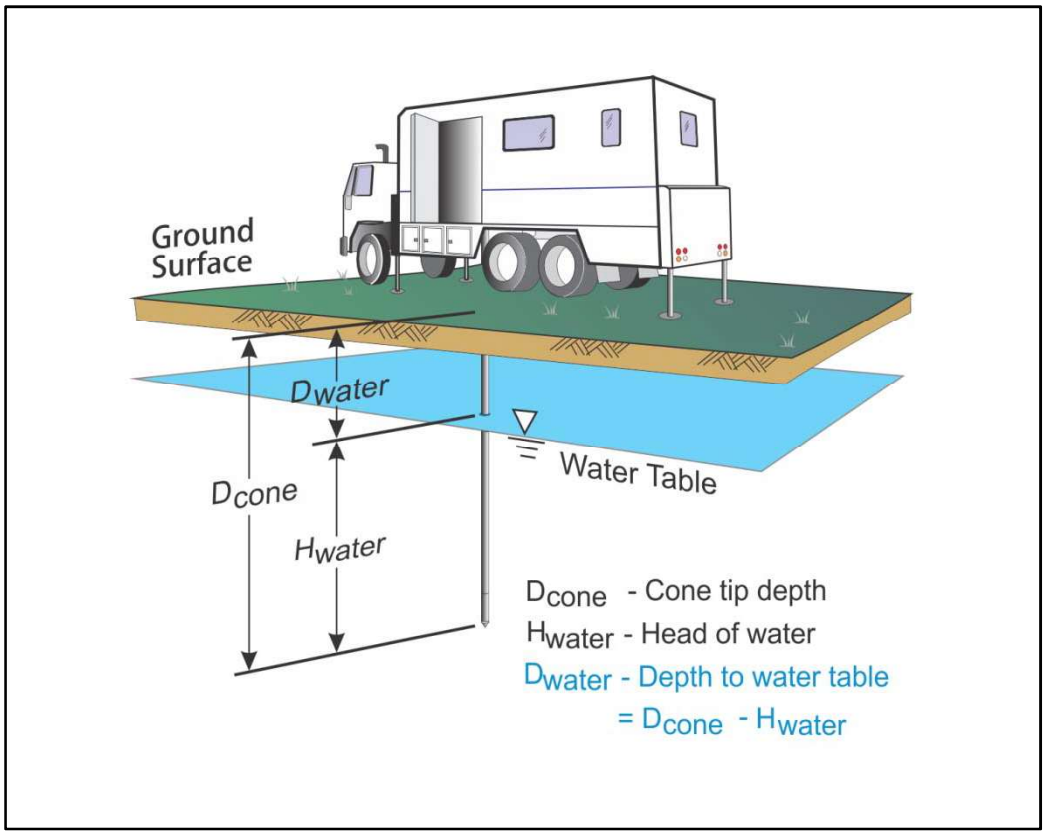


Figure PPD-1. Pore pressure dissipation test setup

Pore pressure dissipation data can be interpreted to provide estimates of ground water conditions, permeability, consolidation characteristics and soil behavior.

The typical shapes of dissipation curves shown in Figure PPD-2 are very useful in assessing soil type, drainage, in situ pore pressure and soil properties. A flat curve that stabilizes quickly is typical of a freely draining sand. Undrained soils such as clays will typically show positive excess pore pressure and have long dissipation times. Dilative soils will often exhibit dynamic pore pressures below equilibrium that then rise over time. Overconsolidated fine-grained soils will often exhibit an initial dilatory response where there is an initial rise in pore pressure before reaching a peak and dissipating.

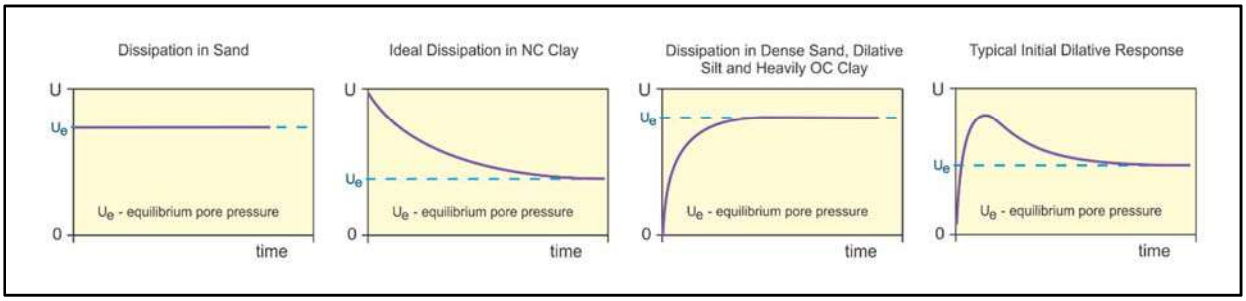


Figure PPD-2. Pore pressure dissipation curve examples

In order to interpret the equilibrium pore pressure (u_{eq}) and the apparent phreatic surface, the pore pressure should be monitored until such time as there is no variation in pore pressure with time as shown for each curve of Figure PPD-2.

In fine grained deposits the point at which 100% of the excess pore pressure has dissipated is known as t_{100}. In some cases this can take an excessive amount of time and it may be impractical to take the dissipation to t_{100}. A theoretical analysis of pore pressure dissipations by Teh and Houlsby (1991) showed that a single curve relating degree of dissipation versus theoretical time factor (T*) may be used to calculate the coefficient of consolidation (c_h) at various degrees of dissipation resulting in the expression for c_h shown below.

$$c_h = \frac{T^* \cdot a^2 \cdot \sqrt{I_r}}{t}$$

Where:

T* is the dimensionless time factor (Table Time Factor)
a is the radius of the cone
I_r is the rigidity index
t is the time at the degree of consolidation

Table Time Factor. T* versus degree of dissipation (Teh and Houlsby, 1991)

Degree of Dissipation (%)	20	30	40	50	60	70	80
T* (u_2)	0.038	0.078	0.142	0.245	0.439	0.804	1.60

The coefficient of consolidation is typically analyzed using the time (t_{50}) corresponding to a degree of dissipation of 50% (u_{50}). In order to determine t_{50}, dissipation tests must be taken to a pressure less than u_{50}. The u_{50} value is half way between the initial maximum pore pressure and the equilibrium pore pressure value, known as u_{100}. To estimate u_{50}, both the initial maximum pore pressure and u_{100} must be known or estimated. Other degrees of dissipations may be considered, particularly for extremely long dissipations.

At any specific degree of dissipation the equilibrium pore pressure (u at t_{100}) must be estimated at the depth of interest. The equilibrium value may be determined from one or more sources such as measuring the value directly (u_{100}), estimating it from other dissipations in the same profile, estimating the phreatic surface and assuming hydrostatic conditions, from nearby soundings, from client provided information, from site observations and/or past experience, or from other site instrumentation.

For calculations of c_h (Teh and Houlsby, 1991), t_{50} values are estimated from the corresponding pore pressure dissipation curve and a rigidity index (I_r) is assumed. For curves having an initial dilatory response in which an initial rise in pore pressure occurs before reaching a peak, the relative time from the peak value is used in determining t_{50}. In cases where the time to peak is excessive, t_{50} values are not calculated.

Due to possible inherent uncertainties in estimating I_r, the equilibrium pore pressure and the effect of an initial dilatory response on calculating t_{50}, other methods should be applied to confirm the results for c_h.

Additional published methods for estimating the coefficient of consolidation from a piezocone test are described in Burns and Mayne (1998, 2002), Jones and Van Zyl (1981), Robertson et al. (1992) and Sully et al. (1999).

A summary of the pore pressure dissipation tests and dissipation plots are presented in the relevant appendix.

References

Burns, S.E. and Mayne, P.W., 1998, "Monotonic and dilatory pore pressure decay during piezocone tests", Canadian Geotechnical Journal 26 (4): 1063-1073.

Burns, S.E. and Mayne, P.W., 2002, "Analytical cavity expansion-critical state model cone dissipation in fine-grained soils", Soils & Foundations, Vol. 42(2): 131-137.

Jones, G.A. and Van Zyl, D.J.A., 1981, "The piezometer probe: a useful investigation tool", Proceedings, 10th International Conference on Soil Mechanics and Foundation Engineering, Vol. 3, Stockholm: 489-495.

Robertson, P.K., Sully, J.P., Woeller, D.J., Lunne, T., Powell, J.J.M. and Gillespie, D.G., 1992, "Estimating coefficient of consolidation from piezocone tests", Canadian Geotechnical Journal, 29(4): 551-557.

Sully, J.P., Robertson, P.K., Campanella, R.G. and Woeller, D.J., 1999, "An approach to evaluation of field CPTU dissipation data in overconsolidated fine-grained soils", Canadian Geotechnical Journal, 36(2): 369-381.

Teh, C.I., and Houlsby, G.T., 1991, "An analytical study of the cone penetration test in clay", Geotechnique, 41(1): 17-34.

The appendices listed below are included in the report:

- Cone Penetration Test Summary and Standard Cone Penetration Test Plots
- Advanced Cone Penetration Test Plots
- Seismic Cone Penetration Test Plots
- Seismic Cone Penetration Test Time Domain Traces
- Seismic Cone Penetration Test Tabular Results
- Soil Behavior Type (SBT) Scatter Plots
- Pore Pressure Dissipation Summary and Pore Pressure Dissipation Plots

Cone Penetration Test Summary and Standard Cone Penetration Test Plots

Job No:	19-53070
Client:	S.W. Cole Engineering
Project:	6150 College St, Brunswick, ME
Start Date:	11-Jun-2019
End Date:	11-Jun-2019

CONE PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Cone	Assumed Phreatic Surface[1] (ft)	Final Depth (ft)	Shear Wave Velocity Tests	Northing[2] (m)	Easting (m)	Refer to Notation Number
SCPT19-01	19-53070_SP01	6/11/2019	542:T1500F15U500	18.0	104.33	28	4862083	422934	
Totals	1 soundings				104.33	28			

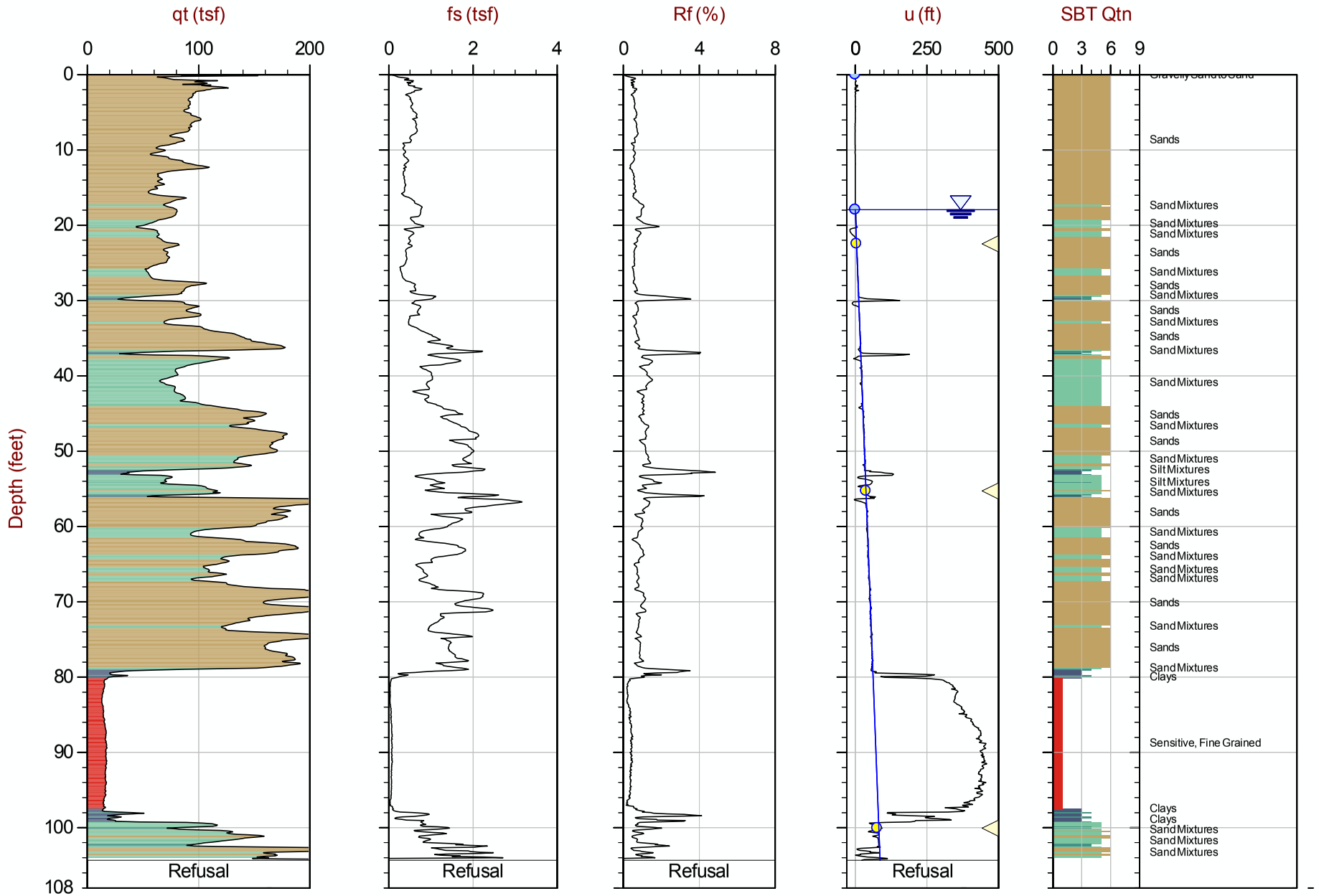
1. Assumed phreatic surface depths were determined from the pore pressure data unless otherwise noted. Hydrostatic data were used for calculated parameters.
2. Coordinates are WGS 84 / UTM Zone 19 and were collected using a MR-350 GlobalSat GPS Receiver.
3. Assumed phreatic surface estimated from the dynamic pore pressure response.

CONETEC

S.W. Cole Engineering

Job No: 19-53070
Date: 2019-06-11 10:34
Site: 6150 College St, Brunswick, ME

Sounding: SCPT19-01
Cone: 542:T1500F15U500



Max Depth: 31.800 m / 104.33 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 19-53070_SP01.COR

SBT: Robertson, 2009 and 2010
Coords: UTM Zone 19N N: 4862083 E: 422934

Hydrostatic Line Ueq Assumed Ueq PPD, Ueq achieved PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

Advanced Cone Penetration Test Plots

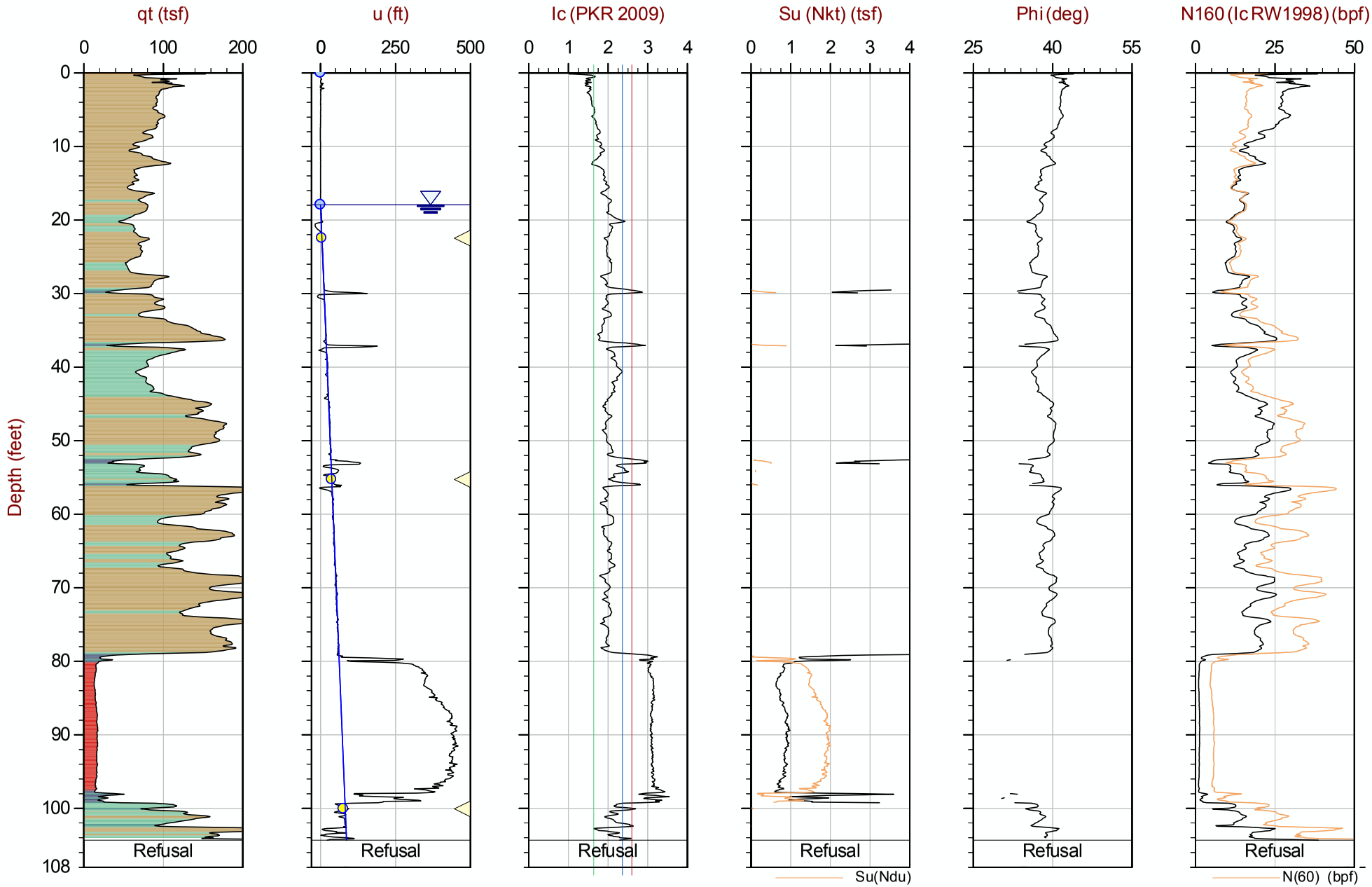
CONETEC

CONETEC

S.W. Cole Engineering

Job No: 19-53070
Date: 2019-06-11 10:34
Site: 6150 College St, Brunswick, ME

Sounding: SCPT19-01
Cone: 542:T1500F15U500



Max Depth: 31.800 m / 104.33 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 19-53070_SP01.COR
Su Nkt/Ndu: 12.5 / 6.0

SBT: Robertson, 2009 and 2010
Coords: UTM Zone 19N N: 4862083 E: 422934

Hydrostatic Line Ueq Assumed Ueq PPD, Ueq achieved PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

Seismic Cone Penetration Test Plots

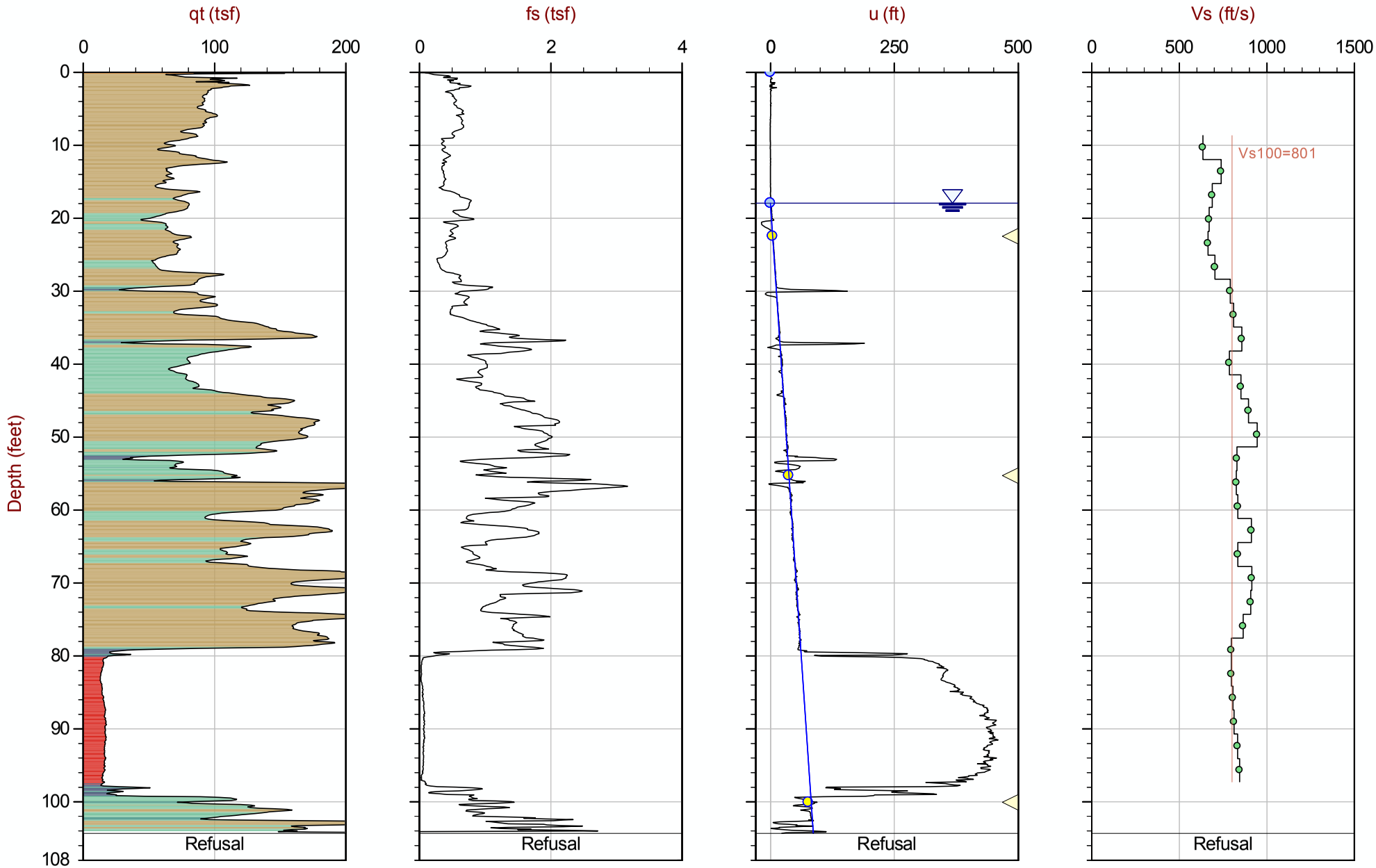
CONETEC

CONETEC

S.W. Cole Engineering

Job No: 19-53070
Date: 2019-06-11 10:34
Site: 6150 College St, Brunswick, ME

Sounding: SCPT19-01
Cone: 542:T1500F15U500



Max Depth: 31.800 m / 104.33 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 19-53070_SP01.COR

SBT: Robertson, 2009 and 2010
Coords: UTM Zone 19N N: 4862083 E: 422934

Hydrostatic Line Ueq Assumed Ueq PPD, Ueq achieved PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

Seismic Cone Penetration Wave Traces

CONETEC

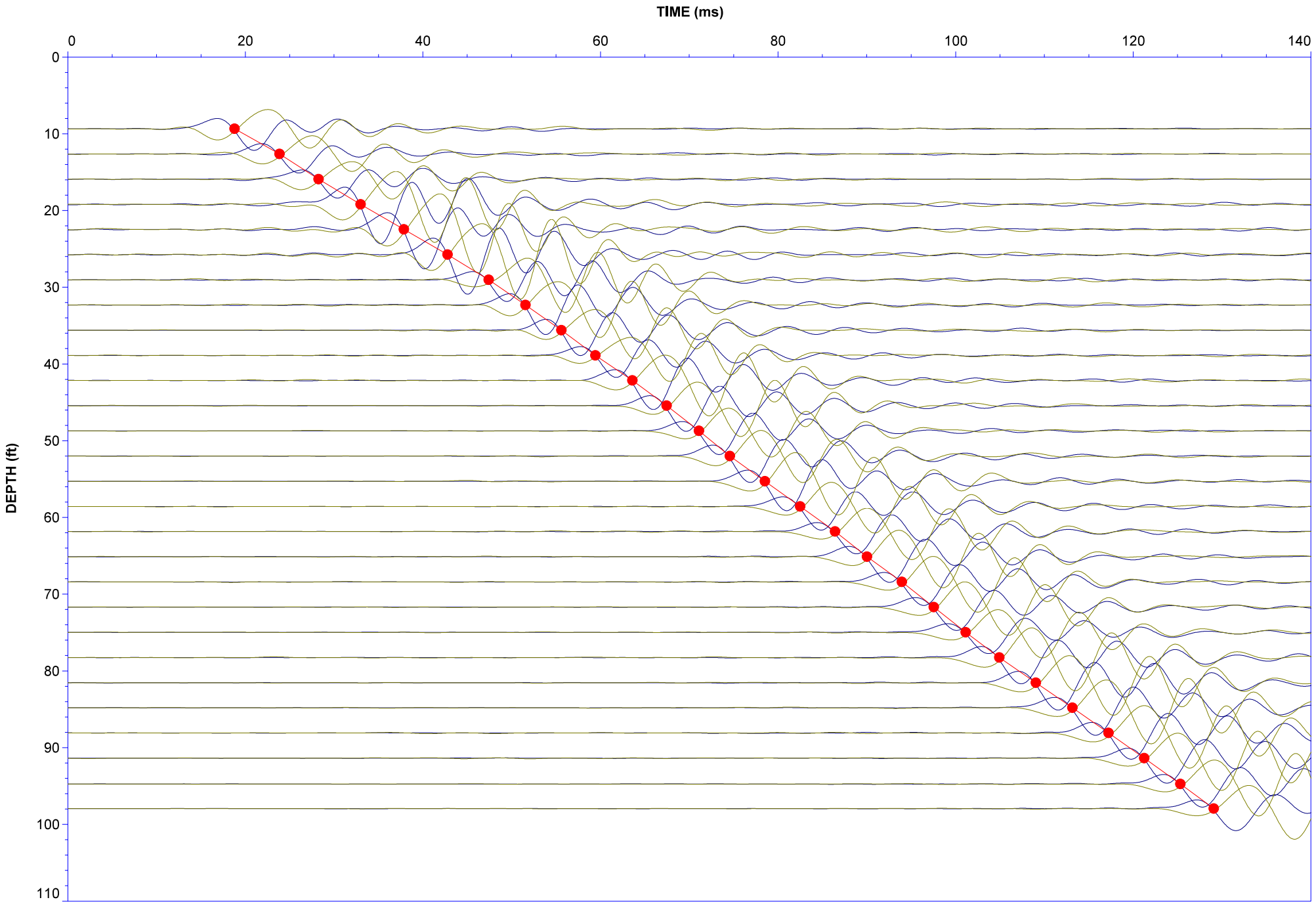
Job No: 19-53070
Date: 06-11-2019

Client: S.W. Cole Engineering

Project Title: 6150 College St, Brunswick, ME

Hole: SCPT19-01

Filter: 20-200hz



Seismic Cone Penetration Test Tabular Results (Vs)

CONETEC

Job No:	19-53070
Client:	S.W. Cole Engineering
Project:	6150 College St, Brunswick, ME
Sounding ID:	SCPT19-01
Date:	11-Jun-2019

Seismic Source:	Beam
Source Offset (ft):	1.97
Source Depth (ft):	0.00
Geophone Offset (ft):	0.66

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
9.35	8.69	8.91			
12.63	11.97	12.14	3.22	5.07	635
15.91	15.26	15.38	3.25	4.39	739
19.19	18.54	18.64	3.26	4.73	688
22.47	21.82	21.91	3.27	4.87	670
25.75	25.10	25.18	3.27	4.92	664
29.04	28.38	28.45	3.27	4.65	704
32.32	31.66	31.72	3.27	4.14	791
35.60	34.94	35.00	3.28	4.04	810
38.88	38.22	38.27	3.28	3.82	857
42.16	41.50	41.55	3.28	4.17	786
45.44	44.78	44.83	3.28	3.85	852
48.72	48.06	48.10	3.28	3.66	896
52.00	51.35	51.38	3.28	3.47	945
55.28	54.63	54.66	3.28	3.95	829
58.56	57.91	57.94	3.28	3.97	826
61.84	61.19	61.22	3.28	3.93	835
65.12	64.47	64.50	3.28	3.59	912
68.41	67.75	67.78	3.28	3.93	835
71.69	71.03	71.06	3.28	3.59	914
74.97	74.31	74.34	3.28	3.61	908
78.25	77.59	77.62	3.28	3.79	865
81.53	80.87	80.90	3.28	4.11	797
84.81	84.15	84.18	3.28	4.11	798
88.09	87.43	87.46	3.28	4.06	807
91.37	90.72	90.74	3.28	4.03	813
94.75	94.09	94.11	3.38	4.06	833
97.93	97.28	97.30	3.18	3.77	845

Soil Behavior Type (SBT) Scatter Plots

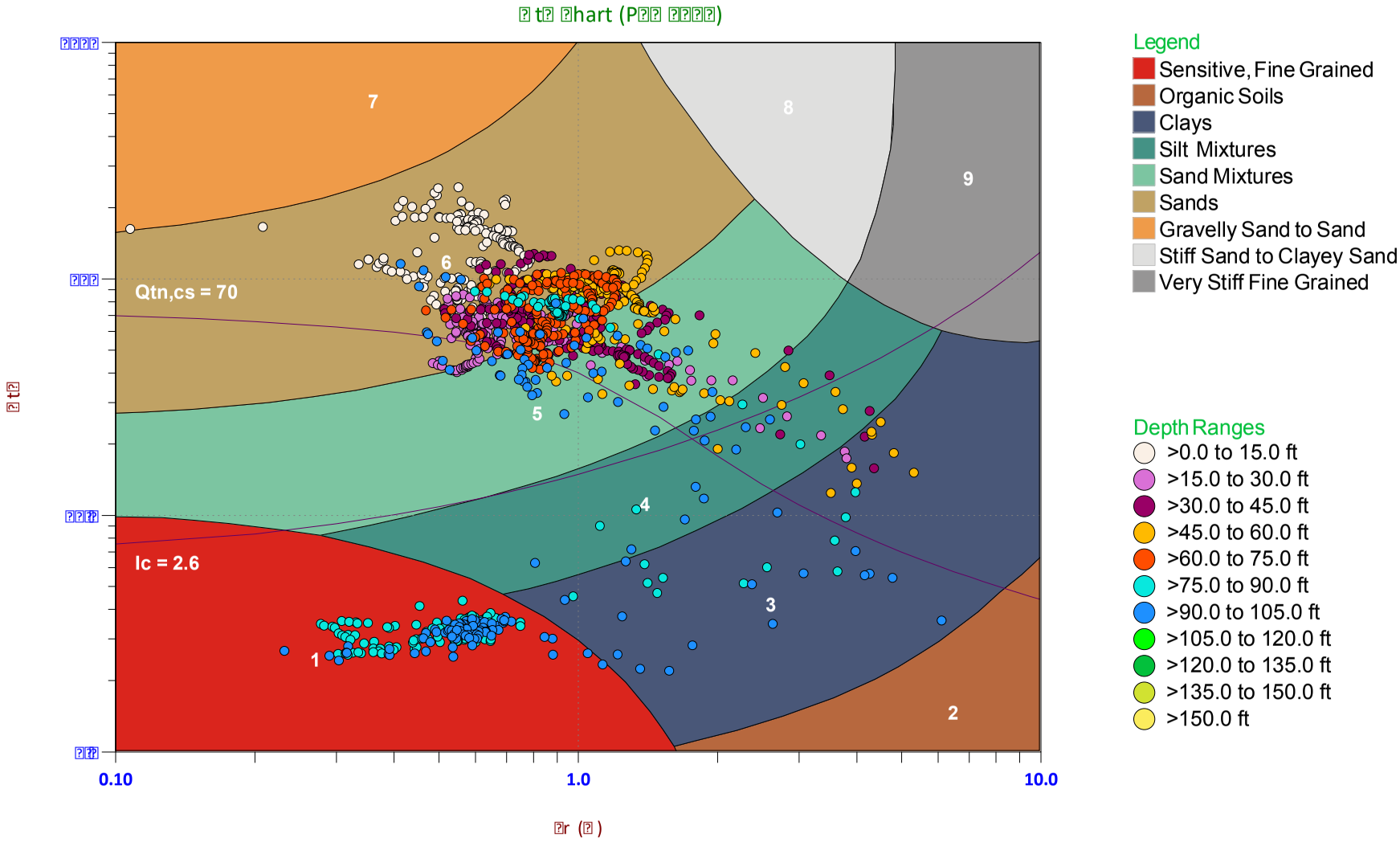
CONETEC

CONETEC

S.W. Cole Engineering

Job No: 19-53070
Date: 2019-06-11 10:34
Site: 6150 College St, Brunswick, ME

Sounding: SCPT19-01
Cone: 542:T1500F15U500



Pore Pressure Dissipation Summary and

Pore Pressure Dissipation Plots

CONETEC

Job No:	19-53070
Client:	S.W. Cole Engineering
Project:	6150 College St, Brunswick, ME
Start Date:	11-Jun-2019
End Date:	11-Jun-2019

CPTu PORE PRESSURE DISSIPATION SUMMARY

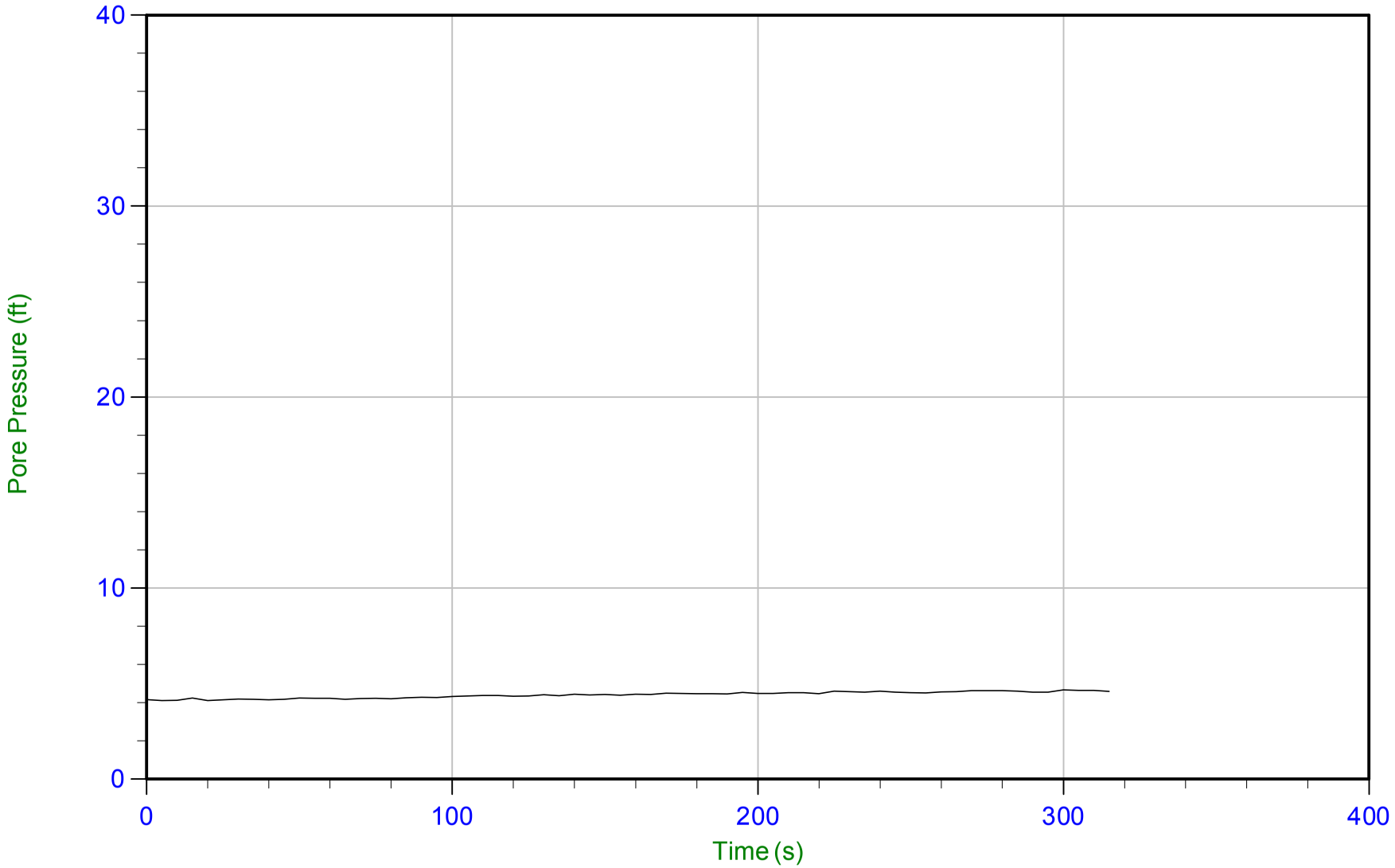
Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (ft)	Estimated Equilibrium Pore Pressure U_{eq} (ft)	Calculated Phreatic Surface (ft)	Estimated Phreatic Surface (ft)
SCPT19-01	19-53070_SP01	15	315	22.47	4.53	17.95	
SCPT19-01	19-53070_SP01	15	335	55.28	37.17	18.11	
SCPT19-01	19-53070_SP01	15	320	100.06	76.61	23.46	
Totals	3 dissipations		16.2 min				

CONETEC

S.W. Cole Engineering

Job No: 19-53070
Date: 06/11/2019 10:34
Site: 6150 College St, Brunswick, ME

Sounding: SCPT19-01
Cone: 542:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 19-53070_SP01.PPD
Depth: 6.850 m / 22.473 ft
Duration: 315.0 s

U Min: 4.1 ft
U Max: 4.7 ft

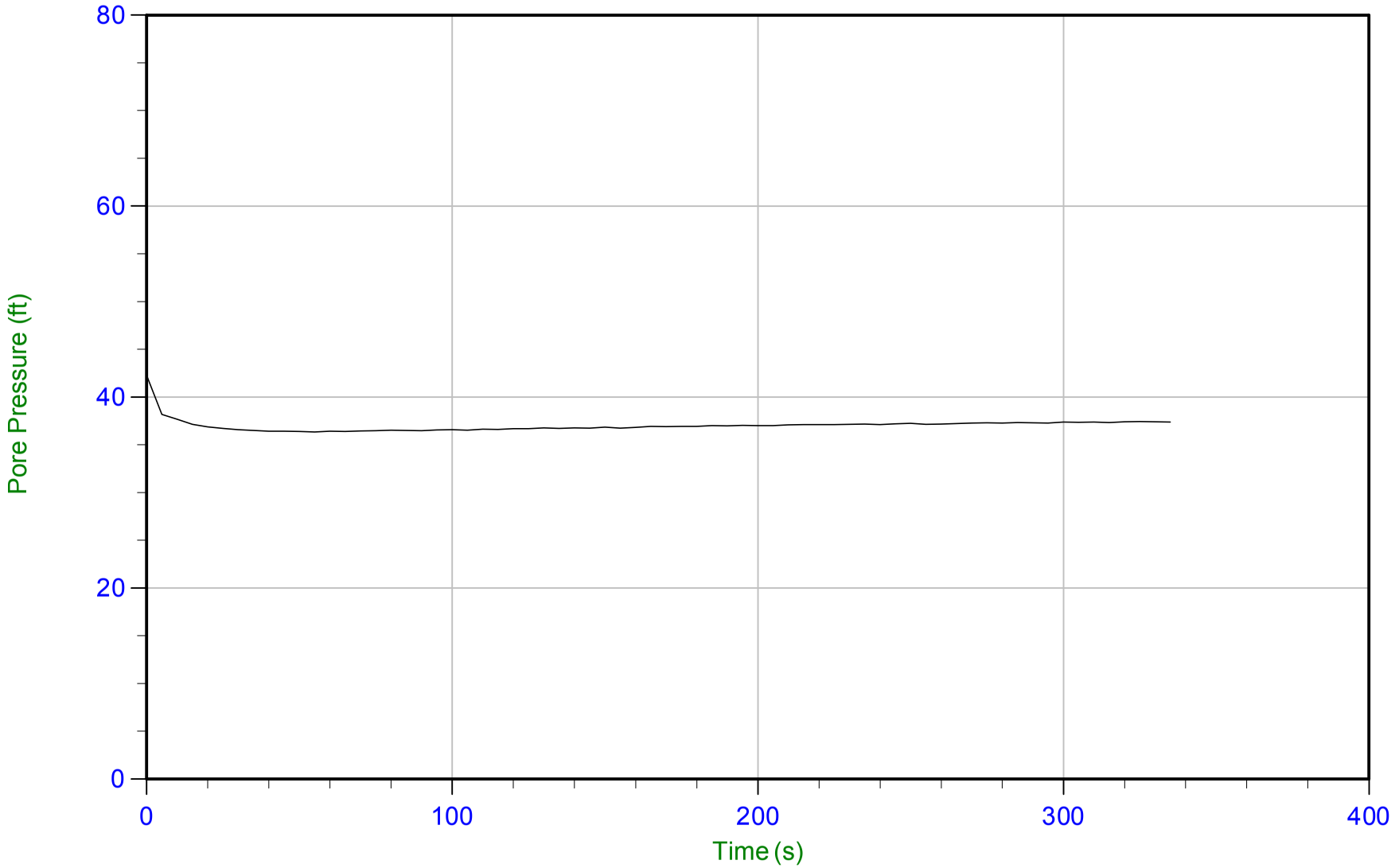
WT: 5.471 m / 17.948 ft
Ueq: 4.5 ft

CONETEC

S.W. Cole Engineering

Job No: 19-53070
Date: 06/11/2019 10:34
Site: 6150 College St, Brunswick, ME

Sounding: SCPT19-01
Cone: 542:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 19-53070_SP01.PPD
Depth: 16.850 m / 55.281 ft
Duration: 335.0 s

U Min: 36.3 ft
U Max: 42.3 ft

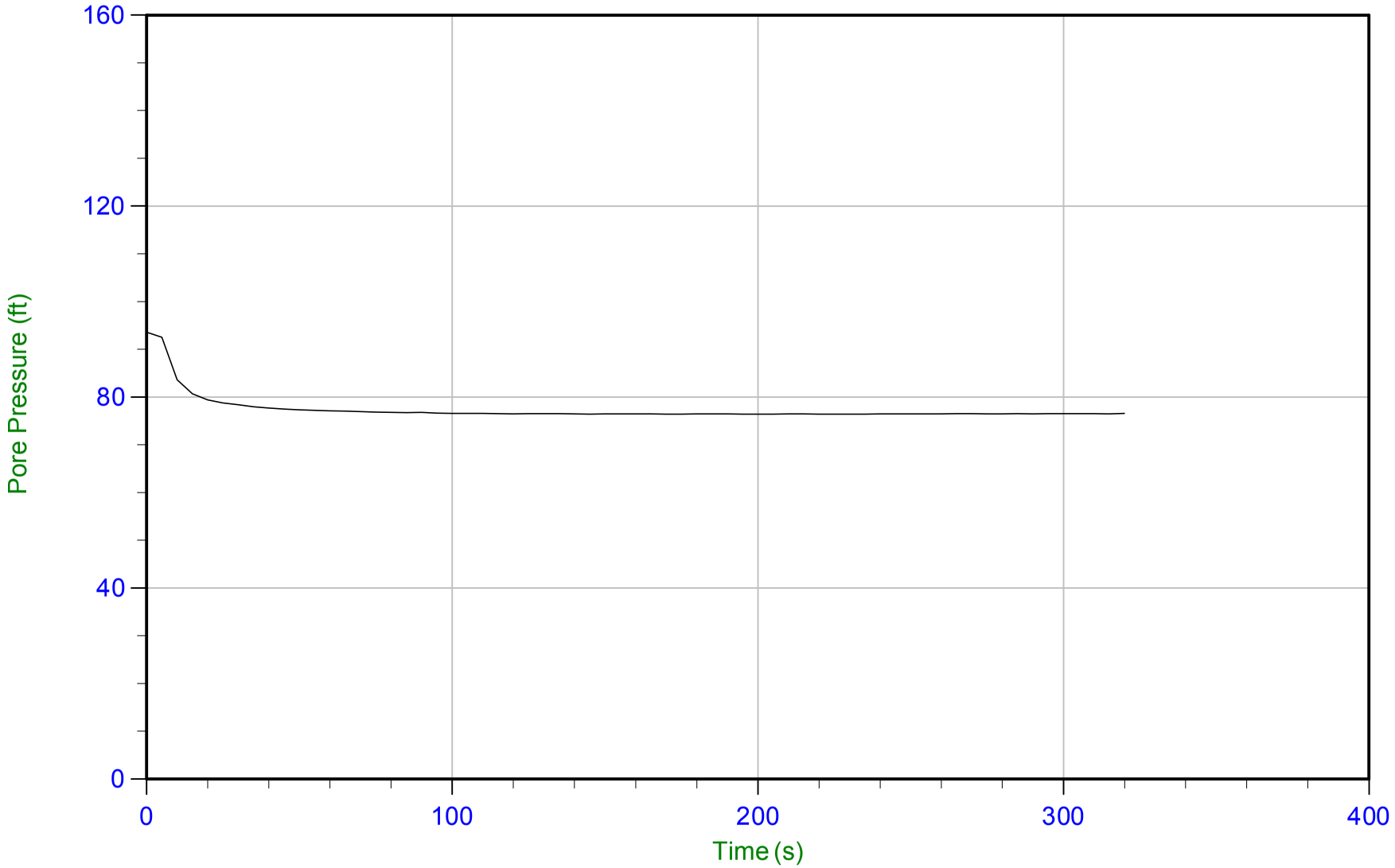
WT: 5.520 m / 18.110 ft
Ueq: 37.2 ft

CONETEC

S.W. Cole Engineering

Job No: 19-53070
Date: 06/11/2019 10:34
Site: 6150 College St, Brunswick, ME

Sounding: SCPT19-01
Cone: 542:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 19-53070_SP01.PPD
Depth: 30.500 m / 100.064 ft
Duration: 320.0 s

U Min: 76.4 ft
U Max: 93.6 ft

WT: 7.150 m / 23.459 ft
Ueq: 76.6 ft

SEBAGO TECHNICS

CIVIL ENGINEERING ▪ SURVEYING ▪ LANDSCAPE ARCHITECTURE

Stormwater Management Report
Mills Hall and The Center for Arctic Studies

To: Maine Department of Environmental Protection

Prepared for:
Bowdoin College
3800 College Station
Brunswick, ME 04011-8447

Prepared by
Sebago Technics
75 John Roberts Rd.
South Portland, ME 04106

January 2020

Table of Contents

Narrative

Attachment A – Water Quality Calculations
Attachment A-1-- Test Pit Logs
Attachment B – Watershed Plans
Attachment C – Pre-Development Stormwater Modeling
Attachment D – Post-Development Stormwater Modeling
Attachment E – Inspection, Maintenance, and Housekeeping Plan

Stormwater Management Narrative

Mills Hall and The Center for Arctic Studies
Brunswick, Maine

A. General

This Stormwater Management Plan has been prepared to address the potential impacts associated with the proposed modification in stormwater runoff characteristics and development footprint as a result of the proposed Mills Hall and The Center for Arctic Studies facility to be constructed within the Polar Loop at Bowdoin Campus in Brunswick, Maine. Stormwater management controls outlined in this plan have been designed to best suit the proposed development and to generally comply with applicable State and Local regulatory requirements for evaluation of pre- and post-development conditions. The project site is located in the Unnamed Tributary to Androscoggin River, near Jordan Avenue, which is defined by the Maine Department of Environmental Protection (Maine DEP) as an Urban Impaired Stream under Chapter 502, Appendix B. As the project is required to obtain a Site Location of Development Permit Amendment, the project must meet the Basic, General, Flooding, and Urban Impaired Stream Standards under Chapter 500.

The scope of work will include the removal of several parking spaces to accommodate the construction of Mills Hall and The Center for Arctic Studies. The project will result in selective tree removal while preserving trees where practicable.

Proposed surfaces will be graded to direct onsite stormwater runoff to several drip edge filters/filtration trenches, porous vehicular pavement, and two infiltration trenches. Surface drainage in the post-development condition is designed to maintain natural drainage patterns to the greatest extent practicable. Maine DEP Basic Standards will be generally satisfied with the implementation of erosion control measures depicted in an Erosion and Sedimentation Control Plan, an Inspection and Maintenance Plan, and a housekeeping plan for use by the contractor/owner during and after construction is complete.

B. Existing Conditions

The subject site is currently developed as a paved parking area with access from Sills Drive in Brunswick. The site was the former location of the Dayton Ice Area, which was demolished in 2009 and the present parking lot was constructed. At that time, the site was granted a Site Location of Development Act Permit Modification which approved the removal of the Dayton Ice Area and subsequent construction of the Polar Loop parking lot, which included stormwater treatment for the non-vegetated surface at a 95% treatment rate.

The site generally slopes towards the center of the parking lot where the constructed stormwater BMP is located with drainage being collected within a closed drainage system that discharges towards Sills Drive/ Bath Road intersection. The portion of the site that abuts College Street has localized, shallow, depressions that allow for attenuation and ultimately infiltration of runoff.

C. Proposed Site Improvements

The project will result in the creation/redevelopment of roughly 1.0 acre of non-vegetated area and 0.6 acres of landscaped area. As the previously permitted Polar Loop Parking Lot achieved a 95%/80% treatment level, the proposed project will strive to meet or exceed the permitted treatment threshold and will therefore no be submitted under the Redevelopment Standard within Chapter 500.

The proposed 15,750 square-foot footprint Mills/CAS facility will be located within the southerly portion of the Polar Loop Parking lot and will result in the loss of 79 parking spaces for the overall campus. As part of project, two new transformer pads will be installed; one for an additional transformer and the other to replace a sinking pad. The existing transformer will likely be utilized and just moved to the relocated pad. A dumpster enclosure is proposed along the rear wall of Smith Union, adjacent to the exiting service loading area, which will remain following construction.

The associated parking areas for the Mills/CAS facility are proposed as porous asphalt paving with regular bituminous pavement within the drive aisles. There are several pedestrian walkways surrounding the facility, which will be constructed of various hardscape elements such as bituminous pavement, granite, and pavers. These areas will be graded to drain and be treated by various filtration trenches that run along the landscaped areas of the site.

In addition to the Mills/CAS facility, Bowdoin College will be removing the existing Dudley COE building and associated pavement as well as installing two Fitlerra Units along North Campus drive which is located west of the project site. This work is being done to meet the Urban Impaired Stream Standard as the Town of Brunswick does not have an approved Compensation Fee Utilization Program.

D. Soils

A Class 'D' Medium Intensity Soil Survey published by the United States Department of Agriculture, Natural Resources Conservation Service for Cumberland County, Maine, supplements the high intensity soil survey for on-site areas that are considered in the stormwater model. The Hydrologic Soil Group (HSG) of the site soils are classified by Technical Release TR-55 of the Soil Conservation Service as follows:

Soil Type	Symbol	Phase	HSG	Drainage Class
Windsor	WmB	Loamy Sand	A	Excessively Drained

SW Cole performed subsurface explorations on the site. Borings were observed around the footprint of the proposed building, the locations of which are indicated on the Grading & Utility Plan, and should accurately represent soil and groundwater conditions for the filtration trenches/drip edge filters, which will likely be lined due to the proximity to the building and knowing that the building foundation drains are below and will require pumping to discharge to the gravity storm drain system. Boring log data, which indicates that there are no areas where a seasonal high groundwater table exists at an elevation above the proposed BMP

outlet/underdrain invert, is included in the Draft report, dated June 27, 2019, as prepared by SW Cole Engineering, Inc. (Attachment A-1).

E. Methodology

The stormwater runoff analysis was developed using the "HydroCAD" computer modeling software, which incorporates the TR-55 and TR-20 methodologies as provided by the Soil Conservation Service of the U.S. Department of Agriculture. The peak runoff rates were calculated using a 24-hour duration storm event with a Type III rainfall distribution. The rainfall amounts for southeast Cumberland County for the 2-year, 10-year and 25-year storm events are as follows:

Storm Frequency	24-hr Duration Rainfall (in.)
2-yr	3.1
10-yr	4.6
25-yr	5.8

F. Pre-Development Watershed Model

The pre-development watershed model consists of three (3) subcatchments.

Subcatchment 1 (1S) is located within the central portion of the development site and represents roughly two-thirds of the overall development area. There are several catch basins within the subcatchment that collect and convey runoff towards the Sills Drive/Bath Road intersection, which ultimately discharges on the north side of Bath Road, east of the Federal Street. Study point 1 is represented by the discharge pipe from an existing catch basin within the easterly park field of Polar Loop.

Subcatchment 2 (2S) is located in the easterly portion of the site and represents the wooded area which is located between Sills Drive/College Street and the easterly edge of the parking lot. This subcatchment does not have a defined discharge point, but has a small depressed area within the wooded area where runoff collects and eventually infiltrates.

Subcatchment 3 (3S) is located in the southerly portion of the site and represents the wooded area along College Street. This subcatchment does not have a defined discharge point, but has a small depressed area within the wooded area where runoff collects and eventually infiltrates.

G. Post-Development Watershed Model

The post-development watershed model consists of fifteen (15) subcatchments. Modeling reflects on-site ground cover changes, which include proposed landscaping, impervious areas associated with the new building, and manmade previous surfaces for sidewalks and paved areas. Existing drainage patterns will be generally maintained with the proposed stormwater design. A Treatment Table can be found on the Post Development Watershed Plan, Attachment B, showing the Best Management Practices used for treating each of the subcatchments.

H. Stormwater Quality Management

The subject site is within an Unnamed Tributary to Androscoggin River near Jordan Avenue, which is listed as an Urban Impaired Stream per Maine DEP Chapter 502: Direct Watersheds of Lakes Most at Risk from New Development, and Urban Impaired Streams – Appendix B. Proposed development associated with this project therefore has to meet the General Standard, Flooding Standard, and Urban Impaired Stream Standard.

The stormwater management design for the site incorporates several different treatment methods; porous asphalt paving, filtration trenches/drip edge filters, and two infiltration trenches. As stated previously, as the existing parking lot achieved a treatment level of 95% for the non-vegetated surface, this project is being designed to meet the minimum general standards (95%/80%) and will not pursue any redevelopment credit.

The parking stalls associated within the Mills Hall and Center for Arctic Studies are proposed as porous asphalt paving with the surrounding drive aisles being graded to drain towards the porous asphalt with no more than 50-feet of run-on length. Each parking bay has a catch basin located within the low spot, to act as an overflow during heavy rain events. An orifice will be utilized on the incoming underdrain header pipe as it enters the catch basin to restrict the release of the water quality volumes over 24-48 hours.

A total of six filtration trenches are proposed to treat non-vegetated surfaces associated with the proposed buildings and pedestrian walkways. The filtration trenches act in the same manner as a roof drip edge filter, in that a layer of crushed stone provides volume attenuation while an underlying layer of filtration media provides the necessary filtration of the runoff. A small orifice opening will control the release of the water quality volumes over 24-48 hours. The Filtration Trench detail within the design plans contain a table which represents the various elevations within the system as well as the controlling orifice elevation and diameter.

There are two infiltration trenches which will aid in the treatment of stormwater generated from a portion of the roof as well as sections of pedestrian walkways that will be reconstructed as a result of the proposed project.

Utilizing the above-mentioned treatment measures, the proposed project attains a treatment level of 95.07% got newly created non-vegetated surface and 84.32% of newly created developed area, which exceed the General Standard treatment level of 95% and 80% respectively.

I. Urban Impaired Stream Standard

As the site is within an Urban Impaired Stream watershed and is subject to a Site Location of Development Act Permit, the project is required to meet the Urban Impaired Stream Standard, which requires the Applicant to either pay a compensation fee or mitigate project impacts by reducing or eliminating on or off-site imperious area. As the Town of Brunswick does not have an approved Compensation Fee Utilization Program, the Applicant will be mitigating proposed impacts by treating and removing existing impervious surfaces.

Bowdoin College, within the next 5 years, will remove the existing Dudley COE building and associated paved parking and access, with the exception of a small pedestrian walk way. The area will be loamed and seeded and restored as a lawn area. Additionally, two Filterra units are proposed within North Campus Drive which will treat approximately 15,000 s.f. of existing parking lot and access drive.

The removal of the Dudley COE is depicted within the Demolition Plan and Site Layout Plans, and the proposed Filterra units are depicted within the Overall Utility Layout Plan. There will be a single 4'x6' curb inlet Filterra with a downstream catch basin for peak runoff diversion and a single 6'x8' grate inlet with internal bypass Filterra. Runoff from the Filterras will discharge to individual R-Tank systems which will detain the water quality volume for 24-48 hours before entering the adjacent closed drainage system that traverses the campus.

Urban Impaired Stream Mitigation Credits Required Per Chap 501.3.A(1)			
	Acres	**Credits per Acre**	**Total Credits**
Non-Roof Impervious	0.66	0.50	0.33
Roof	0.36	0.20	0.07
Landscaped	0.59	0.10	0.06
			0.46

Urban Impaired Stream Mitigation Credits Provided Per Chap 501.3.A(3)			
	Acres	**Credits per Acre**	**Total Credits**
Eliminate Roof, replace with landscape	0.09	0.2	0.02
Eliminate med use parking, replace with landscape	0.15	0.7	0.11
Treat med use parking, at 100% gen. stds.	0.12	1.2	0.14
Treat med use parking, at 100% gen. stds.	0.24	1.2	0.29
			0.56

As can be seen in the above Tables, the provided Mitigation Credits for the Urban Impaired Stream Standard exceed the required credits.

J. Stormwater Quantity Management (Flooding Standard)

In order to satisfy the Flooding Standard, peak flow rates for the 2-, 10-, and 25-year storm events had to be lower in the post-development condition as compared to the pre-development condition at each study point. The following table summarizes the results of the HydroCAD model calculations, which are included in this section as **Attachments C and D**, for the design storm events for the project area. The HydroCAD model runs predict decrease changes in peak flow rates during the 2-, 10- and 25-year storm events.

Stormwater Peak Discharge Summary Table						
Study Point	2-Year Storm		10-Year Storm		25-Year Storm	
	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)
SP-1	3.5	1.6	6.8	2.9	9.5	4.5
SP-2	0.0	0.0	0.1	0.1	0.3	0.2
SP-3	0.0	0.0	0.2	0.2	0.4	0.4

K. Inspection & Maintenance

Provisions for periodic inspection and maintenance of the various Stormwater Best Management Practices are included in the Inspection, Maintenance, and Housekeeping Plan included in this section of the application as **Attachment E**.

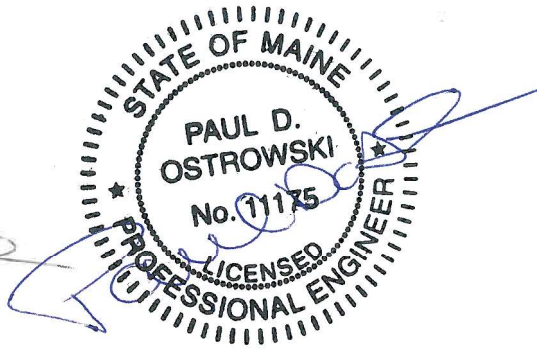
L. Summary

An Erosion and Sedimentation Control Plan has been developed for the project site placing emphasis on the installation of sedimentation barriers and revegetation to minimize erosion potential from development activities during and after construction. The Erosion Control Plan is incorporated into the design plans and includes the locations of the erosion control provisions (i.e., silt fence, construction entrance, inlet protection, trench dams) along with a narrative and construction details for reference by the contractor during construction.

The proposed development will include the removal of an existing paved parking lot and construction of an approximate 15,750 s.f. footprint Mills Hall and Center for Arctic Studies with associated parking (porous pavement) and pedestrian walkways. The project will result in the creation/redevelopment of roughly 1.0 acre of non-vegetated area and 0.6 acres of landscaped area. The project will have an overall disturbance footprint of approximately 2.4 acres, inclusive of the removal of Dudley COE. To meet the Urban Impaired Stream Standard, the Dudley COE building and associated parking area will be removed and replaced with landscaped area and two Fitlerra Units will be installed along North Campus Drive in order to offset the impacts the project on the Unnamed Tributary to Androscoggin River, near Jordan Avenue. In order to meet the General and Flooding Standards of Chapter 500, three areas of porous asphalt paving are proposed, along with six filtration trenches and two infiltration trenches. The combined stormwater management system results in the treatment of 95.07% created/redeveloped non-vegetated area and 84.32% of created/reconstructed developed area.

Prepared by:

SEBAGO TECHNICS, INC.



Paul D. Ostrowski, PE
Senior Project Engineer

01/21/2020

Attachment A

Water Quality Calculations

Table 1: MDEP GENERAL STANDARD CALCULATIONS

Job #

AREA ID	WATERSHED SIZE (S.F.)	EXISTING ONSITE IMPERVIOUS AREA TO REMAIN (S.F.)	NEW ONSITE IMPERVIOUS AREA (S.F.)	EXISTING ONSITE LANDSCAPED AREA TO REMAIN (S.F.)	NEW ONSITE LANDSCAPED AREA (S.F.)	NET NEW DEVELOPED AREA (S.F.)	EXISTING DEVELOPED AREAS (S.F.)	TREATMENT PROVIDED?	IMPERVIOUS AREA TREATED (S.F.)	LANDSCAPED AREA TREATED (S.F.)	DEVELOPED AREA TREATED (S.F.)	TREATMENT BMP
1S	42,431	24,410	2,867	8,337	5,797	8,664	32,747	NO	0	0	0	
1.1S	7,709		6,993		716	7,709	0	YES	6,993	716	7,709	PA-1
1.2S	7,256		6,703		553	7,256	0	YES	6,703	553	7,256	PA-2
1.3S	3,083		3,083		0	3,083	0	YES	3,083	0	3,083	PA-3
1.4S	5,687		3,731		1,956	5,687	0	YES	3,731	1,956	5,687	FT-1
1.5S	3,872		1,716		2,156	3,872	0	YES	1,716	2,156	3,872	FT-6
1.6S	5,278		4,046	571	646	4,692	571	YES	4,046	1,217	5,263	FT-2
1.7S	6,692	335	2,414		3,943	6,357	335	YES	2,749	3,943	6,692	IT-1
1.8S	9,322		7,973		1,349	9,322	0	YES	7,973	1,349	9,322	FT-3
1.9S	5,181	341	3,065		1,775	4,840	341	YES	3,406	1,775	5,181	IT-2
1.10S	7,971	1,445	0	5,860	832	832	7,305	NO	0	0	0	
1.11S	2,896		755		2,141	2,896	0	YES	755	2,141	2,896	FT-4
1.12S	2,034		1,096		938	2,034		YES	1,096	938	2,034	FT-5
2S	29,276				2,725	2,725	0	NO	0	0	0	
3S	16,237	3,929		1,597		0	5,526	NO	0	0	0	
TOTAL (S.F.)	**154,925**	**30,460**	**44,442**	**16,365**	**25,527**	**69,969**	**46,825**		**42,251**	**16,744**	**58,995**	

TOTAL NEW IMPERVIOUS AREA (S.F.)	**44,442**	**TOTAL DEVELOPED AREA (S.F.)**	**69,969**
TOTAL IMPERVIOUS AREA RECEIVING TREATMENT (S.F.)	**42,251**	**TOTAL AREA RECEIVING TREATMENT (S.F.)**	**58,995**
% OF IMPERVIOUS AREA RECEIVING TREATMENT	**95.07%**	**% OF AREA RECEIVING TREATMENT**	**84.32%**

PA = POROUS ASPHALT

FT - FILTER TRENCH/ROOF DRIP EDGE

MB - MEADOW BASIN

IT - INFILTRATION TRENCH

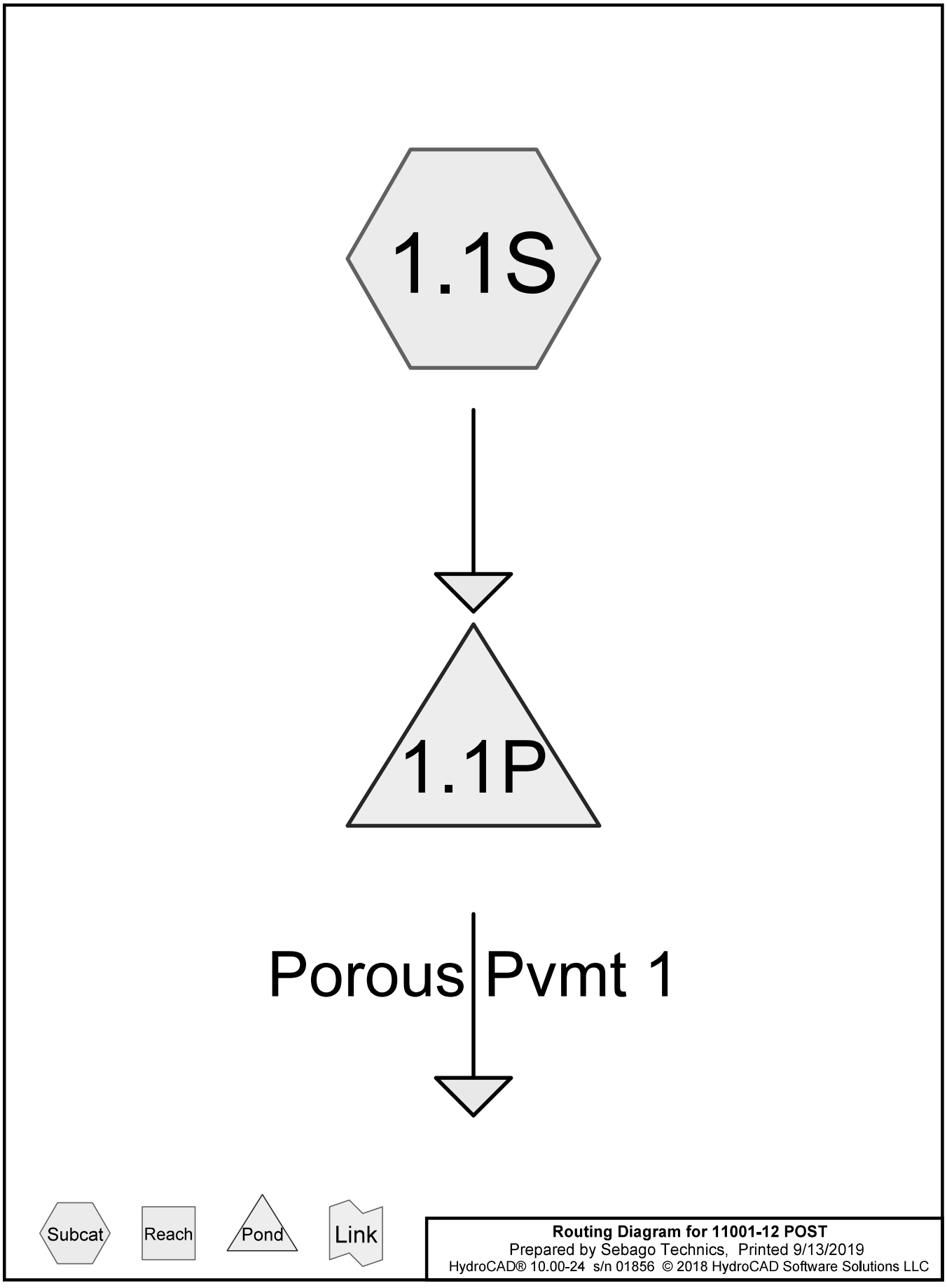
SEBAGO TECHNICS, INC.
75 John Roberts Road, Suite 4A
South Portland, ME 04106
(207) 200-2100 FAX (207) 856-2206

JOB	11001.12 - Arctic Museum		
SHEET NO.	1	OF	3
CALCULATED BY	PDO	DATE	8/14/2019
CHECKED BY			
FILE NAME		PRINT DATE	9/13/2019

MDEP Site Location of Development Submission

Note: Permeable Pavers are sized in accordance with Chapter 7.7 of the Maine Department of Environmental Protection BMPs Technical Design Manual, latest revision

Treatment Calculations for Proposed Porous Pavement				PA-1		1.1S	
WQV Calculation							
(WQV = Water Quality Volume)							
Total Landscaped Area =	716.0	sf					
Total Impervious Area=	6,993.0	sf					
Total Watershed Area=	7,709.0	sf					
Area of Porous Pavements=	1,296.0	sf					
WQV Required= 1.25" x Impervious Area + 0.4"x Landscape Area =				752.3	cf		
Total Depth of Open Graded Base (Reservoir Coarse Varies)=				18.0	in.		
Porosity= 40.0%							
WQV within Reservoir Coarse=	777.6	c.f.					
Maximum Run-on Flow Path=	50	l.f.	Per 7.7.2, runon flow path shall not exceed 50 lf				
Min Filter Layer Depth=	12.0	in.					
Filter Layer Depth Provided=	12.0	in.					



Routing Diagram for 11001-12 POST
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Summary for Subcatchment 1.1S:

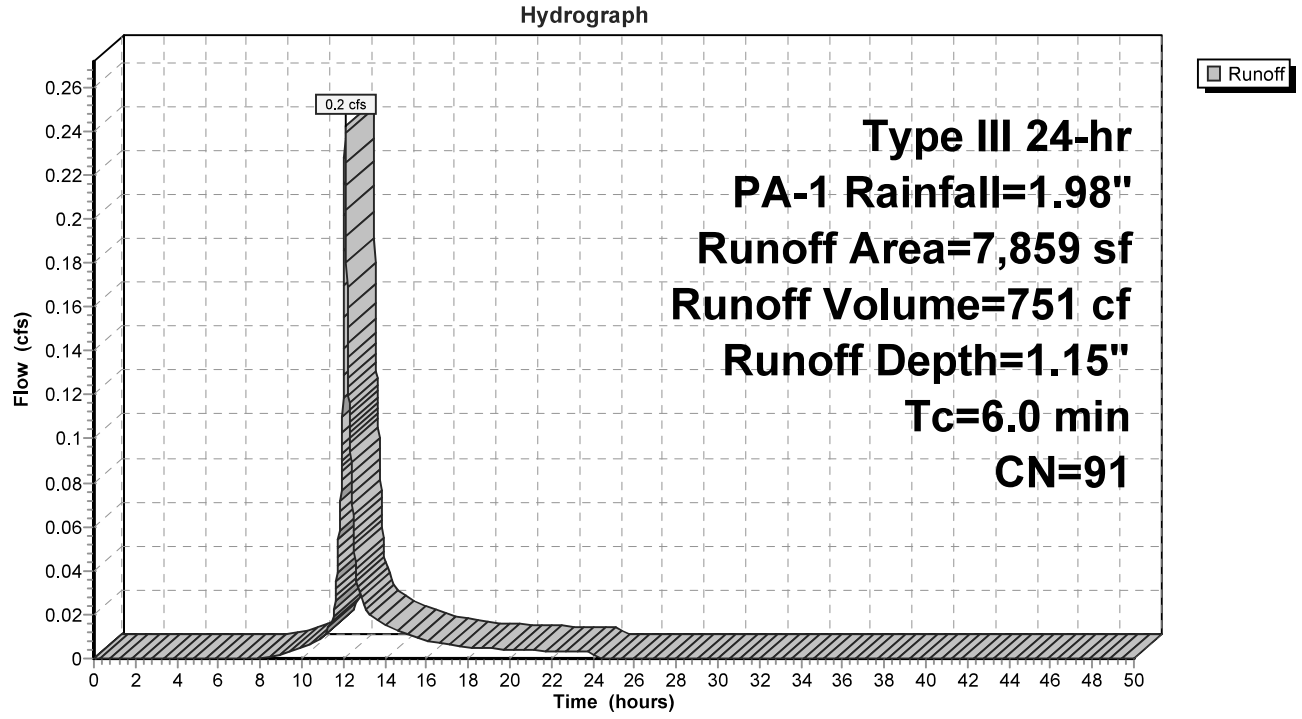
Runoff = 0.2 cfs @ 12.09 hrs, Volume= 751 cf, Depth= 1.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr PA-1 Rainfall=1.98"

	Area (sf)	CN	Description
*	6,993	98	Proposed Porous Pavement
*	866	39	Prop Grass, A
	7,859	91	Weighted Average
	866		11.02% Pervious Area
	6,993		88.98% Impervious Area

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

Subcatchment 1.1S:



Summary for Pond 1.1P: Porous Pvmt 1

Inflow Area = 7,859 sf, 88.98% Impervious, Inflow Depth = 1.15" for PA-1 event
Inflow = 0.2 cfs @ 12.09 hrs, Volume= 751 cf
Outflow = 0.0 cfs @ 14.39 hrs, Volume= 618 cf, Atten= 94%, Lag= 138.3 min
Primary = 0.0 cfs @ 14.39 hrs, Volume= 618 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 74.22' @ 14.39 hrs Surf.Area= 1,296 sf Storage= 453 cf

Plug-Flow detention time= 455.2 min calculated for 618 cf (82% of inflow)
Center-of-Mass det. time= 383.2 min (1,205.0 - 821.7)

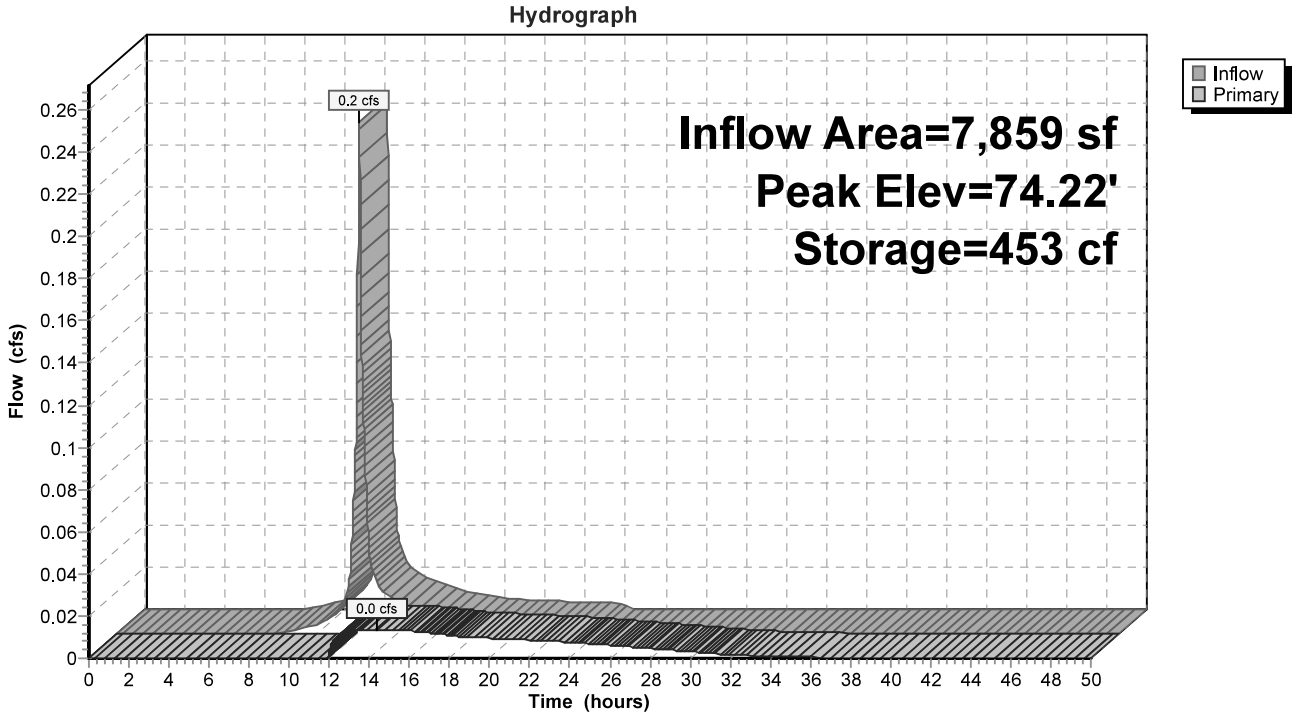
Volume	Invert	Avail.Storage	Storage Description
#1	72.72'	1,402 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
72.72	1,296	0.0	0	0
72.73	1,296	30.0	4	4
73.72	1,296	30.0	385	389
73.73	1,296	10.0	1	390
74.71	1,296	10.0	127	517
74.72	1,296	40.0	5	522
76.22	1,296	40.0	778	1,300
76.23	1,296	10.0	1	1,301
76.88	1,296	10.0	84	1,385
76.89	50	100.0	7	1,392
77.00	120	100.0	9	1,402

Device	Routing	Invert	Outlet Devices
#1	Primary	72.56'	**12.0" Round Outfall** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 72.56' / 72.36' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	73.06'	**0.7" Vert. Orifice** C= 0.600
#3	Device 2	73.06'	**4.0" Vert. 4" UD** C= 0.600
#4	Device 1	76.89'	**2.0" x 2.0" Horiz. Orifice/Grate X 7.00 columns** X 7 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.0 cfs @ 14.39 hrs HW=74.22' (Free Discharge)
└**1=Outfall** (Passes 0.0 cfs of 3.2 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 0.0 cfs @ 5.12 fps)
  │ └**3=4" UD** (Passes 0.0 cfs of 0.4 cfs potential flow)
  └**4=Orifice/Grate** (Controls 0.0 cfs)

Pond 1.1P: Porous Pvmt 1



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JOB	11001.12 - Arctic Museum		
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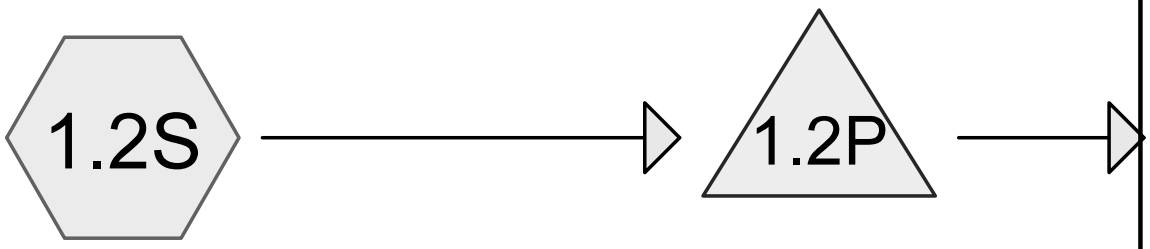
MDEP Site Location of Development Submission

Note: Permeable Pavers are sized in accordance with Chapter 7.7 of the Maine Department of Environmental Protection BMPs Technical Design Manual, latest revision

Treatment Calculations for Proposed Porous Pavement				PA-2		1.2S	
WQV Calculation							
(WQV = Water Quality Volume)							
Total Landscaped Area =	553.0	sf					
Total Impervious Area=	6,703.0	sf					
Total Watershed Area=	7,256.0	sf					
Area of Porous Pavements=	2,916.0	sf					
WQV Required= 1.25" x Impervious Area + 0.4"x Landscape Area =				716.7	cf		
Total Depth of Open Graded Base (Reservoir Coarse Varies)=				18.0	in.		
Porosity= 40.0%							
WQV within Reservoir Coarse=	1749.6	c.f.					
Maximum Run-on Flow Path=	50	l.f.	Per 7.7.2, runon flow path shall not exceed 50 lf				
Min Filter Layer Depth=	12.0	in.					
Filter Layer Depth Provided=	12.0	in.					



Porous Pvmt 2

Subcat Reach Pond Link

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Summary for Subcatchment 1.2S:

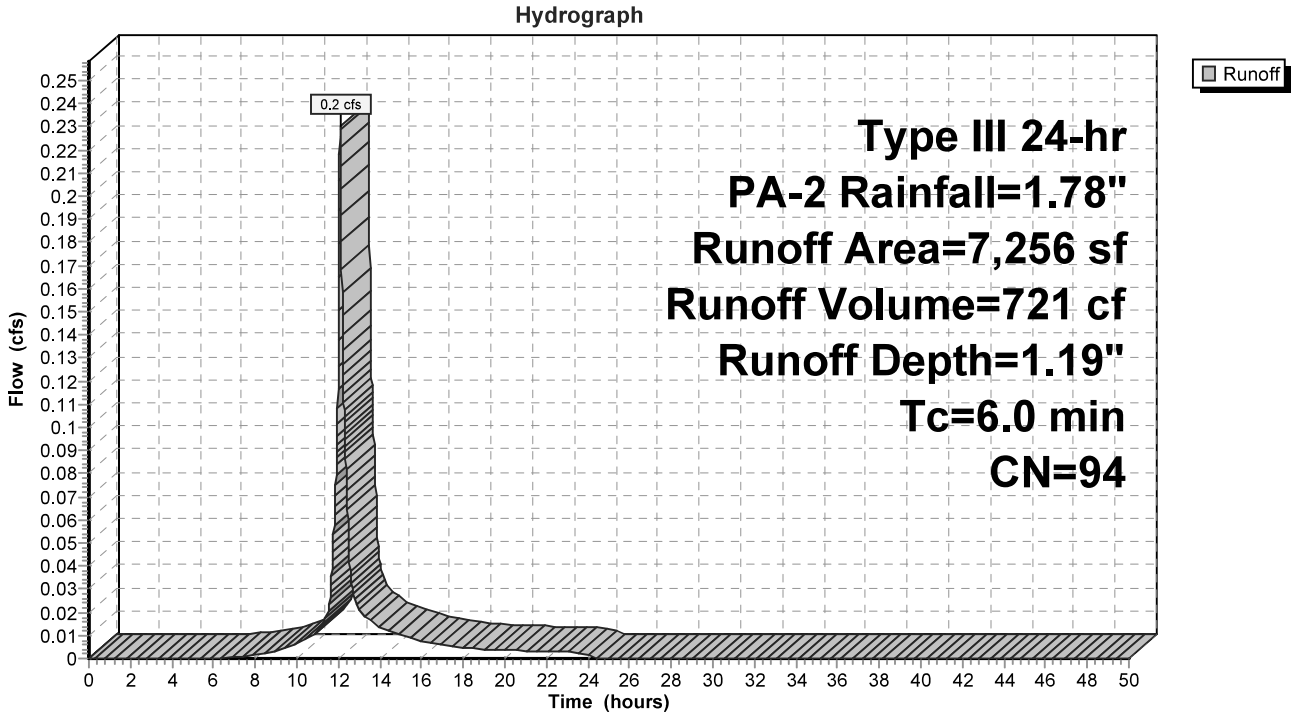
Runoff = 0.2 cfs @ 12.09 hrs, Volume= 721 cf, Depth= 1.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr PA-2 Rainfall=1.78"

	Area (sf)	CN	Description
*	6,703	98	Proposed Porous Pavement
*	553	39	Prop Grass, A
	7,256	94	Weighted Average
	553		7.62% Pervious Area
	6,703		92.38% Impervious Area

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

Subcatchment 1.2S:



Summary for Pond 1.2P: Porous Pvmt 2

Inflow Area = 7,256 sf, 92.38% Impervious, Inflow Depth = 1.19" for PA-2 event
Inflow = 0.2 cfs @ 12.09 hrs, Volume= 721 cf
Outflow = 0.0 cfs @ 15.87 hrs, Volume= 420 cf, Atten= 97%, Lag= 227.2 min
Primary = 0.0 cfs @ 15.87 hrs, Volume= 420 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 73.30' @ 15.87 hrs Surf.Area= 2,916 sf Storage= 512 cf

Plug-Flow detention time= 585.8 min calculated for 420 cf (58% of inflow)
Center-of-Mass det. time= 479.8 min (1,287.9 - 808.2)

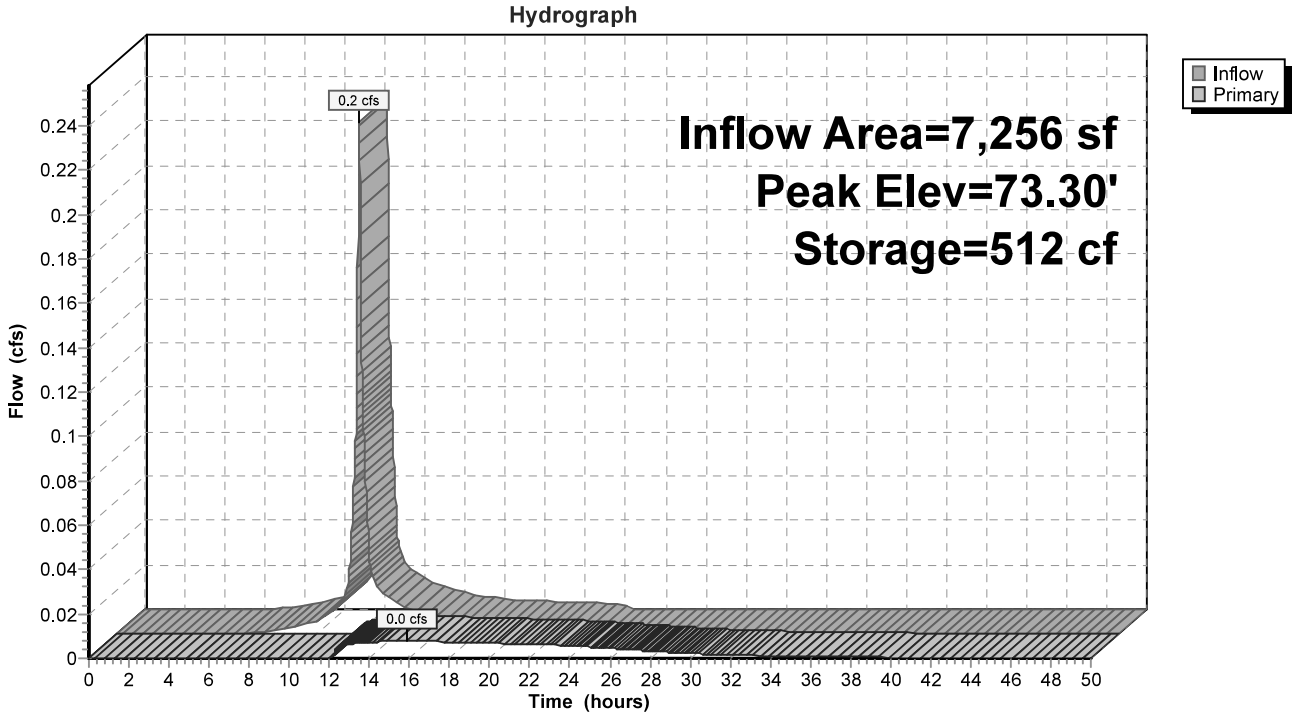
Volume	Invert	Avail.Storage	Storage Description
#1	72.72'	3,141 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
72.72	2,916	0.0	0	0
72.73	2,916	30.0	9	9
73.72	2,916	30.0	866	875
73.73	2,916	10.0	3	878
74.71	2,916	10.0	286	1,163
74.72	2,916	40.0	12	1,175
76.22	2,916	40.0	1,750	2,925
76.23	2,916	10.0	3	2,928
76.88	2,916	10.0	190	3,117
76.89	50	100.0	15	3,132
77.00	120	100.0	9	3,141

Device	Routing	Invert	Outlet Devices
#1	Primary	72.20'	**12.0" Round Outfall** L= 29.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 72.20' / 72.05' S= 0.0052 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	73.06'	**0.8" Vert. Orifice** C= 0.600
#3	Device 2	73.06'	**4.0" Vert. 4" UD** C= 0.600
#4	Device 1	76.89'	**2.0" x 2.0" Horiz. Orifice/Grate X 7.00 columns** X 7 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.0 cfs @ 15.87 hrs HW=73.30' (Free Discharge)
└**1=Outfall** (Passes 0.0 cfs of 2.3 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 0.0 cfs @ 2.21 fps)
  │ └**3=4" UD** (Passes 0.0 cfs of 0.1 cfs potential flow)
  └**4=Orifice/Grate** (Controls 0.0 cfs)

Pond 1.2P: Porous Pvmt 2



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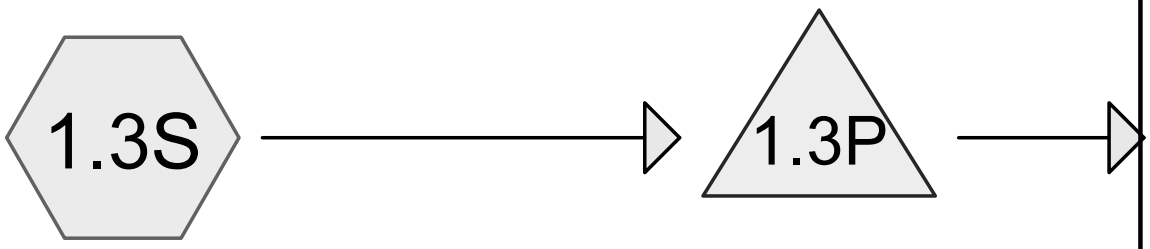
MDEP Site Location of Development Submission

Note: Permeable Pavers are sized in accordance with Chapter 7.7 of the Maine Department of Environmental Protection BMPs Technical Design Manual, latest revision

Treatment Calculations for Proposed Porous Pavement				PA-3		1.3S	
WQV Calculation							
(WQV = Water Quality Volume)							
Total Landscaped Area =	0.0	sf					
Total Impervious Area=	3,083.0	sf					
Total Watershed Area=	3,083.0	sf					
Area of Porous Pavements=	1,296.0	sf					
WQV Required= 1.25" x Impervious Area + 0.4"x Landscape Area =				321.1	cf		
Total Depth of Open Graded Base (Reservoir Coarse Varies)=				18.0	in.		
Porosity= 40.0%							
WQV within Reservoir Coarse=	777.6	c.f.					
Maximum Run-on Flow Path=	50	l.f.	Per 7.7.2, runon flow path shall not exceed 50 lf				
Min Filter Layer Depth=	12.0	in.					
Filter Layer Depth Provided=	12.0	in.					



Porous Pvmt 3

Subcat Reach Pond Link

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Summary for Subcatchment 1.3S:

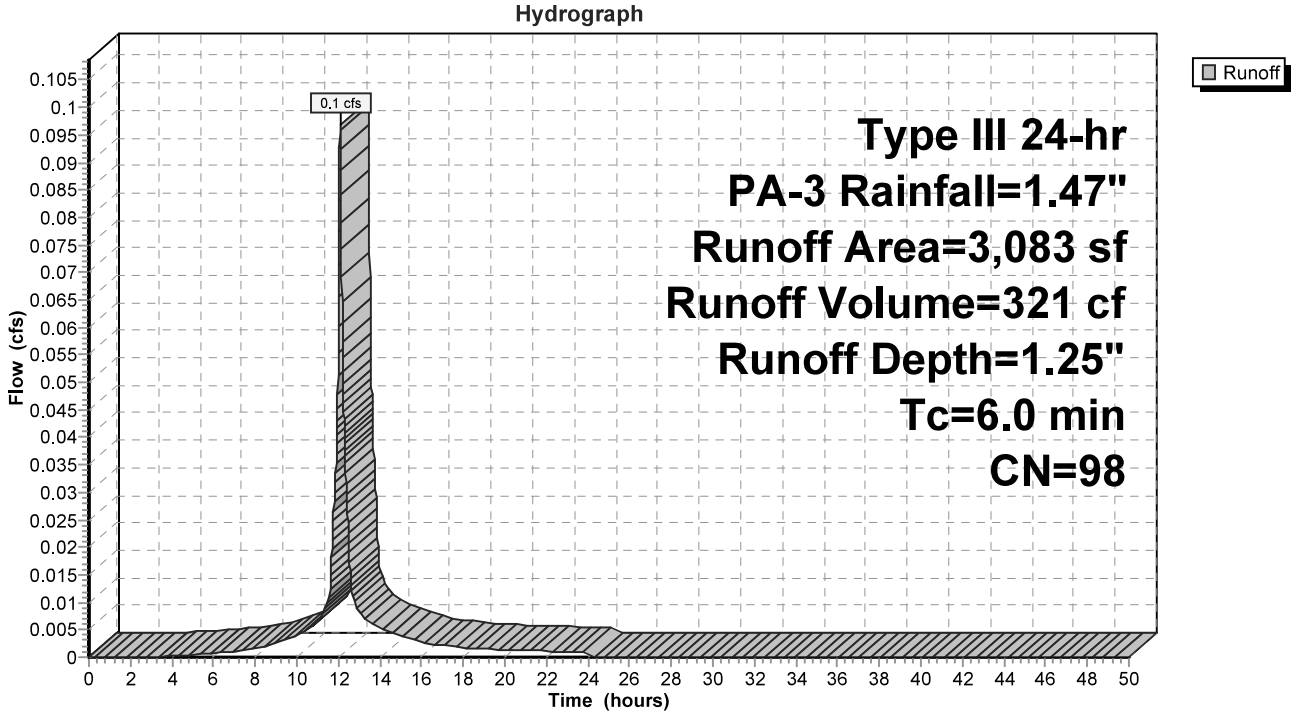
Runoff = 0.1 cfs @ 12.08 hrs, Volume= 321 cf, Depth= 1.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr PA-3 Rainfall=1.47"

	Area (sf)	CN	Description
*	3,083	98	Proposed Porous Pavement
	3,083		100.00% Impervious Area

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

Subcatchment 1.3S:



Summary for Pond 1.3P: Porous Pvmt 3

Inflow Area = 3,083 sf,100.00% Impervious, Inflow Depth = 1.25" for PA-3 event
Inflow = 0.1 cfs @ 12.08 hrs, Volume= 321 cf
Outflow = 0.0 cfs @ 13.59 hrs, Volume= 320 cf, Atten= 94%, Lag= 90.4 min
Primary = 0.0 cfs @ 13.59 hrs, Volume= 320 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 73.18' @ 13.59 hrs Surf.Area= 1,296 sf Storage= 180 cf

Plug-Flow detention time= 371.9 min calculated for 320 cf (100% of inflow)
Center-of-Mass det. time= 369.4 min (1,145.3 - 775.9)

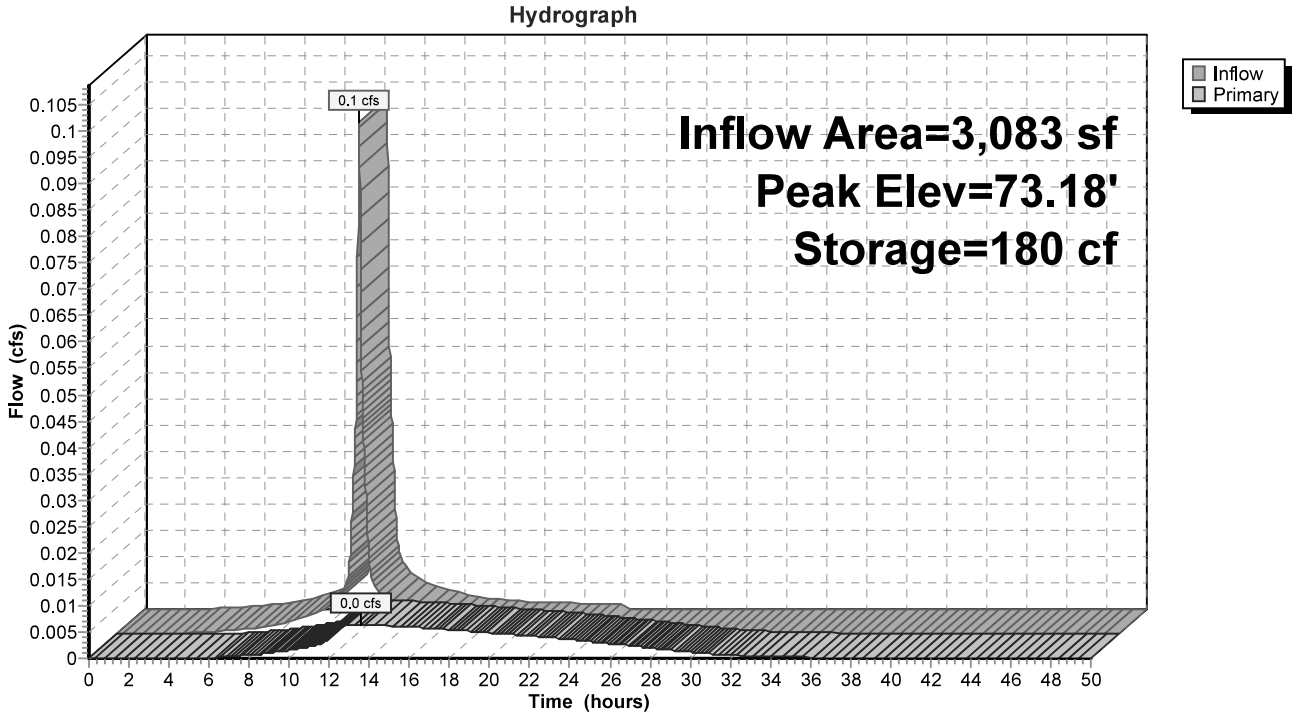
Volume	Invert	Avail.Storage	Storage Description
#1	72.72'	1,402 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
72.72	1,296	0.0	0	0
72.73	1,296	30.0	4	4
73.72	1,296	30.0	385	389
73.73	1,296	10.0	1	390
74.71	1,296	10.0	127	517
74.72	1,296	40.0	5	522
76.22	1,296	40.0	778	1,300
76.23	1,296	10.0	1	1,301
76.88	1,296	10.0	84	1,385
76.89	50	100.0	7	1,392
77.00	120	100.0	9	1,402

Device	Routing	Invert	Outlet Devices
#1	Primary	72.39'	**12.0" Round Outfall** L= 91.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 72.39' / 71.58' S= 0.0089 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	72.72'	**0.6" Vert. Orifice** C= 0.600
#3	Device 2	72.72'	**4.0" Vert. 4" UD** C= 0.600
#4	Primary	76.89'	**2.0" x 2.0" Horiz. Orifice/Grate X 7.00 columns** X 7 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.0 cfs @ 13.59 hrs HW=73.18' (Free Discharge)
- **1=Outfall** (Passes 0.0 cfs of 1.6 cfs potential flow)
  - **2=Orifice** (Orifice Controls 0.0 cfs @ 3.18 fps)
    - **3=4" UD** (Passes 0.0 cfs of 0.2 cfs potential flow)
- **4=Orifice/Grate** (Controls 0.0 cfs)

Pond 1.3P: Porous Pvmt 3



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Treatment Calculations for Proposed Filtration Trench 1 FT-1 1.4S

Water Quality Volume Calculation

Total Impervious Area	3,731	SF		
Total Landscaped Area	1,956	SF		

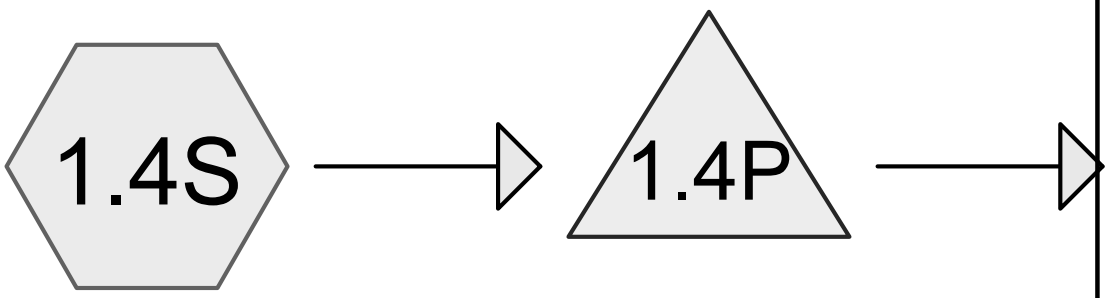
WQV Required = (1.25" x Impervious Area + 0.4" X Landscaped Area)

WQV Required	453.8	CF		
Length of Trench	90.0	FT		
Width of Trench	5.0	FT		
Depth of Stone	24.0	IN	40%	porosity
Depth of Sand Media	12.0	IN	25%	porosity

*WQV Provided = Area of Trench x (Depth of Stone x Stone Porosity + Depth of Sand x Sand Porosity)

Total WQV Provided	472.5	CF

*The stone reservoir volume for the drip edge filter was designed to provide the storage required to convey the water quality storm (storm that generates 1.25" of runoff over the roof) through the filter media under the stone, which is naturally sandy and well-drained.



FIlter Trench 1

Subcat Reach Pond Link

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Summary for Subcatchment 1.4S:

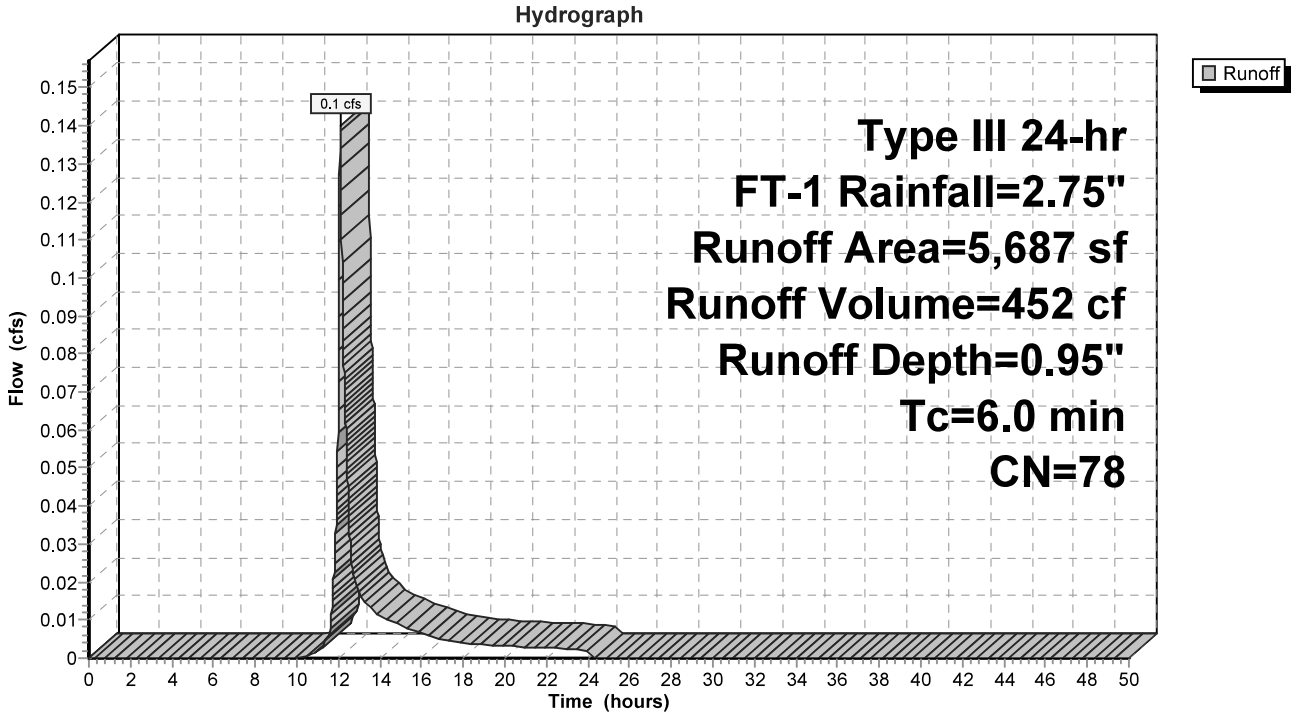
Runoff = 0.1 cfs @ 12.09 hrs, Volume= 452 cf, Depth= 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr FT-1 Rainfall=2.75"

	Area (sf)	CN	Description
*	1,962	98	Proposed Roof
*	1,769	98	Prop Walkway
*	1,956	39	Prop Grass, A
	5,687	78	Weighted Average
	1,956		34.39% Pervious Area
	3,731		65.61% Impervious Area

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

Subcatchment 1.4S:



Summary for Pond 1.4P: FIlter Trench 1

Inflow Area = 5,687 sf, 65.61% Impervious, Inflow Depth = 0.95" for FT-1 event
Inflow = 0.1 cfs @ 12.09 hrs, Volume= 452 cf
Outflow = 0.0 cfs @ 16.40 hrs, Volume= 388 cf, Atten= 96%, Lag= 258.2 min
Primary = 0.0 cfs @ 16.40 hrs, Volume= 388 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 75.77' @ 16.40 hrs Surf.Area= 450 sf Storage= 283 cf

Plug-Flow detention time= 639.7 min calculated for 388 cf (86% of inflow)
Center-of-Mass det. time= 576.1 min (1,434.0 - 857.9)

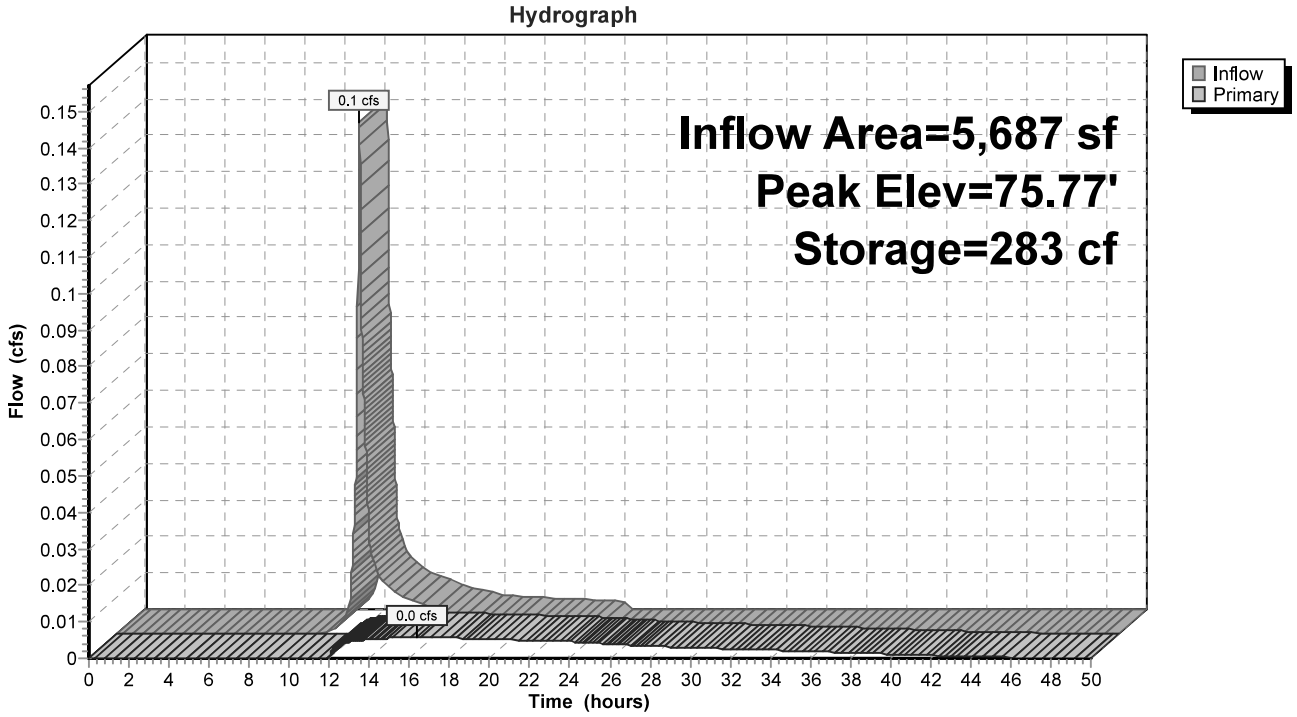
Volume	Invert	Avail.Storage	Storage Description
#1	73.57'	831 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.57	450	0.0	0	0
73.58	450	40.0	2	2
74.57	450	40.0	178	180
74.58	450	20.0	1	181
75.57	450	20.0	89	270
75.58	450	10.0	0	270
75.74	450	10.0	7	278
75.75	450	40.0	2	279
77.74	450	40.0	358	638
77.75	450	40.0	2	639
77.99	450	40.0	43	683
78.00	450	100.0	5	687
78.25	700	100.0	144	831

Device	Routing	Invert	Outlet Devices
#1	Primary	73.92'	**6.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 73.92' / 73.90' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Device 1	73.92'	**0.4" Vert. Orifice/Grate** C= 0.600
#3	Device 1	78.00'	**1.0" W x 7.0" H Vert. Orifice/Grate X 27.00** C= 0.600

Primary OutFlow Max=0.0 cfs @ 16.40 hrs HW=75.77' (Free Discharge)
└**1=Culvert** (Passes 0.0 cfs of 1.2 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.0 cfs @ 6.52 fps)
  └**3=Orifice/Grate** (Controls 0.0 cfs)

Pond 1.4P: FIlter Trench 1



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Treatment Calculations for Proposed Filtration Trench 2 FT-2 1.6S

Water Quality Volume Calculation

Total Impervious Area	4,046	SF		
Total Landscaped Area	1,217	SF		

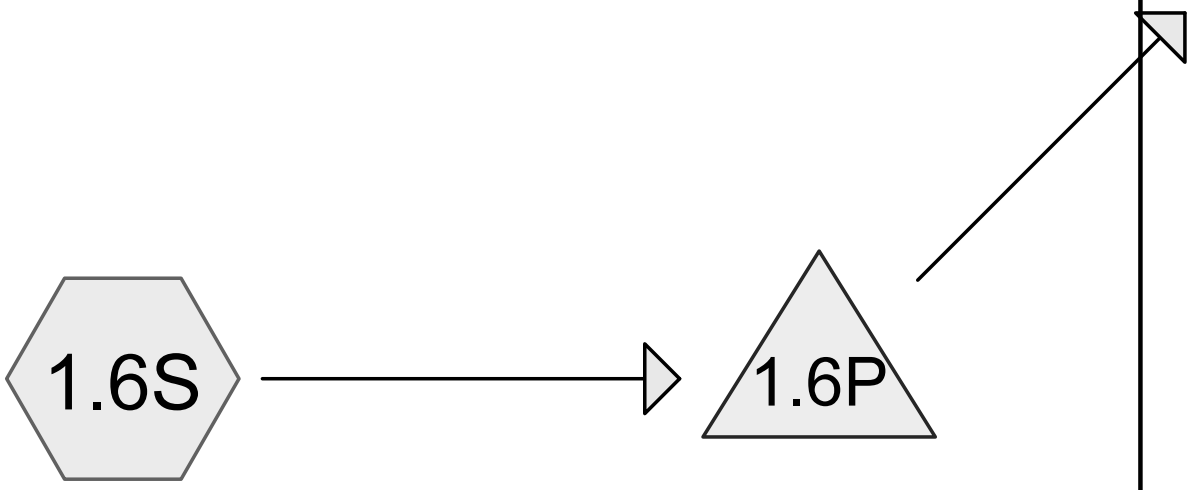
WQV Required = (1.25" x Impervious Area + 0.4" X Landscaped Area)

WQV Required	462.0	CF		
Length of Trench	85.0	FT		
Width of Trench	6.0	FT		
Depth of Stone	24.0	IN	40%	porosity
Depth of Sand Media	12.0	IN	25%	porosity

*WQV Provided = Area of Trench x (Depth of Stone x Stone Porosity + Depth of Sand x Sand Porosity)

Total WQV Provided	535.5	CF

*The stone reservoir volume for the drip edge filter was designed to provide the storage required to convey the water quality storm (storm that generates 1.25" of runoff over the roof) through the filter media under the stone, which is naturally sandy and well-drained.



Filter Trench 2

Subcat Reach Pond Link

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Summary for Subcatchment 1.6S:

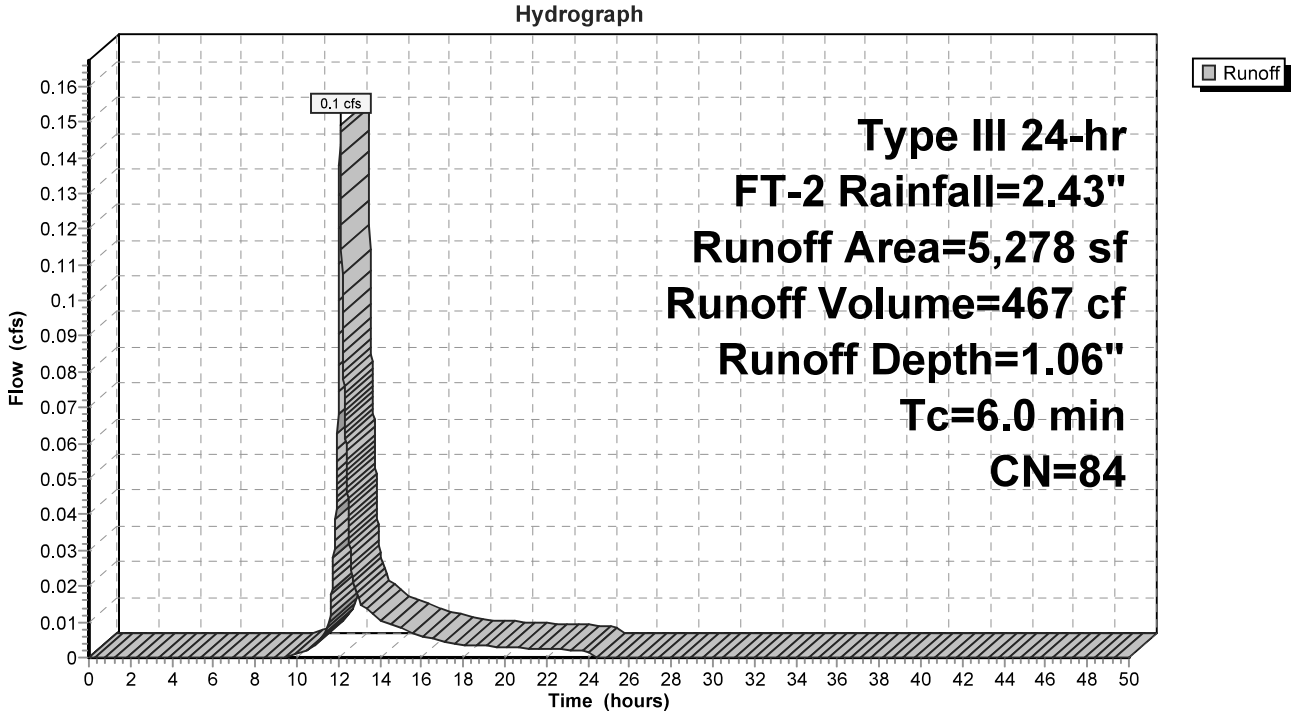
Runoff = 0.1 cfs @ 12.09 hrs, Volume= 467 cf, Depth= 1.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr FT-2 Rainfall=2.43"

	Area (sf)	CN	Description
*	586	39	Exist Grass, A
*	3,203	98	Prop Roof
*	843	98	Prop Walkway
*	646	39	Prop Grass, A
	5,278	84	Weighted Average
	1,232		23.34% Pervious Area
	4,046		76.66% Impervious Area

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

Subcatchment 1.6S:



Summary for Pond 1.6P: Filter Trench 2

Inflow Area = 5,278 sf, 76.66% Impervious, Inflow Depth = 1.06" for FT-2 event
Inflow = 0.1 cfs @ 12.09 hrs, Volume= 467 cf
Outflow = 0.0 cfs @ 16.35 hrs, Volume= 393 cf, Atten= 96%, Lag= 255.3 min
Primary = 0.0 cfs @ 16.35 hrs, Volume= 393 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 75.58' @ 16.35 hrs Surf.Area= 510 sf Storage= 307 cf

Plug-Flow detention time= 701.7 min calculated for 393 cf (84% of inflow)
Center-of-Mass det. time= 633.4 min (1,476.4 - 842.9)

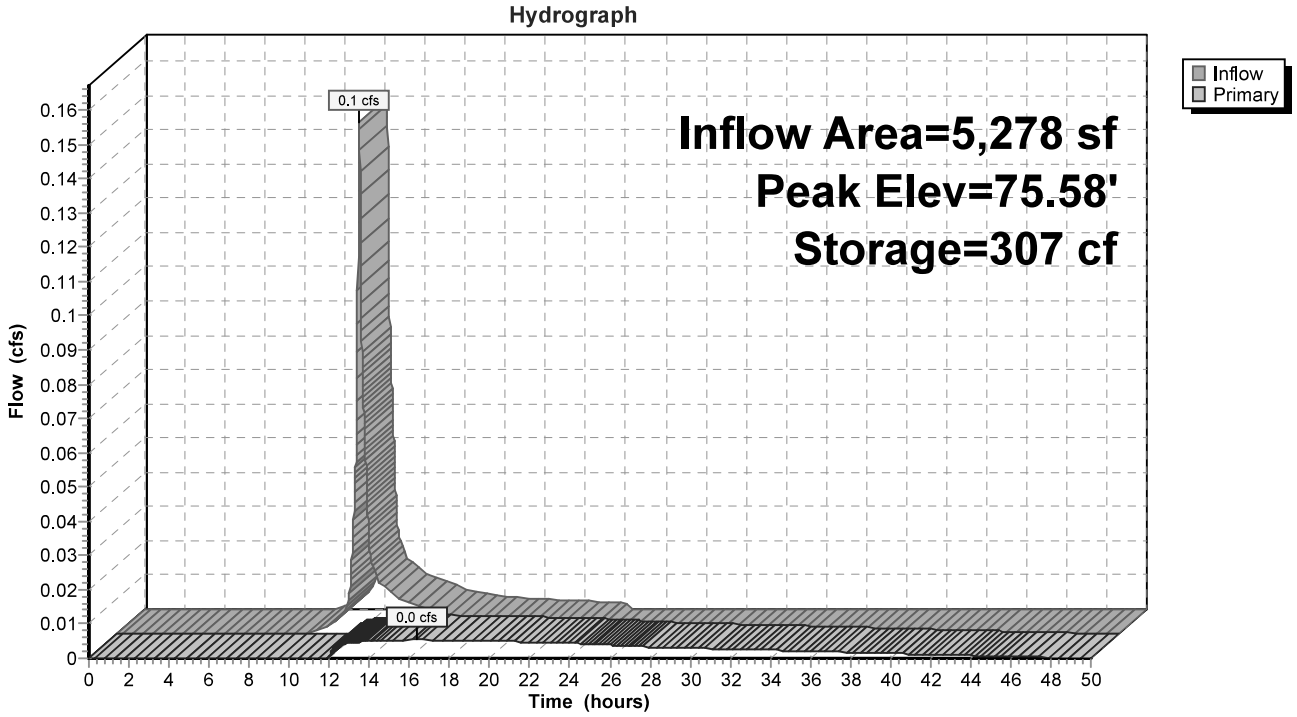
Volume	Invert	Avail.Storage	Storage Description
#1	73.57'	1,094 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.57	510	0.0	0	0
73.58	510	40.0	2	2
74.57	510	40.0	202	204
74.58	510	20.0	1	205
75.57	510	20.0	101	306
75.58	510	10.0	1	307
75.74	510	10.0	8	315
75.75	510	40.0	2	317
77.74	510	40.0	406	723
77.75	510	40.0	2	725
77.99	510	40.0	49	774
78.00	510	100.0	5	779
78.50	750	100.0	315	1,094

Device	Routing	Invert	Outlet Devices
#1	Primary	73.92'	**6.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 73.92' / 73.90' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Device 1	73.92'	**0.4" Vert. Orifice/Grate** C= 0.600
#3	Device 1	78.10'	**1.0" W x 7.0" H Vert. Orifice/Grate X 27.00** C= 0.600

Primary OutFlow Max=0.0 cfs @ 16.35 hrs HW=75.58' (Free Discharge)
└**1=Culvert** (Passes 0.0 cfs of 1.1 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.0 cfs @ 6.17 fps)
  └**3=Orifice/Grate** (Controls 0.0 cfs)

Pond 1.6P: Filter Trench 2



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Treatment Calculations for Proposed Filtration Trench 3 FT-3 1.8S

Water Quality Volume Calculation

Total Impervious Area	7,973	SF		
Total Landscaped Area	1,349	SF		

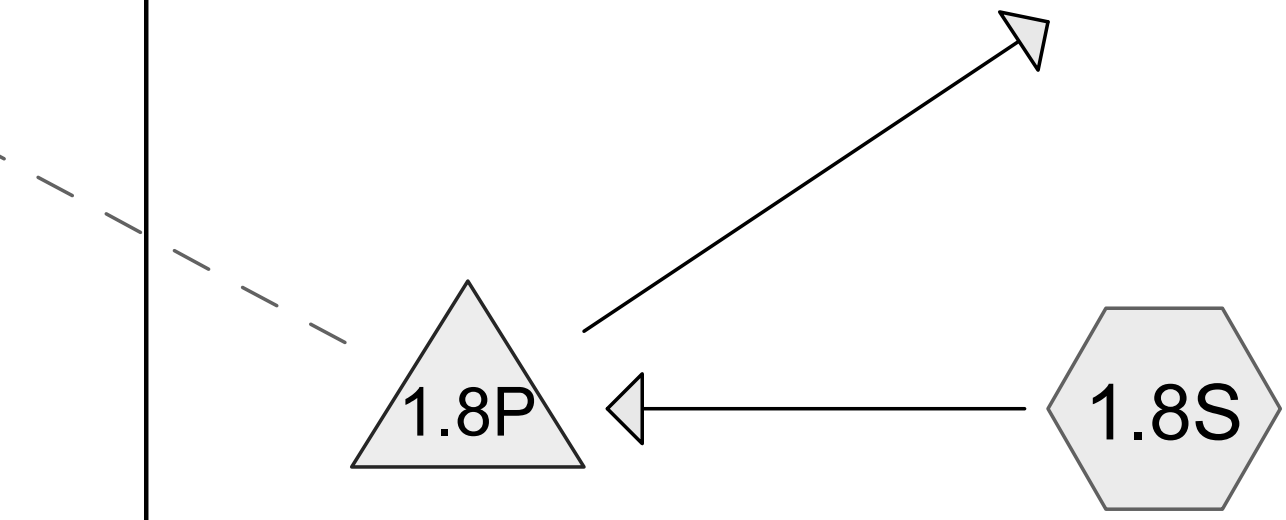
WQV Required = (1.25" x Impervious Area + 0.4" X Landscaped Area)

WQV Required	875.5	CF		
Length of Trench	220.0	FT		
Width of Trench	5.0	FT		
Depth of Stone	24.0	IN	40%	porosity
Depth of Sand Media	12.0	IN	25%	porosity

*WQV Provided = Area of Trench x (Depth of Stone x Stone Porosity + Depth of Sand x Sand Porosity)

Total WQV Provided	1,155.0	CF

*The stone reservoir volume for the drip edge filter was designed to provide the storage required to convey the water quality storm (storm that generates 1.25" of runoff over the roof) through the filter media under the stone, which is naturally sandy and well-drained.



Filter Trench 3

Subcat Reach Pond Link

Routing Diagram for 11001-12 POST
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Summary for Subcatchment 1.8S:

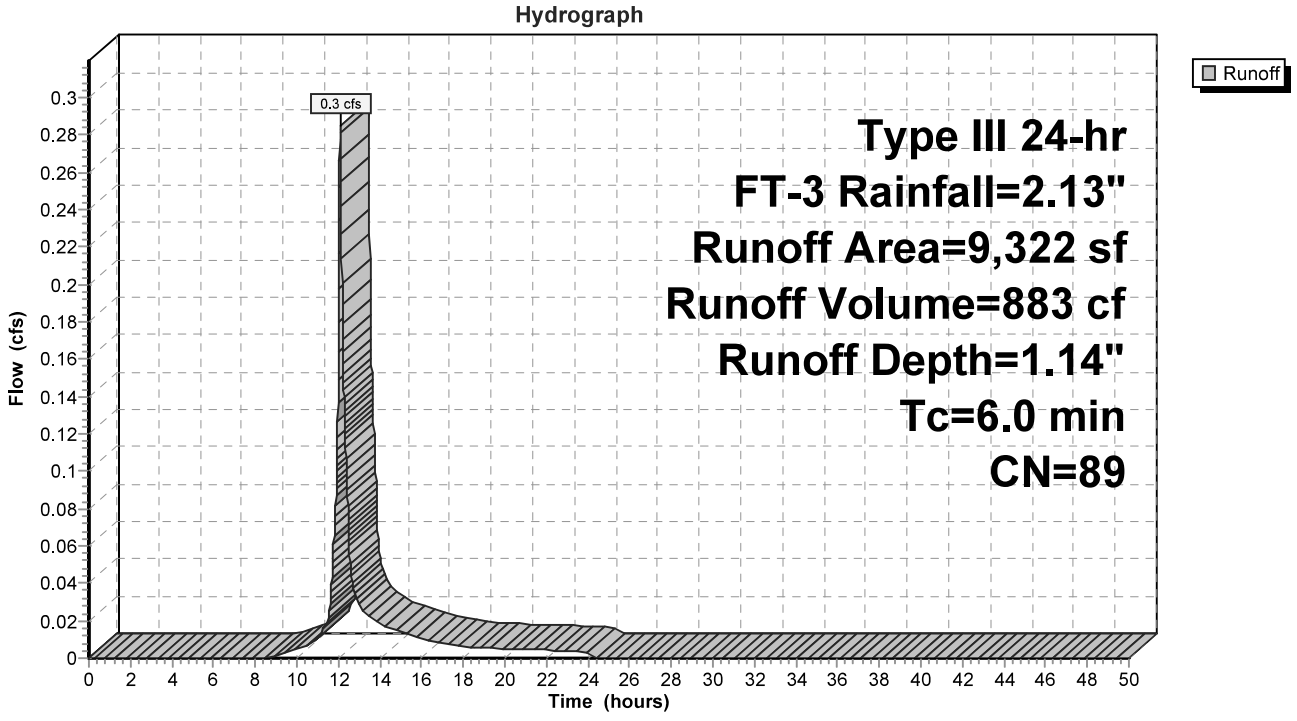
Runoff = 0.3 cfs @ 12.09 hrs, Volume= 883 cf, Depth= 1.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr FT-3 Rainfall=2.13"

	Area (sf)	CN	Description
*	7,323	98	Prop Roof
*	650	98	Prop Walkway
*	1,349	39	Prop Grass, A
	9,322	89	Weighted Average
	1,349		14.47% Pervious Area
	7,973		85.53% Impervious Area

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

Subcatchment 1.8S:



Summary for Pond 1.8P: Filter Trench 3

Inflow Area = 9,322 sf, 85.53% Impervious, Inflow Depth = 1.14" for FT-3 event
Inflow = 0.3 cfs @ 12.09 hrs, Volume= 883 cf
Outflow = 0.0 cfs @ 15.86 hrs, Volume= 724 cf, Atten= 96%, Lag= 226.2 min
Primary = 0.0 cfs @ 15.86 hrs, Volume= 724 cf
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 75.23' @ 15.86 hrs Surf.Area= 1,100 sf Storage= 586 cf

Plug-Flow detention time= 665.9 min calculated for 724 cf (82% of inflow)
Center-of-Mass det. time= 592.6 min (1,420.9 - 828.4)

Volume	Invert	Avail.Storage	Storage Description
#1	73.57'	1,812 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

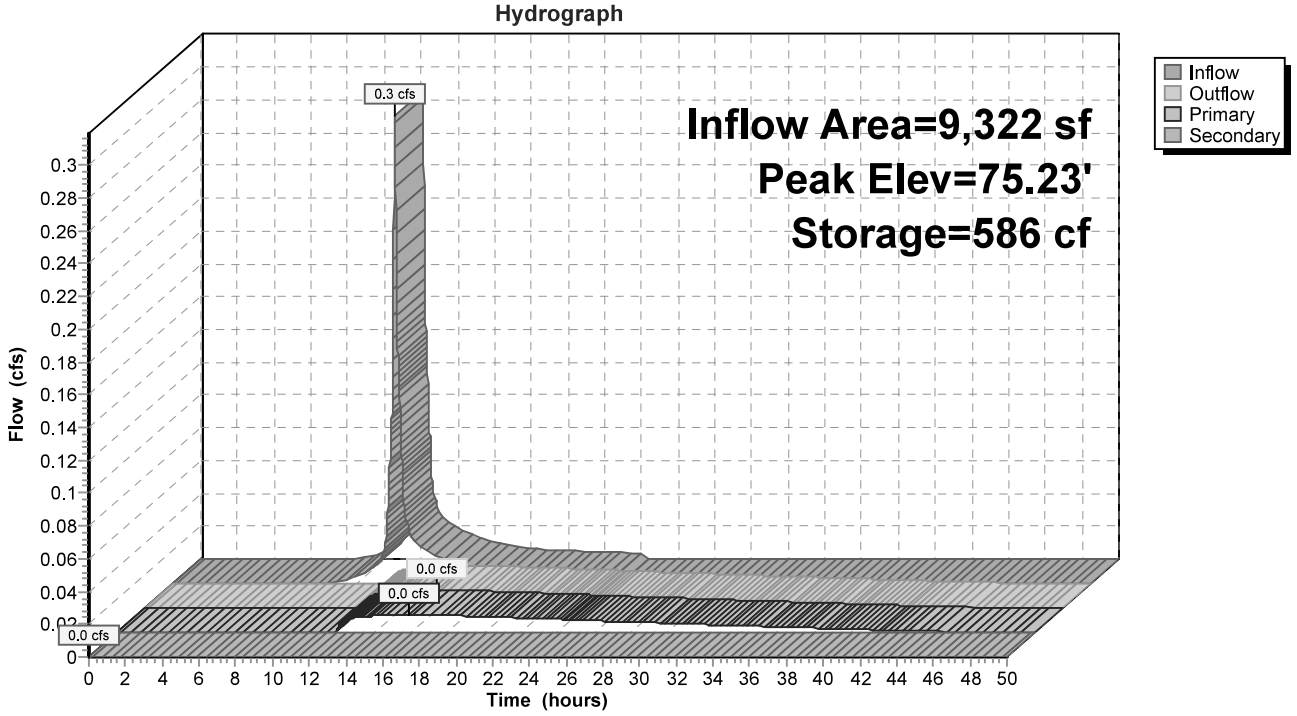
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.57	1,100	0.0	0	0
73.58	1,100	40.0	4	4
74.57	1,100	40.0	436	440
74.58	1,100	20.0	2	442
75.57	1,100	20.0	218	660
75.58	1,100	10.0	1	661
75.74	1,100	10.0	18	679
75.75	1,100	40.0	4	683
77.74	1,100	40.0	876	1,559
77.75	1,100	40.0	4	1,563
77.99	1,100	40.0	106	1,669
78.10	1,500	100.0	143	1,812

Device	Routing	Invert	Outlet Devices
#1	Primary	73.92'	**6.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 73.92' / 73.90' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Device 1	73.92'	**0.6" Vert. Orifice/Grate** C= 0.600
#3	Device 1	77.90'	**0.4" x 13.0" Horiz. Orifice/Grate X 14.00** C= 0.600 Limited to weir flow at low heads
#4	Secondary	78.00'	**220.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.0 cfs @ 15.86 hrs HW=75.23' (Free Discharge)
└**1=Culvert** (Passes 0.0 cfs of 1.0 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 0.0 cfs @ 5.46 fps)
└**3=Orifice/Grate** (Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=73.57' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond 1.8P: Filter Trench 3



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Treatment Calculations for Proposed Filtration Trench 4 FT-4 1.11S

Water Quality Volume Calculation

Total Impervious Area	755	SF		
Total Landscaped Area	2,141	SF		

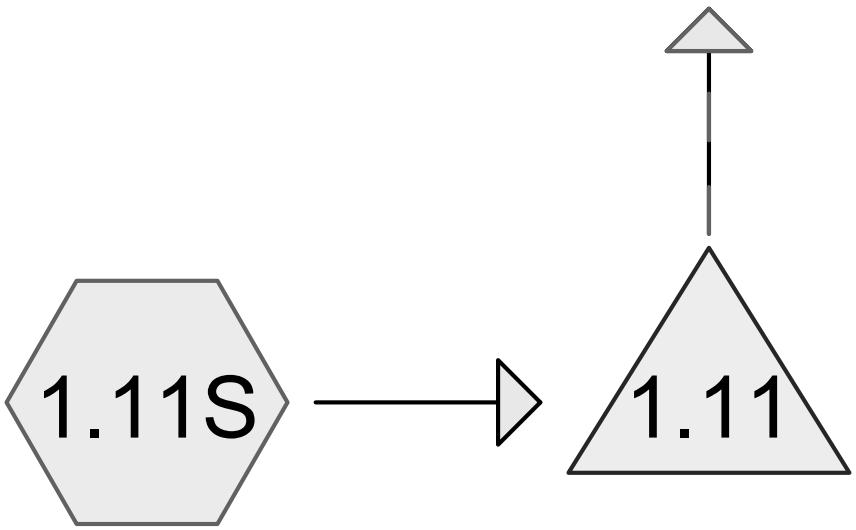
WQV Required = (1.25" x Impervious Area + 0.4" X Landscaped Area)

WQV Required	150.0	CF		
Length of Trench	60.0	FT		
Width of Trench	5.0	FT		
Depth of Stone	24.0	IN	40%	porosity
Depth of Sand Media	12.0	IN	25%	porosity

*WQV Provided = Area of Trench x (Depth of Stone x Stone Porosity + Depth of Sand x Sand Porosity)

Total WQV Provided	315.0	CF

*The stone reservoir volume for the drip edge filter was designed to provide the storage required to convey the water quality storm (storm that generates 1.25" of runoff over the roof) through the filter media under the stone, which is naturally sandy and well-drained.



Filter Trench 4

Subcat Reach Pond Link

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Summary for Subcatchment 1.11S:

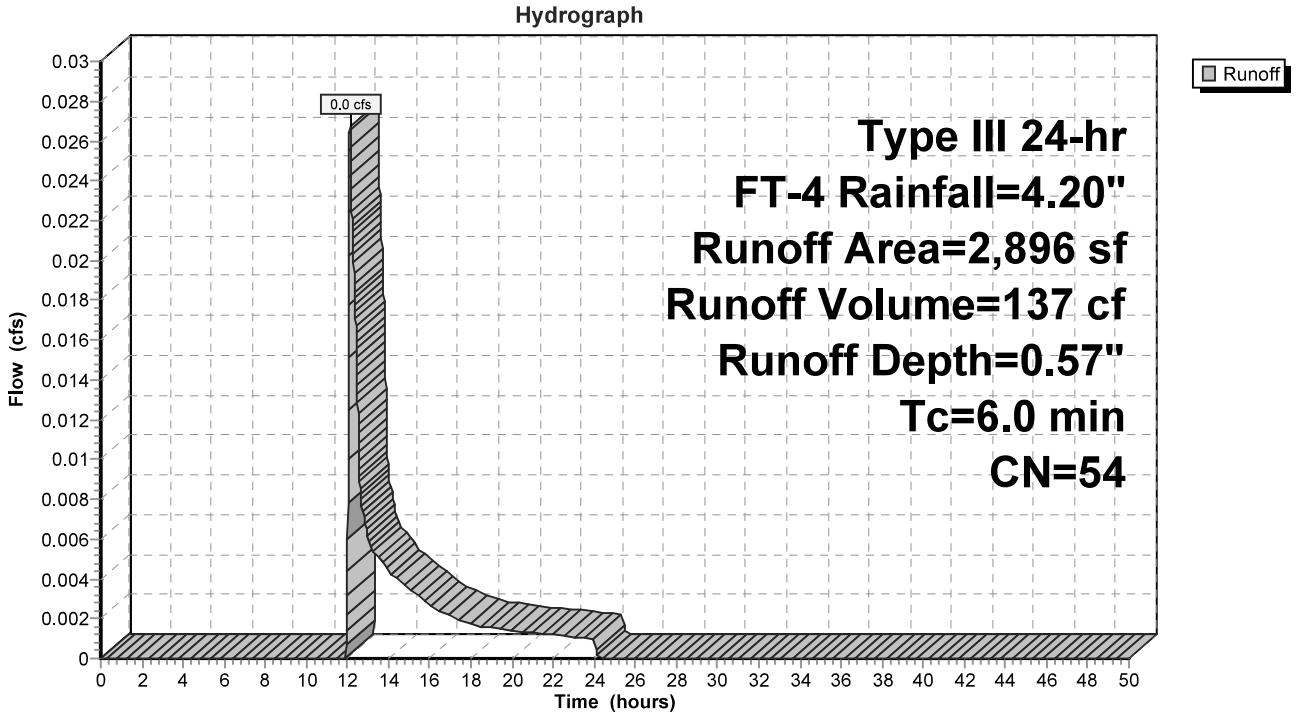
Runoff = 0.0 cfs @ 12.12 hrs, Volume= 137 cf, Depth= 0.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr FT-4 Rainfall=4.20"

	Area (sf)	CN	Description
*	755	98	Prop Walkway
*	2,141	39	Prop Grass, A
	2,896	54	Weighted Average
	2,141		73.93% Pervious Area
	755		26.07% Impervious Area

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

Subcatchment 1.11S:



Summary for Pond 1.11: Filter Trench 4

Inflow Area = 2,896 sf, 26.07% Impervious, Inflow Depth = 0.57" for FT-4 event
Inflow = 0.0 cfs @ 12.12 hrs, Volume= 137 cf
Outflow = 0.0 cfs @ 17.10 hrs, Volume= 95 cf, Atten= 92%, Lag= 298.2 min
Primary = 0.0 cfs @ 17.10 hrs, Volume= 95 cf
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 74.19' @ 17.10 hrs Surf.Area= 300 sf Storage= 75 cf

Plug-Flow detention time= 414.4 min calculated for 95 cf (69% of inflow)
Center-of-Mass det. time= 299.5 min (1,216.3 - 916.7)

Volume	Invert	Avail.Storage	Storage Description
#1	73.57'	499 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

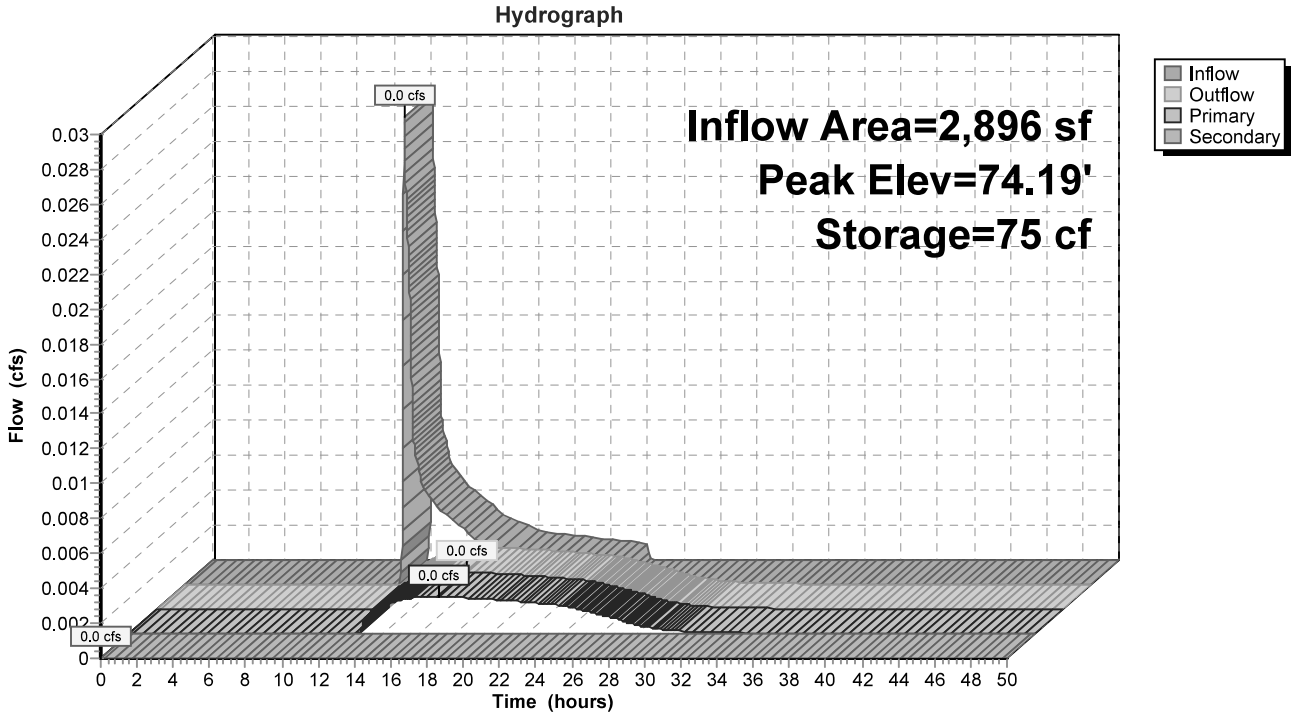
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.57	300	0.0	0	0
73.58	300	40.0	1	1
74.57	300	40.0	119	120
74.58	300	20.0	1	121
75.57	300	20.0	59	180
75.58	300	10.0	0	180
75.74	300	10.0	5	185
75.75	300	40.0	1	186
77.74	300	40.0	239	425
77.75	300	40.0	1	426
77.99	300	40.0	29	455
78.10	500	100.0	44	499

Device	Routing	Invert	Outlet Devices
#1	Primary	73.92'	**8.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 73.92' / 73.90' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#2	Device 1	73.92'	**0.4" Vert. Orifice/Grate** C= 0.600
#3	Secondary	78.00'	**220.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.0 cfs @ 17.10 hrs HW=74.19' (Free Discharge)
└**1=Culvert** (Passes 0.0 cfs of 0.2 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 0.0 cfs @ 2.43 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=73.57' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond 1.11: Filter Trench 4



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Treatment Calculations for Proposed Filtration Trench 5 FT-5 1.12S

Water Quality Volume Calculation

Total Impervious Area	1,096	SF		
Total Landscaped Area	938	SF		

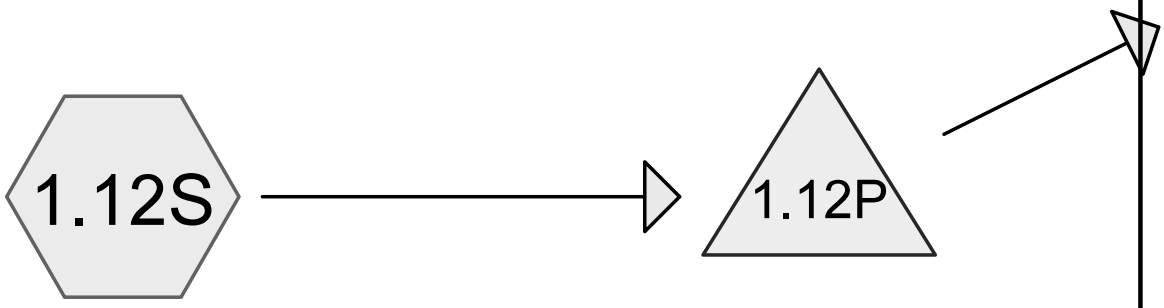
WQV Required = (1.25" x Impervious Area + 0.4" X Landscaped Area)

WQV Required	145.4	CF		
Length of Trench	85.0	FT		
Width of Trench	6.0	FT		
Depth of Stone	24.0	IN	40%	porosity
Depth of Sand Media	12.0	IN	25%	porosity

*WQV Provided = Area of Trench x (Depth of Stone x Stone Porosity + Depth of Sand x Sand Porosity)

Total WQV Provided	535.5	CF

*The stone reservoir volume for the drip edge filter was designed to provide the storage required to convey the water quality storm (storm that generates 1.25" of runoff over the roof) through the filter media under the stone, which is naturally sandy and well-drained.



Filter Trench 5

Subcat Reach Pond Link

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Summary for Subcatchment 1.12S:

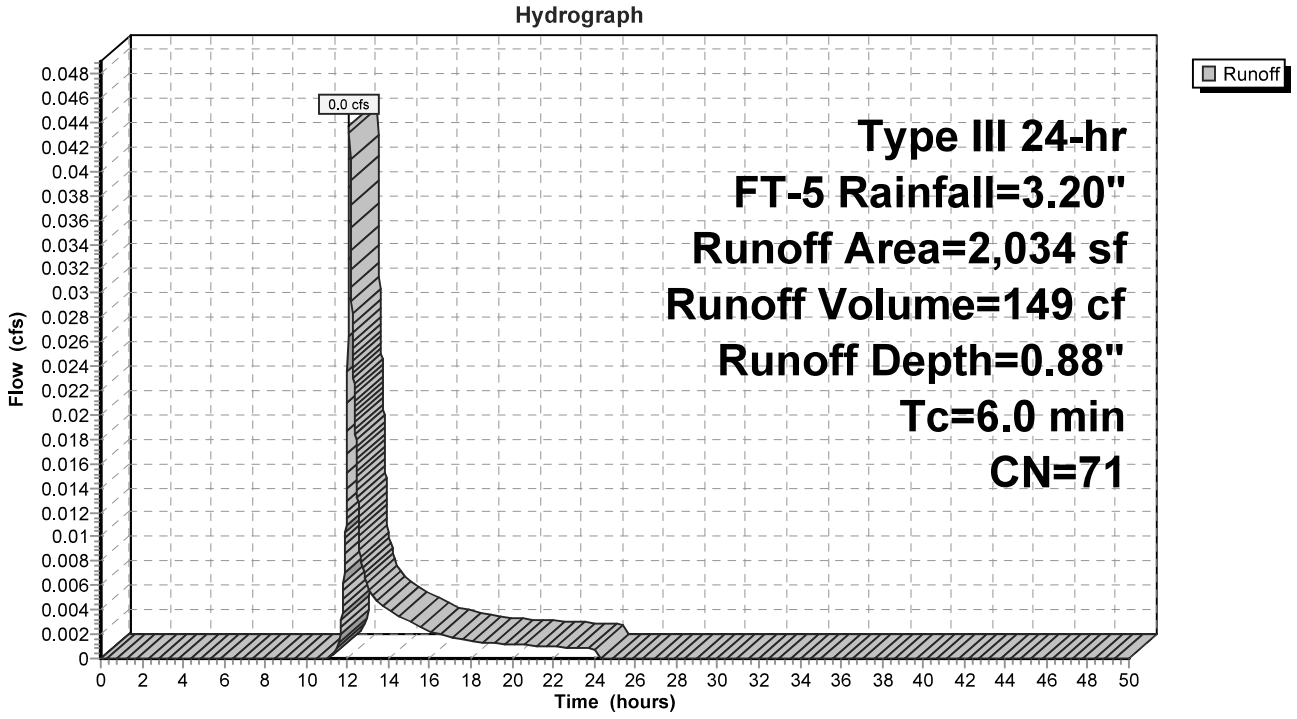
Runoff = 0.0 cfs @ 12.10 hrs, Volume= 149 cf, Depth= 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr FT-5 Rainfall=3.20"

	Area (sf)	CN	Description
*	1,096	98	Prop Walkway
*	938	39	Prop Grass, A
	2,034	71	Weighted Average
	938		46.12% Pervious Area
	1,096		53.88% Impervious Area

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

Subcatchment 1.12S:



Summary for Pond 1.12P: Filter Trench 5

Inflow Area = 2,034 sf, 53.88% Impervious, Inflow Depth = 0.88" for FT-5 event
Inflow = 0.0 cfs @ 12.10 hrs, Volume= 149 cf
Outflow = 0.0 cfs @ 21.27 hrs, Volume= 76 cf, Atten= 98%, Lag= 550.6 min
Primary = 0.0 cfs @ 21.27 hrs, Volume= 76 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 74.38' @ 21.27 hrs Surf.Area= 510 sf Storage= 113 cf

Plug-Flow detention time= 791.7 min calculated for 76 cf (51% of inflow)
Center-of-Mass det. time= 656.5 min (1,528.7 - 872.2)

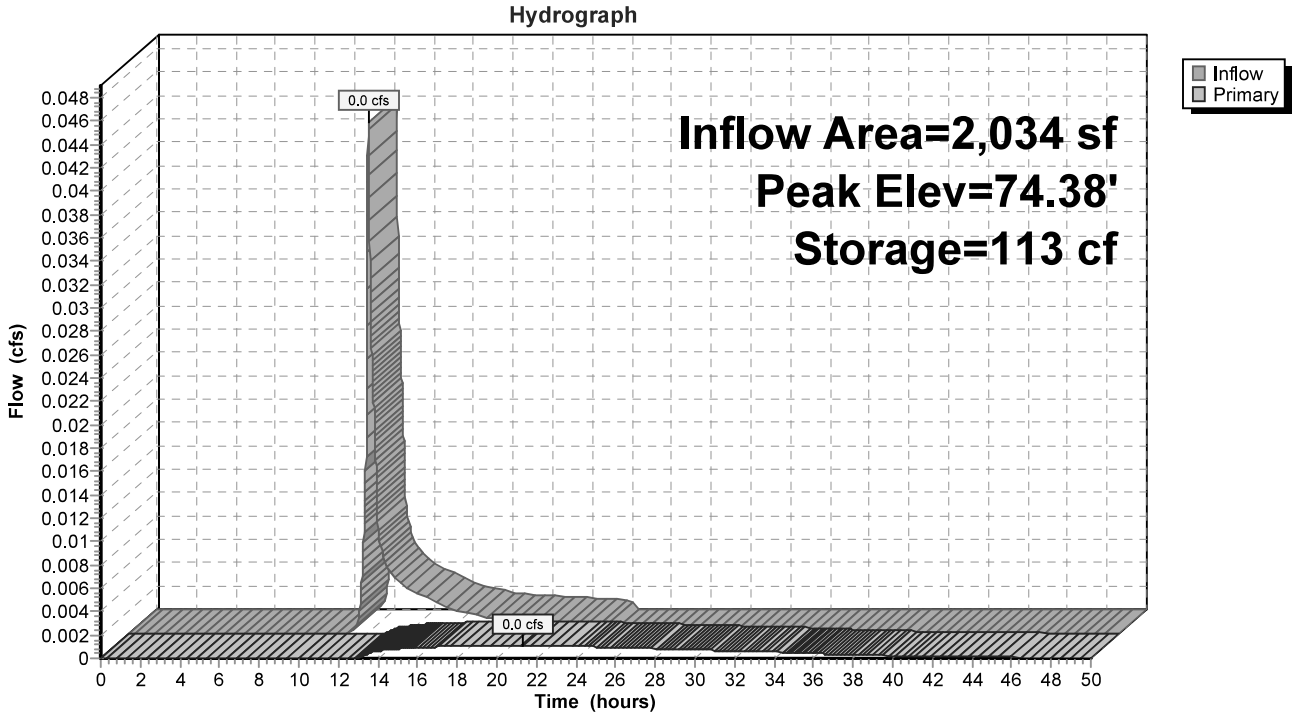
Volume	Invert	Avail.Storage	Storage Description
#1	73.82'	1,094 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.82	510	0.0	0	0
73.83	510	40.0	2	2
74.82	510	40.0	202	204
74.83	510	20.0	1	205
75.82	510	20.0	101	306
75.83	510	10.0	1	307
75.99	510	10.0	8	315
76.00	510	40.0	2	317
77.99	510	40.0	406	723
78.00	510	40.0	2	725
78.24	510	40.0	49	774
78.25	510	100.0	5	779
78.75	750	100.0	315	1,094

Device	Routing	Invert	Outlet Devices
#1	Primary	74.17'	**6.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 74.17' / 74.15' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Device 1	74.17'	**0.3" Vert. Orifice/Grate** C= 0.600
#3	Device 1	78.35'	**1.0" W x 7.0" H Vert. Orifice/Grate X 27.00** C= 0.600

Primary OutFlow Max=0.0 cfs @ 21.27 hrs HW=74.38' (Free Discharge)
└**1=Culvert** (Passes 0.0 cfs of 0.1 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.0 cfs @ 2.11 fps)
  └**3=Orifice/Grate** (Controls 0.0 cfs)

Pond 1.12P: Filter Trench 5



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Treatment Calculations for Proposed Filtration Trench 6 FT-6 1.5S

Water Quality Volume Calculation

Total Impervious Area	1,716	SF		
Total Landscaped Area	2,156	SF		

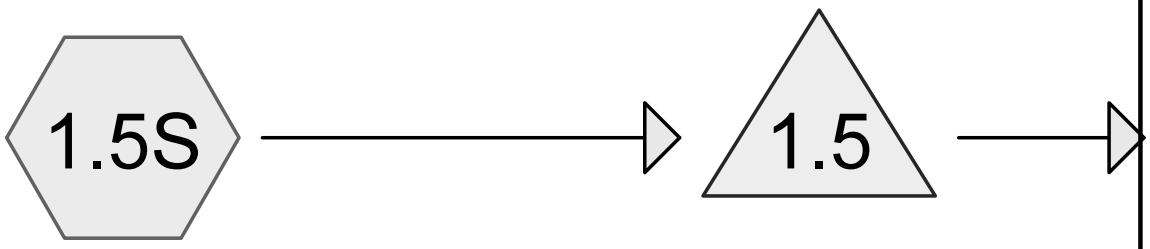
WQV Required = (1.25" x Impervious Area + 0.4" X Landscaped Area)

WQV Required	250.6	CF		
Length of Trench	60.0	FT		
Width of Trench	5.0	FT		
Depth of Stone	24.0	IN	40%	porosity
Depth of Sand Media	12.0	IN	25%	porosity

*WQV Provided = Area of Trench x (Depth of Stone x Stone Porosity + Depth of Sand x Sand Porosity)

Total WQV Provided	315.0	CF

*The stone reservoir volume for the drip edge filter was designed to provide the storage required to convey the water quality storm (storm that generates 1.25" of runoff over the roof) through the filter media under the stone, which is naturally sandy and well-drained.



Filter Trench 6

Subcat Reach Pond Link

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Summary for Subcatchment 1.5S:

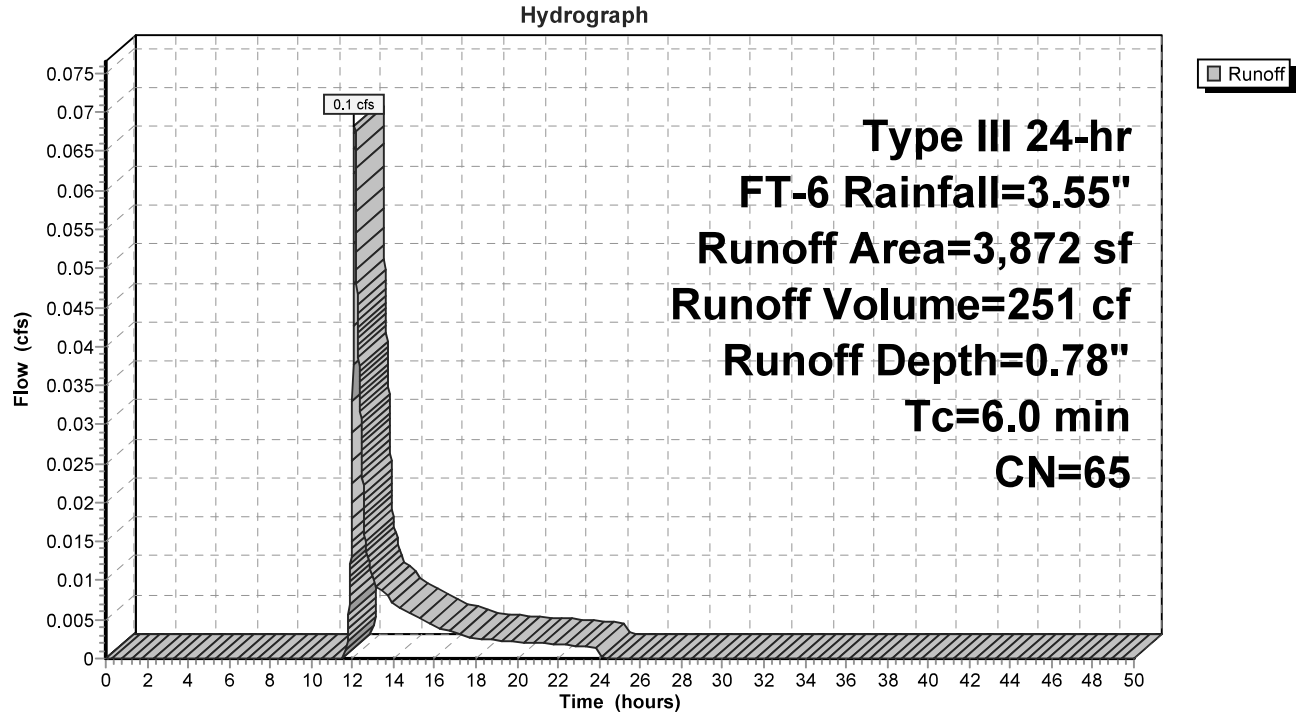
Runoff = 0.1 cfs @ 12.10 hrs, Volume= 251 cf, Depth= 0.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr FT-6 Rainfall=3.55"

	Area (sf)	CN	Description
*	1,716	98	Prop Walkway
*	2,156	39	Prop Grass, A
	3,872	65	Weighted Average
	2,156		55.68% Pervious Area
	1,716		44.32% Impervious Area

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

Subcatchment 1.5S:



Summary for Pond 1.5: Filter Trench 6

Inflow Area = 3,872 sf, 44.32% Impervious, Inflow Depth = 0.78" for FT-6 event
Inflow = 0.1 cfs @ 12.10 hrs, Volume= 251 cf
Outflow = 0.0 cfs @ 17.52 hrs, Volume= 153 cf, Atten= 96%, Lag= 325.1 min
Primary = 0.0 cfs @ 17.52 hrs, Volume= 153 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 74.14' @ 17.52 hrs Surf.Area= 700 sf Storage= 161 cf

Plug-Flow detention time= 531.8 min calculated for 153 cf (61% of inflow)
Center-of-Mass det. time= 405.0 min (1,290.8 - 885.8)

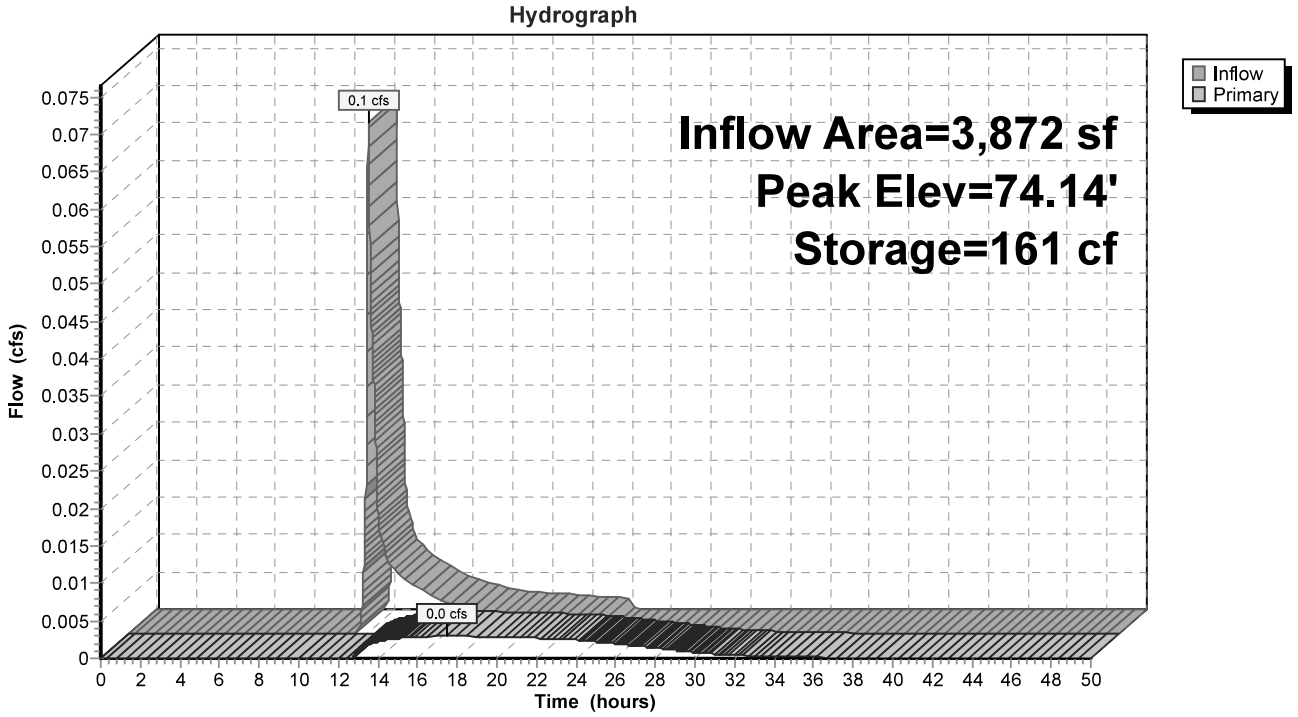
Volume	Invert	Avail.Storage	Storage Description
#1	73.57'	1,128 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.57	700	0.0	0	0
73.58	700	40.0	3	3
74.57	700	40.0	277	280
74.58	700	20.0	1	281
75.57	700	20.0	139	420
75.58	700	10.0	1	421
75.74	700	10.0	11	432
75.75	700	40.0	3	435
77.74	700	40.0	557	992
77.75	700	40.0	3	995
77.99	700	40.0	67	1,062
78.10	500	100.0	66	1,128

Device	Routing	Invert	Outlet Devices
#1	Primary	73.92'	**8.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 73.92' / 73.90' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#2	Device 1	73.92'	**0.5" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.0 cfs @ 17.52 hrs HW=74.14' (Free Discharge)
↑—**1=Culvert** (Passes 0.0 cfs of 0.1 cfs potential flow)
↑—**2=Orifice/Grate** (Orifice Controls 0.0 cfs @ 2.17 fps)

Pond 1.5: Filter Trench 6



SEBAGO TECHNICS, INC.
75 John Roberts Road Suite 4A
South Portland, Maine 04106
Tel. (207) 200-2100

JOB			
SHEET NO.	1	OF	4
CALCULATED BY		DATE	
FILE NAME		PRNT DATE	9/13/2019

Treatment Calculations for Proposed Infiltration Trench 1 IT-1 1.7S

Water Quality Volume Calculation

Total Impervious Area	2,749	SF		
Total Landscaped Area	3,943	SF		

WQV Required = (1.25" x Impervious Area + 0.4" X Landscaped Area)

WQV Required	417.8	CF		
Length of Trench	202.0	FT		
Width of Trench	3.0	FT		
Depth of Stone	24.0	IN	40%	porosity
Depth of Sand Media	12.0	IN	25%	porosity

*WQV Provided = Area of Trench x (Depth of Stone x Stone Porosity + Depth of Sand x Sand Porosity)

Total WQV Provided	636.3	CF

*The stone reservoir volume for the drip edge filter was designed to provide the storage required to convey the water quality storm (storm that generates 1.25" of runoff over the roof) through the filter media under the stone, which is naturally sandy and well-drained.

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75 John Roberts Road Suite 4A
South Portland, Maine 04106
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JOB			
SHEET NO.	1	OF	4
CALCULATED BY		DATE	
FILE NAME		PRNT DATE	9/13/2019

Treatment Calculations for Proposed Infiltration Trench 2 IT-2 1.9S

Water Quality Volume Calculation

Total Impervious Area	3,406	SF		
Total Landscaped Area	1,775	SF		

WQV Required = (1.25" x Impervious Area + 0.4" X Landscaped Area)

WQV Required	414.0	CF		
Length of Trench	202.0	FT		
Width of Trench	3.0	FT		
Depth of Stone	24.0	IN	40%	porosity
Depth of Sand Media	12.0	IN	25%	porosity

*WQV Provided = Area of Trench x (Depth of Stone x Stone Porosity + Depth of Sand x Sand Porosity)

Total WQV Provided	636.3	CF

*The stone reservoir volume for the drip edge filter was designed to provide the storage required to convey the water quality storm (storm that generates 1.25" of runoff over the roof) through the filter media under the stone, which is naturally sandy and well-drained.

SEBAGO TECHNICS, INC.
75 John Roberts Road, Suite 4A
South Portland, ME 04106
(207) 200-2100 FAX (207) 856-2206

JOB			
SHEET NO.	1	OF	1
CALCULATED BY		DATE	
CHECKED BY			
FILE NAME		PRINT DATE	9/13/2019

MDEP Site Location of Development Submission

Tree Box Filter Calculations:

	Size	Watershed Size (Ac.)	Allowable Watershed Area (Ac.)
Tree Box Filter 1	4'X6'	0.12	0.15
Tree Box Filter 2	6'x8'	0.24	0.30

Note: Tree Box Filters are sized in accordance with Chapter 7.5 of the Maine Department of Environmental Protection BMPs Technical Design Manual, latest revision and per MaineDEP proprietary system approval letter dated Feb 2, 2017 (copy of letter attached)

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PAUL R. LEPAGE
GOVERNOR

PAUL MERCER
COMMISSIONER

February 2, 2017

Derek Berg
Filterra Bioretention Systems
Contech Engineered Solutions LLC
71 US Route 1, Suite F
Scarborough, ME 04074

Dear Mr. Berg:

This letter replaces the April 19, 2016 approval from the Department of Environmental Protection (Department) that authorized the use of the Filterra Bioretention System. The Filterra Bioretention System (FBS) was permitted for use by the Department of Environmental Protection (Department) on November 12, 2009, as part of a stormwater treatment train that included the use a StormTech Isolator Row following the structure as an approved alternative to the General Standards (Section 4.C) of the Stormwater Management Rules (Chapter 500). Based on new testing data, the installation of FBS structures without the StormTech Isolator Row was approved on an interim use by the Department on January 21, 2015.

The FBS structures sizing criteria must be revised based on data you provided of an appropriate rainfall intensity rate that would allow for the full treatment of 90% of an average annual runoff volume. Therefore, the Department will review and approve, on a case-by-case basis, the use of the FBS when the system is sized, installed and maintained in accordance with the following provisions:

1. The structure may be a standard concrete box or a soft shell system that is filled with the Filterra engineered filter media, provided it is sized to meet the requirements of the General Standards (Section 4.C) and is installed, operated and maintained in accordance with the manufacturer's specifications.

2. The FBS must be sized in accordance with the manufacturer's standard New England testing results and revised sizing guidelines outlined in the following table to treat 90% of the annual runoff volume:

AUGUSTA
17 STATE HOUSE STATION
AUGUSTA, MAINE 04333-0017
(207) 287-7688 FAX: (207) 287-7826

BANGOR
106 HOGAN ROAD, SUITE 6
BANGOR, MAINE 04401
(207) 941-4570 FAX: (207) 941-4584

PORTLAND
312 CANCO ROAD
PORTLAND, MAINE 04103
(207) 822-6300 FAX: (207) 822-6303

PRESQUE ISLE
1235 CENTRAL DRIVE, SKYWAY PARK
PRESQUE ISLE, MAINE 04769
(207) 764-0477 FAX: (207) 760-3143

website: www.maine.gov/dep

Filterra Model Number	*Area in Acres*	*Treatment Flow Rate at 140"/hr (cfs)*	*Outlet Pipe Size*
4x4	0.100	0.05	4"
4x6	0.151	0.08	4"
4x8	0.202	0.10	4"
6x6	0.227	0.12	4"
6x8 / 4x12	0.301	0.16	4"
6x10	0.378	0.19	6"
6x12	0.454	0.23	6"
7x13	0.573	0.29	6"

Alternatively, the runoff from the entire contributing drainage area, including all pervious areas, may be modelled to provide treatment of the 0.95" storm at the approved hydraulic loading rate of 140" per hour.

3. When designed with the standard curb inlet design, the FBS must be configured "off-line" with the surface elevation at the FBS unit being up gradient of an overflow inlet. When designed with the grated inlet design, the FBS must incorporate an internal bypass and will not require an overflow inlet. The applicant must demonstrate that the proposed design meets all the manufacturer's specifications prior to submission for Department approval. Review and approval of the proposed design by the manufacturer will be sufficient to demonstrate conformance with the manufacturer's specifications.

4. The treated flow and bypass flow must be combined and directed to a detention system/structure that will store the water quality/channel protection volume (WQv) consisting of the first 1.0 inch of runoff from impervious areas and 0.4 inch of runoff from lawns and landscaped areas. An external outlet control structure must control the flow out of the system and the WQv must be detained between 24 hours and 48 hours.

5. When a boxed structure is proposed, the FBS must be delivered to the site with the engineered filter media and plumbing fully installed. The concrete box must be sealed to prevent debris and sediment from entering the system during construction. The activation of the FBS and opening of the protective mesh cover, installation of plant(s) and mulch layers as necessary, can be performed only by the supplier (Contech or its authorized dealer). The activation process must not commence until the project site is fully stabilized and cleaned (i.e., full landscaping, grass cover, final paving and street sweeping completed), minimizing the risk of construction materials contaminating the FBS system.

6. When a soft shell structure is proposed, the FBS(s) must be built on site and must include all the components of a boxed structure. The FBS must be designed per the manufacturer's specifications and must be installed on-site by the manufacturer's representative.

7. Prior to construction, a five-year binding inspection and maintenance contract must be provided for review and approval by the Department, and must be renewed before contract expiration. The contract will be with a professional with knowledge of erosion and stormwater control, including a detailed working knowledge of the proposed system. The first year's maintenance must be provided by the manufacturer to ensure that the system is operating according to the established specifications.

8. The overall stormwater management design must meet all Department criteria and sizing specifications and shall be reviewed and approved by the Department prior to use.

9. Each project must be reviewed and approved by the manufacturer for proposed use, layout and sizing of the system and for conformance with their design specifications. The system must be installed under the manufacturer's representative supervision.

10. This approval is conditional to on-the-ground experience confirming that the FBS's pollutant removal efficiency and sizing are appropriate. The "permit shield" provision (Section 14) of the Chapter 500 rules will apply, and the Department will not require the replacement of the system if, with proper maintenance, pollutant removals do not satisfy the General Standard Best Management Practices.

We look forward to working with you as these stormwater management structures are installed on new projects. Questions concerning this decision should be directed to Jeff Dennis at (207) 215-6376.

Sincerely,

Mark R Bergeron

Mark Bergeron, P.E.
Director
Bureau of Land Resources

cc: Don Witherill, Maine DEP

Summary for Subcatchment 1S: 4x6 Filterra

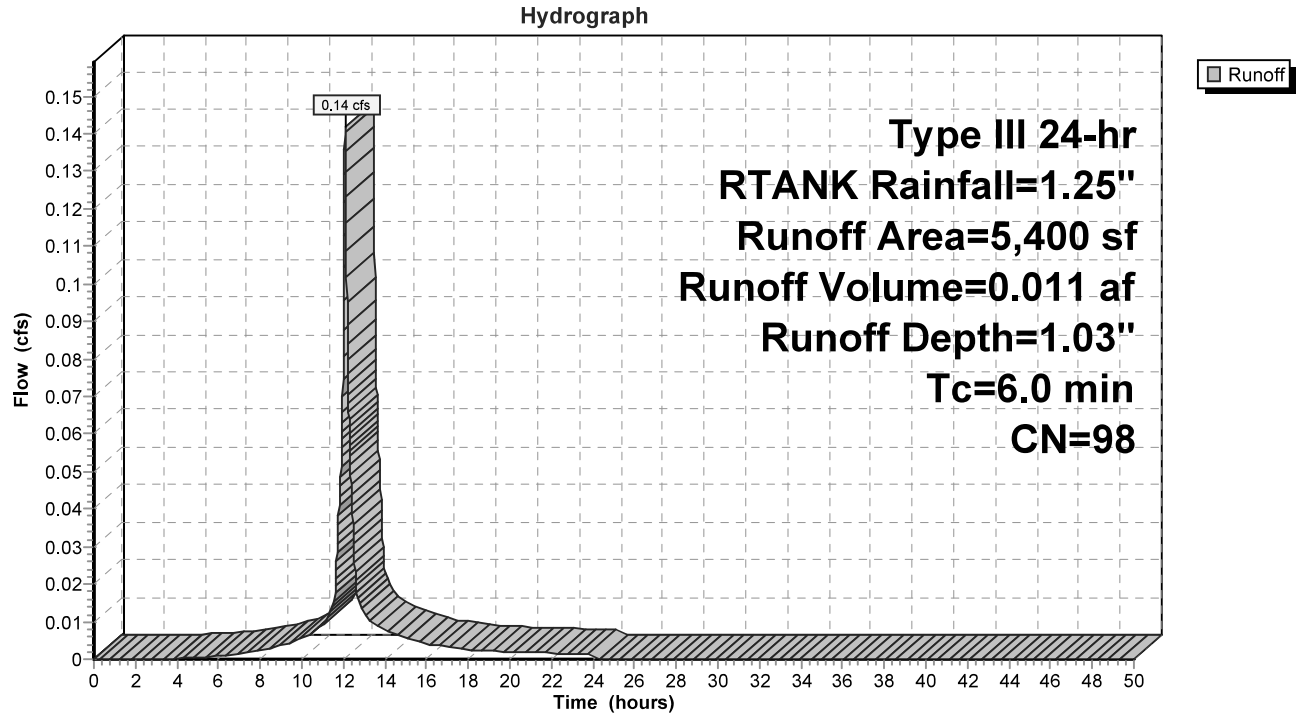
Runoff = 0.14 cfs @ 12.08 hrs, Volume= 0.011 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr RTANK Rainfall=1.25"

	Area (sf)	CN	Description
*	5,400	98	
	5,400		100.00% Impervious Area

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

Subcatchment 1S: 4x6 Filterra



Summary for Subcatchment 2S: 6x10 Filterra bypass

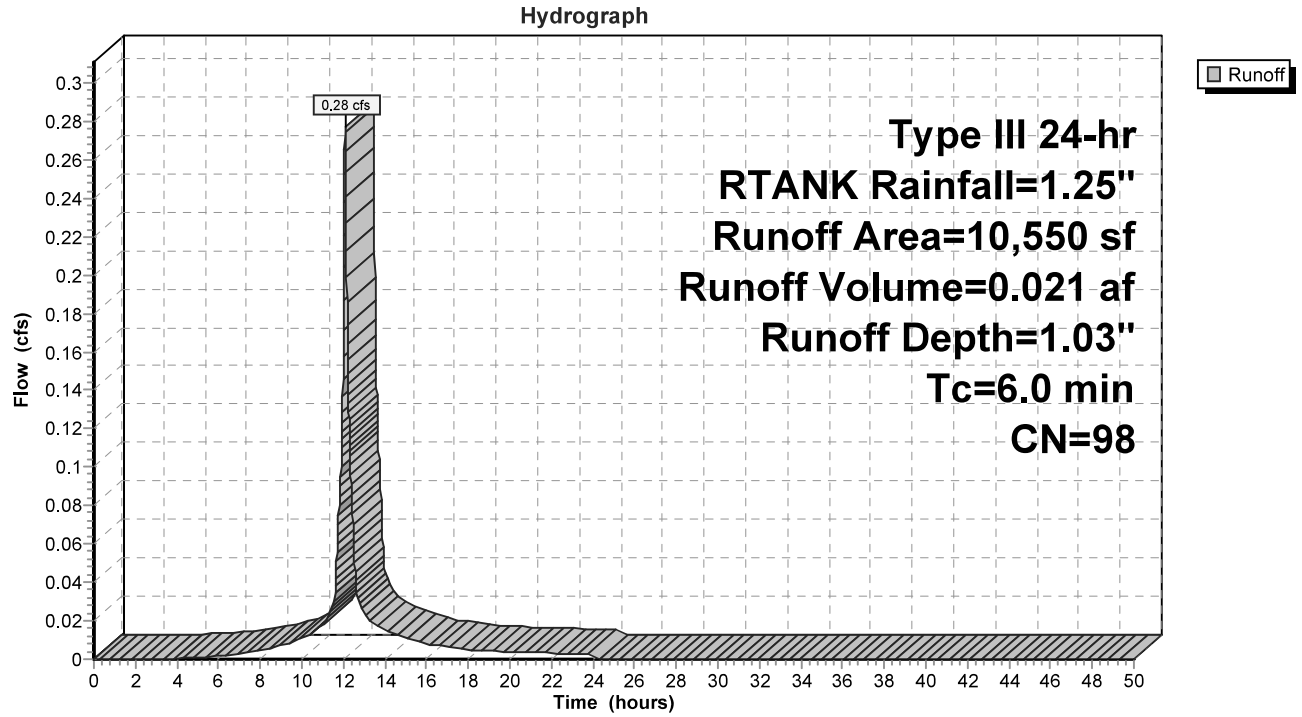
Runoff = 0.28 cfs @ 12.08 hrs, Volume= 0.021 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr RTANK Rainfall=1.25"

	Area (sf)	CN	Description
*	10,550	98	
	10,550		100.00% Impervious Area

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

Subcatchment 2S: 6x10 Filterra bypass



Summary for Pond 1P: R Tank A

Inflow Area = 0.124 ac,100.00% Impervious, Inflow Depth = 1.03" for RTANK event
Inflow = 0.14 cfs @ 12.08 hrs, Volume= 0.011 af
Outflow = 0.01 cfs @ 13.67 hrs, Volume= 0.011 af, Atten= 94%, Lag= 94.9 min
Primary = 0.01 cfs @ 13.67 hrs, Volume= 0.011 af

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 75.89' @ 13.67 hrs Surf.Area= 218 sf Storage= 247 cf

Plug-Flow detention time= 323.3 min calculated for 0.011 af (100% of inflow)
Center-of-Mass det. time= 323.4 min (1,104.1 - 780.7)

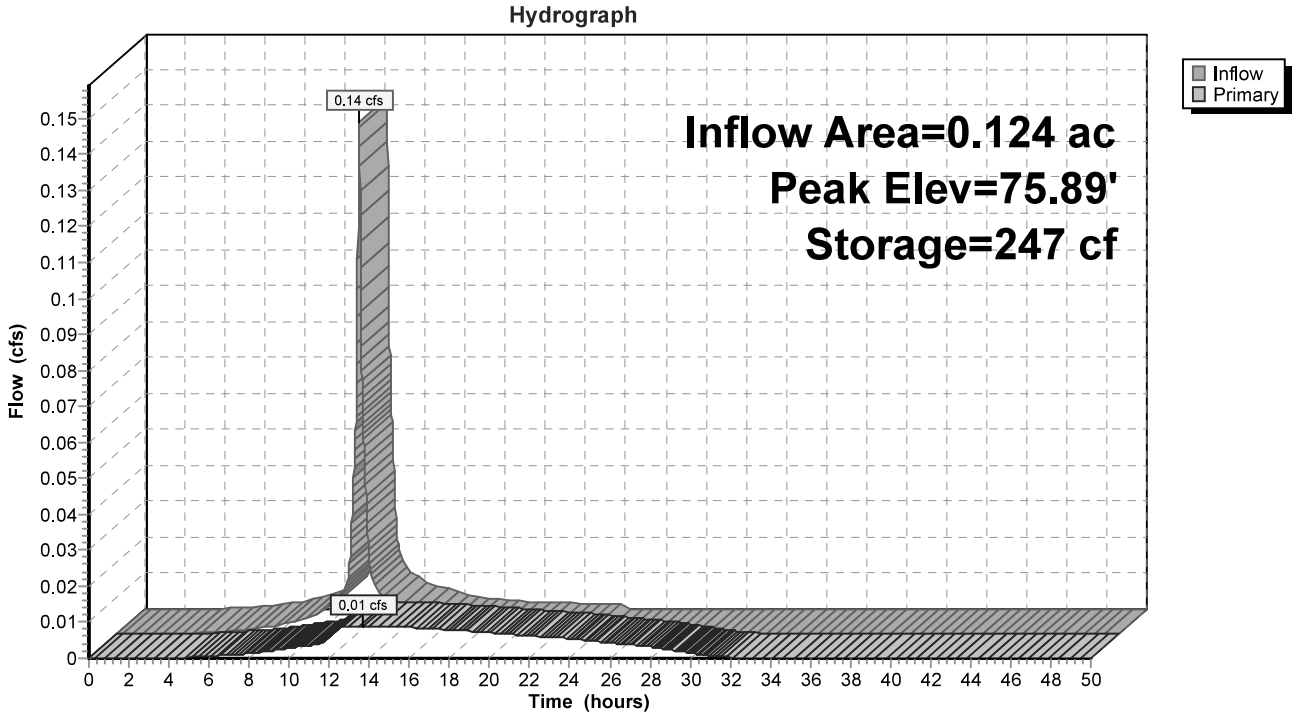
Volume	Invert	Avail.Storage	Storage Description
#1A	74.00'	257 cf	**7.94'W x 27.46'L x 4.20'H Field A** 916 cf Overall - 273 cf Embedded = 643 cf x 40.0% Voids
#2A	74.25'	259 cf	**ACF R-Tank SD 4** x 30 Inside #1 Inside= 15.7"W x 35.4"H => 3.68 sf x 2.35'L = 8.6 cf Outside= 15.7"W x 35.4"H => 3.88 sf x 2.35'L = 9.1 cf 30 Chambers in 3 Rows
		516 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	73.90'	**12.0" Round Culvert** L= 65.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 73.90' / 73.35' S= 0.0085 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	74.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	74.00'	**0.5" Vert. Orifice/Grate** C= 0.600
#4	Device 1	76.00'	**12.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 76.00' / 75.90' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.01 cfs @ 13.67 hrs HW=75.89' (Free Discharge)
└**1=Culvert** (Passes 0.01 cfs of 4.34 cfs potential flow)
  ├**2=Orifice/Grate** (Passes 0.01 cfs of 1.21 cfs potential flow)
  │ └**3=Orifice/Grate** (Orifice Controls 0.01 cfs @ 6.58 fps)
  └**4=Culvert** (Controls 0.00 cfs)

Pond 1P: R Tank A



Summary for Pond 2P: R Tank B

Inflow Area = 0.242 ac,100.00% Impervious, Inflow Depth = 1.03" for RTANK event
Inflow = 0.28 cfs @ 12.08 hrs, Volume= 0.021 af
Outflow = 0.01 cfs @ 14.82 hrs, Volume= 0.021 af, Atten= 96%, Lag= 164.0 min
Primary = 0.01 cfs @ 14.82 hrs, Volume= 0.021 af

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 74.40' @ 14.82 hrs Surf.Area= 470 sf Storage= 549 cf

Plug-Flow detention time= 537.3 min calculated for 0.021 af (100% of inflow)
Center-of-Mass det. time= 537.4 min (1,318.2 - 780.7)

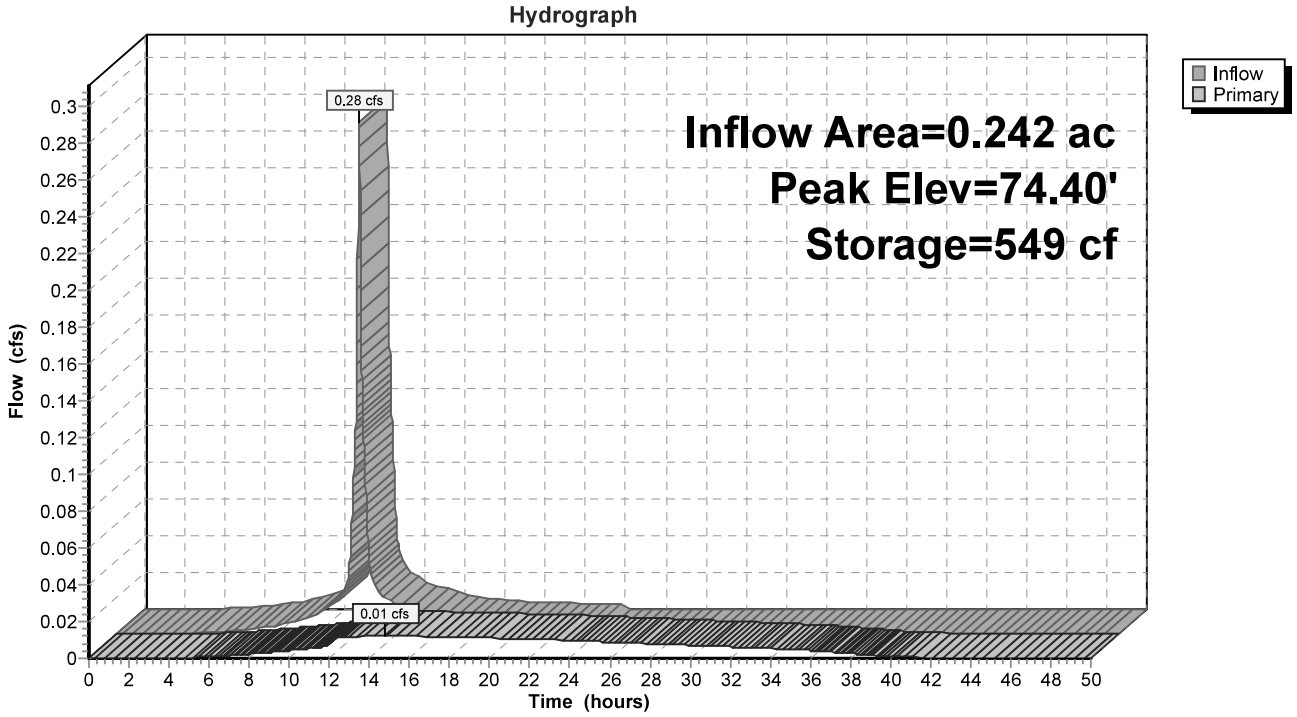
Volume	Invert	Avail.Storage	Storage Description
#1A	72.75'	380 cf	**17.12'W x 27.46'L x 3.48'H Field A** 1,637 cf Overall - 687 cf Embedded = 950 cf x 40.0% Voids
#2A	73.00'	652 cf	**ACF R-Tank SD 3** x 100 Inside #1 Inside= 15.7"W x 26.8"H => 2.78 sf x 2.35'L = 6.5 cf Outside= 15.7"W x 26.8"H => 2.93 sf x 2.35'L = 6.9 cf 100 Chambers in 10 Rows
		1,032 cf	Total Available Storage

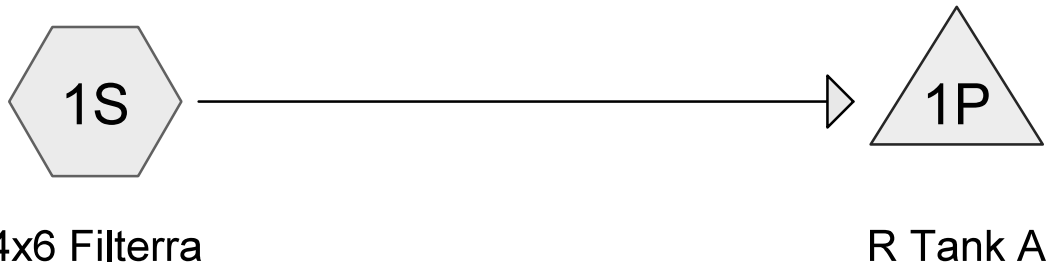
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	72.65'	**12.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 72.65' / 72.47' S= 0.0180 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	72.75'	**6.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	72.75'	**0.6" Vert. Orifice/Grate** C= 0.600
#4	Device 1	75.00'	**12.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 75.00' / 74.90' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.01 cfs @ 14.82 hrs HW=74.40' (Free Discharge)
└**1=Culvert** (Passes 0.01 cfs of 4.23 cfs potential flow)
  ├**2=Orifice/Grate** (Passes 0.01 cfs of 1.12 cfs potential flow)
  │ └**3=Orifice/Grate** (Orifice Controls 0.01 cfs @ 6.14 fps)
  └**4=Culvert** (Controls 0.00 cfs)

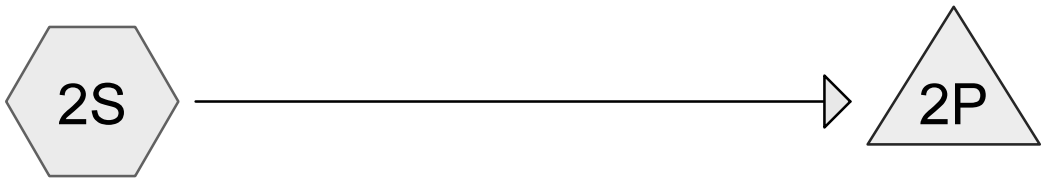
Pond 2P: R Tank B





4x6 Filterra

R Tank A



6x10 Filterra bypass

R Tank B

Subcat Reach Pond Link

Routing Diagram for rtank
Prepared by Sebago Technics, Printed 9/13/2019
HydroCAD® 10.00-24 s/n 01856 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.366	98	(1S, 2S)
0.366	**98**	**TOTAL AREA**

Summary for Subcatchment 1S: 4x6 Filterra

Runoff = 0.37 cfs @ 12.08 hrs, Volume= 0.030 af, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 -YEAR Rainfall=3.10"

	Area (sf)	CN	Description
*	5,400	98	
	5,400		100.00% Impervious Area

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

Summary for Subcatchment 2S: 6x10 Filterra bypass

Runoff = 0.73 cfs @ 12.08 hrs, Volume= 0.058 af, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 -YEAR Rainfall=3.10"

	Area (sf)	CN	Description
*	10,550	98	
	10,550		100.00% Impervious Area

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

Summary for Pond 1P: R Tank A

Inflow Area = 0.124 ac,100.00% Impervious, Inflow Depth = 2.87" for 2 -YEAR event
Inflow = 0.37 cfs @ 12.08 hrs, Volume= 0.030 af
Outflow = 0.36 cfs @ 12.10 hrs, Volume= 0.030 af, Atten= 3%, Lag= 1.2 min
Primary = 0.36 cfs @ 12.10 hrs, Volume= 0.030 af

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 76.32' @ 12.10 hrs Surf.Area= 218 sf Storage= 308 cf

Plug-Flow detention time= 195.0 min calculated for 0.030 af (100% of inflow)
Center-of-Mass det. time= 195.1 min (952.2 - 757.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	74.00'	257 cf	**7.94'W x 27.46'L x 4.20'H Field A** 916 cf Overall - 273 cf Embedded = 643 cf x 40.0% Voids
#2A	74.25'	259 cf	**ACF R-Tank SD 4** x 30 Inside #1 Inside= 15.7"W x 35.4"H => 3.68 sf x 2.35'L = 8.6 cf Outside= 15.7"W x 35.4"H => 3.88 sf x 2.35'L = 9.1 cf 30 Chambers in 3 Rows

516 cf Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	73.90'	**12.0" Round Culvert** L= 65.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 73.90' / 73.35' S= 0.0085 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	74.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	74.00'	**0.5" Vert. Orifice/Grate** C= 0.600
#4	Device 1	76.00'	**12.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 76.00' / 75.90' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.36 cfs @ 12.10 hrs HW=76.32' (Free Discharge)
└**1=Culvert** (Passes 0.36 cfs of 4.92 cfs potential flow)
  ├**2=Orifice/Grate** (Passes 0.01 cfs of 1.36 cfs potential flow)
  │ └**3=Orifice/Grate** (Orifice Controls 0.01 cfs @ 7.31 fps)
  └**4=Culvert** (Barrel Controls 0.35 cfs @ 2.38 fps)

Summary for Pond 2P: R Tank B

Inflow Area = 0.242 ac,100.00% Impervious, Inflow Depth = 2.87" for 2 -YEAR event
Inflow = 0.73 cfs @ 12.08 hrs, Volume= 0.058 af
Outflow = 0.68 cfs @ 12.11 hrs, Volume= 0.058 af, Atten= 6%, Lag= 1.8 min
Primary = 0.68 cfs @ 12.11 hrs, Volume= 0.058 af

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 75.47' @ 12.11 hrs Surf.Area= 470 sf Storage= 889 cf

Plug-Flow detention time= 389.0 min calculated for 0.058 af (100% of inflow)
Center-of-Mass det. time= 388.4 min (1,145.5 - 757.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	72.75'	380 cf	**17.12'W x 27.46'L x 3.48'H Field A** 1,637 cf Overall - 687 cf Embedded = 950 cf x 40.0% Voids
#2A	73.00'	652 cf	**ACF R-Tank SD 3** x 100 Inside #1 Inside= 15.7"W x 26.8"H => 2.78 sf x 2.35'L = 6.5 cf Outside= 15.7"W x 26.8"H => 2.93 sf x 2.35'L = 6.9 cf 100 Chambers in 10 Rows
		1,032 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	72.65'	**12.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 72.65' / 72.47' S= 0.0180 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

#2	Device 1	72.75'	**6.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	72.75'	**0.6" Vert. Orifice/Grate** C= 0.600
#4	Device 1	75.00'	**12.0" Round Culvert**
			L= 10.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 75.00' / 74.90' S= 0.0100 '/' Cc= 0.900
			n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.68 cfs @ 12.11 hrs HW=75.47' (Free Discharge)
└─**1=Culvert** (Passes 0.68 cfs of 5.76 cfs potential flow)
  ├─**2=Orifice/Grate** (Passes 0.02 cfs of 1.48 cfs potential flow)
  │ └─**3=Orifice/Grate** (Orifice Controls 0.02 cfs @ 7.90 fps)
  └─**4=Culvert** (Barrel Controls 0.67 cfs @ 2.73 fps)

Summary for Subcatchment 1S: 4x6 Filterra

Runoff = 0.56 cfs @ 12.08 hrs, Volume= 0.045 af, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 -YEAR Rainfall=4.60"

Area (sf)	CN	Description
* 5,400	98	
5,400		100.00% Impervious Area

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

Summary for Subcatchment 2S: 6x10 Filterra bypass

Runoff = 1.09 cfs @ 12.08 hrs, Volume= 0.088 af, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 -YEAR Rainfall=4.60"

Area (sf)	CN	Description
* 10,550	98	
10,550		100.00% Impervious Area

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

Summary for Pond 1P: R Tank A

Inflow Area = 0.124 ac,100.00% Impervious, Inflow Depth = 4.36" for 10 -YEAR event
Inflow = 0.56 cfs @ 12.08 hrs, Volume= 0.045 af
Outflow = 0.55 cfs @ 12.10 hrs, Volume= 0.045 af, Atten= 2%, Lag= 1.0 min
Primary = 0.55 cfs @ 12.10 hrs, Volume= 0.045 af

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 76.41' @ 12.10 hrs Surf.Area= 218 sf Storage= 320 cf

Plug-Flow detention time= 155.9 min calculated for 0.045 af (100% of inflow)
Center-of-Mass det. time= 155.8 min (905.2 - 749.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	74.00'	257 cf	**7.94'W x 27.46'L x 4.20'H Field A** 916 cf Overall - 273 cf Embedded = 643 cf x 40.0% Voids
#2A	74.25'	259 cf	**ACF R-Tank SD 4** x 30 Inside #1 Inside= 15.7"W x 35.4"H => 3.68 sf x 2.35'L = 8.6 cf Outside= 15.7"W x 35.4"H => 3.88 sf x 2.35'L = 9.1 cf 30 Chambers in 3 Rows

516 cf Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	73.90'	**12.0" Round Culvert** L= 65.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 73.90' / 73.35' S= 0.0085 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	74.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	74.00'	**0.5" Vert. Orifice/Grate** C= 0.600
#4	Device 1	76.00'	**12.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 76.00' / 75.90' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.55 cfs @ 12.10 hrs HW=76.41' (Free Discharge)
- **1=Culvert** (Passes 0.55 cfs of 5.03 cfs potential flow)
  - **2=Orifice/Grate** (Passes 0.01 cfs of 1.39 cfs potential flow)
    - **3=Orifice/Grate** (Orifice Controls 0.01 cfs @ 7.44 fps)
  - **4=Culvert** (Barrel Controls 0.53 cfs @ 2.60 fps)

Summary for Pond 2P: R Tank B

Inflow Area = 0.242 ac,100.00% Impervious, Inflow Depth = 4.36" for 10 -YEAR event
Inflow = 1.09 cfs @ 12.08 hrs, Volume= 0.088 af
Outflow = 1.06 cfs @ 12.10 hrs, Volume= 0.088 af, Atten= 2%, Lag= 1.1 min
Primary = 1.06 cfs @ 12.10 hrs, Volume= 0.088 af

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 75.61' @ 12.10 hrs Surf.Area= 470 sf Storage= 915 cf

Plug-Flow detention time= 291.1 min calculated for 0.088 af (100% of inflow)
Center-of-Mass det. time= 290.5 min (1,040.0 - 749.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	72.75'	380 cf	**17.12'W x 27.46'L x 3.48'H Field A** 1,637 cf Overall - 687 cf Embedded = 950 cf x 40.0% Voids
#2A	73.00'	652 cf	**ACF R-Tank SD 3** x 100 Inside #1 Inside= 15.7"W x 26.8"H => 2.78 sf x 2.35'L = 6.5 cf Outside= 15.7"W x 26.8"H => 2.93 sf x 2.35'L = 6.9 cf 100 Chambers in 10 Rows
		1,032 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	72.65'	**12.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 72.65' / 72.47' S= 0.0180 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

#2	Device 1	72.75'	**6.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	72.75'	**0.6" Vert. Orifice/Grate** C= 0.600
#4	Device 1	75.00'	**12.0" Round Culvert**
			L= 10.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 75.00' / 74.90' S= 0.0100 '/' Cc= 0.900
			n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.06 cfs @ 12.10 hrs HW=75.61' (Free Discharge)
└─**1=Culvert** (Passes 1.06 cfs of 5.93 cfs potential flow)
  ├─**2=Orifice/Grate** (Passes 0.02 cfs of 1.53 cfs potential flow)
  │ └─**3=Orifice/Grate** (Orifice Controls 0.02 cfs @ 8.10 fps)
  └─**4=Culvert** (Barrel Controls 1.05 cfs @ 3.01 fps)

Summary for Subcatchment 1S: 4x6 Filterra

Runoff = 0.70 cfs @ 12.08 hrs, Volume= 0.057 af, Depth= 5.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

	Area (sf)	CN	Description
*	5,400	98	
	5,400		100.00% Impervious Area

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

Summary for Subcatchment 2S: 6x10 Filterra bypass

Runoff = 1.38 cfs @ 12.08 hrs, Volume= 0.112 af, Depth= 5.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

	Area (sf)	CN	Description
*	10,550	98	
	10,550		100.00% Impervious Area

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

Summary for Pond 1P: R Tank A

Inflow Area = 0.124 ac,100.00% Impervious, Inflow Depth = 5.56" for 25-YEAR event
Inflow = 0.70 cfs @ 12.08 hrs, Volume= 0.057 af
Outflow = 0.69 cfs @ 12.10 hrs, Volume= 0.057 af, Atten= 2%, Lag= 0.9 min
Primary = 0.69 cfs @ 12.10 hrs, Volume= 0.057 af

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 76.47' @ 12.10 hrs Surf.Area= 218 sf Storage= 328 cf

Plug-Flow detention time= 135.0 min calculated for 0.057 af (100% of inflow)
Center-of-Mass det. time= 135.2 min (880.8 - 745.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	74.00'	257 cf	**7.94'W x 27.46'L x 4.20'H Field A** 916 cf Overall - 273 cf Embedded = 643 cf x 40.0% Voids
#2A	74.25'	259 cf	**ACF R-Tank SD 4** x 30 Inside #1 Inside= 15.7"W x 35.4"H => 3.68 sf x 2.35'L = 8.6 cf Outside= 15.7"W x 35.4"H => 3.88 sf x 2.35'L = 9.1 cf 30 Chambers in 3 Rows

516 cf Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	73.90'	**12.0" Round Culvert** L= 65.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 73.90' / 73.35' S= 0.0085 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	74.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	74.00'	**0.5" Vert. Orifice/Grate** C= 0.600
#4	Device 1	76.00'	**12.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 76.00' / 75.90' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.69 cfs @ 12.10 hrs HW=76.47' (Free Discharge)
└**1=Culvert** (Passes 0.69 cfs of 5.10 cfs potential flow)
  └**2=Orifice/Grate** (Passes 0.01 cfs of 1.41 cfs potential flow)
    └**3=Orifice/Grate** (Orifice Controls 0.01 cfs @ 7.54 fps)
  └**4=Culvert** (Barrel Controls 0.68 cfs @ 2.74 fps)

Summary for Pond 2P: R Tank B

Inflow Area = 0.242 ac,100.00% Impervious, Inflow Depth = 5.56" for 25-YEAR event
Inflow = 1.38 cfs @ 12.08 hrs, Volume= 0.112 af
Outflow = 1.35 cfs @ 12.10 hrs, Volume= 0.112 af, Atten= 2%, Lag= 1.0 min
Primary = 1.35 cfs @ 12.10 hrs, Volume= 0.112 af

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 75.70' @ 12.10 hrs Surf.Area= 470 sf Storage= 933 cf

Plug-Flow detention time= 242.5 min calculated for 0.112 af (100% of inflow)
Center-of-Mass det. time= 242.0 min (987.7 - 745.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	72.75'	380 cf	**17.12'W x 27.46'L x 3.48'H Field A** 1,637 cf Overall - 687 cf Embedded = 950 cf x 40.0% Voids
#2A	73.00'	652 cf	**ACF R-Tank SD 3** x 100 Inside #1 Inside= 15.7"W x 26.8"H => 2.78 sf x 2.35'L = 6.5 cf Outside= 15.7"W x 26.8"H => 2.93 sf x 2.35'L = 6.9 cf 100 Chambers in 10 Rows
		1,032 cf	Total Available Storage

Storage Group A created with Chamber Wizard

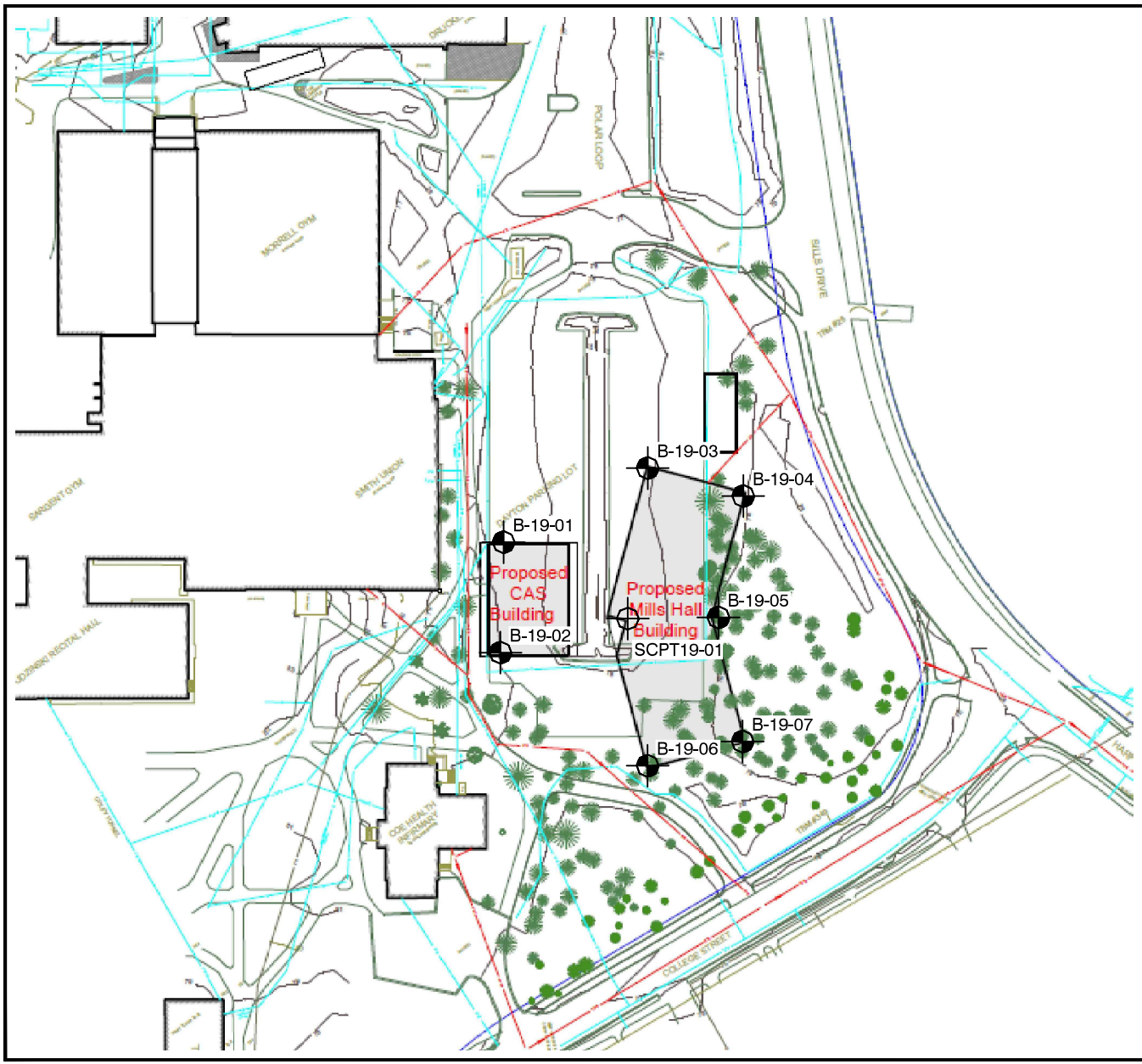
Device	Routing	Invert	Outlet Devices
#1	Primary	72.65'	**12.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 72.65' / 72.47' S= 0.0180 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

#2	Device 1	72.75'	**6.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	72.75'	**0.6" Vert. Orifice/Grate** C= 0.600
#4	Device 1	75.00'	**12.0" Round Culvert**
			L= 10.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 75.00' / 74.90' S= 0.0100 '/' Cc= 0.900
			n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.35 cfs @ 12.10 hrs HW=75.70' (Free Discharge)
└─**1=Culvert** (Passes 1.35 cfs of 6.04 cfs potential flow)
  ├─**2=Orifice/Grate** (Passes 0.02 cfs of 1.55 cfs potential flow)
  │ └─**3=Orifice/Grate** (Orifice Controls 0.02 cfs @ 8.24 fps)
  └─**4=Culvert** (Barrel Controls 1.33 cfs @ 3.18 fps)

Attachment A-1

Test Pit Logs



LEGEND:

APPROXIMATE BORING LOCATION

APPROXIMATE CONE PENETRATION TEST LOCATION

NOTES:

1. EXPLORATION LOCATION PLAN WAS PREPARED FROM A SCANNED SITE PLAN IMAGE AND IS NOT TO SCALE.
2. THE BORING LOCATIONS ARE APPROXIMATE.
3. THIS PLAN SHOULD BE USED IN CONJUNCTION WITH THE ASSOCIATED S. W. COLE ENGINEERING, INC. GEOTECHNICAL REPORT.
4. THE PURPOSE OF THIS PLAN IS ONLY TO DEPICT THE LOCATION OF THE EXPLORATIONS IN RELATION TO THE EXISTING CONDITIONS AND PROPOSED CONSTRUCTION AND IS NOT TO BE USED FOR CONSTRUCTION.

S.W.COLE ENGINEERING, INC.

BOWDOIN COLLEGE

EXPLORATION LOCATION PLAN

PROPOSED CENTER FOR ARCTIC STUDIES & MILLS HALL
BOWDOIN COLLEGE CAMPUS
BRUNSWICK, MAINE

Job No.:	19-0483	Scale:	Not to Scale
Date :	06/24/2019	Sheet:	1

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BORING LOG

S.W.COLE ENGINEERING, INC.

CLIENT: Bowdoin College
PROJECT: Proposed Center for Arctic Studies & Mills Hall
LOCATION: Bowdoin College Campus, Brunswick, Maine

BORING NO.: B-19-01
SHEET: 1 of 1
PROJECT NO. 19-0483
DATE START: 6/6/2019
DATE FINISH: 6/6/2019

Drilling Information

LOCATION: See Exploration Location Plan
ELEVATION (FT): 79' Estimated
TOTAL DEPTH (FT): 37.0
LOGGED BY: Patrick Otto
DRILLING CO.: S. W. Cole Explorations, LLC
DRILLER: Matt Leonard
DRILLING METHOD: Cased Boring
RIG TYPE: Track Mounted Mobile Drill B-53
AUGER ID/OD: N/A / N/A
SAMPLER: Standard Split-Spoon
HAMMER TYPE: Automatic / Automatic
HAMMER WEIGHT (lbs): 140 / 140
CASING ID/OD: 4 in / 4 1/2 in
CORE BARREL:
HAMMER EFFICIENCY FACTOR:
HAMMER DROP (inch): 30 / 16
WATER LEVEL DEPTHS (ft): 6/6/2019 No free water observed, borehole open to 19' after drilling.
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_2O Depth	Remarks
			1D	D	0.3-2.3	24/14	13-16-14-12			2" Asphalt / medium dense, brown gravelly SAND, some silt (FILL)		
										1.5 Medium dense, brown SAND, some silt (FILL)		
			2D	D	2.3-4.3	24/18	7-9-8-9			2.5 Loose, light brown SAND, trace silt		
75	5		3D	D	5-7	24/16	4-4-5-4					
70	10		4D	D	10-12	24/18	3-2-4-4					
65	15		5D	D	15-17	24/10	3-3-5-4			14.0 Loose, brown SAND, trace gravel, trace silt		
60	20		6D	D	20-22	24/8	3-4-6-6			18.0 Medium dense to loose, brown SAND, trace silt		
55	25		7D	D	25-27	24/1	2-3-4-4					
50	30		8D	D	30-32	24/12	6-7-6-9			28.0 Medium dense, brown SAND, some silt with occasional silty clay layers		
45	35		9D	D	35-37	24/12	5-8-11-9					

Bottom of Exploration at 37.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING LOG

S.W.COLE ENGINEERING, INC.

CLIENT: Bowdoin College
PROJECT: Proposed Center for Arctic Studies & Mills Hall
LOCATION: Bowdoin College Campus, Brunswick, Maine

BORING NO.: B-19-02
SHEET: 1 of 1
PROJECT NO. 19-0483
DATE START: 6/6/2019
DATE FINISH: 6/6/2019

Drilling Information

LOCATION: See Exploration Location Plan
ELEVATION (FT): 79' Estimated
TOTAL DEPTH (FT): 37.0
LOGGED BY: Patrick Otto
DRILLING CO.: S. W. Cole Explorations, LLC
DRILLER: Matt Leonard
DRILLING METHOD: Cased Boring
RIG TYPE: Track Mounted Mobile Drill B-53
AUGER ID/OD: N/A / N/A
SAMPLER: Standard Split-Spoon
HAMMER TYPE: Automatic / Automatic
HAMMER WEIGHT (lbs): 140 / 140
CASING ID/OD: 4 in / 4 1/2 in
CORE BARREL:
HAMMER EFFICIENCY FACTOR:
HAMMER DROP (inch): 30 / 16
WATER LEVEL DEPTHS (ft): 6/6/2019 No free water observed, borehole open to 19' after drilling.
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_2O Depth	Remarks
			1D		0.3-2.3	24/15	11-14-12-7			2" Asphalt / medium dense, brown gravelly SAND, some silt (FILL)		
										1.8		
			2D		2.3-4.3	24/16	8-8-7-8			Medium dense, brown SAND, some silt (FILL)		
										2.5		
75										Loose, light brown SAND, some silt, trace gravel		
	5		3D		5-7	24/16	3-5-4-6					
70												
	10		4D		10-12	24/15	2-3-3-3					
										10.5		
65										Loose, light brown SAND, trace silt		
										14.0		
	15		5D		15-17	24/6	2-4-3-5			Loose, brown SAND, trace silt, trace gravel		
60												
	20		6D		20-22	24/6	3-3-4-5					
55										24.0		
	25		7D		25-27	24/10	3-5-8-12			Medium dense to loose, brown SAND, trace silt with occasional silt layers		
50												
	30		8D		30-32	24/9	3-4-4-7					
45												
	35		9D		35-37	24/15	3-3-6-10					
										Bottom of Exploration at 37.0 feet		

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING / WELL 19-0483.GPJ SWCE TEMPLATE.GDT 6/24/19

BORING LOG

S.W.COLE ENGINEERING, INC.

CLIENT: Bowdoin College
PROJECT: Proposed Center for Arctic Studies & Mills Hall
LOCATION: Bowdoin College Campus, Brunswick, Maine

BORING NO.: B-19-03
SHEET: 1 of 1
PROJECT NO. 19-0483
DATE START: 6/5/2019
DATE FINISH: 6/5/2019

Drilling Information

LOCATION: See Exploration Location Plan | **ELEVATION (FT):** 79' Estimated | **TOTAL DEPTH (FT):** 37.0 | **LOGGED BY:** Patrick Otto
DRILLING CO.: S. W. Cole Explorations, LLC | **DRILLER:** Matt Leonard | **DRILLING METHOD:** Cased Boring
RIG TYPE: Track Mounted Mobile Drill B-53 | **AUGER ID/OD:** N/A / N/A | **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / Automatic | **HAMMER WEIGHT (lbs):** 140 / 140 | **CASING ID/OD:** 4 in / 4 1/2 in | **CORE BARREL:**
HAMMER EFFICIENCY FACTOR: | **HAMMER DROP (inch):** 30 / 16
WATER LEVEL DEPTHS (ft): 6/5/2019 No free water observed, borehole open to 25' after drilling.
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_2O Depth	Remarks
			1D		0.5-2.5	24/15	10-12-11-11			2" Asphalt / medium dense, brown gravelly SAND, some silt (FILL)		
										1.5 Medium dense, brown SAND, some silt (FILL)		
			2D		2.5-4.5	24/18	9-8-8-7			2.5 Medium dense to loose, light brown SAND, some silt		
75	5		3D		5-7	24/18	4-5-8-7					
70	10		4D		10-12	24/15	2-6-5-7					
65	15		5D		15-17	24/12	3-3-5-4					
										18.0 Medium dense to loose, brown SAND, some silt with occasional silt layers		
60	20		6D		20-22	24/12	3-4-4-4					
55	25		7D		25-27	24/15	4-5-6-8					
50	30		8D		30-32	24/12	3-3-5-7					
										33.0 Loose, brown SAND with frequent silt layers		
45	35		9D		35-37	24/12	2-2-5-7					

Bottom of Exploration at 37.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING LOG

S.W.COLE ENGINEERING, INC.

CLIENT: Bowdoin College
PROJECT: Proposed Center for Arctic Studies & Mills Hall
LOCATION: Bowdoin College Campus, Brunswick, Maine

BORING NO.: B-19-04
SHEET: 1 of 1
PROJECT NO. 19-0483
DATE START: 6/6/2019
DATE FINISH: 6/6/2019

Drilling Information

LOCATION: See Exploration Location Plan | **ELEVATION (FT):** 78' Estimated | **TOTAL DEPTH (FT):** 37.0 | **LOGGED BY:** Patrick Otto
DRILLING CO.: S. W. Cole Explorations, LLC | **DRILLER:** Matt Leonard | **DRILLING METHOD:** Cased Boring
RIG TYPE: Track Mounted Mobile Drill B-53 | **AUGER ID/OD:** N/A / N/A | **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / Automatic | **HAMMER WEIGHT (lbs):** 140 / 140 | **CASING ID/OD:** 4 in / 4 1/2 in | **CORE BARREL:**
HAMMER EFFICIENCY FACTOR: | **HAMMER DROP (inch):** 30 / 16
WATER LEVEL DEPTHS (ft): ▽ 20 ft 6/6/2019 Free water at 20', borehole open to 37' after drilling.
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_2O Depth	Remarks
			1D		0-2	24/18	2-3-4-5			Loose, dark brown-gray sandy SILT, trace gravel with rootlets (Topsoil/Fill)		
75			2D		2-4	24/18	5-5-5-5			1.8 Loose to medium dense, brown SAND, some silt, trace gravel		
	5		3D		5-7	24/18	3-3-5-4			4.5 Loose to medium dense, light brown SAND, trace silt		
70												
	10		4D		10-12	24/20	4-3-4-4					
65												
	15		5D		15-17	24/12	3-4-6-7					
60										18.0 Loose to medium dense, brown SAND, some silt	▽	
	20		6D		20-22	24/10	2-3-4-12					
55												
	25		7D		25-27	24/12	3-3-5-6					
50												
	30		8D		30-32	24/10	4-6-7-12					
45										33.0 Loose, brown SAND, some silt with frequent silt seams/layers		
	35		9D		35-37	24/15	5-4-5-4					

Bottom of Exploration at 37.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING / WELL 19-0483.GPJ SWCE TEMPLATE.GDT 6/24/19

BORING LOG

S.W.COLE ENGINEERING, INC.

CLIENT: Bowdoin College
PROJECT: Proposed Center for Arctic Studies & Mills Hall
LOCATION: Bowdoin College Campus, Brunswick, Maine

BORING NO.: B-19-05
SHEET: 1 of 1
PROJECT NO. 19-0483
DATE START: 6/5/2019
DATE FINISH: 6/5/2019

Drilling Information

LOCATION: See Exploration Location Plan | **ELEVATION (FT):** 78' Estimated | **TOTAL DEPTH (FT):** 37.0 | **LOGGED BY:** Patrick Otto
DRILLING CO.: S. W. Cole Explorations, LLC | **DRILLER:** Matt Leonard | **DRILLING METHOD:** Cased Boring
RIG TYPE: Track Mounted Mobile Drill B-53 | **AUGER ID/OD:** N/A / N/A | **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / Automatic | **HAMMER WEIGHT (lbs):** 140 / 140 | **CASING ID/OD:** 4 in / 4 1/2 in | **CORE BARREL:**
HAMMER EFFICIENCY FACTOR: | **HAMMER DROP (inch):** 30 / 16
WATER LEVEL DEPTHS (ft): ▽ 20 ft 6/5/2019 Soils saturated at 20'. Borehole open to 19.4' after drilling.
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_2O Depth	Remarks
			1D		0-2	24/16	2-1-2-2			Very loose, brown sandy SILT (Topsoil)		
										1.5 Very loose, brown silty SAND		
75			2D		2-4	24/16	3-4-6-6			2.0 Medium dense to loose, brown SAND, trace silt, trace gravel		
	5		3D		5-7	24/15	4-4-4-4					
70										8.0 Loose to very loose, brown, trace silt, trace gravel at 25'		
	10		4D		10-12	24/20	3-3-2-3					
65												
	15		5D		15-17	24/15	3-3-4-4					
60											▽	
	20		6D		20-22	24/18	1 FOR 12"-2-2					
55												
	25		7D		25-27	24/16	5-9-13-16					
50										28.0 Medium dense, brown SAND, some silt to silty with frequent silt layers below 35'		
	30		8D		30-32	24/14	5-5-8-11					
45												
	35		9D		35-37	24/12	7-8-11-10					

Bottom of Exploration at 37.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING / WELL 19-0483.GPJ SWCE TEMPLATE.GDT 6/24/19

BORING LOG

S.W.COLE ENGINEERING, INC.

CLIENT: Bowdoin College
PROJECT: Proposed Center for Arctic Studies & Mills Hall
LOCATION: Bowdoin College Campus, Brunswick, Maine

BORING NO.: B-19-06
SHEET: 1 of 1
PROJECT NO. 19-0483
DATE START: 6/6/2019
DATE FINISH: 6/6/2019

Drilling Information

LOCATION: See Exploration Location Plan | **ELEVATION (FT):** 78' Estimated | **TOTAL DEPTH (FT):** 37.0 | **LOGGED BY:** Patrick Otto
DRILLING CO.: S. W. Cole Explorations, LLC | **DRILLER:** Matt Leonard | **DRILLING METHOD:** Cased Boring
RIG TYPE: Track Mounted Diedrich D-50 | **AUGER ID/OD:** N/A / N/A | **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / Automatic | **HAMMER WEIGHT (lbs):** 140 / 140 | **CASING ID/OD:** 4 in / 4 1/2 in | **CORE BARREL:**
HAMMER EFFICIENCY FACTOR: | **HAMMER DROP (inch):** 30 / 16
WATER LEVEL DEPTHS (ft): ▽ 20 ft 6/6/2019 Free water at 20', borehole open to 37' after drilling.
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_2O Depth	Remarks
			1D		0-2	24/18	2-2-3-4			Loose, dark sandy SILT with frequent silt layers (Topsoil/FILL)		
										1.8		
75			2D		2-4	24/16	3-5-5-5			Loose, rust brown silty SAND		
										2.5		
	5		3D		5-7	24/16	4-4-5-6			Medium dense to loose, brown SAND, some silt, trace gravel with rootlets to 4'		
										6.5		
70										Loose to medium dense, light brown SAND, trace silt		
	10		4D		10-12	24/15	2-3-3-4					
65												
	15		5D		15-17	24/10	4-5-6-8					
60												
	20		6D		20-22	24/10	2-4-5-5				▽	
55												
	25		7D		25-27	24/1	3-2-4-5					
50										28.0		
	30		8D		30-32	24/12	6-6-7-7			Loose to medium dense, brown SAND, some silt, trace gravel with occasional silt layers		
45												
										34.0		
	35		9D		35-37	24/12	3-2-5-7			Loose, brown silty SAND		
										Bottom of Exploration at 37.0 feet		

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING / WELL 19-0483.GPJ SWCE TEMPLATE.GDT 6/24/19

BORING LOG

S.W.COLE ENGINEERING, INC.

CLIENT: Bowdoin College
PROJECT: Proposed Center for Arctic Studies & Mills Hall
LOCATION: Bowdoin College Campus, Brunswick, Maine

BORING NO.: B-19-07
SHEET: 1 of 1
PROJECT NO. 19-0483
DATE START: 6/5/2019
DATE FINISH: 6/5/2019

Drilling Information

LOCATION: See Exploration Location Plan
ELEVATION (FT): 78' Estimated
TOTAL DEPTH (FT): 37.0
LOGGED BY: Patrick Otto
DRILLING CO.: S. W. Cole Explorations, LLC
DRILLER: Matt Leonard
DRILLING METHOD: Cased Boring
RIG TYPE: Track Mounted Mobile Drill B-53
AUGER ID/OD: N/A / N/A
SAMPLER: Standard Split-Spoon
HAMMER TYPE: Automatic / Automatic
HAMMER WEIGHT (lbs): 140 / 140
CASING ID/OD: 4 in / 4 1/2 in
CORE BARREL:
HAMMER EFFICIENCY FACTOR:
HAMMER DROP (inch): 30 / 16
WATER LEVEL DEPTHS (ft): 6/5/2019 No free water observed
GENERAL NOTES:

KEY TO NOTES AND SYMBOLS:
Water Level: ▽ At time of Drilling; ▼ At Completion of Drilling; ▼ After Drilling
D = Split Spoon Sample; U = Thin Walled Tube Sample; R = Rock Core Sample; V = Field Vane Shear
Pen. = Penetration Length; Rec. = Recovery Length; bpf = Blows per Foot; mpf = Minute per Foot
WOR = Weight of Rods; WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.; q_u = Unconfined Compressive Strength, kips/sq.ft.; Ø = Friction Angle (Estimated); N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data	Graphic Log	Sample Description & Classification	H_2O Depth	Remarks
			1D		0-2	24/18	1-1-2-5			Very loose, dark brown silty SAND (Topsoil)		
										1.0 Loose, brown silty SAND,		
75			2D		2-4	24/15	4-5-5-7			1.9 Medium dense to loose, brown SAND, trace silt, trace gravel		
	5		3D		5-7	24/15	3-4-5-5					
70												
	10		4D		10-12	24/13	2-6-8-10					
65												
	15		5D		15-16.5	18/13	6-5-8			with occasional silt layers		
60										18.0 Loose to medium dense, brown SAND, trace silt		
	20		6D		20-22	24/7	2-3-3-6					
55												
	25		7D		25-27	24/12	4-4-7-9					
50												
	30		8D		30-32	24/14	4-4-6-8					
45												
	35		9D		35-37	24/18	2-2-4-6			34.0 Loose to medium dense, brown SAND, some silt with occasional silt layers		

Bottom of Exploration at 37.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

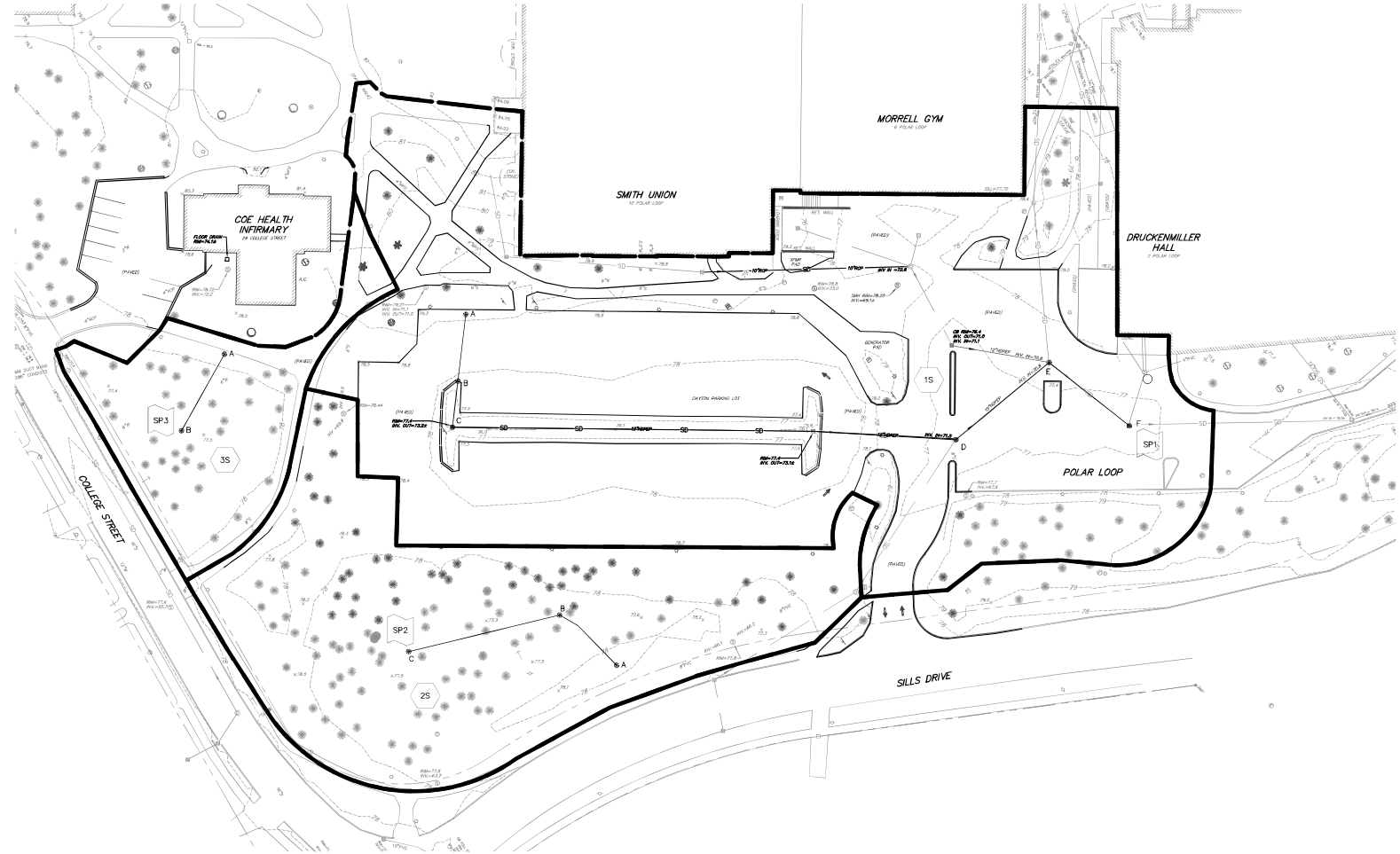
BORING / WELL 19-0483.GPJ SWCE TEMPLATE.GDT 6/24/19

Attachment B

Watershed Plans

SOIL TYPE				
SYMBOL	SOIL SERIES	SLOPE	HSG	DRAINAGE CLASS
W=B	WINDSOR LOAMY SAND	0-8%	A	EXCESSIVELY DRAINED

SOIL INFORMATION FOR THE SITE WAS OBTAINED VIA THE USDA NATURAL RESOURCES CONSERVATION SERVICE WEBSITE AND THEIR WEBSOIL SURVEY APPLICATION. THE HYDROLOGIC SOIL GROUP (HSG) OF THE SITE SOILS ARE CLASSIFIED BY TEHCNICAL RELEASE TR-55 OF THE SOIL CONSERVATION SERVICE.



PRE-DEVELOPMENT LEGEND

- WATERSHED BOUNDARY
- TIME OF CONCENTRATION (B, C)
- 1S — WATERSHED LABEL
- SP1 — STUDY POINT

GRAPHIC SCALE
(IN FEET)
1 INCH = 30 FT.

PAUL D. OSTROWSKI, PE11175
P.L.S. OR P.E.

STATE OF MAINE — PAUL D. OSTROWSKI No. 11175 — REGISTERED PROFESSIONAL ENGINEER — 09/16/2019

NOT FOR CONSTRUCTION

DESIGNED	CHECKED
PDO	PDO

REV.	BY	DATE	DESCRIPTION
B	KSM	09/17/19	SUBMIT TO MAINE DEP
A	KSM	05/28/19	SUBMIT FOR COORDINATION

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WWW.SEBAGOTECHNICS.COM
75 John Roberts Rd.
Suite 4A
South Portland, ME 04106
Tel. 207-200-2100

PRE-DEVELOPMENT WATERSHED PLAN
OF:
MILLS HALL AND THE
CENTER FOR ARCTIC STUDIES
FOR:
BOWDOIN COLLEGE
BRUNSWICK, MAINE

PROJECT NO.	SCALE
11001-12	1" = 30'

SHEET 1 OF 2

11001-12SW AREAS.dwg, Tab:Sw AREAS PRE

Table 1: MDEP GENERAL STANDARD CALCULATIONS

Job #

AREA ID	WATERSHED SIZE (S.F.)	EXISTING ONSITE IMPERVIOUS AREA TO REMAIN (S.F.)	NEW ONSITE IMPERVIOUS AREA (S.F.)	EXISTING ONSITE LANDSCAPED AREA TO REMAIN (S.F.)	NEW ONSITE LANDSCAPED AREA (S.F.)	NET NEW DEVELOPED AREA (S.F.)	EXISTING DEVELOPED AREAS (S.F.)	TREATMENT PROVIDED?	IMPERVIOUS AREA TREATED (S.F.)	LANDSCAPED AREA TREATED (S.F.)	DEVELOPED AREA TREATED (S.F.)	TREATMENT BMP
1S	42,431	26,410	2,867	8,337	5,797	8664	32,747	NO	0	0	0	
1.1S	7,709		6,993		715	7709	0	YES	6,990	716	7,709	PA-1
1.2S	7,256		6,703		553	7256	0	YES	6,703	553	7,256	PA-2
1.3S	3,083		3,083		0	3083	0	YES	3,083	0	3,083	PA-3
1.4S	5,687		3,731		1,956	5687	0	YES	3,731	1,956	5,687	FT-1
1.5S	3,872		1,716		2,156	3872	0	YES	1,716	2,156	3,872	FT-6
1.6S	5,278		4,066	571	646	4692	571	YES	4,046	1,217	1,263	FT-2
1.7S	6,692	335	2,414		3,943	6357	335	YES	2,749	3,943	6,692	IT-1
1.8S	9,322		7,973		1,349	9322	0	YES	7,973	1,349	9,322	FT-3
1.9S	5,181	341	3,065		1,75	4840	341	YES	3,406	1,775	1,181	IT-2
1.10S	7,971	1,445	0	5,860	838	132	7,305	NO	0	0	0	
1.11S	2,896		755		2,141	2896	0	YES	755	2,141	2,896	FT-4
1.12S	2,034		1,096		938	2034		YES	1,096	938	2,034	FT-5
2S	29,276				2,75	2725	0	NO	0	0	0	
3S	16,237	3,929		1,597		0	5,526	NO	0	0	0	
TOTAL (S.F.)	154,925	30,460	44,442	16,365	25,07	69,969	46,825		42,251	16,744	58,995	

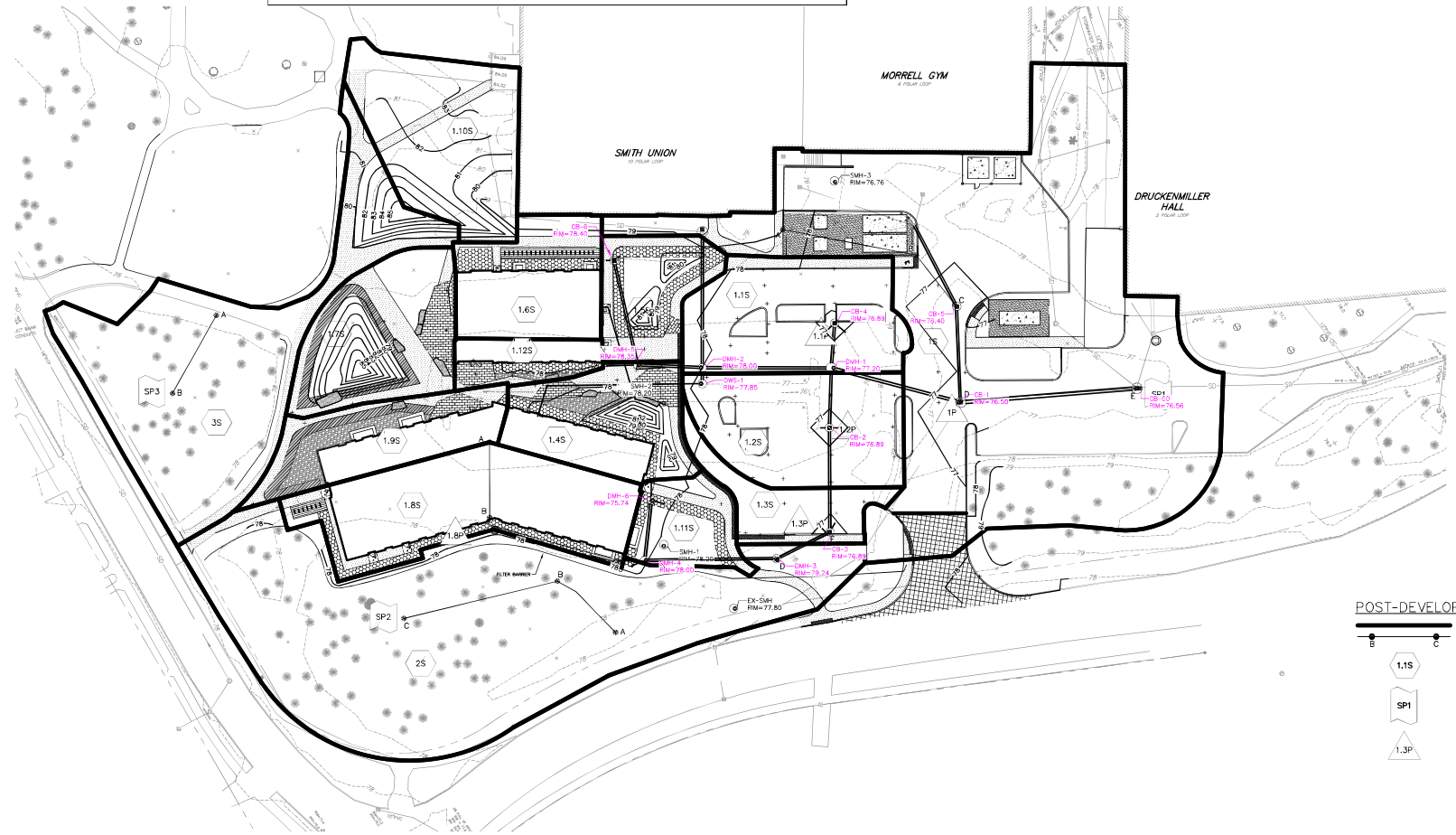
TOTAL NEW IMPERVIOLS AREA (S.F.)	44,442	TOTAL DEVELOPED AREA (S.F.)	69,969
TOTAL IMPERVIOUS AREA RECEIVING TREATMENT (S.F.)	42,251	TOTAL AREA RECEIVING TREATMENT (S.F.)	58,995
% OF IMPERVIOUS AREA RECEIVING TREATMENT	95.07%	% OF AREA RECEIVING TREATMENT	84.32%

PA - POROUS ASPHALT
FT FILTER TRENCH/ROOF DRIP EDGE
IT - INFILTRATION TRENCH

SOIL TYPE

SYMBOL	SOIL SERIES	SLOPE	HSG	DRAINAGE CLASS
W=B	WINDSOR LOAMY SAND	0-8%	A	EXCESSIVELY DRAINED

SOIL INFORMATION FOR THE SITE WAS OBTAINED VIA THE USDA NATURAL RESOURCES CONSERVATION SERVICE WEBSITE AND THEIR WEBSOIL SURVEY APPLICATION. THE HYDROLOGIC SOIL GROUP (HSG) OF THE SITE SOILS ARE CLASSIFIED BY TEHCNICAL RELEASE TR-55 OF THE SOIL CONSERVATION SERVICE.



POST-DEVELOPMENT LEGEND

- WATERSHED BOUNDARY
- TIME OF CONCENTRATION
- 1.1S — WATERSHED LABEL
- SP1 — STUDY POINT
- 1.3P — STORMWATER TREATMENT/DETENTION POND

GRAPHIC SCALE
30 0 15 30 60
(IN FEET)
1 INCH = 30 FT.

PAUL D. OSTROWSKI, PE11175
PLS OR PE

STATE OF MAINE PAUL D. OSTROWSKI No. 11175 REGISTERED PROFESSIONAL ENGINEER 09/16/2019

NOT FOR CONSTRUCTION

DESIGNED	CHECKED
PDO	PDO

REV.	BY	DATE	DESCRIPTION
A	KSM	09/17/19	SUBMIT TO MAINE DEP
B	KSM	05/26/19	SUBMIT FOR COORDINATION

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South Portland, ME 04106
Tel. 207-200-2100

POST-DEVELOPMENT WATERSHED PLAN
OF:
MILLS HALL AND THE
CENTER FOR ARCTIC STUDIES
FOR
BOWDOIN COLLEGE
BRUNSWICK, MAINE

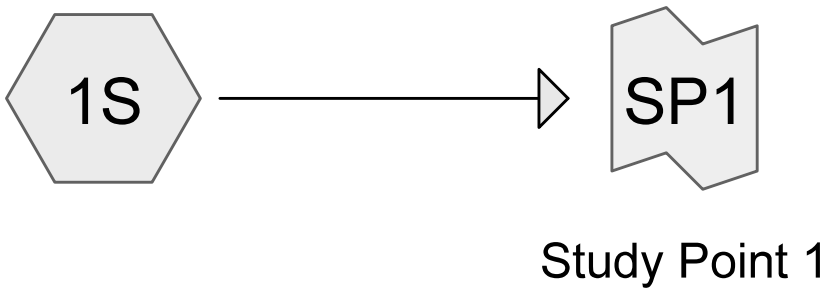
PROJECT NO.	SCALE
11001-12	1" = 30'

SHEET 2 OF 2

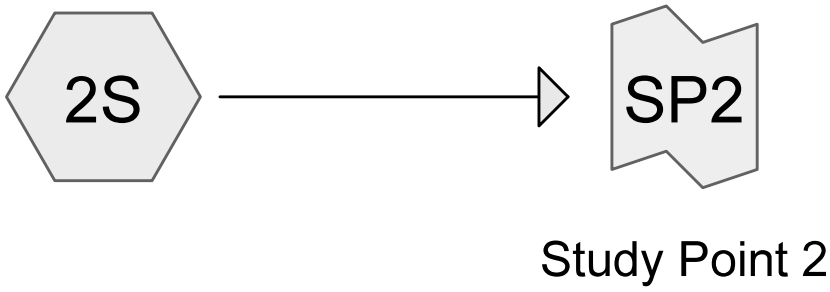
11001-12SW AREA.dwg, Tab:Sw AREAS POST

Attachment C

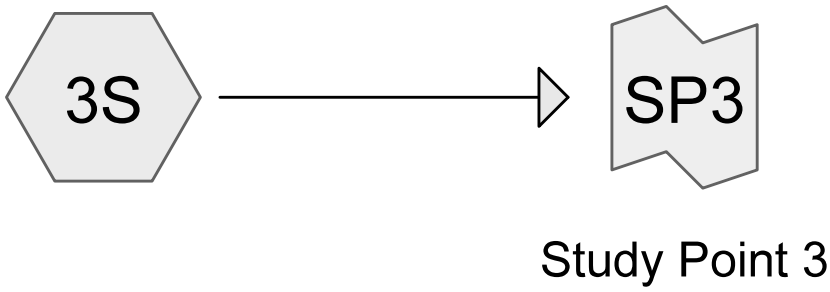
Pre-Development Stormwater Modeling



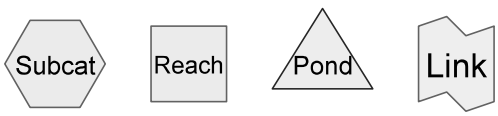
Study Point 1



Study Point 2



Study Point 3



Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
29,758	39	>75% Grass cover, Good, HSG A (1S, 3S)
74,088	98	Existing Pavement (1S, 2S, 3S)
51,086	43	Woods/grass comb., Fair, HSG A (2S, 3S)
154,932	**69**	**TOTAL AREA**

Time span=0.00-50.00 hrs, dt=0.01 hrs, 5001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Runoff Area=98,698 sf 70.29% Impervious Runoff Depth=1.33"
Flow Length=485' Tc=6.0 min CN=80 Runoff=3.5 cfs 10,902 cf

Subcatchment2S: Runoff Area=41,826 sf 3.42% Impervious Runoff Depth=0.03"
Flow Length=133' Tc=17.5 min CN=45 Runoff=0.0 cfs 116 cf

Subcatchment3S: Runoff Area=14,408 sf 22.78% Impervious Runoff Depth=0.22"
Flow Length=51' Slope=0.0137 '/' Tc=14.8 min CN=55 Runoff=0.0 cfs 267 cf

Link SP1: Study Point 1 Inflow=3.5 cfs 10,902 cf
Primary=3.5 cfs 10,902 cf

Link SP2: Study Point 2 Inflow=0.0 cfs 116 cf
Primary=0.0 cfs 116 cf

Link SP3: Study Point 3 Inflow=0.0 cfs 267 cf
Primary=0.0 cfs 267 cf

Total Runoff Area = 154,932 sf Runoff Volume = 11,285 cf Average Runoff Depth = 0.87"
52.18% Pervious = 80,844 sf 47.82% Impervious = 74,088 sf

Summary for Subcatchment 1S:

Runoff = 3.5 cfs @ 12.09 hrs, Volume= 10,902 cf, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 -YEAR Rainfall=3.10"

	Area (sf)	CN	Description
*	69,375	98	Existing Pavement
	29,323	39	>75% Grass cover, Good, HSG A
	98,698	80	Weighted Average
	29,323		29.71% Pervious Area
	69,375		70.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	39	0.0233	1.19		**Sheet Flow, A-B** Smooth surfaces n= 0.011 P2= 3.10"
1.1	27	0.0037	0.43		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.3	290	0.0059	3.77	2.96	**Pipe Channel, C-D** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Corrugated PP, smooth interior
0.4	70	0.0029	3.07	3.77	**Pipe Channel, D-E** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Corrugated PP, smooth interior
0.2	59	0.0051	5.57	17.50	**Pipe Channel, E-F** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Corrugated PP, smooth interior
2.5					**Direct Entry,**
6.0	485	Total			

Summary for Subcatchment 2S:

Runoff = 0.0 cfs @ 15.81 hrs, Volume= 116 cf, Depth= 0.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 -YEAR Rainfall=3.10"

	Area (sf)	CN	Description
	40,395	43	Woods/grass comb., Fair, HSG A
*	1,431	98	Existing Pavement
	41,826	45	Weighted Average
	40,395		96.58% Pervious Area
	1,431		3.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	44	0.0158	0.06		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
5.1	89	0.0034	0.29		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
17.5	133	Total			

Summary for Subcatchment 3S:

Runoff = 0.0 cfs @ 12.48 hrs, Volume= 267 cf, Depth= 0.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 -YEAR Rainfall=3.10"

	Area (sf)	CN	Description
	10,691	43	Woods/grass comb., Fair, HSG A
*	3,282	98	Existing Pavement
	435	39	>75% Grass cover, Good, HSG A
	14,408	55	Weighted Average
	11,126		77.22% Pervious Area
	3,282		22.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	51	0.0137	0.06		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"

Summary for Link SP1: Study Point 1

Inflow Area = 98,698 sf, 70.29% Impervious, Inflow Depth = 1.33" for 2 -YEAR event
Inflow = 3.5 cfs @ 12.09 hrs, Volume= 10,902 cf
Primary = 3.5 cfs @ 12.09 hrs, Volume= 10,902 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs

Summary for Link SP2: Study Point 2

Inflow Area = 41,826 sf, 3.42% Impervious, Inflow Depth = 0.03" for 2 -YEAR event
Inflow = 0.0 cfs @ 15.81 hrs, Volume= 116 cf
Primary = 0.0 cfs @ 15.81 hrs, Volume= 116 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs

Summary for Link SP3: Study Point 3

Inflow Area = 14,408 sf, 22.78% Impervious, Inflow Depth = 0.22" for 2 -YEAR event
Inflow = 0.0 cfs @ 12.48 hrs, Volume= 267 cf
Primary = 0.0 cfs @ 12.48 hrs, Volume= 267 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs

Time span=0.00-50.00 hrs, dt=0.01 hrs, 5001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Runoff Area=98,698 sf 70.29% Impervious Runoff Depth=2.55"
Flow Length=485' Tc=6.0 min CN=80 Runoff=6.8 cfs 20,948 cf

Subcatchment2S: Runoff Area=41,826 sf 3.42% Impervious Runoff Depth=0.32"
Flow Length=133' Tc=17.5 min CN=45 Runoff=0.1 cfs 1,126 cf

Subcatchment3S: Runoff Area=14,408 sf 22.78% Impervious Runoff Depth=0.79"
Flow Length=51' Slope=0.0137 '/' Tc=14.8 min CN=55 Runoff=0.2 cfs 946 cf

Link SP1: Study Point 1 Inflow=6.8 cfs 20,948 cf
Primary=6.8 cfs 20,948 cf

Link SP2: Study Point 2 Inflow=0.1 cfs 1,126 cf
Primary=0.1 cfs 1,126 cf

Link SP3: Study Point 3 Inflow=0.2 cfs 946 cf
Primary=0.2 cfs 946 cf

Total Runoff Area = 154,932 sf Runoff Volume = 23,021 cf Average Runoff Depth = 1.78"
52.18% Pervious = 80,844 sf 47.82% Impervious = 74,088 sf

Summary for Subcatchment 1S:

Runoff = 6.8 cfs @ 12.09 hrs, Volume= 20,948 cf, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 -YEAR Rainfall=4.60"

	Area (sf)	CN	Description
*	69,375	98	Existing Pavement
	29,323	39	>75% Grass cover, Good, HSG A
	98,698	80	Weighted Average
	29,323		29.71% Pervious Area
	69,375		70.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	39	0.0233	1.19		**Sheet Flow, A-B** Smooth surfaces n= 0.011 P2= 3.10"
1.1	27	0.0037	0.43		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.3	290	0.0059	3.77	2.96	**Pipe Channel, C-D** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Corrugated PP, smooth interior
0.4	70	0.0029	3.07	3.77	**Pipe Channel, D-E** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Corrugated PP, smooth interior
0.2	59	0.0051	5.57	17.50	**Pipe Channel, E-F** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Corrugated PP, smooth interior
2.5					**Direct Entry,**
6.0	485	Total			

Summary for Subcatchment 2S:

Runoff = 0.1 cfs @ 12.54 hrs, Volume= 1,126 cf, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 -YEAR Rainfall=4.60"

	Area (sf)	CN	Description
	40,395	43	Woods/grass comb., Fair, HSG A
*	1,431	98	Existing Pavement
	41,826	45	Weighted Average
	40,395		96.58% Pervious Area
	1,431		3.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	44	0.0158	0.06		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
5.1	89	0.0034	0.29		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
17.5	133	Total			

Summary for Subcatchment 3S:

Runoff = 0.2 cfs @ 12.25 hrs, Volume= 946 cf, Depth= 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 -YEAR Rainfall=4.60"

	Area (sf)	CN	Description
	10,691	43	Woods/grass comb., Fair, HSG A
*	3,282	98	Existing Pavement
	435	39	>75% Grass cover, Good, HSG A
	14,408	55	Weighted Average
	11,126		77.22% Pervious Area
	3,282		22.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	51	0.0137	0.06		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"

Summary for Link SP1: Study Point 1

Inflow Area = 98,698 sf, 70.29% Impervious, Inflow Depth = 2.55" for 10 -YEAR event
Inflow = 6.8 cfs @ 12.09 hrs, Volume= 20,948 cf
Primary = 6.8 cfs @ 12.09 hrs, Volume= 20,948 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs

Summary for Link SP2: Study Point 2

Inflow Area = 41,826 sf, 3.42% Impervious, Inflow Depth = 0.32" for 10 -YEAR event
Inflow = 0.1 cfs @ 12.54 hrs, Volume= 1,126 cf
Primary = 0.1 cfs @ 12.54 hrs, Volume= 1,126 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs

Summary for Link SP3: Study Point 3

Inflow Area = 14,408 sf, 22.78% Impervious, Inflow Depth = 0.79" for 10 -YEAR event
Inflow = 0.2 cfs @ 12.25 hrs, Volume= 946 cf
Primary = 0.2 cfs @ 12.25 hrs, Volume= 946 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs

Time span=0.00-50.00 hrs, dt=0.01 hrs, 5001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Runoff Area=98,698 sf 70.29% Impervious Runoff Depth=3.60"
Flow Length=485' Tc=6.0 min CN=80 Runoff=9.5 cfs 29,620 cf

Subcatchment2S: Runoff Area=41,826 sf 3.42% Impervious Runoff Depth=0.72"
Flow Length=133' Tc=17.5 min CN=45 Runoff=0.3 cfs 2,519 cf

Subcatchment3S: Runoff Area=14,408 sf 22.78% Impervious Runoff Depth=1.40"
Flow Length=51' Slope=0.0137 '/' Tc=14.8 min CN=55 Runoff=0.4 cfs 1,686 cf

Link SP1: Study Point 1 Inflow=9.5 cfs 29,620 cf
Primary=9.5 cfs 29,620 cf

Link SP2: Study Point 2 Inflow=0.3 cfs 2,519 cf
Primary=0.3 cfs 2,519 cf

Link SP3: Study Point 3 Inflow=0.4 cfs 1,686 cf
Primary=0.4 cfs 1,686 cf

Total Runoff Area = 154,932 sf Runoff Volume = 33,825 cf Average Runoff Depth = 2.62"
52.18% Pervious = 80,844 sf 47.82% Impervious = 74,088 sf

Summary for Subcatchment 1S:

Runoff = 9.5 cfs @ 12.09 hrs, Volume= 29,620 cf, Depth= 3.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

	Area (sf)	CN	Description
*	69,375	98	Existing Pavement
	29,323	39	>75% Grass cover, Good, HSG A
	98,698	80	Weighted Average
	29,323		29.71% Pervious Area
	69,375		70.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	39	0.0233	1.19		**Sheet Flow, A-B** Smooth surfaces n= 0.011 P2= 3.10"
1.1	27	0.0037	0.43		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.3	290	0.0059	3.77	2.96	**Pipe Channel, C-D** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Corrugated PP, smooth interior
0.4	70	0.0029	3.07	3.77	**Pipe Channel, D-E** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Corrugated PP, smooth interior
0.2	59	0.0051	5.57	17.50	**Pipe Channel, E-F** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Corrugated PP, smooth interior
2.5					**Direct Entry,**
6.0	485	Total			

Summary for Subcatchment 2S:

Runoff = 0.3 cfs @ 12.39 hrs, Volume= 2,519 cf, Depth= 0.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

	Area (sf)	CN	Description
	40,395	43	Woods/grass comb., Fair, HSG A
*	1,431	98	Existing Pavement
	41,826	45	Weighted Average
	40,395		96.58% Pervious Area
	1,431		3.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	44	0.0158	0.06		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
5.1	89	0.0034	0.29		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
17.5	133	Total			

Summary for Subcatchment 3S:

Runoff = 0.4 cfs @ 12.23 hrs, Volume= 1,686 cf, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

	Area (sf)	CN	Description
	10,691	43	Woods/grass comb., Fair, HSG A
*	3,282	98	Existing Pavement
	435	39	>75% Grass cover, Good, HSG A
	14,408	55	Weighted Average
	11,126		77.22% Pervious Area
	3,282		22.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	51	0.0137	0.06		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"

Summary for Link SP1: Study Point 1

Inflow Area = 98,698 sf, 70.29% Impervious, Inflow Depth = 3.60" for 25-YEAR event
Inflow = 9.5 cfs @ 12.09 hrs, Volume= 29,620 cf
Primary = 9.5 cfs @ 12.09 hrs, Volume= 29,620 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs

Summary for Link SP2: Study Point 2

Inflow Area = 41,826 sf, 3.42% Impervious, Inflow Depth = 0.72" for 25-YEAR event
Inflow = 0.3 cfs @ 12.39 hrs, Volume= 2,519 cf
Primary = 0.3 cfs @ 12.39 hrs, Volume= 2,519 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs

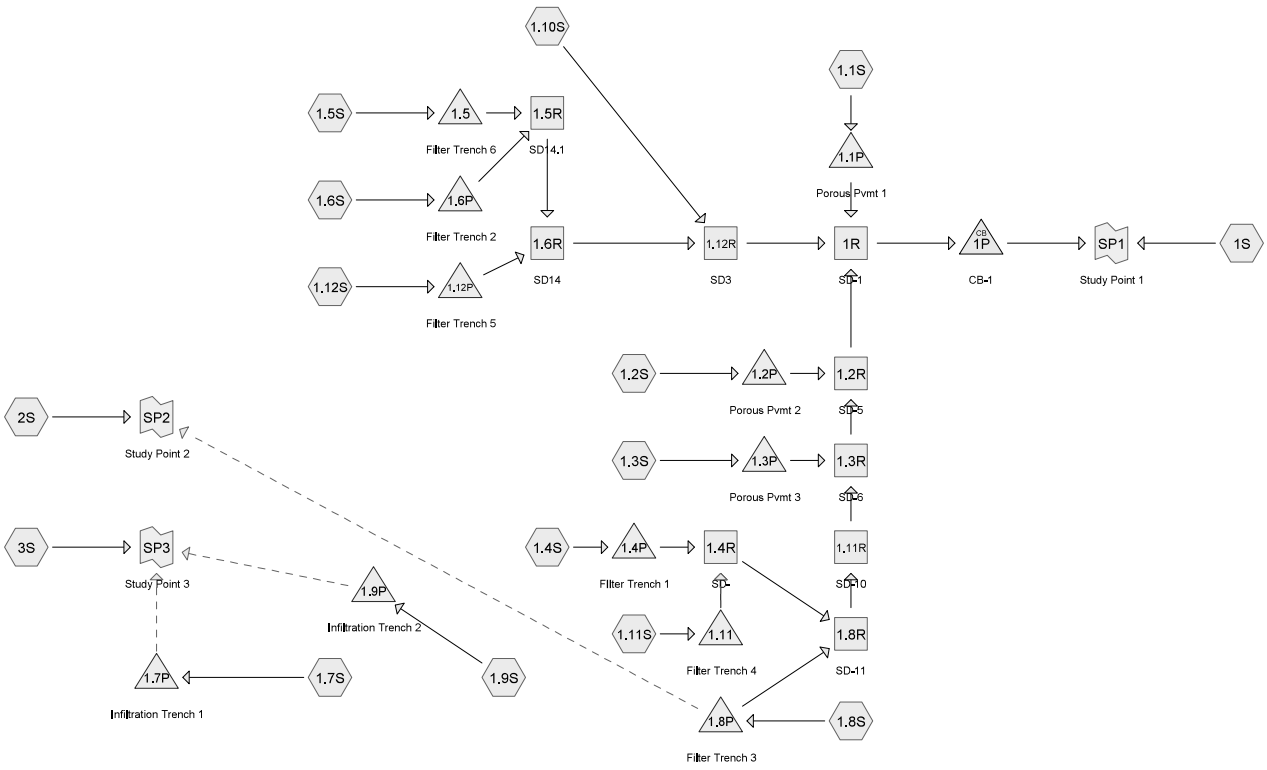
Summary for Link SP3: Study Point 3

Inflow Area = 14,408 sf, 22.78% Impervious, Inflow Depth = 1.40" for 25-YEAR event
Inflow = 0.4 cfs @ 12.23 hrs, Volume= 1,686 cf
Primary = 0.4 cfs @ 12.23 hrs, Volume= 1,686 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs

Attachment D

Post-Development Stormwater Modeling



Subcat Reach Pond Link

Routing Diagram for 11001-12 POST
Prepared by Sebago Technics, Printed 9/13/2019
HydroCAD® 10.00-24 s/n 01856 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
17,084	39	Exist Grass, A (1.10S, 1.6S, 1S, 3S)
1,786	98	Exist Walkway (1.10S, 1.9S)
335	8	Exist Walkway (1.7S)
24,410	98	Existing Pavement (1S)
4,694	98	Existing Walkway (2S, 3S)
16,323	39	Prop Grass, A (1.11S, 1.12S, 1.1S, 1.2S, 1.4S, 1.5S, 1.6S, 1.7S, 1.8S, 1.9S)
5,797	98	Prop Grass, A (1S)
2,867	98	Prop Pavement (1S)
12,693	98	Prop Roof (1.6S, 1.8S, 1.9S)
7,727	98	Prop Walkway (1.11S, 1.12S, 1.4S, 1.5S, 1.6S, 1.8S, 1.9S)
2,414	98	Propo Walkway (1.7S)
16,779	98	Proposed Porous Pavement (1.1S, 1.2S, 1.3S)
1,962	98	Proposed Roof (1.4S)
40,061	43	Woods/grass comb., Fair, HSG A (2S, 3S)
154,932	**71**	**TOTAL AREA**

Time span=0.00-50.00 hrs, dt=0.01 hrs, 5001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1.10S: Runoff Area=7,139 sf 20.24% Impervious Runoff Depth=0.13"
Tc=6.0 min CN=51 Runoff=0.0 cfs 77 cf

Subcatchment1.11S: Runoff Area=2,896 sf 26.07% Impervious Runoff Depth=0.20"
Tc=6.0 min CN=54 Runoff=0.0 cfs 47 cf

Subcatchment1.12S: Runoff Area=2,034 sf 53.88% Impervious Runoff Depth=0.82"
Tc=6.0 min CN=71 Runoff=0.0 cfs 139 cf

Subcatchment1.1S: Runoff Area=7,859 sf 88.98% Impervious Runoff Depth=2.16"
Tc=6.0 min CN=91 Runoff=0.5 cfs 1,418 cf

Subcatchment1.2S: Runoff Area=7,256 sf 92.38% Impervious Runoff Depth=2.45"
Tc=6.0 min CN=94 Runoff=0.5 cfs 1,480 cf

Subcatchment1.3S: Runoff Area=3,083 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.2 cfs 737 cf

Subcatchment1.4S: Runoff Area=5,687 sf 65.61% Impervious Runoff Depth=1.20"
Tc=6.0 min CN=78 Runoff=0.2 cfs 569 cf

Subcatchment1.5S: Runoff Area=3,872 sf 44.32% Impervious Runoff Depth=0.55"
Tc=6.0 min CN=65 Runoff=0.0 cfs 178 cf

Subcatchment1.6S: Runoff Area=5,278 sf 76.66% Impervious Runoff Depth=1.60"
Tc=6.0 min CN=84 Runoff=0.2 cfs 703 cf

Subcatchment1.7S: Runoff Area=6,692 sf 36.07% Impervious Runoff Depth=0.34"
Tc=6.0 min CN=59 Runoff=0.0 cfs 188 cf

Subcatchment1.8S: Runoff Area=9,322 sf 85.53% Impervious Runoff Depth=1.99"
Tc=6.0 min CN=89 Runoff=0.5 cfs 1,546 cf

Subcatchment1.9S: Runoff Area=5,181 sf 65.74% Impervious Runoff Depth=1.20"
Tc=6.0 min CN=78 Runoff=0.2 cfs 518 cf

Subcatchment1S: Runoff Area=42,281 sf 78.22% Impervious Runoff Depth=1.67"
Flow Length=258' Tc=12.9 min CN=85 Runoff=1.5 cfs 5,893 cf

Subcatchment2S: Runoff Area=30,115 sf 2.54% Impervious Runoff Depth=0.02"
Flow Length=133' Tc=17.5 min CN=44 Runoff=0.0 cfs 58 cf

Subcatchment3S: Runoff Area=16,237 sf 24.20% Impervious Runoff Depth=0.25"
Flow Length=51' Slope=0.0137 '/' Tc=14.8 min CN=56 Runoff=0.0 cfs 337 cf

Reach 1.11R: SD-10 Avg. Flow Depth=0.06' Max Vel=1.02 fps Inflow=0.0 cfs 1,869 cf
12.0" Round Pipe n=0.012 L=32.0' S=0.0047 '/' Capacity=2.6 cfs Outflow=0.0 cfs 1,868 cf

Reach 1.12R: SD3 Avg. Flow Depth=0.05' Max Vel=0.85 fps Inflow=0.0 cfs 836 cf
12.0" Round Pipe n=0.012 L=70.0' S=0.0049 '/' Capacity=2.7 cfs Outflow=0.0 cfs 836 cf

Reach 1.2R: SD-5 Avg. Flow Depth=0.10' Max Vel=1.30 fps Inflow=0.1 cfs 3,772 cf
12.0" Round Pipe n=0.012 L=33.0' S=0.0045 '/' Capacity=2.6 cfs Outflow=0.1 cfs 3,772 cf

Reach 1.3R: SD-6 Avg. Flow Depth=0.08' Max Vel=1.13 fps Inflow=0.0 cfs 2,602 cf
12.0" Round Pipe n=0.012 L=59.0' S=0.0044 '/' Capacity=2.6 cfs Outflow=0.0 cfs 2,602 cf

Reach 1.4R: SD- Avg. Flow Depth=0.03' Max Vel=0.91 fps Inflow=0.0 cfs 509 cf
12.0" Round Pipe n=0.012 L=21.0' S=0.0100 '/' Capacity=3.9 cfs Outflow=0.0 cfs 509 cf

Reach 1.5R: SD14.1 Avg. Flow Depth=0.03' Max Vel=1.19 fps Inflow=0.0 cfs 694 cf
12.0" Round Pipe n=0.012 L=58.0' S=0.0162 '/' Capacity=4.9 cfs Outflow=0.0 cfs 694 cf

Reach 1.6R: SD14 Avg. Flow Depth=0.04' Max Vel=1.04 fps Inflow=0.0 cfs 759 cf
12.0" Round Pipe n=0.012 L=27.0' S=0.0100 '/' Capacity=3.9 cfs Outflow=0.0 cfs 759 cf

Reach 1.8R: SD-11 Avg. Flow Depth=0.06' Max Vel=1.24 fps Inflow=0.0 cfs 1,869 cf
12.0" Round Pipe n=0.012 L=72.0' S=0.0081 '/' Capacity=3.5 cfs Outflow=0.0 cfs 1,869 cf

Reach 1R: SD-1 Avg. Flow Depth=0.11' Max Vel=1.50 fps Inflow=0.1 cfs 5,892 cf
15.0" Round Pipe n=0.012 L=73.0' S=0.0049 '/' Capacity=4.9 cfs Outflow=0.1 cfs 5,891 cf

Pond 1.11: Filter Trench 4 Peak Elev=73.95' Storage=45 cf Inflow=0.0 cfs 47 cf
Primary=0.0 cfs 5 cf Secondary=0.0 cfs 0 cf Outflow=0.0 cfs 5 cf

Pond 1.12P: Filter Trench 5 Peak Elev=74.34' Storage=107 cf Inflow=0.0 cfs 139 cf
Outflow=0.0 cfs 66 cf

Pond 1.1P: Porous Pvmt 1 Peak Elev=75.48' Storage=914 cf Inflow=0.5 cfs 1,418 cf
Outflow=0.0 cfs 1,284 cf

Pond 1.2P: Porous Pvmt 2 Peak Elev=74.26' Storage=1,032 cf Inflow=0.5 cfs 1,480 cf
Outflow=0.0 cfs 1,170 cf

Pond 1.3P: Porous Pvmt 3 Peak Elev=74.12' Storage=440 cf Inflow=0.2 cfs 737 cf
Outflow=0.0 cfs 734 cf

Pond 1.4P: FIlter Trench 1 Peak Elev=76.24' Storage=367 cf Inflow=0.2 cfs 569 cf
Outflow=0.0 cfs 503 cf

Pond 1.5: Filter Trench 6 Peak Elev=74.02' Storage=126 cf Inflow=0.0 cfs 178 cf
Outflow=0.0 cfs 80 cf

Pond 1.6P: Filter Trench 2 Peak Elev=76.57' Storage=483 cf Inflow=0.2 cfs 703 cf
Outflow=0.0 cfs 614 cf

Pond 1.7P: Infiltration Trench 1 Peak Elev=73.03' Storage=9 cf Inflow=0.0 cfs 188 cf
Discarded=0.0 cfs 188 cf Secondary=0.0 cfs 0 cf Outflow=0.0 cfs 188 cf

Pond 1.8P: Filter Trench 3 Peak Elev=76.64' Storage=1,075 cf Inflow=0.5 cfs 1,546 cf
Primary=0.0 cfs 1,361 cf Secondary=0.0 cfs 0 cf Outflow=0.0 cfs 1,361 cf

Pond 1.9P: Infiltration Trench 2 Peak Elev=74.53' Storage=143 cf Inflow=0.2 cfs 518 cf
Discarded=0.0 cfs 518 cf Secondary=0.0 cfs 0 cf Outflow=0.0 cfs 518 cf

Pond 1P: CB-1 Peak Elev=71.62' Inflow=0.1 cfs 5,891 cf
18.0" Round Culvert n=0.012 L=95.0' S=0.0051 '/' Outflow=0.1 cfs 5,891 cf

Link SP1: Study Point 1 Inflow=1.6 cfs 11,784 cf
Primary=1.6 cfs 11,784 cf

Link SP2: Study Point 2 Inflow=0.0 cfs 58 cf
Primary=0.0 cfs 58 cf

Link SP3: Study Point 3 Inflow=0.0 cfs 337 cf
Primary=0.0 cfs 337 cf

Total Runoff Area = 154,932 sf Runoff Volume = 13,888 cf Average Runoff Depth = 1.08"
47.64% Pervious = 73,803 sf 52.36% Impervious = 81,129 sf

Summary for Subcatchment 1.10S:

Runoff = 0.0 cfs @ 12.47 hrs, Volume= 77 cf, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 -YEAR Rainfall=3.10"

	Area (sf)	CN	Description
*	1,445	98	Exist Walkway
*	5,694	39	Exist Grass, A
	7,139	51	Weighted Average
	5,694		79.76% Pervious Area
	1,445		20.24% Impervious Area

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

Summary for Subcatchment 1.11S:

Runoff = 0.0 cfs @ 12.38 hrs, Volume= 47 cf, Depth= 0.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 -YEAR Rainfall=3.10"

	Area (sf)	CN	Description
*	755	98	Prop Walkway
*	2,141	39	Prop Grass, A
	2,896	54	Weighted Average
	2,141		73.93% Pervious Area
	755		26.07% Impervious Area

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

Summary for Subcatchment 1.12S:

Runoff = 0.0 cfs @ 12.10 hrs, Volume= 139 cf, Depth= 0.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 -YEAR Rainfall=3.10"

	Area (sf)	CN	Description
*	1,096	98	Prop Walkway
*	938	39	Prop Grass, A
	2,034	71	Weighted Average
	938		46.12% Pervious Area
	1,096		53.88% Impervious Area

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

Summary for Subcatchment 1.1S:

Runoff = 0.5 cfs @ 12.09 hrs, Volume= 1,418 cf, Depth= 2.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 -YEAR Rainfall=3.10"

	Area (sf)	CN	Description
*	6,993	98	Proposed Porous Pavement
*	866	39	Prop Grass, A
	7,859	91	Weighted Average
	866		11.02% Pervious Area
	6,993		88.98% Impervious Area

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

Summary for Subcatchment 1.2S:

Runoff = 0.5 cfs @ 12.08 hrs, Volume= 1,480 cf, Depth= 2.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 -YEAR Rainfall=3.10"

	Area (sf)	CN	Description
*	6,703	98	Proposed Porous Pavement
*	553	39	Prop Grass, A
	7,256	94	Weighted Average
	553		7.62% Pervious Area
	6,703		92.38% Impervious Area

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

Summary for Subcatchment 1.3S:

Runoff = 0.2 cfs @ 12.08 hrs, Volume= 737 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 -YEAR Rainfall=3.10"

	Area (sf)	CN	Description
*	3,083	98	Proposed Porous Pavement
	3,083		100.00% Impervious Area

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

Summary for Subcatchment 1.4S:

Runoff = 0.2 cfs @ 12.09 hrs, Volume= 569 cf, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 -YEAR Rainfall=3.10"

	Area (sf)	CN	Description
*	1,962	98	Proposed Roof
*	1,769	98	Prop Walkway
*	1,956	39	Prop Grass, A
	5,687	78	Weighted Average
	1,956		34.39% Pervious Area
	3,731		65.61% Impervious Area

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

Summary for Subcatchment 1.5S:

Runoff = 0.0 cfs @ 12.11 hrs, Volume= 178 cf, Depth= 0.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 -YEAR Rainfall=3.10"

	Area (sf)	CN	Description
*	1,716	98	Prop Walkway
*	2,156	39	Prop Grass, A
	3,872	65	Weighted Average
	2,156		55.68% Pervious Area
	1,716		44.32% Impervious Area

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

Summary for Subcatchment 1.6S:

Runoff = 0.2 cfs @ 12.09 hrs, Volume= 703 cf, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 -YEAR Rainfall=3.10"

	Area (sf)	CN	Description
*	586	39	Exist Grass, A
*	3,203	98	Prop Roof
*	843	98	Prop Walkway
*	646	39	Prop Grass, A
	5,278	84	Weighted Average
	1,232		23.34% Pervious Area
	4,046		76.66% Impervious Area

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

Summary for Subcatchment 1.7S:

Runoff = 0.0 cfs @ 12.14 hrs, Volume= 188 cf, Depth= 0.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 -YEAR Rainfall=3.10"

	Area (sf)	CN	Description
*	335	8	Exist Walkway
*	2,414	98	Propo Walkway
*	3,943	39	Prop Grass, A
	6,692	59	Weighted Average
	4,278		63.93% Pervious Area
	2,414		36.07% Impervious Area

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

Summary for Subcatchment 1.8S:

Runoff = 0.5 cfs @ 12.09 hrs, Volume= 1,546 cf, Depth= 1.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 -YEAR Rainfall=3.10"

	Area (sf)	CN	Description
*	7,323	98	Prop Roof
*	650	98	Prop Walkway
*	1,349	39	Prop Grass, A
	9,322	89	Weighted Average
	1,349		14.47% Pervious Area
	7,973		85.53% Impervious Area

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

Summary for Subcatchment 1.9S:

Runoff = 0.2 cfs @ 12.09 hrs, Volume= 518 cf, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 -YEAR Rainfall=3.10"

	Area (sf)	CN	Description
*	341	98	Exist Walkway
*	2,167	98	Prop Roof
*	898	98	Prop Walkway
*	1,775	39	Prop Grass, A
	5,181	78	Weighted Average
	1,775		34.26% Pervious Area
	3,406		65.74% Impervious Area

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

Summary for Subcatchment 1S:

Runoff = 1.5 cfs @ 12.18 hrs, Volume= 5,893 cf, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 -YEAR Rainfall=3.10"

	Area (sf)	CN	Description
*	24,410	98	Existing Pavement
*	2,867	98	Prop Pavement
*	9,207	39	Exist Grass, A
*	5,797	98	Prop Grass, A
	42,281	85	Weighted Average
	9,207		21.78% Pervious Area
	33,074		78.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	77	0.0195	0.11		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.10"
0.2	36	0.0306	3.55		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
0.3	50	0.0046	3.33	2.62	**Pipe Channel, C-D** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Corrugated PP, smooth interior
0.5	95	0.0051	3.51	2.76	**Pipe Channel, D-E** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Corrugated PP, smooth interior
12.9	258	Total			

Summary for Subcatchment 2S:

Runoff = 0.0 cfs @ 17.21 hrs, Volume= 58 cf, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 -YEAR Rainfall=3.10"

	Area (sf)	CN	Description
	29,350	43	Woods/grass comb., Fair, HSG A
*	765	98	Existing Walkway
	30,115	44	Weighted Average
	29,350		97.46% Pervious Area
	765		2.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	44	0.0158	0.06		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
5.1	89	0.0034	0.29		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
17.5	133	Total			

Summary for Subcatchment 3S:

Runoff = 0.0 cfs @ 12.46 hrs, Volume= 337 cf, Depth= 0.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 -YEAR Rainfall=3.10"

	Area (sf)	CN	Description
	10,711	43	Woods/grass comb., Fair, HSG A
*	3,929	98	Existing Walkway
*	1,597	39	Exist Grass, A
	16,237	56	Weighted Average
	12,308		75.80% Pervious Area
	3,929		24.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	51	0.0137	0.06		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"

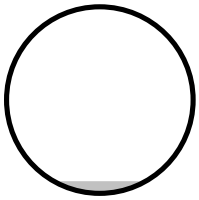
Summary for Reach 1.11R: SD-10

Inflow Area = 17,905 sf, 69.58% Impervious, Inflow Depth > 1.25" for 2 -YEAR event
Inflow = 0.0 cfs @ 16.35 hrs, Volume= 1,869 cf
Outflow = 0.0 cfs @ 16.36 hrs, Volume= 1,868 cf, Atten= 0%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 1.02 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 0.85 fps, Avg. Travel Time= 0.6 min

Peak Storage= 1 cf @ 16.35 hrs
Average Depth at Peak Storage= 0.06'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.6 cfs

12.0" Round Pipe
n= 0.012
Length= 32.0' Slope= 0.0047 '/'
Inlet Invert= 72.81', Outlet Invert= 72.66'



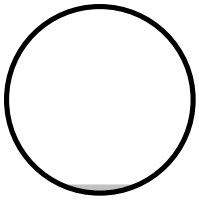
Summary for Reach 1.12R: SD3

Inflow Area = 18,323 sf, 45.31% Impervious, Inflow Depth > 0.55" for 2 -YEAR event
Inflow = 0.0 cfs @ 15.58 hrs, Volume= 836 cf
Outflow = 0.0 cfs @ 15.61 hrs, Volume= 836 cf, Atten= 0%, Lag= 1.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.85 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 0.68 fps, Avg. Travel Time= 1.7 min

Peak Storage= 1 cf @ 15.59 hrs
Average Depth at Peak Storage= 0.05'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.7 cfs

12.0" Round Pipe
n= 0.012
Length= 70.0' Slope= 0.0049 '/'
Inlet Invert= 72.39', Outlet Invert= 72.05'



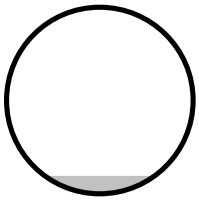
Summary for Reach 1.2R: SD-5

Inflow Area = 28,244 sf, 78.76% Impervious, Inflow Depth > 1.60" for 2 -YEAR event
Inflow = 0.1 cfs @ 15.14 hrs, Volume= 3,772 cf
Outflow = 0.1 cfs @ 15.15 hrs, Volume= 3,772 cf, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.30 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 0.91 fps, Avg. Travel Time= 0.6 min

Peak Storage= 1 cf @ 15.14 hrs
Average Depth at Peak Storage= 0.10'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.6 cfs

12.0" Round Pipe
n= 0.012
Length= 33.0' Slope= 0.0045 '/'
Inlet Invert= 72.20', Outlet Invert= 72.05'



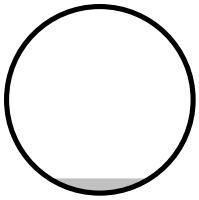
Summary for Reach 1.3R: SD-6

Inflow Area = 20,988 sf, 74.05% Impervious, Inflow Depth > 1.49" for 2 -YEAR event
Inflow = 0.0 cfs @ 15.05 hrs, Volume= 2,602 cf
Outflow = 0.0 cfs @ 15.08 hrs, Volume= 2,602 cf, Atten= 0%, Lag= 1.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.13 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 0.82 fps, Avg. Travel Time= 1.2 min

Peak Storage= 2 cf @ 15.06 hrs
Average Depth at Peak Storage= 0.08'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.6 cfs

12.0" Round Pipe
n= 0.012
Length= 59.0' Slope= 0.0044 '/'
Inlet Invert= 72.56', Outlet Invert= 72.30'



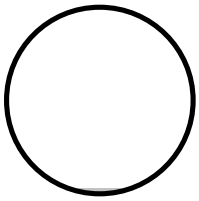
Summary for Reach 1.4R: SD-

Inflow Area = 8,583 sf, 52.27% Impervious, Inflow Depth > 0.71" for 2 -YEAR event
Inflow = 0.0 cfs @ 16.76 hrs, Volume= 509 cf
Outflow = 0.0 cfs @ 16.77 hrs, Volume= 509 cf, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 0.91 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 0.75 fps, Avg. Travel Time= 0.5 min

Peak Storage= 0 cf @ 16.76 hrs
Average Depth at Peak Storage= 0.03'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.9 cfs

12.0" Round Pipe
n= 0.012
Length= 21.0' Slope= 0.0100 '/'
Inlet Invert= 73.80', Outlet Invert= 73.59'



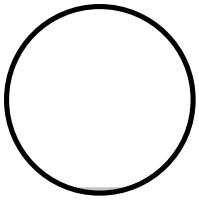
Summary for Reach 1.5R: SD14.1

Inflow Area = 9,150 sf, 62.97% Impervious, Inflow Depth > 0.91" for 2 -YEAR event
Inflow = 0.0 cfs @ 17.92 hrs, Volume= 694 cf
Outflow = 0.0 cfs @ 17.95 hrs, Volume= 694 cf, Atten= 0%, Lag= 1.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.19 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 0.99 fps, Avg. Travel Time= 1.0 min

Peak Storage= 0 cf @ 17.93 hrs
Average Depth at Peak Storage= 0.03'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.9 cfs

12.0" Round Pipe
n= 0.012
Length= 58.0' Slope= 0.0162 '/'
Inlet Invert= 73.80', Outlet Invert= 72.86'



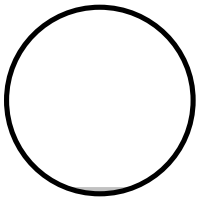
Summary for Reach 1.6R: SD14

Inflow Area = 11,184 sf, 61.32% Impervious, Inflow Depth > 0.81" for 2 -YEAR event
Inflow = 0.0 cfs @ 18.09 hrs, Volume= 759 cf
Outflow = 0.0 cfs @ 18.10 hrs, Volume= 759 cf, Atten= 0%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.04 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 0.85 fps, Avg. Travel Time= 0.5 min

Peak Storage= 0 cf @ 18.10 hrs
Average Depth at Peak Storage= 0.04'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.9 cfs

12.0" Round Pipe
n= 0.012
Length= 27.0' Slope= 0.0100 '/'
Inlet Invert= 72.76', Outlet Invert= 72.49'



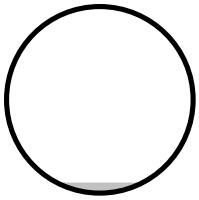
Summary for Reach 1.8R: SD-11

Inflow Area = 17,905 sf, 69.58% Impervious, Inflow Depth > 1.25" for 2 -YEAR event
Inflow = 0.0 cfs @ 16.32 hrs, Volume= 1,869 cf
Outflow = 0.0 cfs @ 16.35 hrs, Volume= 1,869 cf, Atten= 0%, Lag= 1.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 1.24 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 1.03 fps, Avg. Travel Time= 1.2 min

Peak Storage= 1 cf @ 16.33 hrs
Average Depth at Peak Storage= 0.06'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.5 cfs

12.0" Round Pipe
n= 0.012
Length= 72.0' Slope= 0.0081 '/'
Inlet Invert= 73.49', Outlet Invert= 72.91'



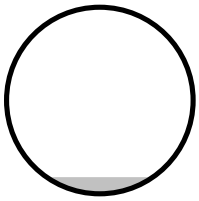
Summary for Reach 1R: SD-1

Inflow Area = 54,426 sf, 68.98% Impervious, Inflow Depth > 1.30" for 2 -YEAR event
Inflow = 0.1 cfs @ 15.34 hrs, Volume= 5,892 cf
Outflow = 0.1 cfs @ 15.36 hrs, Volume= 5,891 cf, Atten= 0%, Lag= 1.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.50 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 1.03 fps, Avg. Travel Time= 1.2 min

Peak Storage= 4 cf @ 15.35 hrs
Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 4.9 cfs

15.0" Round Pipe
n= 0.012
Length= 73.0' Slope= 0.0049 '/'
Inlet Invert= 71.95', Outlet Invert= 71.59'



Summary for Pond 1.11: Filter Trench 4

Inflow Area = 2,896 sf, 26.07% Impervious, Inflow Depth = 0.20" for 2 -YEAR event
Inflow = 0.0 cfs @ 12.38 hrs, Volume= 47 cf
Outflow = 0.0 cfs @ 24.06 hrs, Volume= 5 cf, Atten= 92%, Lag= 701.0 min
Primary = 0.0 cfs @ 24.06 hrs, Volume= 5 cf
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 73.95' @ 24.06 hrs Surf.Area= 300 sf Storage= 45 cf

Plug-Flow detention time= 799.5 min calculated for 5 cf (11% of inflow)

Center-of-Mass det. time= 569.1 min (1,541.0 - 971.9)

Volume	Invert	Avail.Storage	Storage Description
#1	73.57'	499 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.57	300	0.0	0	0
73.58	300	40.0	1	1
74.57	300	40.0	119	120
74.58	300	20.0	1	121
75.57	300	20.0	59	180
75.58	300	10.0	0	180
75.74	300	10.0	5	185
75.75	300	40.0	1	186
77.74	300	40.0	239	425
77.75	300	40.0	1	426
77.99	300	40.0	29	455
78.10	500	100.0	44	499

Device	Routing	Invert	Outlet Devices
#1	Primary	73.92'	**8.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 73.92' / 73.90' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#2	Device 1	73.92'	**0.4" Vert. Orifice/Grate** C= 0.600
#3	Secondary	78.00'	**220.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.0 cfs @ 24.06 hrs HW=73.95' (Free Discharge)
└**1=Culvert** (Passes 0.0 cfs of 0.0 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 0.0 cfs @ 0.57 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=73.57' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 1.12P: Filter Trench 5

Inflow Area = 2,034 sf, 53.88% Impervious, Inflow Depth = 0.82" for 2 -YEAR event
Inflow = 0.0 cfs @ 12.10 hrs, Volume= 139 cf
Outflow = 0.0 cfs @ 21.64 hrs, Volume= 66 cf, Atten= 98%, Lag= 572.6 min
Primary = 0.0 cfs @ 21.64 hrs, Volume= 66 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 74.34' @ 21.64 hrs Surf.Area= 510 sf Storage= 107 cf

Plug-Flow detention time= 781.3 min calculated for 66 cf (48% of inflow)
Center-of-Mass det. time= 642.0 min (1,516.5 - 874.5)

Volume	Invert	Avail.Storage	Storage Description
#1	73.82'	1,094 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.82	510	0.0	0	0
73.83	510	40.0	2	2
74.82	510	40.0	202	204
74.83	510	20.0	1	205
75.82	510	20.0	101	306
75.83	510	10.0	1	307
75.99	510	10.0	8	315
76.00	510	40.0	2	317
77.99	510	40.0	406	723
78.00	510	40.0	2	725
78.24	510	40.0	49	774
78.25	510	100.0	5	779
78.75	750	100.0	315	1,094

Device	Routing	Invert	Outlet Devices
#1	Primary	74.17'	**6.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 74.17' / 74.15' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Device 1	74.17'	**0.3" Vert. Orifice/Grate** C= 0.600
#3	Device 1	78.35'	**1.0" W x 7.0" H Vert. Orifice/Grate X 27.00** C= 0.600

Primary OutFlow Max=0.0 cfs @ 21.64 hrs HW=74.34' (Free Discharge)
└─**1=Culvert** (Passes 0.0 cfs of 0.1 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.0 cfs @ 1.94 fps)
  └─**3=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond 1.1P: Porous Pvmt 1

Inflow Area = 7,859 sf, 88.98% Impervious, Inflow Depth = 2.16" for 2 -YEAR event
Inflow = 0.5 cfs @ 12.09 hrs, Volume= 1,418 cf
Outflow = 0.0 cfs @ 15.01 hrs, Volume= 1,284 cf, Atten= 96%, Lag= 175.4 min
Primary = 0.0 cfs @ 15.01 hrs, Volume= 1,284 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 75.48' @ 15.01 hrs Surf.Area= 1,296 sf Storage= 914 cf

Plug-Flow detention time= 562.5 min calculated for 1,284 cf (91% of inflow)
Center-of-Mass det. time= 516.4 min (1,320.0 - 803.7)

Volume	Invert	Avail.Storage	Storage Description
#1	72.72'	1,402 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
72.72	1,296	0.0	0	0
72.73	1,296	30.0	4	4
73.72	1,296	30.0	385	389
73.73	1,296	10.0	1	390
74.71	1,296	10.0	127	517
74.72	1,296	40.0	5	522
76.22	1,296	40.0	778	1,300
76.23	1,296	10.0	1	1,301
76.88	1,296	10.0	84	1,385
76.89	50	100.0	7	1,392
77.00	120	100.0	9	1,402

Device	Routing	Invert	Outlet Devices
#1	Primary	72.56'	**12.0" Round Outfall** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 72.56' / 72.36' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	73.06'	**0.7" Vert. Orifice** C= 0.600
#3	Device 2	73.06'	**4.0" Vert. 4" UD** C= 0.600
#4	Device 1	76.89'	**2.0" x 2.0" Horiz. Orifice/Grate X 7.00 columns** X 7 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.0 cfs @ 15.01 hrs HW=75.48' (Free Discharge)
└─**1=Outfall** (Passes 0.0 cfs of 4.6 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 0.0 cfs @ 7.44 fps)
  │ └─**3=4" UD** (Passes 0.0 cfs of 0.6 cfs potential flow)
  └─**4=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond 1.2P: Porous Pvmt 2

Inflow Area = 7,256 sf, 92.38% Impervious, Inflow Depth = 2.45" for 2 -YEAR event
Inflow = 0.5 cfs @ 12.08 hrs, Volume= 1,480 cf
Outflow = 0.0 cfs @ 15.19 hrs, Volume= 1,170 cf, Atten= 96%, Lag= 186.5 min
Primary = 0.0 cfs @ 15.19 hrs, Volume= 1,170 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 74.26' @ 15.19 hrs Surf.Area= 2,916 sf Storage= 1,032 cf

Plug-Flow detention time= 706.7 min calculated for 1,170 cf (79% of inflow)
Center-of-Mass det. time= 629.8 min (1,417.9 - 788.2)

Volume	Invert	Avail.Storage	Storage Description
#1	72.72'	3,141 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
72.72	2,916	0.0	0	0
72.73	2,916	30.0	9	9
73.72	2,916	30.0	866	875
73.73	2,916	10.0	3	878
74.71	2,916	10.0	286	1,163
74.72	2,916	40.0	12	1,175
76.22	2,916	40.0	1,750	2,925
76.23	2,916	10.0	3	2,928
76.88	2,916	10.0	190	3,117
76.89	50	100.0	15	3,132
77.00	120	100.0	9	3,141

Device	Routing	Invert	Outlet Devices
#1	Primary	72.20'	**12.0" Round Outfall** L= 29.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 72.20' / 72.05' S= 0.0052 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	73.06'	**0.8" Vert. Orifice** C= 0.600
#3	Device 2	73.06'	**4.0" Vert. 4" UD** C= 0.600
#4	Device 1	76.89'	**2.0" x 2.0" Horiz. Orifice/Grate X 7.00 columns** X 7 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.0 cfs @ 15.19 hrs HW=74.26' (Free Discharge)
└**1=Outfall** (Passes 0.0 cfs of 3.7 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 0.0 cfs @ 5.20 fps)
  │ └**3=4" UD** (Passes 0.0 cfs of 0.4 cfs potential flow)
  └**4=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond 1.3P: Porous Pvmt 3

Inflow Area = 3,083 sf,100.00% Impervious, Inflow Depth = 2.87" for 2 -YEAR event
Inflow = 0.2 cfs @ 12.08 hrs, Volume= 737 cf
Outflow = 0.0 cfs @ 14.04 hrs, Volume= 734 cf, Atten= 95%, Lag= 117.2 min
Primary = 0.0 cfs @ 14.04 hrs, Volume= 734 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 74.12' @ 14.04 hrs Surf.Area= 1,296 sf Storage= 440 cf

Plug-Flow detention time= 528.4 min calculated for 734 cf (100% of inflow)
Center-of-Mass det. time= 525.6 min (1,282.7 - 757.1)

Volume	Invert	Avail.Storage	Storage Description
#1	72.72'	1,402 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
72.72	1,296	0.0	0	0
72.73	1,296	30.0	4	4
73.72	1,296	30.0	385	389
73.73	1,296	10.0	1	390
74.71	1,296	10.0	127	517
74.72	1,296	40.0	5	522
76.22	1,296	40.0	778	1,300
76.23	1,296	10.0	1	1,301
76.88	1,296	10.0	84	1,385
76.89	50	100.0	7	1,392
77.00	120	100.0	9	1,402

Device	Routing	Invert	Outlet Devices
#1	Primary	72.39'	**12.0" Round Outfall** L= 91.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 72.39' / 71.58' S= 0.0089 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	72.72'	**0.6" Vert. Orifice** C= 0.600
#3	Device 2	72.72'	**4.0" Vert. 4" UD** C= 0.600
#4	Primary	76.89'	**2.0" x 2.0" Horiz. Orifice/Grate X 7.00 columns** X 7 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.0 cfs @ 14.04 hrs HW=74.12' (Free Discharge)
- **1=Outfall** (Passes 0.0 cfs of 3.3 cfs potential flow)
  - **2=Orifice** (Orifice Controls 0.0 cfs @ 5.64 fps)
    - **3=4" UD** (Passes 0.0 cfs of 0.5 cfs potential flow)
- **4=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond 1.4P: FIlter Trench 1

Inflow Area = 5,687 sf, 65.61% Impervious, Inflow Depth = 1.20" for 2 -YEAR event
Inflow = 0.2 cfs @ 12.09 hrs, Volume= 569 cf
Outflow = 0.0 cfs @ 16.76 hrs, Volume= 503 cf, Atten= 96%, Lag= 279.8 min
Primary = 0.0 cfs @ 16.76 hrs, Volume= 503 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 76.24' @ 16.76 hrs Surf.Area= 450 sf Storage= 367 cf

Plug-Flow detention time= 700.0 min calculated for 503 cf (88% of inflow)
Center-of-Mass det. time= 645.6 min (1,496.5 - 850.9)

Volume	Invert	Avail.Storage	Storage Description
#1	73.57'	831 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.57	450	0.0	0	0
73.58	450	40.0	2	2
74.57	450	40.0	178	180
74.58	450	20.0	1	181
75.57	450	20.0	89	270
75.58	450	10.0	0	270
75.74	450	10.0	7	278
75.75	450	40.0	2	279
77.74	450	40.0	358	638
77.75	450	40.0	2	639
77.99	450	40.0	43	683
78.00	450	100.0	5	687
78.25	700	100.0	144	831

Device	Routing	Invert	Outlet Devices
#1	Primary	73.92'	**6.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 73.92' / 73.90' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Device 1	73.92'	**0.4" Vert. Orifice/Grate** C= 0.600
#3	Device 1	78.00'	**1.0" W x 7.0" H Vert. Orifice/Grate X 27.00** C= 0.600

Primary OutFlow Max=0.0 cfs @ 16.76 hrs HW=76.24' (Free Discharge)
└**1=Culvert** (Passes 0.0 cfs of 1.4 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.0 cfs @ 7.30 fps)
  └**3=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond 1.5: Filter Trench 6

Inflow Area = 3,872 sf, 44.32% Impervious, Inflow Depth = 0.55" for 2 -YEAR event
Inflow = 0.0 cfs @ 12.11 hrs, Volume= 178 cf
Outflow = 0.0 cfs @ 18.77 hrs, Volume= 80 cf, Atten= 96%, Lag= 399.7 min
Primary = 0.0 cfs @ 18.77 hrs, Volume= 80 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 74.02' @ 18.77 hrs Surf.Area= 700 sf Storage= 126 cf

Plug-Flow detention time= 572.9 min calculated for 80 cf (45% of inflow)
Center-of-Mass det. time= 418.3 min (1,316.8 - 898.6)

Volume	Invert	Avail.Storage	Storage Description
#1	73.57'	1,128 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.57	700	0.0	0	0
73.58	700	40.0	3	3
74.57	700	40.0	277	280
74.58	700	20.0	1	281
75.57	700	20.0	139	420
75.58	700	10.0	1	421
75.74	700	10.0	11	432
75.75	700	40.0	3	435
77.74	700	40.0	557	992
77.75	700	40.0	3	995
77.99	700	40.0	67	1,062
78.10	500	100.0	66	1,128

Device	Routing	Invert	Outlet Devices
#1	Primary	73.92'	**8.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 73.92' / 73.90' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#2	Device 1	73.92'	**0.5" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.0 cfs @ 18.77 hrs HW=74.02' (Free Discharge)
↑—**1=Culvert** (Passes 0.0 cfs of 0.0 cfs potential flow)
↑—**2=Orifice/Grate** (Orifice Controls 0.0 cfs @ 1.36 fps)

Summary for Pond 1.6P: Filter Trench 2

Inflow Area = 5,278 sf, 76.66% Impervious, Inflow Depth = 1.60" for 2 -YEAR event
Inflow = 0.2 cfs @ 12.09 hrs, Volume= 703 cf
Outflow = 0.0 cfs @ 16.83 hrs, Volume= 614 cf, Atten= 97%, Lag= 284.3 min
Primary = 0.0 cfs @ 16.83 hrs, Volume= 614 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 76.57' @ 16.83 hrs Surf.Area= 510 sf Storage= 483 cf

Plug-Flow detention time= 810.5 min calculated for 614 cf (87% of inflow)
Center-of-Mass det. time= 752.5 min (1,583.5 - 831.0)

Volume	Invert	Avail.Storage	Storage Description
#1	73.57'	1,094 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.57	510	0.0	0	0
73.58	510	40.0	2	2
74.57	510	40.0	202	204
74.58	510	20.0	1	205
75.57	510	20.0	101	306
75.58	510	10.0	1	307
75.74	510	10.0	8	315
75.75	510	40.0	2	317
77.74	510	40.0	406	723
77.75	510	40.0	2	725
77.99	510	40.0	49	774
78.00	510	100.0	5	779
78.50	750	100.0	315	1,094

Device	Routing	Invert	Outlet Devices
#1	Primary	73.92'	**6.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 73.92' / 73.90' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Device 1	73.92'	**0.4" Vert. Orifice/Grate** C= 0.600
#3	Device 1	78.10'	**1.0" W x 7.0" H Vert. Orifice/Grate X 27.00** C= 0.600

Primary OutFlow Max=0.0 cfs @ 16.83 hrs HW=76.57' (Free Discharge)
└─**1=Culvert** (Passes 0.0 cfs of 1.5 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.0 cfs @ 7.81 fps)
  └─**3=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond 1.7P: Infiltration Trench 1

Inflow Area = 6,692 sf, 36.07% Impervious, Inflow Depth = 0.34" for 2 -YEAR event
Inflow = 0.0 cfs @ 12.14 hrs, Volume= 188 cf
Outflow = 0.0 cfs @ 12.35 hrs, Volume= 188 cf, Atten= 14%, Lag= 12.6 min
Discarded = 0.0 cfs @ 12.35 hrs, Volume= 188 cf
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 73.03' @ 12.35 hrs Surf.Area= 825 sf Storage= 9 cf

Plug-Flow detention time= 6.0 min calculated for 188 cf (100% of inflow)
Center-of-Mass det. time= 6.0 min (937.3 - 931.3)

Volume	Invert	Avail.Storage	Storage Description
#1	73.00'	1,548 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.00	825	0.0	0	0
73.06	825	40.0	20	20
74.27	825	40.0	399	419
74.28	825	10.0	1	420
75.27	825	10.0	82	502
75.28	825	20.0	2	503
75.44	825	20.0	26	530
75.45	825	40.0	3	533
77.45	825	40.0	660	1,193
77.46	825	40.0	3	1,196
77.70	825	40.0	79	1,275
77.71	825	100.0	8	1,284
78.00	1,000	100.0	265	1,548

Device	Routing	Invert	Outlet Devices
#1	Discarded	73.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Secondary	77.70'	**165.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.0 cfs @ 12.35 hrs HW=73.03' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=73.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 1.8P: Filter Trench 3

Inflow Area = 9,322 sf, 85.53% Impervious, Inflow Depth = 1.99" for 2 -YEAR event
Inflow = 0.5 cfs @ 12.09 hrs, Volume= 1,546 cf
Outflow = 0.0 cfs @ 16.10 hrs, Volume= 1,361 cf, Atten= 97%, Lag= 240.8 min
Primary = 0.0 cfs @ 16.10 hrs, Volume= 1,361 cf
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 76.64' @ 16.10 hrs Surf.Area= 1,100 sf Storage= 1,075 cf

Plug-Flow detention time= 801.1 min calculated for 1,360 cf (88% of inflow)
Center-of-Mass det. time= 745.9 min (1,558.2 - 812.3)

Volume	Invert	Avail.Storage	Storage Description
#1	73.57'	1,812 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.57	1,100	0.0	0	0
73.58	1,100	40.0	4	4
74.57	1,100	40.0	436	440
74.58	1,100	20.0	2	442
75.57	1,100	20.0	218	660
75.58	1,100	10.0	1	661
75.74	1,100	10.0	18	679
75.75	1,100	40.0	4	683
77.74	1,100	40.0	876	1,559
77.75	1,100	40.0	4	1,563
77.99	1,100	40.0	106	1,669
78.10	1,500	100.0	143	1,812

Device	Routing	Invert	Outlet Devices
#1	Primary	73.92'	**6.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 73.92' / 73.90' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Device 1	73.92'	**0.6" Vert. Orifice/Grate** C= 0.600
#3	Device 1	77.90'	**0.4" x 13.0" Horiz. Orifice/Grate X 14.00** C= 0.600 Limited to weir flow at low heads
#4	Secondary	78.00'	**220.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.0 cfs @ 16.10 hrs HW=76.64' (Free Discharge)
└**1=Culvert** (Passes 0.0 cfs of 1.5 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.0 cfs @ 7.91 fps)
  └**3=Orifice/Grate** (Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=73.57' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 1.9P: Infiltration Trench 2

Inflow Area = 5,181 sf, 65.74% Impervious, Inflow Depth = 1.20" for 2 -YEAR event
Inflow = 0.2 cfs @ 12.09 hrs, Volume= 518 cf
Outflow = 0.0 cfs @ 11.80 hrs, Volume= 518 cf, Atten= 83%, Lag= 0.0 min
Discarded = 0.0 cfs @ 11.80 hrs, Volume= 518 cf
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 74.53' @ 12.61 hrs Surf.Area= 500 sf Storage= 143 cf

Plug-Flow detention time= 34.9 min calculated for 518 cf (100% of inflow)
Center-of-Mass det. time= 34.9 min (885.8 - 850.9)

Volume	Invert	Avail.Storage	Storage Description
#1	73.82'	834 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.82	500	0.0	0	0
73.83	500	40.0	2	2
74.82	500	40.0	198	200
74.83	500	20.0	1	201
75.82	500	20.0	99	300
75.83	500	10.0	1	301
75.99	500	10.0	8	309
76.00	500	40.0	2	311
77.99	500	40.0	398	709
78.00	500	40.0	2	711
78.24	500	40.0	48	759
78.25	600	100.0	6	764
78.35	800	100.0	70	834

Device	Routing	Invert	Outlet Devices
#1	Discarded	73.82'	**2.410 in/hr Exfiltration over Surface area**
#2	Secondary	77.70'	**80.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.0 cfs @ 11.80 hrs HW=73.83' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=73.82' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 1P: CB-1

Inflow Area = 54,426 sf, 68.98% Impervious, Inflow Depth > 1.30" for 2 -YEAR event
Inflow = 0.1 cfs @ 15.36 hrs, Volume= 5,891 cf
Outflow = 0.1 cfs @ 15.36 hrs, Volume= 5,891 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.1 cfs @ 15.36 hrs, Volume= 5,891 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 71.62' @ 15.36 hrs
Flood Elev= 76.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	71.48'	**18.0" Round Culvert** L= 95.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 71.48' / 71.00' S= 0.0051 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=0.1 cfs @ 15.36 hrs HW=71.62' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 0.1 cfs @ 1.44 fps)

Summary for Link SP1: Study Point 1

Inflow Area = 96,707 sf, 73.02% Impervious, Inflow Depth > 1.46" for 2 -YEAR event
Inflow = 1.6 cfs @ 12.18 hrs, Volume= 11,784 cf
Primary = 1.6 cfs @ 12.18 hrs, Volume= 11,784 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs

Summary for Link SP2: Study Point 2

Inflow Area = 30,115 sf, 2.54% Impervious, Inflow Depth = 0.02" for 2 -YEAR event
Inflow = 0.0 cfs @ 17.21 hrs, Volume= 58 cf
Primary = 0.0 cfs @ 17.21 hrs, Volume= 58 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs

Summary for Link SP3: Study Point 3

Inflow Area = 16,237 sf, 24.20% Impervious, Inflow Depth = 0.25" for 2 -YEAR event
Inflow = 0.0 cfs @ 12.46 hrs, Volume= 337 cf
Primary = 0.0 cfs @ 12.46 hrs, Volume= 337 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs

Time span=0.00-50.00 hrs, dt=0.01 hrs, 5001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1.10S: Runoff Area=7,139 sf 20.24% Impervious Runoff Depth=0.58"
Tc=6.0 min CN=51 Runoff=0.1 cfs 347 cf

Subcatchment1.11S: Runoff Area=2,896 sf 26.07% Impervious Runoff Depth=0.73"
Tc=6.0 min CN=54 Runoff=0.0 cfs 177 cf

Subcatchment1.12S: Runoff Area=2,034 sf 53.88% Impervious Runoff Depth=1.82"
Tc=6.0 min CN=71 Runoff=0.1 cfs 308 cf

Subcatchment1.1S: Runoff Area=7,859 sf 88.98% Impervious Runoff Depth=3.59"
Tc=6.0 min CN=91 Runoff=0.7 cfs 2,354 cf

Subcatchment1.2S: Runoff Area=7,256 sf 92.38% Impervious Runoff Depth=3.91"
Tc=6.0 min CN=94 Runoff=0.7 cfs 2,367 cf

Subcatchment1.3S: Runoff Area=3,083 sf 100.00% Impervious Runoff Depth=4.36"
Tc=6.0 min CN=98 Runoff=0.3 cfs 1,121 cf

Subcatchment1.4S: Runoff Area=5,687 sf 65.61% Impervious Runoff Depth=2.38"
Tc=6.0 min CN=78 Runoff=0.4 cfs 1,126 cf

Subcatchment1.5S: Runoff Area=3,872 sf 44.32% Impervious Runoff Depth=1.39"
Tc=6.0 min CN=65 Runoff=0.1 cfs 450 cf

Subcatchment1.6S: Runoff Area=5,278 sf 76.66% Impervious Runoff Depth=2.91"
Tc=6.0 min CN=84 Runoff=0.4 cfs 1,278 cf

Subcatchment1.7S: Runoff Area=6,692 sf 36.07% Impervious Runoff Depth=1.01"
Tc=6.0 min CN=59 Runoff=0.2 cfs 566 cf

Subcatchment1.8S: Runoff Area=9,322 sf 85.53% Impervious Runoff Depth=3.39"
Tc=6.0 min CN=89 Runoff=0.8 cfs 2,634 cf

Subcatchment1.9S: Runoff Area=5,181 sf 65.74% Impervious Runoff Depth=2.38"
Tc=6.0 min CN=78 Runoff=0.3 cfs 1,026 cf

Subcatchment1S: Runoff Area=42,281 sf 78.22% Impervious Runoff Depth=3.00"
Flow Length=258' Tc=12.9 min CN=85 Runoff=2.7 cfs 10,572 cf

Subcatchment2S: Runoff Area=30,115 sf 2.54% Impervious Runoff Depth=0.29"
Flow Length=133' Tc=17.5 min CN=44 Runoff=0.1 cfs 717 cf

Subcatchment3S: Runoff Area=16,237 sf 24.20% Impervious Runoff Depth=0.84"
Flow Length=51' Slope=0.0137 '/' Tc=14.8 min CN=56 Runoff=0.2 cfs 1,140 cf

Reach 1.11R: SD-10 Avg. Flow Depth=0.13' Max Vel=1.60 fps Inflow=0.1 cfs 3,445 cf
12.0" Round Pipe n=0.012 L=32.0' S=0.0047 '/' Capacity=2.6 cfs Outflow=0.1 cfs 3,444 cf

Reach 1.12R: SD3 Avg. Flow Depth=0.11' Max Vel=1.47 fps Inflow=0.1 cfs 1,995 cf
12.0" Round Pipe n=0.012 L=70.0' S=0.0049 '/' Capacity=2.7 cfs Outflow=0.1 cfs 1,995 cf

Reach 1.2R: SD-5 Avg. Flow Depth=0.15' Max Vel=1.74 fps Inflow=0.1 cfs 6,584 cf
12.0" Round Pipe n=0.012 L=33.0' S=0.0045 '/' Capacity=2.6 cfs Outflow=0.1 cfs 6,583 cf

Reach 1.3R: SD-6 Avg. Flow Depth=0.14' Max Vel=1.62 fps Inflow=0.1 cfs 4,560 cf
12.0" Round Pipe n=0.012 L=59.0' S=0.0044 '/' Capacity=2.6 cfs Outflow=0.1 cfs 4,559 cf

Reach 1.4R: SD- Avg. Flow Depth=0.06' Max Vel=1.45 fps Inflow=0.0 cfs 1,137 cf
12.0" Round Pipe n=0.012 L=21.0' S=0.0100 '/' Capacity=3.9 cfs Outflow=0.0 cfs 1,137 cf

Reach 1.5R: SD14.1 Avg. Flow Depth=0.06' Max Vel=1.74 fps Inflow=0.0 cfs 1,433 cf
12.0" Round Pipe n=0.012 L=58.0' S=0.0162 '/' Capacity=4.9 cfs Outflow=0.0 cfs 1,433 cf

Reach 1.6R: SD14 Avg. Flow Depth=0.06' Max Vel=1.50 fps Inflow=0.0 cfs 1,648 cf
12.0" Round Pipe n=0.012 L=27.0' S=0.0100 '/' Capacity=3.9 cfs Outflow=0.0 cfs 1,648 cf

Reach 1.8R: SD-11 Avg. Flow Depth=0.11' Max Vel=1.93 fps Inflow=0.1 cfs 3,446 cf
12.0" Round Pipe n=0.012 L=72.0' S=0.0081 '/' Capacity=3.5 cfs Outflow=0.1 cfs 3,445 cf

Reach 1R: SD-1 Avg. Flow Depth=0.19' Max Vel=2.06 fps Inflow=0.2 cfs 10,794 cf
15.0" Round Pipe n=0.012 L=73.0' S=0.0049 '/' Capacity=4.9 cfs Outflow=0.2 cfs 10,792 cf

Pond 1.11: Filter Trench 4 Peak Elev=74.36' Storage=95 cf Inflow=0.0 cfs 177 cf
Primary=0.0 cfs 135 cf Secondary=0.0 cfs 0 cf Outflow=0.0 cfs 135 cf

Pond 1.12P: Filter Trench 5 Peak Elev=75.05' Storage=228 cf Inflow=0.1 cfs 308 cf
Outflow=0.0 cfs 215 cf

Pond 1.1P: Porous Pvmt 1 Peak Elev=76.89' Storage=1,392 cf Inflow=0.7 cfs 2,354 cf
Outflow=0.1 cfs 2,216 cf

Pond 1.2P: Porous Pvmt 2 Peak Elev=75.16' Storage=1,686 cf Inflow=0.7 cfs 2,367 cf
Outflow=0.0 cfs 2,025 cf

Pond 1.3P: Porous Pvmt 3 Peak Elev=75.05' Storage=692 cf Inflow=0.3 cfs 1,121 cf
Outflow=0.0 cfs 1,116 cf

Pond 1.4P: FIlter Trench 1 Peak Elev=78.01' Storage=694 cf Inflow=0.4 cfs 1,126 cf
Outflow=0.0 cfs 1,002 cf

Pond 1.5: Filter Trench 6 Peak Elev=74.59' Storage=283 cf Inflow=0.1 cfs 450 cf
Outflow=0.0 cfs 350 cf

Pond 1.6P: Filter Trench 2 Peak Elev=78.12' Storage=841 cf Inflow=0.4 cfs 1,278 cf
Outflow=0.0 cfs 1,083 cf

Pond 1.7P: Infiltration Trench 1 Peak Elev=73.32' Storage=106 cf Inflow=0.2 cfs 566 cf
Discarded=0.0 cfs 566 cf Secondary=0.0 cfs 0 cf Outflow=0.0 cfs 566 cf

Pond 1.8P: Filter Trench 3 Peak Elev=77.90' Storage=1,631 cf Inflow=0.8 cfs 2,634 cf
Primary=0.1 cfs 2,309 cf Secondary=0.0 cfs 0 cf Outflow=0.1 cfs 2,309 cf

Pond 1.9P: Infiltration Trench 2 Peak Elev=76.47' Storage=405 cf Inflow=0.3 cfs 1,026 cf
Discarded=0.0 cfs 1,026 cf Secondary=0.0 cfs 0 cf Outflow=0.0 cfs 1,026 cf

Pond 1P: CB-1 Peak Elev=71.72' Inflow=0.2 cfs 10,792 cf
18.0" Round Culvert n=0.012 L=95.0' S=0.0051 '/' Outflow=0.2 cfs 10,792 cf

Link SP1: Study Point 1 Inflow=2.9 cfs 21,363 cf
Primary=2.9 cfs 21,363 cf

Link SP2: Study Point 2 Inflow=0.1 cfs 717 cf
Primary=0.1 cfs 717 cf

Link SP3: Study Point 3 Inflow=0.2 cfs 1,140 cf
Primary=0.2 cfs 1,140 cf

Total Runoff Area = 154,932 sf Runoff Volume = 26,182 cf Average Runoff Depth = 2.03"
47.64% Pervious = 73,803 sf 52.36% Impervious = 81,129 sf

Summary for Subcatchment 1.10S:

Runoff = 0.1 cfs @ 12.13 hrs, Volume= 347 cf, Depth= 0.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 -YEAR Rainfall=4.60"

	Area (sf)	CN	Description
*	1,445	98	Exist Walkway
*	5,694	39	Exist Grass, A
	7,139	51	Weighted Average
	5,694		79.76% Pervious Area
	1,445		20.24% Impervious Area

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

Summary for Subcatchment 1.11S:

Runoff = 0.0 cfs @ 12.11 hrs, Volume= 177 cf, Depth= 0.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 -YEAR Rainfall=4.60"

	Area (sf)	CN	Description
*	755	98	Prop Walkway
*	2,141	39	Prop Grass, A
	2,896	54	Weighted Average
	2,141		73.93% Pervious Area
	755		26.07% Impervious Area

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

Summary for Subcatchment 1.12S:

Runoff = 0.1 cfs @ 12.09 hrs, Volume= 308 cf, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 -YEAR Rainfall=4.60"

	Area (sf)	CN	Description
*	1,096	98	Prop Walkway
*	938	39	Prop Grass, A
	2,034	71	Weighted Average
	938		46.12% Pervious Area
	1,096		53.88% Impervious Area

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

Summary for Subcatchment 1.1S:

Runoff = 0.7 cfs @ 12.08 hrs, Volume= 2,354 cf, Depth= 3.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 -YEAR Rainfall=4.60"

	Area (sf)	CN	Description
*	6,993	98	Proposed Porous Pavement
*	866	39	Prop Grass, A
	7,859	91	Weighted Average
	866		11.02% Pervious Area
	6,993		88.98% Impervious Area

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

Summary for Subcatchment 1.2S:

Runoff = 0.7 cfs @ 12.08 hrs, Volume= 2,367 cf, Depth= 3.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 -YEAR Rainfall=4.60"

	Area (sf)	CN	Description
*	6,703	98	Proposed Porous Pavement
*	553	39	Prop Grass, A
	7,256	94	Weighted Average
	553		7.62% Pervious Area
	6,703		92.38% Impervious Area

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

Summary for Subcatchment 1.3S:

Runoff = 0.3 cfs @ 12.08 hrs, Volume= 1,121 cf, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 -YEAR Rainfall=4.60"

	Area (sf)	CN	Description
*	3,083	98	Proposed Porous Pavement
	3,083		100.00% Impervious Area

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

Summary for Subcatchment 1.4S:

Runoff = 0.4 cfs @ 12.09 hrs, Volume= 1,126 cf, Depth= 2.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 -YEAR Rainfall=4.60"

	Area (sf)	CN	Description
*	1,962	98	Proposed Roof
*	1,769	98	Prop Walkway
*	1,956	39	Prop Grass, A
	5,687	78	Weighted Average
	1,956		34.39% Pervious Area
	3,731		65.61% Impervious Area

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

Summary for Subcatchment 1.5S:

Runoff = 0.1 cfs @ 12.10 hrs, Volume= 450 cf, Depth= 1.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 -YEAR Rainfall=4.60"

	Area (sf)	CN	Description
*	1,716	98	Prop Walkway
*	2,156	39	Prop Grass, A
	3,872	65	Weighted Average
	2,156		55.68% Pervious Area
	1,716		44.32% Impervious Area

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

Summary for Subcatchment 1.6S:

Runoff = 0.4 cfs @ 12.09 hrs, Volume= 1,278 cf, Depth= 2.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 -YEAR Rainfall=4.60"

	Area (sf)	CN	Description
*	586	39	Exist Grass, A
*	3,203	98	Prop Roof
*	843	98	Prop Walkway
*	646	39	Prop Grass, A
	5,278	84	Weighted Average
	1,232		23.34% Pervious Area
	4,046		76.66% Impervious Area

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

Summary for Subcatchment 1.7S:

Runoff = 0.2 cfs @ 12.10 hrs, Volume= 566 cf, Depth= 1.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 -YEAR Rainfall=4.60"

	Area (sf)	CN	Description
*	335	8	Exist Walkway
*	2,414	98	Propo Walkway
*	3,943	39	Prop Grass, A
	6,692	59	Weighted Average
	4,278		63.93% Pervious Area
	2,414		36.07% Impervious Area

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

Summary for Subcatchment 1.8S:

Runoff = 0.8 cfs @ 12.09 hrs, Volume= 2,634 cf, Depth= 3.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 -YEAR Rainfall=4.60"

	Area (sf)	CN	Description
*	7,323	98	Prop Roof
*	650	98	Prop Walkway
*	1,349	39	Prop Grass, A
	9,322	89	Weighted Average
	1,349		14.47% Pervious Area
	7,973		85.53% Impervious Area

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

Summary for Subcatchment 1.9S:

Runoff = 0.3 cfs @ 12.09 hrs, Volume= 1,026 cf, Depth= 2.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 -YEAR Rainfall=4.60"

	Area (sf)	CN	Description
*	341	98	Exist Walkway
*	2,167	98	Prop Roof
*	898	98	Prop Walkway
*	1,775	39	Prop Grass, A
	5,181	78	Weighted Average
	1,775		34.26% Pervious Area
	3,406		65.74% Impervious Area

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

Summary for Subcatchment 1S:

Runoff = 2.7 cfs @ 12.17 hrs, Volume= 10,572 cf, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 -YEAR Rainfall=4.60"

	Area (sf)	CN	Description
*	24,410	98	Existing Pavement
*	2,867	98	Prop Pavement
*	9,207	39	Exist Grass, A
*	5,797	98	Prop Grass, A
	42,281	85	Weighted Average
	9,207		21.78% Pervious Area
	33,074		78.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	77	0.0195	0.11		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.10"
0.2	36	0.0306	3.55		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
0.3	50	0.0046	3.33	2.62	**Pipe Channel, C-D** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Corrugated PP, smooth interior
0.5	95	0.0051	3.51	2.76	**Pipe Channel, D-E** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Corrugated PP, smooth interior
12.9	258	Total			

Summary for Subcatchment 2S:

Runoff = 0.1 cfs @ 12.55 hrs, Volume= 717 cf, Depth= 0.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 -YEAR Rainfall=4.60"

	Area (sf)	CN	Description
	29,350	43	Woods/grass comb., Fair, HSG A
*	765	98	Existing Walkway
	30,115	44	Weighted Average
	29,350		97.46% Pervious Area
	765		2.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	44	0.0158	0.06		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
5.1	89	0.0034	0.29		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
17.5	133	Total			

Summary for Subcatchment 3S:

Runoff = 0.2 cfs @ 12.25 hrs, Volume= 1,140 cf, Depth= 0.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 -YEAR Rainfall=4.60"

	Area (sf)	CN	Description
	10,711	43	Woods/grass comb., Fair, HSG A
*	3,929	98	Existing Walkway
*	1,597	39	Exist Grass, A
	16,237	56	Weighted Average
	12,308		75.80% Pervious Area
	3,929		24.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	51	0.0137	0.06		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"

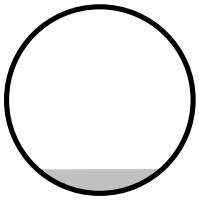
Summary for Reach 1.11R: SD-10

Inflow Area = 17,905 sf, 69.58% Impervious, Inflow Depth > 2.31" for 10 -YEAR event
Inflow = 0.1 cfs @ 12.87 hrs, Volume= 3,445 cf
Outflow = 0.1 cfs @ 12.89 hrs, Volume= 3,444 cf, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 1.60 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.01 fps, Avg. Travel Time= 0.5 min

Peak Storage= 2 cf @ 12.88 hrs
Average Depth at Peak Storage= 0.13'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.6 cfs

12.0" Round Pipe
n= 0.012
Length= 32.0' Slope= 0.0047 '/'
Inlet Invert= 72.81', Outlet Invert= 72.66'



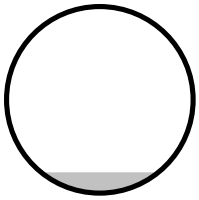
Summary for Reach 1.12R: SD3

Inflow Area = 18,323 sf, 45.31% Impervious, Inflow Depth > 1.31" for 10 -YEAR event
Inflow = 0.1 cfs @ 12.13 hrs, Volume= 1,995 cf
Outflow = 0.1 cfs @ 12.15 hrs, Volume= 1,995 cf, Atten= 1%, Lag= 1.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.47 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 0.87 fps, Avg. Travel Time= 1.3 min

Peak Storage= 3 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.7 cfs

12.0" Round Pipe
n= 0.012
Length= 70.0' Slope= 0.0049 '/'
Inlet Invert= 72.39', Outlet Invert= 72.05'



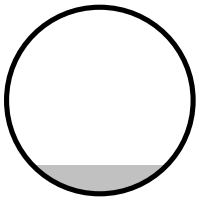
Summary for Reach 1.2R: SD-5

Inflow Area = 28,244 sf, 78.76% Impervious, Inflow Depth > 2.80" for 10 -YEAR event
Inflow = 0.1 cfs @ 12.91 hrs, Volume= 6,584 cf
Outflow = 0.1 cfs @ 12.92 hrs, Volume= 6,583 cf, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.74 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.09 fps, Avg. Travel Time= 0.5 min

Peak Storage= 3 cf @ 12.91 hrs
Average Depth at Peak Storage= 0.15'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.6 cfs

12.0" Round Pipe
n= 0.012
Length= 33.0' Slope= 0.0045 '/'
Inlet Invert= 72.20', Outlet Invert= 72.05'



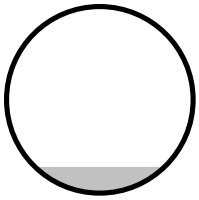
Summary for Reach 1.3R: SD-6

Inflow Area = 20,988 sf, 74.05% Impervious, Inflow Depth > 2.61" for 10 -YEAR event
Inflow = 0.1 cfs @ 12.89 hrs, Volume= 4,560 cf
Outflow = 0.1 cfs @ 12.91 hrs, Volume= 4,559 cf, Atten= 0%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.62 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 0.97 fps, Avg. Travel Time= 1.0 min

Peak Storage= 4 cf @ 12.90 hrs
Average Depth at Peak Storage= 0.14'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.6 cfs

12.0" Round Pipe
n= 0.012
Length= 59.0' Slope= 0.0044 '/'
Inlet Invert= 72.56', Outlet Invert= 72.30'



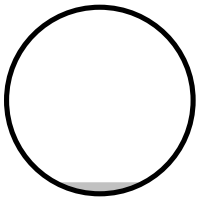
Summary for Reach 1.4R: SD-

Inflow Area = 8,583 sf, 52.27% Impervious, Inflow Depth > 1.59" for 10 -YEAR event
Inflow = 0.0 cfs @ 13.75 hrs, Volume= 1,137 cf
Outflow = 0.0 cfs @ 13.76 hrs, Volume= 1,137 cf, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 1.45 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 0.96 fps, Avg. Travel Time= 0.4 min

Peak Storage= 0 cf @ 13.76 hrs
Average Depth at Peak Storage= 0.06'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.9 cfs

12.0" Round Pipe
n= 0.012
Length= 21.0' Slope= 0.0100 '/'
Inlet Invert= 73.80', Outlet Invert= 73.59'



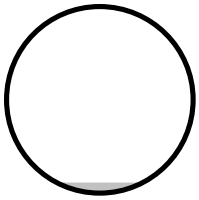
Summary for Reach 1.5R: SD14.1

Inflow Area = 9,150 sf, 62.97% Impervious, Inflow Depth > 1.88" for 10 -YEAR event
Inflow = 0.0 cfs @ 13.95 hrs, Volume= 1,433 cf
Outflow = 0.0 cfs @ 13.97 hrs, Volume= 1,433 cf, Atten= 0%, Lag= 1.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.74 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.21 fps, Avg. Travel Time= 0.8 min

Peak Storage= 1 cf @ 13.96 hrs
Average Depth at Peak Storage= 0.06'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.9 cfs

12.0" Round Pipe
n= 0.012
Length= 58.0' Slope= 0.0162 '/'
Inlet Invert= 73.80', Outlet Invert= 72.86'



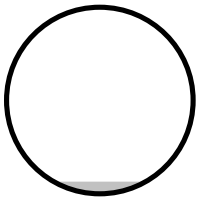
Summary for Reach 1.6R: SD14

Inflow Area = 11,184 sf, 61.32% Impervious, Inflow Depth > 1.77" for 10 -YEAR event
Inflow = 0.0 cfs @ 13.97 hrs, Volume= 1,648 cf
Outflow = 0.0 cfs @ 13.98 hrs, Volume= 1,648 cf, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.50 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.07 fps, Avg. Travel Time= 0.4 min

Peak Storage= 1 cf @ 13.97 hrs
Average Depth at Peak Storage= 0.06'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.9 cfs

12.0" Round Pipe
n= 0.012
Length= 27.0' Slope= 0.0100 '/'
Inlet Invert= 72.76', Outlet Invert= 72.49'



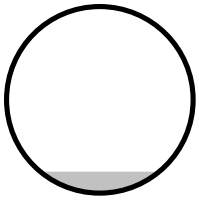
Summary for Reach 1.8R: SD-11

Inflow Area = 17,905 sf, 69.58% Impervious, Inflow Depth > 2.31" for 10 -YEAR event
Inflow = 0.1 cfs @ 12.85 hrs, Volume= 3,446 cf
Outflow = 0.1 cfs @ 12.87 hrs, Volume= 3,445 cf, Atten= 1%, Lag= 1.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 1.93 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.22 fps, Avg. Travel Time= 1.0 min

Peak Storage= 4 cf @ 12.86 hrs
Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.5 cfs

12.0" Round Pipe
n= 0.012
Length= 72.0' Slope= 0.0081 '/'
Inlet Invert= 73.49', Outlet Invert= 72.91'



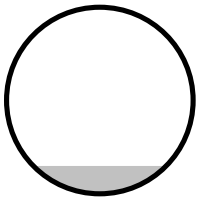
Summary for Reach 1R: SD-1

Inflow Area = 54,426 sf, 68.98% Impervious, Inflow Depth > 2.38" for 10 -YEAR event
Inflow = 0.2 cfs @ 12.91 hrs, Volume= 10,794 cf
Outflow = 0.2 cfs @ 12.93 hrs, Volume= 10,792 cf, Atten= 0%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.06 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.24 fps, Avg. Travel Time= 1.0 min

Peak Storage= 8 cf @ 12.92 hrs
Average Depth at Peak Storage= 0.19'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 4.9 cfs

15.0" Round Pipe
n= 0.012
Length= 73.0' Slope= 0.0049 '/'
Inlet Invert= 71.95', Outlet Invert= 71.59'



Summary for Pond 1.11: Filter Trench 4

Inflow Area = 2,896 sf, 26.07% Impervious, Inflow Depth = 0.73" for 10 -YEAR event
Inflow = 0.0 cfs @ 12.11 hrs, Volume= 177 cf
Outflow = 0.0 cfs @ 16.82 hrs, Volume= 135 cf, Atten= 93%, Lag= 282.2 min
Primary = 0.0 cfs @ 16.82 hrs, Volume= 135 cf
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 74.36' @ 16.82 hrs Surf.Area= 300 sf Storage= 95 cf

Plug-Flow detention time= 420.2 min calculated for 135 cf (76% of inflow)

Center-of-Mass det. time= 324.7 min (1,230.3 - 905.6)

Volume	Invert	Avail.Storage	Storage Description
#1	73.57'	499 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.57	300	0.0	0	0
73.58	300	40.0	1	1
74.57	300	40.0	119	120
74.58	300	20.0	1	121
75.57	300	20.0	59	180
75.58	300	10.0	0	180
75.74	300	10.0	5	185
75.75	300	40.0	1	186
77.74	300	40.0	239	425
77.75	300	40.0	1	426
77.99	300	40.0	29	455
78.10	500	100.0	44	499

Device	Routing	Invert	Outlet Devices
#1	Primary	73.92'	**8.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 73.92' / 73.90' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#2	Device 1	73.92'	**0.4" Vert. Orifice/Grate** C= 0.600
#3	Secondary	78.00'	**220.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.0 cfs @ 16.82 hrs HW=74.36' (Free Discharge)
└**1=Culvert** (Passes 0.0 cfs of 0.4 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 0.0 cfs @ 3.14 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=73.57' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 1.12P: Filter Trench 5

Inflow Area = 2,034 sf, 53.88% Impervious, Inflow Depth = 1.82" for 10 -YEAR event
Inflow = 0.1 cfs @ 12.09 hrs, Volume= 308 cf
Outflow = 0.0 cfs @ 19.23 hrs, Volume= 215 cf, Atten= 98%, Lag= 428.2 min
Primary = 0.0 cfs @ 19.23 hrs, Volume= 215 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 75.05' @ 19.23 hrs Surf.Area= 510 sf Storage= 228 cf

Plug-Flow detention time= 946.1 min calculated for 215 cf (70% of inflow)
Center-of-Mass det. time= 844.2 min (1,693.8 - 849.6)

Volume	Invert	Avail.Storage	Storage Description
#1	73.82'	1,094 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.82	510	0.0	0	0
73.83	510	40.0	2	2
74.82	510	40.0	202	204
74.83	510	20.0	1	205
75.82	510	20.0	101	306
75.83	510	10.0	1	307
75.99	510	10.0	8	315
76.00	510	40.0	2	317
77.99	510	40.0	406	723
78.00	510	40.0	2	725
78.24	510	40.0	49	774
78.25	510	100.0	5	779
78.75	750	100.0	315	1,094

Device	Routing	Invert	Outlet Devices
#1	Primary	74.17'	**6.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 74.17' / 74.15' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Device 1	74.17'	**0.3" Vert. Orifice/Grate** C= 0.600
#3	Device 1	78.35'	**1.0" W x 7.0" H Vert. Orifice/Grate X 27.00** C= 0.600

Primary OutFlow Max=0.0 cfs @ 19.23 hrs HW=75.05' (Free Discharge)
└─**1=Culvert** (Passes 0.0 cfs of 0.8 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.0 cfs @ 4.49 fps)
  └─**3=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond 1.1P: Porous Pvmt 1

Inflow Area = 7,859 sf, 88.98% Impervious, Inflow Depth = 3.59" for 10 -YEAR event
Inflow = 0.7 cfs @ 12.08 hrs, Volume= 2,354 cf
Outflow = 0.1 cfs @ 12.64 hrs, Volume= 2,216 cf, Atten= 87%, Lag= 33.0 min
Primary = 0.1 cfs @ 12.64 hrs, Volume= 2,216 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 76.89' @ 12.64 hrs Surf.Area= 53 sf Storage= 1,392 cf

Plug-Flow detention time= 630.4 min calculated for 2,216 cf (94% of inflow)
Center-of-Mass det. time= 598.2 min (1,387.8 - 789.6)

Volume	Invert	Avail.Storage	Storage Description
#1	72.72'	1,402 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
72.72	1,296	0.0	0	0
72.73	1,296	30.0	4	4
73.72	1,296	30.0	385	389
73.73	1,296	10.0	1	390
74.71	1,296	10.0	127	517
74.72	1,296	40.0	5	522
76.22	1,296	40.0	778	1,300
76.23	1,296	10.0	1	1,301
76.88	1,296	10.0	84	1,385
76.89	50	100.0	7	1,392
77.00	120	100.0	9	1,402

Device	Routing	Invert	Outlet Devices
#1	Primary	72.56'	**12.0" Round Outfall** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 72.56' / 72.36' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	73.06'	**0.7" Vert. Orifice** C= 0.600
#3	Device 2	73.06'	**4.0" Vert. 4" UD** C= 0.600
#4	Device 1	76.89'	**2.0" x 2.0" Horiz. Orifice/Grate X 7.00 columns** X 7 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.1 cfs @ 12.64 hrs HW=76.89' (Free Discharge)
└**1=Outfall** (Passes 0.1 cfs of 5.8 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 0.0 cfs @ 9.39 fps)
  │ └**3=4" UD** (Passes 0.0 cfs of 0.8 cfs potential flow)
  └**4=Orifice/Grate** (Weir Controls 0.0 cfs @ 0.21 fps)

Summary for Pond 1.2P: Porous Pvmt 2

Inflow Area = 7,256 sf, 92.38% Impervious, Inflow Depth = 3.91" for 10 -YEAR event
Inflow = 0.7 cfs @ 12.08 hrs, Volume= 2,367 cf
Outflow = 0.0 cfs @ 15.58 hrs, Volume= 2,025 cf, Atten= 97%, Lag= 209.8 min
Primary = 0.0 cfs @ 15.58 hrs, Volume= 2,025 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 75.16' @ 15.58 hrs Surf.Area= 2,916 sf Storage= 1,686 cf

Plug-Flow detention time= 798.7 min calculated for 2,024 cf (86% of inflow)
Center-of-Mass det. time= 736.6 min (1,512.5 - 775.9)

Volume	Invert	Avail.Storage	Storage Description
#1	72.72'	3,141 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
72.72	2,916	0.0	0	0
72.73	2,916	30.0	9	9
73.72	2,916	30.0	866	875
73.73	2,916	10.0	3	878
74.71	2,916	10.0	286	1,163
74.72	2,916	40.0	12	1,175
76.22	2,916	40.0	1,750	2,925
76.23	2,916	10.0	3	2,928
76.88	2,916	10.0	190	3,117
76.89	50	100.0	15	3,132
77.00	120	100.0	9	3,141

Device	Routing	Invert	Outlet Devices
#1	Primary	72.20'	**12.0" Round Outfall** L= 29.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 72.20' / 72.05' S= 0.0052 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	73.06'	**0.8" Vert. Orifice** C= 0.600
#3	Device 2	73.06'	**4.0" Vert. 4" UD** C= 0.600
#4	Device 1	76.89'	**2.0" x 2.0" Horiz. Orifice/Grate X 7.00 columns** X 7 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.0 cfs @ 15.58 hrs HW=75.16' (Free Discharge)
└**1=Outfall** (Passes 0.0 cfs of 4.7 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 0.0 cfs @ 6.92 fps)
  │ └**3=4" UD** (Passes 0.0 cfs of 0.6 cfs potential flow)
  └**4=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond 1.3P: Porous Pvmt 3

Inflow Area = 3,083 sf,100.00% Impervious, Inflow Depth = 4.36" for 10 -YEAR event
Inflow = 0.3 cfs @ 12.08 hrs, Volume= 1,121 cf
Outflow = 0.0 cfs @ 14.54 hrs, Volume= 1,116 cf, Atten= 95%, Lag= 147.6 min
Primary = 0.0 cfs @ 14.54 hrs, Volume= 1,116 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 75.05' @ 14.54 hrs Surf.Area= 1,296 sf Storage= 692 cf

Plug-Flow detention time= 602.9 min calculated for 1,116 cf (99% of inflow)
Center-of-Mass det. time= 599.8 min (1,349.2 - 749.4)

Volume	Invert	Avail.Storage	Storage Description
#1	72.72'	1,402 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
72.72	1,296	0.0	0	0
72.73	1,296	30.0	4	4
73.72	1,296	30.0	385	389
73.73	1,296	10.0	1	390
74.71	1,296	10.0	127	517
74.72	1,296	40.0	5	522
76.22	1,296	40.0	778	1,300
76.23	1,296	10.0	1	1,301
76.88	1,296	10.0	84	1,385
76.89	50	100.0	7	1,392
77.00	120	100.0	9	1,402

Device	Routing	Invert	Outlet Devices
#1	Primary	72.39'	**12.0" Round Outfall** L= 91.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 72.39' / 71.58' S= 0.0089 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	72.72'	**0.6" Vert. Orifice** C= 0.600
#3	Device 2	72.72'	**4.0" Vert. 4" UD** C= 0.600
#4	Primary	76.89'	**2.0" x 2.0" Horiz. Orifice/Grate X 7.00 columns** X 7 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.0 cfs @ 14.54 hrs HW=75.05' (Free Discharge)
- **1=Outfall** (Passes 0.0 cfs of 4.4 cfs potential flow)
  - **2=Orifice** (Orifice Controls 0.0 cfs @ 7.31 fps)
    - **3=4" UD** (Passes 0.0 cfs of 0.6 cfs potential flow)
- **4=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond 1.4P: FIlter Trench 1

Inflow Area = 5,687 sf, 65.61% Impervious, Inflow Depth = 2.38" for 10 -YEAR event
Inflow = 0.4 cfs @ 12.09 hrs, Volume= 1,126 cf
Outflow = 0.0 cfs @ 13.75 hrs, Volume= 1,002 cf, Atten= 93%, Lag= 99.6 min
Primary = 0.0 cfs @ 13.75 hrs, Volume= 1,002 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 78.01' @ 13.75 hrs Surf.Area= 464 sf Storage= 694 cf

Plug-Flow detention time= 786.4 min calculated for 1,002 cf (89% of inflow)
Center-of-Mass det. time= 734.2 min (1,565.1 - 830.9)

Volume	Invert	Avail.Storage	Storage Description
#1	73.57'	831 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.57	450	0.0	0	0
73.58	450	40.0	2	2
74.57	450	40.0	178	180
74.58	450	20.0	1	181
75.57	450	20.0	89	270
75.58	450	10.0	0	270
75.74	450	10.0	7	278
75.75	450	40.0	2	279
77.74	450	40.0	358	638
77.75	450	40.0	2	639
77.99	450	40.0	43	683
78.00	450	100.0	5	687
78.25	700	100.0	144	831

Device	Routing	Invert	Outlet Devices
#1	Primary	73.92'	**6.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 73.92' / 73.90' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Device 1	73.92'	**0.4" Vert. Orifice/Grate** C= 0.600
#3	Device 1	78.00'	**1.0" W x 7.0" H Vert. Orifice/Grate X 27.00** C= 0.600

Primary OutFlow Max=0.0 cfs @ 13.75 hrs HW=78.01' (Free Discharge)
└**1=Culvert** (Passes 0.0 cfs of 1.9 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.0 cfs @ 9.72 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.0 cfs @ 0.38 fps)

Summary for Pond 1.5: Filter Trench 6

Inflow Area = 3,872 sf, 44.32% Impervious, Inflow Depth = 1.39" for 10 -YEAR event
Inflow = 0.1 cfs @ 12.10 hrs, Volume= 450 cf
Outflow = 0.0 cfs @ 16.99 hrs, Volume= 350 cf, Atten= 96%, Lag= 293.4 min
Primary = 0.0 cfs @ 16.99 hrs, Volume= 350 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 74.59' @ 16.99 hrs Surf.Area= 700 sf Storage= 283 cf

Plug-Flow detention time= 600.9 min calculated for 350 cf (78% of inflow)
Center-of-Mass det. time= 513.3 min (1,379.5 - 866.2)

Volume	Invert	Avail.Storage	Storage Description
#1	73.57'	1,128 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.57	700	0.0	0	0
73.58	700	40.0	3	3
74.57	700	40.0	277	280
74.58	700	20.0	1	281
75.57	700	20.0	139	420
75.58	700	10.0	1	421
75.74	700	10.0	11	432
75.75	700	40.0	3	435
77.74	700	40.0	557	992
77.75	700	40.0	3	995
77.99	700	40.0	67	1,062
78.10	500	100.0	66	1,128

Device	Routing	Invert	Outlet Devices
#1	Primary	73.92'	**8.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 73.92' / 73.90' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#2	Device 1	73.92'	**0.5" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.0 cfs @ 16.99 hrs HW=74.59' (Free Discharge)
↑—**1=Culvert** (Passes 0.0 cfs of 0.8 cfs potential flow)
↑—**2=Orifice/Grate** (Orifice Controls 0.0 cfs @ 3.89 fps)

Summary for Pond 1.6P: Filter Trench 2

Inflow Area = 5,278 sf, 76.66% Impervious, Inflow Depth = 2.91" for 10 -YEAR event
Inflow = 0.4 cfs @ 12.09 hrs, Volume= 1,278 cf
Outflow = 0.0 cfs @ 13.94 hrs, Volume= 1,083 cf, Atten= 94%, Lag= 111.4 min
Primary = 0.0 cfs @ 13.94 hrs, Volume= 1,083 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 78.12' @ 13.94 hrs Surf.Area= 566 sf Storage= 841 cf

Plug-Flow detention time= 867.8 min calculated for 1,083 cf (85% of inflow)
Center-of-Mass det. time= 802.9 min (1,616.8 - 813.9)

Volume	Invert	Avail.Storage	Storage Description
#1	73.57'	1,094 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.57	510	0.0	0	0
73.58	510	40.0	2	2
74.57	510	40.0	202	204
74.58	510	20.0	1	205
75.57	510	20.0	101	306
75.58	510	10.0	1	307
75.74	510	10.0	8	315
75.75	510	40.0	2	317
77.74	510	40.0	406	723
77.75	510	40.0	2	725
77.99	510	40.0	49	774
78.00	510	100.0	5	779
78.50	750	100.0	315	1,094

Device	Routing	Invert	Outlet Devices
#1	Primary	73.92'	**6.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 73.92' / 73.90' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Device 1	73.92'	**0.4" Vert. Orifice/Grate** C= 0.600
#3	Device 1	78.10'	**1.0" W x 7.0" H Vert. Orifice/Grate X 27.00** C= 0.600

Primary OutFlow Max=0.0 cfs @ 13.94 hrs HW=78.12' (Free Discharge)
└**1=Culvert** (Passes 0.0 cfs of 1.9 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.0 cfs @ 9.84 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.0 cfs @ 0.41 fps)

Summary for Pond 1.7P: Infiltration Trench 1

Inflow Area = 6,692 sf, 36.07% Impervious, Inflow Depth = 1.01" for 10 -YEAR event
Inflow = 0.2 cfs @ 12.10 hrs, Volume= 566 cf
Outflow = 0.0 cfs @ 12.04 hrs, Volume= 566 cf, Atten= 70%, Lag= 0.0 min
Discarded = 0.0 cfs @ 12.04 hrs, Volume= 566 cf
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 73.32' @ 12.53 hrs Surf.Area= 825 sf Storage= 106 cf

Plug-Flow detention time= 15.2 min calculated for 566 cf (100% of inflow)
Center-of-Mass det. time= 15.2 min (900.7 - 885.4)

Volume	Invert	Avail.Storage	Storage Description
#1	73.00'	1,548 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.00	825	0.0	0	0
73.06	825	40.0	20	20
74.27	825	40.0	399	419
74.28	825	10.0	1	420
75.27	825	10.0	82	502
75.28	825	20.0	2	503
75.44	825	20.0	26	530
75.45	825	40.0	3	533
77.45	825	40.0	660	1,193
77.46	825	40.0	3	1,196
77.70	825	40.0	79	1,275
77.71	825	100.0	8	1,284
78.00	1,000	100.0	265	1,548

Device	Routing	Invert	Outlet Devices
#1	Discarded	73.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Secondary	77.70'	**165.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.0 cfs @ 12.04 hrs HW=73.06' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=73.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 1.8P: Filter Trench 3

Inflow Area = 9,322 sf, 85.53% Impervious, Inflow Depth = 3.39" for 10 -YEAR event
Inflow = 0.8 cfs @ 12.09 hrs, Volume= 2,634 cf
Outflow = 0.1 cfs @ 12.85 hrs, Volume= 2,309 cf, Atten= 90%, Lag= 45.8 min
Primary = 0.1 cfs @ 12.85 hrs, Volume= 2,309 cf
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 77.90' @ 12.85 hrs Surf.Area= 1,100 sf Storage= 1,631 cf

Plug-Flow detention time= 798.8 min calculated for 2,309 cf (88% of inflow)
Center-of-Mass det. time= 742.6 min (1,540.0 - 797.3)

Volume	Invert	Avail.Storage	Storage Description
#1	73.57'	1,812 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.57	1,100	0.0	0	0
73.58	1,100	40.0	4	4
74.57	1,100	40.0	436	440
74.58	1,100	20.0	2	442
75.57	1,100	20.0	218	660
75.58	1,100	10.0	1	661
75.74	1,100	10.0	18	679
75.75	1,100	40.0	4	683
77.74	1,100	40.0	876	1,559
77.75	1,100	40.0	4	1,563
77.99	1,100	40.0	106	1,669
78.10	1,500	100.0	143	1,812

Device	Routing	Invert	Outlet Devices
#1	Primary	73.92'	**6.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 73.92' / 73.90' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Device 1	73.92'	**0.6" Vert. Orifice/Grate** C= 0.600
#3	Device 1	77.90'	**0.4" x 13.0" Horiz. Orifice/Grate X 14.00** C= 0.600 Limited to weir flow at low heads
#4	Secondary	78.00'	**220.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.1 cfs @ 12.85 hrs HW=77.90' (Free Discharge)
└**1=Culvert** (Passes 0.1 cfs of 1.8 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.0 cfs @ 9.58 fps)
  └**3=Orifice/Grate** (Weir Controls 0.0 cfs @ 0.23 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=73.57' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 1.9P: Infiltration Trench 2

Inflow Area = 5,181 sf, 65.74% Impervious, Inflow Depth = 2.38" for 10 -YEAR event
Inflow = 0.3 cfs @ 12.09 hrs, Volume= 1,026 cf
Outflow = 0.0 cfs @ 11.61 hrs, Volume= 1,026 cf, Atten= 92%, Lag= 0.0 min
Discarded = 0.0 cfs @ 11.61 hrs, Volume= 1,026 cf
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 76.47' @ 13.37 hrs Surf.Area= 500 sf Storage= 405 cf

Plug-Flow detention time= 129.2 min calculated for 1,026 cf (100% of inflow)
Center-of-Mass det. time= 129.2 min (960.1 - 830.9)

Volume	Invert	Avail.Storage	Storage Description
#1	73.82'	834 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.82	500	0.0	0	0
73.83	500	40.0	2	2
74.82	500	40.0	198	200
74.83	500	20.0	1	201
75.82	500	20.0	99	300
75.83	500	10.0	1	301
75.99	500	10.0	8	309
76.00	500	40.0	2	311
77.99	500	40.0	398	709
78.00	500	40.0	2	711
78.24	500	40.0	48	759
78.25	600	100.0	6	764
78.35	800	100.0	70	834

Device	Routing	Invert	Outlet Devices
#1	Discarded	73.82'	**2.410 in/hr Exfiltration over Surface area**
#2	Secondary	77.70'	**80.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.0 cfs @ 11.61 hrs HW=73.83' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=73.82' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 1P: CB-1

Inflow Area = 54,426 sf, 68.98% Impervious, Inflow Depth > 2.38" for 10 -YEAR event
Inflow = 0.2 cfs @ 12.93 hrs, Volume= 10,792 cf
Outflow = 0.2 cfs @ 12.93 hrs, Volume= 10,792 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.2 cfs @ 12.93 hrs, Volume= 10,792 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 71.72' @ 12.93 hrs
Flood Elev= 76.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	71.48'	**18.0" Round Culvert** L= 95.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 71.48' / 71.00' S= 0.0051 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=0.2 cfs @ 12.93 hrs HW=71.72' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 0.2 cfs @ 1.94 fps)

Summary for Link SP1: Study Point 1

Inflow Area = 96,707 sf, 73.02% Impervious, Inflow Depth > 2.65" for 10 -YEAR event
Inflow = 2.9 cfs @ 12.17 hrs, Volume= 21,363 cf
Primary = 2.9 cfs @ 12.17 hrs, Volume= 21,363 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs

Summary for Link SP2: Study Point 2

Inflow Area = 30,115 sf, 2.54% Impervious, Inflow Depth = 0.29" for 10 -YEAR event
Inflow = 0.1 cfs @ 12.55 hrs, Volume= 717 cf
Primary = 0.1 cfs @ 12.55 hrs, Volume= 717 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs

Summary for Link SP3: Study Point 3

Inflow Area = 16,237 sf, 24.20% Impervious, Inflow Depth = 0.84" for 10 -YEAR event
Inflow = 0.2 cfs @ 12.25 hrs, Volume= 1,140 cf
Primary = 0.2 cfs @ 12.25 hrs, Volume= 1,140 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs

Time span=0.00-50.00 hrs, dt=0.01 hrs, 5001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1.10S: Runoff Area=7,139 sf 20.24% Impervious Runoff Depth=1.12"
Tc=6.0 min CN=51 Runoff=0.2 cfs 664 cf

Subcatchment1.11S: Runoff Area=2,896 sf 26.07% Impervious Runoff Depth=1.33"
Tc=6.0 min CN=54 Runoff=0.1 cfs 321 cf

Subcatchment1.12S: Runoff Area=2,034 sf 53.88% Impervious Runoff Depth=2.74"
Tc=6.0 min CN=71 Runoff=0.1 cfs 464 cf

Subcatchment1.1S: Runoff Area=7,859 sf 88.98% Impervious Runoff Depth=4.76"
Tc=6.0 min CN=91 Runoff=1.0 cfs 3,118 cf

Subcatchment1.2S: Runoff Area=7,256 sf 92.38% Impervious Runoff Depth=5.10"
Tc=6.0 min CN=94 Runoff=0.9 cfs 3,083 cf

Subcatchment1.3S: Runoff Area=3,083 sf 100.00% Impervious Runoff Depth=5.56"
Tc=6.0 min CN=98 Runoff=0.4 cfs 1,429 cf

Subcatchment1.4S: Runoff Area=5,687 sf 65.61% Impervious Runoff Depth=3.40"
Tc=6.0 min CN=78 Runoff=0.5 cfs 1,613 cf

Subcatchment1.5S: Runoff Area=3,872 sf 44.32% Impervious Runoff Depth=2.21"
Tc=6.0 min CN=65 Runoff=0.2 cfs 712 cf

Subcatchment1.6S: Runoff Area=5,278 sf 76.66% Impervious Runoff Depth=4.01"
Tc=6.0 min CN=84 Runoff=0.6 cfs 1,764 cf

Subcatchment1.7S: Runoff Area=6,692 sf 36.07% Impervious Runoff Depth=1.71"
Tc=6.0 min CN=59 Runoff=0.3 cfs 955 cf

Subcatchment1.8S: Runoff Area=9,322 sf 85.53% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=89 Runoff=1.1 cfs 3,528 cf

Subcatchment1.9S: Runoff Area=5,181 sf 65.74% Impervious Runoff Depth=3.40"
Tc=6.0 min CN=78 Runoff=0.5 cfs 1,469 cf

Subcatchment1S: Runoff Area=42,281 sf 78.22% Impervious Runoff Depth=4.11"
Flow Length=258' Tc=12.9 min CN=85 Runoff=3.7 cfs 14,496 cf

Subcatchment2S: Runoff Area=30,115 sf 2.54% Impervious Runoff Depth=0.66"
Flow Length=133' Tc=17.5 min CN=44 Runoff=0.2 cfs 1,663 cf

Subcatchment3S: Runoff Area=16,237 sf 24.20% Impervious Runoff Depth=1.48"
Flow Length=51' Slope=0.0137 '/' Tc=14.8 min CN=56 Runoff=0.4 cfs 2,002 cf

Reach 1.11R: SD-10 Avg. Flow Depth=0.33' Max Vel=2.74 fps Inflow=0.6 cfs 4,937 cf
12.0" Round Pipe n=0.012 L=32.0' S=0.0047 '/' Capacity=2.6 cfs Outflow=0.6 cfs 4,936 cf

Reach 1.12R: SD3 Avg. Flow Depth=0.22' Max Vel=2.21 fps Inflow=0.3 cfs 3,161 cf
12.0" Round Pipe n=0.012 L=70.0' S=0.0049 '/' Capacity=2.7 cfs Outflow=0.3 cfs 3,160 cf

Reach 1.2R: SD-5 Avg. Flow Depth=0.34' Max Vel=2.76 fps Inflow=0.7 cfs 8,995 cf
12.0" Round Pipe n=0.012 L=33.0' S=0.0045 '/' Capacity=2.6 cfs Outflow=0.7 cfs 8,995 cf

Reach 1.3R: SD-6 Avg. Flow Depth=0.34' Max Vel=2.70 fps Inflow=0.6 cfs 6,351 cf
12.0" Round Pipe n=0.012 L=59.0' S=0.0044 '/' Capacity=2.6 cfs Outflow=0.6 cfs 6,350 cf

Reach 1.4R: SD- Avg. Flow Depth=0.15' Max Vel=2.56 fps Inflow=0.2 cfs 1,757 cf
12.0" Round Pipe n=0.012 L=21.0' S=0.0100 '/' Capacity=3.9 cfs Outflow=0.2 cfs 1,757 cf

Reach 1.5R: SD14.1 Avg. Flow Depth=0.13' Max Vel=3.03 fps Inflow=0.2 cfs 2,167 cf
12.0" Round Pipe n=0.012 L=58.0' S=0.0162 '/' Capacity=4.9 cfs Outflow=0.2 cfs 2,166 cf

Reach 1.6R: SD14 Avg. Flow Depth=0.15' Max Vel=2.56 fps Inflow=0.2 cfs 2,497 cf
12.0" Round Pipe n=0.012 L=27.0' S=0.0100 '/' Capacity=3.9 cfs Outflow=0.2 cfs 2,497 cf

Reach 1.8R: SD-11 Avg. Flow Depth=0.29' Max Vel=3.33 fps Inflow=0.6 cfs 4,937 cf
12.0" Round Pipe n=0.012 L=72.0' S=0.0081 '/' Capacity=3.5 cfs Outflow=0.6 cfs 4,937 cf

Reach 1R: SD-1 Avg. Flow Depth=0.43' Max Vel=3.34 fps Inflow=1.2 cfs 15,125 cf
15.0" Round Pipe n=0.012 L=73.0' S=0.0049 '/' Capacity=4.9 cfs Outflow=1.2 cfs 15,123 cf

Pond 1.11: Filter Trench 4 Peak Elev=75.47' Storage=174 cf Inflow=0.1 cfs 321 cf
Primary=0.0 cfs 279 cf Secondary=0.0 cfs 0 cf Outflow=0.0 cfs 279 cf

Pond 1.12P: Filter Trench 5 Peak Elev=76.13' Storage=343 cf Inflow=0.1 cfs 464 cf
Outflow=0.0 cfs 331 cf

Pond 1.1P: Porous Pvmt 1 Peak Elev=76.92' Storage=1,394 cf Inflow=1.0 cfs 3,118 cf
Outflow=0.7 cfs 2,970 cf

Pond 1.2P: Porous Pvmt 2 Peak Elev=75.64' Storage=2,247 cf Inflow=0.9 cfs 3,083 cf
Outflow=0.0 cfs 2,646 cf

Pond 1.3P: Porous Pvmt 3 Peak Elev=75.48' Storage=915 cf Inflow=0.4 cfs 1,429 cf
Outflow=0.0 cfs 1,415 cf

Pond 1.4P: FIlter Trench 1 Peak Elev=78.09' Storage=729 cf Inflow=0.5 cfs 1,613 cf
Outflow=0.2 cfs 1,478 cf

Pond 1.5: Filter Trench 6 Peak Elev=75.80' Storage=449 cf Inflow=0.2 cfs 712 cf
Outflow=0.0 cfs 611 cf

Pond 1.6P: Filter Trench 2 Peak Elev=78.18' Storage=880 cf Inflow=0.6 cfs 1,764 cf
Outflow=0.2 cfs 1,556 cf

Pond 1.7P: Infiltration Trench 1 Peak Elev=73.83' Storage=273 cf Inflow=0.3 cfs 955 cf
Discarded=0.0 cfs 955 cf Secondary=0.0 cfs 0 cf Outflow=0.0 cfs 955 cf

Pond 1.8P: Filter Trench 3 Peak Elev=77.95' Storage=1,653 cf Inflow=1.1 cfs 3,528 cf
Primary=0.6 cfs 3,180 cf Secondary=0.0 cfs 0 cf Outflow=0.6 cfs 3,180 cf

Pond 1.9P: Infiltration Trench 2 Peak Elev=77.70' Storage=651 cf Inflow=0.5 cfs 1,469 cf
Discarded=0.0 cfs 1,445 cf Secondary=0.0 cfs 24 cf Outflow=0.0 cfs 1,469 cf

Pond 1P: CB-1 Peak Elev=72.05' Inflow=1.2 cfs 15,123 cf
18.0" Round Culvert n=0.012 L=95.0' S=0.0051 '/' Outflow=1.2 cfs 15,123 cf

Link SP1: Study Point 1 Inflow=4.5 cfs 29,619 cf
Primary=4.5 cfs 29,619 cf

Link SP2: Study Point 2 Inflow=0.2 cfs 1,663 cf
Primary=0.2 cfs 1,663 cf

Link SP3: Study Point 3 Inflow=0.4 cfs 2,026 cf
Primary=0.4 cfs 2,026 cf

Total Runoff Area = 154,932 sf Runoff Volume = 37,281 cf Average Runoff Depth = 2.89"
47.64% Pervious = 73,803 sf 52.36% Impervious = 81,129 sf

Summary for Subcatchment 1.10S:

Runoff = 0.2 cfs @ 12.11 hrs, Volume= 664 cf, Depth= 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

	Area (sf)	CN	Description
*	1,445	98	Exist Walkway
*	5,694	39	Exist Grass, A
	7,139	51	Weighted Average
	5,694		79.76% Pervious Area
	1,445		20.24% Impervious Area

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

Summary for Subcatchment 1.11S:

Runoff = 0.1 cfs @ 12.10 hrs, Volume= 321 cf, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

	Area (sf)	CN	Description
*	755	98	Prop Walkway
*	2,141	39	Prop Grass, A
	2,896	54	Weighted Average
	2,141		73.93% Pervious Area
	755		26.07% Impervious Area

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

Summary for Subcatchment 1.12S:

Runoff = 0.1 cfs @ 12.09 hrs, Volume= 464 cf, Depth= 2.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

	Area (sf)	CN	Description
*	1,096	98	Prop Walkway
*	938	39	Prop Grass, A
	2,034	71	Weighted Average
	938		46.12% Pervious Area
	1,096		53.88% Impervious Area

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

Summary for Subcatchment 1.1S:

Runoff = 1.0 cfs @ 12.08 hrs, Volume= 3,118 cf, Depth= 4.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

	Area (sf)	CN	Description
*	6,993	98	Proposed Porous Pavement
*	866	39	Prop Grass, A
	7,859	91	Weighted Average
	866		11.02% Pervious Area
	6,993		88.98% Impervious Area

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

Summary for Subcatchment 1.2S:

Runoff = 0.9 cfs @ 12.08 hrs, Volume= 3,083 cf, Depth= 5.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

	Area (sf)	CN	Description
*	6,703	98	Proposed Porous Pavement
*	553	39	Prop Grass, A
	7,256	94	Weighted Average
	553		7.62% Pervious Area
	6,703		92.38% Impervious Area

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

Summary for Subcatchment 1.3S:

Runoff = 0.4 cfs @ 12.08 hrs, Volume= 1,429 cf, Depth= 5.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

	Area (sf)	CN	Description
*	3,083	98	Proposed Porous Pavement
	3,083		100.00% Impervious Area

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

Summary for Subcatchment 1.4S:

Runoff = 0.5 cfs @ 12.09 hrs, Volume= 1,613 cf, Depth= 3.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

	Area (sf)	CN	Description
*	1,962	98	Proposed Roof
*	1,769	98	Prop Walkway
*	1,956	39	Prop Grass, A
	5,687	78	Weighted Average
	1,956		34.39% Pervious Area
	3,731		65.61% Impervious Area

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

Summary for Subcatchment 1.5S:

Runoff = 0.2 cfs @ 12.09 hrs, Volume= 712 cf, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

	Area (sf)	CN	Description
*	1,716	98	Prop Walkway
*	2,156	39	Prop Grass, A
	3,872	65	Weighted Average
	2,156		55.68% Pervious Area
	1,716		44.32% Impervious Area

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

Summary for Subcatchment 1.6S:

Runoff = 0.6 cfs @ 12.09 hrs, Volume= 1,764 cf, Depth= 4.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

	Area (sf)	CN	Description
*	586	39	Exist Grass, A
*	3,203	98	Prop Roof
*	843	98	Prop Walkway
*	646	39	Prop Grass, A
	5,278	84	Weighted Average
	1,232		23.34% Pervious Area
	4,046		76.66% Impervious Area

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

Summary for Subcatchment 1.7S:

Runoff = 0.3 cfs @ 12.10 hrs, Volume= 955 cf, Depth= 1.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

	Area (sf)	CN	Description
*	335	8	Exist Walkway
*	2,414	98	Propo Walkway
*	3,943	39	Prop Grass, A
	6,692	59	Weighted Average
	4,278		63.93% Pervious Area
	2,414		36.07% Impervious Area

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

Summary for Subcatchment 1.8S:

Runoff = 1.1 cfs @ 12.08 hrs, Volume= 3,528 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

	Area (sf)	CN	Description
*	7,323	98	Prop Roof
*	650	98	Prop Walkway
*	1,349	39	Prop Grass, A
	9,322	89	Weighted Average
	1,349		14.47% Pervious Area
	7,973		85.53% Impervious Area

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

Summary for Subcatchment 1.9S:

Runoff = 0.5 cfs @ 12.09 hrs, Volume= 1,469 cf, Depth= 3.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

	Area (sf)	CN	Description
*	341	98	Exist Walkway
*	2,167	98	Prop Roof
*	898	98	Prop Walkway
*	1,775	39	Prop Grass, A
	5,181	78	Weighted Average
	1,775		34.26% Pervious Area
	3,406		65.74% Impervious Area

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

Summary for Subcatchment 1S:

Runoff = 3.7 cfs @ 12.17 hrs, Volume= 14,496 cf, Depth= 4.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

	Area (sf)	CN	Description
*	24,410	98	Existing Pavement
*	2,867	98	Prop Pavement
*	9,207	39	Exist Grass, A
*	5,797	98	Prop Grass, A
	42,281	85	Weighted Average
	9,207		21.78% Pervious Area
	33,074		78.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	77	0.0195	0.11		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.10"
0.2	36	0.0306	3.55		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
0.3	50	0.0046	3.33	2.62	**Pipe Channel, C-D** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Corrugated PP, smooth interior
0.5	95	0.0051	3.51	2.76	**Pipe Channel, D-E** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Corrugated PP, smooth interior
12.9	258	Total			

Summary for Subcatchment 2S:

Runoff = 0.2 cfs @ 12.42 hrs, Volume= 1,663 cf, Depth= 0.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

	Area (sf)	CN	Description
	29,350	43	Woods/grass comb., Fair, HSG A
*	765	98	Existing Walkway
	30,115	44	Weighted Average
	29,350		97.46% Pervious Area
	765		2.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	44	0.0158	0.06		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
5.1	89	0.0034	0.29		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
17.5	133	Total			

Summary for Subcatchment 3S:

Runoff = 0.4 cfs @ 12.22 hrs, Volume= 2,002 cf, Depth= 1.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

	Area (sf)	CN	Description
	10,711	43	Woods/grass comb., Fair, HSG A
*	3,929	98	Existing Walkway
*	1,597	39	Exist Grass, A
	16,237	56	Weighted Average
	12,308		75.80% Pervious Area
	3,929		24.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	51	0.0137	0.06		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"

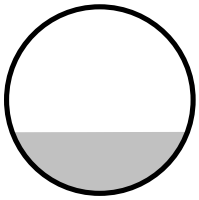
Summary for Reach 1.11R: SD-10

Inflow Area = 17,905 sf, 69.58% Impervious, Inflow Depth > 3.31" for 25-YEAR event
Inflow = 0.6 cfs @ 12.32 hrs, Volume= 4,937 cf
Outflow = 0.6 cfs @ 12.32 hrs, Volume= 4,936 cf, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 2.74 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.06 fps, Avg. Travel Time= 0.5 min

Peak Storage= 7 cf @ 12.32 hrs
Average Depth at Peak Storage= 0.33'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.6 cfs

12.0" Round Pipe
n= 0.012
Length= 32.0' Slope= 0.0047 '/'
Inlet Invert= 72.81', Outlet Invert= 72.66'



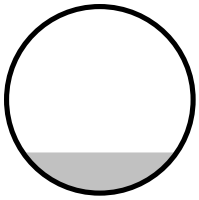
Summary for Reach 1.12R: SD3

Inflow Area = 18,323 sf, 45.31% Impervious, Inflow Depth > 2.07" for 25-YEAR event
Inflow = 0.3 cfs @ 12.39 hrs, Volume= 3,161 cf
Outflow = 0.3 cfs @ 12.40 hrs, Volume= 3,160 cf, Atten= 0%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.21 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 0.95 fps, Avg. Travel Time= 1.2 min

Peak Storage= 9 cf @ 12.39 hrs
Average Depth at Peak Storage= 0.22'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.7 cfs

12.0" Round Pipe
n= 0.012
Length= 70.0' Slope= 0.0049 '/'
Inlet Invert= 72.39', Outlet Invert= 72.05'



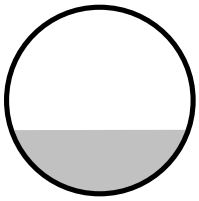
Summary for Reach 1.2R: SD-5

Inflow Area = 28,244 sf, 78.76% Impervious, Inflow Depth > 3.82" for 25-YEAR event
Inflow = 0.7 cfs @ 12.33 hrs, Volume= 8,995 cf
Outflow = 0.7 cfs @ 12.34 hrs, Volume= 8,995 cf, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.76 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.17 fps, Avg. Travel Time= 0.5 min

Peak Storage= 8 cf @ 12.34 hrs
Average Depth at Peak Storage= 0.34'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.6 cfs

12.0" Round Pipe
n= 0.012
Length= 33.0' Slope= 0.0045 '/'
Inlet Invert= 72.20', Outlet Invert= 72.05'



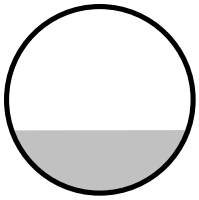
Summary for Reach 1.3R: SD-6

Inflow Area = 20,988 sf, 74.05% Impervious, Inflow Depth > 3.63" for 25-YEAR event
Inflow = 0.6 cfs @ 12.32 hrs, Volume= 6,351 cf
Outflow = 0.6 cfs @ 12.33 hrs, Volume= 6,350 cf, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.70 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.03 fps, Avg. Travel Time= 1.0 min

Peak Storage= 14 cf @ 12.33 hrs
Average Depth at Peak Storage= 0.34'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.6 cfs

12.0" Round Pipe
n= 0.012
Length= 59.0' Slope= 0.0044 '/'
Inlet Invert= 72.56', Outlet Invert= 72.30'



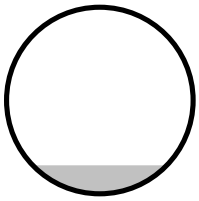
Summary for Reach 1.4R: SD-

Inflow Area = 8,583 sf, 52.27% Impervious, Inflow Depth > 2.46" for 25-YEAR event
Inflow = 0.2 cfs @ 12.36 hrs, Volume= 1,757 cf
Outflow = 0.2 cfs @ 12.37 hrs, Volume= 1,757 cf, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 2.56 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.03 fps, Avg. Travel Time= 0.3 min

Peak Storage= 2 cf @ 12.37 hrs
Average Depth at Peak Storage= 0.15'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.9 cfs

12.0" Round Pipe
n= 0.012
Length= 21.0' Slope= 0.0100 '/'
Inlet Invert= 73.80', Outlet Invert= 73.59'



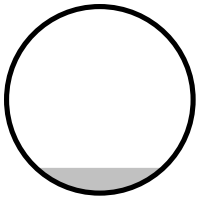
Summary for Reach 1.5R: SD14.1

Inflow Area = 9,150 sf, 62.97% Impervious, Inflow Depth > 2.84" for 25-YEAR event
Inflow = 0.2 cfs @ 12.39 hrs, Volume= 2,167 cf
Outflow = 0.2 cfs @ 12.40 hrs, Volume= 2,166 cf, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.03 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.31 fps, Avg. Travel Time= 0.7 min

Peak Storage= 4 cf @ 12.39 hrs
Average Depth at Peak Storage= 0.13'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.9 cfs

12.0" Round Pipe
n= 0.012
Length= 58.0' Slope= 0.0162 '/'
Inlet Invert= 73.80', Outlet Invert= 72.86'



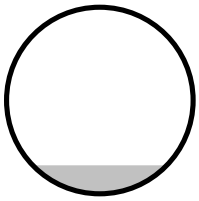
Summary for Reach 1.6R: SD14

Inflow Area = 11,184 sf, 61.32% Impervious, Inflow Depth > 2.68" for 25-YEAR event
Inflow = 0.2 cfs @ 12.40 hrs, Volume= 2,497 cf
Outflow = 0.2 cfs @ 12.40 hrs, Volume= 2,497 cf, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.56 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.17 fps, Avg. Travel Time= 0.4 min

Peak Storage= 2 cf @ 12.40 hrs
Average Depth at Peak Storage= 0.15'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.9 cfs

12.0" Round Pipe
n= 0.012
Length= 27.0' Slope= 0.0100 '/'
Inlet Invert= 72.76', Outlet Invert= 72.49'



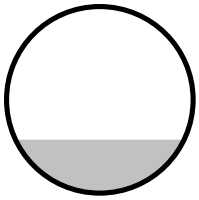
Summary for Reach 1.8R: SD-11

Inflow Area = 17,905 sf, 69.58% Impervious, Inflow Depth > 3.31" for 25-YEAR event
Inflow = 0.6 cfs @ 12.31 hrs, Volume= 4,937 cf
Outflow = 0.6 cfs @ 12.32 hrs, Volume= 4,937 cf, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 3.33 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.29 fps, Avg. Travel Time= 0.9 min

Peak Storage= 13 cf @ 12.31 hrs
Average Depth at Peak Storage= 0.29'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.5 cfs

12.0" Round Pipe
n= 0.012
Length= 72.0' Slope= 0.0081 '/'
Inlet Invert= 73.49', Outlet Invert= 72.91'



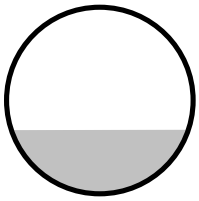
Summary for Reach 1R: SD-1

Inflow Area = 54,426 sf, 68.98% Impervious, Inflow Depth > 3.33" for 25-YEAR event
Inflow = 1.2 cfs @ 12.35 hrs, Volume= 15,125 cf
Outflow = 1.2 cfs @ 12.36 hrs, Volume= 15,123 cf, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.34 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.34 fps, Avg. Travel Time= 0.9 min

Peak Storage= 27 cf @ 12.35 hrs
Average Depth at Peak Storage= 0.43'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 4.9 cfs

15.0" Round Pipe
n= 0.012
Length= 73.0' Slope= 0.0049 '/'
Inlet Invert= 71.95', Outlet Invert= 71.59'



Summary for Pond 1.11: Filter Trench 4

Inflow Area = 2,896 sf, 26.07% Impervious, Inflow Depth = 1.33" for 25-YEAR event
Inflow = 0.1 cfs @ 12.10 hrs, Volume= 321 cf
Outflow = 0.0 cfs @ 15.98 hrs, Volume= 279 cf, Atten= 94%, Lag= 232.7 min
Primary = 0.0 cfs @ 15.98 hrs, Volume= 279 cf
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 75.47' @ 15.98 hrs Surf.Area= 300 sf Storage= 174 cf

Plug-Flow detention time= 453.1 min calculated for 279 cf (87% of inflow)

Center-of-Mass det. time= 392.5 min (1,275.6 - 883.0)

Volume	Invert	Avail.Storage	Storage Description
#1	73.57'	499 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.57	300	0.0	0	0
73.58	300	40.0	1	1
74.57	300	40.0	119	120
74.58	300	20.0	1	121
75.57	300	20.0	59	180
75.58	300	10.0	0	180
75.74	300	10.0	5	185
75.75	300	40.0	1	186
77.74	300	40.0	239	425
77.75	300	40.0	1	426
77.99	300	40.0	29	455
78.10	500	100.0	44	499

Device	Routing	Invert	Outlet Devices
#1	Primary	73.92'	**8.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 73.92' / 73.90' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#2	Device 1	73.92'	**0.4" Vert. Orifice/Grate** C= 0.600
#3	Secondary	78.00'	**220.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.0 cfs @ 15.98 hrs HW=75.47' (Free Discharge)
└**1=Culvert** (Passes 0.0 cfs of 1.9 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 0.0 cfs @ 5.97 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=73.57' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 1.12P: Filter Trench 5

Inflow Area = 2,034 sf, 53.88% Impervious, Inflow Depth = 2.74" for 25-YEAR event
Inflow = 0.1 cfs @ 12.09 hrs, Volume= 464 cf
Outflow = 0.0 cfs @ 18.42 hrs, Volume= 331 cf, Atten= 98%, Lag= 379.5 min
Primary = 0.0 cfs @ 18.42 hrs, Volume= 331 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 76.13' @ 18.42 hrs Surf.Area= 510 sf Storage= 343 cf

Plug-Flow detention time= 947.8 min calculated for 331 cf (71% of inflow)
Center-of-Mass det. time= 851.1 min (1,688.7 - 837.5)

Volume	Invert	Avail.Storage	Storage Description
#1	73.82'	1,094 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.82	510	0.0	0	0
73.83	510	40.0	2	2
74.82	510	40.0	202	204
74.83	510	20.0	1	205
75.82	510	20.0	101	306
75.83	510	10.0	1	307
75.99	510	10.0	8	315
76.00	510	40.0	2	317
77.99	510	40.0	406	723
78.00	510	40.0	2	725
78.24	510	40.0	49	774
78.25	510	100.0	5	779
78.75	750	100.0	315	1,094

Device	Routing	Invert	Outlet Devices
#1	Primary	74.17'	**6.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 74.17' / 74.15' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Device 1	74.17'	**0.3" Vert. Orifice/Grate** C= 0.600
#3	Device 1	78.35'	**1.0" W x 7.0" H Vert. Orifice/Grate X 27.00** C= 0.600

Primary OutFlow Max=0.0 cfs @ 18.42 hrs HW=76.13' (Free Discharge)
└─**1=Culvert** (Passes 0.0 cfs of 1.2 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.0 cfs @ 6.72 fps)
  └─**3=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond 1.1P: Porous Pvmt 1

Inflow Area = 7,859 sf, 88.98% Impervious, Inflow Depth = 4.76" for 25-YEAR event
Inflow = 1.0 cfs @ 12.08 hrs, Volume= 3,118 cf
Outflow = 0.7 cfs @ 12.17 hrs, Volume= 2,970 cf, Atten= 30%, Lag= 5.4 min
Primary = 0.7 cfs @ 12.17 hrs, Volume= 2,970 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 76.92' @ 12.17 hrs Surf.Area= 69 sf Storage= 1,394 cf

Plug-Flow detention time= 510.2 min calculated for 2,970 cf (95% of inflow)
Center-of-Mass det. time= 483.4 min (1,265.5 - 782.1)

Volume	Invert	Avail.Storage	Storage Description
#1	72.72'	1,402 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
72.72	1,296	0.0	0	0
72.73	1,296	30.0	4	4
73.72	1,296	30.0	385	389
73.73	1,296	10.0	1	390
74.71	1,296	10.0	127	517
74.72	1,296	40.0	5	522
76.22	1,296	40.0	778	1,300
76.23	1,296	10.0	1	1,301
76.88	1,296	10.0	84	1,385
76.89	50	100.0	7	1,392
77.00	120	100.0	9	1,402

Device	Routing	Invert	Outlet Devices
#1	Primary	72.56'	**12.0" Round Outfall** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 72.56' / 72.36' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	73.06'	**0.7" Vert. Orifice** C= 0.600
#3	Device 2	73.06'	**4.0" Vert. 4" UD** C= 0.600
#4	Device 1	76.89'	**2.0" x 2.0" Horiz. Orifice/Grate X 7.00 columns** X 7 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.6 cfs @ 12.17 hrs HW=76.92' (Free Discharge)
└**1=Outfall** (Passes 0.6 cfs of 5.9 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 0.0 cfs @ 9.42 fps)
  │ └**3=4" UD** (Passes 0.0 cfs of 0.8 cfs potential flow)
  └**4=Orifice/Grate** (Weir Controls 0.6 cfs @ 0.57 fps)

Summary for Pond 1.2P: Porous Pvmt 2

Inflow Area = 7,256 sf, 92.38% Impervious, Inflow Depth = 5.10" for 25-YEAR event
Inflow = 0.9 cfs @ 12.08 hrs, Volume= 3,083 cf
Outflow = 0.0 cfs @ 15.93 hrs, Volume= 2,646 cf, Atten= 97%, Lag= 230.7 min
Primary = 0.0 cfs @ 15.93 hrs, Volume= 2,646 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 75.64' @ 15.93 hrs Surf.Area= 2,916 sf Storage= 2,247 cf

Plug-Flow detention time= 891.7 min calculated for 2,645 cf (86% of inflow)
Center-of-Mass det. time= 830.2 min (1,599.6 - 769.4)

Volume	Invert	Avail.Storage	Storage Description
#1	72.72'	3,141 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
72.72	2,916	0.0	0	0
72.73	2,916	30.0	9	9
73.72	2,916	30.0	866	875
73.73	2,916	10.0	3	878
74.71	2,916	10.0	286	1,163
74.72	2,916	40.0	12	1,175
76.22	2,916	40.0	1,750	2,925
76.23	2,916	10.0	3	2,928
76.88	2,916	10.0	190	3,117
76.89	50	100.0	15	3,132
77.00	120	100.0	9	3,141

Device	Routing	Invert	Outlet Devices
#1	Primary	72.20'	**12.0" Round Outfall** L= 29.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 72.20' / 72.05' S= 0.0052 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	73.06'	**0.8" Vert. Orifice** C= 0.600
#3	Device 2	73.06'	**4.0" Vert. 4" UD** C= 0.600
#4	Device 1	76.89'	**2.0" x 2.0" Horiz. Orifice/Grate X 7.00 columns** X 7 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.0 cfs @ 15.93 hrs HW=75.64' (Free Discharge)
└**1=Outfall** (Passes 0.0 cfs of 5.1 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 0.0 cfs @ 7.68 fps)
  │ └**3=4" UD** (Passes 0.0 cfs of 0.7 cfs potential flow)
  └**4=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond 1.3P: Porous Pvmt 3

Inflow Area = 3,083 sf,100.00% Impervious, Inflow Depth = 5.56" for 25-YEAR event
Inflow = 0.4 cfs @ 12.08 hrs, Volume= 1,429 cf
Outflow = 0.0 cfs @ 15.07 hrs, Volume= 1,415 cf, Atten= 96%, Lag= 178.9 min
Primary = 0.0 cfs @ 15.07 hrs, Volume= 1,415 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 75.48' @ 15.07 hrs Surf.Area= 1,296 sf Storage= 915 cf

Plug-Flow detention time= 691.8 min calculated for 1,414 cf (99% of inflow)
Center-of-Mass det. time= 685.1 min (1,430.8 - 745.7)

Volume	Invert	Avail.Storage	Storage Description
#1	72.72'	1,402 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
72.72	1,296	0.0	0	0
72.73	1,296	30.0	4	4
73.72	1,296	30.0	385	389
73.73	1,296	10.0	1	390
74.71	1,296	10.0	127	517
74.72	1,296	40.0	5	522
76.22	1,296	40.0	778	1,300
76.23	1,296	10.0	1	1,301
76.88	1,296	10.0	84	1,385
76.89	50	100.0	7	1,392
77.00	120	100.0	9	1,402

Device	Routing	Invert	Outlet Devices
#1	Primary	72.39'	**12.0" Round Outfall** L= 91.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 72.39' / 71.58' S= 0.0089 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	72.72'	**0.6" Vert. Orifice** C= 0.600
#3	Device 2	72.72'	**4.0" Vert. 4" UD** C= 0.600
#4	Primary	76.89'	**2.0" x 2.0" Horiz. Orifice/Grate X 7.00 columns** X 7 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.0 cfs @ 15.07 hrs HW=75.48' (Free Discharge)
- **1=Outfall** (Passes 0.0 cfs of 4.8 cfs potential flow)
  - **2=Orifice** (Orifice Controls 0.0 cfs @ 7.96 fps)
    - **3=4" UD** (Passes 0.0 cfs of 0.7 cfs potential flow)
- **4=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond 1.4P: FIlter Trench 1

Inflow Area = 5,687 sf, 65.61% Impervious, Inflow Depth = 3.40" for 25-YEAR event
Inflow = 0.5 cfs @ 12.09 hrs, Volume= 1,613 cf
Outflow = 0.2 cfs @ 12.36 hrs, Volume= 1,478 cf, Atten= 63%, Lag= 16.6 min
Primary = 0.2 cfs @ 12.36 hrs, Volume= 1,478 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 78.09' @ 12.36 hrs Surf.Area= 536 sf Storage= 729 cf

Plug-Flow detention time= 563.9 min calculated for 1,478 cf (92% of inflow)
Center-of-Mass det. time= 521.7 min (1,342.3 - 820.6)

Volume	Invert	Avail.Storage	Storage Description
#1	73.57'	831 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.57	450	0.0	0	0
73.58	450	40.0	2	2
74.57	450	40.0	178	180
74.58	450	20.0	1	181
75.57	450	20.0	89	270
75.58	450	10.0	0	270
75.74	450	10.0	7	278
75.75	450	40.0	2	279
77.74	450	40.0	358	638
77.75	450	40.0	2	639
77.99	450	40.0	43	683
78.00	450	100.0	5	687
78.25	700	100.0	144	831

Device	Routing	Invert	Outlet Devices
#1	Primary	73.92'	**6.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 73.92' / 73.90' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Device 1	73.92'	**0.4" Vert. Orifice/Grate** C= 0.600
#3	Device 1	78.00'	**1.0" W x 7.0" H Vert. Orifice/Grate X 27.00** C= 0.600

Primary OutFlow Max=0.2 cfs @ 12.36 hrs HW=78.09' (Free Discharge)
└**1=Culvert** (Passes 0.2 cfs of 1.9 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.0 cfs @ 9.81 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.2 cfs @ 0.94 fps)

Summary for Pond 1.5: Filter Trench 6

Inflow Area = 3,872 sf, 44.32% Impervious, Inflow Depth = 2.21" for 25-YEAR event
Inflow = 0.2 cfs @ 12.09 hrs, Volume= 712 cf
Outflow = 0.0 cfs @ 16.20 hrs, Volume= 611 cf, Atten= 96%, Lag= 246.4 min
Primary = 0.0 cfs @ 16.20 hrs, Volume= 611 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 75.80' @ 16.20 hrs Surf.Area= 700 sf Storage= 449 cf

Plug-Flow detention time= 638.8 min calculated for 611 cf (86% of inflow)
Center-of-Mass det. time= 575.0 min (1,427.1 - 852.1)

Volume	Invert	Avail.Storage	Storage Description
#1	73.57'	1,128 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.57	700	0.0	0	0
73.58	700	40.0	3	3
74.57	700	40.0	277	280
74.58	700	20.0	1	281
75.57	700	20.0	139	420
75.58	700	10.0	1	421
75.74	700	10.0	11	432
75.75	700	40.0	3	435
77.74	700	40.0	557	992
77.75	700	40.0	3	995
77.99	700	40.0	67	1,062
78.10	500	100.0	66	1,128

Device	Routing	Invert	Outlet Devices
#1	Primary	73.92'	**8.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 73.92' / 73.90' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#2	Device 1	73.92'	**0.5" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.0 cfs @ 16.20 hrs HW=75.80' (Free Discharge)
↑—**1=Culvert** (Passes 0.0 cfs of 2.1 cfs potential flow)
↑—**2=Orifice/Grate** (Orifice Controls 0.0 cfs @ 6.56 fps)

Summary for Pond 1.6P: Filter Trench 2

Inflow Area = 5,278 sf, 76.66% Impervious, Inflow Depth = 4.01" for 25-YEAR event
Inflow = 0.6 cfs @ 12.09 hrs, Volume= 1,764 cf
Outflow = 0.2 cfs @ 12.39 hrs, Volume= 1,556 cf, Atten= 67%, Lag= 18.0 min
Primary = 0.2 cfs @ 12.39 hrs, Volume= 1,556 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 78.18' @ 12.39 hrs Surf.Area= 598 sf Storage= 880 cf

Plug-Flow detention time= 637.5 min calculated for 1,555 cf (88% of inflow)
Center-of-Mass det. time= 583.1 min (1,387.9 - 804.8)

Volume	Invert	Avail.Storage	Storage Description
#1	73.57'	1,094 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.57	510	0.0	0	0
73.58	510	40.0	2	2
74.57	510	40.0	202	204
74.58	510	20.0	1	205
75.57	510	20.0	101	306
75.58	510	10.0	1	307
75.74	510	10.0	8	315
75.75	510	40.0	2	317
77.74	510	40.0	406	723
77.75	510	40.0	2	725
77.99	510	40.0	49	774
78.00	510	100.0	5	779
78.50	750	100.0	315	1,094

Device	Routing	Invert	Outlet Devices
#1	Primary	73.92'	**6.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 73.92' / 73.90' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Device 1	73.92'	**0.4" Vert. Orifice/Grate** C= 0.600
#3	Device 1	78.10'	**1.0" W x 7.0" H Vert. Orifice/Grate X 27.00** C= 0.600

Primary OutFlow Max=0.2 cfs @ 12.39 hrs HW=78.18' (Free Discharge)
└**1=Culvert** (Passes 0.2 cfs of 1.9 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.0 cfs @ 9.92 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.2 cfs @ 0.93 fps)

Summary for Pond 1.7P: Infiltration Trench 1

Inflow Area = 6,692 sf, 36.07% Impervious, Inflow Depth = 1.71" for 25-YEAR event
Inflow = 0.3 cfs @ 12.10 hrs, Volume= 955 cf
Outflow = 0.0 cfs @ 11.91 hrs, Volume= 955 cf, Atten= 84%, Lag= 0.0 min
Discarded = 0.0 cfs @ 11.91 hrs, Volume= 955 cf
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 73.83' @ 12.75 hrs Surf.Area= 825 sf Storage= 273 cf

Plug-Flow detention time= 46.4 min calculated for 955 cf (100% of inflow)
Center-of-Mass det. time= 46.4 min (914.1 - 867.8)

Volume	Invert	Avail.Storage	Storage Description
#1	73.00'	1,548 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.00	825	0.0	0	0
73.06	825	40.0	20	20
74.27	825	40.0	399	419
74.28	825	10.0	1	420
75.27	825	10.0	82	502
75.28	825	20.0	2	503
75.44	825	20.0	26	530
75.45	825	40.0	3	533
77.45	825	40.0	660	1,193
77.46	825	40.0	3	1,196
77.70	825	40.0	79	1,275
77.71	825	100.0	8	1,284
78.00	1,000	100.0	265	1,548

Device	Routing	Invert	Outlet Devices
#1	Discarded	73.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Secondary	77.70'	**165.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.0 cfs @ 11.91 hrs HW=73.05' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=73.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 1.8P: Filter Trench 3

Inflow Area = 9,322 sf, 85.53% Impervious, Inflow Depth = 4.54" for 25-YEAR event
Inflow = 1.1 cfs @ 12.08 hrs, Volume= 3,528 cf
Outflow = 0.6 cfs @ 12.22 hrs, Volume= 3,180 cf, Atten= 49%, Lag= 8.3 min
Primary = 0.6 cfs @ 12.22 hrs, Volume= 3,180 cf
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 77.95' @ 12.22 hrs Surf.Area= 1,100 sf Storage= 1,653 cf

Plug-Flow detention time= 611.5 min calculated for 3,180 cf (90% of inflow)
Center-of-Mass det. time= 563.4 min (1,352.7 - 789.3)

Volume	Invert	Avail.Storage	Storage Description
#1	73.57'	1,812 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.57	1,100	0.0	0	0
73.58	1,100	40.0	4	4
74.57	1,100	40.0	436	440
74.58	1,100	20.0	2	442
75.57	1,100	20.0	218	660
75.58	1,100	10.0	1	661
75.74	1,100	10.0	18	679
75.75	1,100	40.0	4	683
77.74	1,100	40.0	876	1,559
77.75	1,100	40.0	4	1,563
77.99	1,100	40.0	106	1,669
78.10	1,500	100.0	143	1,812

Device	Routing	Invert	Outlet Devices
#1	Primary	73.92'	**6.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 73.92' / 73.90' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#2	Device 1	73.92'	**0.6" Vert. Orifice/Grate** C= 0.600
#3	Device 1	77.90'	**0.4" x 13.0" Horiz. Orifice/Grate X 14.00** C= 0.600 Limited to weir flow at low heads
#4	Secondary	78.00'	**220.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.6 cfs @ 12.22 hrs HW=77.95' (Free Discharge)
└**1=Culvert** (Passes 0.6 cfs of 1.8 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.0 cfs @ 9.64 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.6 cfs @ 1.13 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=73.57' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 1.9P: Infiltration Trench 2

Inflow Area = 5,181 sf, 65.74% Impervious, Inflow Depth = 3.40" for 25-YEAR event
Inflow = 0.5 cfs @ 12.09 hrs, Volume= 1,469 cf
Outflow = 0.0 cfs @ 13.15 hrs, Volume= 1,469 cf, Atten= 91%, Lag= 63.8 min
Discarded = 0.0 cfs @ 11.30 hrs, Volume= 1,445 cf
Secondary = 0.0 cfs @ 13.15 hrs, Volume= 24 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 77.70' @ 13.15 hrs Surf.Area= 500 sf Storage= 651 cf

Plug-Flow detention time= 218.7 min calculated for 1,469 cf (100% of inflow)
Center-of-Mass det. time= 218.7 min (1,039.3 - 820.6)

Volume	Invert	Avail.Storage	Storage Description
#1	73.82'	834 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
73.82	500	0.0	0	0
73.83	500	40.0	2	2
74.82	500	40.0	198	200
74.83	500	20.0	1	201
75.82	500	20.0	99	300
75.83	500	10.0	1	301
75.99	500	10.0	8	309
76.00	500	40.0	2	311
77.99	500	40.0	398	709
78.00	500	40.0	2	711
78.24	500	40.0	48	759
78.25	600	100.0	6	764
78.35	800	100.0	70	834

Device	Routing	Invert	Outlet Devices
#1	Discarded	73.82'	**2.410 in/hr Exfiltration over Surface area**
#2	Secondary	77.70'	**80.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.0 cfs @ 11.30 hrs HW=73.83' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 13.15 hrs HW=77.70' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.0 cfs @ 0.06 fps)

Summary for Pond 1P: CB-1

Inflow Area = 54,426 sf, 68.98% Impervious, Inflow Depth > 3.33" for 25-YEAR event
Inflow = 1.2 cfs @ 12.36 hrs, Volume= 15,123 cf
Outflow = 1.2 cfs @ 12.36 hrs, Volume= 15,123 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.2 cfs @ 12.36 hrs, Volume= 15,123 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 72.05' @ 12.36 hrs
Flood Elev= 76.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	71.48'	**18.0" Round Culvert** L= 95.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 71.48' / 71.00' S= 0.0051 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=1.2 cfs @ 12.36 hrs HW=72.05' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 1.2 cfs @ 2.98 fps)

Summary for Link SP1: Study Point 1

Inflow Area = 96,707 sf, 73.02% Impervious, Inflow Depth > 3.68" for 25-YEAR event
Inflow = 4.5 cfs @ 12.19 hrs, Volume= 29,619 cf
Primary = 4.5 cfs @ 12.19 hrs, Volume= 29,619 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs

Summary for Link SP2: Study Point 2

Inflow Area = 30,115 sf, 2.54% Impervious, Inflow Depth = 0.66" for 25-YEAR event
Inflow = 0.2 cfs @ 12.42 hrs, Volume= 1,663 cf
Primary = 0.2 cfs @ 12.42 hrs, Volume= 1,663 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs

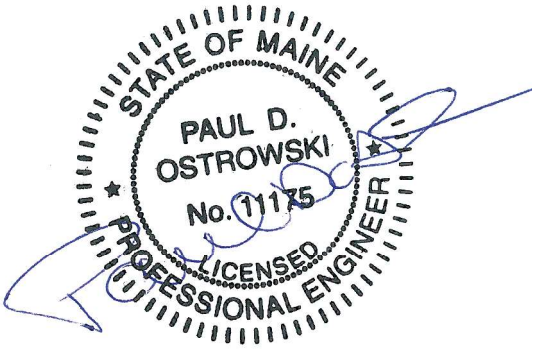
Summary for Link SP3: Study Point 3

Inflow Area = 16,237 sf, 24.20% Impervious, Inflow Depth = 1.50" for 25-YEAR event
Inflow = 0.4 cfs @ 12.22 hrs, Volume= 2,026 cf
Primary = 0.4 cfs @ 12.22 hrs, Volume= 2,026 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs

Attachment E

Inspection, Maintenance, and Housekeeping Plan



Prepared by Paul D. Ostrowski, PE

INSPECTION, MAINTENANCE, AND HOUSEKEEPING PLAN
MILLS HALL AND CENTER FOR ARCTIC STUDIES

Introduction

The responsible party for maintenance of the stormwater management facility following construction will be the Bowdoin College.

The Contract Documents will require the contractor to designate of person responsible for maintenance of the sedimentation control features during construction as required by the Erosion & Sedimentation Control Report.

The following plan outlines the anticipated inspection and maintenance procedures for the erosion and sedimentation control measures as well as stormwater management facilities for the project. This plan also outlines several housekeeping requirements that shall be followed during and after construction. These procedures shall be followed in order to ensure the intended function of the designed measures and to prevent unreasonably adverse impacts to the surrounding environment. To determine when inspections will be triggered; a heavy or significant rainfall amount for this project shall be defined as greater than 0.5" in 24 hours during construction, and greater than 1" post-construction.

The procedures outlined in this Inspection, Maintenance and Housekeeping Plan are provided as an overview of the anticipated practices to be used on this site. In some instances, additional measures may be required due to unexpected conditions. For additional detail on any of the erosion and sedimentation control measures or stormwater management devices to be utilized on this project, refer to the most recently revised edition of the "Maine Erosion and Sedimentation Control BMP" manual and/or the "Stormwater Management for Maine: Best Management Practices" manual as published by the Maine Department of Environmental Protection (MDEP).

During Construction

1. **Inspection:** During the construction process, it is the Contractor's responsibility to comply with the inspection and maintenance procedures outlined in this section and the erosion and sedimentation control plan for the project. These responsibilities include inspecting disturbed and impervious areas, erosion control measures, materials storage areas that are exposed to precipitation, and locations where vehicles enter or exit the site. These areas shall be inspected at least once a week as well as before and after a storm event, and prior to completing permanent stabilization measures. A person with knowledge of erosion and stormwater control, including the standards and conditions in any applicable permits, shall conduct the inspections.

2. **Maintenance:** All measures shall be maintained in an effective operating condition until areas are permanently stabilized. If Best Management Practices (BMPs) need to be maintained or modified, additional BMPs are necessary, or other corrective action is needed,

implementation must be completed within 7 calendar days and prior to any storm event (rainfall).

3. **Documentation:** A log summarizing the inspections and any corrective action taken must be maintained on-site. Correction action shall be performed in general conformance with the Maine Construction General Permit and Maine DEP Chapter 500 Stormwater standards. The log must include the name(s) and qualifications of the person making the inspections, the date(s) of the inspections, and major observations about the operation and maintenance of erosion and sedimentation controls, material storage areas, and vehicle access points to the site. Major observations must include BMPs that need maintenance, BMPs that failed to operate as designed or proved inadequate for a particular location, and locations where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the log the corrective action taken and when it was taken. The log must be made accessible to the appropriate regulatory agency upon request. The permittee shall retain a copy of the log for a period of at least three years from the completion of permanent stabilization.

4. **Specific Inspection and Maintenance Tasks:** The following is a list of erosion control and stormwater management measures and the specific inspection and maintenance tasks to be performed during construction.

A. Filter Berms:

- Hay bale barriers, silt fences, and filter berms shall be inspected immediately after each rainfall and at least daily during prolonged rainfall.
- If the fabric on a silt fence or filter barrier should decompose or become ineffective prior to the end of the expected usable life and the barrier is still necessary, it shall be replaced.
- Sediment deposits should be removed after each storm event. They must be removed before deposits reach approximately one-half the height of the barrier.
- Filter berms shall be reshaped as needed.
- Any sediment deposits remaining in place after the silt fence or filter barrier is no longer required should be dressed to conform to the existing grade, prepared, and seeded.

B. Riprap Materials:

- Once a riprap installation has been completed, it should require very little maintenance. It shall, however, be inspected periodically to determine if high flows have caused scour beneath the riprap or dislodged any of the stone.

C. Stabilized Construction Entrances/Exits:

- The exit shall be maintained in a condition that will prevent tracking of sediment onto public rights-of-way.

- When the control pad becomes ineffective, the stone shall be removed along with the collected soil material. The entrance should then be reconstructed.
- Areas that have received mud-tracking or sediment deposits shall be swept or washed. Washing shall be done on an area stabilized with aggregate, which drains into an approved sediment-trapping device (not into storm drains, ditches, or waterways).

D. Temporary Seed and Mulch:

- Mulched areas should be inspected after rain events to check for rill erosion.
- If less than 90% of the soil surface is covered by mulch, additional mulch shall be applied in bare areas.
- In applications where seeding and mulch have been applied in conjunction with erosion control blankets, the blankets must be inspected after rain events for dislocation or undercutting.
- Mulch shall continue to be reapplied until 95% of the soil surface has established temporary vegetative cover.

5. **Housekeeping:** The following general performance standards apply to the proposed project.

A. Spill prevention: Controls must be used to prevent pollutants from being discharged from materials on-site, including storage practices to minimize exposure of the materials to stormwater, and appropriate spill prevention, containment, and response planning and implementation. A Spill, Prevention, Control and Countermeasures Plan is created for the project and is to be kept onsite at all times.

B. 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.

C. Fugitive sediment and dust: Actions must be taken to insure 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.

D. Debris and other materials: Litter, construction debris, and chemicals exposed to stormwater must be prevented from becoming a pollutant source.

E. Trench or foundation dewatering: Trench dewatering is the removal of water from trenches, foundations, cofferdams, ponds, and other areas within the construction area that retain water after excavation. In most cases, the collected

water is heavily silted and hinders correct and safe construction practices. The collected water must be removed from the ponded area, either through gravity or pumping, and must be spread through natural wooded buffers or removed to areas that are specifically designed to collect the maximum amount of sediment possible, like a cofferdam sedimentation basin. Avoid allowing the water to flow over disturbed areas of the site. Equivalent measures may be taken if approved.

Post-Construction

Inspection: After construction, it is the responsibility of Bowdoin College to comply with the inspection and maintenance procedures outlined in this section. All measures must be maintained in effective operating condition. A person with knowledge of erosion and stormwater control, including the standards and conditions in all applicable permits, shall conduct the inspections. It should be noted that snow storage is not permitted on any stormwater BMP, and vehicles are prohibited from driving on all filtration BMPS.

1. **Specific Inspection and Maintenance Tasks:** The following is a list of permanent erosion control and stormwater management measures and the inspection and maintenance tasks to be performed after construction.

A. Vegetated Areas:

- Inspect vegetated areas, particularly slopes and embankments, early in the growing season or after heavy rains to identify active or potential erosion problems.
- Replant bare areas or areas with sparse growth. Where rill erosion is evident, armor the area with an appropriate lining or divert the erosive flows to on-site areas able to withstand the concentrated flows.

B. Ditches, Swales and Other Open Channels:

- Inspect ditches, swales, level spreaders and other open stormwater channels in the spring, in the late fall, and after heavy rains to remove any obstructions to flow. Remove accumulated sediments and debris, remove woody vegetative growth that could obstruct flow, and repair any erosion of the ditch lining.
- Vegetated ditches must be mowed at least annually or otherwise maintained to control the growth of woody vegetation and maintain flow capacity.
- Any woody vegetation growing through riprap linings must also be removed. Repair any slumping side slopes as soon as practicable.
- If the ditch has a riprap lining, replace riprap in areas where any underlying filter fabric or underdrain gravel is showing through the stone or where stones have dislodged.

C. Catch Basins

- Inspect catch basins in the spring, in late fall and after heavy rains to remove any obstructions to flow. Inspect for structural integrity and illicit discharges.
- Working from upstream to downstream, inspect catch basin and sumps removing accumulated sediments and debris in sumps when 2 inches of the sump capacity has filled. Clean debris from grate. Properly dispose of debris and sediments.
- Record of inspections, cleanouts, and debris removal should be kept to help determine future frequency of maintenance.

D. Winter Sanding:

- Clear accumulations of winter sand along access road at least once a year, preferably in the spring.
- Accumulations of sand along road shoulders may be removed by grading excess sand to the pavement edge and removing it manually or by a front-end loader or other acceptable method.

E. Culverts:

- Inspect culverts in the spring, in the late fall, and after heavy rains to remove any obstructions to flow.
- Remove accumulated sediments and debris at the inlet, at the outlet, and within the conduit.
- Inspect and repair any erosion damage at the culvert's inlet and outlet.

F. Manmade Pervious Surfaces (ie Porous Asphalt/Porous Pavers/Stormcrete™):

- Frequent inspections are performed during the first few months following construction. Then, the system is inspected routinely on an annual basis. Inspections should be made after significant storm events to check for surface ponding that could indicate failure due to clogging. Non-routine maintenance may require reconstruction of the surface treatment, and possibly the filter and reservoir layers, to relieve major clogging.
- Prevent sedimentation due to the erosion of areas upgradient the porous structures.
- Prevent vehicles with muddy wheels from accessing onto areas intended for porous areas.
- Sweep, vacuum and/or pressure wash porous areas twice annually at a minimum.
- Limit salt use for deicing, and do not use sand.
- Remove leaves and organic debris in the fall.

- Measures should be taken to ensure that an area designed to be porous does not receive a future overlay of conventional non-porous paving.

G. Roof Dripline Filters

- Inspect frequently and remove sediment debris from stone.
- Filter should drain within 24 to 48 hours after storms.

H. Filtration/Infiltration Basin:

- During the first year, the basin shall be inspected semi-annually and following major storm events.
- Debris and sediment buildup shall be removed from the fore bay and basin as needed, but monthly at a minimum.
- Any bare area or erosion rills shall be repaired with new engineered soil mix. Maintaining good vegetated cover will minimize clogging with fine sediments and if ponding exceeds 48 hours, the top of the filter bed must be rototilled to reestablish the soil's filtration capacity.
- The basin should be inspected after every major storm in the first year to be sure it is functioning properly. Thereafter, the filter should be inspected at least once every six months to ensure that it is draining within 48 hours following a one inch storm or greater. Following storms that fill the system and overflow is observed, the soil filter should drain in no less than 36 to 60 hours. If the system drains too fast, an orifice may need to be added on the underdrain outlet or, if already present, may need to be modified.
- Soil Media Replacement: The top several inches of the filter shall be replaced with fresh material when water ponds on the surface of the bed for more than 72 hours. Removed sediments should be disposed of in an acceptable manner.
- Vegetation: Remove dead or dying vegetation in the fall or spring of every year, and replace if necessary. Harvesting and pruning of excessive growth will need to be done occasionally. Weeding to control unwanted or invasive plants may also be necessary.
- Fertilization: Fertilization of the underdrained filter area should be avoided unless absolutely necessary to establish vegetation.

2. Housekeeping: The following general performance standards apply to the proposed project.

A. Spill prevention: Controls must be used to prevent pollutants from being discharged from materials on-site, including storage practices to minimize exposure of the materials to stormwater, and appropriate spill prevention, containment, and response planning and implementation. A Spill, Prevention, Control and Countermeasures Plan is created for the project and is to be kept onsite at all times.

B. 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.

C. 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.

D. Debris and other materials: Litter, construction debris, and chemicals exposed to stormwater must be prevented from becoming a pollutant source.

E. Trench or foundation dewatering: Trench dewatering is the removal of water from trenches, foundations, cofferdams, ponds, and other areas within the construction area that retain water after excavation. In most cases, the collected water is heavily silted and hinders correct and safe construction practices. The collected water must be removed from the ponded area, either through gravity or pumping, and must be spread through natural wooded buffers or removed to areas that are specifically designed to collect the maximum amount of sediment possible, like a cofferdam sedimentation basin. Avoid allowing the water to flow over disturbed areas of the site. Equivalent measures may be taken if approved.

F. 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 wash water 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 wash water (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.

G. 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.

3. Documentation:

A. A qualified post-construction stormwater inspector hired by Bowdoin College, shall, on or by June 30 of each year, provide a completed and signed certification to DPS in a form provided by DPS, certifying that the person has inspected the BMP(s) and that they are adequately maintained and functioning as intended by the approved post-construction stormwater management plan, or that they required maintenance or repair, including the record of the deficiency and corrective action(s) taken.

B. A log summarizing the inspections and any corrective action taken must be maintained for a minimum of five (5) years. The log must include the name(s) and qualifications of the person making the inspections, the date(s) of the inspections, and major observations about the operation and maintenance of controls. Major observations must include BMPs that need maintenance, BMPs that failed to operate as designed or proved inadequate for a particular location, and locations where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the log the corrective action taken and when it was taken. The log must be made accessible to the appropriate regulatory agency upon request. A sample "Stormwater Inspection and Maintenance Form" has been included as Attachment 2 of this Inspection, Maintenance, and Housekeeping Plan.

4. Maine DEP Recertification: A certification of the following shall be submitted to the MDEP within three months of the expiration of each five-year interval from the date of issuance of MDEP permits.

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

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

C. The Inspection, Maintenance, and Housekeeping Plan for the site is being implemented as written, or modifications to the plan have been submitted to and approved by the MDEP, and the maintenance log is being maintained.

5. Duration of Maintenance: Perform maintenance as described and required for any associated permits unless and until the system is formally accepted by a municipality or quasi-municipal district or is placed under the jurisdiction of a legally created association that will be responsible for the maintenance of the system. If a municipality or quasi-municipal district chooses to accept a stormwater management system, or a component of a stormwater system, it must provide a letter to the MDEP stating that it assumes responsibility for the system. The letter must specify the components of the system for which the municipality or district will assume responsibility, and that the municipality or district agrees to maintain those components of the system in compliance with MDEP standards. Upon such assumption of responsibility, and approval by the MDEP, the municipality, quasi-municipal district, or association becomes a co-permittee for this purpose only and must comply with all terms and conditions of the permit.

Maintenance Agreement

All Stormwater Structures, Filterras

Bowdoin College currently has a maintenance contract with a qualified service provider and will include these elements in the annual inspection and maintenance operations and will report in their 5-year recertification forms as dictated by the Site Location of Development Conditions of Approval.

Porous and Permeable Surfaces:

Bowdoin College currently owns a Bob Cat 48-inch Angle Broom and 60-inch Sweeper that sweeps and collects sand, debris and other materials from paved surfaces this piece of equipment will be used in the annual maintenance of the porous asphalt and permeable paver areas for the project.

Maintenance and inspection to be completed by qualified staff and contracted services will include:

- Frequent inspections will be performed during the first 3-6 months following construction specifically after significant storm events to check for surface ponding that could indicate failure due to clogging.
- Inspect and correct sedimentation due to any erosion of areas upgradient the pervious pavement structures.
- If vehicles with muddy wheels access onto areas intended for pervious pavement are discovered, correct by sweeping debris using sweeper.
- Sweep, vacuum and/or pressure wash pavement once annually for pedestrian areas and twice annually for vehicular areas.
- Remove leaves and organic debris in the fall.
- Measures will be taken to ensure that an area designed to be porous does not receive a future overlay of conventional non-porous paving.
- The system will be inspected routinely on an annual basis. Inspections will be made after significant storm events to check for surface ponding that could indicate failure due to clogging.
- Annual inspections will be reported as part of the 5-year certification program

General Site

INSPECTION MAINTENANCE AND HOUSEKEEPING FORM			
General Information			
Project Name:		**Inspection Date:**	
Project Location:		**Current Weather:**	
		Date / Amount Last Precip:	
BMP Owner:		**Company conducting inspection:**	
Owner Mailing Address:		**Company Mailing Address**	
Owner Phone #:		**Company Phone #:**	
Owner Email:		**Inspector Name:**	
		Inspector Email:	

Site Element	Suggested Maintenance (recm'd frequency)	Observations	Inspection Notes/Recommended Action
Vegetated Areas	Inspect Slopes/Embankments for erosion (annually)		
	Replant bare areas or areas of sparse growth (annually)		
Paved Surfaces	Clear accumulated winter sand (annually)		
	Remove sediment along edges of parking and within low spots/pockets (annually)		
Ditches/Swales	Remove obstructions/debris/sediment (monthly)		
	Inspect for erosion/repair as needed (annually)		
	Remove woody vegetation (annually)		
	Mow vegetated ditches (annually)		
Catch Basins	Remove sediment/debris from sump (annually)		
Culverts	Remove sediment/debris from inlet/outlet aprons (annually)		
	Inspect inlet/outlet aprons for erosion, repair as needed (annually)		
	Inspect, repair as needed, riprap aprons for dislodged/sparse coverage (annually)		
Pipe Outlets	Remove sediment/debris from outlet aprons (annually)		
	Inspect outlet aprons for erosion, repair as needed (annually)		
	Inspect, repair as needed, riprap aprons for dislodged/sparse coverage (annually)		

Additional Notes/Observations:

Underdrain Filter Trench

INSPECTION MAINTENANCE AND HOUSEKEEPING FORM			
General Information			
Project Name:		**Inspection Date:**	
Project Location:		**Current Weather:**	
		Date / Amount Last Precip:	
BMP Owner:		**Company conducting inspection:**	
Owner Mailing Address:		**Company Mailing Address**	
Owner Phone #:		**Company Phone #:**	
Owner Email:		**Inspector Name:**	
		Inspector Email:	

BMP Element	Suggested Maintenance (recm'd frequency)	Observations	Inspection Notes/Recommended Action
Forebay/Pretreatment	Sediment/Debris Removal (Annually)		
	Inspect for bare areas or rill erosion (Annually)		
Outlet Control Structure	Sediment Depth (Annually)		
	Floatables/Debris (Annually)		
Discharge Pipe	Ground Stabilized (>1" rain, Annually)		
Emergency Spillway	Review for signs of erosion (Twice Annually)		
	Review for signs of discharge (>1" rain, twice annually)		
Embankments	Review for signs of erosion (Twice Annually)		
Filter Bed	Trim overgrown vegetation with string trimmer (annually)		
	Review basin for evidence of vehicular traffic or storage of snow within footprint (annually)		
	Confirm pond drains in 24-48 hours for water quality volume (annually)		

Additional Notes/Observations:

Infitration Trench

INSPECTION MAINTENANCE AND HOUSEKEEPING FORM			
General Information			
Project Name:		**Inspection Date:**	
Project Location:		**Current Weather:**	
		Date / Amount Last Precip:	
BMP Owner:		**Company conducting inspection:**	
Owner Mailing Address:		**Company Mailing Address**	
Owner Phone #:		**Company Phone #:**	
Owner Email:		**Inspector Name:**	
		Inspector Email:	

BMP Element	Suggested Maintenance (recm'd frequency)	Observations	Inspection Notes/Recommended Action
Forebay/Pretreatment	Sediment/Debris Removal (Annually)		
	Inspect for bare areas or rill erosion (Annually)		
Outlet Control Structure	Sediment Depth (Annually)		
	Floatables/Debris (Annually)		
Overflow Pipe	Ground Stabilized (>1" rain, Annually)		
Emergency Spillway	Review for signs of erosion (Twice Annually)		
	Review for signs of discharge (>1" rain, twice annually)		
Embankments	Review for signs of erosion (Twice Annually)		
Filter Bed	Trim overgrown vegetation with string trimmer (annually)		
	Review basin for evidence of vehicular traffic or storage of snow within footprint (annually)		
	Confirm pond drains in 24-48 hours for water quality volume (annually)		

Additional Notes/Observations:

INSPECTION MAINTENANCE AND HOUSEKEEPING FORM			
General Information			
Project Name:		**Inspection Date:**	
Project Location:		**Current Weather:**	
		Date / Amount Last Precip:	
BMP Owner:		**Company conducting inspection:**	
Owner Mailing Address:		**Company Mailing Address**	
Owner Phone #:		**Company Phone #:**	
Owner Email:		**Inspector Name:**	
		Inspector Email:	

BMP Element	Suggested Maintenance (recm'd frequency)	Observations	Inspection Notes/Recommended Action
Forebay/Pretreatment	Sediment/Debris Removal (Annually)		
	Inspect for bare areas or rill erosion (Annually)		
Outlet Control Structure	Sediment Depth (Annually)		
	Floatables/Debris (Annually)		
Discharge Pipe	Ground Stabilized (>1" rain, Annually)		
Filterra Stucture	Review condition of installed planting for signs on stress or damage (annually)		
	Review condition of concrete structure and inlet that no damage has occurred to weaken intergrity (annually)		
	Confirm pond drains in 24-48 hours for water quality volume (annually)		

Additional Notes/Observations:

Porous Pavement

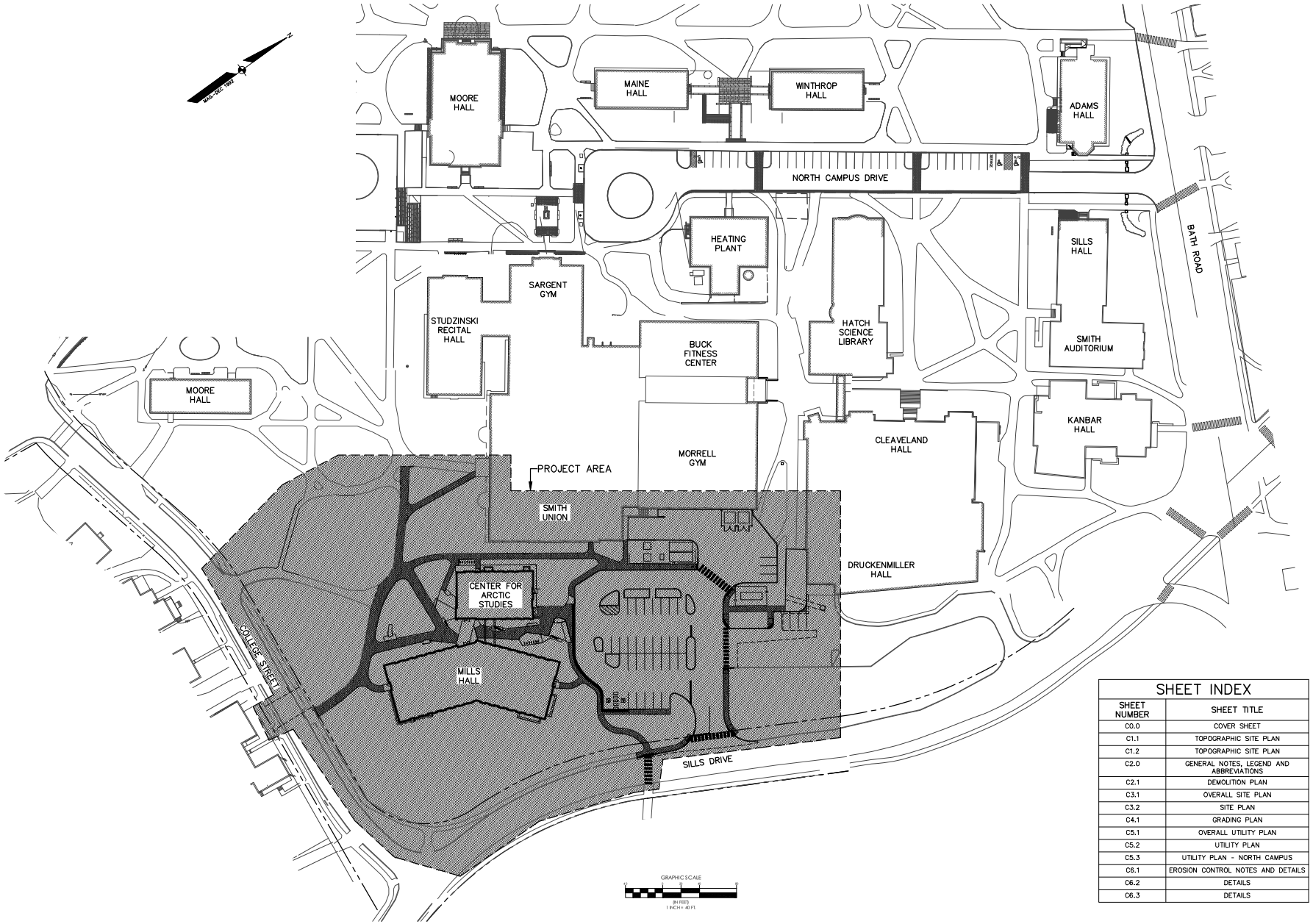
INSPECTION MAINTENANCE AND HOUSEKEEPING FORM			
General Information			
Project Name:		**Inspection Date:**	
Project Location:		**Current Weather:**	
		Date / Amount Last Precip:	
BMP Owner:		**Company conducting inspection:**	
Owner Mailing Address:		**Company Mailing Address**	
Owner Phone #:		**Company Phone #:**	
Owner Email:		**Inspector Name:**	
		Inspector Email:	

BMP Element	Suggested Maintenance (recm'd frequency)	Observations	Inspection Notes/Recommended Action
Forebay/Pretreatment	Sediment/Debris Removal (Annually)		
	Inspect for bare areas or rill erosion (Annually)		
Outlet Control Structure	Sediment Depth (Annually)		
	Floatables/Debris (Annually)		
Discharge Pipe	Ground Stabilized (>1" rain, Annually)		
Upgradient Drainage Areas	Review for signs of erosion (Twice Annually)		
Porous Surface	Remove fallen leaf debris (fall-annually)		
	Revuew surface for rutting or raffeling of pavement surface (annually)		
	Confirm pond drains in 24-48 hours for water quality volume (annually)		

Additional Notes/Observations:

MILLS HALL AND THE CENTER FOR ARCTIC STUDIES

BOWDOIN COLLEGE, BRUNSWICK, MAINE



SHEET INDEX	
SHEET NUMBER	SHEET TITLE
C0.0	COVER SHEET
C1.1	TOPOGRAPHIC SITE PLAN
C1.2	TOPOGRAPHIC SITE PLAN
C2.0	GENERAL NOTES, LEGEND AND ABBREVIATIONS
C2.1	DEMOLITION PLAN
C3.1	OVERALL SITE PLAN
C3.2	SITE PLAN
C4.1	GRADING PLAN
C5.1	OVERALL UTILITY PLAN
C5.2	UTILITY PLAN
C5.3	UTILITY PLAN - NORTH CAMPUS
C6.1	EROSION CONTROL NOTES AND DETAILS
C6.2	DETAILS
C6.3	DETAILS

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FOOD SERVICE CONSULTANT
FOODSERVICE DESIGN
603-969-0009

BOWDOIN COLLEGE
BRUNSWICK, ME

MILLS HALL AND THE CENTER FOR ARCTIC STUDIES

Bowdoin

KEYPLAN

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND WAS DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF

NAME:
DATE:
REGISTRATION NUMBER:

NO	DESCRIPTION	DATE
1	SUBMIT DEPTOWN	9/16/19
2	SUBMIT TOWN	10/2/19
3	CD SUBMISSION	10/18/19
4	BP-1 CONST DOC	01/09/20
5	SUBMIT TO TOWN	01/21/20

ISSUANCE HISTORY - THIS SHEET

HGA NO: 4387-001-00

COVER SHEET

DATE: JANUARY 21, 2020

TOWN SUBMITTAL

C0.0

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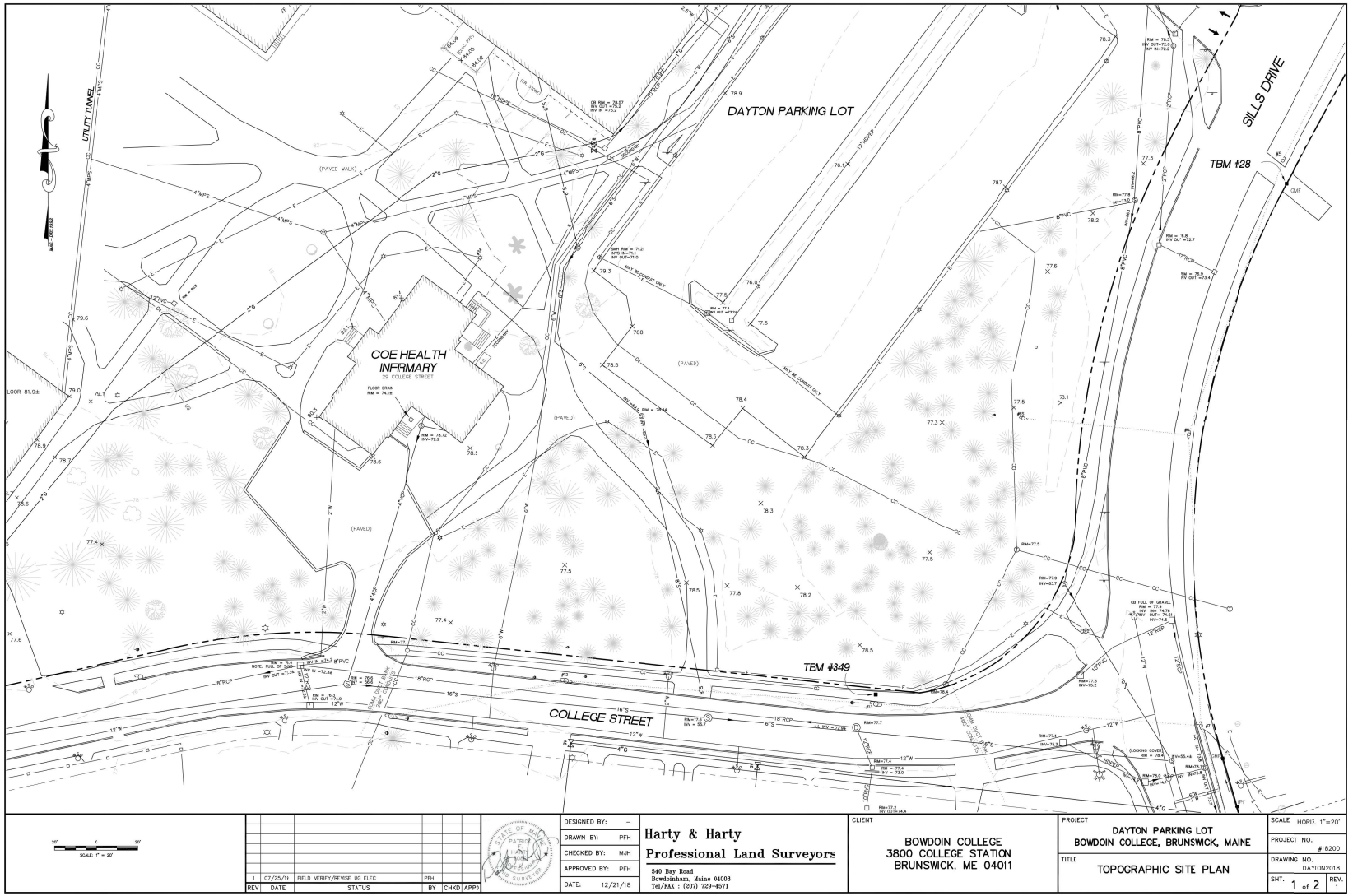

1	07/25/19	FIELD VERIFY/REVISE UG ELEC	PFH		
REV	DATE	STATUS	BY	CHKD	APP'D

DESIGNED BY: –
DRAWN BY: PFH
CHECKED BY: MJH
APPROVED BY: PFH
DATE: 12/21/18

Harty & Harty
Professional Land Surveyors
540 Bay Road
Bowdoinham, Maine 04008
Tel/FAX : (207) 729-4571

CLIENT
BOWDOIN COLLEGE
3800 COLLEGE STATION
BRUNSWICK, ME 04011

PROJECT
DAYTON PARKING LOT
BOWDOIN COLLEGE, BRUNSWICK, MAINE

TITLE
TOPOGRAPHIC SITE PLAN

SCALE HORIZ. 1"=20'
PROJECT NO. #18200
DRAWING NO. DAYTON2018
SHT. 1 of 2
REV. 1

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TOPOGRAPHIC SITE PLAN

DATE: JANUARY 21, 2020
TOWN SUBMITTAL

C1.1

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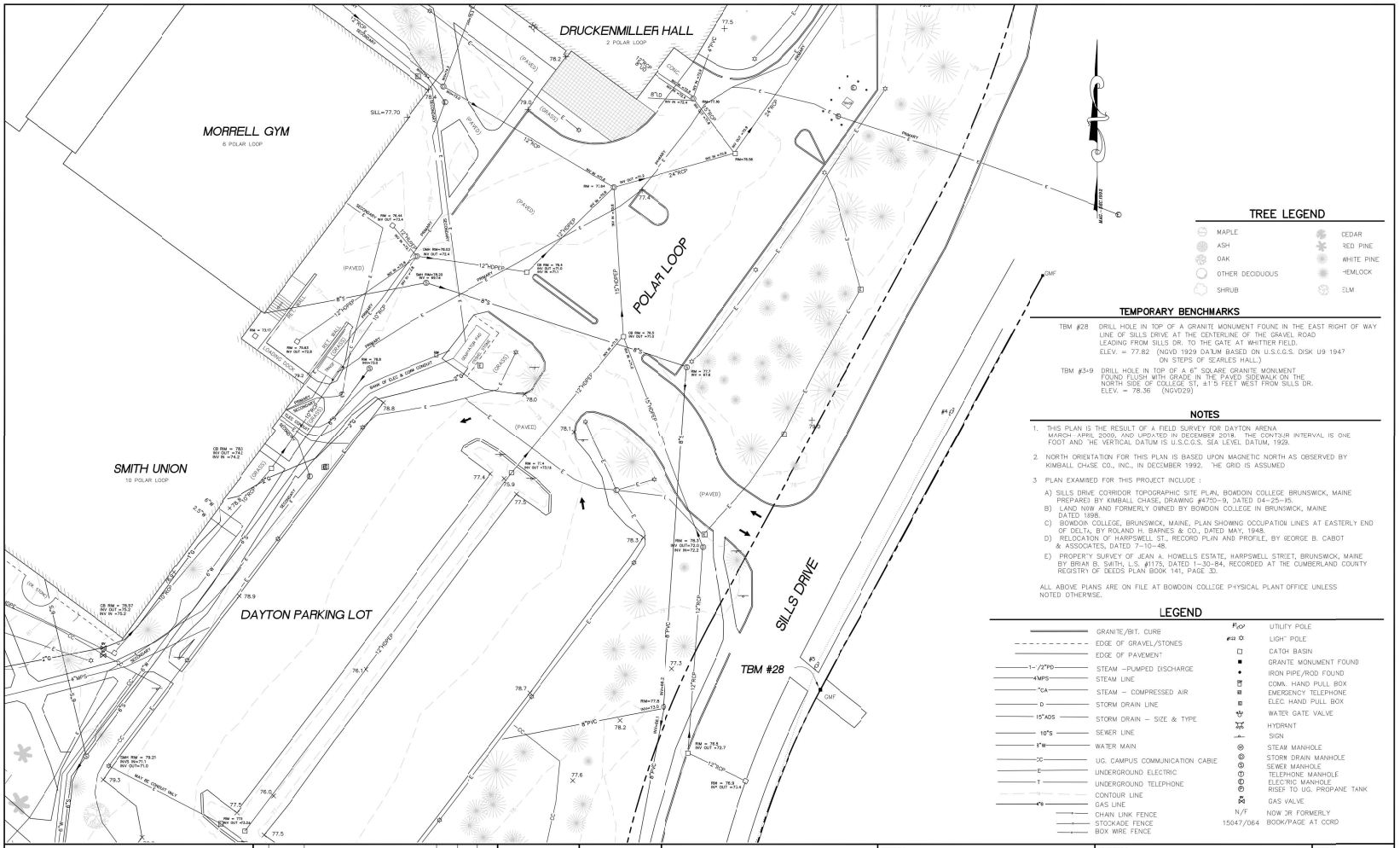

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DATE: JANUARY 21, 2020

TOWN SUBMITTAL

C1.2

TOWN SUBMITTAL

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LEGEND

EXISTING	DESCRIPTION	PROPOSED
	PROPERTY LINE/R.O.W.	
	ABUTTER LINE/R.O.W.	
	DEED LINE/R.O.W.	
	TIE LINE	
	SETBACK	
	EASEMENT	
	BUFFER	
	FLOODPLAIN	
	FLOODWAY	
	CENTERLINE	
	MONUMENT	
	IRON PIPE/ROD	
	DRILL HOLE	
C1/L1	DEED CALL	
C1/L1	CURVE/LINE NO.	C1/L1
	SOILS	
	ZONE LINE	
	ZONE LINE ON PL	
BENCHMARK DESCRIPTION WITH ELEVATION	BENCHMARK	
	SURVEY CONTROL	
TP-1	TEST PIT	
MW-1	MONITORING WELL	
	BORING	
	BUILDING	
	DECK/STEPS/ OVERHANG	
	EDGE WETLAND	
	WETLANDS	
	UPLANDS	
	STREAM	
	LEDGE	
	EDGE PAVEMENT	
	PAVEMENT SAWCUT	
	EDGE CONCRETE	
	PAVEMENT PAINT	
	EDGE GRAVEL	
	CURB LINE	
	EDGE OF WATER	
	TREELINE	
120 18	CONTOURS	120
+120.00	SPOT GRADE	+120.00
	CHAIN LINK FENCE	
	BARB WIRE FENCE	
	STOCKADE FENCE	
	GUARD RAIL	
	STONE WALL	
	RETAINING WALL	
	DECIDUOUS TREE	
	CONIFEROUS TREE	
	MULCH LINE	
	BOLLARD	
	SIGN	
	RAILROAD	
G	GAS	G
	GAS GATE VALVE	
	GAS METER	
	GAS MANHOLE	
W	WATER	W
	WATER GATE VALVE	
	WATER SHUT OFF	
	HYDRANT	
	WATER MANHOLE	
	WELL	
S	SANITARY SEWER	S
FM	FORCE MAIN	FM
	SANITARY MANHOLE	
SD	STORM DRAIN	SD
UD	UNDER DRAIN	UD
	DRAINAGE MANHOLE	
	CATCH BASIN	
OHU	OVERHEAD UTILITY	OHU
UGU	UNDERGROUND UTILITY	UGU
	TRANSFORMER PAD	
	ELECTRICAL MANHOLE	
	ELECTRIC METER	
	HVAC UNIT	
	TELEPHONE MANHOLE	
	LIGHT POLE	
	UTILITY POLE	
	GUY WIRE	
	DRAINAGE DITCH	
	EROSION CONTROL BLANKET	
	FILTER BARRIER	FB
	RIPRAP	
	CHECK DAM	
	INLET PROTECTION	
	BOULDER	

GENERAL NOTES

1. BOUNDARY AND TOPOGRAPHIC INFORMATION SHOWN HEREON IS BASED UPON PLAN REFERENCE 2.
2. PLAN REFERENCE: SURVEY BY HARTY & HARTY DATED JULY 2019.
3. ALL WORK SHALL CONFORM TO THE APPLICABLE CODES AND ORDINANCES.
4. CONTRACTOR SHALL VISIT THE SITE AND FAMILIARIZE THEMSELVES WITH ALL CONDITIONS AFFECTING THE PROPOSED WORK AND SHALL MAKE PROVISIONS AS TO THE COST THEREOF. CONTRACTOR SHALL BE RESPONSIBLE FOR FAMILIARIZING HIM OR HERSELF WITH ALL CONTRACT DOCUMENTS, FIELD CONDITIONS AND DIMENSIONS AND CONFIRMING THAT THE WORK MAY BE ACCOMPLISHED AS SHOWN PRIOR TO PROCEEDING WITH CONSTRUCTION. ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO THE COMMENCEMENT OF WORK.
5. CONTRACTOR SHALL NOTIFY ENGINEER OF ALL PRODUCTS OR ITEMS NOTED AS "EXISTING" WHICH ARE NOT FOUND IN THE FIELD.
6. PROVIDE ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND OWNER'S REQUIREMENTS UNLESS SPECIFICALLY OTHERWISE INDICATED OR WHERE LOCAL CODES OR REGULATIONS TAKE PRECEDENCE.
7. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS IN THE FIELD PRIOR TO FABRICATION AND ERECTION OF ANY MATERIAL. ANY UNUSUAL CONDITIONS SHALL BE REPORTED TO THE ATTENTION OF THE ENGINEER.
8. CONTRACTOR SHALL CLEAN AND REMOVE DEBRIS AND SEDIMENT DEPOSITED ON PUBLIC STREETS, SIDEWALKS, ADJACENT AREAS, OR OTHER PUBLIC WAYS DUE TO CONSTRUCTION.
9. CONTRACTOR SHALL INCORPORATE PROVISIONS AS NECESSARY IN CONSTRUCTION TO PROTECT EXISTING STRUCTURES, PHYSICAL FEATURES, AND MAINTAIN SITE STABILITY DURING CONSTRUCTION. CONTRACTOR SHALL RESTORE ALL AREAS TO ORIGINAL CONDITION AND AS DIRECTED BY DESIGN DRAWINGS.
10. SITE CONTRACTOR SHALL OBTAIN ALL REQUIRED PERMITS PRIOR TO CONSTRUCTION.
11. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED IN ACCORDANCE WITH "MAINE EROSION AND SEDIMENT CONTROL BMPS" PUBLISHED BY THE BUREAU OF LAND AND WATER QUALITY OF THE MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION, LATEST EDITION. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO POSSESS A COPY OF THE EROSION CONTROL PLAN AT ALL TIMES.
12. THE CONTRACTOR IS HEREBY CAUTIONED THAT ALL SITE FEATURES SHOWN HEREON ARE BASED ON FIELD OBSERVATIONS BY THE SURVEYOR AND BY INFORMATION PROVIDED BY UTILITY COMPANIES. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR SHALL CONTACT DIG SAFE (811) AT LEAST THREE (3) BUT NOT MORE THAN THIRTY (30) DAYS PRIOR TO COMMENCEMENT OF EXCAVATION OR DEMOLITION TO VERIFY HORIZONTAL AND VERTICAL LOCATION OF ALL UTILITIES.
13. CONTRACTOR SHALL BE AWARE THAT DIG SAFE ONLY NOTIFIES ITS "MEMBER" UTILITIES ABOUT THE DIG. WHEN NOTIFIED, DIG SAFE WILL ADVISE CONTRACTOR OF MEMBER UTILITIES IN THE AREA. CONTRACTOR IS RESPONSIBLE FOR LOCATING AND CONTACTING NON-MEMBER UTILITIES DIRECTLY. NON-MEMBER UTILITIES MAY INCLUDE TOWN OR CITY WATER AND SEWER DISTRICTS AND SMALL LOCAL UTILITIES, AS WELL AS USG PUBLIC WORKS SYSTEMS.
14. CONTRACTORS SHALL BE RESPONSIBLE FOR COMPLIANCE WITH THE REQUIREMENTS OF 23 MRSA 3360-A. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE WITH THE APPROPRIATE UTILITIES TO OBTAIN AUTHORIZATION PRIOR TO RELOCATION OF ANY EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THESE PLANS. IF A UTILITY CONFLICT ARISES, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNER, THE MUNICIPALITY AND APPROPRIATE UTILITY COMPANY PRIOR TO PROCEEDING WITH ANY RELOCATION.
15. ALL PAVEMENT MARKINGS AND DIRECTIONAL SIGNAGE SHOWN ON THE PLAN SHALL CONFORM TO THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) STANDARDS.
16. ALL PAVEMENT JOINTS SHALL BE SAWCUT PRIOR TO PAVING TO PROVIDE A DURABLE AND UNIFORM JOINT.
17. NO HOLES, TRENCHES OR STRUCTURES SHALL BE LEFT OPEN OVERNIGHT IN ANY EXCAVATION ACCESSIBLE TO THE PUBLIC OR IN PUBLIC RIGHTS-OF-WAY.
18. IMMEDIATELY UPON COMPLETION OF CUTS/FILLS, THE CONTRACTOR SHALL STABILIZE DISTURBED AREAS IN ACCORDANCE WITH EROSION CONTROL NOTES AND AS SPECIFIED ON PLANS.
19. THE CONTRACTOR SHALL BE FULLY AND SOLELY RESPONSIBLE FOR THE REMOVAL, REPLACEMENT AND RECTIFICATION OF ALL DAMAGED AND DEFECTIVE MATERIAL AND WORKMANSHIP IN CONNECTION WITH THE CONTRACT WORK. THE CONTRACTOR SHALL REPLACE OR REPAIR AS DIRECTED BY THE OWNER ALL SUCH DAMAGED OR DEFECTIVE MATERIALS WHICH APPEAR WITHIN A PERIOD OF ONE YEAR FROM THE DATE OF SUBSTANTIAL COMPLETION.
20. ALL WORK PERFORMED BY THE GENERAL CONTRACTOR AND/OR TRADE SUBCONTRACTOR SHALL CONFORM TO THE REQUIREMENTS OF LOCAL, STATE OR FEDERAL LAWS, AS WELL AS ANY OTHER GOVERNING REQUIREMENTS, WHETHER OR NOT SPECIFIED ON THE DRAWINGS.
21. WHERE THE TERMS "APPROVED EQUAL", "OTHER APPROVED", "EQUAL TO", "ACCEPTABLE" OR OTHER GENERAL QUALIFYING TERMS ARE USED IN THESE NOTES, IT SHALL BE UNDERSTOOD THAT REFERENCE IS MADE TO THE RULING AND JUDGEMENT OF SEBAGO TECHNICS, INC.
22. THE GENERAL CONTRACTOR SHALL PROVIDE ALL NECESSARY PROTECTION FOR THE WORK UNTIL TURNED OVER TO THE OWNER.
23. THE GENERAL CONTRACTOR SHALL MAINTAIN A CURRENT AND COMPLETE SET OF CONSTRUCTION DRAWINGS ON SITE DURING ALL PHASES OF CONSTRUCTION FOR USE OF ALL TRADES.
24. THE CONTRACTOR SHALL TAKE FULL RESPONSIBILITY FOR ANY CHANGES AND DEVIATION OF APPROVED PLANS NOT AUTHORIZED BY THE ARCHITECT/ENGINEER AND/OR CLIENT/OWNER.
25. DETAILS ARE INTENDED TO SHOW END RESULT OF DESIGN. ANY MODIFICATION TO SUIT FIELD DIMENSION AND CONDITION SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL PRIOR TO ANY WORK.
26. BEFORE THE FINAL ACCEPTANCE OF THE PROJECT, THE CONTRACTOR SHALL REMOVE ALL EQUIPMENT AND MATERIALS, REPAIR OR REPLACE PRIVATE OR PUBLIC PROPERTY WHICH MAY HAVE BEEN DAMAGED OR DESTROYED DURING CONSTRUCTION, CLEAN THE AREAS WITHIN AND ADJACENT TO THE PROJECT WHICH HAVE BEEN DISTURBED BY HIS/HER OPERATIONS, AND LEAVE THE PROJECT AREA NEAT AND PRESENTABLE.
27. ALL GRAVITY CONDUIT PIPES SHALL BE INSTALLED USING A PIPE LASER AND TARGET SYSTEM THROUGH THE PIPE. ON PIPE RUNS 50 FEET OR LESS, THE THE CONTRACTOR SHALL REQUEST ENGINEER'S APPROVAL TO USE A GROUND LASER.
28. SIDESLOPES SHALL NOT BE STEEPER THAN 3:1 (H:V) EXCEPT AS OTHERWISE IDENTIFIED ON THIS PLAN. ALL SIDESLOPES STEEPER THAN 3:1 (H: V) SHALL BE LINED WITH EROSION CONTROL BLANKET.
29. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING FLOW THROUGH THE EXISTING CLOSED STORM DRAINAGE SYSTEM DURING CONSTRUCTION AND SHALL SUBMIT A WORK PLAN FOR APPROVAL BY THE DESIGN ENGINEER.

UTILITY DEMOLITION NOTES

1. PROTECT EXISTING BOUNDARY LINE MONUMENTATION. IF DISTURBED, EXISTING MONUMENTATION TO BE RESET BY A PROFESSIONAL LAND SURVEYOR.
2. DEMOLITION OF UTILITIES REQUIRING TREE REMOVAL SHALL BE COORDINATED WITH THE OWNER AND IN ACCORDANCE WITH PROJECT PLANS.
3. UTILITY DEMOLITION SHALL BE COMPLETED IN COORDINATION WITH NEW INFRASTRUCTURE. CONTRACTOR SHALL ENSURE EXISTING SURFACE DRAINAGE IS MAINTAINED DURING CONSTRUCTION.
4. EXISTING SEWER AND STORM DRAINAGE INFRASTRUCTURE TO REMAIN ACTIVE DURING CONSTRUCTION AND UPON COMPLETION OF PROJECT. DEMOLITION/CONSTRUCTION ACTIVITIES SHALL NOT INTERFERE OR IMPEDE EXISTING FLOWS. CONTRACTOR SHALL PROVIDE BYPASS PUMPING AS REQUIRED DURING SEWER AND STORM DEMOLITION AND NEW CONSTRUCTION. DAMAGE TO EXISTING SEWER INFRASTRUCTURE SHALL BE REPAIRED BY CONTRACTOR AT THEIR EXPENSE.
5. DEMOLITION SHOWN IS FOR MAJOR SITE ELEMENTS TO BE DEMOLISHED. OTHER MINOR DEMOLITION MAY BE REQUIRED AS PART OF CONSTRUCTION AND SHALL BE CONSIDERED INCIDENTAL TO THE COST OF CONSTRUCTION. COORDINATE ALL DEMOLITION WORK WITH SITE AND BUILDING DRAWINGS.
6. PRIOR TO ANY DEMOLITION, THE CONTRACTOR SHALL SUBMIT A SEQUENCE OF DEMOLITION PLANS TO THE OWNER. THIS PLAN SHALL DEPICT LOCATIONS OF PROPOSED TERMINATIONS AND ANY TEMPORARY SERVICES THAT WILL BE NEEDED.
7. CONTRACTOR REQUIRED TO CONFIRM/MAINTAIN BENCHMARKS. IF IMPACTED CONTRACTOR IS RESPONSIBLE FOR NOTIFICATION/RELOCATION AND COORDINATION WITH PROJECT TEAM.

GRADING & EROSION NOTES

1. SIDESLOPES SHALL NOT BE STEEPER THAN 3:1 (H:V) EXCEPT AS OTHERWISE IDENTIFIED ON THIS PLAN. ALL SIDESLOPES STEEPER THAN 3:1 (H: V) SHALL BE LINED WITH EROSION CONTROL BLANKET, OR ADDITIONAL MEASURES AS INDICATED.
2. ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE INSTALLED IN ACCORDANCE WITH "MAINE EROSION AND SEDIMENT CONTROL BMPS" MANUAL PUBLISHED BY BUREAU OF LAND AND WATER QUALITY MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION, LATEST EDITION. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO POSSESS A COPY OF THE EROSION CONTROL PLAN AT ALL TIMES.
3. ALL AREAS DISTURBED DURING CONSTRUCTION AND NOT RESTORED WITH IMPERVIOUS SURFACES (BUILDINGS, PAVEMENTS, WALKS, ETC.) SHALL RECEIVE LOAM AND SEED PER DETAIL.

CONSTRUCTION PLAN

1. PROVIDE EROSION CONTROL MEASURES PRIOR TO SITE DISTURBANCE.
2. GRADING AND CLEARING LIMITS SHALL NOT ENCROACH ON ADJACENT PROPERTIES UNLESS NOTED OTHERWISE ON THE PLANS.
3. OPEN AREAS SHALL BE LIMITED TO AREAS BEING WORKED IN. THE AREA STRIPPED OF EXISTING VEGETATION AT ANY GIVEN TIME SHALL BE MINIMIZED AND BE IMMEDIATELY WHERE PRACTICAL SO THAT AREAS ARE REVEGETATED AND PERMANENTLY STABILIZED BEFORE ADDITIONAL AREAS ARE STRIPPED OF EXISTING VEGETATION. CONSTRUCTION BY USE OF RIPRAP, SEED, MULCH, OR OTHER GROUND COVER WITHIN ONE WEEK FROM THE TIME IT WAS ACTIVELY WORKED. SURFACES SHALL BE STABILIZED PRIOR TO DIRECTING STORMWATER RUNOFF TOWARD STORMWATER BMPS. PLEASE REFER TO DRAINAGE PLANS FOR WATERSHED AREAS.

UTILITY NOTES

1. UTILITY INFORMATION DEPICTED HEREON IS COMPILED USING PHYSICAL EVIDENCE LOCATED IN THE FIELD. UTILITIES DEPICTED HEREON MAY NOT NECESSARILY REPRESENT ALL EXISTING UTILITIES. CONTRACTORS AND/OR DESIGNERS NEED TO CONTACT DIG-SAFE SYSTEMS, INC. (1-888-DIG-SAFE) AND FIELD VERIFY EXISTING UTILITIES PRIOR TO CONSTRUCTION AND/OR EXCAVATION. PROTECT EXISTING ONSITE SEWER PIPE AND ADJUST MANHOLE RIMS TO GRADE WHERE APPLICABLE.
2. ALL GRAVITY CONDUIT PIPES SHALL BE INSTALLED USING A PIPE LASER AND TARGET SYSTEM THROUGH THE PIPE. ON PIPE RUNS 50 FEET OR LESS, THE CONTRACTOR SHALL REQUEST ENGINEER'S APPROVAL TO USE OR NOT USE A GROUND LASER.
3. MAINTAIN MINIMUM 5'-6" OF COVER ABOVE TOP OF WATER SERVICE PIPE OR AS REQUIRED BY LOCAL WATER DISTRICT.
4. MAINTAIN MINIMUM 10 FEET HORIZONTAL SEPARATION BETWEEN WATER SERVICES AND OTHER UTILITIES. MAINTAIN MINIMUM 18 INCHES VERTICAL SEPARATION BETWEEN WATER SERVICES AND OTHER UTILITIES.
5. LOWER OR RAISE WATER SERVICES AS REQUIRED TO MAINTAIN MINIMUM 12 INCH VERTICAL SEPARATION FROM OTHER UTILITIES. WATER SERVICES CROSSING SEWERS SHALL BE PROVIDE 12 INCH MINIMUM SEPARATION BETWEEN THE BOTTOM OF WATER LINE AND TOP OF SEWER UNLESS NOTED OTHERWISE ON THE PLANS.
6. PIPE:
   - SEWER PIPE SHALL BE SDR 35 PVC OR APPROVED EQUAL.
   - STORMDRAIN SHALL BE ADS N-12 DUAL WALL HDPE PIPE WITH SMOOTH-WALLED INTERIOR OR APPROVED EQUAL UNLESS NOTED OTHERWISE ON THE UTILITY PLANS.
   - WATER PIPE AND FITTINGS SHALL CONFORM TO BRUNSWICK TOPSHAM WATER DISTRICT WATER PIPING SPECIFICATIONS. MAIN WATER SERVICE PIPE SHALL BE DUCTILE IRON, CLASS 52 PUSH-ON PIPE MEETING THE REQUIREMENTS OF AWWA/ANSI C-151/A21.11 (LATEST REVISION). PIPE SHALL BE CEMENT-LINED AWWA/ANSI C104/A21.4 WITH LINING TWICE THE THICKNESS SPECIFIED, AND COATED TWICE WITH A BITUMINOUS SEAL COATING. PROVIDE THRUST BLOCKS AT ALL WATER SERVICE BENDS. PIPE SHALL BE ZINC COATED WITH 200 mg/m² PER ISO 8179-1.
7. COORDINATE FOUNDATION UNDERDRAIN LOCATIONS WITH ARCHITECTURAL, STRUCTURAL AND PLUMBING DRAWINGS.
8. COORDINATE UTILITY INVERTS AT BUILDING WITH ARCHITECTURAL, STRUCTURAL AND PLUMBING DRAWINGS.
9. COORDINATE LOCATION OF SEWER, WATER, GAS, FOUNDATION DRAINS AND ROOF DRAIN INVERTS AT THE BUILDING WITH ARCHITECTURAL AND/OR MEP DRAWINGS.
10. WATER SERVICE ENTRANCE DESIGNS TO INCLUDE METERS AND BACKFLOW PREVENTERS TO MEET ALL STANDARDS AND REQUIREMENTS OF THE LOCAL WATER DISTRICT.
11. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY GRADE CHANGES THAT WILL IMPACT STORM DRAINAGE INFRASTRUCTURE OR OTHER UTILITIES.
12. UTILITIES WITHIN 5 FEET FROM FACE OF BUILDING ARE COORDINATED ON RELEVANT M.E.P. DRAWINGS. CONTRACTOR SHALL COORDINATE INVERTS, CONNECTIONS AND MATERIALS WITH ALL DRAWINGS.
13. CONTRACTOR SHALL FURNISH AND INSTALL TRENCHING, MATERIALS AND BACKFILL FOR ALL UTILITIES. ELECTRICAL AND TELECOM/DATA PROVIDERS WILL PULL PRIMARY SERVICE TO TRANSFORMER AND PANEL. CONTRACTOR RESPONSIBLE FOR TIMING AND COORDINATION WITH UTILITIES AND DRAWINGS. COORDINATE WITH ELECTRICAL DRAWINGS FOR CONDUIT SCHEDULE, TYPE AND SIZES.
14. COORDINATE ALL WATER RELATED WORK WITH BRUNSWICK TOPSHAM WATER DISTRICT.

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KYLE S. MASON — No. 8552 — REGISTERED LANDSCAPE ARCHITECT — STATE OF MAINE
01/21/2020

PAUL D. OSTROWSKI — No. 11175 — STATE OF MAINE — LICENSED PROFESSIONAL ENGINEER
01/21/2020

BOWDOIN COLLEGE

BRUNSWICK, ME

MILLS HALL AND THE CENTER FOR ARCTIC STUDIES

Bowdoin

KEYPLAN

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NAME:
DATE:
REGISTRATION NUMBER:

NO	DESCRIPTION	DATE
1	SUBMIT DEPT/OWN	9/16/19
2	SUBMIT TOWN	10/2/19
3	DD SUBMISSION	10/18/19
4	BP-1 CONST DOC	01/09/20
5	SUBMIT TO TOWN	01/21/20

ISSUANCE HISTORY - THIS SHEET

HGA NO: 4387-001-00

GENERAL NOTES, LEGEND AND ABBREVIATIONS

DATE: JANUARY 21, 2020

TOWN SUBMITTAL

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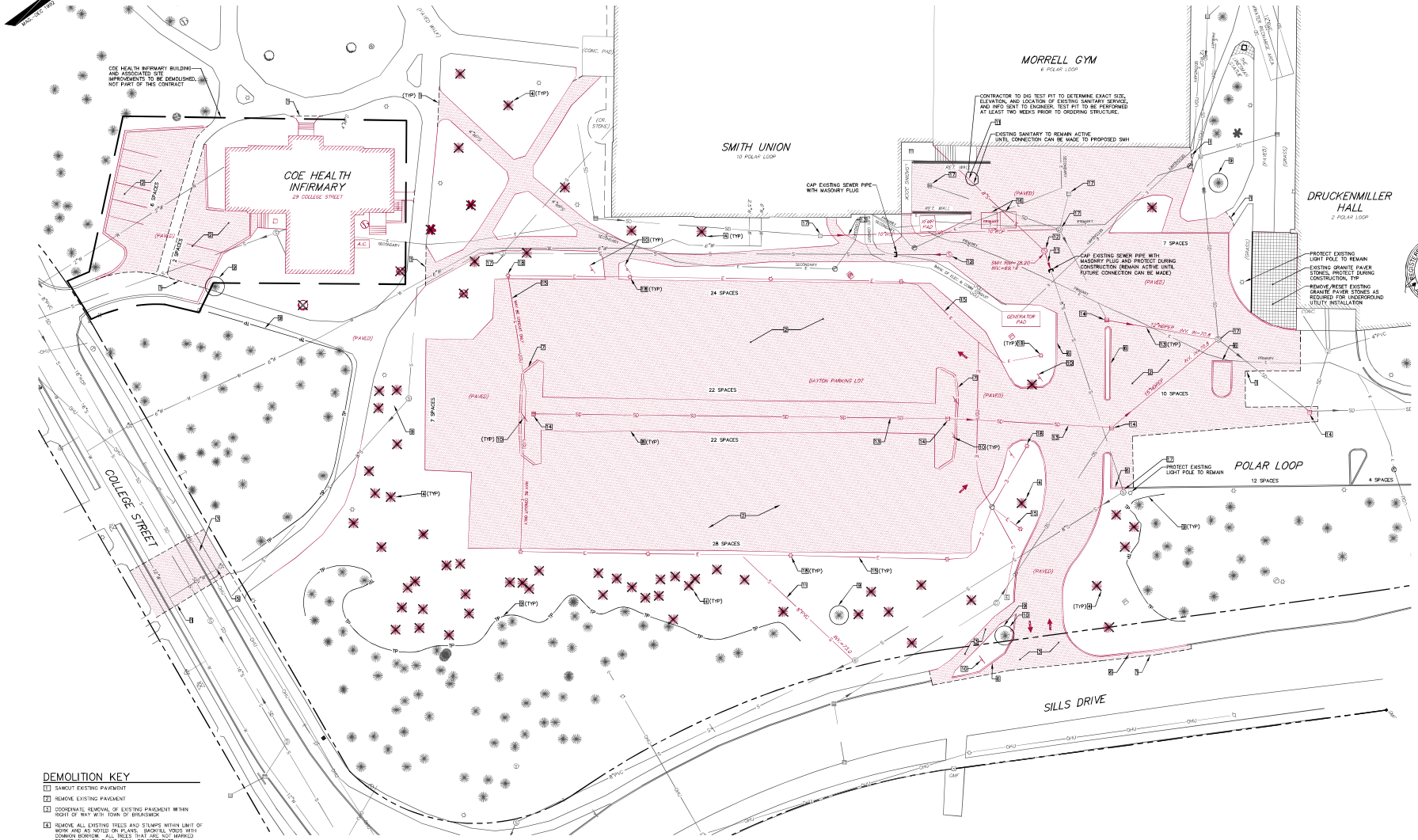

DEMOLITION KEY

1. SAWCUT EXISTING PAVEMENT
2. REMOVE EXISTING PAVEMENT
3. COORDINATE REMOVAL OF EXISTING PAVEMENT WITHIN RIGHT OF WAY WITH TOWN OF BRUNSWICK
4. REMOVE ALL EXISTING TREES AND STUMPS WITHIN LIMIT OF WORK AND AS NOTED ON PLANS. BACKFILL VOIDS WITH COMMON BORROW. ALL TREES THAT ARE NOT MARKED FOR REMOVAL ON PLANS SHALL BE PRESERVED
5. REMOVE EXISTING WATER SERVICE LINE(S) AS INDICATED IN ACCORDANCE WITH BRUNSWICK AND TOPSHAM WATER DISTRICT STANDARDS.
6. REMOVE, STACK AND REUSE EXISTING GRANITE CURB
7. REMOVE EXISTING BITUMINOUS CURBING
8. REMOVE, STACK AND DELIVER TO BOWDOIN FACILITIES MANAGEMENT OFFICE EXISTING CONCRETE WHEEL STOPS. CONTRACTOR TO COORDINATE DELIVERY LOCATION AND TIME WITH BOWDOIN FACILITIES MANAGEMENT
9. TREES TO BE PRESERVED (PROTECT DURING CONSTRUCTION)
10. REMOVE AND RESTORE EXISTING SIGN
11. REMOVE EXISTING SANITARY PIPE
12. REMOVE EXISTING SANITARY STRUCTURE
13. REMOVE EXISTING STORM DRAINAGE PIPE
14. REMOVE EXISTING STORM DRAINAGE STRUCTURE
15. REMOVE EXISTING UNDERGROUND ELECTRIC LINES
16. RELOCATE DUMPSTER (REFER TO SITE PLAN)
17. PROTECT EXISTING STRUCTURE, ADJUST TO GRADE AS PER GRADING PLAN
18. REMOVE EXISTING LIGHT POLE BASE, LIGHT POLE, AND FIXTURE AND STORE FOR USE IN NEW LOCATION
19. REMOVE AND STORE EXISTING SIGN

BOWDOIN CAMPUS TREE CALCULATION TABLE
EXISTING TREES TO BE REMOVED = 68 TREES
TREE REPLACEMENT CALCULATION 68 TREES X 1.25 = 85 TREES REQUIRED

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REGISTERED LANDSCAPE ARCHITECT — KYLIE S. MASON — No. 1511 — STATE OF MAINE — 01/21/2020

PAUL D. OSTROWSKI — No. 11175 — STATE OF MAINE — LICENSED PROFESSIONAL ENGINEER — 01/21/2020

BOWDOIN COLLEGE
BRUNSWICK, ME

MILLS HALL AND THE CENTER FOR ARCTIC STUDIES

Bowdoin

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PHASE:
DATE:
RESERVATION NUMBER:

NO	DESCRIPTION	DATE
1	SUBMIT DEP/TOWN	9/19/19
2	SUBMIT TOWN	10/2/19
3	OD SUBMISSION	10/18/19
4	BP3 CONST DOC	01.06.00
5	SUBMIT TO TOWN	01/21/20

ISSUANCE HISTORY - THIS SHEET

HGA NO: 4387-001-00

DEMOLITION PLAN

DATE: JANUARY 21, 2020

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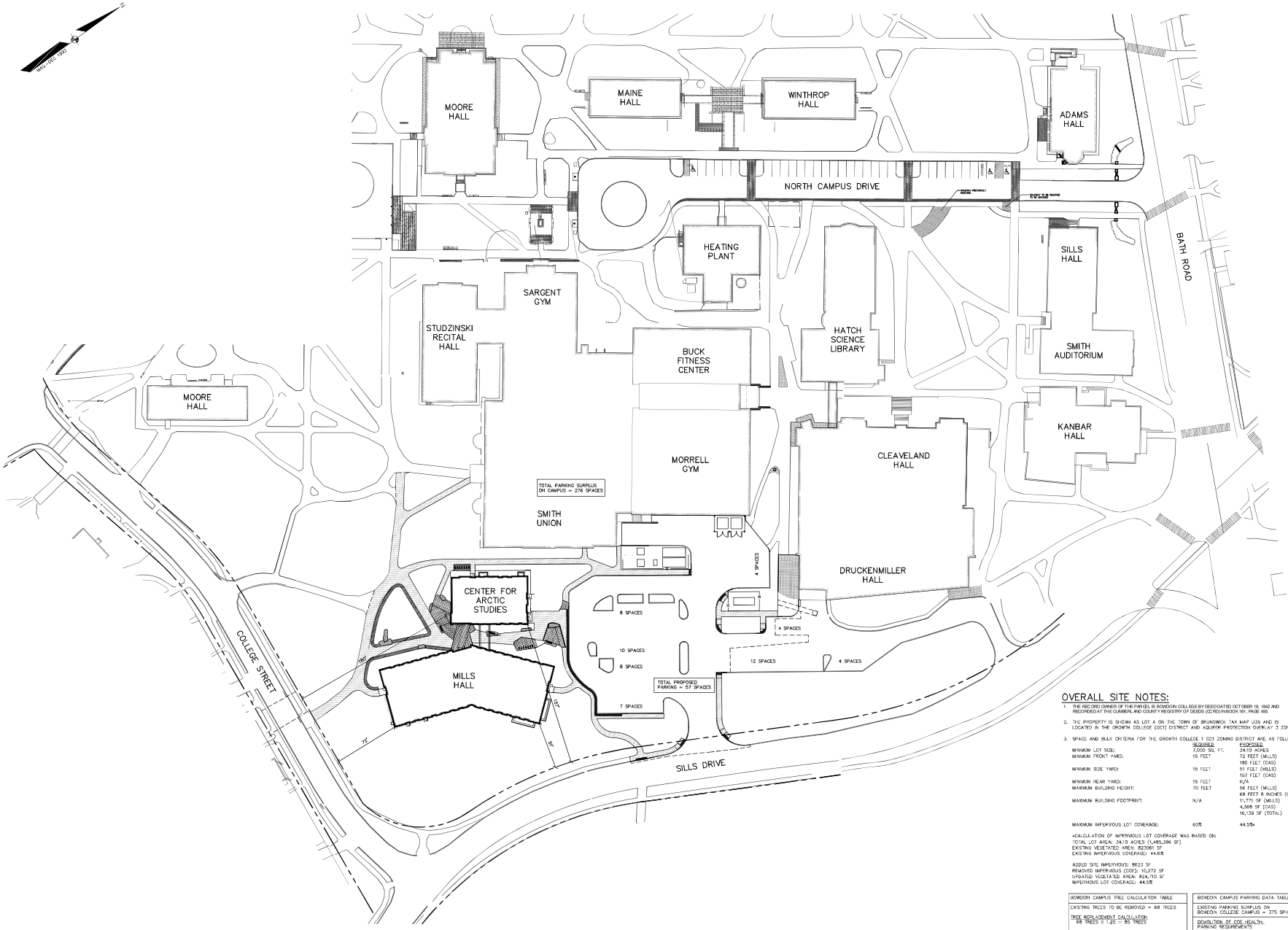

OVERALL SITE NOTES:

1. THE RECORD OWNER OF THE PARCEL IS BOWDOIN COLLEGE BY DEED DATED OCTOBER 18, 1942 AND RECORDED AT THE CUMBERLAND COUNTY REGISTRY OF DEEDS (CCRD) IN BOOK 181, PAGE 465.
2. THE PROPERTY IS SHOWN AS LOT A ON THE TOWN OF BRUNSWICK TAX MAP U35 AND IS LOCATED IN THE GROWTH COLLEGE (GC1) DISTRICT AND AQUIFER PROTECTION OVERLAY 3 ZONE.
3. SPACE AND BULK CRITERIA FOR THE GROWTH COLLEGE 1 GC1 ZONING DISTRICT ARE AS FOLLOWS:

	REQUIRED:	PROPOSED:
MINIMUM LOT SIZE:	7,000 SQ. FT.	34.13 ACRES
MINIMUM FRONT YARD:	15 FEET	72 FEET (MILLS) 180 FEET (CAS)
MINIMUM SIDE YARD:	15 FEET	51 FEET (MILLS) 157 FEET (CAS)
MINIMUM REAR YARD:	15 FEET	N/A
MAXIMUM BUILDING HEIGHT:	70 FEET	56 FEET (MILLS) 68 FEET 8 INCHES (CAS)
MAXIMUM BUILDING FOOTPRINT:	N/A	11,771 SF (MILLS) 4,368 SF (CAS) 16,139 SF (TOTAL)
MAXIMUM IMPERVIOUS LOT COVERAGE:	60%	44.5%*

*CALCULATION OF IMPERVIOUS LOT COVERAGE WAS BASED ON:
TOTAL LOT AREA: 34.13 ACRES (1,485,996 SF)
EXISTING VEGETATED AREA: 823061 SF
EXISTING IMPERVIOUS COVERAGE: 44.6%

ADDED SITE IMPERVIOUS: 8623 SF
REMOVED IMPERVIOUS (CDC): 10,272 SF
UPDATED VEGETATED AREA: 824,710 SF
IMPERVIOUS LOT COVERAGE: 44.5%

BOWDOIN CAMPUS TREE CALCULATION TABLE
EXISTING TREES TO BE REMOVED = 68 TREES
TREE REPLACEMENT CALCULATION: 68 TREES X 1.25 = 85 TREES

BOWDOIN CAMPUS PARKING DATA TABLE
EXISTING PARKING SURPLUS ON BOWDOIN COLLEGE CAMPUS = 375 SPACES
DEMOLITION OF CDC HEALTH: PARKING REQUIREMENTS COLLEGE USE: 11,478 SF @ 1 SPACE/900 SF = 13 SPACES ON-SITE PARKING (TO BE REMOVED) = 8 SPACES*
MILLS HALL AND THE CENTER FOR ARCTIC STUDIES: PARKING REQUIREMENTS COLLEGE USE: 16,900 SF @ 1 SPACE/900 SF = 19 SPACES MUSEUM: 3000 SF @ 1 SPACE/500 SF = 6 SPACES TOTAL PARKING REQUIRED = 25 SPACES EXISTING PARKING LOT = 156 SPACES PROPOSED PARKING LOT = 57 SPACES NET CHANGE (LOSS) = 79 SPACES
NEW PARKING SURPLUS = 276 SPACES** ** SPACES ADDED BACK TO CAMPUS SURPLUS =375-5-25-79=276

GRAPHIC SCALE
0 40 80
(IN FEET)
1 INCH= 40 FT.

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REGISTERED LANDSCAPE ARCHITECT KYLIE S. MASON No. 532 STATE OF MAINE — 01/21/2020

STATE OF MAINE PAUL D. OSTROWSKI No. 11175 LICENSED PROFESSIONAL ENGINEER — 01/21/2020

BOWDOIN COLLEGE
BRUNSWICK, ME

MILLS HALL AND THE CENTER FOR ARCTIC STUDIES

Bowdoin

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ISSUANCE HISTORY - THIS SHEET

HGA NO: 4387-001-00

OVERALL SITE PLAN

DATE: JANUARY 21, 2020

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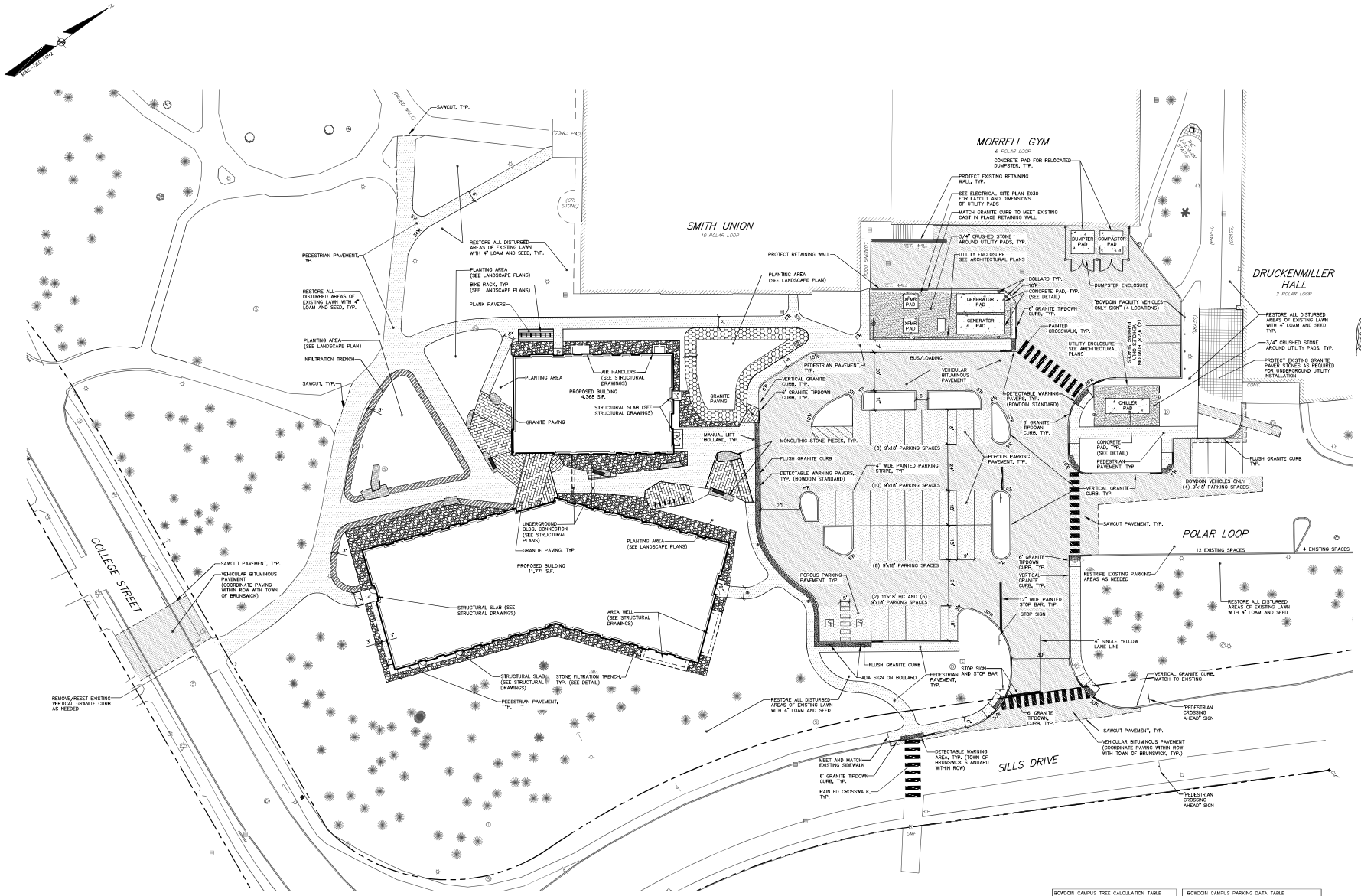

SITE SURFACE LEGEND

- VEHICULAR (BITUMINOUS PAVEMENT
- POROUS PARKING PAVING
- PEDESTRIAN PAVEMENT
- GRANITE PAVING
- PLANK PAVERS
- STONE PLANTING AREA
- CONCRETE SLAB (SEE STRUCTURAL DRAWINGS)
- INFILTRATION TRENCH
- 3/4" CRUSHED STONE
- FILTRATION TRENCH
- MONOLITHIC STONE PIECES (SEE LANDSCAPE PLANS)

NOTE:
SEE LAYOUT PLAN IN LANDSCAPE DRAWINGS FOR DETAILED DIMENSIONING WITHIN BUILDING ENTRANCE EXIT AND SIDEWALK AREAS.

BOWDOIN CAMPUS TREE CALCULATION TABLE

EXISTING TREES TO BE REMOVED = 68 TREES

TREE REPLACEMENT CALCULATION
68 TREES X 1.25 = 85 TREES

BOWDOIN CAMPUS PARKING DATA TABLE

EXISTING PARKING SURPLUS ON BOWDOIN COLLEGE CAMPUS = 375 SPACES

DEMOLITION OF COE HEALTH:
PARKING REQUIREMENTS:
COLLEGE USE: 11,678 SF @ 1 SPACE/900 SF = 13 SPACES
ON-SITE PARKING (TO BE REMOVED) = 8 SPACES+

MILLS HALL AND THE CENTER FOR ARCTIC STUDIES:
PARKING REQUIREMENTS:
COLLEGE USE: 16,890 SF @ 1 SPACE/900 SF = 19 SPACES
MUSEUM: 3000 SF @ 1 SPACE/500 SF = 6 SPACES
TOTAL PARKING REQUIRED = 25 SPACES
EXISTING PARKING LOT = 136 SPACES
PROPOSED PARKING LOT = 57 SPACES
NET CHANGE (LOSS) = 79 SPACES

NEW PARKING SURPLUS = 276 SPACES**
*5 SPACES ADDED BACK TO CAMPUS SURPLUS
•375+5-25-79=276

GRAPHIC SCALE
0 10 20 40
(IN FEET)
1 INCH = 20 FT.

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KYLE S. MASON No. 15574 REGISTERED LANDSCAPE ARCHITECT STATE OF MAINE
01/21/2020

PAUL D. OSTROWSKI No. 11175 STATE OF MAINE LICENSED PROFESSIONAL ENGINEER
01/21/2020

BOWDOIN COLLEGE

BRUNSWICK, ME

MILLS HALL AND THE CENTER FOR ARCTIC STUDIES

Bowdoin

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ISSUANCE HISTORY - THIS SHEET

HGA NO: 4387-001-00

SITE PLAN

DATE: JANUARY 21, 2020

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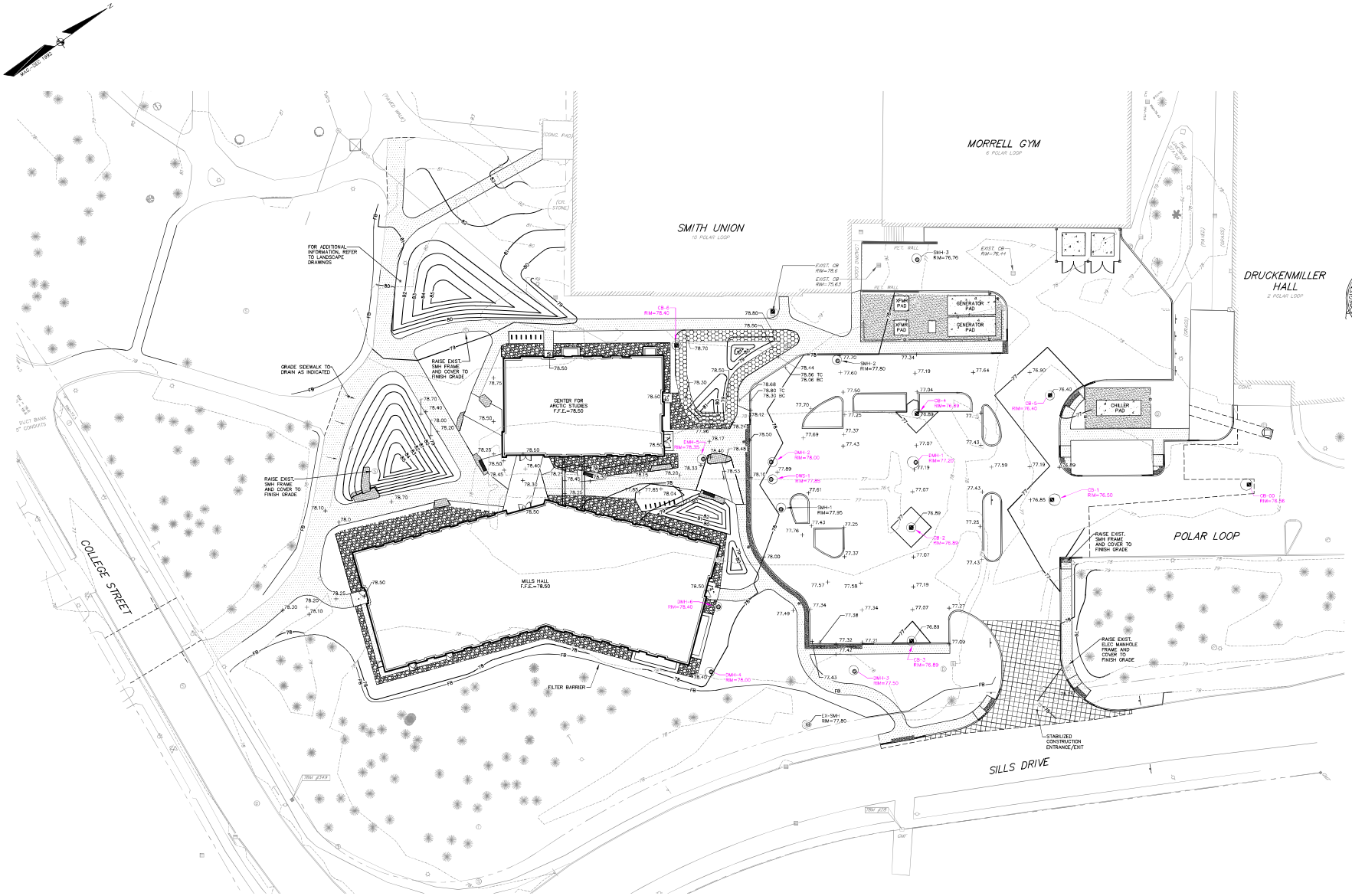

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KYLIE S. MASON No. 5530 REGISTERED LANDSCAPE ARCHITECT STATE OF MAINE
01/21/2020

PAUL D. OSTROWSKI No. 11175 LICENSED PROFESSIONAL ENGINEER STATE OF MAINE
01/21/2020

BOWDOIN COLLEGE
BRUNSWICK, ME

MILLS HALL AND THE CENTER FOR ARCTIC STUDIES

Bowdoin

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NAME:
PLAN:
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GRADING PLAN

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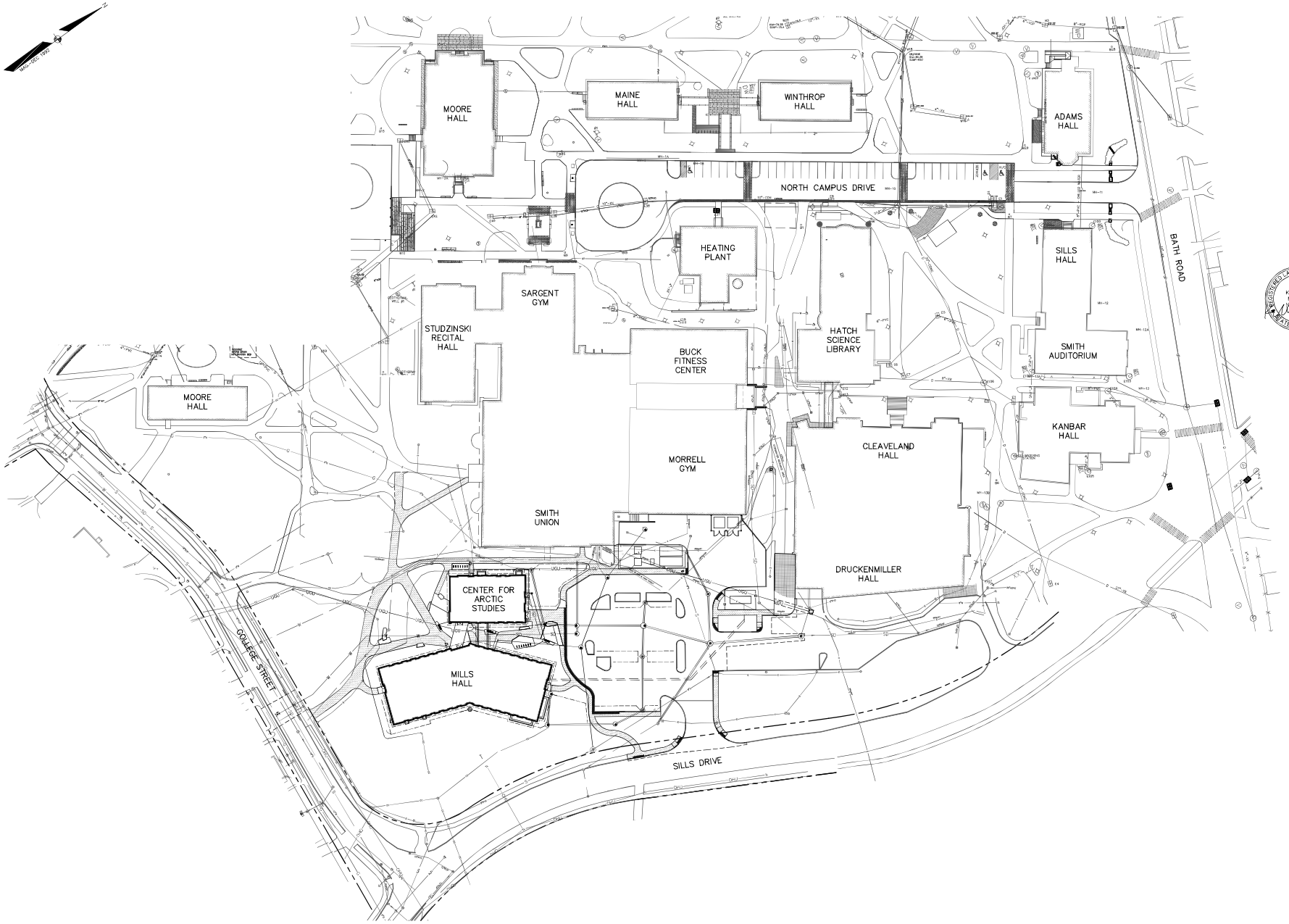

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REGISTERED LANDSCAPE ARCHITECT KYLIE S. MASON No. 533 STATE OF MAINE
01/21/2020

STATE OF MAINE PAUL D. OSTROWSKI No. 11175 LICENSED PROFESSIONAL ENGINEER
01/21/2020

BOWDOIN COLLEGE
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OVERALL UTILITY PLAN

DATE: JANUARY 21, 2020

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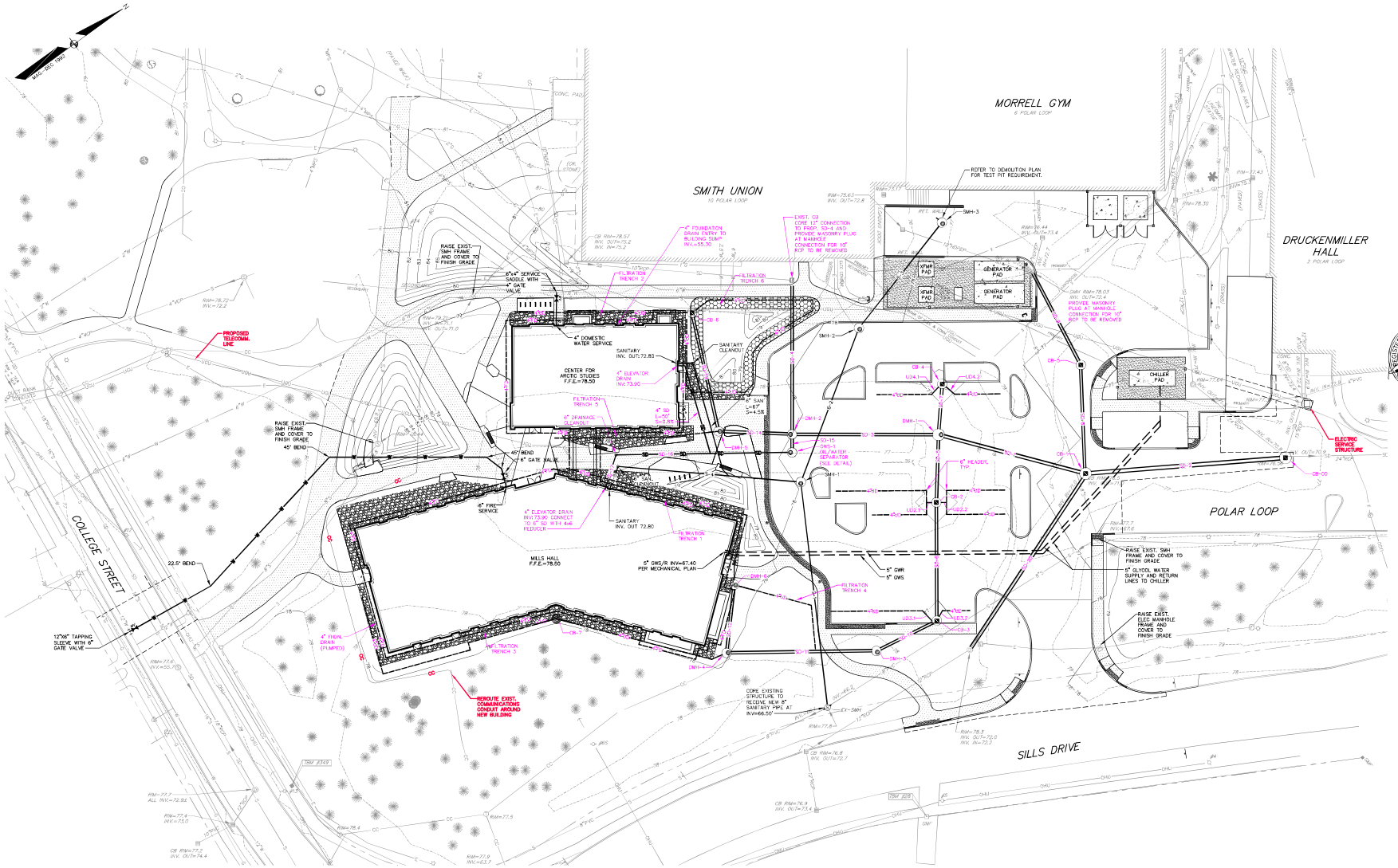

NOTE:
BOTH BUILDINGS WILL REQUIRE A PUMP TO DISCHARGE PERIMETER FOUNDATION DRAIN TO THE GRAVITY STORM DRAIN

STORM DRAIN STRUCTURE DATA

STRUCTURE	RIM	INV. IN	INV. OUT:	DIAM.
CB-00	76.66	71.00 (SD-2)	70.90 (EX)	60"
CB-1	76.50	71.58 (SD-1) 71.58 (SD-8) 71.58 (SD-20)	71.48 (SD-2)	60"
CB-2	76.89	72.30 (SD-6) 73.06 (UD2.2) 73.06 (UD2.1)	72.20 (SD-5)	48"
CB-3	76.89	72.66 (SD-10) 73.06 (UD3.2) 73.06 (UD3.1)	72.56 (SD-6)	48"
CB-4	76.89	73.06 (UD4.2) 73.06 (UD4.1)	72.56 (SD-7)	48"
CB-5	76.40	71.93 (SD-9)	71.83 (SD-8)	48"
CB-6	78.40	73.90 (4" UD) 73.90 (4" UD.)	73.80 (SD-19)	48"
CB-7	77.90	73.90 (UD7.1)	73.90 (UD7.2)	12" N.T.D. 48" 12" TYP.
CLEANOUT	74.34	73.77 (SD-17)	73.77 (SD-16)	TYP.

STORM DRAIN STRUCTURE DATA

STRUCTURE	RIM	INV. IN	INV. OUT:	DIAM.
DMH-1	77.20	72.05 (SD-3) 72.05 (SD-5) 72.36 (SD-7)	71.95 (SD-1)	60"
DMH-2	78.00	73.46 (SD-4) 72.40 (SD-14) 72.75 (SD-15)	72.29 (SD-3)	48"
DMH-3	77.50	72.91 (SD-11)	72.81 (SD-10)	48"
DMH-4	78.00	73.90 (4" UD) 73.59 (SD-12)	73.49 (SD-11)	48"
DMH-5	78.35	73.92 (4" UD) 72.86 (SD-19)	72.76 (SD-14)	48"
DMH-6	78.40	73.90 (4"UD) 73.90 (4" UD.)	73.80 (SD-12)	48"
EX. CB	78.60		74.18 (SD-4)	60"
OWS-1	77.85	73.12 (SD-16)	72.80 (SD-18)	48"

STORM DRAIN PIPE DATA

NAME	SIZE	LENGTH	SLOPE
SD-1	15"	71'	0.50%
SD-2	18"	95'	0.51%
SD-3	12"	68'	0.48%
SD-4	12"	72'	1.00%
SD-5	12"	29'	0.44%
SD-6	12"	55'	0.44%
SD-7	12"	21'	0.79%
SD-8	12"	50'	0.46%
SD-9	12"	49'	0.96%
SD-10	12"	30'	0.47%
SD-11	12"	71'	0.77%
SD-12	12"	30'	0.63%
SD-14	12"	53'	0.75%
SD-15	12"	5'	1.00%
SD-16	6"	86'	0.74%

STORM DRAIN PIPE DATA

NAME	SIZE	LENGTH	SLOPE
SD-17	6"	18'	0.74%
SD-19	12"	63'	1.56%
SD-20	15"	101'	0.42%
UD2.1	6"	3'	0.00%
UD2.2	6"	3'	0.00%
UD3.1	6"	7'	0.00%
UD3.2	6"	4'	0.00%
UD4.1	6"	5'	0.00%
UD4.2	6"	6'	0.00%

SANITARY SEWER STRUCTURE DATA

STRUCTURE	RIM	INV. IN	INV. OUT:	DIAM.
CLEANOUT	72.87	72.28 (S-5)	72.14 (S-4)	6"
EX-SMH	77.80	66.50 (S-1) 66.20 (EX. 8")	66.10 (EX 8")	48"
SMH-1	77.95	68.29 (S-2) 68.30 (S-4)	67.06 (S-1)	48"
SMH-2	77.80	68.75 (S-3)	68.65 (S-2)	48"
SMH-3	76.76	69.20 (EX 8" S)	69.10 (S-3)	48"

SANITARY SEWER PIPE DATA

NAME	SIZE	LENGTH	SLOPE
S-1	8"	109'	0.49%
S-2	8"	78'	0.47%
S-3	8"	67'	0.48%
S-4	8"	89'	4.20%
S-5	6"	12'	4.20%

GRAPHIC SCALE
(IN FEET)
1 INCH = 20 FT.

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KYLIE S. MASON No. 5537 REGISTERED LANDSCAPE ARCHITECT STATE OF MAINE
01/21/2020

PAUL D. OSTROWSKI No. 11175 LICENSED PROFESSIONAL ENGINEER STATE OF MAINE
01/21/2020

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UTILITY PLAN

DATE: JANUARY 21, 2020

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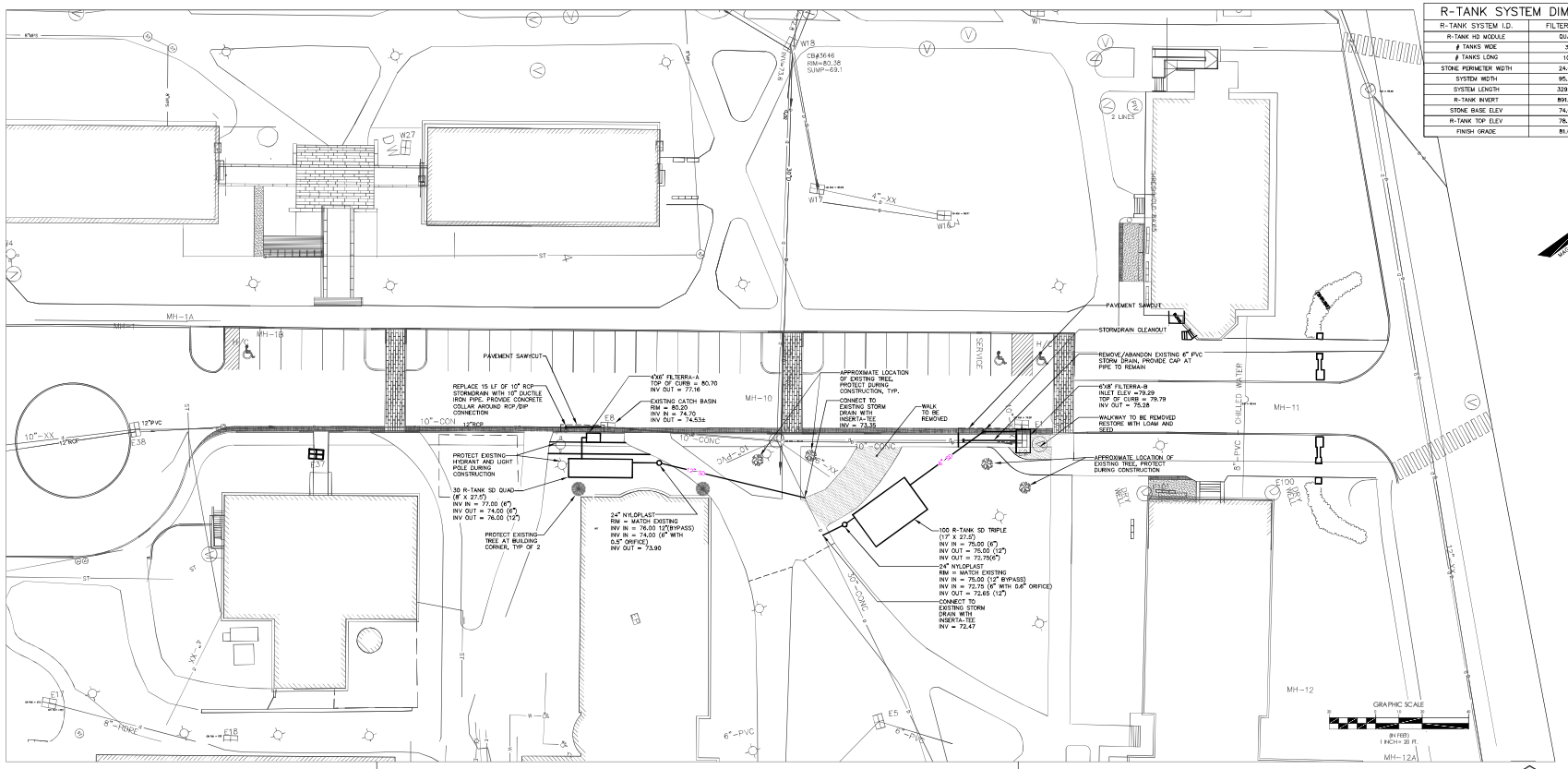
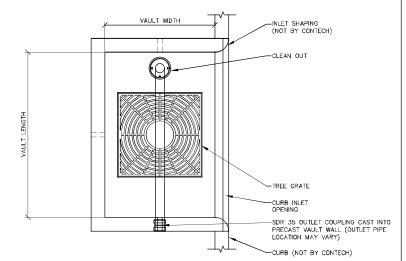
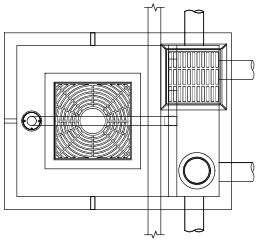


R-TANK SYSTEM DIMENSIONAL DATA

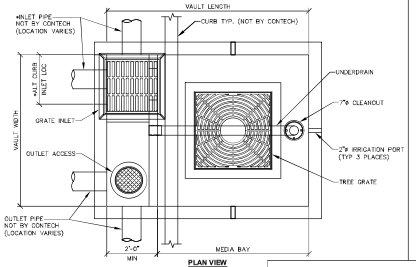
R-TANK SYSTEM I.D.	FILTERRA A	FILTTERA B
R-TANK HD MODULE	QUAD	TRIPLE
# TANKS WIDE	3	10
# TANKS LONG	10	10
STONE PERIMETER WIDTH	24.00	24.00
SYSTEM WIDTH	95.28	17.12
SYSTEM LENGTH	329.52	329.52
R-TANK INVERT	891.00	876.00
STONE BASE ELEV	74.00	72.75
R-TANK TOP ELEV	78.20	914.76
FINISH GRADE	81.00	81.00



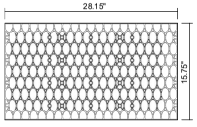
PLAN VIEW



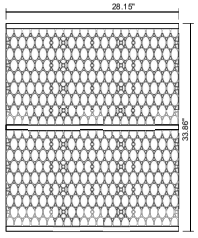
ALTERNATE ORIENTATION



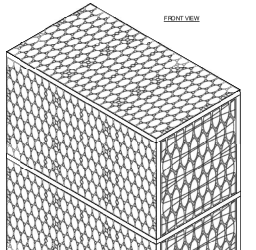
PLAN VIEW



PLAN VIEW

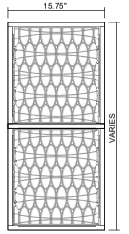


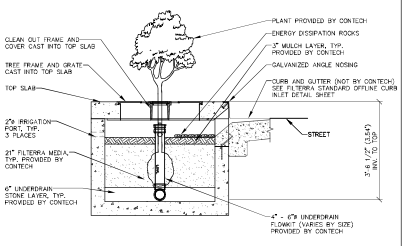
SECTION VIEW



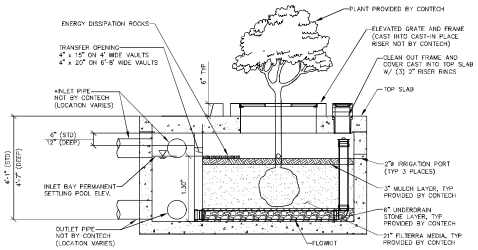
FRONT VIEW

ISOMETRIC VIEW





SECTION A-A



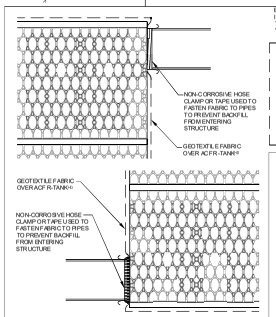
SECTION A-A
(STANDARD DEPTH SHOWN)

FT LONG SIDE INLET CONFIGURATION - FILTERRA A

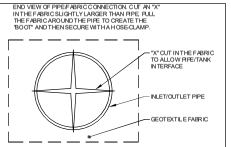
DESIGNATION	AVAILABILITY	MEDIA BAY SIZE	VAULT SIZE (L x W)	OUTLET PIPE DIA	TREE GRATE QTY & SIZE
FT0604	N/A CA	6 x 4	6 x 4	4" SDR 35	(1) 3' x 3'

FTPD-G STANDARD HEIGHT CONFIGURATION - FILTERRA B

DESIGNATION (OPTIONS: -P)	AVAILABILITY	MEDIA BAY SIZE	VAULT SIZE (W x L)	WEIR LENGTH / MAX CURB OPENING	*MAX BYPASS FLOW (CFS)	GRATE INLET / OUTLET ACCESS SIZE	TREE GRATE QTY & SIZE
FTPD0608-G	ALL	6 x 8	6 x 10	1'-8"	1.4	24"SQ/12"ø	(1) 4' x 4'



R-TANK® TYPICAL TANK INLET/OUTLET DETAIL



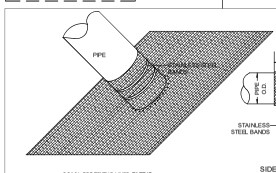
R-TANK® DOUBLE - MODULE DETAIL

MODULE DATA

GEOMETRY: LENGTH =28.15 IN. (715MM)
WIDTH= 15.75 IN. (400 MM)
HEIGHT = 33.88 IN. (860 MM)
STORAGE VOLUME =8.25 CF (234 L)
VOID INTERNAL VOLUME: 95%
VOID SURFACE AREA 90%

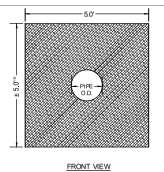
LOAD RATING: 33.4 PSI, (MODULE ONLY)
HS20L (WITH ACF COVER SYSTEM)

MATERIAL: 85% RECYCLED POLYPROPYLENE

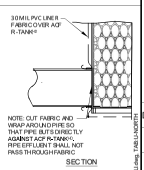


- 30 MIL GEOTEXTILE LINER FABRIC COLLAR TO FIT OUTSIDE DIAMETER OF INLET/OUTLET PIPE
- * TRIM AS NEEDED

SIDE VIEW



FRONT VIEW



NOTE: CUT FABRIC AND WRAP AROUND PIPE SO THAT PIPE BUTS DIRECTLY AGAINST ACF R-TANK®. PIPE EFFLUENT SHALL NOT PASS THROUGH FABRIC

SECTION

GEOTEXTILE PIPE BOOT FOR R-TANK®

HGA
420 North 5th Street, Suite 100
Minneapolis Minnesota 55401
Telephone 612.758.4000

CIVIL ENGINEER
SEBAGO TECHNICS, INC.
75 JOHN ROBERTS ROAD, SUITE 4A
SOUTH PORTLAND, ME 04106
207-200-2100

LANDSCAPE ARCHITECT
STIMSON STUDIO
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CAMBRIDGE, MA 02138
617-499-8000

FOOD SERVICE CONSULTANT
FOODSERVICE DESIGN
603-969-0009

KYLE S. MASON No. 8332 REGISTERED LANDSCAPE ARCHITECT STATE OF MAINE
01/21/2020

PAUL D. OSTROWSKI No. 011175 LICENSED PROFESSIONAL ENGINEER STATE OF MAINE
01/21/2020

BOWDOIN COLLEGE
BRUNSWICK, ME

MILLS HALL AND THE CENTER FOR ARCTIC STUDIES

Bowdoin

KEYPLAN

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION OR REPORT WAS DEPARTED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF

NAME:
NAME:
DATE:
REGISTRATION NUMBER:

NO	DESCRIPTION	DATE
1	SUBMIT DEP/TOWN	9/19/19
2	SUBMIT TOWN	10/2/19
3	DD SUBMISSION	10/18/19
4	BP3 CONST DOC	01.06.20
5	SUBMIT TO TOWN	01/21/20

ISSUANCE HISTORY - THIS SHEET

HGA NO: 4387-001-00

UTILITY PLAN - NORTH CAMPUS

DATE: JANUARY 21, 2020

TOWN SUBMITTAL

C5.3

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EROSION CONTROL MEASURES

PRE-CONSTRUCTION PHASE

PRIOR TO THE BEGINNING OF ANY CONSTRUCTION, SEDIMENT BARRIERS (SILT FENCE) WILL BE STAKED/INSTALLED ACROSS THE SLOPE(S), ON THE CONTOUR AT OR JUST BELOW THE LIMITS OF CLEARING OR GRUBBING, AND/OR JUST ABOVE ANY ADJACENT PROPERTY LINE OR WATERCOURSE TO PROTECT AGAINST CONSTRUCTION RELATED EROSION. THE PLACEMENT OF SEDIMENT BARRIERS SHALL BE COMPLETED IN ACCORDANCE WITH GUIDELINES ESTABLISHED IN BEST MANAGEMENT PRACTICES AND IN ACCORDANCE WITH THIS EROSION CONTROL PLAN AND DETAILS IN THIS PLAN SET. THIS NETWORK IS TO BE MAINTAINED BY THE CONTRACTOR UNTIL ALL EXPOSED SURFACES HAVE AT LEAST 90% VIGOROUS PERENNIAL VEGETATIVE COVER TO PREVENT EROSION. TEMPORARY EROSION CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER PERMANENT STABILIZATION IS ATTAINED.

PRIOR TO ANY CLEARING OR GRUBBING, A CONSTRUCTION ENTRANCE/EXIT SHALL BE CONSTRUCTED AT THE INTERSECTION OF THE PROPOSED ENTRANCES AND EXISTING ROADWAY TO AVOID TRACKING OF MUD, DUST AND DEBRIS FROM THE SITE.

PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL PREPARE A DETAILED SCHEDULE AND MARKED UP PLAN INDICATING AREAS AND COMPONENTS OF THE WORK AND KEY DATES SHOWING DATE OF DISTURBANCE AND COMPLETION OF THE WORK. THE CONTRACTOR SHALL SCHEDULE A PRE-CONSTRUCTION MEETING WITH THE MUNICIPAL STAFF. THREE COPIES OF THE SCHEDULE AND MARKED UP PLAN SHALL BE PROVIDED TO THE MUNICIPALITY THREE DAYS PRIOR TO THE SCHEDULED PRE-CONSTRUCTION MEETING. SPECIAL ATTENTION SHALL BE GIVEN TO THE 14 DAY LIMIT OF DISTURBANCE IN THE SCHEDULE ADDRESSING TEMPORARY AND PERMANENT VEGETATION MEASURES.

CONSTRUCTION AND POST-CONSTRUCTION PHASE

AREAS UNDERGOING ACTUAL CONSTRUCTION SHALL ONLY EXPOSE THAT AMOUNT OF MINERAL SOIL NECESSARY FOR PROGRESSIVE AND EFFICIENT CONSTRUCTION. AN AREA CONSIDERED OPEN IS ANY AREA NOT STABILIZED WITH PAVEMENT, VEGETATION, MULCHING, EROSION CONTROL MATS, RIPRAP OR GRAVEL BASE ON A ROAD, SUCH AS ACTIVE EXCAVATION AND ACTIVE GRADING. LIMIT THE EXPOSED AREA TO THOSE AREAS IN WHICH WORK IS ACTIVELY OCCURRING OR CAN BE MULCHED IN THE SAME DAY. OPEN AREAS SHALL BE ANCHORED WITH TEMPORARY EROSION CONTROL AS SHOWN ON THE DESIGN PLANS AND AS DESCRIBED WITHIN THIS EROSION CONTROL PLAN WITHIN SEVEN (7) DAYS OF DISTURBANCE. AREAS LOCATED WITHIN 100 FEET OF STREAMS SHALL BE ANCHORED WITH TEMPORARY EROSION CONTROL WITHIN SEVEN (7) DAYS. REFER TO WINTER EROSION CONTROL NOTES FOR THE TREATMENT OF OPEN AREAS AFTER OCTOBER 1ST OF THE CONSTRUCTION YEAR.

THE CONTRACTOR MUST INSTALL ANY ADDED MEASURES WHICH MAY BE NECESSARY TO CONTROL EROSION/SEDIMENTATION FROM SITE DEPENDENT UPON THE ACTUAL SITE AND WEATHER CONDITIONS. CONTINUATION OF EARTHWORK OPERATIONS ON ADDITIONAL AREAS SHALL NOT BEGIN UNTIL THE EXPOSED SOIL SURFACE ON THE AREA BEING WORKED HAS BEEN STABILIZED, IN ORDER TO MINIMIZE AREAS WITHOUT EROSION CONTROL PROTECTION.

EROSION CONTROL APPLICATIONS & MEASURES:

THE PLACEMENT OF EROSION CONTROL MEASURES SHALL BE COMPLETED IN ACCORDANCE WITH GUIDELINES ESTABLISHED IN BEST MANAGEMENT PRACTICES AND IN ACCORDANCE WITH THE EROSION CONTROL PLAN AND DETAILS IN THE PLAN SET.

1. TEMPORARY MULCHING:

ALL DISTURBED AREAS SHALL BE MULCHED WITH MATERIALS SPECIFIED BELOW PRIOR TO ANY STORM EVENT. ALL DISTURBED AREAS NOT FINAL GRADED WITHIN 14 DAYS SHALL BE MULCHED. DISTURBED AREAS ADJACENT TO NATURAL RESOURCES THAT ARE NOT GRADED WITHIN SEVEN (7) DAYS SHALL BE MULCHED. ALSO, AREAS, WHICH HAVE BEEN TEMPORARILY OR PERMANENTLY SEEDED, SHALL BE MULCHED IMMEDIATELY FOLLOWING SEEDING. EROSION CONTROL BLANKETS ARE RECOMMENDED TO BE USED AT THE BASE OF GRASSED WATERWAYS AND ON SLOPES GREATER THAN 33%. MULCH ANCHORING SHOULD BE USED ON SLOPES GREATER THAN 8% AFTER SEPTEMBER 15TH OF THE CONSTRUCTION YEAR (SEE WINTER EROSION CONTROL NOTES).
TYPES OF MULCH:

HAY OR STRAW: SHALL BE APPLIED AT A RATE OF 75 LBS./1,000 S.F. (1.5 TONS PER ACRE).

EROSION CONTROL MIX: SHALL BE PLACED EVENLY AND MUST PROVIDE 100% SOIL COVERAGE. EROSION CONTROL MIX SHALL BE APPLIED SUCH THAT THE THICKNESS ON SLOPES 3:1 OR LESS IS 2 INCHES PLUS 1/2 INCH PER 20 FEET OF SLOPE UP TO 100 FEET. THE THICKNESS ON SLOPES BETWEEN 3:1 AND 2:1 SHALL BE 4 INCHES PLUS 1/2 INCH PER 20 FEET OF SLOPE UP TO 100 FEET. THIS SHALL NOT BE USED ON SLOPES GREATER THAN 2:1.

EROSION CONTROL BLANKETS: SHALL BE INSTALLED SUCH THAT CONTINUOUS CONTACT BETWEEN THE MAT AND THE SOIL IS OBTAINED. INSTALL BLANKETS AND STAPLE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

2. SOIL STOCKPILES

STOCKPILES OF SOIL OR SUBSOIL SHALL BE MULCHED WITH HAY OR STRAW AT A RATE OF 75 LBS./1,000 S.F. (1.5 TONS PER ACRE) OR WITH A FOUR-INCH LAYER OF WOOD WASTE EROSION CONTROL MIX. THIS WILL BE DONE WITHIN 24 HOURS OF STOCKPILING AND RE-ESTABLISHED PRIOR TO ANY RAINFALL. ANY SOIL STOCKPILE WILL NOT BE PLACED (EVEN COVERED WITH HAY OR STRAW) WITHIN 100 FEET FROM ANY NATURAL RESOURCES. SEDIMENT BARRIERS SHALL BE INSTALLED DOWNGRADIENT OF STOCKPILES, AND STORMWATER SHALL BE PREVENTED FROM RUNNING ONTO THE STOCKPILE.

3. NATURAL RESOURCES PROTECTION:

ANY AREAS WITHIN 100 FEET FROM ANY NATURAL RESOURCES SHALL BE MULCHED USING TEMPORARY MULCHING (AS DESCRIBED IN PART 1 OF THIS SECTION) WITHIN 7 DAYS OF EXPOSURE OR PRIOR TO ANY STORM EVENT (AS DESCRIBED IN PART 4 OF THIS SECTION) SHALL BE PLACED BETWEEN ANY NATURAL RESOURCE AND THE DISTURBED AREA. PROJECTS CROSSING THE NATURAL RESOURCE SHALL BE PROTECTED A MINIMUM DISTANCE OF 100 FEET ON EITHER SIDE FROM THE RESOURCE.

4. SEDIMENT BARRIERS:

PRIOR TO THE BEGINNING OF ANY CONSTRUCTION, SEDIMENT BARRIERS SHALL BE STAKED ACROSS THE SLOPE(S), ON THE CONTOUR AT OR JUST BELOW THE LIMITS OF CLEARING OR GRUBBING, AND/OR JUST ABOVE ANY ADJACENT PROPERTY LINE OR WATERCOURSE TO PROTECT AGAINST CONSTRUCTION RELATED EROSION. SEDIMENT BARRIERS SHALL BE MAINTAINED BY THE CONTRACTOR UNTIL ALL EXPOSED SLOPES HAVE AT LEAST 90% VIGOROUS PERENNIAL VEGETATIVE COVER TO PREVENT EROSION.

SILT FENCE: SHALL BE INSTALLED PER THE DETAIL ON THE PLANS. THE EFFECTIVE HEIGHT OF THE FENCE SHALL NOT EXCEED 36 INCHES. IT IS RECOMMENDED THAT SILT FENCE BE REMOVED BY CUTTING THE FENCE MATERIALS AT GROUND LEVEL SO AS TO AVOID ADDITIONAL SOIL DISTURBANCE.

HAY BALES: SHALL NOT BE INSTALLED ADJACENT TO WETLAND. INSTALL FOR THE DETAIL ON THE PLANS. BALES SHALL BE WIRE-BOUND OR STRING-TIED AND THESE BINDINGS MUST REMAIN PARALLEL WITH THE GROUND SURFACE DURING INSTALLATION TO PREVENT DETERIORATION OF THE BINDINGS. BALES SHALL BE INSTALLED WITHIN A MINIMUM 4 INCH DEEP TRENCH WITH ENDS OF ADJACENT BALES TIGHTLY ABUTTING ONE ANOTHER.

EROSION CONTROL MIX: SHALL NOT BE USED ADJACENT TO WETLANDS. INSTALL PER THE DETAIL ON THE PLANS. THE MIX SHALL CONSIST PRIMARILY OF ORGANIC MATERIAL AND CONTAIN A WELL-GRADED MIXTURE OF PARTICLE SIZES AND A MOISTURE CONTENT WHICH LESS THAN 4 INCHES IN DIAMETER. THE MIX COMPOSITION SHALL MEET THE STANDARDS DESCRIBED WITHIN THE MDEP BEST MANAGEMENT PRACTICES. NO TRENCHING IS REQUIRED FOR INSTALLATION OF THIS BARRIER. EROSION CONTROL MIX BERMS SHALL NOT BE USED AT THE BOTTOM OF STEEP SLOPES (>8%) OR SLOPES WITH FLOWING WATER.

FROM THE CONTAINED BERM: SHALL BE INSTALLED DOWNGRADIENT OF THE PLANS. THE SEDIMENT BARRIER IS EROSION CONTROL MIX PLACED WITHIN A SYNTHETIC TUBULAR NETTING AND PERFORMS AS A STURDY SEDIMENT BARRIER THAT WORKS WELL ON HARD GROUND SUCH AS FROZEN CONDITIONS, TRAVELED AREAS OR PAVEMENT. NO TRENCHING IS REQUIRED FOR INSTALLATION OF THIS BARRIER.

5. TEMPORARY CHECK DAMS:

SHALL BE INSTALLED PER THE DETAIL ON THE PLANS. CHECK DAMS ARE TO BE PLACED WITHIN DITCHES/ SWALES AS SPECIFIED ON THE DESIGN PLANS IMMEDIATELY AFTER FINAL GRADING. CHECK DAMS SHALL BE 2 FEET HIGH. TEMPORARY CHECK DAMS MAY BE REMOVED ONLY AFTER THE ROADWAYS ARE PAVED AND THE VEGETATION SHALL ARE ESTABLISHED WITH AT LEAST 90% OF VIGOROUS PERENNIAL GROWTH. THE AREA BENEATH THE CHECK DAM MUST BE SEEDED AND MULCHED IMMEDIATELY AFTER REMOVAL OF THE CHECK DAM.

STONE CHECK DAMS: STONE DAMS SHOULD BE CONSTRUCTED OF 2 TO 3 INCH STONE AND PLACED SUCH THAT COMPLETE COVERAGE OF THE SWALE IS OBTAINED AND THAT THE CENTER OF THE DAM IS 6 INCHES LOWER THAN THE OUTER EDGES.

HAY BALE CHECK DAMS: BALES SHALL BE WIRE-BOUND OR STRING-TIED. BALES SHALL BE INSTALLED WITHIN A MINIMUM 4 INCH DEEP TRENCH LINE WITH ENDS OF ADJACENT BALES TIGHTLY ABUTTING ONE ANOTHER. HAY BALES SHALL BE PLACED SUCH THAT COMPLETE COVERAGE OF THE SWALE IS OBTAINED AND THAT THE CENTER OF THE DAM IS 6 INCHES LOWER THAT THE OUTER EDGES.

MANUFACTURED CHECK DAMS: MANUFACTURED CHECK DAMS, AS SPECIFIED IN THE DETAIL ON THE PLANS, MAY BE USED IF AUTHORIZED BY THE PROPER LOCAL, STATE OR FEDERAL REGULATING AGENCIES. THESE UNITS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

6. STORMDRAIN INLET PROTECTION:

INLET PROTECTION SHALL BE PLACED AROUND A STORMDRAIN DROP INLET OR CURB INLET PRIOR TO PERMANENT STABILIZATION OF THE IMMEDIATE AND UPSTREAM DISTURBED AREAS. THEY SHALL BE CONSTRUCTED IN A MANNER THAT WILL FACILITATE CLEAN-OUT AND DISPOSAL OF TRAPPED SEDIMENTS AND MINIMIZE INTERFERENCE WITH CONSTRUCTION ACTIVITIES. ANY RESULTANT PONDING OF WATER FROM THE PROTECTION METHOD MUST NOT CAUSE EXCESSIVE INCONVENIENCE OR DAMAGE TO ADJACENT AREAS OR STRUCTURES.

HAY BALE DROP INLET PROTECTION: WE DO NOT RECOMMEND THE USE OF HAY BALES AS INLET PROTECTION.

CONCRETE BLOCK AND STONE INLET SEDIMENT FILTER/ DROP OR CURB INLETS: SHALL BE INSTALLED PER THE DETAIL ON THE PLANS. THE HEIGHT OF THE CONCRETE BLOCK BARRIER CAN VARY BUT MUST BE BETWEEN 12 AND 24 INCHES TALL. A MINIMUM OF 1 INCH CRUSHED STONE SHALL BE USED.

MANUFACTURED SEDIMENT BARRIERS AND FILTER DROP OR CURB INLETS: MANUFACTURED FILTERS, AS SPECIFIED IN THE DETAIL ON THE PLANS, MAY BE USED IF INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

7. STABILIZED CONSTRUCTION ENTRANCE/EXIT:

PRIOR TO CLEARING AND/OR GRUBBING THE SITE A STABILIZED CONSTRUCTION ENTRANCE/EXIT SHALL BE CONSTRUCTED WHEREVER TRAFFIC WILL EXIT THE CONSTRUCTION SITE ONTO A PAVED ROADWAY IN ORDER TO MINIMIZE THE TRACKING OF SEDIMENT AND DEBRIS FROM THE CONSTRUCTION SITE ONTO PUBLIC ROADWAYS. THESE ENTRANCES AND ROADWAYS SHALL BE PERIODICALLY SWEPT OR FLUSHED TO MINIMIZE THE TRACKING OF MUD, DUST OR DEBRIS FROM THE CONSTRUCTION AREA. THE TERM "STREET" INCLUDES TOOLS TO MEAN REMOVAL AND RECOVERY OF TRACKED SEDIMENT WITH A STREET SWEEPER, NOT BRUSHING OR WASHING INTO STORM DRAINS OR STRUCTURES WITH A MECHANICAL BROOM. STABILIZED CONSTRUCTION EXITS SHALL BE CONSTRUCTED IN AREAS SPECIFIED ON THE PLANS AND AS DETAILED ON THE PLANS. THE CONTRACTOR SHALL MAINTAIN THE STABILIZED CONSTRUCTION ENTRANCE UNTIL ALL DISTURBED AREAS ARE STABILIZED.

8. DUST CONTROL:

DUST CONTROL DURING CONSTRUCTION SHALL BE ACHIEVED BY THE USE OF A WATERING TRUCK TO PERIODICALLY SPRINKLE THE EXPOSED ROADWAY AREAS AS NECESSARY TO REDUCE DUST DURING THE DRY MONTHS. APPLYING OTHER DUST CONTROL PRODUCTS SUCH AS CALCIUM CHLORIDE OR OTHER MANUFACTURED PRODUCTS ARE ALLOWED IF AUTHORIZED BY THE LOCAL, STATE AND/OR FEDERAL REGULATING AGENCIES. HOWEVER, IT IS THE CONTRACTOR'S RESPONSIBILITY TO MITIGATE DUST AND SOIL LOSS FROM THE SITE. IF OFFSITE TRACKING OCCURS, PUBLIC ROADS SHOULD BE SWEPT IMMEDIATELY AND NOT LESS THAN ONCE A WEEK AND PRIOR TO SIGNIFICANT STORM EVENTS.

9. TEMPORARY VEGETATION:

TEMPORARY VEGETATION SHALL BE APPLIED TO DISTURBED AREAS THAT WILL NOT RECEIVE FINAL GRADING FOR PERIODS UP TO 12 MONTHS. THIS PROCEDURE SHOULD BE USED EXTENSIVELY IN AREAS ADJACENT TO NATURAL RESOURCES. SEEDBED PREPARATION AND APPLICATION OF SEED SHALL BE CONDUCTED AS INDICATED IN THE PERMANENT VEGETATION SECTION OF THIS NARRATIVE. SPECIFIC SEEDS (FAST GROWING AND SHORT LIVING) SHALL BE SELECTED FROM THE MAINE EROSION AND SEDIMENT CONTROL BMP MANUALS FOR CONTRACTORS AND ENGINEERS, 2016 OR LATEST REVISION. ALTERNATIVE EROSION CONTROL MEASURES SHOULD BE USED IF SEEDING CAN NOT BE DONE BEFORE SEPTEMBER 15TH OF THE CONSTRUCTION YEAR.

10. PERMANENT VEGETATION:

REVEGETATION MEASURES SHALL COMMENCE IMMEDIATELY UPON COMPLETION OF FINAL GRADING OF AREAS TO BE LOAMED AND SEEDED. THE APPLICATION OF SEED SHALL BE CONDUCTED BETWEEN APRIL 1ST AND OCTOBER 1ST OF THE CONSTRUCTION YEAR. PLEASE REFER TO THE WINTER EROSION CONTROL NOTES FOR MORE DETAIL. REVEGETATION MEASURES SHALL CONSIST OF THE FOLLOWING:

SEEDBED PREPARATION:

A. FOUR (4) INCHES OF LOAM SHALL BE SPREAD OVER DISTURBED AREAS AND SMOOTHED TO A UNIFORM SURFACE. LOAM SHALL BE FREE OF SUBSOIL, CLAY LUMPS, STONES AND OTHER OBJECTS OVER 2 INCHES OR LARGER IN ANY DIMENSION, AND WITHOUT WEEDS, ROOTS OR OTHER OBJECTIONABLE MATERIAL.

B. SOILS TESTS SHALL BE TAKEN AT THE TIME OF SOIL STRIPPING TO DETERMINE FERTILIZATION REQUIREMENTS. SOILS TESTS SHALL BE TAKEN PROMPTLY AS TO NOT INTERFERE WITH THE 14-DAY LIMIT ON SOIL EXPOSURE. BASED UPON TEST RESULTS, SOIL AMENDMENTS SHALL BE INCORPORATED INTO THE SOIL PRIOR TO FINAL SEEDING. IN LIEU OF SOIL TESTS, SOIL AMENDMENTS MAY BE APPLIED AS FOLLOWS:

ITEM	APPLICATION RATE
10-20-20 FERTILIZER (N-P205-K20 OR EQUAL)	18.4 LBS./1,000 S.F.
GROUND LIMESTONE (50% CALCIUM & MAGNESIUM OXIDE)	138 LBS./1,000 S.F.

C. WORK LIME AND FERTILIZER INTO THE SOIL AS NEARLY AS PRACTICAL TO A DEPTH OF 4 INCHES WITH PROPER EQUIPMENT. ROLL THE AREA TO FIRM THE SEEDBED EXCEPT ON CLAY OR SILTY SOILS OR COARSE SAND.

APPLICATION OF SEED:

A. SEEDING: SHALL BE CONDUCTED BETWEEN APRIL 1ST AND OCTOBER 1ST OF THE CONSTRUCTION YEAR. GENERALLY A SEED MIXTURE MAY BE APPLIED AS FOLLOWS: (MDEP SEED MIX 2 IS DISPLAYED)

SEED TYPE	APPLICATION RATE
CREEPING RED FESCUE	0.46 LBS./1,000 S.F. (20 LBS./ACRE)
REDTOP	0.05 LBS./1,000 S.F. (2 LBS./ACRE)
TALL FESCUE	0.46 LBS./1,000 S.F. (20 LBS./ACRE)
TOTAL:	0.97 LBS./1,000 S.F. (42 LBS./ACRE)

NOTE: A SPECIFIC SEED MIXTURE SHOULD BE CHOSEN TO MATCH THE SOILS CONDITION OF THE SITE. VARIOUS AGENCIES CAN RECOMMEND SEED MIXTURES. MDEP RECOMMENDED SEED MIXES ARE LISTED IN THE EROSION CONTROL BMP MANUAL DATED 2016 OR LATEST REVISION.

B. HYDROSEEDING: SHALL BE CONDUCTED ON PREPARED AREAS WITH SLOPES LESS THAN 2:1. LIME AND FERTILIZER MAY BE APPLIED SIMULTANEOUSLY WITH THE SEED. RECOMMENDED SEEDING RATES MUST BE INCREASED BY 10% WHEN HYDROSEEDING.

C. MULCHING: SHALL COMMENCE IMMEDIATELY AFTER SEED IS APPLIED. REFER TO THE TEMPORARY MULCHING SECTION OF THIS NARRATIVE FOR DETAILS.

SEEDING:

FOLLOWING SEEDBED PREPARATION, SOD CAN BE APPLIED IN LIEU OF SEEDING IN AREAS WHERE IMMEDIATE VEGETATION IS MOST BENEFICIAL SUCH AS DITCHES, AROUND STORMWATER DROP INLETS AND AREAS OF ACTIVE USE. SOD SHOULD BE LAID AT RIGHT ANGLES TO THE DIRECTION OF FLOW, STARTING AT THE LOWEST ELEVATION. SOD SHOULD BE ROLLED OR TAMPED DOWN TO EVEN OUT THE JOINTS ONCE LAID DOWN. WHERE FLOW IS PREVALENT THE SOD MUST BE PROPERLY ANCHORED DOWN. IRRIGATE THE SOD IMMEDIATELY AFTER INSTALLATION. IN MOST CASES, SOD CAN BE ESTABLISHED BETWEEN APRIL 1ST AND NOVEMBER 15TH OF THE CONSTRUCTION YEAR. HOWEVER, REFER TO THE WINTER EROSION CONTROL NOTES FOR ANY ACTIVITIES AFTER OCTOBER 1ST.

STANDARDS FOR TIMELY STABILIZATION:

STANDARD FOR THE TIMELY STABILIZATION OF DISTURBED SLOPES -- THE CONTRACTOR WILL CONSTRUCT AND STABILIZE STONE-COVERED SLOPES BY NOVEMBER 15. THE CONTRACTOR WILL SEED AND MULCH ALL SLOPES TO BE VEGETATED BY SEPTEMBER 15. THE MDEP WILL CONSIDER ANY AREA HAVING A GRADE GREATER THAN 10% (10H:1V) TO BE A SLOPE. IF THE CONTRACTOR FAILS TO STABILIZE ANY SLOPE TO BE VEGETATED BY SEPTEMBER 15, 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 1 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 APPLICANT WILL MONITOR GROWTH OF THE RYE OVER THE NEXT 30 DAYS. IF THE RYE FAILS TO GROW AT LEAST THREE INCHES OR COVER AT LEAST 75% OF THE DISTURBED SOIL BEFORE NOVEMBER 15, THEN THE APPLICANT WILL MULCH THE AREA FOR OVER-WINTER PROTECTION AS DESCRIBED IN ITEM 3(C) OF THIS STANDARD.

B. STABILIZE THE SOIL WITH SOD -- THE APPLICANT WILL STABILIZE THE DISTURBED SOIL WITH PROPERLY INSTALLED SOD BY OCTOBER 1. PROPER INSTALLATION INCLUDES THE APPLICANT 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. THE APPLICANT WILL NOT USE LATE-SEASON SOD INSTALLATION TO STABILIZE SLOPES HAVING A GRADE GREATER THAN 33% (3H:1V). IF THE APPLICANT FAILS TO STABILIZE ANY SLOPE WITH SOD BY OCTOBER 15, THEN THE APPLICANT WILL TAKE ONE OF THE FOLLOWING ACTIONS TO STABILIZE THE SLOPE FOR LATE FALL AND WINTER.

C. STABILIZE THE SOIL WITH WOOD WASTE COMPOST -- BY OCTOBER 15 THE CONTRACTOR WILL PLACE A SIX-INCH LAYER OF WOOD WASTE COMPOST ON THE SLOPE BY NOVEMBER 15. PRIOR TO PLACING THE WOOD WASTE COMPOST, THE APPLICANT WILL REMOVE ANY SNOW ACCUMULATION ON THE DISTURBED SLOPE. THE APPLICANT WILL NOT USE WOOD WASTE COMPOST TO STABILIZE SLOPES FOR LATE FALL AND WINTER APPLICATION THAN 50% (2H:1V) OR HAVING GROUNDWATER SEEPS ON THE SLOPE FACE.

D. STABILIZE THE SLOPE WITH STONE RIPRAP -- THE CONTRACTOR WILL PLACE A LAYER OF STONE RIPRAP ON THE SLOPE BY NOVEMBER 15. THE APPLICANT WILL HIRE A REGISTERED PROFESSIONAL ENGINEER TO DETERMINE THE STONE SIZE NEEDED FOR STABILITY AND TO DESIGN A FILTER LAYER FOR UNDERNEATH THE RIPRAP.

STANDARD FOR THE TIMELY STABILIZATION OF DISTURBED SOILS -- BY SEPTEMBER 15 THE CONTRACTOR WILL SEED AND MULCH ALL DISTURBED SOILS ON AREAS HAVING A SLOPE LESS THAN 10%. IF THE CONTRACTOR FAILS TO STABILIZE THE SOILS BY THIS DATE, THEN THE CONTRACTOR WILL TAKE ONE OF THE FOLLOWING ACTIONS TO STABILIZE THE SOIL FOR LATE FALL AND WINTER.

A. STABILIZE THE SOIL WITH TEMPORARY VEGETATION -- BY OCTOBER 1 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 APPLICANT WILL MONITOR GROWTH OF THE RYE OVER THE NEXT 30 DAYS. IF THE RYE FAILS TO GROW AT LEAST THREE INCHES OR COVER AT LEAST 75% OF THE DISTURBED SOIL BEFORE NOVEMBER 15, THEN THE APPLICANT WILL MULCH THE AREA FOR OVER-WINTER PROTECTION AS DESCRIBED IN ITEM 3(C) OF THIS STANDARD.

B. STABILIZE THE SOIL WITH SOD -- THE APPLICANT WILL STABILIZE THE DISTURBED SOIL WITH PROPERLY INSTALLED SOD BY OCTOBER 1. PROPER INSTALLATION INCLUDES THE APPLICANT 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. THE APPLICANT WILL NOT USE LATE-SEASON SOD INSTALLATION TO STABILIZE SLOPES HAVING A GRADE GREATER THAN 33% (3H:1V). IF THE APPLICANT FAILS TO STABILIZE ANY SLOPE WITH SOD BY OCTOBER 15, THEN THE APPLICANT WILL TAKE ONE OF THE FOLLOWING ACTIONS TO STABILIZE THE SOIL FOR LATE FALL AND WINTER.

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D. STABILIZE THE SLOPE WITH STONE RIPRAP -- THE CONTRACTOR WILL PLACE A LAYER OF STONE RIPRAP ON THE SLOPE BY NOVEMBER 15. THE APPLICANT WILL HIRE A REGISTERED PROFESSIONAL ENGINEER TO DETERMINE THE STONE SIZE NEEDED FOR STABILITY AND TO DESIGN A FILTER LAYER FOR UNDERNEATH THE RIPRAP.

STANDARD FOR THE TIMELY STABILIZATION OF DISTURBED SOILS -- BY SEPTEMBER 15 THE CONTRACTOR WILL SEED AND MULCH ALL DISTURBED SOILS ON AREAS HAVING A SLOPE LESS THAN 15%. IF THE APPLICANT FAILS TO STABILIZE THESE SOILS BY THIS DATE, THEN THE APPLICANT WILL TAKE ONE OF THE FOLLOWING ACTIONS TO STABILIZE THE SOIL FOR LATE FALL AND WINTER.

A. STABILIZE THE SOIL WITH TEMPORARY VEGETATION -- BY OCTOBER 1 THE APPLICANT 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 APPLICANT WILL MONITOR GROWTH OF THE RYE OVER THE NEXT 30 DAYS. IF THE RYE FAILS TO GROW AT LEAST THREE INCHES OR COVER AT LEAST 75% OF THE DISTURBED SOIL BEFORE NOVEMBER 15, THEN THE APPLICANT WILL MULCH THE AREA FOR OVER-WINTER PROTECTION AS DESCRIBED IN ITEM 3(C) OF THIS STANDARD.

B. STABILIZE THE SOIL WITH SOD -- THE APPLICANT WILL STABILIZE THE DISTURBED SOIL WITH PROPERLY INSTALLED SOD BY OCTOBER 1. PROPER INSTALLATION INCLUDES THE APPLICANT 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. THE APPLICANT WILL NOT USE LATE-SEASON SOD INSTALLATION TO STABILIZE SLOPES HAVING A GRADE GREATER THAN 33% (3H:1V).

C. STABILIZE THE SOIL WITH MULCH -- BY NOVEMBER 15 THE APPLICANT 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. THE APPLICANT WILL REMOVE ANY SNOW ACCUMULATION ON THE DISTURBED AREA. IMMEDIATELY AFTER APPLYING THE MULCH, THE APPLICANT WILL ANCHOR THE MULCH WITH PLASTIC NETTING TO PREVENT WIND FROM MOVING THE MULCH OFF THE DISTURBED SOIL.

1. MAINTENANCE MEASURES SHALL BE APPLIED AS NEEDED DURING THE ENTIRE CONSTRUCTION CYCLE. AFTER EACH RAINFALL, SNOW STORM OR PERIOD OF THAWING AND THUNDY, AND AT LEAST EVERY SEVEN (7) DAYS, THE CONTRACTOR SHALL PERFORM A VISUAL INSPECTION OF ALL INSTALLED EROSION CONTROL MEASURES. THE CONTRACTOR SHALL PERFORM REPAIRS NO LATER THAN THE END OF THE NEXT WORKDAY, TO ALLOW CONTINUED PROPER FUNCTIONING OF THE EROSION CONTROL MEASURE. THE CONTRACTOR SHALL PROVIDE THE NECESSARY REGULATING AGENCIES WITH WRITTEN DOCUMENTATION DESCRIBING DATES OF INSPECTIONS AND NECESSARY FOLLOW UP WORK TO MAINTAIN EROSION CONTROL MEASURES INCLUDING THE REQUIREMENTS OF THIS PLAN WITHIN SEVEN (7) DAYS.

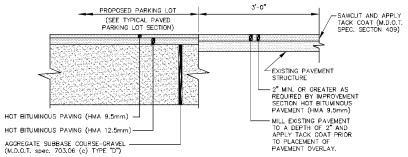
2. FOLLOWING THE TEMPORARY AND/OR FINAL SEEDINGS, THE CONTRACTOR SHALL INSPECT THE WORK AREA SEMIMONTHLY UNTIL THE SEEDINGS HAVE BEEN ESTABLISHED. ESTABLISHED MEANS A MINIMUM OF 90% OF AREAS VEGETATED WITH VIGOROUS GROWTH. RESEEDING SHALL BE CARRIED OUT BY THE CONTRACTOR WITH FOLLOW-UP INSPECTIONS IN THE EVENT OF ANY FAILURES UNTIL VEGETATION IS ADEQUATELY ESTABLISHED.

HOUSEKEEPING:

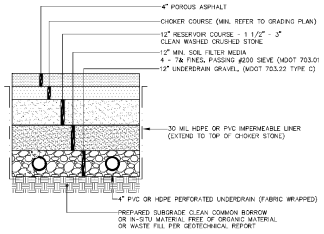
1. SPILL PREVENTION. CONTROLS MUST BE USED TO PREVENT POLLUTANTS FROM CONSTRUCTION AND WASTE MATERIALS STORED ON SITE TO ENTER STORMWATER, WHICH INCLUDES STORAGE PRACTICES TO MINIMIZE EXPOSURE OF THE MATERIALS TO STORMWATER. THE SITE CONTRACTOR OR OPERATOR MUST DEVELOP, AND IMPLEMENT AS NECESSARY, APPROPRIATE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

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 SEDIMENT AND OTHER POLLUTANTS THAT WILL IMPAIR INFILTRATION AREAS AND GROUNDWATER QUALITY.

3. FUGITIVE SEDIMENT AND D



TYPICAL PAVEMENT JOINT
NOT TO SCALE



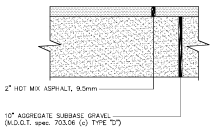
NOTES:

1. ALL MATERIALS SHALL CONFORM TO MDOT SPECIFICATIONS LATEST REVISION COMPACTION OF ALL MATERIALS TO BE IN ACCORDANCE WITH THE SPECIFICATIONS AND THE GEOTECHNICAL REPORT.
2. FILTER LAYER SHALL BE UNIFORM, FREE OF STONES, STUMPS, AND ROOTS.
3. GEOTEXTILE FABRICS SHALL BE FREE OF DRAINAGE. OVERLAP SEAMS A MINIMUM OF 12".
4. UNDISTURBED GROUND SHALL BE 3 FEET MIN. ABOVE SEASONAL HIGH WATER TABLE.
5. AT MIN. 1 FOOT SEPARATION IS REQUIRED FROM BELOW THE ROAD SUBGRADE TO GROUNDWATER.
6. STORED VOLUME NEEDS TO FULL DRAIN WITHIN 24-48 HOURS.
7. CHOKER COURSE SHALL MEET AASHTO #57 STONE SPECIFICATIONS.
8. RESERVOIR COURSE SHALL MEET AASHTO #3 STONE SPECIFICATIONS.
9. THICKNESS OF CHOKER STONE SHALL BE A MINIMUM OF 4-INCHES, ACTUAL THICKNESS WILL VARY ACCORDING TO GRADING PLAN AND ELEVATION VARIANCE WITHIN THE POROUS PAVEMENT SECTION.

CONSTRUCTION OVERSIGHT NOTES FOR POROUS PAVEMENT:

1. INSPECTIONS BY A PROFESSIONAL ENGINEER SHALL CONSIST OF WEEKLY VISITS TO THE SITE TO INSPECT THE CONSTRUCTION AND STABILIZATION OF THE PROPOSED PERVIOUS PAVEMENT AND ITS FILTER COURSE MATERIAL TO BE BUILT ON THE SITE. INSPECTIONS SHALL CONSIST OF AN APPROPRIATE NUMBER OF VISITS TO THE SITE TO INSPECT THE FILTER BED MATERIAL PLACEMENT AND COMPACTION, STORAGE COURSE, PAVEMENT ALTERNATIVE PLACEMENT, FABRIC PLACEMENT, AND STORMWATER OVERFLOW BYPASS CONSTRUCTION FROM INITIAL GROUND DISTURBANCE TO FINAL PAVEMENT COMPACTION

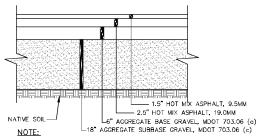
POROUS PARKING PAVEMENT SECTION
NOT TO SCALE



NOTES:

1. COMPACT GRAVEL TO 92% MAXIMUM DENSITY.
2. HOT MIX ASPHALT TO BE COMPACTED TO 95% THEORETICAL MAXIMUM DENSITY PER ASTM-D-2041
3. APPLY TACK COAT BETWEEN SUCCESSIVE LIFTS OR HOT MIX ASPHALT

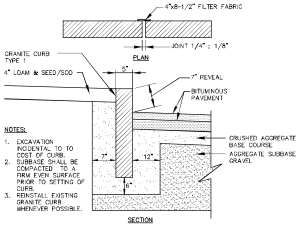
PEDESTRIAN PAVEMENT
NOT TO SCALE



NOTE:

1. COMPACT SUBBASE AND BASE COURSE GRAVEL TO 95% OF MAXIMUM DENSITY.
2. APPLY TACK COAT ON ALL EXISTING PAVEMENT SURFACES ABUTTING NEW PAVEMENT.

TYPICAL STREET PAVEMENT REPAIR
NOT TO SCALE

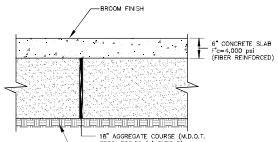


NOTES:

1. EXCAVATION INCIDENTAL TO COST OF CURB.
2. SUBBASE SHALL BE COMPACTED TO A FIRM EVEN SURFACE, PRIOR TO SETTING OF CURB.
3. REINSTALL EXISTING GRANITE CURB WHENEVER POSSIBLE.

NOTE:
CONTRACTOR SHALL REVIEW CONDITION OF EXISTING CURBING WITH OWNER IF CONDITION IS POOR, CONTRACTOR SHALL FURNISH AND INSTALL NEW VERTICAL GRANITE CURBING

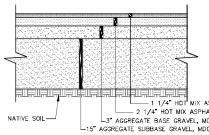
VERTICAL GRANITE CURB
NOT TO SCALE



NOTE:

1. PROVIDE CONTRACTION CONTROL JOINTS EVERY 6'-0" IN EACH DIRECTION.
2. FIBER REINFORCING SHALL BE SYNTHETIC FIBER, COMPLYING WITH ASTMC 1116, TYPE III, 1/2" TO 1-1/2" LONG.
3. SYNTHETIC FIBER SHALL BE UNIFORMLY DISPERSED IN CONCRETE AT MANUFACTURERS RECOMMENDED RATE, BUT NOT LESS THAN 3 LBS/CU. YD.

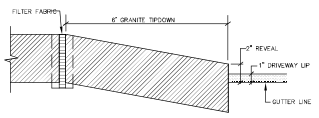
TYPICAL CONCRETE PAD SECTION
NOT TO SCALE



NOTES:

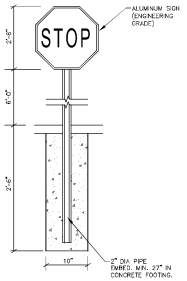
1. COMPACT GRAVEL SUBBASE AND BASE COURSES TO 95% OF MAXIMUM DENSITY USING HEAVY ROLLER COMPACTION.
2. HOT MIX ASPHALT SURFACE COARSE SHALL BE COMPACTED TO 95% OF ITS THEORETICAL MAXIMUM DENSITY (ASTM D-2041). BASE COARSE SHALL BE COMPACTED TO 95% ±2.5% OF ITS THEORETICAL MAXIMUM DENSITY (ASTM D-2041).
3. APPLY TACK COAT BETWEEN SUCCESSIVE LIFTS OF BITUMINOUS PAVEMENT.
4. CONTRACTOR SHALL SET GRADE STAKES MARKING SUBBASE AND FINISH GRADE ELEVATIONS FOR CONSTRUCTION REFERENCE.

TYPICAL VEHICULAR BITUMINOUS PAVEMENT
NOT TO SCALE

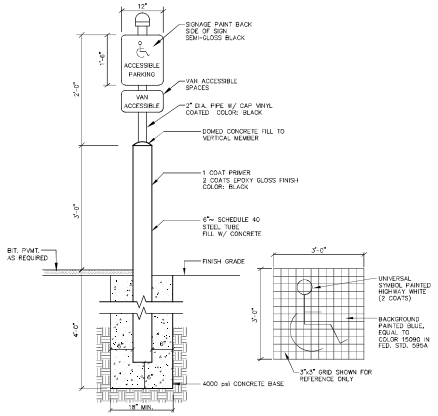


NOTE:
CONTRACTOR SHALL REVIEW CONDITION OF EXISTING CURBING WITH OWNER IF CONDITION IS POOR, CONTRACTOR SHALL FURNISH AND INSTALL NEW VERTICAL GRANITE CURBING

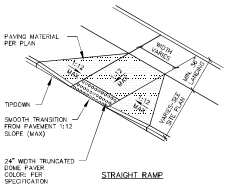
TYPICAL TIPDOWN CURB INSTALLATION
NOT TO SCALE

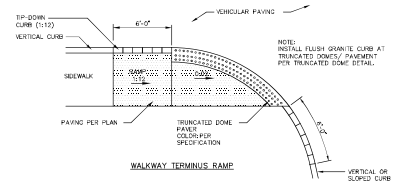


TYPICAL SIGN DETAIL
NOT TO SCALE

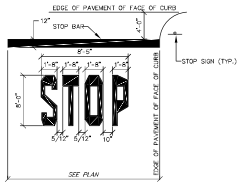


ACCESSIBLE SIGN IN METAL BOLLARD
NOT TO SCALE





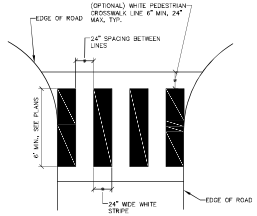
HANDICAP RAMP WITH TRUNCATED DOME BAND (SITE INTERIOR)
NOT TO SCALE



NOTE:

1. WORDS AND ARROWS FOR DRIVEWAYS SHALL BE APPLIED ACCORDING TO REQUIREMENTS AS OUTLINED IN SECTION 3B OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS.
2. THESE WORDS AND BAR ARE TO BE PAINTED REFLECTIVE WHITE.

STOP BAR
NOT TO SCALE



CROSSWALK STRIPING
NOT TO SCALE

HGA
420 North 5th Street, Suite 100
Minneapolis, Minnesota 55401
Telephone 612.758.4000

CIVIL ENGINEER
SEBAGO TECHNICS, INC.
75 JOHN ROBERTS ROAD, SUITE 4A
SOUTH PORTLAND, ME 04106
207-200-2100

LANDSCAPE ARCHITECT
STIMSON STUDIO
288 NORFOLK STREET
CAMBRIDGE, MA 02139
617-876-8960

AV / ACOUSTIC CONSULTANT
ACENTECH
33 MOULTON STREET
CAMBRIDGE, MA 02138
617-499-8000

FOOD SERVICE CONSULTANT
FOODSERVICE DESIGN
603-969-0009

REGISTERED LANDSCAPE ARCHITECT KYLIE S. MASON No. 5557 STATE OF MAINE
01/21/2020

STATE OF MAINE PAUL D. OSTROWSKI No. 11175 LICENSED PROFESSIONAL ENGINEER
01/21/2020

BOWDOIN COLLEGE
BRUNSWICK, ME

MILLS HALL AND THE CENTER FOR ARCTIC STUDIES

Bowdoin

KEYPLAN

I HEREBY CERTIFY THAT THE ELEMENTS SPECIFIED ON THIS PLAN WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF

NAME:
NAME:
DATE:
REGISTRATION NUMBER:

NO	DESCRIPTION	DATE
1	SUBMIT DEPTOWN	9/16/19
2	SUBMIT TOWN	10/2/19
3	DD SUBMISSION	10/18/19
4	BP-1 CONST DOC	01/09/20
5	SUBMIT TO TOWN	01/21/20

ISSUANCE HISTORY - THIS SHEET

HGA NO: 4387-001-00

DETAILS

DATE: JANUARY 21, 2020

TOWN SUBMITTAL

C6.2

TOWN SUBMITTAL

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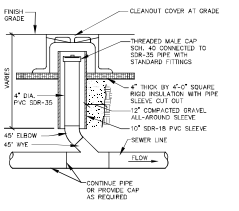
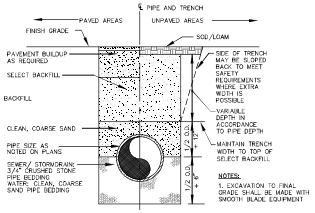
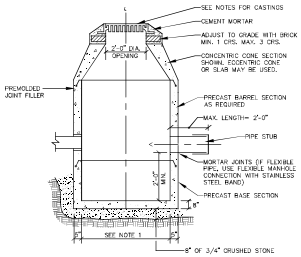


CLEANOUT
NOT TO SCALE

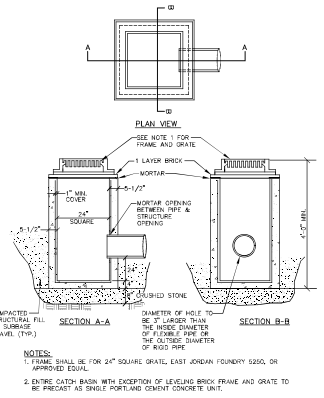


TYPICAL TRENCH SECTION
NOT TO SCALE



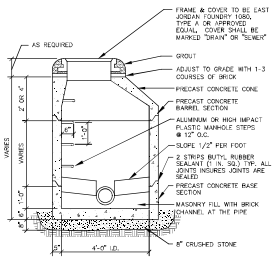
NOTES:
1. 4'-0" I.D. TYPICAL. SOME STRUCTURES MAY REQUIRE LARGER I.D. PROVIDE SHOP DRAWINGS.
2. DRAINAGE STRUCTURES TO BE DESIGNED FOR H-20 LOADING.
3. PIPE SIZES AND INVERTS AS NOTED ON GRADING AND UTILITY PLANS.
4. CATCH BASIN SET IN PAVED AREAS: FRAME AND GRATE SHALL BE EAST JORDAN FOUNDRY 5205, OR APPROVED EQUAL.
5. CATCH BASIN SET IN LANDSCAPED AREAS: FRAME SHALL BE V-3600-2 AND GRATE SHALL BE V-3800-2 BY EAST JORDAN FOUNDRY, OR APPROVED EQUAL.
6. DOUBLE GRATE CATCH BASIN FRAME AND GRATE SHALL BE EAST JORDAN FOUNDRY 5236, OR APPROVED EQUAL.

TYPICAL CATCH BASIN
NOT TO SCALE



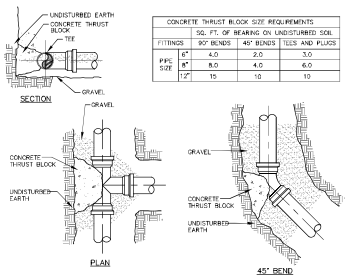
NOTES:
1. FRAME SHALL BE FOR 24" SQUARE GRATE, EAST JORDAN FOUNDRY 5250, OR APPROVED EQUAL.
2. ENTIRE CATCH BASIN, WITH EXCEPTION OF LEVELING BRICK FRAME AND GRATE TO BE PRECAST AS SINGLE PORTLAND CEMENT CONCRETE UNIT.

"TYPE F" CATCH BASIN
NOT TO SCALE



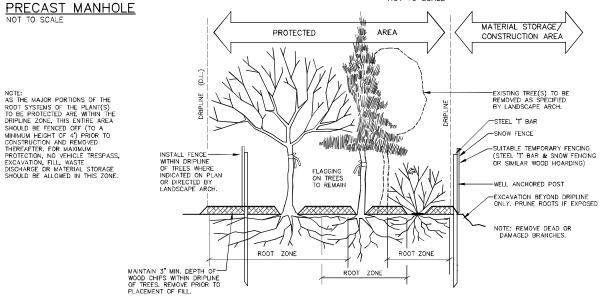
NOTE:
1. PIPE CONNECTIONS SHALL BE WATERTIGHT FLEXIBLE BOOT CONNECTORS PROVIDES LEAKPROOF CONNECTION.
2. PRECAST SEWER MANHOLE SHALL RECEIVE WATERPROOF COATING PER BRUNSWICK SEWER DISTRICT SPECIFICATIONS.

PRECAST MANHOLE
NOT TO SCALE



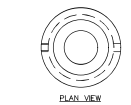
CONCRETE THRUST BLOCK SIZE REQUIREMENTS		SQ. FT. OF BEARING ON UNDISTURBED SOIL		
FITTINGS		90° BENDS	45° BENDS	TEES AND PLUGS
PIPE SIZE	6"	4.0	2.0	3.0
	8"	8.0	4.0	6.0
	12"	15	10	10

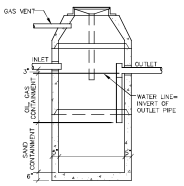
TEE & BEND DETAIL
NOT TO SCALE



NOTE:
AS THE MAJOR PORTIONS OF THE ROOT SYSTEMS OF THE PLANT(S) TO BE PROTECTED ARE WITHIN THE DRIPLINE ZONE, THIS ENTIRE AREA SHOULD BE FENCED OFF (TO A MINIMUM HEIGHT OF 4') PRIOR TO CONSTRUCTION AND REMOVED THEREAFTER. FOR MAXIMUM PROTECTION, NO VEHICLE TRESPASS, EXCAVATION, FILL, WASTE DISCHARGE OR MATERIAL STORAGE SHOULD BE ALLOWED IN THIS ZONE.

TREE PROTECTION DETAIL
NOT TO SCALE
CROSS-SECTION OF TYPICAL PLANT GROUPING

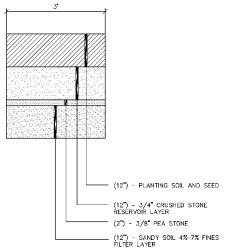




SECTION VIEW

NOTES:
1. CONCRETE: 4,000 PSI AFTER 28 DAYS
2. REINFORCING: H-20 LOADING, 4x4/4x4 W.W.M.
3. SHIPLAP JOINTS SEALED WITH 1 STRIP OF BUTYL RUBBER SEALANT.
4. EACH CASTING TO HAVE LIFTING PINS CAST IN.
5. 24" DIA. HEAVY DUTY FRAME & GRATE OR SOLID COVER (M24RS).
6. PIPE OPENINGS CAST IN AS REQUIRED PIPING TO BE PROVIDED BY OTHERS.
7. LARGER DIAMETER STRUCTURES MAY ALSO BE UTILIZED.

SAND, OIL, WATER SEPARATOR
NOT TO SCALE



CONSTRUCTION OVERSIGHT NOTES:
1. INSPECTIONS BY A PROFESSIONAL ENGINEER SHALL CONSIST OF WEEKLY VISITS TO THE SITE TO INSPECT THE CONSTRUCTION AND STABILIZATION OF THE PROPOSED ROOF FILTER AND ITS FILTER COURSE MATERIAL AND STONE RESERVOIR COURSE. INSPECTIONS SHALL CONSIST OF AN APPROPRIATE NUMBER OF VISITS TO THE SITE TO INSPECT EXCAVATION, FILL, BED MATERIAL PLACEMENT AND COMPACTION, STORAGE COURSE, FABRIC, AND PIPING FROM INITIAL GROUND DISTURBANCE TO FINAL PLACEMENT.

INFILTRATION TRENCH (NO PIPE)
NOT TO SCALE

INFILTRATION TRENCH CONSTRUCTION OVERSIGHT NOTES:
THE APPLICANT WILL RETAIN THE SERVICES OF A PROFESSIONAL ENGINEER TO INSPECT THE CONSTRUCTION AND STABILIZATION OF THE TRENCH. 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 BMP 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 OF SIEVE ANALYSIS DATA OF EVERY MINERAL SOIL AND SOIL MEDIA SPECIFIED IN THE PLANS AND USED ON SITE.

1. CONSTRUCTION SEQUENCE: THE BMP SHALL NOT BE INSTALLED UNTIL THE AREA THAT DRAINS TO THE BMP HAS BEEN PERMANENTLY STABILIZED WITH PAVEMENT OR OTHER STRUCTURE, MOW VEGETATION COVER, OR OTHER PERMANENT STABILIZATION UNLESS THE RUNOFF FROM THE CONTRIBUTING DRAINAGE AREA IS DIVERTED AROUND THE FILTER UNTIL STABILIZATION IS COMPLETED.
2. COMPACTION OF MATERIAL: BEDDING MATERIAL MUST BE COMPACTED TO BETWEEN 85% AND 95% STANDARD PROCTOR. THE BED SHOULD BE INSTALLED IN LIFTS OF 8 INCHES TO PREVENT POCKETS OF LOOSE MEDIA.
3. CONSTRUCTION OVERSIGHT: INSPECTION BY A PROFESSIONAL ENGINEER WILL OCCUR AT A MINIMUM:
   A. AFTER THE PRELIMINARY CONSTRUCTION OF THE FILTER GRADES AND PRIOR TO PLACEMENT OF FILTER MATERIAL.
   B. AFTER THE FILTER MEDIA HAS BEEN INSTALLED AND ADDITIONAL DRAINAGE STONE MATERIAL IS BEING PLACED.
   C. AFTER ONE YEAR TO OPERATIONS MAKE CORRECTIONS.
   D. ALL MATERIAL USED FOR THE CONSTRUCTION OF THE BMP MUST BE CONFIRMED AS SUITABLE BY THE DESIGN ENGINEER. TESTING MUST BE DONE BY A CERTIFIED LABORATORY.

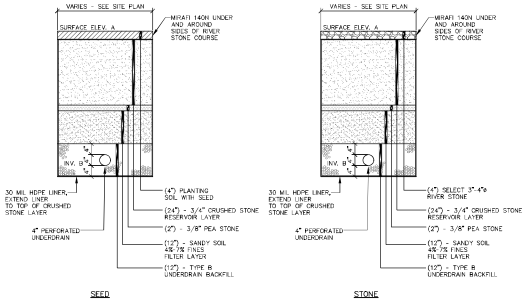


TABLE 1

LOAMY COARSE SAND LAYER	
SIEVE SIZE	% PASSING BY WEIGHT
#10	85-100
#20	70-100
#60	15-50
#200	8-15
CLAY FRACTION	0-2

FILTRATION TRENCH CONSTRUCTION TABLE

TREATMENT	SURFACE ELEV. A	PIPE OUTLET ELEV. B	ORIFICE DIA.	DOWNSTREAM STRUCTURE
1	78.00	73.92	0.4"	DMH-6
2	78.00	73.92	0.4"	CB-6
3	78.00	73.92	0.6"	DMH-4
4	78.00	73.92	0.4"	DMH-6
5	78.00	73.92	0.7"	DMH-5
6	78.00	73.92	0.5"	CB-6

NOTE: ALL DOWNSTREAM STRUCTURE SHALL HAVE A SOLID CAP INSTALLED ON THE INCOMING UNDERDRAIN PIPE WITH AN ORIFICE OPENING DRILLED INTO THE CAP, AS SPECIFIED IN THE ABOVE TABLE.

FILTRATION TRENCH
NOT TO SCALE

FILTRATION TRENCH CONSTRUCTION OVERSIGHT NOTES:
THE APPLICANT WILL RETAIN THE SERVICES OF A PROFESSIONAL ENGINEER TO INSPECT THE CONSTRUCTION AND STABILIZATION OF THE UNDERDRAIN. IF NECESSARY, THE INSPECTING ENGINEER WILL INTERPRET THE UNDERDRAIN'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 BMP 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 OF SIEVE ANALYSIS DATA OF EVERY MINERAL SOIL AND SOIL MEDIA SPECIFIED IN THE PLANS AND USED ON SITE.

1. CONSTRUCTION SEQUENCE: THE BMP SHALL NOT BE INSTALLED UNTIL THE AREA THAT DRAINS TO THE UNDERDRAIN HAS BEEN PERMANENTLY STABILIZED WITH PAVEMENT OR OTHER STRUCTURE, MOW VEGETATION COVER, OR OTHER PERMANENT STABILIZATION UNLESS THE RUNOFF FROM THE CONTRIBUTING DRAINAGE AREA IS DIVERTED AROUND THE FILTER UNTIL STABILIZATION IS COMPLETED.
2. COMPACTION OF MATERIAL: BEDDING MATERIAL MUST BE COMPACTED TO BETWEEN 85% AND 95% STANDARD PROCTOR. THE BED SHOULD BE INSTALLED IN LIFTS OF 8 INCHES TO PREVENT POCKETS OF LOOSE MEDIA.
3. CONSTRUCTION OVERSIGHT: INSPECTION BY A PROFESSIONAL ENGINEER WILL OCCUR AT A MINIMUM:
   A. AFTER THE PRELIMINARY CONSTRUCTION OF THE FILTER GRADES AND ONCE THE THE UNDERDRAIN PIPES ARE INSTALLED BUT NOT YET BACKFILLED.
   B. AFTER THE UNDERDRAIN BACKFILL IS INSTALLED AND PRIOR TO THE INSTALLATION OF THE FILTER MEDIA.
   C. AFTER THE FILTER MEDIA HAS BEEN INSTALLED AND ADDITIONAL DRAINAGE STONE MATERIAL IS BEING PLACED.
   D. AFTER ONE YEAR TO OPERATIONS MAKE CORRECTIONS.
   E. ALL MATERIAL USED FOR THE CONSTRUCTION OF THE UNDERDRAIN MUST BE CONFIRMED AS SUITABLE BY THE DESIGN ENGINEER. TESTING MUST BE DONE BY A CERTIFIED LABORATORY.

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FOOD SERVICE CONSULTANT
FOODSERVICE DESIGN
603-969-0009

KYLE S. MASON — No. 15551 — REGISTERED LANDSCAPE ARCHITECT — STATE OF MAINE
01/21/2020

PAUL D. OSTROWSKI — No. 11175 — STATE OF MAINE — LICENSED PROFESSIONAL ENGINEER
01/21/2020

BOWDOIN COLLEGE
BRUNSWICK, ME

MILLS HALL AND THE CENTER FOR ARCTIC STUDIES

Bowdoin

KEYPLAN

I HEREBY CERTIFY THAT THE PLANS, SPECIFICATION OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF

NAME:
DATE:
REGISTRATION NUMBER:

NO	DESCRIPTION	DATE
1	SUBMIT DEPTOWN	9/16/19
2	SUBMIT TOWN	10/2/19
3	DD SUBMISSION	10/18/19
4	BPH CONST DOC	01/09/20
5	SUBMIT TO TOWN	01/21/20

ISSUANCE HISTORY - THIS SHEET

HGA NO: 4387-001-00

DETAILS

DATE: JANUARY 21, 2020

TOWN SUBMITTAL

C6.3

TOWN SUBMITTAL

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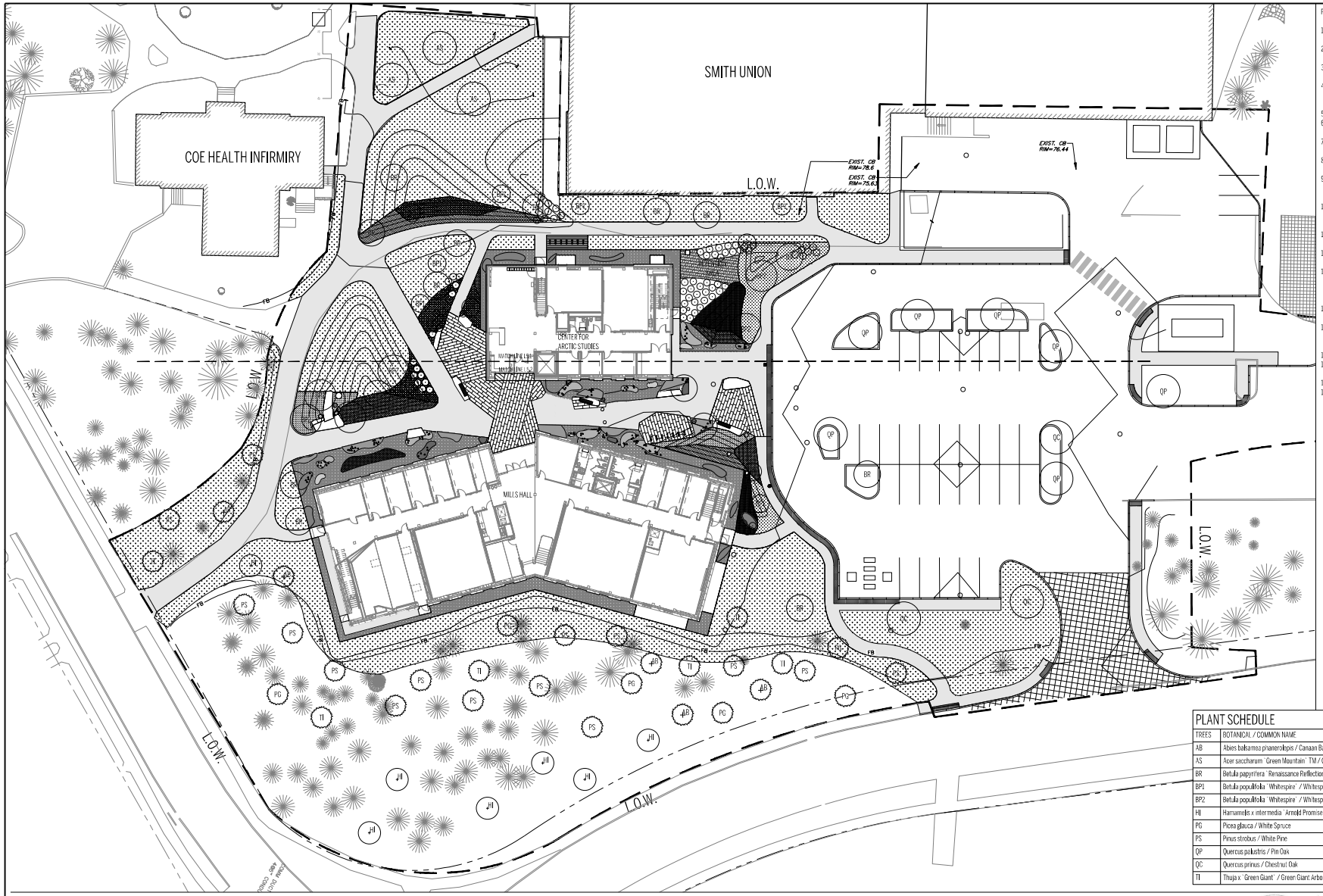

PLANTING NOTES

1. Planting contractor shall visit site prior to submitting bid to become completely familiar with site conditions.
2. No planting will be installed until all grading and construction has been completed in immediate area.
3. Contractor to verify all utilities on property and to protect all utilities during excavation for plants.
4. If there is a discrepancy between the number of plants shown on the plan and the number of plants shown in plant list, the number of plants shown on plan will take precedence.
5. All container material to be grown in container a minimum of 6 months.
6. All material shall comply with the latest edition of the American Standard for Nursery Stock, American Association of Nurseryman.
7. Contractor shall repair all damage to property from planting operations at no cost to the owner.
8. Contractor shall guarantee new plant material through one calendar year from time of provisional acceptance.
9. The Landscape Architect will tag all plants at the nursery and inspect them after delivery to the site. All plant materials shall be inspected by the Landscape Architect on site prior to installation.
10. All proposed plants shall be located carefully as shown on the plans and the placements shall be approved by Landscape Architect before the plants are installed.
11. Spacing of plants is to be based on measurements taken parallel to the ground plane.
12. All disturbed areas not to be paved or planted shall be loamed and seeded as shown. See specifications for seed mix.
13. Staking and guying shall be determined by the Landscape Architect on a tree by tree basis. For pricing purposes, provide a per tree unit cost for staking and guying. If staking and guying is required, remove tree wrap, stakes, and guy wires at end of first growing season.
14. For tree planting in lawn areas, any disturbed lawn shall be loamed and seeded as necessary.
15. Grass seed shall be applied at the recommended rate then raked in. Additional seeding at the recommended rate will be hydro seeded, depending on conditions, straw cover may be required.
16. Landscape Architect to flag trees to be protected on site.
17. All lawn areas to be irrigated. Refer to specifications for irrigation and maintenance.
18. Planting outside scope by owner.
19. Existing planting zone to be protected and preserved. No equipment or materials to be stored in these zones. All work is to be done be hand or with the uses of an Air Spade as directed be Landscape Architect.

PLANT SCHEDULE

TREES	BOTANICAL / COMMON NAME	CONT	SIZE	QTY
AB	Abies balsamea phanerolepis / Canaan Balsam Fir	B & B	8'-10' H	5
AS	Acer saccharum `Green Mountain` TM / Green Mountain Sugar Maple	B & B	2.5"-3" Cal	3
BR	Betula papyrifera `Renaissance Reflection` / Renaissance Reflection Paper Birch	B & B	2.5"-3" Cal	15
BP1	Betula populifolia `Whitespire` / Whitespire Birch	B & B	2"-2.5" Cal	12
BP2	Betula populifolia `Whitespire` / Whitespire Birch	B & B	3.5"-4" Cal	6
HI	Hamamelis x intermedia `Arnold Promise` / Arnold Promise Hybrid Witch Hazel	B & B	5'-6" H	7
PG	Picea glauca / White Spruce	B & B	7'-8" H	6
PS	Pinus strobus / White Pine	B & B	6'-7" H	15
QP	Quercus palustris / Pin Oak	B & B	3"-3.5" Cal	7
QC	Quercus prinus / Chestnut Oak	B & B	3"-3.5" Cal	3
TI	Thuja x `Green Giant` / Green Giant Arborvitae	B & B	6'-7" H	6

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COLLEGE ST
BRUNSWICK, ME 04011

ISSUE	DATE	DESCRIPTION
1	09.09.2019	DD PERMITTING SET
2	10.07.2019	DEP PERMITTING SET
3	10.17.2019	100% DESIGN DEVELOPMENT
4	01.03.2020	100% CONSTRUCTION DOCUMENTS
5	01.21.2020	BRUNSWICK PLANNING BOARD
6		
7		
8		

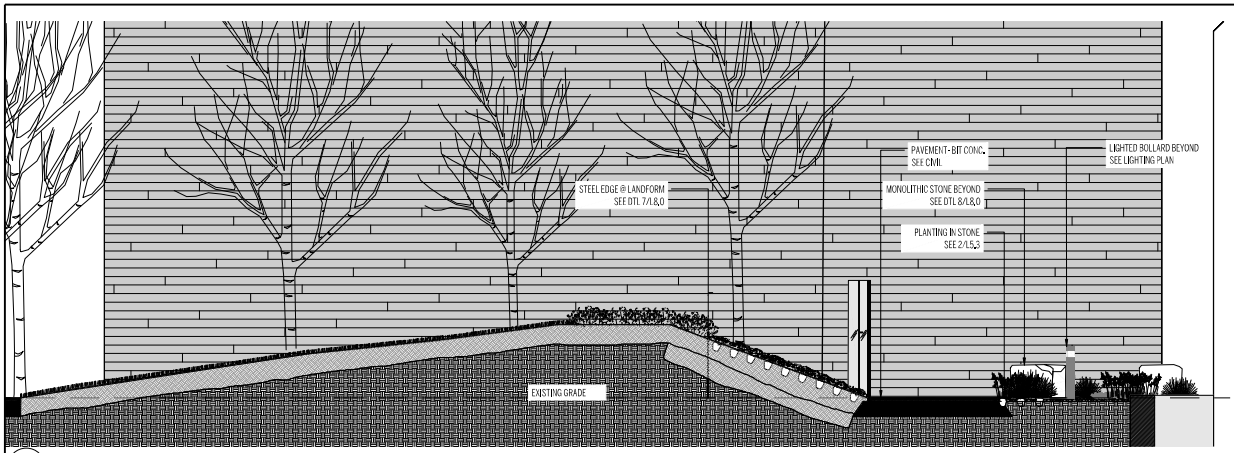
SCALE 1"=20'-0"
DATE 01.21.2020
DRAWN BY JN, CM
REVIEWED BY SS

LICENSED LANDSCAPE ARCHITECT STEPHEN C. STIMSON No. 3916 STATE OF MAINE

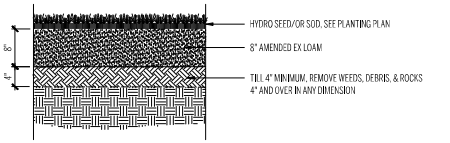
TREE PLANTING PLAN

CONSTRUCTION DOCUMENTS

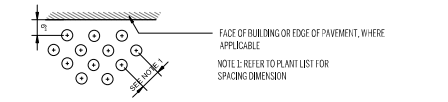
L5.0

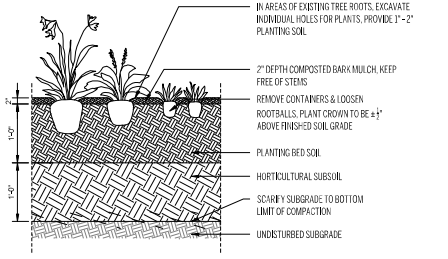


7 SECTION @ SOUTH LANDFORM
1/4" =1-0"

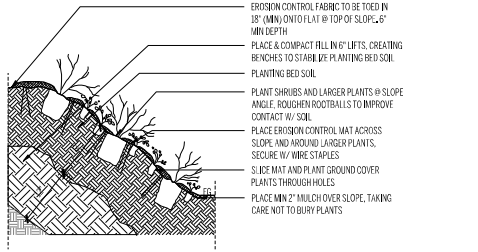


6 LAWN-SOD OR HYDROSEED
1" =1-0"

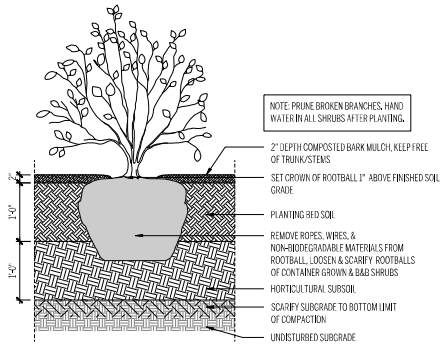




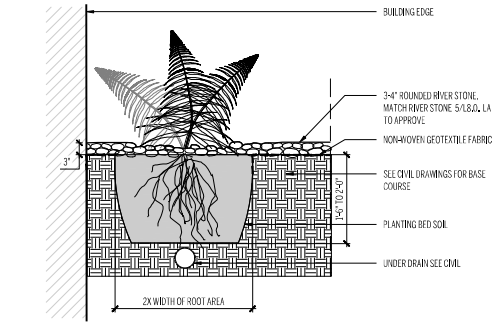
5 PERRENIEL/GROUND COVER PLANTING
1" =1-0"



4 PLANTED SLOPE
1" =1-0"



3 SHRUB PLANTING
1" =1-0"

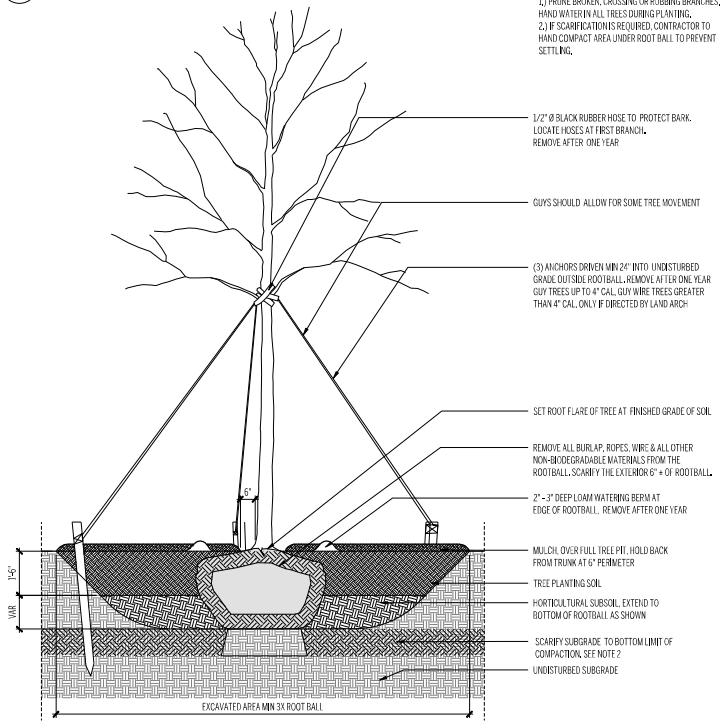


2 PLANTING IN STONE
1" =1-0"

SOILS NOTES

1. Individual tree and Shrub soil area are not shown on plan see planting Details for soil areas.
2. Contractor to test existing site soils to determent soil amendments to be incorporated. Top 6" of Lawn soil to be amended, top 8"-12" of perennial and ground cover soil to be amended.
3. Contractor to provide proposed amendments per planting area Landscape Architect.
4. Soil amendments to Existing trees to be V.I.F by LA
5. All soil amendment work to be preformed in Tree invigoration Zone to be completed with Air Spade as directed be Landscape Architect or Arborist.
6. All soil work to be preformed in Tree invigoration Zone to completed before the emergence of existing groundcover's or after first hard frost of the season as directed by Landscape Architect.
7. All equipment work areas, and material storage areas to be decompacted to limit of compaction
8. Topsoil to be installed shall be natural, friable, fertile soil characteristic of productive soil in the vicinity, reasonably free of stones, clay lumps, roots, and other foreign matter. Do not use muddy topsoil. Place during dry weather. Allow for 8" average depth of topsoil screened for lawn areas, and 12" depth at planting areas, except as otherwise indicated on the drawings.
9. Fine grade topsoil eliminating rough and low areas to ensure positive drainage. Maintain levels, profiles, and contours of subgrades.

NOTE:
1.) PRUNE BROKEN, CROSSING OR RUBBING BRANCHES, HAND WATER IN ALL TREES DURING PLANTING.
2.) IF SCARIFICATION IS REQUIRED. CONTRACTOR TO HAND COMPACT AREA UNDER ROOT BALL TO PREVENT SETTLING.



1 DECIDUOUS TREE PLANTING
3/8" =1-0"

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MILLS HALL AND CENTER FOR ARCTIC STUDIES

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5	03.21.2020	BRUNSWICK PLANNING BOARD
6		
7		
8		

SCALE: AS SHOWN
DATE: 03.21.2020
DRAWN BY: JN, CM
REVIEWED BY: SS

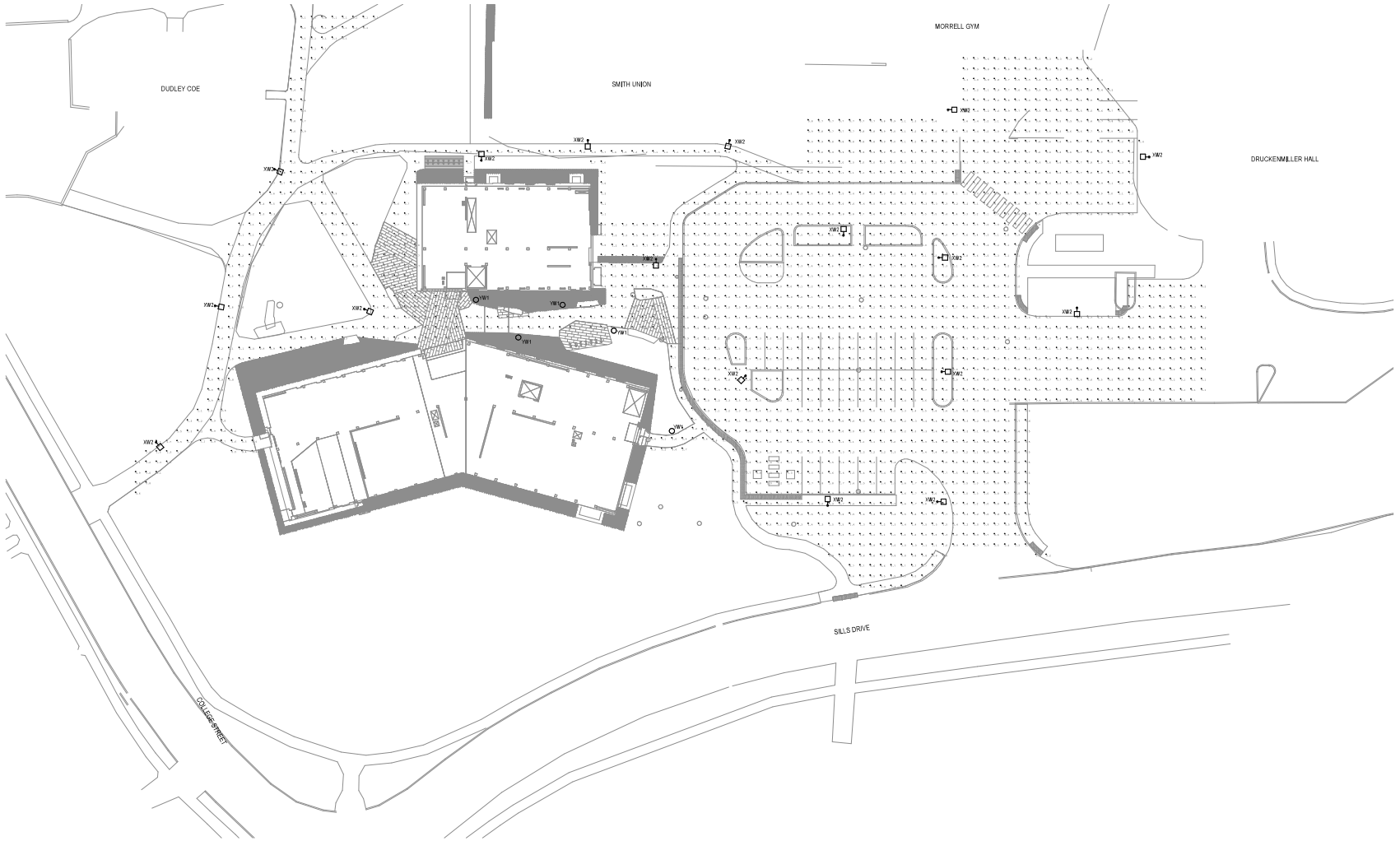
LICENSED LANDSCAPE ARCHITECT STEPHEN C. STIMSON No. 3916 STATE OF MAINE

PLANTING DETAILS

CONSTRUCTION DOCUMENTS | L5.3

GENERAL NOTES

A. REFER TO ELECTRICAL DETAILS SHEETS FOR POLE BASE INFORMATION, LIGHTING CONTROL DIAGRAMS, AND ZONE SCHEDULES.



1 LIGHTING SITE PLAN
1" = 20'-0"

Scale: 1" = 20'-0"
0' 10' 20' 40' 80'

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BOWDOIN COLLEGE

MILLS HALL AND THE CENTER FOR ARCTIC STUDIES

Bowdoin

KEYPLAN

NO	DESCRIPTION	DATE

ISSUANCE HISTORY - THIS SHEET

HGA NO: 4387-001-00

SITE LIGHTING PHOTOMETRIC PLAN

DATE: JANUARY 6, 2020

BP-1 CONSTRUCTION DOCUMENTS

E031

BP-1 CONSTRUCTION DOCUMENTS

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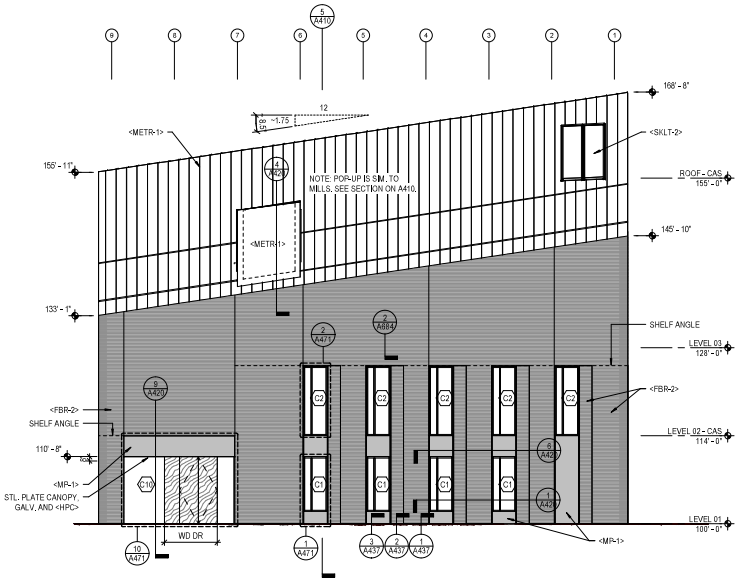
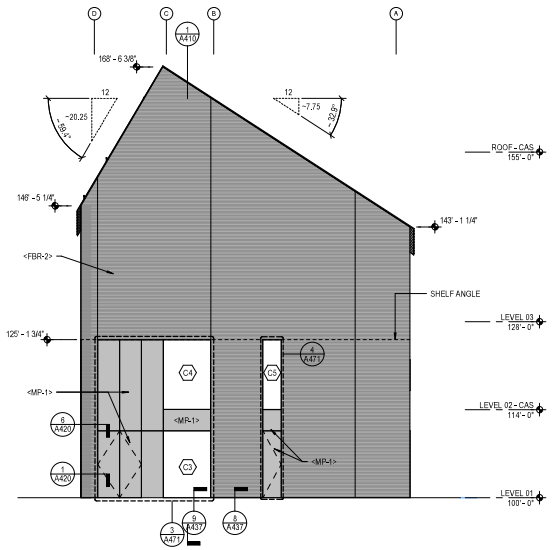


4 EAST ELEVATION - CENTER FOR ARTIC STUDIES
1/8" = 1'-0"



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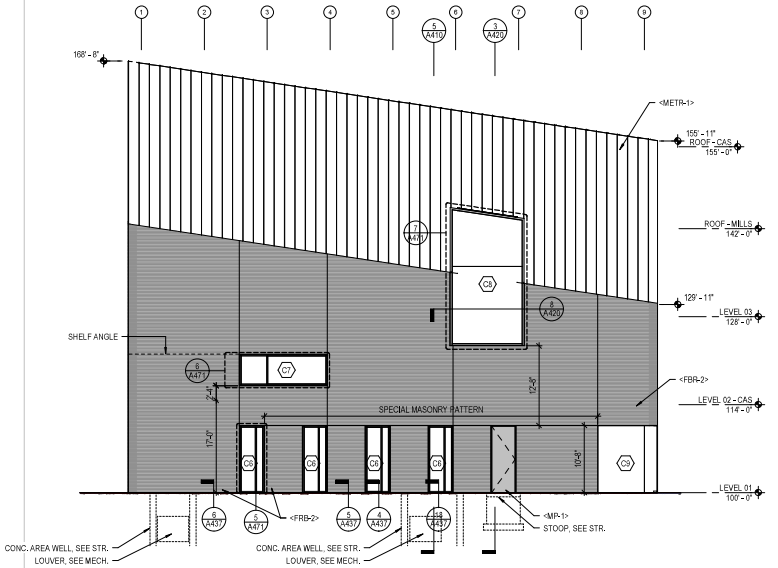
1/8" = 1'-0"



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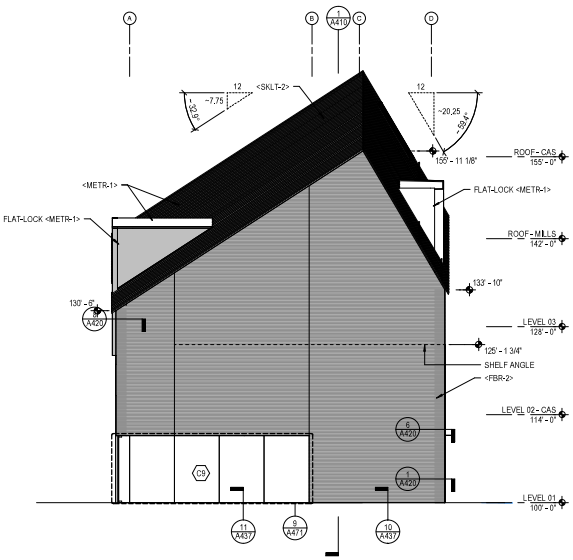

1 SOUTH ELEVATION - CENTER FOR ARCTIC STUDIES
1/8" = 1'-0"

HGA
420 North 5th Street, Suite 100
Minneapolis, Minnesota 55401
Telephone 612.758.4000

CIVIL ENGINEER
SEBAGO TECHNICS INC
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SOUTH PORTLAND, ME 04106
207-856-2206

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603-969-9009

BOWDOIN COLLEGE

MILLS HALL AND THE CENTER FOR ARCTIC STUDIES

Bowdoin

KEYPLAN

NOT FOR CONSTRUCTION

NO	DESCRIPTION	DATE

ISSUANCE HISTORY - THIS SHEET

HGA NO: 4387-001-00

EXTERIOR ELEVATIONS CENTER FOR ARCTIC STUDIES

DATE: JANUARY 21, 2020

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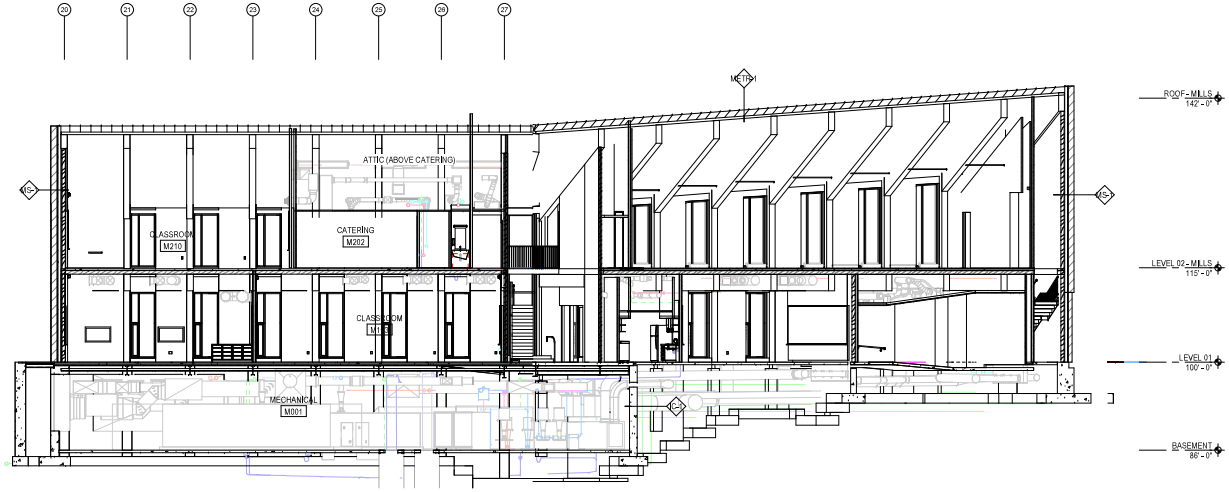
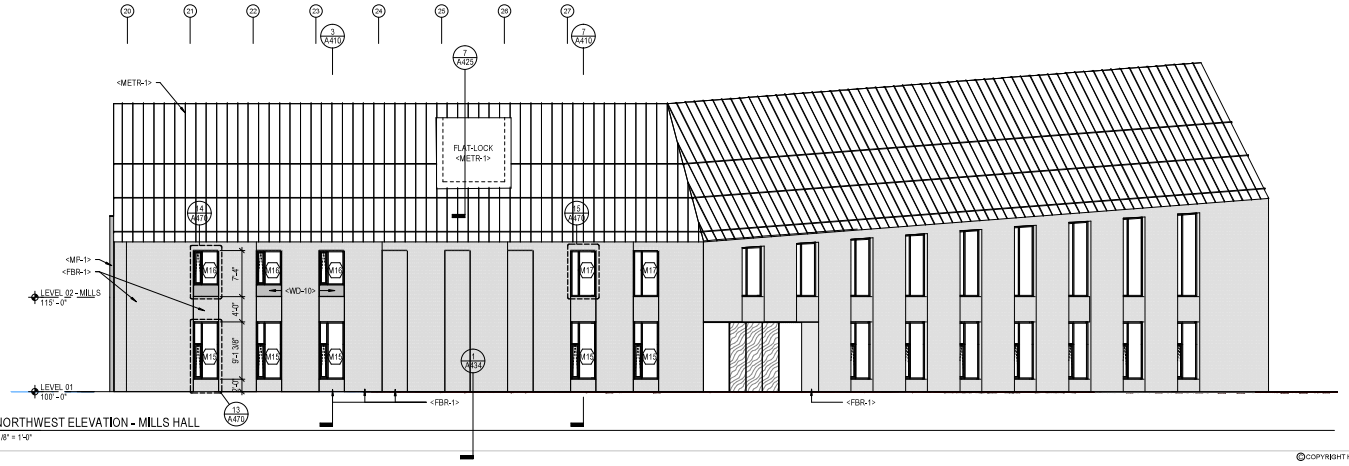


2 MILLS LONG SECTION LOOKING EAST
1/8" = 1'-0"



1 NORTHWEST ELEVATION - MILLS HALL
1/8" = 1'-0"

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BOWDOIN COLLEGE

MILLS HALL AND THE CENTER FOR ARCTIC STUDIES

Bowdoin

KEYPLAN

NOT FOR CONSTRUCTION

NO	DESCRIPTION	DATE

ISSUANCE HISTORY - THIS SHEET

HGA NO: 4387-001-00

EXTERIOR ELEVATIONS & BUILDING SECTIONS

DATE: JANUARY 21, 2020

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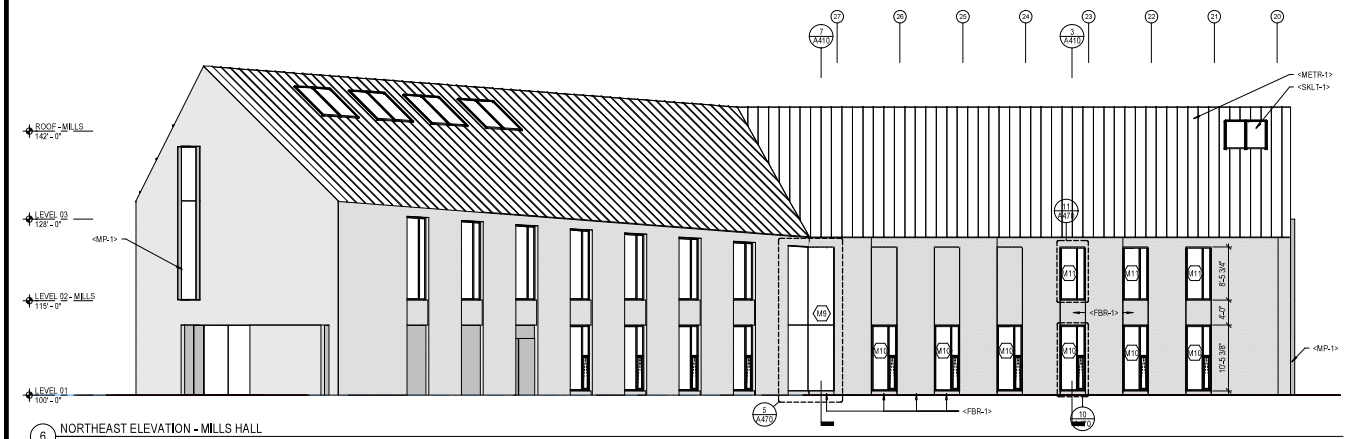
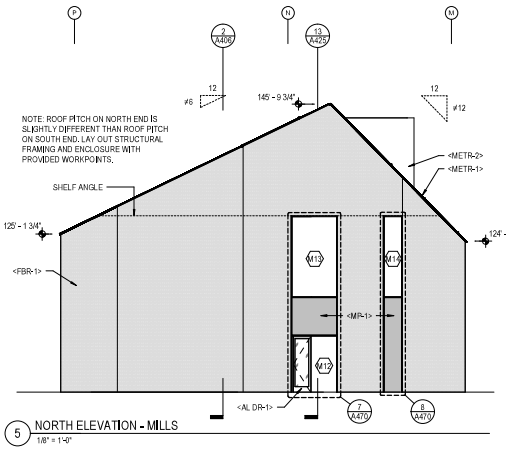
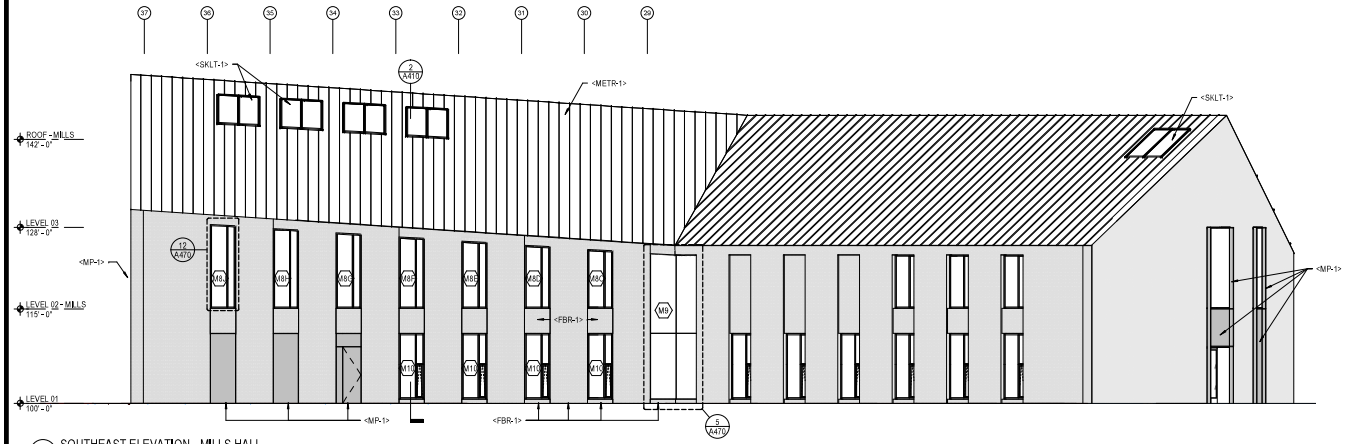


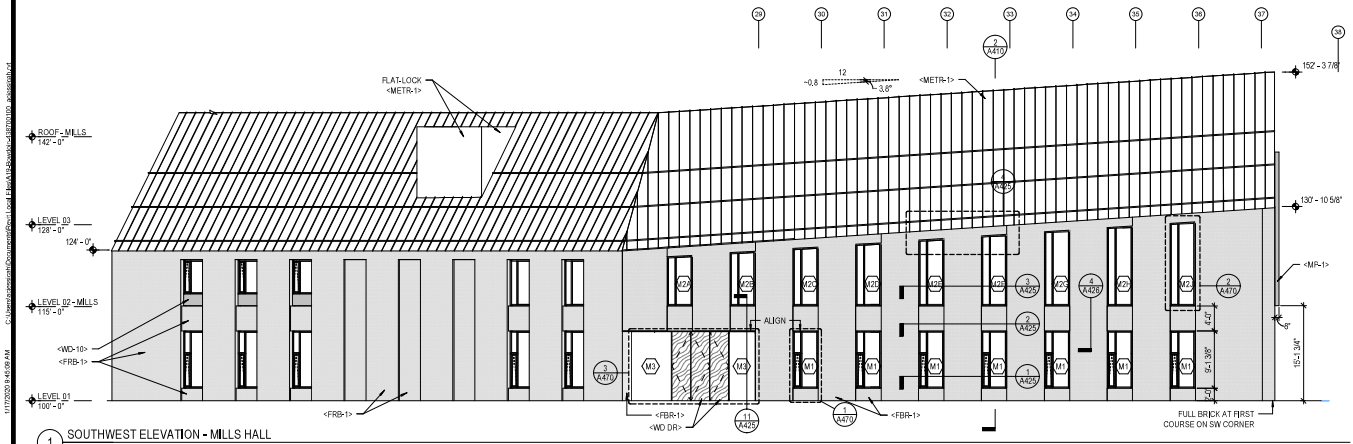
6 NORTHEAST ELEVATION - MILLS HALL
1/8" = 1'-0"



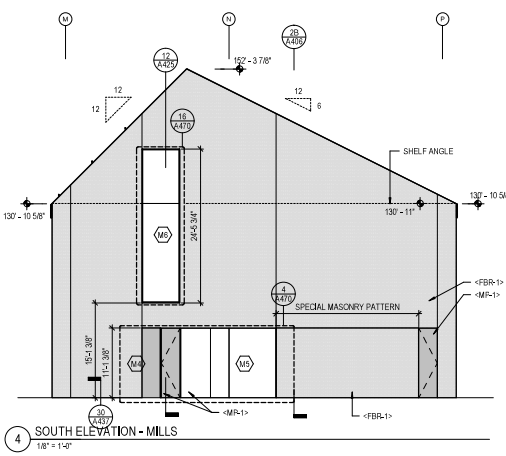
5 NORTH ELEVATION - MILLS
1/8" = 1'-0"



3 SOUTHEAST ELEVATION - MILLS HALL
1/8" = 1'-0"



1 SOUTHWEST ELEVATION - MILLS HALL
1/8" = 1'-0"



4 SOUTH ELEVATION - MILLS
1/8" = 1'-0"

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BOWDOIN COLLEGE

MILLS HALL AND THE CENTER FOR ARCTIC STUDIES

Bowdoin

KEYPLAN

NOT FOR CONSTRUCTION

NO	DESCRIPTION	DATE

HGA NO: 4387-001-00

EXTERIOR ELEVATIONS MILLS HALL

DATE: JANUARY 21, 2020

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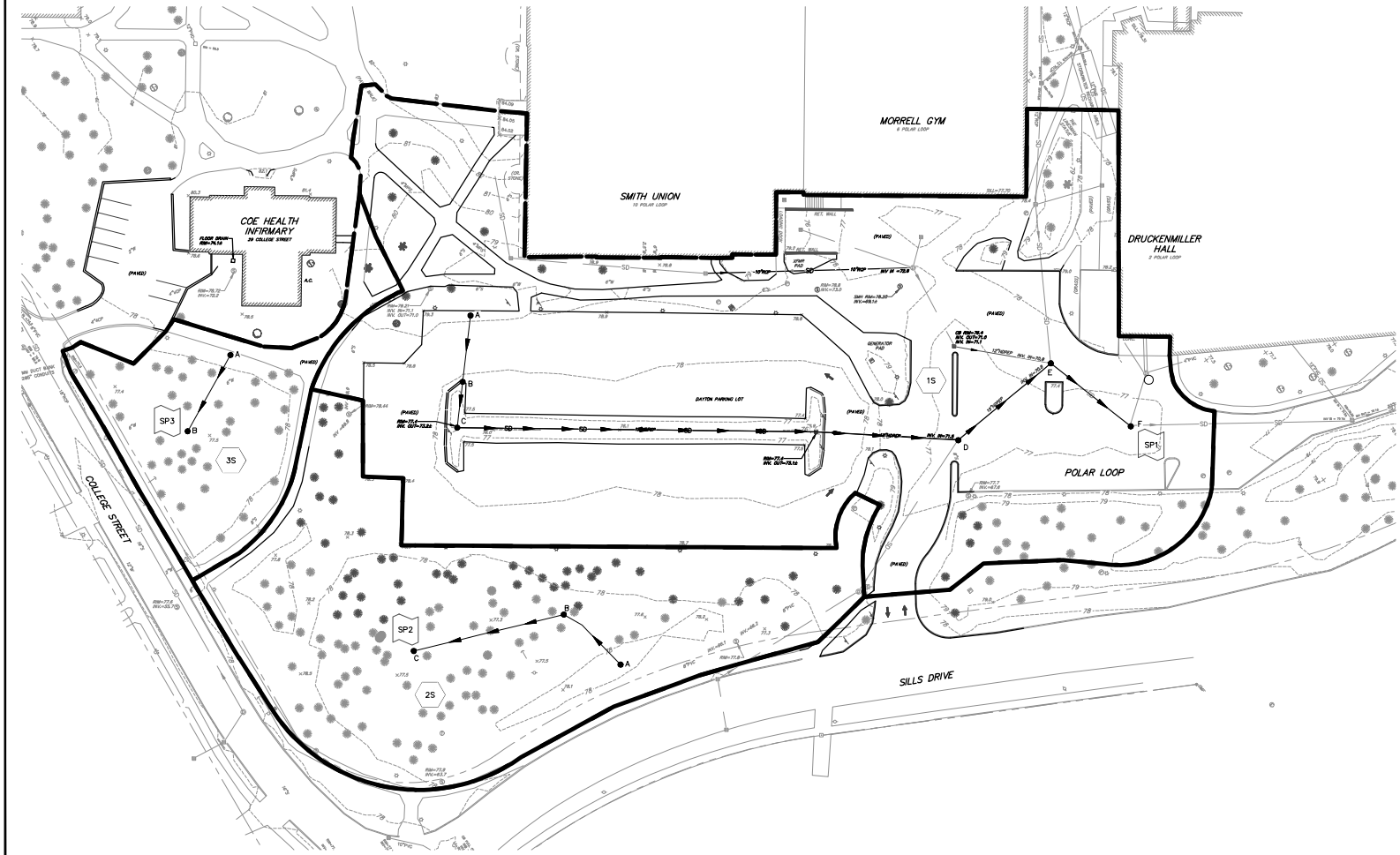
SOIL TYPE				
SYMBOL	SOIL SERIES	SLOPE	HSG	DRAINAGE CLASS
WmB	WINDSOR LOAMY SAND	0-8%	A	EXCESSIVELY DRAINED

SOIL INFORMATION FOR THE SITE WAS OBTAINED VIA THE USDA NATURAL RESOURCES CONSERVATION SERVICE WEBSITE AND THEIR WEBSOIL SURVEY APPLICATION. THE HYDROLOGIC SOIL GROUP (HSG) OF THE SITE SOILS ARE CLASSIFIED BY TEHCNICAL RELEASE TR-55 OF THE SOIL CONSERVATION SERVICE.



PRE-DEVELOPMENT LEGEND

- WATERSHED BOUNDARY
- TIME OF CONCENTRATION (B, C)
- 1S — WATERSHED LABEL
- SP1 — STUDY POINT

GRAPHIC SCALE
10 0 15 30 60
(IN FEET)
1 INCH = 30 FT.

PAUL D. OSTROWSKI, PE11175
PLS OR PE

NOT FOR CONSTRUCTION

DESIGNED	CHECKED
PDO	PDO

REV.	BY	DATE	DESCRIPTION
C	KSM	01/21/20	SUBMIT TO TOWN
B	KSM	09/17/19	SUBMIT TO MAINE DEP
A	KSM	05/28/19	SUBMIT FOR COORDINATION

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PRE-DEVELOPMENT WATERSHED PLAN
OF:
MILLS HALL AND THE CENTER FOR ARCTIC STUDIES
FOR:
BOWDOIN COLLEGE
BRUNSWICK, MAINE

PROJECT NO.	SCALE
11001-12	1" = 30'

SHEET 1 OF 2

11001-12SW AREAS.dwg, TAB-SW AREAS PRE

Table 1: MCEP GENERAL STANDARD CALCULATIONS

Job #

AREA ID	WATERSHED SIZE (S.F.)	EXISTING ONSITE IMPERVIOUS AREA TO REMAIN (S.F.)	NEW ONSITE IMPERVIOUS AREA (S.F.)	EXISTING ONSITE LANDSCAPED AREA TO REMAIN (S.F.)	NEW ONSITE LANDSCAPED AREA (S.F.)	NET NEW DEVELOPED AREA (S.F.)	EXISTING DEVELOPED AREAS (S.F.)	TREATMENT PROVIDED?	IMPERVIOUS AREA TREATED (S.F.)	LANDSCAPED AREA TREATED (S.F.)	DEVELOPED AREA TREATED (S.F.)	TREATMENT BMP
1S	42,431	24,410	2,867	8,337	5,797	8,664	32,747	NO	0	0	0	
1.1S	7,709		6,993		716	7,709	0	YES	6,993	716	7,709	PA-1
1.2S	7,256		6,703		553	7,256	0	YES	6,703	553	7,256	PA-2
1.3S	3,083		3,083		0	3,083	0	YES	3,083	0	3,083	PA-3
1.4S	5,687		3,731		1,956	5,687	0	YES	3,731	1,956	5,687	FT-1
1.5S	3,872		1,716		2,156	3,872	0	YES	1,716	2,156	3,872	FT-6
1.6S	5,778		4,066	571	646	4,692	571	YES	4,046	1,217	5,263	FT-2
1.7S	6,692	335	2,414		3,943	3,357	335	YES	2,749	3,943	6,692	IT-1
1.8S	9,322		7,973		1,349	3,322	0	YES	7,973	1,349	9,322	FT-3
1.9S	5,181	341	3,065		1,775	4,840	341	YES	3,406	1,775	5,181	IT-2
1.10S	7,971	1,445	0	5,860	832	832	7,305	NO	0	0	0	
1.11S	2,896		755		2,141	2,896	0	YES	755	2,141	2,896	FT-4
1.12S	2,034		1,096		938	2,034		YES	1,096	938	2,034	FT-5
2S	29,276				2,725	2,725	0	NO	0	0	0	
3S	16,237	3,929		1,597		0	5,526	NO	0	0	0	
TOTAL (S.F.)	154,525	30,460	44,442	16,365	25,527	69,969	46,825		42,251	16,744	58,995	

TOTAL NEW IMPERVIOUS AREA (S.F.)	44,442	TOTAL DEVELOPED AREA (S.F.)	69,969
TOTAL IMPERVIOUS AREA RECEIVING TREATMENT (S.F.)	42,251	TOTAL AREA RECEIVING TREATMENT (S.F.)	58,995
% OF IMPERVIOUS AREA RECEIVING TREATMENT	95.07%	% OF AREA RECEIVING TREATMENT	84.32%

PA = POROUS ASPHALT
FT - FILTER TRENCH/ROOF DRIP EDGE
IT - INFILTRATION TRENCH

SOIL TYPE

SYMBOL	SOIL SERIES	SLOPE	HSG	DRAINAGE CLASS
WmB	WINDSOR LOAMY SAND	0-8%	A	EXCESSIVELY DRAINED

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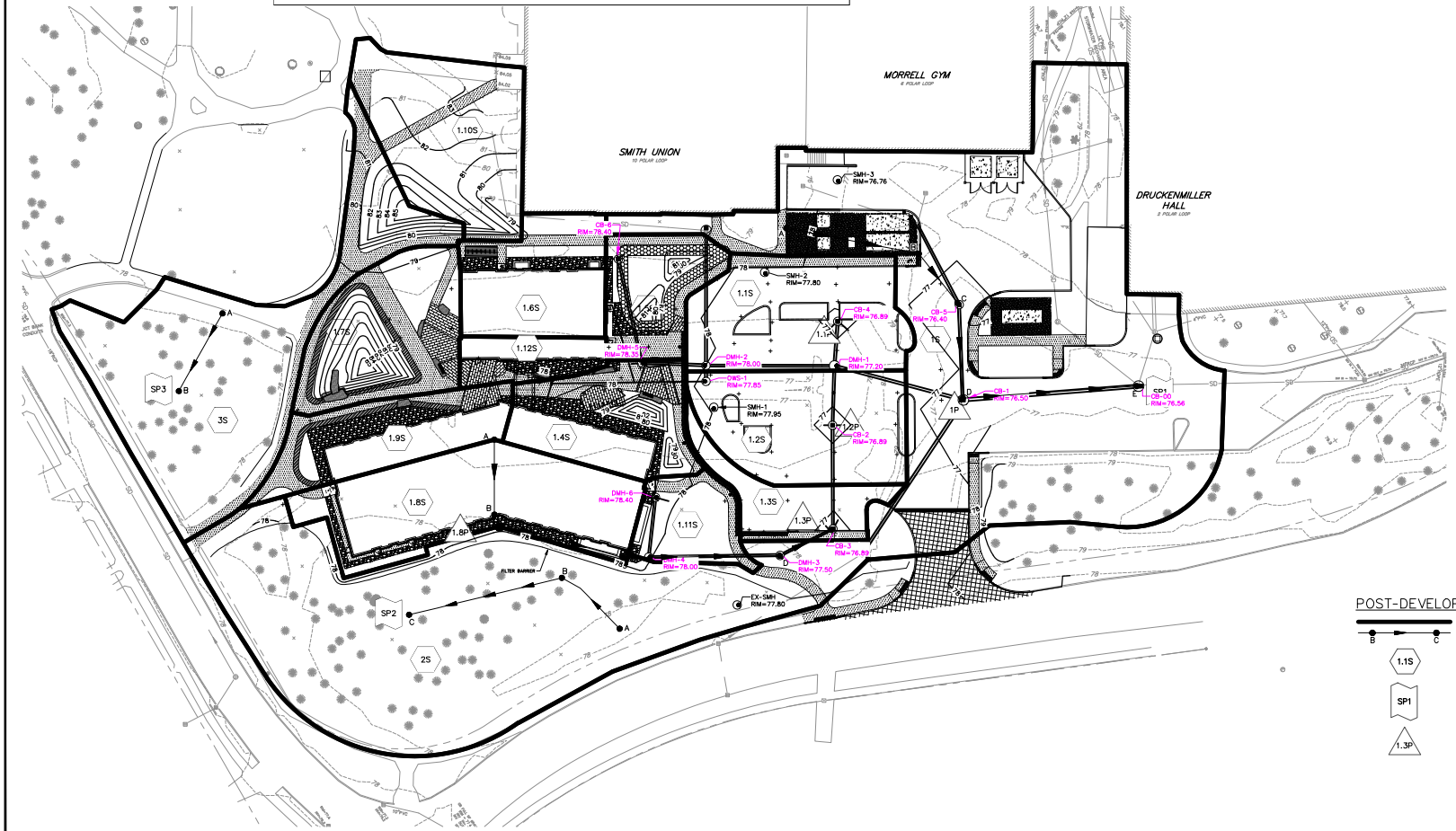

POST-DEVELOPMENT LEGEND

- WATERSHED BOUNDARY
- TIME OF CONCENTRATION
- 1.1S — WATERSHED LABEL
- SP1 — STUDY POINT
- 1.3P — STORMWATER TREATMENT/DETENTION POND

GRAPHIC SCALE
10 0 15 30 40
(IN FEET)
1 INCH = 30 FT.

PAUL D. OSTROWSKI, PE11175
PLS OR PE

NOT FOR CONSTRUCTION

DESIGNED	CHECKED
PDO	PDO

REV	DATE	ISSUE
C	KSM 01/21/20	SUBMIT TO TOWN
B	KSM 09/17/19	SUBMIT TO MAINE DEP
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Suite 4A
South Portland, ME 04106
Tel. 207-200-2100

POST-DEVELOPMENT WATERSHED PLAN

OF:

MILLS HALL AND THE CENTER FOR ARCTIC STUDIES

FOR:

BOWDOIN COLLEGE
BRUNSWICK, MAINE

PROJECT NO.	SCALE
11001-12	1" = 30'

SHEET 2 OF 2

11001-12SW AREA.dwg, TAB:SW AREAS POST

PLANNING BOARD
Major Development Review
DRAFT Findings of Fact
Review Date: February 21, 2020

Project Name:	Hinton Recreation Dock
Project Location:	98 Toads Landing
Tax Map:	Map 36, 28
Zoning District:	RP1
Overlay Zoning:	SPO, FPO, and RPSMO
Case Number:	20-004
Applicant / Owner:	Greg and Salli Hinton 1633 SE 39th Terrace Cape Coral, FL 33094
Authorized Representative:	Tim Forrester 135 River Road Woolwich, ME 04579

Staff reviewed the application and has determined it is complete.

DRAFT Motion 1: That the Final Site Plan application is deemed complete.

PROJECT SUMMARY

Staff review is based on the Major Development Review application for, "Hinton Recreational Dock" dated January 23, 2020. The proposed activity is the construction of a residential pier, and seasonal ramp and float system. The proposed activity is within the RP1 Zoning District and the subject parcel contains the Shoreland Protection Overlay Resource Protection (SPO-RP) Zoning District, the Flood Protection Overlay (FPO) Special Flood Hazard Area, and the Rural Protection Stormwater Management Overlay (RPSMO). The subject parcel is developed with a residence and an existing staircase access way to the ocean. The proposed residential pier will be constructed at the end of the existing ocean-side staircase.

The Town of Brunswick's Staff Review Committee (SRC) reviewed the development proposal on February 12, 2020. The SRC meeting notes are included in the Planning Board packet.

The applicant proposes waivers for the following Appendix D standard submissions:

1. Fiscal Capacity. *The applicant indicates funds are available for the proposed pier system. Based on the relatively small scale of the project and existing development on-site and adjacent properties, staff advise the proposed waiver is acceptable in*

accordance with Subsection 5.2.9.M.3, specifically, that granting of the waiver or modification would not adversely affect properties in the locality.

2. Medium Intensity Soil Survey. *The applicant provided an assessment of existing conditions including areas that contain similar development (stairs and concrete) and undeveloped areas that will be developed within coastal wetlands. Based on the available information, staff advise the proposed waiver is acceptable in accordance with Subsection 5.2.9.M.2, specifically, that the application of the standards is not requisite to public health, safety, and general welfare.*
3. Stormwater Management Plan. *The applicant provided an erosion control plan which satisfies standard construction best management practices to prevent runoff pollution from construction activities. No additional stormwater treatment is required by ordinance within the RPSMO or Stormwater Management standards (i.e. more than -.25 acres of new development). Based on the available information, staff advise the proposed waiver is acceptable in accordance with Subsection 5.2.9.M.2, specifically, that the application of the standards is not requisite to public health, safety, and general welfare.*

Review Standards from Chapter 4 of the Town of Brunswick Zoning Ordinance

4.1 Applicability of Property Development Standards
The subject property is located within the RP1 Zoning District and contains the Shoreland Protection Overlay (SPO) and mapped subdistricts and the Rural Protection Stormwater Management Overlay (RPSMO). The applicant provided an assessment of right, title, and interest to construct the pier system for the proposed project. The Town Attorney concurred that the applicant provided sufficient evidence for the Planning Board to approve the pier system.

Rural Protection Stormwater Management Overlay
The applicant provided plans that indicated the proposed developed area is below the treatment thresholds for the RPSMO. Based on the proposed development at this time only an erosion and sedimentation plan is required. The applicant provided an acceptable E&S plan for construction of the pier.

Flood Protection Overlay (FPO) District
The applicant indicates that a FPO permit (Special Flood Hazard Area) will be obtained from the Town of Brunswick for the construction of the dock system pursuant to subsection 2.3.4.C which states, "All development within the FPO District shall require a Flood Hazard Development Permit obtained in accordance with Section 5.2.4 (Special Permits for Nonconforming Building Footprint Expansions)."

Shoreland Protection Permit (Subsection 5.2.6)
In accordance with subsection 5.2.6, all development or other land use activity within the Shoreland Protection Overlay District shall require a Shoreland Protection Permit from the applicable Review Authority. In addition to the review criteria in Chapter 4, the below finding satisfies the zoning ordinance requirement for additional SPO review.

Based on the information in the application and the SRC advice, the Board finds the SPO permit review criteria at subsection 5.2.6.B.1(a-h) are satisfied as follows:

a. The development or other land use activity will maintain safe and healthful conditions;
b. The development or other land use activity will not result in water pollution, erosion, or sedimentation to surface waters;
c. The development or other land use activity will adequately provide for the disposal of all wastewater;
d. The development or other land use activity will not have an adverse impact on spawning grounds, fish, aquatic life, bird or other wildlife habitat;
e. The development or other land use activity will conserve shore cover and visual, as well as actual, points of access to inland and coastal waters;
f. The development or other land use activity will protect archaeological and historic resources as designated in the 2008 Comprehensive Plan, as amended;
g. The development or other land use activity will avoid problems associated with floodplain development and use; and
h. The development or other land use activity is in conformance with standards set forth in Section 2.3 (Shoreland Protection Overlay District) and Chapter 4 (Property Development Standards), as applicable.

The Board finds that the provisions of Section 4.1 are satisfied.

4.2 Dimensional and Density Standards
Based on the site plan the proposed development complies with the applicable dimensional standards of the RP1 Zoning District. Density is not applicable to the proposed development. *The Board finds that the provisions of Section 4.2 are satisfied.*

4.3 Natural and Historic Areas
4.3.1 Mapping of Natural and Historic Areas Requirements. Based on the available information, no features were identified that are important to the natural, scenic, and historic character of the Town or that add to the visual quality of the development.
4.3.2 Pollution. The applicant referenced the FEMA flood insurance rate maps in determining a portion of the dock system is within the 100-year flood plain and an FPO permit is required prior to construction. No undue air or water pollution is proposed.
4.3.3 Protection of Natural Vegetation. No upland vegetation will be disturbed by construction. The applicant received a permit from the Maine DEP and the Army Corps of Engineers for any natural vegetation impacts (if any) within coastal wetlands. The development maximizes the preservation of natural landscape features, does not occur within or cause harm to land not suitable for development, and will not have an undue adverse effect on the area's scenic or natural beauty.

4.3.4 Protection of Significant Plant and Animal Habitat. Significant wildlife habitat is mapped within coastal wetlands at the subject parcel by the Maine Department of Inland Fisheries and Wildlife (MDIFW). The Town Harbor Master provided a memorandum indicating the dock development poses no concern to commercial shellfish. Based on the information provided no habitat concerns with the proposed project. The proposed development is not within the Wildlife Habitat Overlay, and no other mapped significant plant and animal habitats were identified during review. Therefore, the proposed development will not have an undue adverse effect on important plant and animal habitats identified by the Maine Department of Inland Fisheries and Wildlife or Town of Brunswick, or on rare and irreplaceable natural areas, such as rare and exemplary natural communities and rare plant habitat as identified by the Maine Natural Areas Program.

4.3.5 Steep Slopes: The application indicates the development site contains more than 5,000 square feet of contiguous slopes exceeding 25 percent. However, the proposed development is a pier system that will have minimal effect on the steep slopes.

4.3.6 Erosion and Sedimentation. The proposed development is designed in accordance with the Maine Department of Environmental Protection's Best Management Practices (BMPs) to avoid causing unreasonable soil erosion or a reduction in the land's capacity to hold water so that a dangerous or unhealthy situation results.

4.3.7 Groundwater. The application indicates the proposed activity will not extract groundwater for operations. No undue adverse effect to the quantity or quality of groundwater is proposed.

4.3.8 Surface waters, Wetlands, and Marine Resources. Direct impacts to surface waters, wetlands, and marine resources are proposed. These activities were approved by the Maine DEP and Army Corps of Engineers to ensure the avoidance and minimization of any undue nonpoint source pollution impacts. Based on the information provided, the proposed development will have no undue adverse effect on wetlands, waterbodies, and their shorelines within the watershed of the development site.

4.3.9 Historic and Archeological Resources. No historic or archeological resources were identified within the proposed development area. Therefore, the proposed development will have no undue adverse effect on any historic or archeological resources. *The Board finds that the provisions of Section 4.3 are approved.*

4.4 Flood Hazard Areas

The proposed development is located in a Flood Protection Overlay (FPO) District's Flood Hazard Area. The application indicates the applicant will obtain an FPO permit for the pier system. *The Board finds subsection 4.4 is satisfied upon approval of the FPO permit.*

4.5 Basic Municipal Services

4.5.1. Sewage Disposal. The proposed development does not require sewage disposal.
4.5.2. Water Supply and Quality. The proposed development does not require water supply.
4.5.3 Solid Waste Disposal. The applicant is not required to pay solid waste impact fees for the proposed development.
4.5.4. Stormwater Management. The applicant requests a waiver from 4.5.4. *The Board finds that the provisions of Section 4.5 are satisfied provided the waiver for stormwater management is approved.*

4.6 Landscaping Requirements
No landscaping is proposed for the proposed dock system. The proposed dock is consistent with other piers in the vicinity and the associated land disturbance from landscaping is not advised to minimize impacts to existing natural areas for consistency with section 4.3.3. Therefore, subsection 4.6 is satisfied as proposed. *The Board finds the provisions of Section 4.7 are satisfied.*

4.7 Residential Recreation Requirements
The proposed development does not include a new dwelling unit. Therefore recreation impact fees are not applicable. *The Board finds that the provisions of Section 4.6 is not applicable.*

4.8 Circulation and Access
The proposed development is will be constructed with the use of a barge and over land. The Harbor Master reviewed the proposal and advised no undue impact to navigable waters is proposed. *The Board finds that the provisions of Section 4.8 are satisfied.*

4.9 Parking and Loading
The existing parking area for the residence is suitable without additional parking area. No loading areas are proposed. The existing parking for the residence provides adequate off-street parking and loading/unloading areas for motor vehicles and bicycles. *The Board finds that the provisions of Section 4.9 are satisfied.*

4.10 Lighting
Exterior lights are not proposed for the pier system. *The Board finds that the provisions of Section 4.10 are not applicable to the proposed development.*

4.11 Architectural Compatibility
The applicant provided site plans and renderings of the proposed pier system. The proposed pier system is consistent with development in the area. Therefore, the proposed development is compatible with its architectural surroundings in terms of its size, mass, and design. *The Board finds that the provisions of Section 4.11 are satisfied.*

4.12 Neighborhood Protection Standards

The proposed development is not within a Growth Mixed-Use District or Growth Special Purpose District and is therefore not required to comply with subsection 4.12. Therefore, subsection 4.12 is not applicable to the proposed development. *The Board finds that the neighborhood protection standards at Section 4.12 are not applicable.*

4.13 Signs

No signs are not applicable to the proposed project. *The Board finds that the provisions of Section 4.13 are not applicable.*

4.14 Performance Standards

The proposed development will operate in accordance with the performance standards listed at Section 4.14. No additional operating hours are proposed. No exceedance in Section 4.14 standards is proposed. The application indicates the development will comply with the Site Law permit standards applicable to smoke and particulate matter. *The Board finds that the provisions of Section 4.14 are satisfied.*

4.15 Site Feature Maintenance

All site features constructed or installed as required by this development approval will be maintained in good repair, and replaced if damaged or destroyed. As proposed, no landscaped areas are proposed. In the event that the Board requires new landscaped areas, all living materials, if they die or are effectively destroyed after installation shall be replaced in accordance with subsection 4.15. *The Board finds that the provisions of Section 4.15 are satisfied.*

4.16 Financial and Technical Capacity

The applicant hired qualified professionals to design the technical aspects of the proposed activity. The applicant requests a waiver for proof of financial capacity. *The Board finds that the applicant has adequate technical capacity to meet subsection 4.16; and a waiver is granted for proof of financial capacity.*

4.17 Administrative Adjustments / Alternative Equivalent Compliance

No administrative adjustments / alternative equivalent compliance is requested for the proposed development. *The Board finds that administrative adjustments / alternative equivalent compliance pursuant to Section 4.17 is not applicable.*

DRAFT MOTIONS
CASE #20-004

Motion 2: That the requested waivers are approved.

Motion 3: That the Final Plan is approved with the following conditions:

1. That the Committee's review and approval does hereby refer to these findings of fact, the plans and materials submitted by the applicant and the written and oral comments of the applicant, his representatives, reviewing officials, and members of the public as reflected in the public record. Any changes to the approved plan not called for in these conditions of approval or otherwise approved by the Director of Planning and Development as a minor modification shall require a review and approval in accordance with the Brunswick Zoning Ordinance.

ATLANTIC Environmental LLC
135 River Road • Woolwich, ME 04579
tim@atlanticenviromaine.com 207-837-2199
www.atlanticenviromaine.com

February 6, 2020

Mr. Matt Panfil, Director
Planning & Development
Town of Brunswick
85 Union Street
Brunswick, ME 04011

Re: Response to review comments from Jared Woolston, Brunswick Town Planner concerning the Hinton proposed dock application.

Dear Mr. Panfil,

Review comments for the proposed Hinton dock project were received on February 4, 2020 from Town Planner, Mr. Woolston. Below are my responses to those comments.

1. ***Was a seasonal dock considered? If so, why is a seasonal dock not feasible here?***
Yes the applicant did consider a seasonal dock. However, the distance from the proposed start of the pier to the outside edge of the float is approximately 60 feet. A seasonal dock of that distance, in this location would require substantial bracing in order to be stable. Additionally, the substrates below the majority of the dock consist of ledge and rockweed covered ledge. A seasonal pier would still require permanent mounts in the ledge in order to build a stable pier structure. The applicant has reduced impacts to the intertidal zone by limiting the length of the permanent pier and installing a longer seasonal ramp.

2. ***Please provide a copy of the Corps and DEP permits for this project.***
As requested, copies of the Corps and DEP permits are attached.

3. ***Are the existing stairs or the concrete pad at the base of the stairs getting reconstructed?***
I confirmed with the applicant and the contractor that the existing steps will remain and will be incorporated into the proposed pier as shown on the plans. The concrete pad will remain in place.

4. ***This project is in the Rural Protection Stormwater Management Overlay (RPSMO). If that chunk of concrete is coming out the E&S plan should address that work. Otherwise, I think the E&S narrative you provided is sufficient to meet the RPSMO standards.***
The small section of concrete at the base of the steps will remain. Therefore, no changes to the E& S plan are proposed.

Sincerely,
Atlantic Environmental LLC.

Timothy A. Forrester, Owner

PretiFlaherty

Portland, ME
Augusta, ME
Concord, NH
Boston, MA
Washington, DC

Kristin M. Collins
kcollins@preti.com
207.791.3292

February 17, 2020

Jared Woolston
Town Planner
Town of Brunswick
85 Union Street
Brunswick, ME 04011

RE: Hinton Dock Permit

Dear Jared:

I have reviewed the letter of opinion provided by Attorney Federle stating that Gregory and Salli Hinton have adequate right, title and interest in the intertidal zone adjoining their property such that they may apply for a permit to construct a dock and float. I agree with Attorney Federle's analysis and conclusions. As he mentions, there is a strong presumption that a grant of shorefront property intends to convey both the uplands and lowlands. That is bolstered here by the fact that the Hinton's current deed does not appear to convey any different property than was conveyed in their chain of title from Leet to Coffin, which referenced the line running "along the waters." Attorney Federle's analysis fairly quotes and applies the Hermansen treatise, which is often quoted by the courts.

Understanding that the Town needs only to find that the applicant has sufficient evidence to claim title, not to prove it, I do believe the deed demonstrates sufficient standing to apply for the dock permit. Please keep in mind that this opinion is based solely on the materials provided with Attorney Federle's letter.

Sincerely

Kristin M. Collins

KMC:

Town of Brunswick, Maine

INCORPORATED 1739
Coastal Resource Office
85 UNION STREET
BRUNSWICK, MAINE 04011
TELEPHONE 207-721-4027 FAX 207-725-6627
Email – ddevereaux@brunswickme.org

Daniel Devereaux
Coastal Resource
Manager

OFFICE MEMO

February 13, 2020

TO: Jared Woolston, Town Planner

FROM: Daniel Devereaux, Harbormaster/Coastal Resource Manager

RE: Hinton Dock Application

Jared,

I have reviewed the above titled dock application and have made the following comments.

1. The above titled application will not unreasonably interfere with existing uses or navigation in this part of the Gurnet Straits/Long Reach.

2. The proposed dock will not unreasonably impact existing flora and fauna. There may be some shading of existing rockweed vegetation; however the pier and gangway are elevated above the vegetation which will allow significant light penetration.

3. Commercial shellfish resources will not be unreasonably impacted. There are existing oyster and mussel populations along the shoreline in the immediate area, however there was nothing noted at this specific location (89 Toad Landing) in the Town's 2019 shellfish inventories conducted by this office.

If you have any questions please feel free to contact me.

ATLANTIC Environmental LLC
135 River Road • Woolwich, ME 04579
207-837-2199 •tim@atlanticenviromaine.com
www.atlanticenviromaine.com

January 23, 2020

Mr. Matt Panfil, Director
Planning & Development
Town of Brunswick
85 Union Street
Brunswick, ME 04011

Re: Request for Development Review on behalf of Greg and Salli Hinton, 98 Toads Landing, Brunswick Maine.

Dear Mr. Panfil,

On behalf of Greg and Salli Hinton, Atlantic Environmental, LLC (AE) is pleased to submit an application for Development Review by the Planning Board for the construction of a dock consisting of a fixed pier that connects to seasonal ramp and float. This letter is intended to summarize the project and includes request for waivers in accordance with Subsection 5.2.9.M of the Town of Brunswick Zoning Ordinance.

Property Description
Greg and Salli Hinton own property located at 98 Toads Landing and identified as Lot #28 on the Town of Brunswick's Tax Map #36. The project site is approximately 0.94 acres and is located in the Rural Protection 1 (RP1) zoning district and the SPO-RP overlay zone. The site is currently developed with a residential structure and includes a set of access stairs that provides access to the Hinton's shoreline.

Project Description
The proposed project consists of the construction of a recreational dock that consists of a fixed pier and a seasonal ramp and seasonal float. Specifically, the pier will connect to the existing set of access stairs and extend in an easterly direction. The pier will measure six (6) feet wide by sixteen (16) feet long and will be supported with four (4), eight (8) inch by eight (8) inch timber pilings that will be pinned to ledge. The pier will connect to a three (3) foot wide by thirty-six (36) foot long seasonal ramp and a ten (10) foot wide by sixteen (16) foot long seasonal float. The float will be secured in place with cross chains pinned to ledge. During the off-season, the ramp will be stored on the pier and the float will be hauled off-site and stored at an upland location.

Request for Waivers

Given the scale of the project and the limited size of the dock, AE respectfully requests the following submission requirements are waived.

- Fiscal Capacity
- Medium Intensity Soil Survey
- Storm water management plan

The Applicant has received approvals from the Maine Department of Environmental Protection (MDEP) and the Army Corps of Engineers (ACOE) and copies of those permits are included with the attached application materials. Thank you in advance for your consideration of this Application. If you require any additional information or clarifications, please feel free to contact me at 207 - 837 - 2199 or by email at tim@atlanticenviromaine.com.

Sincerely,
Atlantic Environmental LLC.

Timothy A. Forrester, Owner

DEVELOPMENT REVIEW APPLICATION

1. Development Review application type (refer to **Appendix D**):

- [ ] **Minor Development Review**
- [X] Major Development Review: **Sketch Plan**
- [X] Major Development Review: **Final Plan**
- [ ] Major Development Review: **Streamlined Final Plan**

2. Project Name: Hinton Recreational Dock

3. Project Applicant
   - Name: Greg and Salli Hinton
   - Address: 1633 SE 39th Terrace
     Cape Coral, FL 33094
   - Phone Number: (561) 531 - 1629
   - Email: grhinton@hotmail.com

4. Project Owner (if different than applicant)
   - Name:
   - Address:
   - Phone Number:
   - Email:

5. Authorized Representative
   - Name: Tim Forrester, Atlantic Environmental, LLC
   - Address: 135 River Road
     Woolwich, ME 04579
   - Phone Number: (207) 837 - 2199
   - Email: tim@atlanticenviromaine.com

6. List of Design Consultants. Indicate the registration number, address and phone number, email for any additional project engineers, surveyors, architects, landscape architects or planners:

   1.
   2.
   3.

7. Physical location of property: 98 Toads Landing

8. Lot Size: 0.94 acres

9. Zoning District: RP1

10. Overlay Zoning District(s): SPO - RP

11. Indicate the interest of the applicant in the property and abutting property. For example, is the applicant the owner of the property and abutting property? If not, who owns the property subject to this application?

The Applicant, Greg and Salli Hinton, own the property located at 98 Toads Landing. They do not own any abutting properties.

12. Assessor's Tax Map 36 Lot Number 28 of subject property.

13. Brief description of proposed use/subdivision: Residential/Recreational

14. Describe specific physical improvements to be done: _____

The Applicant proposes to construct a dock consisting of a fixed pier and a seasonal ramp and float. The pier will connect to the existing set of access stairs and will measure 6 feet wide by 16 feet long. The pier will connect to a 3 foot wide by 36 foot long ramp and a 10 foot wide by 16 foot long float. The ramp and float will be in place on a seasonal basis.

Owner Signature:

Applicant Signature (*if different*):

Timothy A. Forester on behalf of Greg and Salli Hinton

DEVELOPMENT REVIEW APPLICATION REQUIREMENTS

The submission requirements contained in **Appendix D** of the Brunswick Zoning Ordinance (attached in checklist format for each application category) shall apply to all Minor Development, Major Development, and Streamlined Major Development Review unless a waiver is granted. Proposed development applications shall be submitted to the Director of Planning and Development.

For each item listed in Appendix D the applicant shall either submit the requested information or request a waiver from the information requirement pursuant to Subsection 5.2.9.M of the Zoning Ordinance.

ATLANTIC Environmental LLC
135 River Road • Woolwich, ME 04579
207-837-2199 •tim@atlanticenviromaine.com
www.atlanticenviromaine.com

April 22, 2019

To whom it may concern:

By this letter, I authorize Atlantic Environmental LLC to act on my behalf as my Agent for the preparation and submission of all federal, state, and local town or city permit applications and relevant documents and correspondence related to dock permitting at my property located at 98 Toads Landing in Brunswick, Maine. This authorization includes attending meetings and site visits, appearing before all boards, commissions, and/or committees, and providing other services as required for completing the aforementioned tasks.

Thank you for the opportunity to work with you on this project. Should you have any additional questions, please do not hesitate to contact me at 207-837-2199 or via email at tim@atlanticenviromaine.com.

Gregory R. Hinton
Print Name

Gregory R Hinton 4-22-19
Signature Date

Sincerely,
Atlantic Environmental LLC.

Timothy A Forrester

Timothy A. Forrester, Owner

REQUIREMENTS FOR FINAL PLAN, STREAMLINED REVIEW & MINOR REVIEW APPLICATION SUBMITTAL Please mark box with one of the following: "W" (Waiver); "P" (Pending); "X" (Submitted) or "N/A" (Not applicable)		Final Plan	Streamlined	Minor
General	Application form and fee	X	--	--
	Name of development	X	--	--
	Existing zoning district and overlay designations	X	--	--
	Location map	X	--	--
	Names of current owner(s) of subject parcel and abutting parcels	X	--	--
	Names of engineer and surveyor; and professional registration numbers of those who prepared the plan	X	--	--
	Location of features, natural and artificial, such as water bodies, wetlands, streams, important habitats, vegetation, railroads, ditches and buildings	X	--	--
	Documentation of Right, Title and Interest	X	--	--
	Drafts of legal documents appropriate to the application, including: deeds, easements, conservation easements, deed restrictions or covenants, home/property owners association declarations and by-laws, and such other agreements or documents as are necessary to show the manner in which common areas will be owned, maintained, and protected	X X	-- --	-- --
	Draft performance guarantee or conditional agreement	N/A	--	--
Survey, Topography, & Existing Conditions	Scale, date, north point, and area	X	--	--
	A survey submitted (stamped for final plan submittal) by a professional surveyor with a current license by the State of Maine Board of Licensure for Professional Surveyors	X	--	--
	Boundaries of all lots and tracts with accurate distances and bearings, locations of all permanent monuments property identified as existing or proposed	X	--	--
	Existing easements associated with the development	N/A	--	--
	Location of existing utilities; water, sewer, electrical lines, and profiles of underground facilities	X	--	--
Survey, Topography, & Existing Conditions	Existing location, size, profile and cross section of sanitary sewers; description, plan and location of other means of sewage disposal with evidence of soil suitability	X	--	--
	Topography with contour intervals of not more than two (2) feet	N/A	--	--
	A Medium Intensity Soil Survey, available from the Cumberland County Soil and water Conservation District,. The Planning Board may require a Class A (high intensity) Soil Survey, prepared in accordance with the standards of the Maine Association of Professional Soil Scientists, if issues of water quality, wetlands or other natural constraints are noted.	W N/A	-- --	-- --
	Existing locations of sidewalks	N/A	--	--
	A delineation of wetlands, floodplains, important habitats, and other environmentally sensitive areas	X	--	--
	Approximate locations of dedicated public open space, areas protected by conservation easements and recreation areas	N/A	--	--

REQUIREMENTS FOR FINAL PLAN, STREAMLINED REVIEW & MINOR REVIEW APPLICATION SUBMITTAL Please mark box with one of the following: "W" (Waiver); "P" (Pending); "X" (Submitted) or "N/A" (Not applicable)		Final Plan	Streamlined	Minor
Infrastructure - Proposed	Name, location, width of paving and rights-of-way, profile, cross-section dimensions, curve radii of existing and proposed streets; profiles of center-lines of proposed streets, at a horizontal scale of one (1) inch = 50 feet and vertical scale of one (1) = five (5) feet, with all evaluations referred to in U.S.G.S. datum	N/A N/A	-- --	-- --
	Proposed easements associated with the development	N/A	--	--
	Kind, location, profile and cross-section of all proposed drainage facilities, both within and connections to the proposed development, and a storm-water management plan in accordance with Section	N/A	--	--
	Location of proposed utilities; water, sewer, electrical lines, and profiles of underground facilities. Tentative locations of private wells.	N/A	--	--
	Proposed location, size, profile and cross section of sanitary sewers; description, plan and location of other means of sewage disposal with evidence of soil suitability	N/A	--	--
	Proposed locations, widths and profiles of sidewalks	N/A	--	--
	Locations and dimensions of proposed vehicular and bicycle parking areas, including proposed shared parking arrangement if applicable.	N/A	--	--
Infrastructure - Proposed	Grading, erosion control, and landscaping plan; proposed finished grades, slopes, swells, and ground cover or other means of stabilization	X	--	--
	Storm water management plan for the proposed project prepared by a professional engineer	W	--	--
	The size and proposed location of water supply and sewage disposal systems	N/A	--	--
	Where a septic system is to be used, evidence of soil suitability	N/A	--	--
	A statement from the General Manager of the Brunswick Sewer District as to conditions under which the Sewer District will provide public sewer and approval of the proposed sanitary sewer infrastructure	N/A	--	--
	A statement from the Fire Chief recommending the number, size and location of hydrants, available pressure levels, road layout and street and project name, and any other fire protection measures to be taken	N/A	--	--
	A statement from the General Manager of the Brunswick and Topsham Water District as to conditions under which public water will be provided and approval of the proposed water distribution infrastructure	N/A	--	--
Proposed Development Plan	Lighting plan showing details of all proposed lighting and the location of that lighting in relation to the site	N/A	--	--
	Reference to special conditions stipulated by the Review Authority	N/A	--	--
	Proposed ownership and approximate location and dimensions of open spaces for conservation and recreation. Dedicated public open specs, areas protected by conservation easements, and existing and proposed open spaces or recreation areas and potential connectivity to adjoining open space.	N/A N/A	-- --	-- --
	When applicable, a table indicating the maximum number of lots permitted based upon the applicable dimensional requirements, the number of lots proposed, and the number of lots permitted to be further subdivided.	N/A	--	--
	Building envelopes showing acceptable locations for principal and accessory structures, setbacks and impervious coverage	X	--	--

REQUIREMENTS FOR FINAL PLAN, STREAMLINED REVIEW & MINOR REVIEW APPLICATION SUBMITTAL Please mark box with one of the following: "W" (Waiver); "P" (Pending); "X" (Submitted) or "N/A" (Not applicable)		Final Plan	Streamlined	Minor
Proposed Development Plan	Disclosure of any required permits or, if a permit has already been granted, a copy of that permit	X	--	--
	A statement from the General Manager of the Brunswick and Topsham Water District regarding the proposed development if located within an Aquifer Protection Zone	N/A	--	--
	A plan of all new construction, expansion and/or redevelopment of existing facilities, including type, size, footprint, floor layout, setback, elevation of first floor slab, storage and loading areas	X	--	--
	An elevation view of all sides of each building proposed indicating height, color, bulk, surface treatment, signage and other features as may be required by specific design standards	X	--	--
	A circulation plan describing all pedestrian and vehicle traffic flow on surrounding road systems	N/A	--	--
	A site landscaping plan indicating grade change, vegetation to be preserved, new plantings used to stabilize areas of cut and fill, screening, the size, locations and purpose and type of vegetation	N/A	--	--
	Number of lots if a subdivision	N/A	--	--
	A plan showing all ten (10) inch caliper trees to be removed as a result of the development proposal	N/A	--	--
	All applicable materials necessary for the Review Authority to review the proposal in accordance with the criteria of Chapter 5.	X	--	--
	Any additional studies required by the Review Authority	N/A	--	--

200 foot Abutters List Report

Brunswick, ME
November 08, 2019

Subject Property:

Parcel Number:	36-28	Mailing Address:	HINTON, GREGORY R & SALLI P JT
CAMA Number:	36-28		1633 SE 39TH TERRACE
Property Address:	98 TOADS LANDING		CAPE CORAL, FL 33094

Abutters:

Parcel Number:	36-18	Mailing Address:	RAVENSCROFT, RYAN & MONGELL,
CAMA Number:	36-18		COURTNEY L
Property Address:	7 MEMORY LN		20 SEAGRASS FARM RD
			BRUNSWICK, ME 04011
Parcel Number:	36-20D	Mailing Address:	PARENT, NORMAN C TRUSTEE OF
CAMA Number:	36-20D		8 WENTWORTH LN
Property Address:	0 TOADS LANDING		BAILEY ISLAND, ME 04003
Parcel Number:	36-24	Mailing Address:	FONTAINE, KERRI MICHELLE & JOHN
CAMA Number:	36-24		JAMES JT
Property Address:	86 TOADS LANDING		86 TOADS LANDING
			BRUNSWICK, ME 04011
Parcel Number:	36-24A	Mailing Address:	WHEELER, KIM M & SCOTT D JT
CAMA Number:	36-24A		91 TOADS LANDING
Property Address:	91 TOADS LANDING		BRUNSWICK, ME 04011
Parcel Number:	36-25	Mailing Address:	LAURENDEAU, MARLENE
CAMA Number:	36-25		92 TOADS LANDING
Property Address:	90 TOADS LANDING		BRUNSWICK, ME 04011
Parcel Number:	36-27	Mailing Address:	MCKENNEY, DAVID B & THERESA M
CAMA Number:	36-27		100 NORTHAMPTON ST
Property Address:	94 TOADS LANDING		HOLYOKE, MA 01040
Parcel Number:	36-35	Mailing Address:	COFFIN, BARBARA H
CAMA Number:	36-35		46 CLUF BAY RD
Property Address:	0 BUTTERMILK COVE		BRUNSWICK, ME 04011

Doc#: 49853 Bk:33454 Pg: 174

WARRANTY DEED
Maine Statutory Short Form

KNOW ALL BY THESE PRESENTS, That We, **Peter C. McKenney and Maureen T. McKenney,** of Cummaquid, Massachusetts, for consideration paid, grant to:

Gregory R. Hinton and Salli P. Hinton

whose mailing address is: 1633 SE 39th Terrace, Cape Coral, Florida 33094, with **warranty covenants, as joint tenants,** the real estate situated in Brunswick, County of Cumberland, and State of Maine, described as follows:

> A certain lot or parcel of land, together with any buildings and improvements thereon, situated in the Town of Brunswick, County of Cumberland, and State of Maine being more particularly described in Exhibit A attached hereto and made a part hereof.

Witness our hands and seals this 13 day of September, 2016.

Signed, Sealed and Delivered
in the presence of

Peter C. McKenney
Peter C. McKenney

Maureen T. McKenney
Maureen T. McKenney

State of MA
County of Barnstable

September 13th, 2016

Then personally appeared before me the above named Peter C. McKenney and Maureen T. McKenney and acknowledged the foregoing instrument to be their free act and deed.

Before me,

Attorney at Law/Notary Public
Printed Name: Gregory B Meikle

SEAL

MAINE REAL ESTATE TAX PAID

EXHIBIT A
98 Toad's Landing, Brunswick, Maine

All that certain parcel of land, with the buildings thereon situated to the west of Buttermilk Cove, in the Town of Brunswick, County of Cumberland and State of Maine, bounded and described as follows:

TRACT I:

Beginning at a three-quarter inch iron pipe located a distance of 66.00 feet southeast of the most northerly corner of those premises conveyed to McKenney Electrical Co., Inc. by deed dated December 7, 1989 and recorded in the Cumberland County Registry of Deeds at Book 9015, Page 323, which pipe is the northerly corner of Tract I to be conveyed herein;

Thence S 13° 37' 09" W a distance of 122.75 feet along other land of the grantor herein to a one and one-quarter inch iron pipe in the base of an 8" oak;

Thence S 50° 44' 40" E a distance of 84.00 feet to the high water line of Buttermilk Cove;

Thence running easterly by the high water line a distance of 280.00 feet, more or less, to a point at other land of the grantor herein;

Thence N 68° 02' 30" W a distance of 15 feet, more or less, along other land of grantor herein from said high water line to an iron rebar set;

Thence N 68° 02' 30' W a distance of 65.81 feet along other land of the grantor herein to a one and one-half inch iron pipe;

Thence N 50° 42' 00" W a distance of 15.23 feet along other land of the grantor herein to a one and one-half inch iron pipe;

Thence N 50° 41' 17" W a distance of 7.83 feet along other land of the grantor herein to a three-quarter inch iron pipe:

Thence N 39° 27' 58" W a distance of 56.09 feet along land now or formerly or James S. Chard to the place of beginning.

Reference is made to "Standard Boundary Survey Land of McKenney Electric Co., Inc. and Land of Donald C. McKenney and Elizabeth B. McKenney dated August 14, 1990, revised January 11, 1996 by Brian Smith Surveying, Inc. and recorded in the Cumberland County Registry of Deeds in Plan Book 196, Page 28 and further revised September 13, 2001 and said revised plan recorded in Plan Book 201, Page 404 (the "Plan").

Together with a 20 foot right of way reserved by McKenney Electrical Co., Inc., in warranty deed David B. McKenney and Theresa M. McKenney dated September 28, 2001 and recorded in

the Cumberland County Registry of Deeds in Book 17123, Page 52, for the purpose of ingress and egress by foot and by vehicle and with utilities to access said premises and also together with a 20 foot right of way over land conveyed by David B. McKenney and Peter C. McKenney to David B. McKenney and Theresa M. McKenney by warranty deed dated September 28, 2001 and recorded in the Cumberland County Registry of Deeds in Book 17123, Page 54, for purpose of installing utilities and for ingress and egress by foot and vehicles. Both rights of way being shown as "Proposed New 20' Right of Way" as shown on said plan "Standard Boundary Survey Land of McKenney Electric Co., Inc. and Land of Donald C. McKenney and Elizabeth B. McKenney dated August 14, 1990, revised January 11, 1996 by Brian Smith Surveying, Inc. and recorded in the Cumberland County Registry of Deeds in Plan Book 196, Page 28 and further revised September 13, 2001 and said revised plan recorded in Plan Book 201, Page 404.

The premises are conveyed together with the benefit of an exclusive easement appurtenant to the above-described premises to use the existing well as shown on said Plan on the northerly portion of land now or formerly of McKenney Electric Co. Inc. recorded at Cumberland County Registry of Deeds in Book 9015, Page 323 and as conveyed by warranty deed from David B. McKenney and Peter C. McKenney to David B. McKenney and Theresa M. McKenney dated September 28, 2001 and recorded in the Cumberland County Registry of Deeds in Book 17123, Page 54, together with all the rights to enter on said land to maintain the same and to lay and maintain pipelines from said well to the dwelling on the land herein conveyed all at the expense of the grantees herein, their heirs and assigns.

*As used herein, "grantor" shall mean McKenney Electrical Co., Inc.

TRACT II:

Beginning at a 3/4 inch iron pipe found at the southwest corner of land of the Grantor herein:

Thence N 32° 27' 33" E along land now or formerly of James Chard, a distance of 82.95 feet to a 3/4 inch pipe found;

Thence N 45° 09' 41" W along land now or formerly of said Chard, a distance of 15.76 feet to a 3/4 inch pipe found;

Thence N 45° 21' 25" E along land now or formerly of said Chard, a distance of 121.73 feet to a 5/8 inch rebar set;

Thence S 47° 20' 47" E through other land now or formerly of Barbara H. Coffin a distance of 78.18 feet to a 5/8 inch rebar set;

Thence continuing S 47° 20' 47" E a distance of 12 feet, more or less, to the high water line of Buttermilk Cove;

Thence running in a southerly direction by the high water line of Buttermilk Cove a distance of 195 feet, more or less, to other land of McKenney Electric Co., Inc.;

Thence N 68° 02' 30" W along said McKenney lot, a distance of 15 feet, more or less, to a 5/8 rebar set in 1990;

Thence N 68° 02' 30" W along said McKenney lot, a distance of 65.81 feet to a 1 1/2 inch iron pipe found;

Thence N 50° 42' 00" W along said McKenney lot, a distance of 15.23 feet to a 1 1/2 inch iron pipe found;

Thence N 50° 41' 17" W along said McKenney lot, a distance of 7.83 feet to the point of beginning of the parcel herein described.

Further reference is made to "Standard Boundary Survey Land of McKenney Electric Co., Inc. and Land of Donald C. McKenney and Elizabeth B. McKenney dated August 14, 1990, revised January 11, 1996 by Brian Smith Surveying, Inc. and recorded in the Cumberland County Registry of Deeds, Plan Book 196, Page 28 and further revised September 13, 2001 and said revised plan recorded in Plan Book 201, Page 404.

*As used herein, "Grantor" shall mean Barbara E. Coffin

Being the premises conveyed to the Grantors by warranty deed from McKenney Electrical Co., Inc. dated September 28, 2001 and recorded in the Cumberland County Registry of Deeds in Book 17123, Page 48.

Also conveying all easements appurtenant to the above described premises, including but not limited to those rights of way set forth in Deed of Conservator from Sharon Brown, Conservator of Peter H. Brown to McKenney Electrical Co., Inc. dated December 7, 1989 and recorded in the Cumberland County Registry of Deeds in Book 9015, Page 321 and in warranty deed from Sharon R. Brown to McKenney Electrical Co., Inc. dated December 7, 1989 and recorded in said Registry of Deeds in Book 9015, Page 323, which are recited therein as follows:

"There is also conveyed herewith, the right to travel to and from said lot over the road or right of way as it now exists".

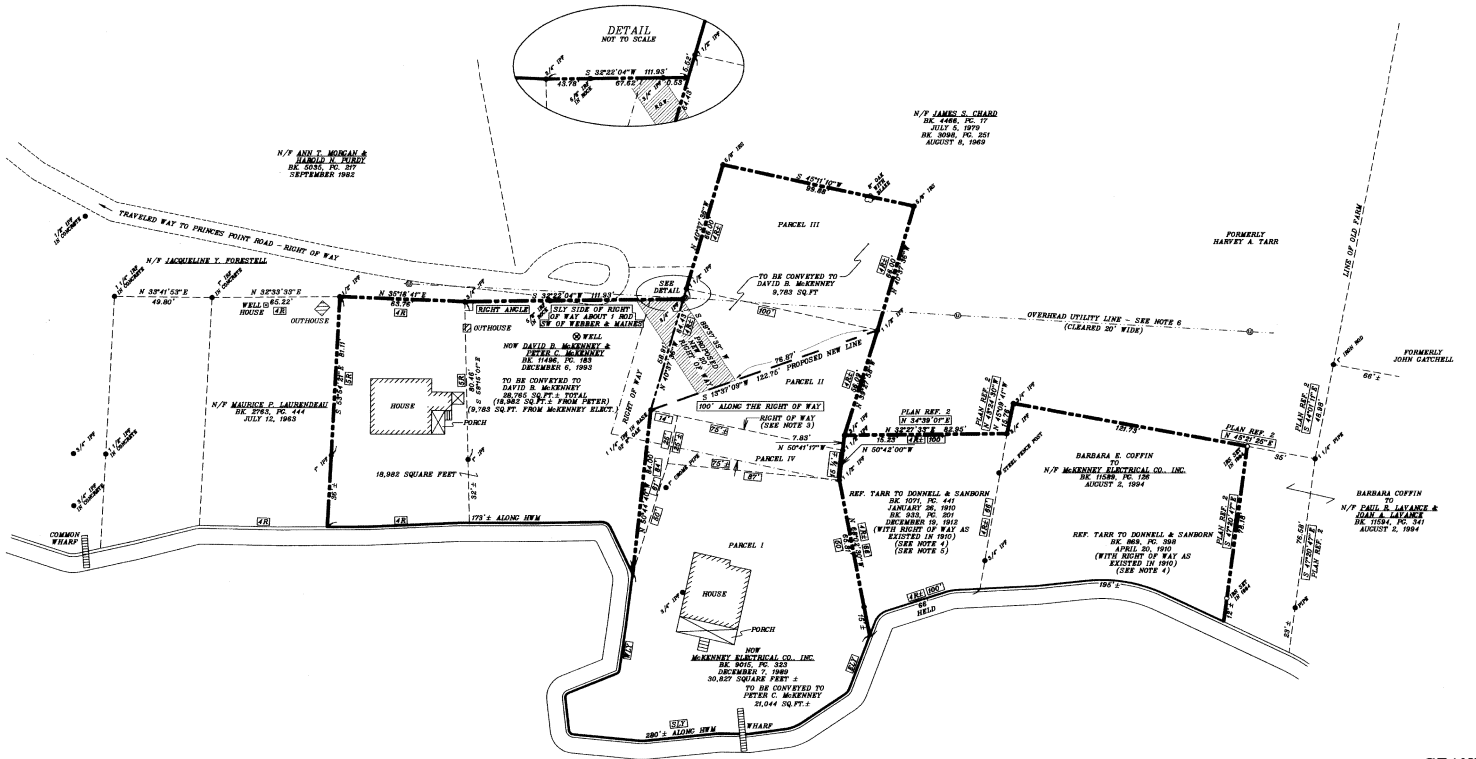
"Including the use of the right of way as it now exists from said lot the Main Road".

There is included herewith a right of way over the road as now travelled or hereafter to be established, for the lot owners who have purchased of said Tarr to the public highway, said right of way to be sufficient width to admit of team or automobile travel".

The premises are conveyed subject to and benefited by the terms and provisions of Road Maintenance Agreement for Toad's Landing, Brunswick dated November 18, 2013 and recorded

in the Cumberland County Registry of Deeds in Book 31198, Page 259, as amended by Amendment No. 1 to Road Maintenance Agreement for Toads Landing, Brunswick, dated April 22, 2016 and recorded in said Registry of Deeds in Book 33091, Page 7 and Toad's Landing Road Association Joinder to be recorded herewith.

Received
Recorded Register of Deeds
Sep 20,2016 09:08:59A
Cumberland County
Nancy A. Lane



PLAN REFERENCES

1.) UNTITLED, UNSIGNED, PLAN WITH NO DATE SHOWING LOTS ON BUTTERMILK COVE. IN POSSESSION OF ELIZABETH McKENNEY.

2.) SURVEY WORKSHEET OF ROBERT LEE PROPERTY, PRINCES POINT, BRUNSWICK DATED MARCH 23, 1979 BY BRIAN B. SMITH L.S. #1175.

3.) PLAN OF PROPERTY PREPARED FOR JAQUELINE FORESTELL SITUATED IN BRUNSWICK, CUMBERLAND COUNTY, MAINE DATED JANUARY 1985. RECORDED IN PLAN BOOK 136, PAGE 42.

4.) SEE NOTE 8.

NOTES

1.) DELETED 9-13-2001

2.) DELETED 9-13-2001

3.) DELETED 9-13-2001

4.) THIS LOT ORIGINALLY HAD A RIGHT OF WAY TO TOWN ROAD OVER LAND OF HARVEY A. TARR. NO PHYSICAL EVIDENCE OF THIS LOT USING A RIGHT OF WAY OVER THE LAND OF McKENNEY ELECTRICAL CO., INC. OR OVER LAND OF DONALD C. McKENNEY AND ELIZABETH B. McKENNEY WAS FOUND. THIS LOT NOW, AND HISTORICALLY, HAS USED ANOTHER LEGAL RIGHT OF WAY TO ACCESS THE TOWN ROAD BY GOING NORTHERLY ACROSS LAND FORMERLY OF JOHN CATCHELL.

5.) TARR CONVEYED THIS LOT TO DONNELL AND SANBORN IN 1910 BUT THE DEED WAS LOST SO A SECOND DEED WAS DRAFTED IN 1912 TO CONVEY THE EXACT SAME PROPERTY. THE ORIGINAL DEED WAS LATER FOUND AND RECORDED. THE TWO DEEDS DO NOT HAVE THE SAME LEGAL DESCRIPTION. IT IS THE ADVISE OF THIS SURVEYOR THAT QUIT CLAIM DEEDS BE EXCHANGED BETWEEN BARBARA H. COFFIN AND McKENNEY ELECTRICAL CO., INC. TO ESTABLISH THEIR COMMON BOUNDARY AS SHOWN HEREON.

6.) THE DEED TO THIS UTILITY LINE HAS NOT BEEN INVESTIGATED.

7.) JANUARY 11, 1996, LOT CONVEYED BY COFFIN TO McKENNEY BOOK 11589, PAGE 126 AND COFFIN TO LAVANCE BOOK 11594, PAGE 341 ADDED AND RECORDING BLOCK ADDED. NOTE - BEARINGS USED IN SAID DEEDS ARE BASED ON PLAN REFERENCE 2. NO OTHER CHANGES TO 1990 PLAN HAVE BEEN MADE.

8.) SEE PLAN OF THIS SAME PROPERTY DATED AUGUST 14, 1990 REVISED JANUARY 11, 1996 AND RECORDED IN CUMBERLAND COUNTY REGISTRY OF DEEDS AT PLAN BOOK 196 PAGE 28. SEE SAID PLAN FOR DEED REFERENCE INFORMATION.

9.) THE INTENT OF THIS 2001 PLAN IS TO SHOW THE PROPOSED PETER C. McKENNEY LOT AND THE PROPOSED DAVID B. McKENNEY LOT.

LEGEND

- PROPERTY LINE
- RIGHT OF WAY LINE
- PRESENT OR FORMER PROPERTY LINE - NOT SURVEYED
- IPF● IRON PIPE FOUND
- IRF● IRON ROD FOUND
- IRS○ IRON REBAR SET
- HARDWOOD TREE
- HWM HIGH WATER MARK
- UTILITY POLE
- N/F NOW OR FORMERLY
- 4R DEED CALL OF 4 RODS

BUTTERMILK COVE

RECORDING INFORMATION
STATE OF MAINE, CUMBERLAND
COUNTY REGISTRY OF DEEDS
RECEIVED: October 9, 2001
at 3h 9m PM
RECORDED IN Plan Book 201 Pg 404
ATTEST: John B. O'Brien
REGISTRAR

30 15 0 30 60 90
SCALE IN FEET

CERTIFICATION
TO THE BEST OF MY KNOWLEDGE THIS SURVEY CONFORMS TO THE MAINE BOARD OF REGISTRATION FOR LAND SURVEYOR STANDARDS WITH THE FOLLOWING EXCEPTIONS:

1.) NO REPORT
2.) NO DESCRIPTION PROVIDED
3.) DEED RESEARCH HAS NOT BEEN UPDATED SINCE 1996 SEE NOTE 9.

SEAL
Brian B. Smith
BRIAN B. SMITH P.L.S. #1175

STANDARD BOUNDARY SURVEY
LAND NOW OF McKENNEY ELECTRICAL CO., INC.
LAND NOW OF DAVID B. McKENNEY **AND** PETER C. McKENNEY
PRINCES POINT ROAD
BRUNSWICK, MAINE

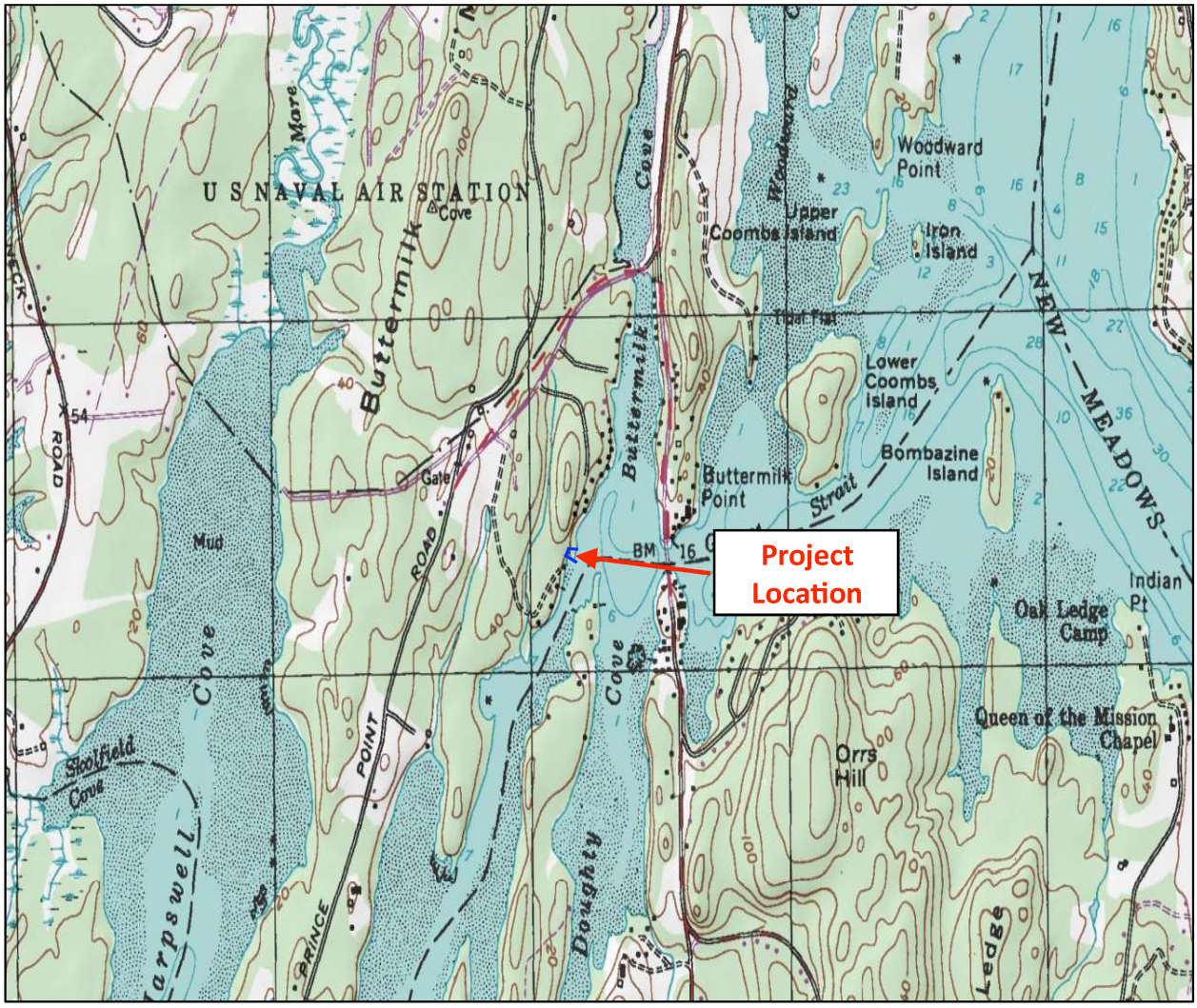
SCALE: 1"=30' DATE: AUGUST 14, 1990
REVISED: JANUARY 11, 1996 - SEE NOTE 7
REVISED: SEPTEMBER 13, 2001 - SEE NOTE 9

BY BRIAN SMITH SURVEYING, INC.
213 MAIN STREET, BOWDOINHAM, MAINE 04008

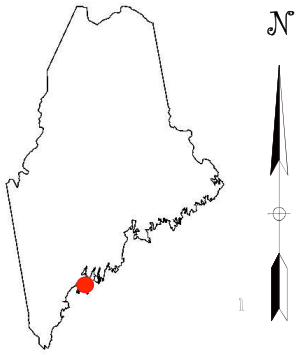
JOB NO. 99-60.DWG
ROTATION ANGLE: -67°

EXHIBIT 3.0: LOCATION MAP

Greg and Salli Hinton, 98 Toads Landing, Brunswick, Maine

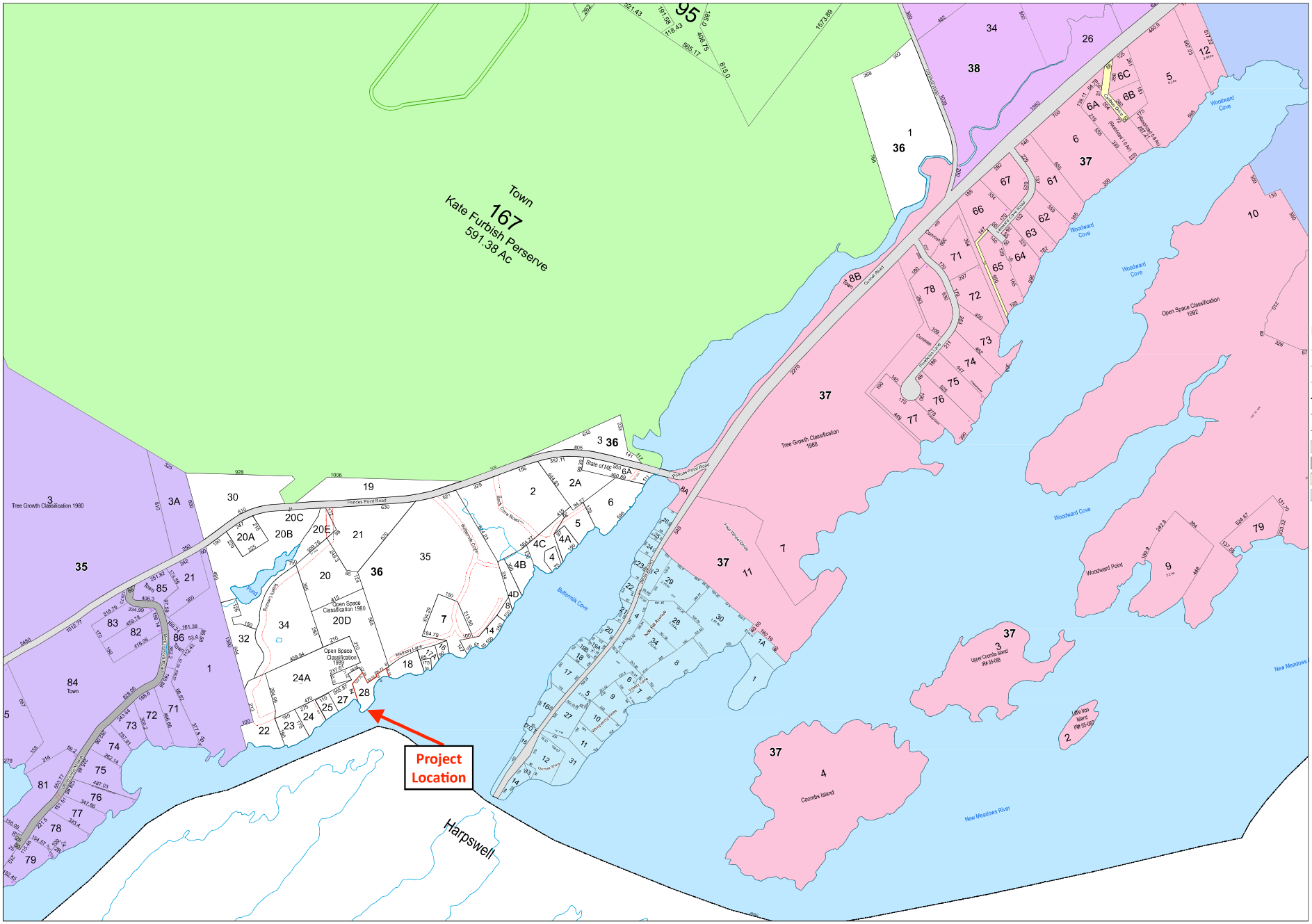


Directions: From Cook's Corner in Brunswick, turn right on Route 24 and travel for approximately 3.0 miles. Turn right onto Prince's Point Road and travel for approximately 0.5 miles. Turn left on Toads Landing and travel for approximately 0.5 miles. #98 is located on the right.



N

Notes:	ATLANTIC ENVIRONMENTAL LLC. Environmental Consultants 135 River Road, Woolwich, ME 04579 (207) 837-2199 tim@atlanticenviromaine.com	
Maine Atlas & Gazetteer Map 6 (Section D-3) 43.858355 -69.918097	Date: 5/14/2019	DWG Name: Hinton Site Location



Town of
BRUNSWICK
Maine

Disclaimer:
The information is provided as a reasonably accurate point of reference, but is not guaranteed and is not to be used for conveyances.
The Town of Brunswick shall not be held responsible for the accuracy or misuse of this data.
Copyright Town of Brunswick.

1 inch = 300 feet

Revised To: April 1, 2017
Maps Prepared by:
Town of Brunswick

MAP
36

EXHIBIT 4.0: PHOTOGRAPHS

The following photographs are taken from the site of the project and represent the proposed location of the dock located at 98 Toads Landing in the Town of Brunswick, ME.

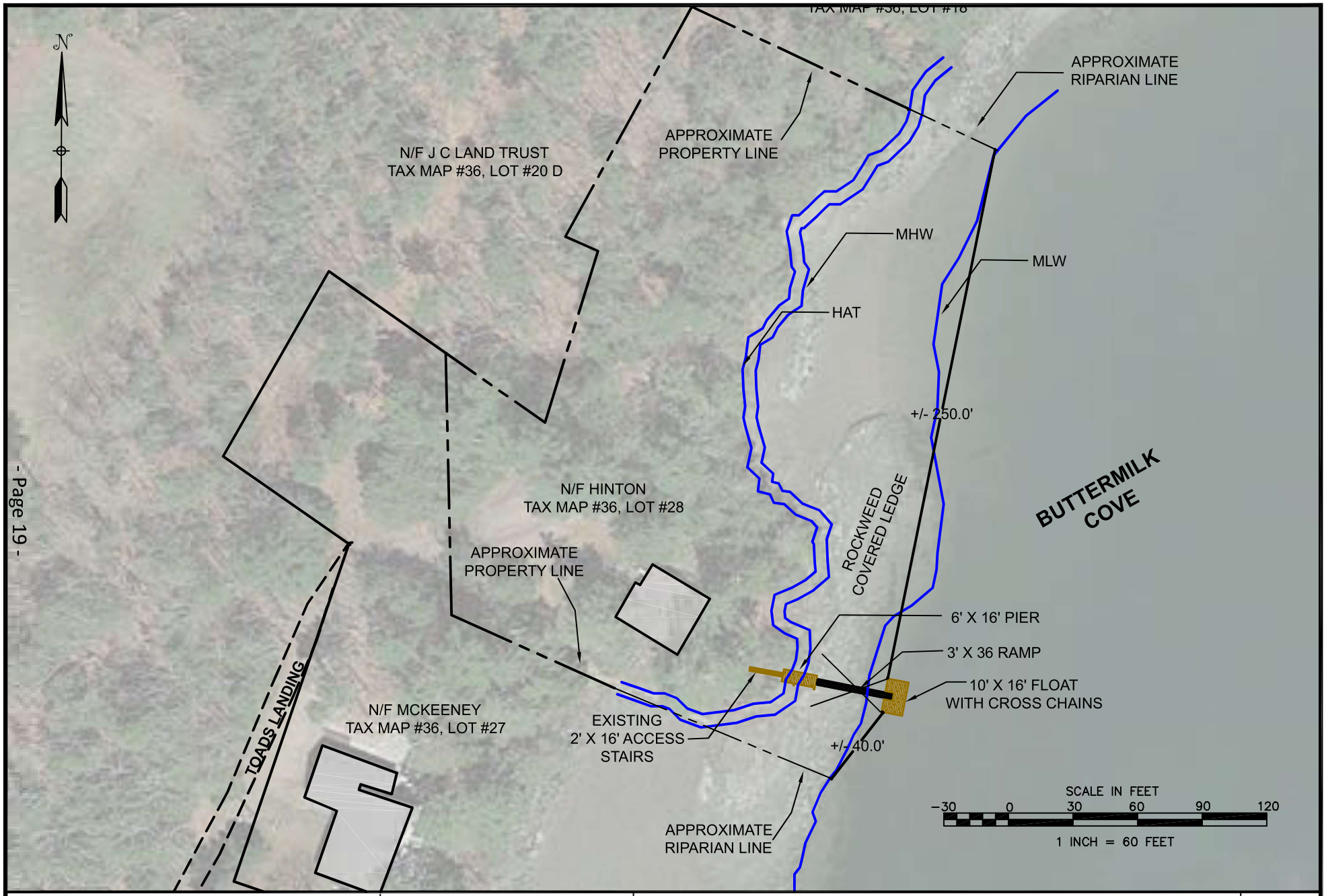
Photograph One. Aerial View of Project Site. Red arrow indicates approximate location of project. Source: Google Maps. Date: Unknown.

Photograph Two. Facing westerly – view of existing set of access stairs and view of upper intertidal. Photographer: Tim Forrester, Atlantic Environmental, LLC Date: May 6, 2019.

Photograph Three. Facing southerly – view of intertidal area showing rockweed covered ledge. Photographer: Tim Forrester, Atlantic Environmental, LLC Date: May 6, 2019.

Photograph Four. Facing northerly – additional view of rockweed covered ledge. Photographer: Tim Forrester, Atlantic Environmental, LLC Date: May 6, 2019.

Photograph Five. Facing easterly – view of lower intertidal – float will land beyond rockweed covered ledge. Photographer: Tim Forrester, Atlantic Environmental, LLC Date: May 6, 2019.



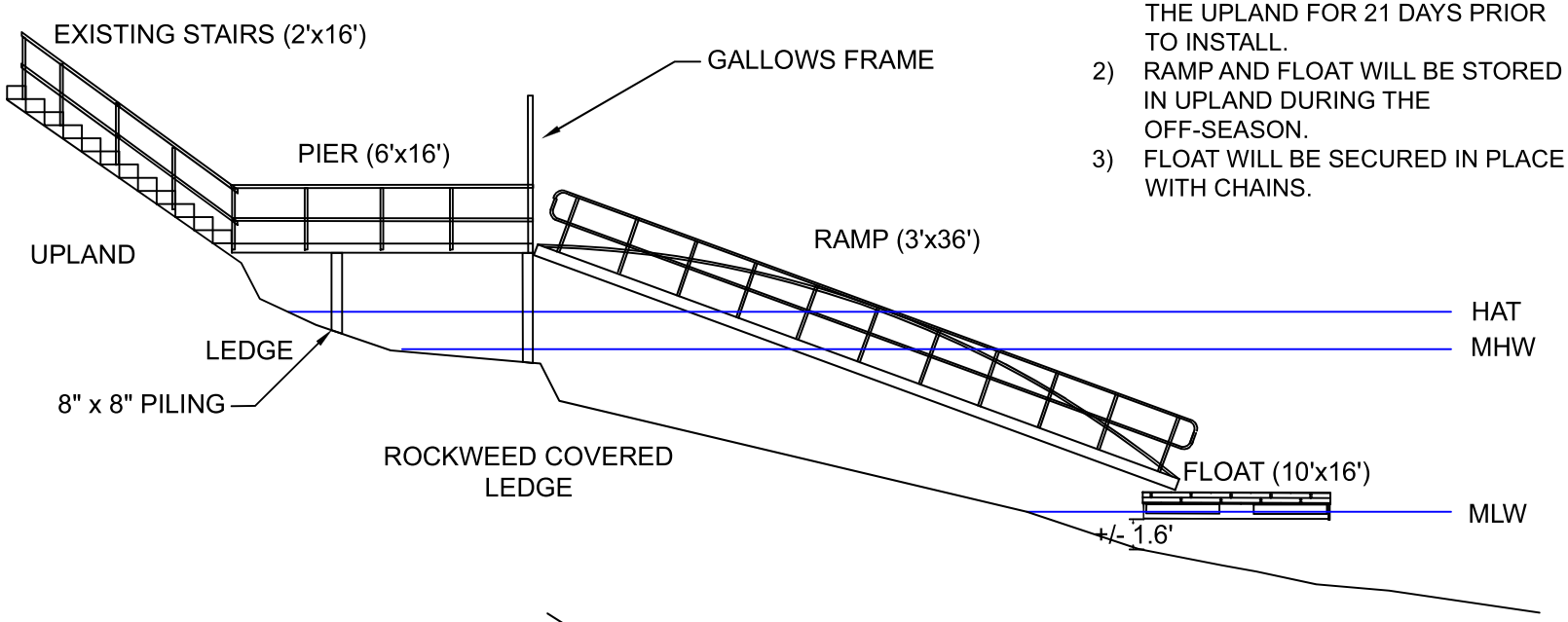
ATLANTIC ENVIRONMENTAL LLC.
Environmental Consultants
135 River Road, Woolwich, ME 04579
(207) 837-2199
tim@atlanticenviromaine.com

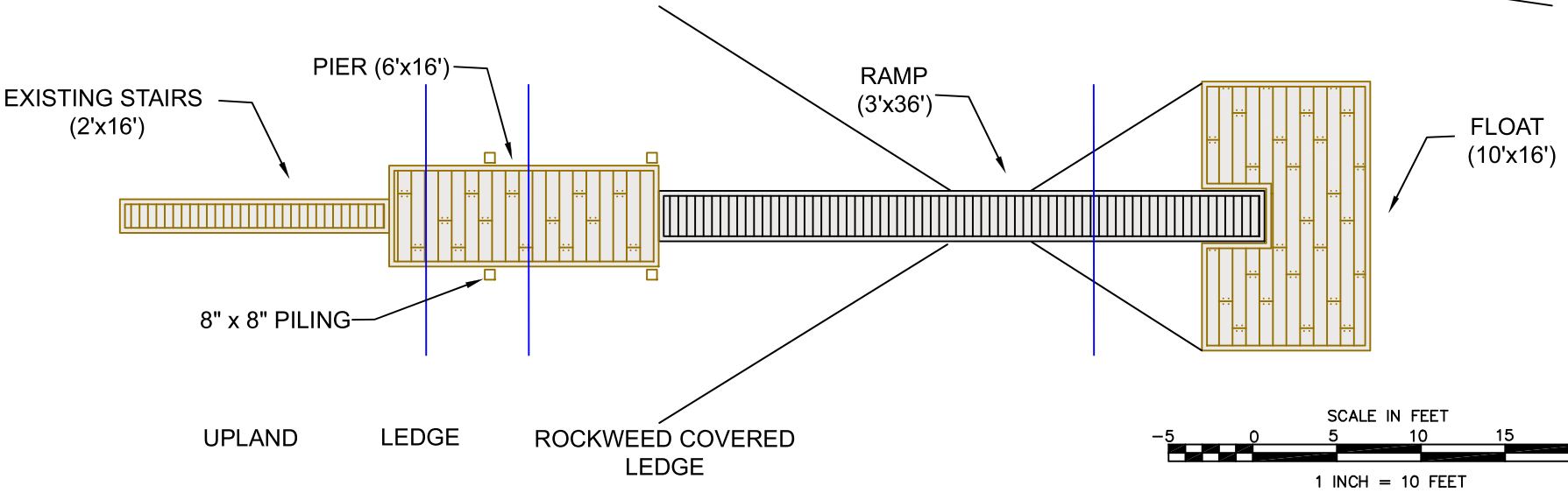
Date: 5/14/2019
Revised:
Project: Hinton, Brunswick
Drafted By: LCV

Plan View of the proposed Pier, Ramp and Float for Greg and Salli Hinton located at 98 Toads Landing in Brunswick, Maine.

Sheet 1 of 2

NOTES:
1) ALL PT LUMBER WILL BE CURED IN THE UPLAND FOR 21 DAYS PRIOR TO INSTALL.
2) RAMP AND FLOAT WILL BE STORED IN UPLAND DURING THE OFF-SEASON.
3) FLOAT WILL BE SECURED IN PLACE WITH CHAINS.





ATLANTIC ENVIRONMENTAL LLC.
Environmental Consultants
135 River Road, Woolwich, ME 04579
(207) 837-2199
tim@atlanticenviromaine.com

Date: 5/10/2019
Revised:
Project: Hinton, Brunswick
Drafted By: TAF/LCV

Plan View and Cross Section View of the Proposed Pier, Ramp and Float for Greg and Salli Hinton located at 98 Toads Landing in Brunswick, Maine.

Sheet 2 of 2

EXHIBIT 6.0: CONSTRUCTION PLAN

The pier will be supported with pilings pinned to ledge as described in **Exhibit 1.0.** Any CCA-treated lumber used for the construction of the pier will be cured on dry land for 21 days prior to the start of construction. The ramp and float will be constructed off-site and set in place once the pier is constructed.

All materials will be transported to the site from the upland and construction access will take place from the adjacent upland. It is not anticipated that measureable soil disturbance will occur as a result of the construction of the pier given the ledge in the area. The construction of the dock should take approximately one (1) to two (2) weeks.

EXHIBIT 7.0: EROSION CONTROL PLAN

The construction of the dock involves minimal excavation and/or earth moving and all work will be conducted at low tide. Given that minimal sedimentation, if any, will occur for the construction of the proposed structures, no formal measures are proposed to control erosion or sedimentation.

EXHIBIT 8.0

REVIEW STANDARDS – TOWN OF BRUNSWICK ZONING ORDINANCE

CHAPTER 2 (14) – STRUCTURES AND OTHER ACTIVITIES EXTENDING OVER OR BELOW A WATER BODY OR WITHIN A WETLAND OR SHORELINE STABILIZATION AREA.

2.14.A No more than one (1) pier, dock, wharf, or similar structure extending over or located below the normal high-water line of a water body, or within a wetland or shoreline stabilization area is permitted on a single lot; excepting on single lots having a lot width at least twice the required lot width of the base zoning district and at least twice the minimum shorefrontage as specified in Table 4.2.5.F(1), a second structure may be permitted and may remain as long as the lot is not further divided.
The Applicant proposes to construct one dock on their property.

2.14.B Access from shore shall be developed on soils appropriate for such use and constructed so as to control erosion.
The proposed structures will begin in the upland and extend over ledge. No large machinery will operate in the coastal wetland. The project does not involve excavation or earth moving. The Applicant does not anticipate any adverse causes of erosion or sediment.

2.14.C The location shall not interfere with existing developed or natural beach areas.
The proposed location is not located over a developed or natural beach area.

2.14.D The structure or activity shall be located so as to minimize adverse effects on fisheries as determined by the Marine Resource Officer or designee.
The proposed dock has been positioned to provide reasonable tidal access and will be located over exposed ledge and rockweed covered ledge. According to the Significant Wildlife Habitat (SWH) maps of the DEP, the project is not located within a mapped SWH. In addition, the proposed dock was reviewed by the Department of Inland Fisheries and Wildlife (MDIFW) and the Department of Marine Resources (DMR) during the Department of Environmental Protection (MDEP) review process. The dock was also reviewed by the US Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and the Environmental Protection Agency (EPA) during the Army Corps of Engineers (ACOE) process. These agencies did not identify any adverse effects to these resources as a result of the proposed modifications.

2.14.E The structure or activity shall be no larger in dimension than necessary to carry on the activity and be consistent with the surrounding character and uses of the area. A temporary pier, dock, or wharf shall not be wider than six (6) feet for noncommercial uses.
The Applicant is proposing a dock that is consistent with existing docks that are located within the surrounding area and will provide all-tide recreational access to coastal waters. There are recreational docks of similar size and design to the south and north of the proposed dock.

2.14.F No new structure shall be built on, over, or abutting a pier, wharf, dock, or other structure extending beyond the normal high-water line of a water body or within a wetland or shoreline stabilization area unless the structure requires direct access to the water body or wetland or shoreline stabilization area as an operational necessity.

The Applicant does not propose to construct a new structure on, over, or abutting the proposed dock.

2.14.G New permanent piers and docks on non-tidal waters shall not be permitted unless it is clearly demonstrated to the Code Enforcement Officer that a temporary pier or dock is not feasible, and a permit has been obtained from the Maine Department of Environmental Protection pursuant to the Natural Resources Protection Act, Title 38 M.R.S., § 480-C, as amended.
The proposed dock is located on tidal waters.

2.14.H A structure constructed on a float is prohibited unless it is designed to function as a watercraft and is registered as such with the Maine Department of Inland Fisheries and Wildlife.
The Applicant does not propose to construct a structure on a float.

2.14.I No existing structures built on, over, or abutting a pier, dock, wharf, or other structure extending beyond the normal high-water line of water body or within a wetland shall be converted to residential dwelling units.
The Applicant does not propose to convert any existing structures on, over, or abutting the proposed dock to a residential dwelling unit.

2.14.J Structures built on, over, or abutting a pier, wharf, dock, or other structure extending beyond the normal high-water line of a water body or within a wetland or shoreline stabilization area shall not exceed 20 feet in height above the pier, wharf, dock, or other structure.
The Applicant does not proposes to construct a structure on, over, or abutting the proposed dock.

2.14.K Commercial marine activities and piers, docks, wharves, breakwaters, causeways, marinas, bridges, and other structures projecting into water bodies shall conform to the supplementary use standards in Subsection 3.4.1.S.
The proposed dock is for recreational use only and will not be utilized for commercial marine activities.

2.14.L Vegetation may be removed in excess of the standards in Subsection 2.3.3.C.(11) in order to stabilize an eroding shoreline, provided that prior to such removal, the proposed activity is reviewed onsite and approved by the Code Enforcement Officer. Construction equipment shall access the shoreline by barge when feasible, as determined by the Code Enforcement Officer.

i. When necessary, the removal of trees and other vegetation to allow for construction equipment access to the stabilization site by land shall be limited to no more than 12 feet in width. Upon completion of the stabilization activity, the area cleared for construction

equipment access shall be restored with native trees and other vegetation, in accordance with a plan submitted to and approved by the Code Enforcement Officer.

ii. Revegetation shall be completed in accordance with Subsection 2.3.3.C (10).

The Applicant is not proposing to remove vegetation to stabilize an eroding shoreline.

2.14.M A deck over a river may be exempt from the 125 foot shoreland setback requirement for new construction if the new construction is part of a downtown revitalization project, defined in a project plan and approved by Town Council. This may include the revitalization of structures formerly used as mills that do not currently meet the structure setback requirements, if the proposed deck complies with the following:

i. The total deck area attached to the structure does not exceed 700 square feet;

ii. The deck is cantilevered over a river segment that is located within the boundaries of the downtown revitalization project area;

iii. The deck is attached or accessory to a permitted commercial use in a structure constructed prior to 1971 and is located within the boundaries of the downtown revitalization project area;

iv. The deck construction complies with all other applicable standards, with the exception of shoreland setback requirements contained in Subsection 2.3.3.(C); and

v. The deck construction complies with all other local, State and Federal laws and regulations.

The Applicant does not propose to construct a deck.

Chapter 4: Property Development Standards

4.2 DIMENSIONAL AND DENSITY STANDARDS

The proposed dock will meet the dimensional and density standards of Table 4.2.4.

4.3 NATURAL AND HISTORIC AREAS

The proposed project is a water dependent use and, as such, it is unavoidable to located the proposed dock within the coastal wetland. All CCA-treated lumber will be cured in the upland for 21 days prior to construction to minimize potential water pollution. MDIFW did not identify any concerns with the proposed project during the review process.

The area is mapped in steep slopes; however, given the recent ordinance change regarding water dependent structures and steep slopes and that the proposed dock is sited at the base of the bank, the impact of development on such slopes has been minimized.

The proposed pilings for the pier will be pinned to ledge and the Applicant does not propose any excavation or earth-moving. In addition, the Applicant will ensure the site is stabilized at the completion of construction in accordance with the Maine Department of Environmental Protection's Best Management Practices.

The dock does not propose to impact the quality or quantity of groundwater.

The proposed dock has received approval from the MDEP and ACOE. During the review process of these agencies, it was determined the Applicant has avoided and minimized impacts to the coastal wetland to the greatest extent practicable. In addition, it was determined there would not be an adverse effect on the water quality or functions and values of the coastal wetland.

The project was reviewed by the Maine Historic Preservation Commission (MHPC) and the five tribes. These entities did not identify concerns with the proposed project and historical resources.

4.4 FLOOD HAZARD AREAS
The proposed project is located within a Special Flood Hazard area. The Applicant will submit a Floodplain Development permit application that complies with Subsection 2.3.4.

4.5.1. SEWAGE DISPOSAL
The Applicant does not propose sewage disposal as part of the project.

4.5.2 WATER SUPPLY AND QUALITY
The Applicant does not propose to modify the existing water supply and/or quality as part of the project.

4.5.3. SOLID WASTE DISPOSAL
The proposed project will not increase solid waste.

4.5.4 STORMWATER MANAGEMENT
The Applicant will take appropriate measures to ensure the site is stabilized at the completion of construction. No formal stormwater management structures are proposed.

4.6 LANDSCAPING REQUIREMENTS
The proposed dock is located over ledge. No formal landscaping is proposed.

4.7. RESIDENTIAL RECREATION REQUIREMENTS
The proposed project does not involve the construction of a dwelling unit. Therefore, no impact fee or reserved land is proposed.

4.8 CIRCULATION AND ACCESS
The proposed project will not increase traffic and does not propose to modify the existing access. There are no public rights of access to the shoreline at the project site.

4.9 PARKING AND LOADING
The proposed dock does not propose additional parking areas.

4.10 LIGHTING
The proposed dock does not propose lighting.

4.11 ARCHITECTURAL COMPATIBILITY
The proposed dock is consistent with marine construction standards. The fixed pier and float will be constructed with pressure treated and cedar lumber and the ramp will be constructed with aluminum. This is consists with the size and design of existing structures in the project vicinity in the marine environment.

4.12 NEIGHBORHOOD PROTECTION STANDARDS
As stated, the design is consistent with neighboring structures.

4.13 SIGNS
The project does not propose any signs

4.14 PERFORMANCE STANDARDS
The Applicant proposes to comply with the performance standards outlined in this section.

4.15 SITE FEATURE MAINTENANCE
The project does not involve site features such as landscaping, signs, parking areas, or outdoor lighting.

4.16 FINANCIAL AND TECHNICAL CAPACITY
The Applicant has the financial capacity to construct the proposed dock. The dock will be constructed by Waddle Docks based in Harpswell, Maine.

5.1.6.B PERFORMANCE GUARANTEE
No public infrastructure is proposed; therefore, no performance guarantee is anticipated to be required.

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
17 STATE HOUSE STATION AUGUSTA, MAINE 04333-0017

DEPARTMENT ORDER

IN THE MATTER OF

GREG and SALLI HINTON	) NATURAL RESOURCES PROTECTION ACT
Brunswick, Cumberland County	) COASTAL WETLAND ALTERATION
RESIDENTIAL PIER SYSTEM	) WATER QUALITY CERTIFICATION
L-28323-4P-A-N (approval)	) FINDINGS OF FACT AND ORDER

Pursuant to the provisions of 38 M.R.S. §§ 480-A–480-JJ, Section 401 of the Federal Water Pollution Control Act (33 U.S.C. § 1341), and Chapters 310 and 315 of Department rules, the Department of Environmental Protection has considered the application of GREG and SALLI HINTON with the supportive data and other related materials on file and FINDS THE FOLLOWING FACTS:

1. PROJECT DESCRIPTION:

A. Summary: The applicants propose to construct a pier system to include a pile-supported permanent pier with an associated seasonal ramp and float. The proposed permanent pier will be affixed to, and lead from, an existing two-foot wide by 16-foot long set of access stairs which leads to the resource, will measure six feet wide by 16 feet long, and will be supported by four pilings. The proposed system also includes a three-foot wide by 36-foot long seasonal ramp and a 10-foot wide by 16-foot long seasonal float. The proposed project can be seen on plan titled "Plan View," prepared by Atlantic Environmental, LLC and dated May 14, 2019. The project site is located off Toads Landing in the Town of Brunswick.

B. Current Use of the Site: The site of the proposed project is located on a 0.94-acre parcel of land and contains an existing residence in an upland location and an existing set of access stairs. The project site is identified as Lot #28 on Map #36 on the Town of Brunswick's tax maps.

2. EXISTING SCENIC, AESTHETIC, RECREATIONAL OR NAVIGATIONAL USES:

The Natural Resources Protection Act (NRPA), in 38 M.R.S. §480-D(1), requires the applicant to demonstrate that the proposed project will not unreasonably interfere with existing scenic, aesthetic, recreational and navigational uses.

In accordance with Chapter 315, *Assessing and Mitigating Impacts to Scenic and Aesthetic Uses* (06-096 C.M.R. ch. 315, effective June 29, 2003), the applicants submitted a copy of the Department's Visual Evaluation Field Survey Checklist as Appendix A to the application along with a description of the property and the proposed project. The applicants also submitted several photographs of the proposed project site and surroundings. Department staff visited the project site on July 1, 2019.

The proposed project is located in Buttermilk Cove, which is a scenic resource visited by the general public, in part, for the use, observation, enjoyment and appreciation of its natural and cultural visual qualities. Nearby properties contain similar residential structures and pier systems. The proposed project will be constructed with similar dimensions and features as surrounding pier systems. The applicants do not propose to remove vegetation along the shoreline to construct the project.

The Department staff utilized the Department's Visual Impact Assessment Matrix in its evaluation of the proposed project and the Matrix showed an acceptable potential visual impact rating for the proposed project. Based on the information submitted in the application, the visual impact rating and the site visit, the Department determined that the location and scale of the proposed activity is compatible with the existing visual quality and landscape characteristics found within the viewshed of the scenic resource in the project area.

The Department finds that the proposed activity will not unreasonably interfere with existing scenic, aesthetic, recreational or navigational uses of the coastal wetland.

3. SOIL EROSION:

The NRPA, in 38 M.R.S. §480-D(2), requires the applicant to demonstrate that the proposed project will not cause unreasonable erosion of soil or sediment nor unreasonably inhibit the natural transfer of soil from the terrestrial to the marine or freshwater environment.

The proposed pier will be constructed from the applicants' property. Pilings for the proposed pier will be pinned to ledge. The proposed ramp and float will be constructed at an off-site location and towed to the project site for installation. Based upon these construction methods, the applicants anticipate that soil disturbance associated with project construction will be minimal.

The Department finds that the activity will not cause unreasonable erosion of soil or sediment nor unreasonably inhibit the natural transfer of soil from the terrestrial to the marine or freshwater environment.

4. HABITAT CONSIDERATIONS:

The NRPA, in 38 M.R.S. §480-D(3), requires the applicant to demonstrate that the proposed project will not unreasonably harm significant wildlife habitat, freshwater wetland plant habitat, threatened or endangered plant habitat, aquatic or adjacent upland habitat, travel corridor, freshwater, estuarine or marine fisheries or other aquatic life.

The intertidal substrate at the proposed project site consists of ledge and mixed coarse and fine sediment. The shoreline is a vegetated, steep slope and contains an existing set of stairs that provides access to the upper intertidal area.

According to the Department's Geographic Information System (GIS) database, there are no mapped Essential or Significant Wildlife Habitats located at the site.

The Department finds that the activity will not unreasonably harm any significant wildlife habitat, freshwater wetland plant habitat, threatened or endangered plant habitat, aquatic or adjacent upland habitat, travel corridor, freshwater, estuarine or marine fisheries or other aquatic life.

5. WATER QUALITY CONSIDERATIONS:

The applicants propose to use lumber treated with chromated copper arsenate (CCA) to construct the proposed project. To protect water quality, all CCA-treated lumber must be cured on dry land in a manner that exposes all surfaces to the air for 21 days prior to the start of construction.

Provided that CCA-treated lumber is cured as described above, the Department finds that the proposed project will not violate any state water quality law, including those governing the classification of the State's waters.

6. WETLANDS AND WATERBODIES PROTECTION RULES:

In order to construct the proposed project, the applicants propose to directly alter approximately four square feet of coastal wetland as a result of pile installation to support the pier. The proposed pier system will indirectly alter 330 square feet of coastal wetland as a result of shading over the resource.

The *Wetlands and Waterbodies Protection Rules*, 06-096 C.M.R. ch. 310 (last amended January 26, 2009), interpret and elaborate on the Natural Resources Protection Act (NRPA) criteria for obtaining a permit. The rules guide the Department in its determination of whether a project's impacts would be unreasonable. A proposed project would generally be found to be unreasonable if it would cause a loss in wetland area, functions and values and there is a practicable alternative to the project that would be less damaging to the environment. Each application for a NRPA permit that involves a coastal wetland alteration must provide an analysis of alternatives in order to demonstrate that a practicable alternative does not exist.

A. Avoidance. An applicant must submit an analysis of whether there is a practicable alternative to the project that would be less damaging to the environment and this analysis is considered by the Department in its assessment of the reasonableness of any impacts. The applicants submitted an alternatives analysis for the proposed project completed by Atlantic Environmental, LLC and dated May 14, 2019. The purpose of the proposed project is to provide the applicants with all-tide recreational access to the resource. As alternative options to the proposed project, the applicant considered the use of the nearest public boat ramp and marina located in the Towns of Brunswick and Harpswell, which are approximately 1.2 miles and 2.6 miles, respectively, from the

project site. The applicants determined that these facilities do not meet their needs as the facilities are consistently congested with boat traffic or have an extensive waiting list for a slip or mooring. The applicants also considered other on-site locations, layouts, and a temporary system to gain access to the coastal wetland. The applicants stated that other locations and layouts on the property would require upland vegetation removal or a longer pier system to access navigable water, resulting in a greater impact to the coastal wetland. In light of these considerations, the applicants stated that there is no other practicable alternative to the proposed project that avoids impact to the resource.

B. Minimal Alteration. In support of an application and to address the analysis of the reasonableness of any impacts of a proposed project, an applicant must demonstrate that the amount of coastal wetland to be altered will be kept to the minimum amount necessary for meeting the overall purpose of the project. The applicants designed the proposed project such that disturbance to the resource is minimal and navigation within the resource remains unobstructed. The applicants intend to construct the project on the point of frontage that contains an existing access towards the resource. This strategy minimizes the amount of disturbance adjacent to the coastal wetland. The applicants stated that the proposed project minimizes impacts to the coastal wetland to the greatest extent practicable.

C. Compensation. In accordance with Chapter 310 Section 5(C)(6)(b), compensation is not required to achieve the goal of no net loss of coastal wetland functions and values since the project will not result in over 500 square feet of fill in the resource, which is the threshold over which compensation is generally required. Further, the proposed project will not have an adverse impact on marine resources or wildlife habitat as determined by the Department. For this reason, the Department determined that compensation is not required.

The Department finds that the applicants have avoided and minimized coastal wetland impacts to the greatest extent practicable, and that the proposed project represents the least environmentally damaging alternative that meets the overall purpose of the project.

7. OTHER CONSIDERATIONS:

The Department finds, based on the design, proposed construction methods, and location, the proposed project will not inhibit the natural transfer of soil from the terrestrial to the marine environment, will not interfere with the natural flow of any surface or subsurface waters, and will not cause or increase flooding. The proposed project is not located in a coastal sand dune system, is not a crossing of an outstanding river segment, and does not involve dredge spoils disposal or the transport of dredge spoils by water.

BASED on the above findings of fact, and subject to the conditions listed below, the Department makes the following conclusions pursuant to 38 M.R.S. §§ 480-A–480-JJ and Section 401 of the Federal Water Pollution Control Act:

A. The proposed activity will not unreasonably interfere with existing scenic, aesthetic, recreational, or navigational uses.

B. The proposed activity will not cause unreasonable erosion of soil or sediment.

C. The proposed activity will not unreasonably inhibit the natural transfer of soil from the terrestrial to the marine or freshwater environment.

D. The proposed activity will not unreasonably harm any significant wildlife habitat, freshwater wetland plant habitat, threatened or endangered plant habitat, aquatic or adjacent upland habitat, travel corridor, freshwater, estuarine, or marine fisheries or other aquatic life.

E. The proposed activity will not unreasonably interfere with the natural flow of any surface or subsurface waters.

F. The proposed activity will not violate any state water quality law including those governing the classifications of the State's waters provided that CCA-treated lumber is cured as described in Finding 5.

G. The proposed activity will not unreasonably cause or increase the flooding of the alteration area or adjacent properties.

H. The proposed activity is not on or adjacent to a sand dune.

I. The proposed activity is not on an outstanding river segment as noted in 38 M.R.S. § 480-P.

THEREFORE, the Department APPROVES the above noted application of GREG and SALLI HINTON to construct a residential pier system as described in Finding 1, SUBJECT TO THE ATTACHED CONDITIONS, and all applicable standards and regulations:

1. Standard Conditions of Approval, a copy attached.

2. The applicants shall take all necessary measures to ensure that their activities or those of their agent do not result in measurable erosion of soil on the site during the construction of the project covered by this approval.

3. Severability. The invalidity or unenforceability of any provision, or part thereof, of this License shall not affect the remainder of the provision or any other provisions. This License shall be construed and enforced in all respects as if such invalid or unenforceable provision or part thereof had been omitted.

4. All CCA-treated lumber shall be cured on dry land in a manner that exposes all surfaces to the air for 21 days prior to the start of construction.

THIS APPROVAL DOES NOT CONSTITUTE OR SUBSTITUTE FOR ANY OTHER REQUIRED STATE, FEDERAL OR LOCAL APPROVALS NOR DOES IT VERIFY COMPLIANCE WITH ANY APPLICABLE SHORELAND ZONING ORDINANCES.

DONE AND DATED IN AUGUSTA, MAINE, THIS 20 DAY OF August, 2019.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: _____
For: Gerald D. Reid, Commissioner

Filed
AUG 20 2019
State of Maine
Board of Environmental Protection

PLEASE NOTE THE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES.

BC/L28323AN/ATS#84562

Natural Resources Protection Act (NRPA)
Standard Conditions

THE FOLLOWING STANDARD CONDITIONS SHALL APPLY TO ALL PERMITS GRANTED UNDER THE NATURAL RESOURCES PROTECTION ACT, 38 M.R.S. § 480-A ET SEQ., UNLESS OTHERWISE SPECIFICALLY STATED IN THE PERMIT.

A. Approval of Variations From Plans. The granting of this permit 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 these plans, proposals, and supporting documents is subject to review and approval prior to implementation.

B. Compliance With All Applicable Laws. The applicant shall secure and comply with all applicable federal, state, and local licenses, permits, authorizations, conditions, agreements, and orders prior to or during construction and operation, as appropriate.

C. Erosion Control. The applicant shall take all necessary measures to ensure that his activities or those of his agents do not result in measurable erosion of soils on the site during the construction and operation of the project covered by this Approval.

D. Compliance With Conditions. Should the project be found, at any time, not to be in compliance with any of the Conditions of this Approval, or should the applicant construct or operate this development in any way other the specified in the Application or Supporting Documents, as modified by the Conditions of this Approval, then the terms of this Approval shall be considered to have been violated.

E. Time frame for approvals. If construction or operation of the activity is not begun within four years, this permit shall lapse and the applicant shall reapply to the Board for a new permit. The applicant may not begin construction or operation of the activity until a new permit is granted. Reapplications for permits may include information submitted in the initial application by reference. This approval, if construction is begun within the four-year time frame, is valid for seven years. If construction is not completed within the seven-year time frame, the applicant must reapply for, and receive, approval prior to continuing construction.

F. No Construction Equipment Below High Water. No construction equipment used in the undertaking of an approved activity is allowed below the mean high water line unless otherwise specified by this permit.

G. Permit Included In Contract Bids. A copy of this permit must be included in or attached to all contract bid specifications for the approved activity.

H. Permit Shown To Contractor. Work done by a contractor pursuant to this permit shall not begin before the contractor has been shown by the applicant a copy of this permit.

DEP INFORMATION SHEET

Appealing a Department Licensing Decision

Dated: November 2018 **Contact: (207) 287-2452**

SUMMARY

There are two methods available to an aggrieved person seeking to appeal a licensing decision made by the Department of Environmental Protection's (DEP) Commissioner: (1) an administrative process before the Board of Environmental Protection (Board); or (2) a judicial process before Maine's Superior Court. An aggrieved person seeking review of a licensing decision over which the Board had original jurisdiction may seek judicial review in Maine's Superior Court.

A judicial appeal of final action by the Commissioner or the Board regarding an application for an expedited wind energy development (35-A M.R.S. § 3451(4)) or a general permit for an offshore wind energy demonstration project (38 M.R.S. § 480-HH(1)) or a general permit for a tidal energy demonstration project (38 M.R.S. § 636-A) must be taken to the Supreme Judicial Court sitting as the Law Court.

This information sheet, in conjunction with a review of the statutory and regulatory provisions referred to herein, can help a person to understand his or her rights and obligations in filing an administrative or judicial appeal.

I. ADMINISTRATIVE APPEALS TO THE BOARD

LEGAL REFERENCES

The laws concerning the DEP's *Organization and Powers*, 38 M.R.S. §§ 341-D(4) & 346; the *Maine Administrative Procedure Act*, 5 M.R.S. § 11001; and the DEP's *Rules Concerning the Processing of Applications and Other Administrative Matters* ("Chapter 2"), 06-096 C.M.R. ch. 2.

DEADLINE TO SUBMIT AN APPEAL TO THE BOARD

The Board must receive a written appeal within 30 days of the date on which the Commissioner's decision was filed with the Board. Appeals filed more than 30 calendar days after the date on which the Commissioner's decision was filed with the Board will be dismissed unless notice of the Commissioner's license decision was required to be given to the person filing an appeal (appellant) and the notice was not given as required.

HOW TO SUBMIT AN APPEAL TO THE BOARD

Signed original appeal documents must be sent to: Chair, Board of Environmental Protection, 17 State House Station, Augusta, ME 04333-0017. An appeal may be submitted by fax or e-mail if it contains a scanned original signature. It is recommended that a faxed or e-mailed appeal be followed by the submittal of mailed original paper documents. The complete appeal, including any attachments, must be received at DEP's offices in Augusta on or before 5:00 PM on the due date; materials received after 5:00 pm are not considered received until the following day. The risk of material not being received in a timely manner is on the sender, regardless of the method used. The appellant must also send a copy of the appeal documents to the Commissioner of the DEP; the applicant (if the appellant is not the applicant in the license proceeding at issue); and if a hearing was held on the application, any intervenor in that hearing process. All of the information listed in the next section of this information sheet must be submitted at the time the appeal is filed.

INFORMATION APPEAL PAPERWORK MUST CONTAIN

Appeal materials must contain the following information at the time the appeal is submitted:

1. *Aggrieved Status*. The appeal must explain how the appellant has standing to maintain an appeal. This requires an explanation of how the appellant may suffer a particularized injury as a result of the Commissioner's decision.
2. *The findings, conclusions, or conditions objected to or believed to be in error.* The appeal must identify the specific findings of fact, conclusions regarding compliance with the law, license conditions, or other aspects of the written license decision or of the license review process that the appellant objects to or believes to be in error.
3. *The basis of the objections or challenge.* For the objections identified in Item #2, the appeal must state why the appellant believes that the license decision is incorrect and should be modified or reversed. If possible, the appeal should cite specific evidence in the record or specific licensing requirements that the appellant believes were not properly considered or fully addressed.
4. *The remedy sought.* This can range from reversal of the Commissioner's decision on the license or permit to changes in specific permit conditions.
5. *All the matters to be contested*. The Board will limit its consideration to those matters specifically raised in the written notice of appeal.
6. *Request for hearing.* If the appellant wishes the Board to hold a public hearing on the appeal, a request for public hearing must be filed as part of the notice of appeal, and must include an offer of proof in accordance with Chapter 2. The Board will hear the arguments in favor of and in opposition to a hearing on the appeal and the presentations on the merits of an appeal at a regularly scheduled meeting. If the Board decides to hold a public hearing on an appeal, that hearing will then be scheduled for a later date.
7. *New or additional evidence to be offered.* If an appellant wants to provide evidence not previously provided to DEP staff during the DEP's review of the application, the request and the proposed evidence must be submitted with the appeal. The Board may allow new or additional evidence, referred to as supplemental evidence, to be considered in an appeal only under very limited circumstances. The proposed evidence must be relevant and material, and (a) the person seeking to add information to the record must show due diligence in bringing the evidence to the DEP's attention at the earliest possible time in the licensing process; or (b) the evidence itself must be newly discovered and therefore unable to have been presented earlier in the process. Specific requirements for supplemental evidence are found in Chapter 2 § 24.

OTHER CONSIDERATIONS IN APPEALING A DECISION TO THE BOARD

1. *Be familiar with all relevant material in the DEP record.* A license application file is public information, subject to any applicable statutory exceptions, and is made easily accessible by the DEP. Upon request, the DEP will make application materials available during normal working hours, provide space to review the file, and provide an opportunity for photocopying materials. There is a charge for copies or copying services.
2. *Be familiar with the regulations and laws under which the application was processed, and the procedural rules governing your appeal.* DEP staff will provide this information on request and answer general questions regarding the appeal process.
3. *The filing of an appeal does not operate as a stay to any decision.* If a license has been granted and it has been appealed, the license normally remains in effect pending the processing of the appeal. Unless a stay of the decision is requested and granted, a license holder may proceed with a project pending the outcome of an appeal, but the license holder runs the risk of the decision being reversed or modified as a result of the appeal.

WHAT TO EXPECT ONCE YOU FILE A TIMELY APPEAL WITH THE BOARD

The Board will formally acknowledge receipt of an appeal, and will provide the name of the DEP project manager assigned to the specific appeal. The notice of appeal, any materials accepted by the Board Chair as supplementary evidence, any materials submitted in response to the appeal, and relevant excerpts from the DEP's application review file will be sent to Board members with a recommended decision from DEP staff. The appellant, the license holder if different from the appellant, and any interested persons are notified in advance of the date set for Board consideration of an appeal or request for public hearing. The appellant and the license holder will have an opportunity to address the Board at the Board meeting. With or without holding a public hearing, the Board may affirm, amend, or reverse a Commissioner decision or remand the matter to the Commissioner for further proceedings. The Board will notify the appellant, the license holder, and interested persons of its decision.

II. JUDICIAL APPEALS

Maine law generally allows aggrieved persons to appeal final Commissioner or Board licensing decisions to Maine's Superior Court (see 38 M.R.S. § 346(1); 06-096 C.M.R. ch. 2; 5 M.R.S. § 11001; and M.R. Civ. P. 80C). A party's appeal must be filed with the Superior Court within 30 days of receipt of notice of the Board's or the Commissioner's decision. For any other person, an appeal must be filed within 40 days of the date the decision was rendered. An appeal to court of a license decision regarding an expedited wind energy development, a general permit for an offshore wind energy demonstration project, or a general permit for a tidal energy demonstration project may only be taken directly to the Maine Supreme Judicial Court. See 38 M.R.S. § 346(4).

Maine's Administrative Procedure Act, DEP statutes governing a particular matter, and the Maine Rules of Civil Procedure must be consulted for the substantive and procedural details applicable to judicial appeals.

ADDITIONAL INFORMATION

If you have questions or need additional information on the appeal process, for administrative appeals contact the Board's Executive Analyst at (207) 287-2452, or for judicial appeals contact the court clerk's office in which your appeal will be filed.

Note: The DEP provides this INFORMATION SHEET for general guidance only; it is not intended for use as a legal reference. Maine law governs an appellant's rights.

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO ATTENTION OF

MAINE GENERAL PERMIT (GP)
AUTHORIZATION LETTER AND SCREENING SUMMARY

GREG & SALLI HINTON
1633 SE 9TH TERRACE
CAPE CORAL, FLORIDA 33094

CORPS PERMIT # NAE-2019-01300
CORPS GP ID# 19-320
STATE ID# L-28323-4P-A-N

DESCRIPTION OF WORK:
To construct and maintain a 2' x 16' access ramp above the mean high water line; to construct and maintain a 6' x 16' pile supported pier leading to a 3' x 36' ramp with a 16' x 10' float below the mean high water line of Buttermilk Cove off 98 Toads Landing, Map 36 Lot#28 at Brunswick, Maine as described on the state of Maine NRPA application entitled "Greg and Salli Hinton" as shown on plans on 2 sheets dated "05-14-2019". ADDITIONAL CONDITIONS: SEE ATTACHED SHEET

LAT/LONG COORDINATES: 43.858444°N N -69.918099°W W **USGS QUAD:** ORRS ISLAND, MAINE

I. CORPS DETERMINATION:
Based on our review of the information you provided, we have determined that your project will have only minimal individual and cumulative impacts on waters and wetlands of the United States. **Your work is therefore authorized by the U.S. Army Corps of Engineers under the enclosed Federal Permit, the Maine General Permit (GP).** Accordingly, we do not plan to take any further action on this project.

You must perform the activity authorized herein in compliance with all the terms and conditions of the GP [including any attached Additional Conditions and any conditions placed on the State 401 Water Quality Certification including any required mitigation]. Please review the enclosed GP carefully, including the GP conditions beginning on page 5, to familiarize yourself with its contents. You are responsible for complying with all of the GP requirements; therefore you should be certain that whoever does the work fully understands all of the conditions. You may wish to discuss the conditions of this authorization with your contractor to ensure the contractor can accomplish the work in a manner that conforms to all requirements.

If you change the plans or construction methods for work within our jurisdiction, please contact us immediately to discuss modification of this authorization. This office must approve any changes before you undertake them.

Condition 37 of the GP (page 16) provides one year for completion of work that has commenced or is under contract to commence prior to the expiration of the GP on October 13, 2020. You will need to apply for reauthorization for any work within Corps jurisdiction that is not completed by October 13, 2021.

This authorization presumes the work shown on your plans noted above is in waters of the U.S. Should you desire to appeal our jurisdiction, please submit a request for an approved jurisdictional determination in writing to the undersigned.

No work may be started unless and until all other required local, State and Federal licenses and permits have been obtained. **This includes but is not limited to a Flood Hazard Development Permit issued by the town if necessary.**

II. STATE ACTIONS: PENDING [X], ISSUED [ ], DENIED [ ] DATE_____

APPLICATION TYPE: PBR:___, TIER 1:____, TIER 2:____, TIER 3: X, LURC:____ DMR LEASE:____ NA:____

III. FEDERAL ACTIONS:

JOINT PROCESSING MEETING: 05/23/2019 LEVEL OF REVIEW: CATEGORY 1:_____ CATEGORY 2: X

AUTHORITY (Based on a review of plans and/or State/Federal applications): SEC 10 X, 404_____ 10/404_____, 103_____

EXCLUSIONS: The exclusionary criteria identified in the general permit do not apply to this project.

FEDERAL RESOURCE AGENCY OBJECTIONS: EPA NO, USF&WS NO, NMFS NO

If you have any questions on this matter, please contact my staff at 207-623-8367 at our Augusta, Maine Project Office. In order for us to better serve you, we would appreciate your completing our Customer Service Survey located at http://per2.nwp.usace.army.mil/survey.html

NEAL.LEEANN.B.1239504007 Digitally signed by NEAL.LEEANN.B.1239504007 Date: 2019.06.07 13:04:11 -04'00'

LEEANN B. NEAL
SENIOR PROJECT MANAGER
MAINE PROJECT OFFICE

6/12/19

LINDSEY E. LEFEBVRE **DATE**
CHIEF, PERMITS & ENFORCEMENT BRANCH
REGULATORY DIVISION

US Army Corps
of Engineers ®
New England District

PLEASE NOTE THE FOLLOWING ADDITIONAL CONDITIONS FOR
DEPARTMENT OF THE ARMY
GENERAL PERMIT
NO. NAE-2019-01300

1. The permittee shall assure that a copy of this permit is at the work site whenever work is being performed and that all personnel performing work at the site of the work authorized by this permit are fully aware of the terms and conditions of the permit. This permit, including its drawings and any appendices and other attachments, shall be made a part of any and all contracts and sub-contracts for work which affects areas of Corps of Engineers' jurisdiction at the site of the work authorized by this permit. This shall be done by including the entire permit in the specifications for the work. If the permit is issued after construction specifications but before receipt of bids or quotes, the entire permit shall be included as an addendum to the specifications. The term "entire permit" includes permit amendments. Although the permittee may assign various aspects of the work to different contractors or sub-contractors, all contractors and sub-contractors shall be obligated by contract to comply with all environmental protection provisions of the entire permit, and no contract or sub-contract shall require or allow unauthorized work in areas of Corps of Engineers jurisdiction.

2. The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

3. This permit for a pier, ramp, float and flip up float does not eliminate the need to obtain local harbormaster approval or conform to local harbor management plans. If, in the best interest of overall navigation and under harbormaster direction, it becomes necessary to relocate the structures, prior written authorization from the Corps is not required. If relocation occurs, the permittee shall provide the Corps with a copy of the harbormaster approval and a plan and coordinates depicting the new location of the structure(s).

4. Pile installation shall adhere to one of the 4 methods in (i) –(iv) below:
   - **i.** Piles installed in-the-dry during low water or in-water between Nov. 8th - Apr. 9th, or
   - **ii.** Must be drilled and pinned to ledge, or
   - **iii.** Vibratory hammers used to install any size and quantity of wood, concrete or steel piles, or
   - **iv.** Impact hammers limited to one hammer and <50 piles installed/day with the following: wood piles of any size, concrete piles ≤18-inches diameter, steel piles <12-inches diameter if the hammer is ≤3000 lbs and a wood cushion is used between the hammer and steel pile.

   For (ii) – (iv) above:
   - **i.** In-water noise levels shall not exceed >187dB SEL re 1µPa or 206dB peak re 1µPa at a distance >10m from the pile being installed., and
   - **ii.** In-water noise levels >155dB peak re 1µPa shall not exceed 12 consecutive hours on any given day and a 12 hour recovery period (i.e., in-water noise below 155dB peak re 1µPa) must be provided between work days.

5. Any pier or ramp that extends across tidal marsh shall be elevated above the marsh by 1' in height for each foot in width. Example: A 3' wide ramp shall be elevated 3' above the marsh. Note that the height shall be measured from the marsh substrate to the bottom of the longitudinal support beam of the pier or ramp (e.g. the bottom of the stringer) and not to the top of the deck.

6. Any float(s) that do not extend beyond mean low water shall be constructed in such a way as to keep them elevated a minimum of 18" above the tidal bottom. Techniques include but are not limited to float stops, skids, blocks, or other practicable means.

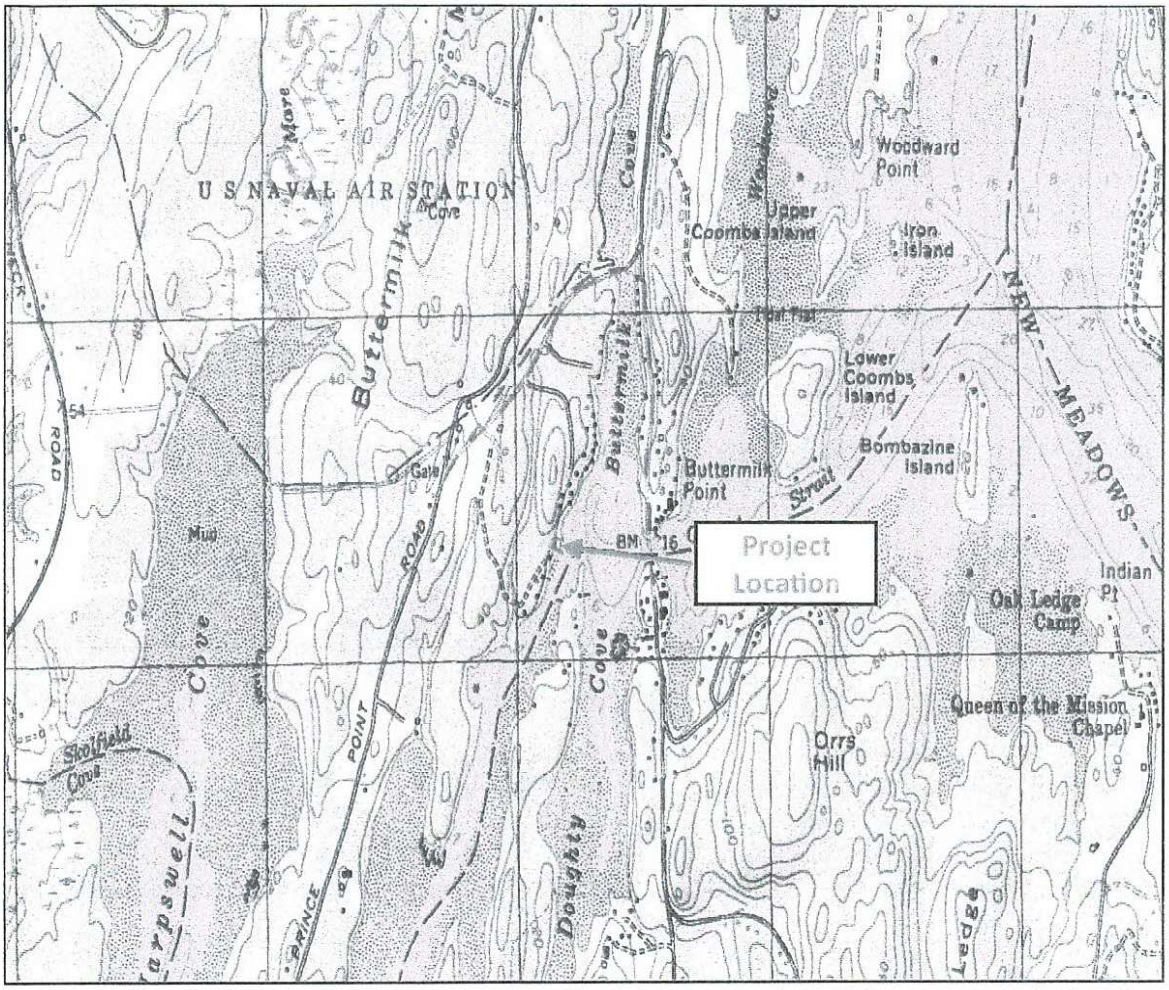
7. Seasonal coastal structures such as ramps and floats that are removed from the waterway for a portion of the year shall be stored in an upland location above mean high water and not on mud flats or tidal marsh.

8. The permittee must still obtain any other Federal, State, or local permits as required by law before beginning work.

9. This authorization requires you to 1) notify us before beginning work so we may inspect the project, and 2) submit a Compliance Certification Form. You must complete and return the enclosed Work Start Notification Form(s) to this office at least two weeks before the anticipated starting date. You must complete and return the enclosed Compliance Certification Form within one month following the completion of the authorized work and any required mitigation (but not mitigation monitoring, which requires separate submittals).

EXHIBIT 3.0: LOCATION MAP

Greg and Salli Hinton, 98 Toads Landing, Brunswick, Maine



Directions: From Cook's Corner in Brunswick, turn right on Route 24 and travel for approximately 3.0 miles. Turn right onto Prince's Point Road and travel for approximately 0.5 miles. Turn left on Toads Landing and travel for approximately 0.5 miles. #98 is located on the right.

Notes:	ATLANTIC ENVIRONMENTAL LLC. Environmental Consultants 135 River Road, Woolwich, ME 04579 (207) 837-2199 tim@atlanticenviromaine.com	
Maine Atlas & Gazetteer Map 6 (Section D-3) 43.858355 -69.918097	Date: 5/14/2019	DWG Name: Hinton Site Location

ATLANTIC Environmental LLC

Town of
BRUNSWICK
Maine

Legend

- Other Road
- Hydrography Line
- ROW Property Access
- Town Boundary
- Other Lot Boundary
- Parcels_Lines
- Public Road
- Private Road
- ROW
- Water

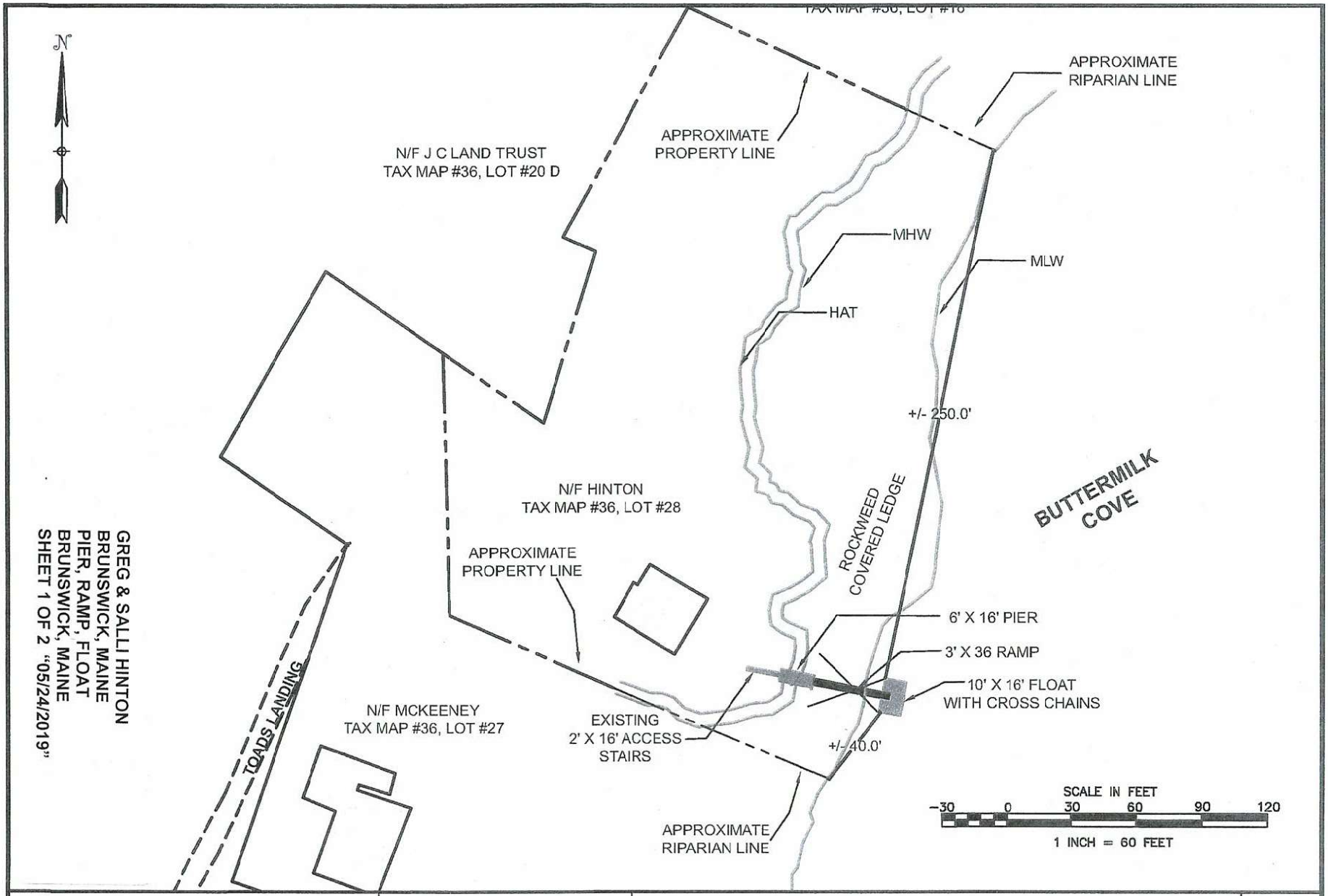
Disclaimer:
The information is provided as a reasonably accurate point of reference, but is not guaranteed and is not to be used for conveyances.
The Town of Brunswick shall not be held responsible for the accuracy or misuse of this data.
Copyright Town of Brunswick.

1 inch = 300 feet

Revised To: April 1, 2017

Maps Prepared by:
Town of Brunswick

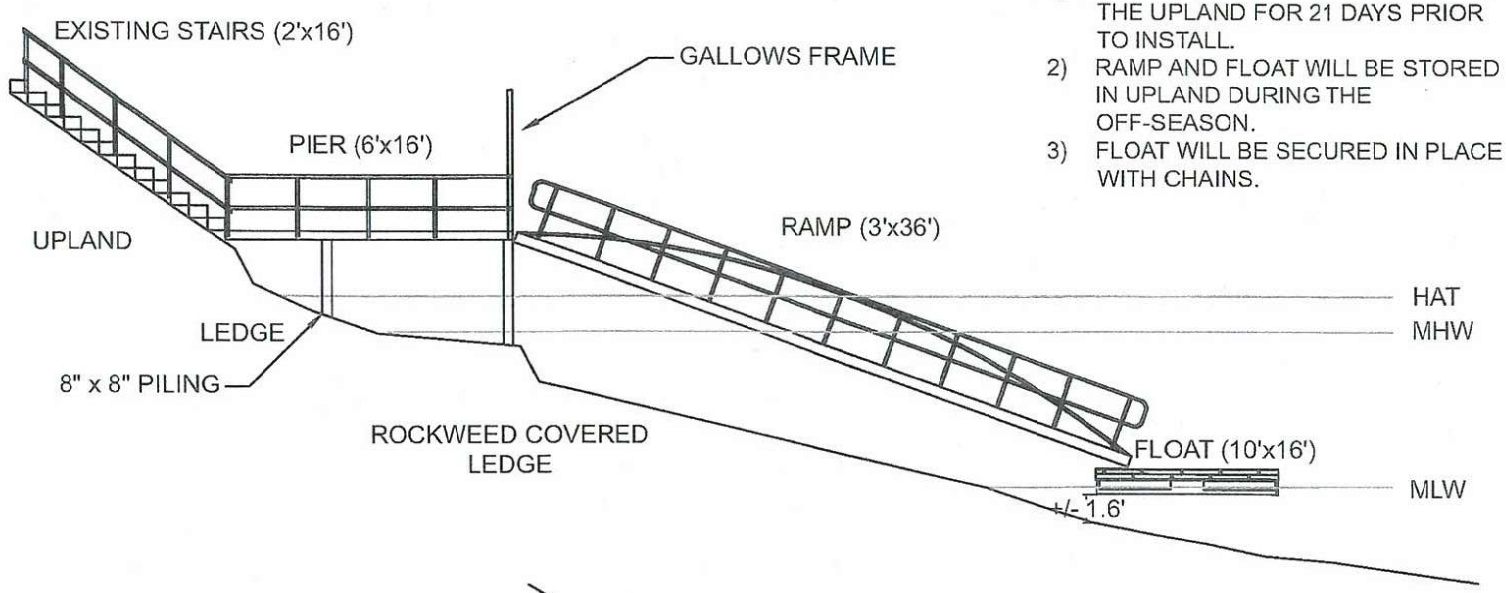
MAP
36

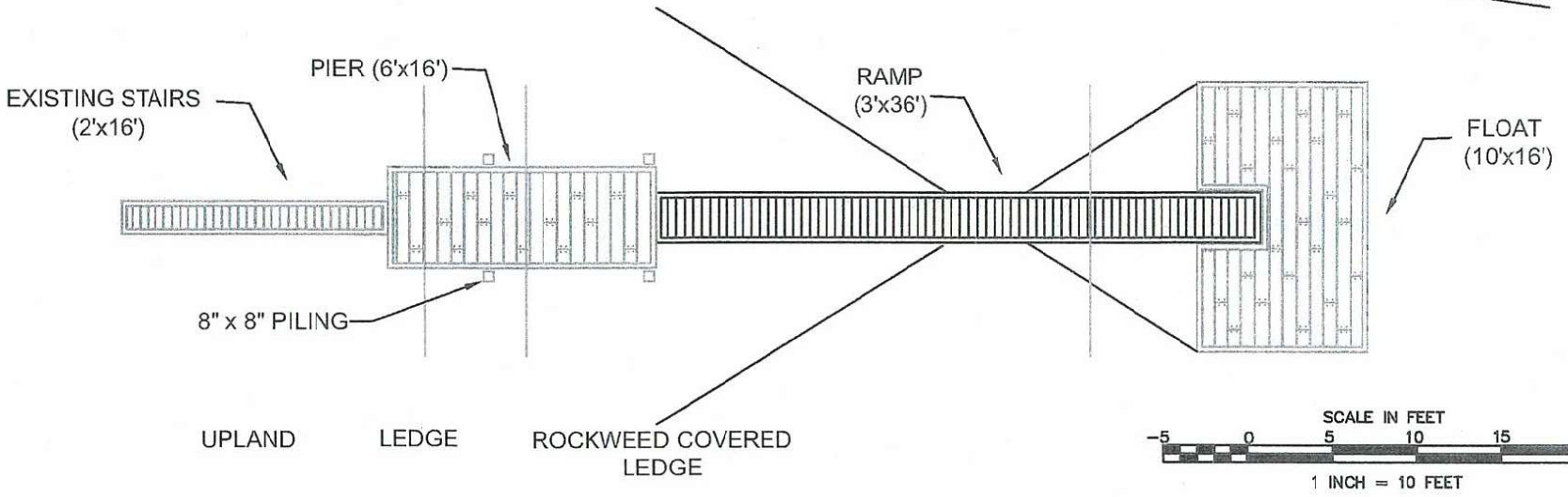


GREG & SALLI HINTON
BRUNSWICK, MAINE
PIER, RAMP, FLOAT
BRUNSWICK, MAINE
SHEET 1 OF 2 "05/24/2019"

ATLANTIC ENVIRONMENTAL LLC. Environmental Consultants 135 River Road, Woolwich, ME 04579 (207) 837-2199 tim@atlanticenviromaine.com	Date: 5/14/2019 Revised: Project: Hinton, Brunswick Drafted By: LCV	Plan View of the proposed Pier, Ramp and Float for Greg and Salli Hinton located at 98 Toads Landing in Brunswick, Maine.	Sheet 1 of 2

NOTES:
1) ALL PT LUMBER WILL BE CURED IN THE UPLAND FOR 21 DAYS PRIOR TO INSTALL.
2) RAMP AND FLOAT WILL BE STORED IN UPLAND DURING THE OFF-SEASON.
3) FLOAT WILL BE SECURED IN PLACE WITH CHAINS.





GREG & SALLI HINTON
BRUNSWICK, MAINE
PIER, RAMP, FLOAT
BRUNSWICK, MAINE
SHEET 2 OF 2 "05/24/2019"

ATLANTIC ENVIRONMENTAL LLC. Environmental Consultants 135 River Road, Woolwich, ME 04579 (207) 837-2199 tim@atlanticenviromaine.com	Date: 5/10/2019 Revised: Project: Hinton, Brunswick Drafted By: TAF/LCV	Plan View and Cross Section View of the Proposed Pier, Ramp and Float for Greg and Salli Hinton located at 98 Toads Landing in Brunswick, Maine.	Sheet 2 of 2

US Army Corps
of Engineers ®
New England District

GENERAL PERMIT
WORK-START NOTIFICATION FORM

MAIL TO: LeeAnn Neal
U.S. Army Corps of Engineers, New England District
Maine Project Office
442 Civic Center Drive, Suite 350
Augusta, Maine 04330

A Corps of Engineers Permit (**NAE-2019-01300**) was issued to Greg & Salli Hinton. The permit authorized the permittee(s) To construct and maintain a 2' x 16' access ramp above the mean high water line; to construct and maintain a 6' x 16' pile supported pier leading to a 3' x 36' ramp with a 16' x 10' float below the mean high water line of Buttermilk Cove off 98 Toads Landing, Map 36 Lot#28 at Brunswick, Maine.

The people (e.g., contractor) listed below will do the work, and they understand the permit's conditions and limitations.

PLEASE PRINT OR TYPE

Name of Person/Firm: _____

_____

_____

Business Address: _____

_____

_____

Telephone: (____) _____ (____) _____

Proposed Work Dates: Start: _____

Finish: _____

PERMITTEE'S SIGNATURE: _____ DATE: _____

PRINTED NAME: _____ TITLE: _____

FOR USE BY THE CORPS OF ENGINEERS

PM **NEAL** Submittals Required: **No.**

Inspection Recommendation: Random MEGP compliance

US Army Corps
of Engineers ®
New England District

(Minimum Notice: Permittee must sign and return notification within one month of the completion of work.)

COMPLIANCE CERTIFICATION FORM

Corps of Engineers Permit No: NAE-2019-01300

Name of Permittee: Greg & Salli Hinton

Permit Issuance Date: _____

Please sign this certification and return it to the following address upon completion of the activity and any mitigation required by the permit. You must submit this after the mitigation is complete, but not the mitigation monitoring, which requires separate submittals.

****
* MAIL TO: U.S. Army Corps of Engineers, New England District *
* Policy & Technical Support Branch *
* Regulatory Division *
* 696 Virginia Road *
* Concord, Massachusetts 01742-2751 *
****

Please note that your permitted activity is subject to a compliance inspection by an U.S. Army Corps of Engineers representative. If you fail to comply with this permit you are subject to permit suspension, modification, or revocation.

I hereby certify that the work authorized by the above referenced permit was completed in accordance with the terms and conditions of the above referenced permit, and any required mitigation was completed in accordance with the permit conditions.

_____ _____
Signature of Permittee Date

_____ _____
Printed Name Date of Work Completion

( ) _____ ( ) _____
Telephone Number Telephone Number

TOWN OF BRUNSWICK, MAINE
INCORPORATED 1739
DEPARTMENT OF PLANNING AND DEVELOPMENT
85 UNION STREET
BRUNSWICK, ME 04011

MATT PANFIL, AICP CUD
DIRECTOR OF PLANNING & DEVELOPMENT

PHONE: 207-725-6660
FAX: 207-725-6663

MEMORANDUM

TO: The Planning Board
FROM: Jared Woolston, AICP
DATE: February 21, 2020 (meeting date February 24, 2020)
RE: Sketch Plan Review Marijuana Store, 4 Business Parkway (Case #20-008)

DRAFT MOTIONS
SKETCH PLAN – MAJOR DEVELOPMENT REVIEW
MARIJUANA STORE, 4 BUSINESS PARKWAY
CASE # 20-008

Staff has reviewed the Sketch Plan application and determined that it is complete.

DRAFT Motion 1. That the Board deems the Sketch Plan to be complete.

The proposed development is the construction of a new 3,100 square foot marijuana store on 4 Business Parkway. The subject lot (Map 17, Lot 66) is within the GI (Growth Industrial) Zoning District. The Staff Review Committee (SRC) reviewed the project on February 12, 2020. The notes for the SRC meeting are included in the packet. Based on the available material and the scope of sketch plan review for dimensional and density standards, staff advise the proposed development meets the applicable zoning district and overlay zoning district dimensional standards.

A Sketch Plan of the proposed development was prepared by Sitelines for GJoris LLC on Plan Sheet 1 entitled, "Site Layout Plan" most recently revised on February 4, 2020. Staff advised the applicant to review the applicable development review standards that may require modifications to the dimensions of the parking lot, pedestrian access ways, and orientation of the development for the final plan review. Further, the applicant was advised to reduce the parking lot dimensions where possible and review vehicular traffic generation for any significant increases near the proposed use.

The proposed use will require a Conditional Use Permit. While the Conditional Use Permit standards are not applicable to sketch plan review, staff advised the applicant's agent to discuss any anticipated issues with the Conditional Use Permit standards with the Planning Board.

The following is an excerpt from page 5-9 of the Brunswick Zoning Ordinance:

The following Criteria shall be applied, by the Planning Board when considering an application for a Conditional Use Permit. The burden of proof of compliance with these standards rests with the applicant.

(1) The proposed structure and site design comply with all standards of this Ordinance applicable to the zoning district and any overlay district within which the property is located.
(2) The proposed use will not create significantly more vehicular traffic by patrons, residents, or suppliers than the uses and structure currently within 300 feet of the proposed use or structure that generates the most vehicular traffic;
(3) The proposed use will not operate or require deliveries earlier in the morning, or later
(4) at night, than the uses and structures currently within 300 feet of the proposed use or structure that operate earliest in the morning and latest at night.
(5) The proposed use shall not create any more adverse impacts on any current use or structure within 300 feet of the lot on which the proposed use or structure would be located.
(6) The application shall further the planning goals of the adopted Town of Brunswick 2008
(7) Comprehensive Plan, as amended, including but not limited to the planning goals for the Planning Area (Appendix A - Planning Areas) in which the property is located.

Motion 2. That the Board approves the Sketch Plan.

MAJOR DEVELOPMENT REVIEW
SKETCH PLAN APPLICATION

MARIJUANA STORE – ADULT USE

TAX MAP 17, LOT 66
4 BUSINESS PARKWAY
BRUNSWICK, MAINE

February 4, 2020

Prepared For

GJORIS LLC
135 Maine Street, Suite 129
Brunswick, Maine 04011

Prepared By

119 Purinton Road, Suite A, Brunswick Landing, Brunswick, ME 04011
207-725-1200 ▪ www.sitelinespa.com

SITELINES
Civil Engineers • Land Surveyors

February 4, 2020

3781.02-7

Jared Woolston, Planner
Town of Brunswick
85 Union Street
Brunswick, Maine 04011

RE: **Major Development Review Sketch Application**
Marijuana Store – Adult Use
4 Business Parkway, Brunswick, Maine
Tax Map 17, Lot 66

Dear Jared:

On behalf of GJoris LLC, Sitelines PA is pleased to submit the enclosed Sketch Plan Application, drawings, and supporting materials for the development of single-story commercial building with associated parking, infrastructure, and landscaping to be located at 4 Business Parkway in Brunswick. This letter is intended to summarize the project in order to facilitate the review process.

PROPERTY

GJoris LLC owns a parcel of land currently identified as Tax Map 17, Lot 66. The parcel contains approximately 2.92 acres and has frontage on Business Parkway, a public road. The property is located within the Growth Industrial (GI) zoning district in which marijuana store is a conditional use. The site is currently undeveloped and consists of a mix of meadow and woodland.

As part of the Industrial Park Expansion, which included the construction of Business Parkway and four commercial lots, a Site Location of Development Act permit (#L-6773-39-L-A) was obtained from the Maine Department of Environmental Protection (MDEP). As part of that permit, each commercial lot was approved with impervious area and wetland fill totals. For the subject property (known as Lot 2 on MDEP permit) was approved for 1.70 acres of impervious area and 2,215 s.f. (0.05 acres) of wetland alteration. It is anticipated that the project will result in approximately 37,333 s.f. (0.86 acres) of impervious area and less than 835 s.f. (0.02 acres) of wetland alteration.

As part of the Industrial Park Expansion, a Traffic Movement Permit was obtained from the Maine Department of Transportation (MaineDOT) that allocated a certain number of trips to the properties located off Business Parkway. Diane Morabito with Sewall is currently coordinating with MaineDOT to determine what, if any, permit modifications are required due to the project.

PROJECT DESCRIPTION

The proposed project consists of the construction of a 3,100 s.f. footprint single-story commercial building that will be utilized for a marijuana retail store. The project will include 65 parking spaces, with an additional twenty (20) potential parking spaces that can be added in the future if necessary. The site will be accessed via a new entrance off Business Parkway. The proposed building will be served via public water, public sewer, and underground electric. As part of the construction of Business Parkway, sewer and water service stubs were extended to the property. It is anticipated that these stubs will be utilized for the building. Stormwater runoff from the project will be directed to the drainage ditch along Business Parkway which ultimate discharges to a stormwater pond located at the end of Business Parkway.

A wetland delineation has been previously completed for the property and indicated forested wetlands in the rear of the property. As the wetland delineation is more than five (5) years old, an updated wetlands delineation will need to be completed as part of the project approval process.

Although located within an existing Industrial park, the applicant intends for the proposed building to be visually appealing and be the focal point of the project. They are currently developing architectural elevations for the building which will be provided as part of the final plan application. A copy of the preliminary floor plan has been enclosed with this submission.

SUMMARY

We trust that this information satisfactorily addresses the requirements for Sketch Plan Review, and we look forward to meeting with you and the Planning Board at their February 25, 2020 meeting.

We appreciate your assistance with this project. Should you have any questions, please call or contact me via jmarden@sitelinespa.com.

Very truly yours,

Joseph J. Marden, P.E.
Project Manager

Enclosures

STATE OF MAINE
JOSEPH J. MARDEN
No. 12828
LICENSED PROFESSIONAL ENGINEER

SITELINES
Civil Engineers • Land Surveyors

DEVELOPMENT REVIEW APPLICATION

1. Development Review application type (refer to **Appendix D**):

☐	**Minor Development Review**
✓	Major Development Review: **Sketch Plan**
☐	Major Development Review: **Final Plan**
☐	Major Development Review: **Streamlined Final Plan**

2. Project Name: Marijuana Store - Adult Use

3. Project Applicant
   - Name: Gjoris LLC
   - Address: 135 Maine Street, Suite 129, Brunswick, Maine 04011
   - Phone Number: (207)-239-4189
   - Email: docfoglight@gmail.com

4. Project Owner (if different than applicant)
   - Name: Same as Application
   - Address:
   - Phone Number:
   - Email:

5. Authorized Representative
   - Name: Sitelines, PA, Attn: Joseph Marden, PE
   - Address: 119 Purinton Road, Suite A, Brunswick, Maine 04011
   - Phone Number: (207)-725-1200 ext. 12
   - Email: jmarden@sitelinespa.com

6. List of Design Consultants. Indicate the registration number, address and phone number, email for any additional project engineers, surveyors, architects, landscape architects or planners:
   1. Engineering & Surveying: Sitelines PA
   2.
   3.

7. Physical location of property: 4 Business Parkway

8. Lot Size: 2.92 Acres

9. Zoning District: Growth Industrial (GI)

10. Overlay Zoning District(s): None

11. Indicate the interest of the applicant in the property and abutting property. For example, is the applicant the owner of the property and abutting property? If not, who owns the property subject to this application?
Owner

12. Assessor's Tax Map 17 Lot Number 66 of subject property.

13. Brief description of proposed use/subdivision: Refer to Cover Letter

14. Describe specific physical improvements to be done: Refer to Cover Letter

Owner Signature:

Applicant Signature (*if different*):

AS AGENT

DEVELOPMENT REVIEW APPLICATION REQUIREMENTS

The submission requirements contained in **Appendix D** of the Brunswick Zoning Ordinance (attached in checklist format for each application category) shall apply to all Minor Development, Major Development, and Streamlined Major Development Review unless a waiver is granted. Proposed development applications shall be submitted to the Director of Planning and Development.

For each item listed in Appendix D the applicant shall either submit the requested information or request a waiver from the information requirement pursuant to Subsection 5.2.9.M of the Zoning Ordinance.

REQUIREMENTS FOR SKETCH PLAN APPLICATION SUBMITTAL		Sketch Plan
General	Application form and fee	X
	Name of development	X
	Existing zoning district and overlay designations	X
	Location map	X
	Location of features, natural and artificial, such as water bodies, wetlands, streams, important habitats, vegetation, railroads, ditches and buildings	X
	Documentation of Right, Title and Interest	X
	Draft performance guarantee or conditional agreement	N/A
Survey, Topography, & Existing Conditions	Scale, date, north point, and area	X
	Existing easements associated with the development	X
	Existing locations of sidewalks	X
	Approximate locations of dedicated public open space, areas protected by conservation easements and recreation areas	N/A
	When applicable, a table indicating the maximum number of lots permitted based upon the applicable dimensional requirements, the number of lots proposed, and the number of lots permitted to be further subdivided.	N/A
	Building envelopes showing acceptable locations for principal and accessory structures, setbacks and impervious coverage	X
Proposed Development Plan	Number of lots if a subdivision	N/A

SITELINES
Civil Engineers • Land Surveyors

January 31, 2020

3781.02-2

Mr. Michael DiPersia
GJoris LLC
135 Maine Street, Suite 129
Brunswick, Maine 04011
<via email>

Re: Designation of Agent Authorization
Marijuana Store – Adult Use
4 Business Parkway, Brunswick, Maine
Tax Map 17, Lot 66

Dear Michael:

As required by various approval agencies, please indicate by signing below that Sitelines, PA is authorized to act as agent for GJoris LLC, for the specific purpose of preparation and submission of local and state permitting applications on your behalf for the proposed marijuana store to be located at 4 Business Parkway in Brunswick, Maine.

Sincerely,

Joseph J. Marden, P.E.
Project Manager

The undersigned hereby gives Sitelines, PA the authority to act as agent for GJoris LLC for the specific purpose of preparation and submission of local and state permitting applications for the project specifically identified above.

GJoris LLC By Michael DiPersia 2/3/2020

Michael DiPersia, GJoris LLC Date

State of Maine

Department of the Secretary of State

I, the Secretary of State of Maine, certify that according to the provisions of the Constitution and Laws of the State of Maine, the Department of the Secretary of State is the legal custodian of the Great Seal of the State of Maine which is hereunto affixed and that the paper to which this is attached is a true copy from the records of this Department.

In testimony whereof, I have caused the Great Seal of the State of Maine to be hereunto affixed. Given under my hand at Augusta, Maine, this twenty-ninth day of January 2020.

Matthew Dunlap
Secretary of State

Additional Addresses

Legal Name	Title	Name	Charter #	Status
GJORIS LLC	Registered Agent	DREW A. ANDERSON	20192995DC	GOOD STANDING

Home Office Address (of foreign entity)	Other Mailing Address
	75 PEARL STREET PORTLAND, ME 04101

DLN: 1001940058058

QUITCLAIM DEED WITH COVENANT

(Statutory Short Form)

MAINE REAL ESTATE TAX PAID

KNOW ALL MEN BY THESE PRESENTS, that **ALLIED COMPOSITE CENTER, LLC**, a Maine limited liability company with offices at 2 Main Street, Topsham, Maine, in consideration of One Dollar and other valuable consideration paid by **GJORIS LLC**, a Maine limited liability company with a principal place of business at 8 Business Parkway, Brunswick, Maine, the receipt whereof is hereby acknowledged, does hereby REMISE, RELEASE, BARGAIN, SELL AND CONVEY and forever QUITCLAIM unto the said **GJORIS LLC**, its successors and assigns forever, WITH QUITCLAIM COVENANT, the following described real estate located in the Town of Brunswick, County of Cumberland and State of Maine:

All that property described in **Exhibit A** attached hereto and incorporated herein by reference.

Meaning and intending to convey, and hereby conveying, a portion of that property described in a deed from The Town of Brunswick to the Grantor herein, dated January 18, 2008 and recorded in the Cumberland County Registry of Deeds at Book 25771, Page 3.

IN WITNESS WHEREOF, the said Allied Composite Center, LLC has caused this instrument to executed this 20th day of May, 2019 by James G. Howard, its Manager thereunto duly authorized.

WITNESS:

ALLIED COMPOSITE CENTER, LLC

By: _____
James G. Howard
Its City Manager

STATE OF MAINE
COUNTY OF Sagadahoc, ss.

May 20, 2019

Then personally appeared the above-named James G. Howard, in his capacity as Manager of Allied Composite Center, LLC, and acknowledged the foregoing instrument to be his free act and deed in his said capacity and the free act and deed of Allied Composite Center, LLC.

Before me,

_____
Notary Public/Attorney-at-Law

NICOLE L. CHIPMAN
Notary Public-State of Maine
My Commission Expires August 9, 2019

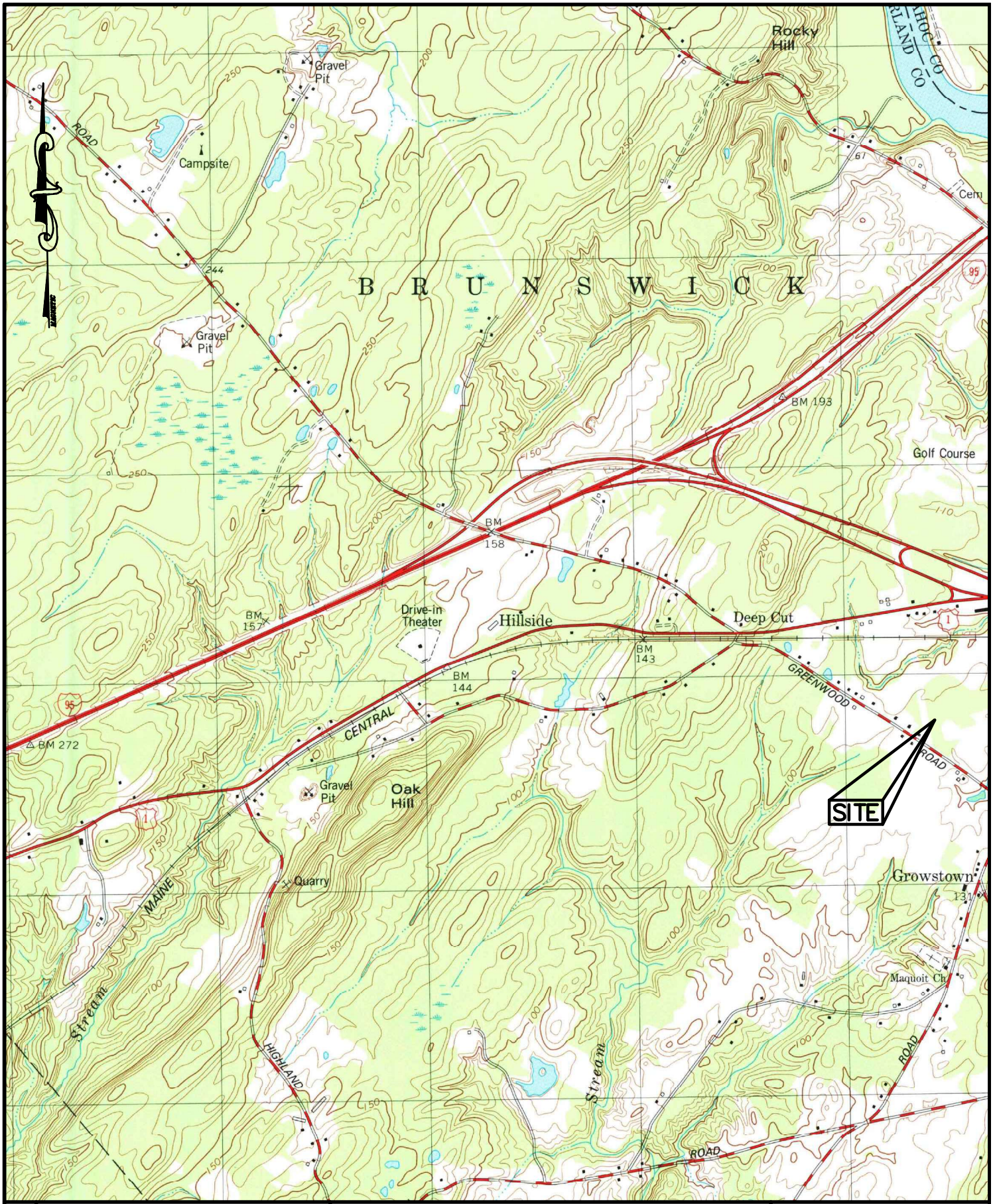
EXHIBIT A

A certain lot or parcel of land, with any buildings and improvements thereon, situated on the southerly side of Business Parkway on the Town of Brunswick, County of Cumberland and State of Maine, being Lot 2 on plan entitled "Subdivision Plan Industrial Park Expansion , Brunswick Industrial Park (Phase IV)", dated March 28, 2003 and last revised June 23, 2003, approved by the Town of Brunswick Planning Board on June 24, 2003 and recorded in the Cumberland County Registry of Deeds at Plan Book 203, Page 520, as modified by plan entitled "Subdivision Plan – Amendment, Industrial Park Expansion, Brunswick Industrial Park (Phase IV)" Prepared by Sitelines, PA, dated March 28, 2003 and recorded in said Registry at Plan Book 203, Page 530. Being a portion of the second parcel described in mortgage recorded in said Registry at Book 25771, Page 5.

This conveyance is subject to:

1. The Declaration of Covenants and Restrictions of the Brunswick Industrial Park dated February 12, 1981 and recorded in the Cumberland County Registry of Deeds at Book 4739, Page 302, as amended from time to time, which grantee and its successors and assigns forever hereby agree to observe.
2. Any utility easements.
3. The requirement of the federal, state and local approval processes.

Received
Recorded Register of Deeds
May 22,2019 11:21:57A
Cumberland County
Nancy A. Lane

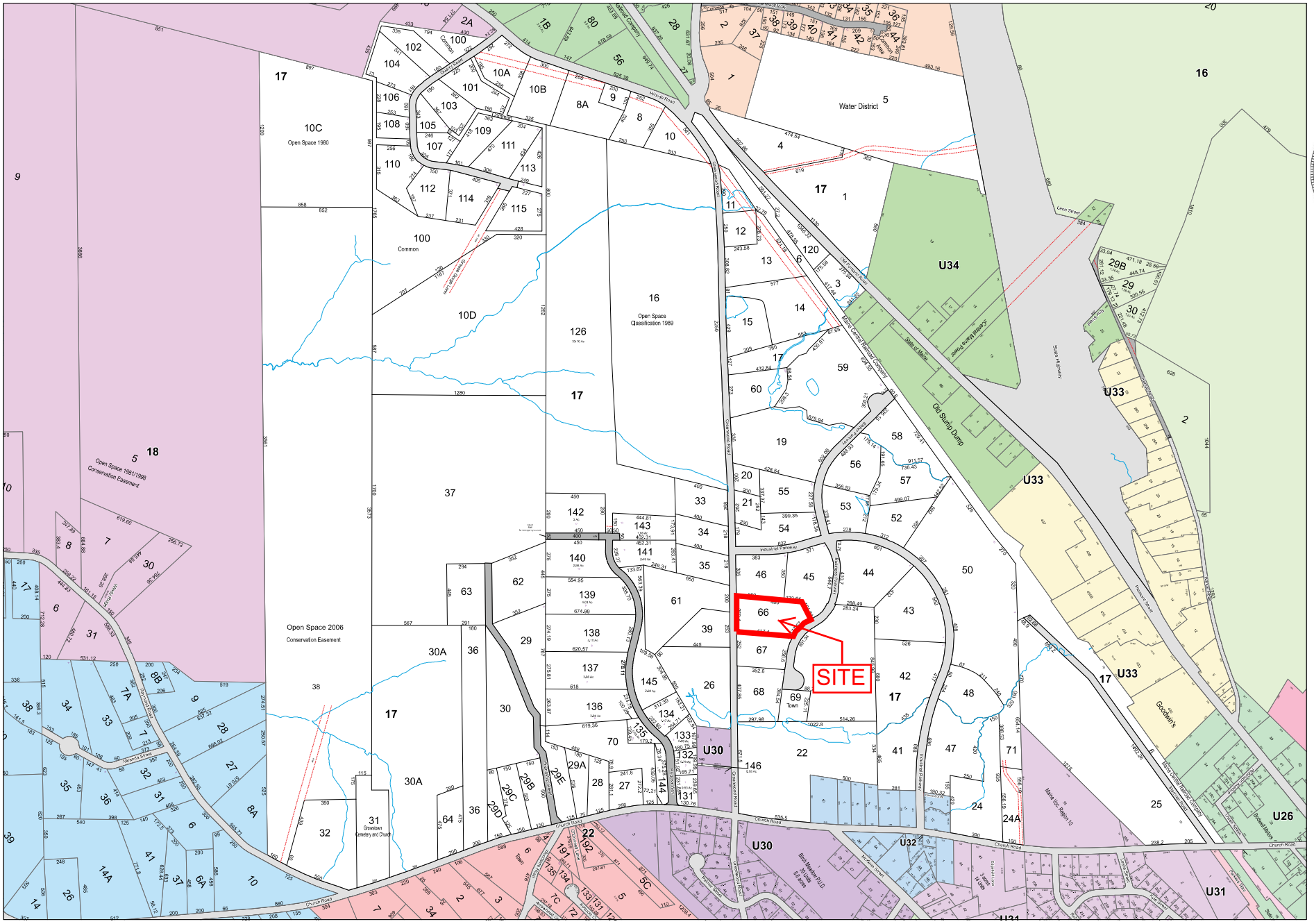


SHEET: 1 OF 1

SITELINES
119 PURINTON ROAD, SUITE A
BRUNSWICK, ME 04011
207.725.1200
CIVIL ENGINEERS ▪ LAND SURVEYORS

USGS MAP
MARIJUANA STORE – ADULT USE
GJORIS LLC
4 BUSINESS PKWY, BRUNSWICK, MAINE

DATE: 01–29–20
SCALE: 1" = 2000'
JOB: 3781.02
FILE: 3781.02–USGS



Town of
BRUNSWICK
Maine

Legend

- Lines_Other
- Other Road
- Hydrography Line
- ROW Property Access
- Town Boundary
- Other Lot Boundary
- Parcels_Lines
- Public Road
- Private Road
- ROW
- Water

Disclaimer:
The information is provided as a reasonably accurate point of reference, but is not guaranteed and is not to be used for conveyances.
The Town of Brunswick shall not be held responsible for the accuracy or misuse of this data.
Copyright Town of Brunswick.

1 inch = 300 feet

Revised To: April 1, 2019

Maps Prepared by:
Town of Brunswick

Revised and Reprinted By:

CAI Technologies
Precision Mapping, Geospatial Solutions

MAP 17

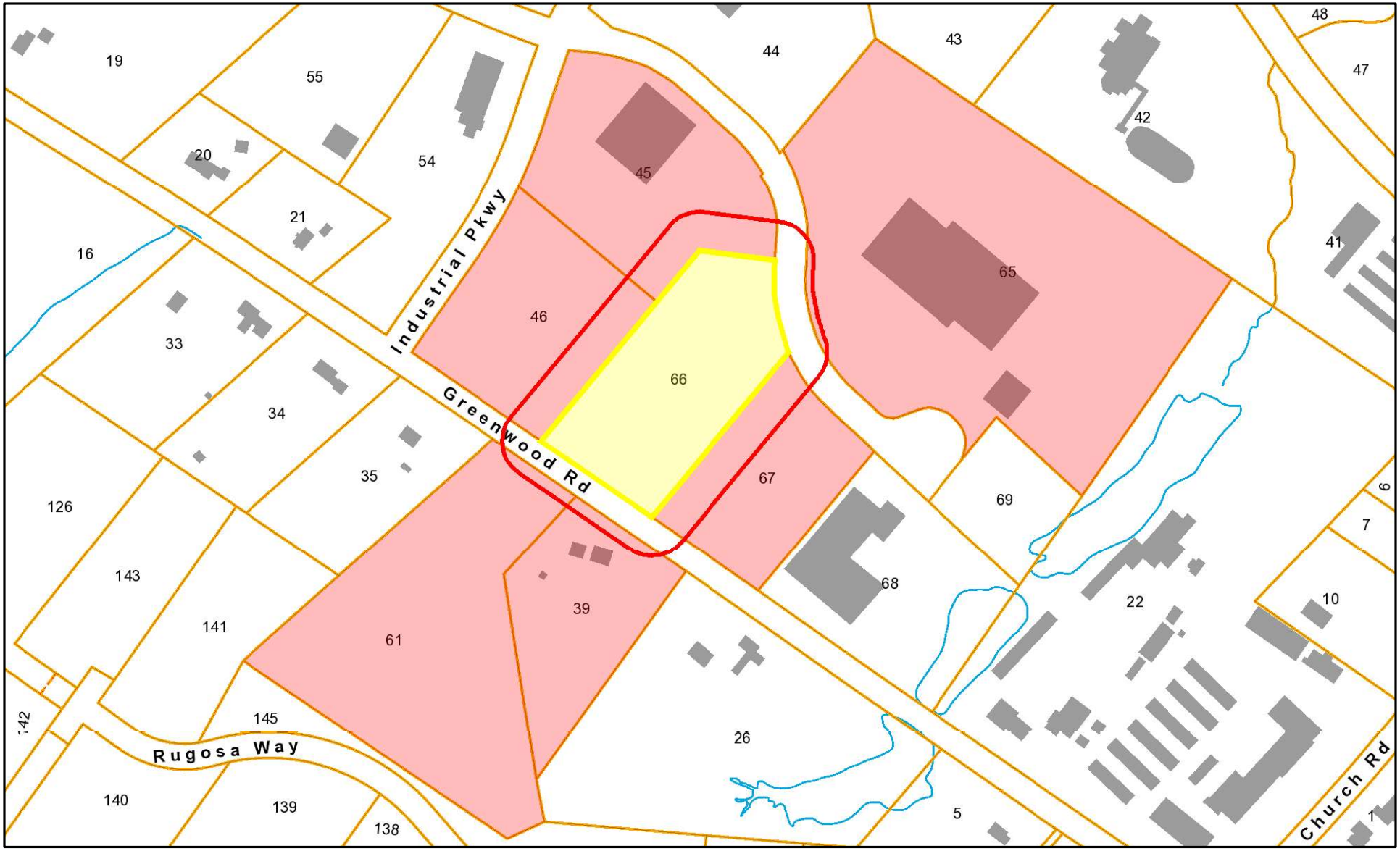
Abutter Map

Brunswick, ME

1 inch = 271 Feet

0 271 542 813

January 29, 2020



Data shown on this map is provided for planning and informational purposes only. The municipality and CAI Technologies are not responsible for any use for other purposes or misuse or misrepresentation of this map.

75 foot Abutters List Report

Brunswick, ME
January 29, 2020

Subject Property:

Parcel Number:	17-66	Mailing Address:	GJORIS LLC
CAMA Number:	17-66		135 MAINE ST SUITE 129
Property Address:	4 BUSINESS PKWY		BRUNSWICK, ME 04011

Abutters:

Parcel Number:	17-39	Mailing Address:	JOHNSON, HANNAH
CAMA Number:	17-39		1655 WILLOW LN
Property Address:	76 GREENWOOD RD		VENICE, FL 34293
Parcel Number:	17-45	Mailing Address:	BRINKS ALLIED HOLDINGS LLC
CAMA Number:	17-45-1		2 MAIN ST
Property Address:	9 INDUSTRIAL PKWY		TOPSHAM, ME 04086
Parcel Number:	17-45	Mailing Address:	NAVIGATOR PROPERTIES LLC
CAMA Number:	17-45-2		PO BOX 1160
Property Address:	0 BUSINESS PKWY		KENNEBUNKPORT, ME 04046
Parcel Number:	17-46	Mailing Address:	LEBOURDAIS, PETER
CAMA Number:	17-46		183 HIGH HEAD RD
Property Address:	11 INDUSTRIAL PKWY		HARPSWELL, ME 04079
Parcel Number:	17-61	Mailing Address:	CENTRAL MAINE POWER CO
CAMA Number:	17-61		ONE CITY CENTER - 5TH FLR
Property Address:	0 GREENWOOD RD		PORTLAND, ME 04101
Parcel Number:	17-65	Mailing Address:	3 BUSINESS PARKWAY LLC
CAMA Number:	17-65		10 DANA ST SUITE 400
Property Address:	3 BUSINESS PKWY		PORTLAND, ME 04101
Parcel Number:	17-67	Mailing Address:	ALLIED COMPOSITE CENTER LLC
CAMA Number:	17-67		2 MAIN ST
Property Address:	6 BUSINESS PKWY		TOPSHAM, ME 04086

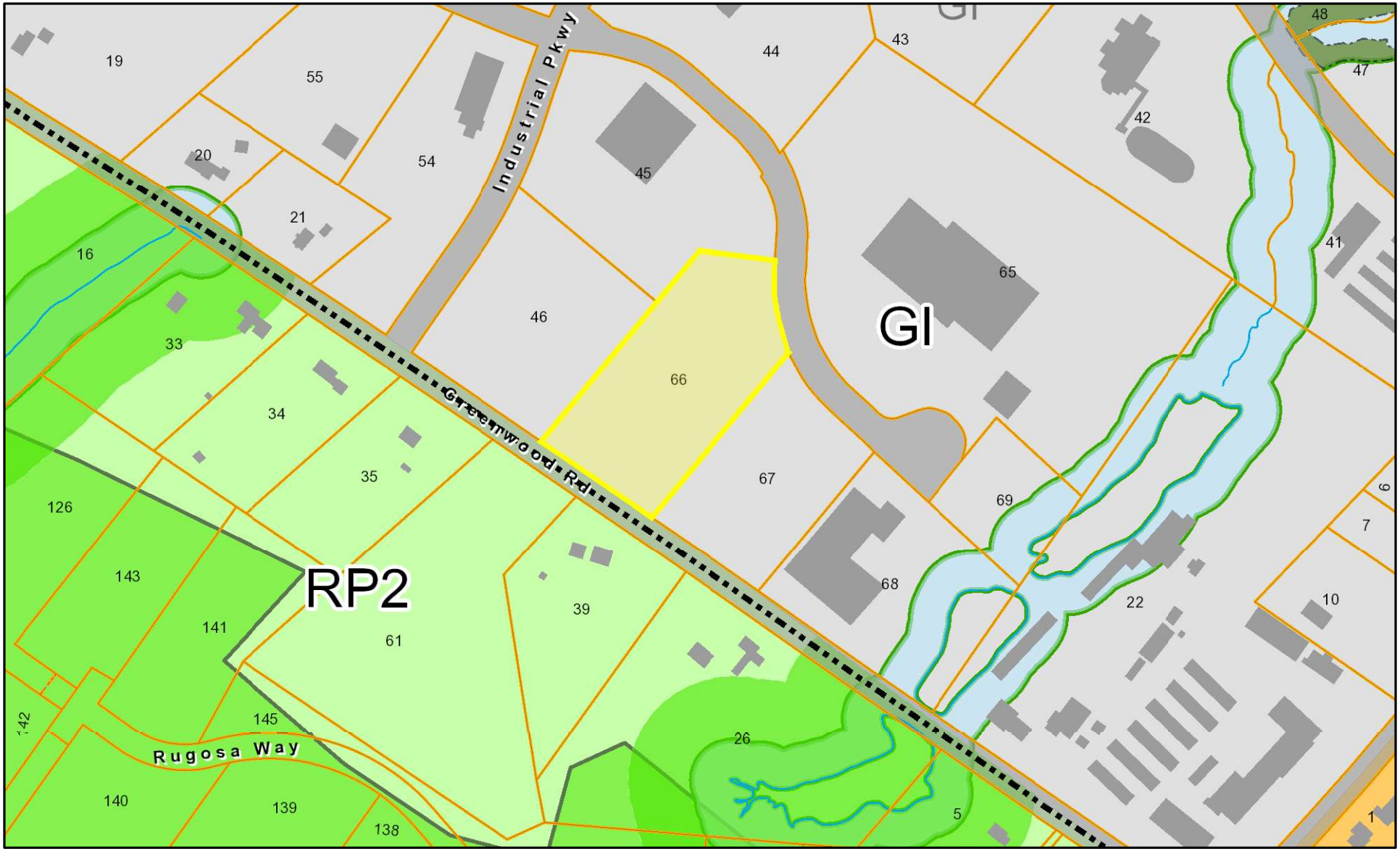
Zoning Map

Brunswick, ME

1 inch = 271 Feet

0 271 542 813

January 29, 2020



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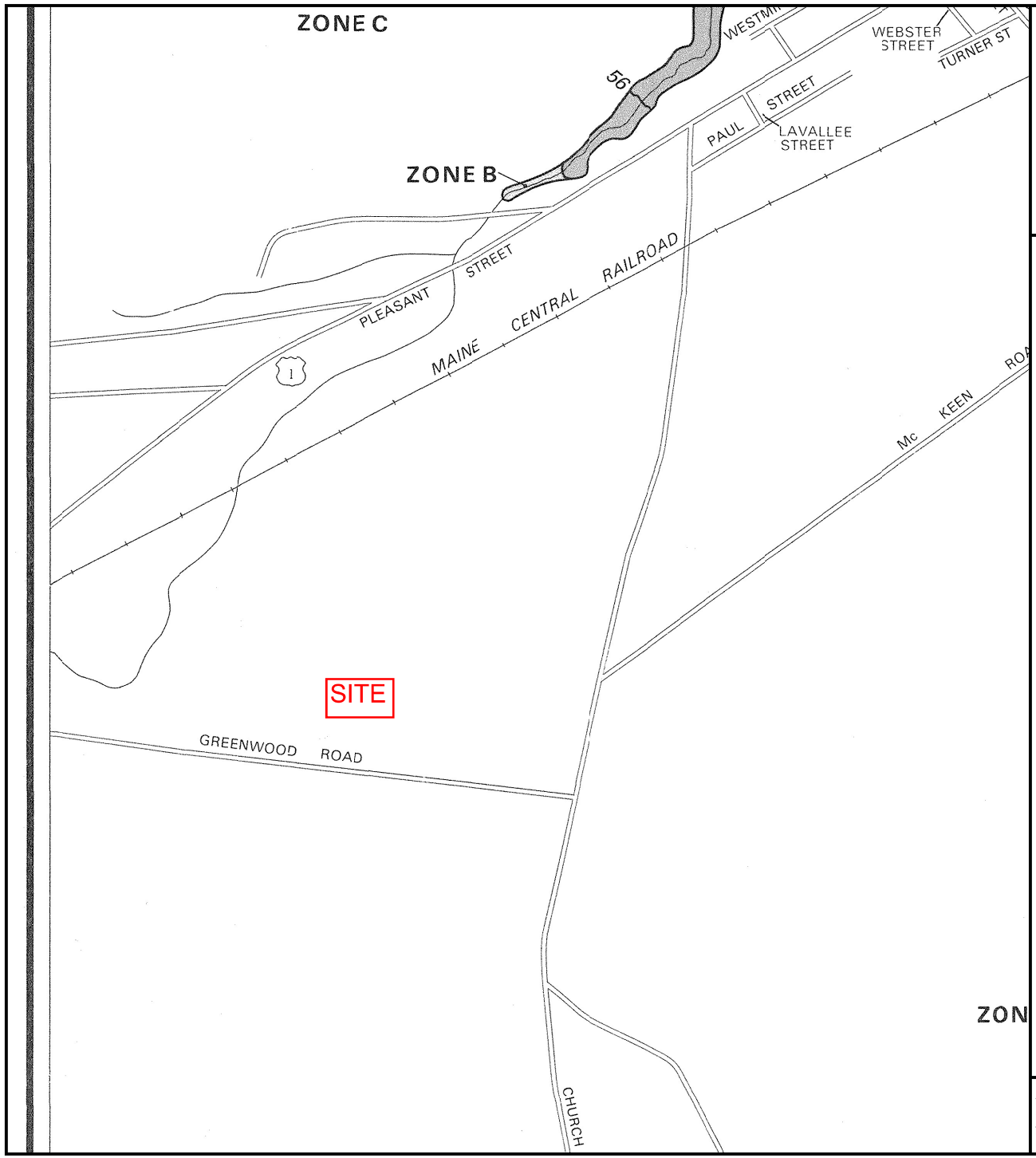


APPROXIMATE SCALE

1000 0 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

TOWN OF

BRUNSWICK, MAINE

CUMBERLAND COUNTY

PANEL 15 OF 35

(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER

230042 0015 B

EFFECTIVE DATE:

JANUARY 3, 1986

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Aerial Map

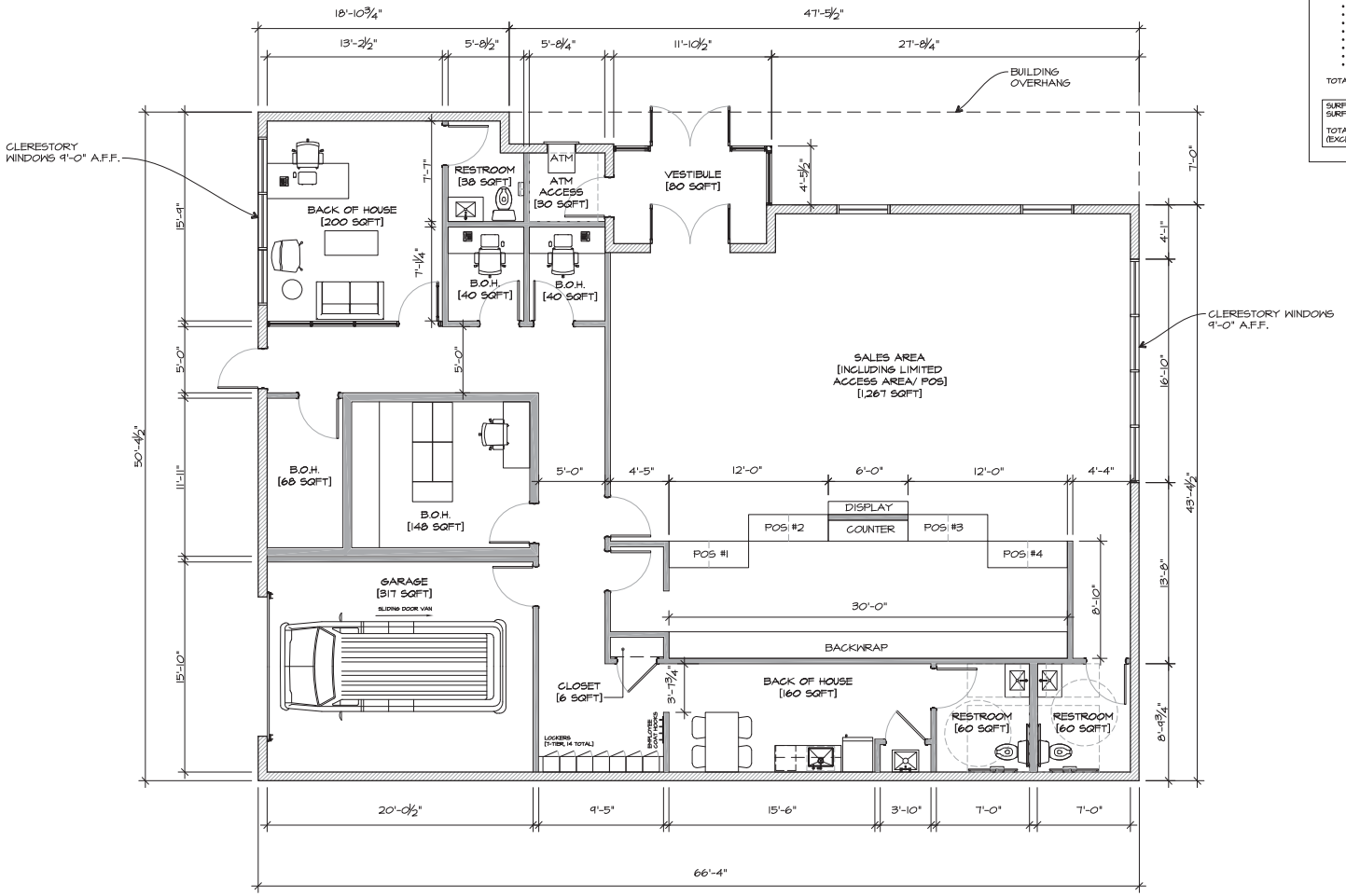
Brunswick, ME

1 inch = 135 Feet

0 135 270 405

January 29, 2020

Data shown on this map is provided for planning and informational purposes only. The municipality and CAI Technologies are not responsible for any use for other purposes or misuse or misrepresentation of this map.



AREA CALCULATIONS

SURFACE AREA FOH:

• VESTIBULE	= 80 SF
• ATM ACCESS	= 30 SF
• SALES AREA	= 972 SF
• LIMITED ACCESS AREA (POS)	= 295 SF
• CUSTOMER RESTROOM	= 60 SF
TOTAL SURFACE AREA FOH	= 1,437 SF

SURFACE AREA BOH:

• GARAGE	= 317 SF
• UTILITY ROOM	= 68 SF
• SECURE VAULT	= 148 SF
• EXECUTIVE OFFICE	= 200 SF
• EXECUTIVE RESTROOM	= 38 SF
• MANAGER'S OFFICE	= 40 SF
• SECURITY OFFICE	= 40 SF
• SUPPLY CLOSET	= 6 SF
• EMPLOYEE BREAK AREA	= 160 SF
• EMPLOYEE RESTROOM	= 60 SF
• CORRIDOR	= 586 SF
TOTAL SURFACE AREA BOH	= 1,663 SF

SURFACE AREA FOH	= 1,437
SURFACE AREA BOH	= 1,663
TOTAL SURFACE AREA (EXCLUDING BUILDING OVERHANG)	= 3,100 SF

1 PROPOSED FLOOR PLAN
SCALE: 1/4" = 1'-0"

TRICARICO ARCHITECTURE AND DESIGN PC
502 VALLEY ROAD, WAYNE, NJ 07470
T:973-692-0222 F:973-692-0223
TRICARICO.COM

© 2020 NICHOLAS J. TRICARICO

THE GENERAL CONTRACTOR AND/OR ALL SUB-CONTRACTORS WORKING FROM THESE PLANS AND SPECIFICATIONS ARE NOT TO SCALE ANY INFORMATION BUT TO CONTACT THE ARCHITECT OR HIS REPRESENTATIVE REGARDING MEASUREMENTS. IF SUCH MEASUREMENTS DO NOT APPEAR CORRECT, ADD UP PROPERLY OR SCALE CORRECTLY TO THE INDICATED SIZE.

DATE:	ISSUE
01/10/2020	CLIENT REVIEW
01/20/2020	CLIENT REVIEW
01/24/2020	CLIENT REVIEW
01/31/2020	CLIENT REVIEW

DATE: NO. REVISIONS / BY:

PROJECT:

LOCATION:
4 BUSINESS PARKWAY
BRUNSWICK, ME 04011

PROJECT NO.: 190475	DRAWN BY: MF
SCALE: AS NOTED	CHECKED BY: GJC
DATE: 01.07.2020	THESE DRAWINGS WERE COMPLETED UNDER THE DIRECT SUPERVISION OF: NJT

NICHOLAS J. TRICARICO
ARCHITECT

TRICARICO ARCHITECTURE AND DESIGN PC

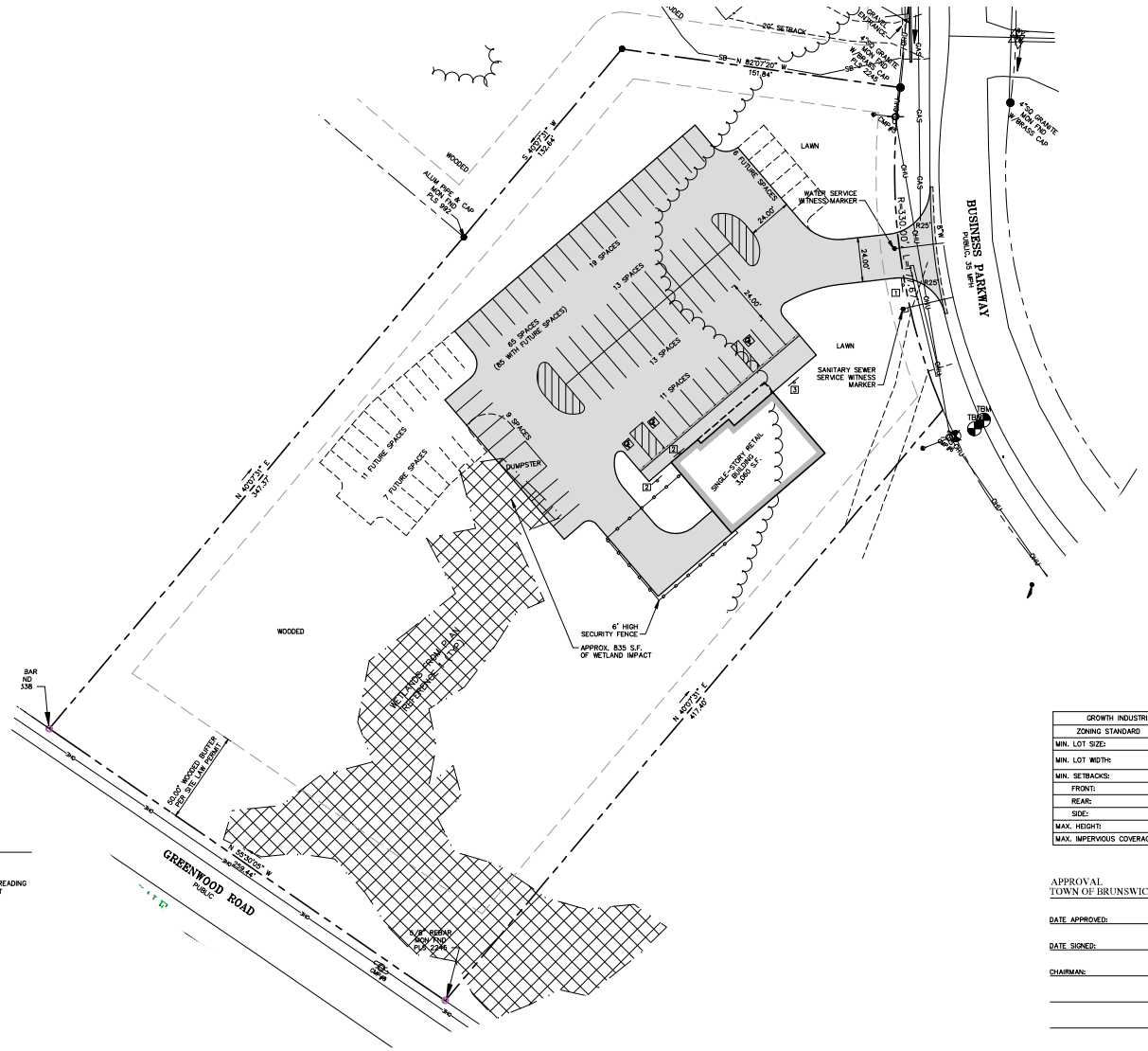
DRAWING NAME:
PROPOSED FLOOR PLAN

DRAWING NO.
SK-1.0

LICENSE NO.

SEAL SEAL

PROJECT NO.: 190475 DATE: AS SHOWN
LOCATION: 4 BUSINESS PARKWAY, BRUNSWICK, ME 04011
PROJECT: WILSHIRE MADISON
PLOT SCALE: 1:1



GENERAL NOTES:

1. TITLE REFERENCE FOR SURVEYED PARCEL:

   BK 35660, PG 227

2. PLAN REFERENCE(S):

   1. "SUBDIVISION PLAN – AMENDMENT 1 INDUSTRIAL PARK EXPANSION BRUNSWICK INDUSTRIAL PARK (PHASE IV)" DATED 3-28-03, LAST REVISED 08-29-03. PREPARED BY SITELINES, P.A. FOR THE TOWN OF BRUNSWICK, MAINE

   2. "TOPOGRAPHIC SURVEY LOT 2,3 & 4 BRUNSWICK BUSINESS PARK" DATED APRIL 2005, PREPARED BY COLONIAL SURVEYING COMPANY, LLC OF GRAY MAINE FOR SITELINES, P.A.

3. AREA INFORMATION:

   LOT AREA: 127,300 S.F. (2.92 ACRES)

4. TAX MAP REFERENCE:

   TAX MAP 17, LOT 66

5. BASIS OF BEARINGS:

   BEARINGS ARE REFERENCED TO MAGNETIC.

6. ELEVATION DATUM:

   CONTACT SITELINES, PA (207-725-1200)

7. FLOOD ZONE INFORMATION:

   PARCEL IS LOCATED WITHIN ZONE C (AREAS OF MINIMAL FLOODING) OF THE FLOOD INSURANCE RATE MAPS FOR CUMBERLAND COUNTY, MAINE. THE PROJECT IS LOCATED ON PANEL 15 OF 35 (COMMUNITY PANEL 230042-0015-B, EFF. DATE JANUARY 3, 1986)

8. IMPERVIOUS AREA:

   PROPOSED IMPERVIOUS AREA: 37,333 S.F. (0.86 AC)

9. SITE SUBJECT TO SITE LOCATION OF DEVELOPMENT ACT PERMIT #L-6773-39-L-A

UTILITY NOTES:

1. INFORMATION REGARDING THE LOCATION OF EXISTING UNDERGROUND UTILITIES IS A COMPILATION OF THAT FOUND IN THE FIELD AND THAT SHOWN ON A PREVIOUS PLANS, AND SHALL NOT BE CONSIDERED AN AS-BUILT PLAN. CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFYING UTILITY LOCATIONS PRIOR TO COMMENCING WORK. NOTIFY ENGINEER OF ANY DISCREPANCY BETWEEN UTILITIES AS SHOWN AND AS FOUND. CONTRACTOR SHALL NOTIFY DIG-SAFE (1-888-344-7233) PRIOR TO EXCAVATION.

LAYOUT NOTES:

1. ALL DIMENSIONING, UNLESS NOTED OTHERWISE, IS TO THE FACE OF CURB OR FOUNDATION.
2. BOUNDARY INFORMATION ON LAYOUT PLAN IS FOR REFERENCE ONLY. REFER TO CERTIFIED BOUNDARY PLANS FOR BOUNDARY INFORMATION.
3. ALL HANDICAP ACCESSIBLE PARKING SPACES, RAMPS AND SIDEWALKS SHALL BE CONSTRUCTED IN CONFORMANCE WITH THE AMERICANS WITH DISABILITIES ACT (ADA).
4. ALL SITE SIGNAGE AND PAVEMENT MARKINGS SHALL CONFORM TO THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES. (MUTCD)
5. BUILDING FOUNDATION SHOWN IS NOT FOR FOUNDATION LAYOUT, COORDINATE SITE WORK WITH ARCHITECTURAL DRAWINGS INCLUDING BUILDING FEATURES AND FOUNDATION PLAN.

GROWTH INDUSTRIAL ZONING DISTRICT (GI)		
ZONING STANDARD	REQUIRED	PROPOSED
MIN. LOT SIZE:	7,000 S.F.	127,300 S.F.
MIN. LOT WIDTH:	50'	175'
MIN. SETBACKS:		
FRONT:	10'	>10'
REAR:	20'	>20"
SIDE:	15'	>15'
MAX. HEIGHT:	60'	<60'
MAX. IMPERVIOUS COVERAGE:	80%	29%

APPROVAL
TOWN OF BRUNSWICK PLANNING BOARD

DATE APPROVED:

DATE SIGNED:

CHAIRMAN:

LEGEND

■	MONUMENT FOUND
●	IRON MARKER FOUND
⊙	5/8" REBAR TOPPED WITH AN ALUMINUM CAP READING "BRUCE W. MARTINSON – PLS 2137" TO BE SET
	BOUNDARY LINE OF SURVEYED PARCEL
	BOUNDARY LINE OF ABUTTERS (APPROX.)
	ROAD RIGHT OF WAY LINE (APPROX.)
	COMPUTATIONAL TIE LINE
	STONE WALL (APPROX.)
	EDGE OF TRAVELED WAY
OHE	UTILITY LINE
O'CMP 13	UTILITY POLE WITH NUMBER
IPF	IRON PIPE FOUND
IRF	IRON ROD FOUND
DH	DRILL HOLE
△ 4	ARBITRARY TRAVERSE POINT WITH NUMBER
12, 1001	ARBITRARY COMPUTATIONAL POINT NUMBER
BK 10674, PG 197	DEED BOOK & PAGE IN COUNTY REGISTRY OF DEEDS
PB 195, PG 130	PLAN BOOK & PAGE IN COUNTY REGISTRY OF DEEDS
R/W	RIGHT OF WAY
N/F	NOW OR FORMERLY HELD BY
AC.	ACRES
±	MORE OR LESS
Ⓢ	SEWER MANHOLE
☼	LIGHT POLE
■	CATCH BASIN
	WATER SHUT OFF
	HYDRANT
	SIGN
	WATER VALVE
TBM 24.91	ELEVATION TEMPORARY BENCH MARK
	TEST PIT

PROGRESS PRINT
THIS PLAN IS ISSUED FOR REVIEW AND INFORMATION PURPOSES ONLY. THIS PLAN IS SUBJECT TO CHANGE AND IS NOT FOR PRICING OR CONSTRUCTION. PRICING BASED ON THIS PLAN IS NOT BINDING UNLESS SIGNED BY BOTH CONTRACTOR AND OWNER.

CALL DIG SAFE UTILITY LOCATION
1-888-344-7233
STATE LAW REQUIRES ADVANCE NOTICE OF AT LEAST 3 BUSINESS DAYS BEFORE YOU DIG, GRADE OR EXCAVATE FOR THE MARKING OF UNDERGROUND UTILITIES

GRAPHIC SCALE
30 0 15 30 60
(IN FEET)
1 inch = 30 ft.

ISSUED FOR:
PERMITTING REVIEW

STATE OF MAINE
JOSEPH J. MARDEN
12828
LICENSED PROFESSIONAL ENGINEER
02-04-20

1.	02-04-20	SUBMITTED TO TOWN FOR SKETCH REVIEW JJM

TITLE:
SITE LAYOUT PLAN

PROJECT:
MARIJUANA STORE – ADULT USE
4 BUSINESS PARKWAY, BRUNSWICK, ME 04011

PREPARED FOR:
GJORIS LLC
135 MAINE STREET, SUITE 129, BRUNSWICK, ME 04011

SITELINES
119 PURINTON ROAD, SUITE A
BRUNSWICK, MAINE 04011
207.725.1200
CIVIL ENGINEERS ▪ PLANNERS ▪ LAND SURVEYORS

FIELD WK: MC/MH	SCALE: 1"=30'	SHEET: 1
DRN BY: JJM	JOB #: 3781.02	
CHD BY: CYN	MAP/LOT: 17/66	
DATE: 01-30-20	FILE: 3781.02-SITE	

©2020, THIS DRAWING IS THE PROPERTY AND INSTRUMENT OF SITELINES PA, NO REPRODUCTION OR CHANGES MAY BE MADE TO THIS DRAWING WITHOUT THE EXPRESS WRITTEN PERMISSION OF SITELINES PA. ANY MODIFICATION, CHANGE OR USE OF THIS DRAWING WITHOUT THE EXPRESS WRITTEN PERMISSION OF SITELINES PA IS WRONGFUL AND IS AT THE USER'S RISK.

X:\LAND PROJECTS\3781.02 GJORIS 4 BUSINESS PKWY BRUNSWICK\DWG\3781.02-SITE-1.DWG, SITE, 2/4/2020 2:28 PM, JOSEPH MARDEN

TOWN OF BRUNSWICK, MAINE
INCORPORATED 1739
DEPARTMENT OF PLANNING AND DEVELOPMENT
85 UNION STREET
BRUNSWICK, ME 04011

MATT PANFIL, AICP CUD
DIRECTOR OF PLANNING & DEVELOPMENT

PHONE: 207-725-6660
FAX: 207-725-6663

MEMORANDUM

TO: The Planning Board
FROM: Jared Woolston, AICP
DATE: February 21, 2020 (meeting date February 24, 2020)
RE: Sketch Plan Review Marijuana Cultivation, 43 Bibber Parkway (Case #20-009)

DRAFT MOTIONS
SKETCH PLAN – MAJOR DEVELOPMENT REVIEW
MARIJUANA CULTIVATION, 43 BIBBER PARKWAY
CASE # 20-009

Staff has reviewed the Sketch Plan application and determined that it is complete.

DRAFT Motion 1. That the Board deems the Sketch Plan to be complete.

The proposed development is the use of an existing building at 43 Bibber Parkway. The subject lot (Map 17, Lot 59) is within the GI (Growth Industrial) Zoning District. The Staff Review Committee (SRC) reviewed the project on February 12, 2020. The notes for the SRC meeting are included in the packet. Based on the available material and the scope of sketch plan review for dimensional and density standards, staff advise the proposed development meets the applicable zoning district and overlay zoning district dimensional standards. While no exterior changes are proposed, the change of use over 10,000 square feet will require major development review. Additionally, the proposed use will require a conditional use permit.

A Sketch Plan of the proposed development was prepared by Sitelines for Bibber Properties, LLC on Plan Sheet 1 entitled, "Site Development Plan" most recently revised on February 4, 2020. The proposed use will require a Conditional Use Permit. While the Conditional Use Permit standards are not applicable to sketch plan review, staff advised the applicant's agent to discuss any anticipated issues with the Conditional Use Permit standards with the Planning Board.

The following is an excerpt from page 5-9 of the Brunswick Zoning Ordinance:

The following Criteria shall be applied, by the Planning Board when considering an application for a Conditional Use Permit. The burden of proof of compliance with these standards rests with the applicant.

(1) The proposed structure and site design comply with all standards of this Ordinance applicable to the zoning district and any overlay district within which the property is located.
(2) The proposed use will not create significantly more vehicular traffic by patrons, residents, or suppliers than the uses and structure currently within 300 feet of the proposed use or structure that generates the most vehicular traffic;
(3) The proposed use will not operate or require deliveries earlier in the morning, or later
(4) at night, than the uses and structures currently within 300 feet of the proposed use or structure that operate earliest in the morning and latest at night.
(5) The proposed use shall not create any more adverse impacts on any current use or structure within 300 feet of the lot on which the proposed use or structure would be located.
(6) The application shall further the planning goals of the adopted Town of Brunswick 2008
(7) Comprehensive Plan, as amended, including but not limited to the planning goals for the Planning Area (Appendix A - Planning Areas) in which the property is located.

Motion 2. That the Board approves the Sketch Plan.

MAJOR DEVELOPMENT REVIEW
SKETCH PLAN APPLICATION

CHANGE OF USE
MARIJUANA CULTIVATION FACILITY

TAX MAP 17, LOT 59
43 BIBBER PARKWAY
BRUNSWICK, MAINE

February 4, 2020

Prepared For

BIBBER PROPERTIES, LLC
4 Milk Street, Suite 103
Portland, Maine 04101

Prepared By

SITELINES
Civil Engineers • Land Surveyors

119 Purinton Road, Suite A, Brunswick Landing, Brunswick, ME 04011
207-725-1200 ▪ www.sitelinespa.com

SITELINES
Civil Engineers • Land Surveyors

February 4, 2020

4029-7

Jared Woolston, Planner
Town of Brunswick
85 Union Street
Brunswick, Maine 04011

RE: **Major Development Review Sketch Application**
Change of Use – Marijuana Cultivation Facility
43 Bibber Parkway, Brunswick, Maine
Tax Map 17, Lot 59

Dear Jared:

On behalf of Bibber Properties, LLC, Sitelines PA is pleased to submit the enclosed Sketch Plan Application, drawings, and supporting materials for the change of use of a portion of a commercial building located at 43 Bibber Parkway in Brunswick. This letter is intended to summarize the project in order to facilitate the review process.

PROPERTY

Bibber Properties, LLC owns a parcel of land currently identified as Tax Map 17, Lot 59. The parcel contains approximately 7.78 acres and has frontage on Bibber Parkway within the Brunswick Industrial Park. The property is located within the Growth Industrial (GI) zoning district in which marijuana cultivation facility is a conditional use. The site is currently developed and consists of a large industrial/commercial building with associated parking, loading docks, stormwater management infrastructure, and mature landscaping.

PROJECT DESCRIPTION

The existing development consists of a 100,200± s.f. footprint commercial building that is currently utilized for warehouse and industrial use. A portion of the building that comprises approximately 38,300± s.f. will be converted to a Marijuana Cultivation Facility. As the converted portion of the building will be separate from the other portions of the building from a leasing standpoint, and there is no access to the converted portion of the building from the parking lot on the north side of the building, there will be new parking spaces demarcated within the loading area on the south side of the building for use by the new tenants of the converted space. Due to the change of use, the loading docks will no longer need to be utilized by larger tractor-trailers, and the remainder of the paved area within the loading space can be utilized for parking and access.

As there are no site changes proposed, no permits are required from the Maine Department of Environmental Protection. As the proposed change of use does not result in any significant traffic generation, no permits are required from the Maine Department of Transportation.

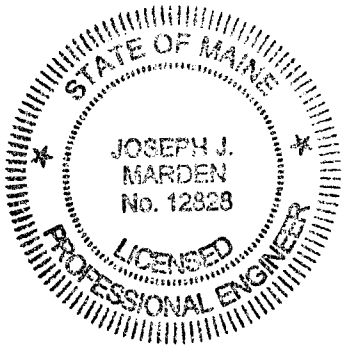
SUMMARY

We trust that this information satisfactorily addresses the requirements for Sketch Plan Review, and we look forward to meeting with you and the Planning Board at their February 25, 2019 meeting.

We appreciate your assistance with this project. Should you have any questions, please call or contact me via jmarden@sitelinespa.com.

Very truly yours,

Joseph J. Marden, P.E.
Project Manager



Enclosures

cc: Joe Cooper, Bibber Properties, LLC

SITELINES
Civil Engineers • Land Surveyors

DEVELOPMENT REVIEW APPLICATION

1. Development Review application type (refer to **Appendix D**):

	Minor Development Review
✓	Major Development Review: **Sketch Plan**
	Major Development Review: **Final Plan**
	Major Development Review: **Streamlined Final Plan**

2. Project Name: Change of Use - Marijuana Cultivation Facility

3. Project Applicant

Name:	Bibber Properties, LLC c/o Joe Cooper
Address:	PO Box 36092
	Charlotte, NC 28236-6092
Phone Number:	(207)-450-5010
Email:	joe@cbf.properties

4. Project Owner (if different than applicant)

Name:	Same as Application
Address:	
Phone Number:	
Email:	

5. Authorized Representative

Name:	Sitelines, PA, Attn: Joseph Marden, PE
Address:	119 Purinton Road, Suite A
	Brunswick, Maine 04011
Phone Number:	(207)-725-1200 ext. 12
Email:	jmarden@sitelinespa.com

6. List of Design Consultants. Indicate the registration number, address and phone number, email for any additional project engineers, surveyors, architects, landscape architects or planners:

   1. Engineering & Surveying: Sitelines PA
   2.
   3.

7. Physical location of property: 43 Bibber Parkway

8. Lot Size: 7.78 Acres

9. Zoning District: Growth Industrial (GI)

10. Overlay Zoning District(s): Stream Protection Overlay (SPO)

11. Indicate the interest of the applicant in the property and abutting property. For example, is the applicant the owner of the property and abutting property? If not, who owns the property subject to this application?
Owner

12. Assessor's Tax Map 17 Lot Number 59 of subject property.

13. Brief description of proposed use/subdivision: Refer to Cover Letter

14. Describe specific physical improvements to be done: Refer to Cover Letter

Owner Signature:

Applicant Signature (*if different*):
AS AGENT

DEVELOPMENT REVIEW APPLICATION REQUIREMENTS

The submission requirements contained in **Appendix D** of the Brunswick Zoning Ordinance (attached in checklist format for each application category) shall apply to all Minor Development, Major Development, and Streamlined Major Development Review unless a waiver is granted. Proposed development applications shall be submitted to the Director of Planning and Development.

For each item listed in Appendix D the applicant shall either submit the requested information or request a waiver from the information requirement pursuant to Subsection 5.2.9.M of the Zoning Ordinance.

REQUIREMENTS FOR SKETCH PLAN APPLICATION SUBMITTAL		Sketch Plan
General	Application form and fee	X
	Name of development	X
	Existing zoning district and overlay designations	X
	Location map	X
	Location of features, natural and artificial, such as water bodies, wetlands, streams, important habitats, vegetation, railroads, ditches and buildings	X
	Documentation of Right, Title and Interest	X
	Draft performance guarantee or conditional agreement	N/A
Survey, Topography, & Existing Conditions	Scale, date, north point, and area	X
	Existing easements associated with the development	X
	Existing locations of sidewalks	X
	Approximate locations of dedicated public open space, areas protected by conservation easements and recreation areas	X
	When applicable, a table indicating the maximum number of lots permitted based upon the applicable dimensional requirements, the number of lots proposed, and the number of lots permitted to be further subdivided.	N/A
	Building envelopes showing acceptable locations for principal and accessory structures, setbacks and impervious coverage	X
Proposed Development Plan	Number of lots if a subdivision	N/A

State of Maine

Department of the Secretary of State

I, the Secretary of State of Maine, certify that according to the provisions of the Constitution and Laws of the State of Maine, the Department of the Secretary of State is the legal custodian of the Great Seal of the State of Maine which is hereunto affixed and that the paper to which this is attached is a true copy from the records of this Department.

In testimony whereof, I have caused the Great Seal of the State of Maine to be hereunto affixed. Given under my hand at Augusta, Maine, this twenty-ninth day of January 2020.

Matthew Dunlap
Secretary of State

Additional Addresses

Legal Name	Title	Name	Charter #	Status
BIBBER PROPERTIES, LLC	Registered Agent	DAVID J. PERKINS	20070417DC	GOOD STANDING

Home Office Address (of foreign entity)	Other Mailing Address
	32 PLEASANT STREET PORTLAND, ME 04101

SHORT FORM QUITCLAIM DEED WITH COVENANT

Brunswick Development Corporation, a Maine non-profit corporation organized under the laws of the State of Maine, with a mailing address c/o Town of Brunswick, 28 Federal Street, Suite 2, Brunswick, Maine, 04011 ("Grantor"), FOR CONSIDERATION PAID, grants to **Bibber Properties, LLC**, a Maine limited liability company with a mailing address of P.O. Box 491, 4 Moulton Street, Portland, Maine 04112 ("Grantee") with QUITCLAIM COVENANT, certain real property, together with any improvements thereon, located in the Town of Brunswick, Cumberland County, Maine and more particularly described on Exhibit A attached hereto and made a part hereof.

MAINE REAL ESTATE TAX PAID

Being the same premises conveyed to the Grantor by deed from the Town of Brunswick dated December 20, 1995 and recorded in the Cumberland County Registry of Deeds in Book 12281, Page 31.

IN WITNESS WHEREOF, BRUNSWICK DEVELOPMENT CORPORATION has caused this instrument to be executed by Donald H. Gerrish, its President thereunto duly authorized, this 31st day of August, 2006.

WITNESS:

Name: Jaimie P. Schwartz

BRUNSWICK DEVELOPMENT CORPORATION

By: Donald H. Gerrish
Donald H. Gerrish
Its President, duly authorized

State of Maine
County of Cumberland, ss.

August 30, 2006

PERSONALLY APPEARED the above-named Donald H. Gerrish, President of Brunswick Development Corporation as aforesaid, and acknowledged the foregoing instrument to be his free act and deed in his said capacity and the free act and deed of said corporation.

Before me,

Name:
~~Notary Public~~/Attorney at Law
~~Notary Commission Expires:~~

EXHIBIT A

A certain lot or parcel of land in the Town of Brunswick, County of Cumberland, State of Maine, situated at the terminus of Bibber Parkway in the Brunswick Industrial Park and being more particularly bounded and described as follows:

Lot 19 as defined on the plan entitled "Plan of Subdivision of Property, Brunswick Industrial Park, Phase III, Greenwood Road & Industrial Parkway, Brunswick, Maine" dated August 26, 1988, revised as of January 16, 1989, (erroneously referred to in previous recorded documents as being dated June 28, 1989) and recorded on June 28, 1989 in the Cumberland County Registry of Deeds in Plan Book 179, Page 58.

Excepting an easement to the Brunswick Sewer District for a sewerage pump station over a certain parcel of land on the west side of Bibber Parkway near the southeast corner of Lot 19 and more particularly bounded and described as follows:

Commencing at a 1" aluminum post with a 3-1/2" cap stamped PLS 2238, said post is located at the southeast corner of Lot 19 of the Brunswick Industrial Park as defined on the plan entitled "Plan of Subdivision of Property, Brunswick Industrial Park, Phase III, Greenwood Road & Industrial Parkway, Brunswick, Maine" dated August 26, 1988, revised as of January 16, 1989, (erroneously referred to in previous recorded documents as being dated June 28, 1989) and recorded on June 28, 1989 in the Cumberland County Registry of Deeds in Plan Book 179, Page 58.

Thence north ten degrees five minutes twenty seconds west (N 10° 05' 20" W) along the west side of Bibber Parkway five and zero hundredths (5.00) feet to the True Point of Beginning;

Thence south seventy-nine degrees fifty-four minutes forty seconds west (S 79° 54' 40" W) twenty-five and zero hundredths (25.00) feet;

Thence north ten degrees five minutes twenty seconds west (N 10° 05' 20" W) thirty-two and zero hundredths (32.00) feet;

Thence north seventy-nine degrees fifty-four minutes forty seconds east (N 79° 54' 40" E) twenty-five and zero hundredths (25.00) feet to the west side of Bibber Parkway;

Thence south ten degrees five minutes twenty seconds east (S 10° 05' 20" E) along the west side of Bibber Parkway thirty-two and zero hundredths (32.00) feet to the True Point of Beginning.

The bearings and distances are based upon a survey plan oriented to grid north prepared by Wright-Pierce, Topsham, Maine captioned "Site Survey of Lot 19, Brunswick Industrial Park, For Town of Brunswick" dated June 14, 1995.

Also excepting and reserving:

An easement to the Inhabitants of the Town of Brunswick dated January 4, 1990 and recorded in the Cumberland County Registry of Deeds at Book 9053, Page 91.

The property herein conveyed is subject to:

An easement to Central Maine Power Company dated October 29, 1953 and recorded in the Cumberland County Registry of Deeds at Book 2171, Page 32.

The Declaration of Covenants and Restrictions dated February 21, 1981 and recorded in the Cumberland County Registry of Deeds at Book 4739, Page 302.

An Amendment to Declaration of Covenants and Restrictions dated May 30, 1984 and recorded in the Cumberland County Registry of Deeds at Book 6561, Page 179.

An Amendment to Declaration of Covenants and Restrictions dated May 30, 1984 and recorded in the Cumberland County Registry of Deeds at Book 7053, Page 252.

A Second Amendment to Declaration of Covenants and Restrictions dated October 3, 1988 and recorded in the Cumberland County Registry of Deeds at Book 8526, Page 23.

A Second Amendment to Declaration of Covenants and Restrictions dated August 23 and 24, 1988 and recorded in the Cumberland County Registry of Deeds at Book 8549, Page 166.

An addendum to the Second Amendment dated October 28, 1988 and recorded in said Registry of Deeds in Book 8558, Page 91.

A Third Amendment dated September 2, 1999 and recorded in said Registry of Deeds in Book 15358, Page 261.

The rights and easements granted to New England Telephone and Telegraph Company by Abbie J. Morang as set forth in an instrument dated November 3, 1910 and recorded in said Registry of Deeds in Book 864, Page 492 for a utility line crossing Lot 19.

The rights and easements granted to New England Telephone and Telegraph Company by Wesley M. Gott and Mildred F. Gott as set forth in an instrument dated November 3, 1910 and recorded in said Registry of Deeds in Book 3132, Page 364 for a utility line crossing Lot 19.

An Easement Deed to New England Telephone and Telegraph Company dated August 25, 1987 and recorded in the Cumberland County Registry of Deeds at Book 8123, Page 205.

All of the Matters, Notes, Easements and other matters portrayed on said Plan recorded in the Cumberland County Registry of Deeds in Plan Book 179, Page 58;

The Return Layout of Town Way dated October 3, 1988 and recorded in the Cumberland County Registry of Deeds at Book 8516, Page 124.

A Department of Environmental Protection Site Location Order dated September 14, 1989 and recorded in the Cumberland County Registry of Deeds at Book 8926, Page 58.

A Department of Environmental Protection Site Location of Development Order dated November 1, 1990 and recorded in the Cumberland County Registry of Deeds at Book 9382, Page 107.

The Declaration of Covenants and Restrictions for Phase III dated April 5, 1993 and recorded in the Cumberland County Registry of Deeds at Book 10692, Page 322.

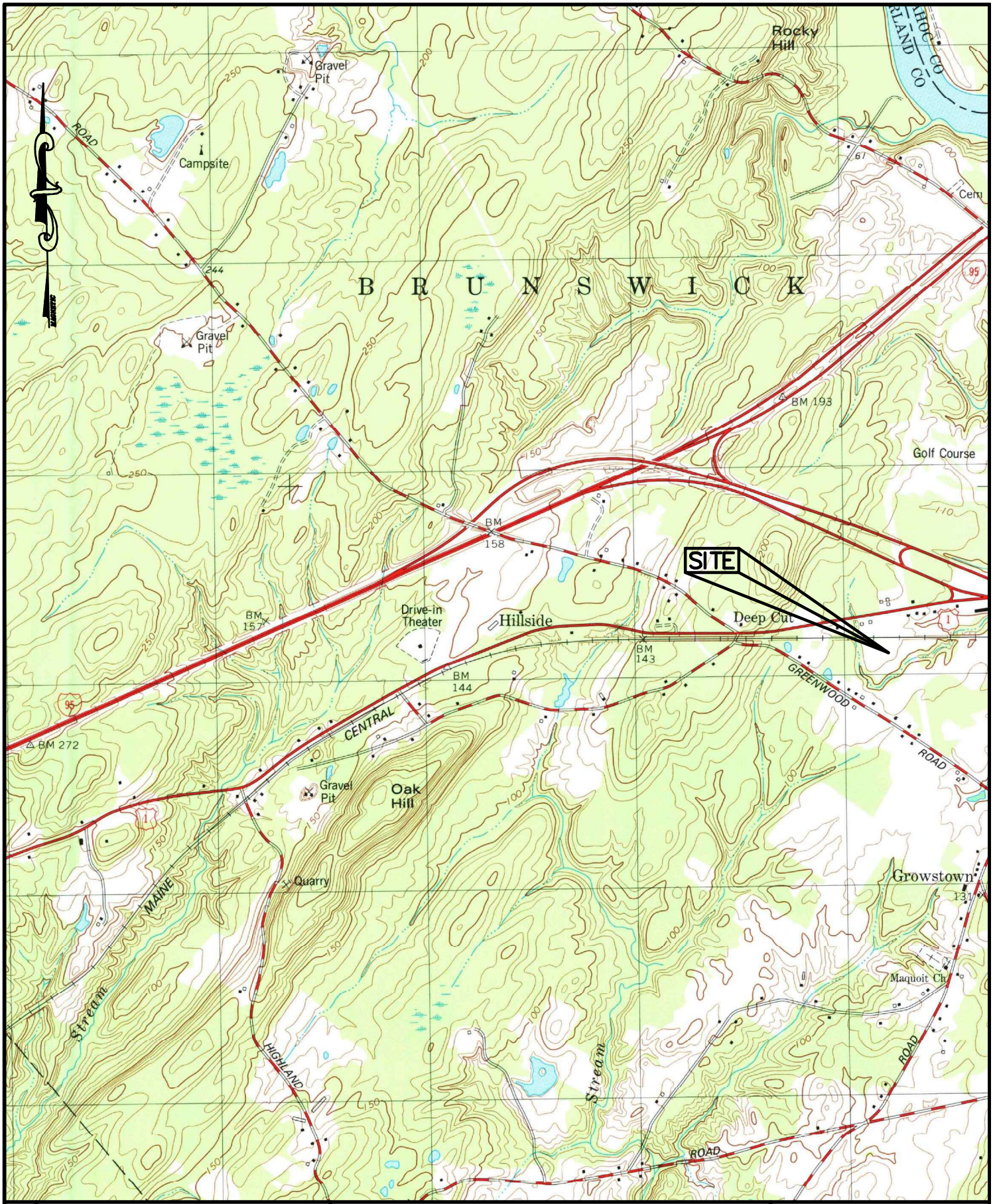
A certain Polyphase Contract dated September 10, 1993 and recorded in the Cumberland County Registry of Deeds at Book 11456, Page 38.

An Amendment to the Polyphase Contract dated February 24, 1995 and recorded in the Cumberland County Registry of Deeds at Book 11856, Page 299.

The rights and easements granted to the Brunswick Sewer District by the Town of Brunswick for a sewage pump station located on Lot 19 as set forth in an instrument dated December 20, 1995 and recorded in said Registry of Deeds in Book 12345, Page 116.

All other easements, covenants, and other matters of record affecting the premises and not expressly set forth above; and real estate taxes for which Grantee by acceptance of this deed agrees to assume responsibility for payment.

Received
Recorded Register of Deeds
Aug 31,2006 11:46:32A
Cumberland County
John B OBrien



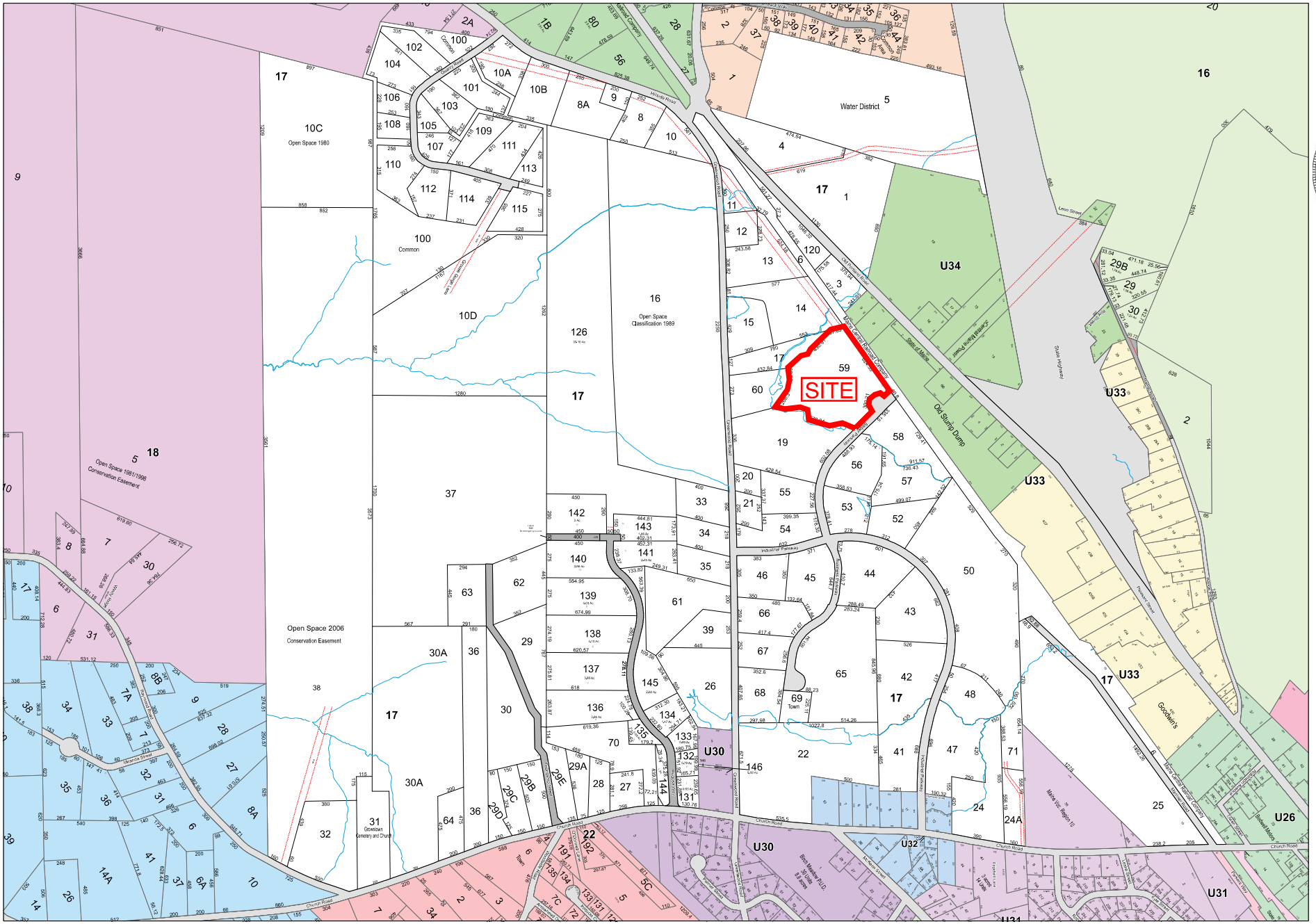
SHEET: 1 OF 1

SITELINES
119 PURINTON ROAD, SUITE A
BRUNSWICK, ME 04011
207.725.1200
CIVIL ENGINEERS ▪ LAND SURVEYORS

USGS MAP

MARIJUANA CULTIVATION FACILITY
BIBBER PROPERTIES, LLC
43 BIBBER PKWY, BRUNSWICK, MAINE

DATE: 01–29–20
SCALE: 1" = 2000'
JOB: 4029
FILE: 4029–USGS



Town of
BRUNSWICK
Maine

Legend

- Lines_Other
- Other Road
- Hydrography Line
- ROW Property Access
- Town Boundary
- Other Lot Boundary
- Parcels_Lines
- Public Road
- Private Road
- ROW
- Water

Disclaimer:
The information is provided as a reasonably accurate point of reference, but is not guaranteed and is not to be used for conveyances.
The Town of Brunswick shall not be held responsible for the accuracy or misuse of this data.
Copyright Town of Brunswick.

1 inch = 300 feet

Revised To: April 1, 2019

Maps Prepared by:
Town of Brunswick

Revised and Reprinted By:

CAI Technologies
Precision Mapping, Geospatial Solutions

MAP 17

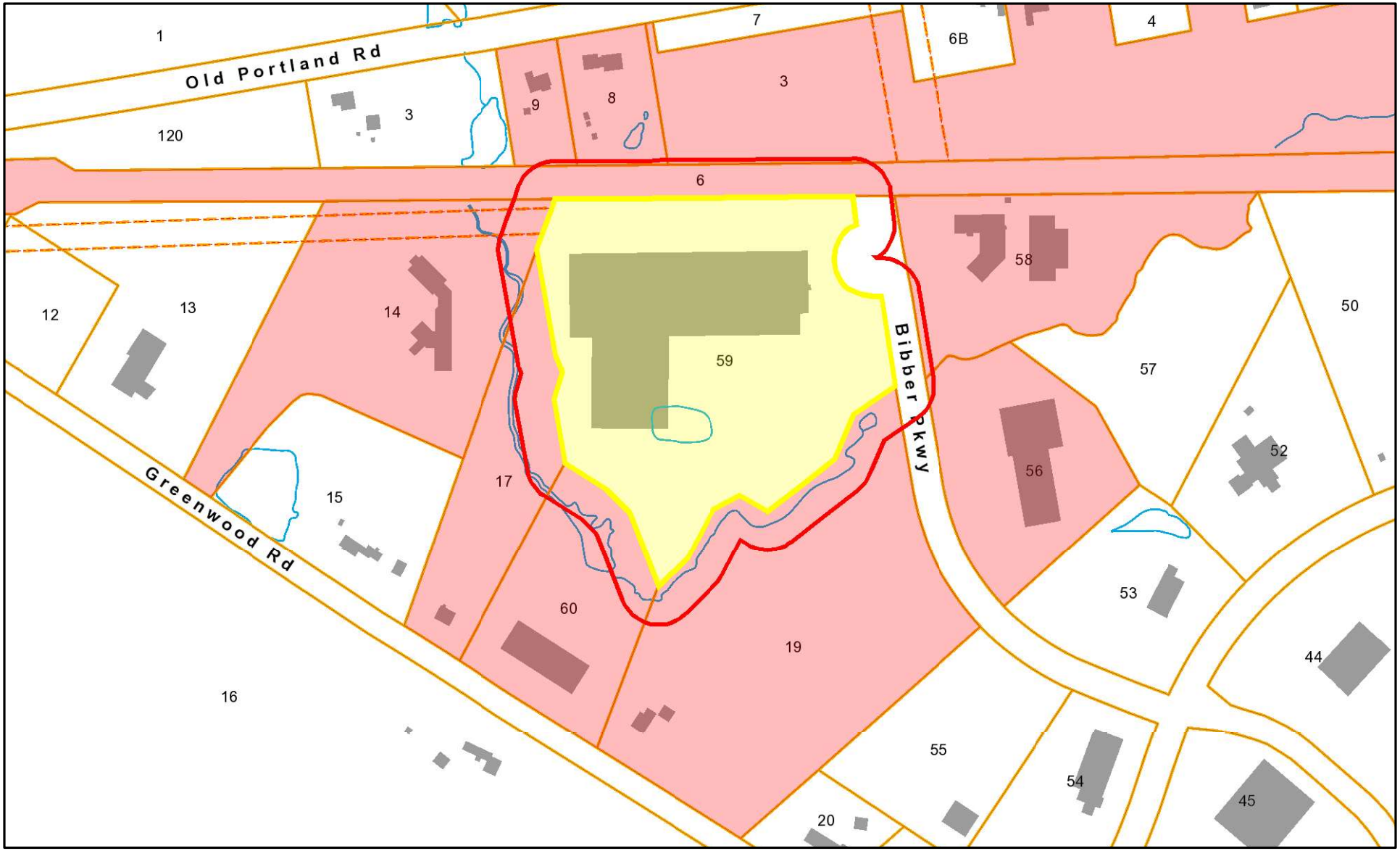
Abutter Map

Brunswick, ME

1 inch = 271 Feet

0 271 542 814

January 29, 2020



Data shown on this map is provided for planning and informational purposes only. The municipality and CAI Technologies are not responsible for any use for other purposes or misuse or misrepresentation of this map.

75 foot Abutters List Report

Brunswick, ME
January 29, 2020

Subject Property:

Parcel Number:	17-59	Mailing Address:	BIBBER PROPERTIES LLC
CAMA Number:	17-59		ATTN: COMMERCIAL PROP MGMT 4
Property Address:	43 BIBBER PARKWAY		MILK ST SUITE 103
			PORTLAND, ME 04101

Abutters:

Parcel Number:	17-14	Mailing Address:	MAINE OIL DEALERS ASSOCIATION
CAMA Number:	17-14		25 GREENWOOD RD
Property Address:	25 GREENWOOD RD		BRUNSWICK, ME 04011
Parcel Number:	17-17	Mailing Address:	CORON, ALEX B
CAMA Number:	17-17		35 GREENWOOD RD
Property Address:	35 GREENWOOD RD		BRUNSWICK, ME 04011
Parcel Number:	17-19	Mailing Address:	COULOMBE, PIERRE
CAMA Number:	17-19		47 GREENWOOD RD
Property Address:	47 GREENWOOD RD		BRUNSWICK, ME 04011
Parcel Number:	17-56	Mailing Address:	GARREC, JEAN M & LAURIE L JT
CAMA Number:	17-56		12 SANDY BEACH RD
Property Address:	22 BIBBER PARKWAY		FREEPORT, ME 04032
Parcel Number:	17-58	Mailing Address:	COASTAL REALTY GROUP LLC
CAMA Number:	17-58		56 BIBBER PARKWAY
Property Address:	56 BIBBER PARKWAY		BRUNSWICK, ME 04011
Parcel Number:	17-6	Mailing Address:	MAINE CENTRAL RR CO
CAMA Number:	17-6		IRON HORSE PK
Property Address:	34 CHURCH RD		N BILLERICA, MA 01862
Parcel Number:	17-60	Mailing Address:	GREENWOOD TRADES BUILDING LLC
CAMA Number:	17-60		41 GREENWOOD RD SUITE 3
Property Address:	41 GREENWOOD RD		BRUNSWICK, ME 04011-7336
Parcel Number:	U34-3	Mailing Address:	LINNCO INC
CAMA Number:	U34-3-2		ONE OFFICE PL
Property Address:	3 OLD PORTLAND RD		BRUNSWICK, ME 04011
Parcel Number:	U34-3	Mailing Address:	STANLEY, ROB & RHIANNON
CAMA Number:	U34-3-4		118 MAGNOLIA AVE
Property Address:	0 LINNHAVEN SALES		SEFFNER, FL 33584
Parcel Number:	U34-3	Mailing Address:	SANDERS, NANCY
CAMA Number:	U34-3-5		14 SOUTH ST
Property Address:	0 LINNHAVEN SALES		FREEPORT, ME 04032

75 foot Abutters List Report

Brunswick, ME
January 29, 2020

Parcel Number:	U34-8	Mailing Address:	BOUCHER, DOMINIC E
CAMA Number:	U34-8		P O BOX 897
Property Address:	67 OLD PORTLAND RD		BRUNSWICK, ME 04011

Parcel Number:	U34-9	Mailing Address:	HADLEY, JOHN R & KAREN E JT
CAMA Number:	U34-9		73 OLD PORTLAND RD
Property Address:	73 OLD PORTLAND RD		BRUNSWICK, ME 04011

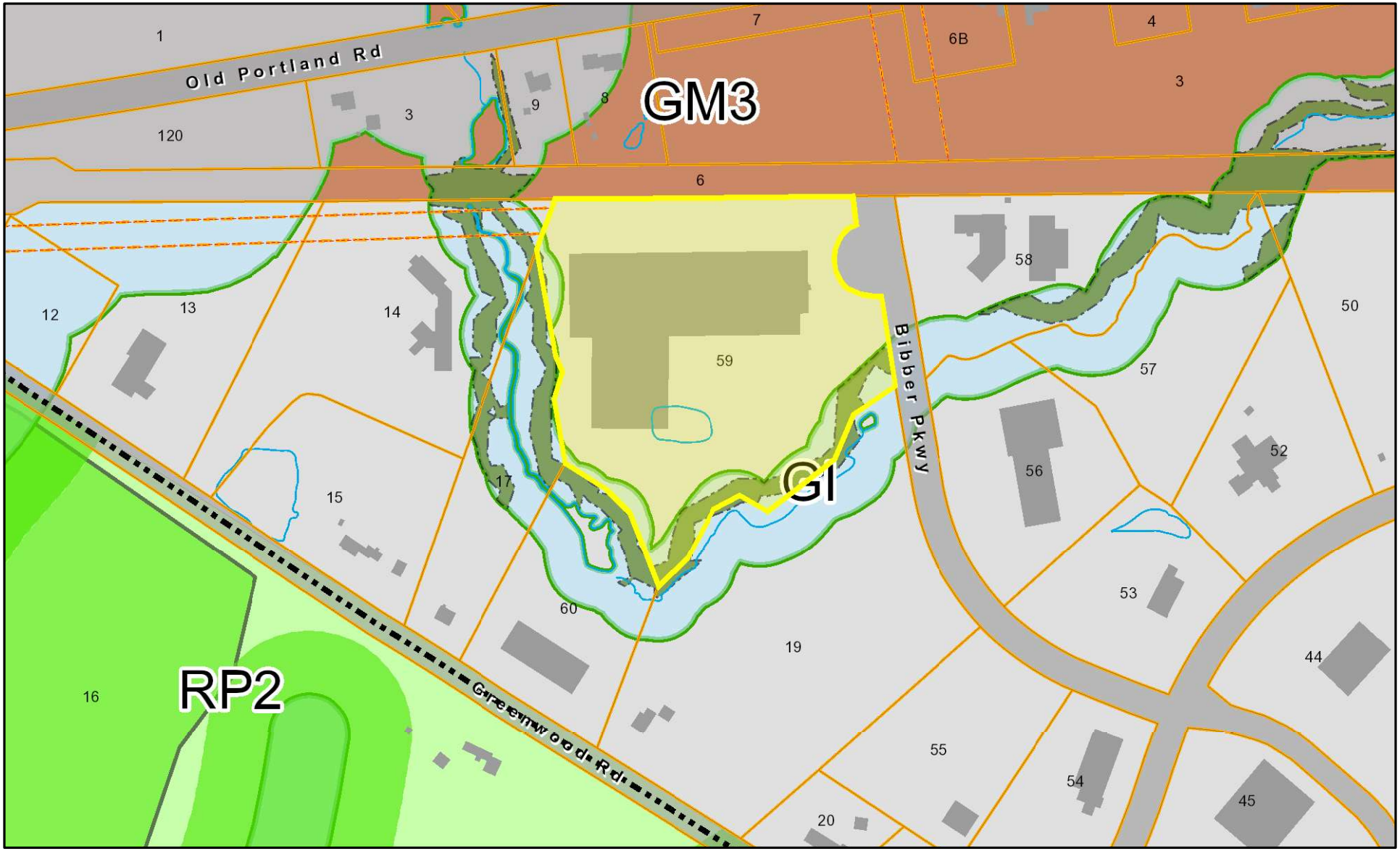
Zoning Map

Brunswick, ME

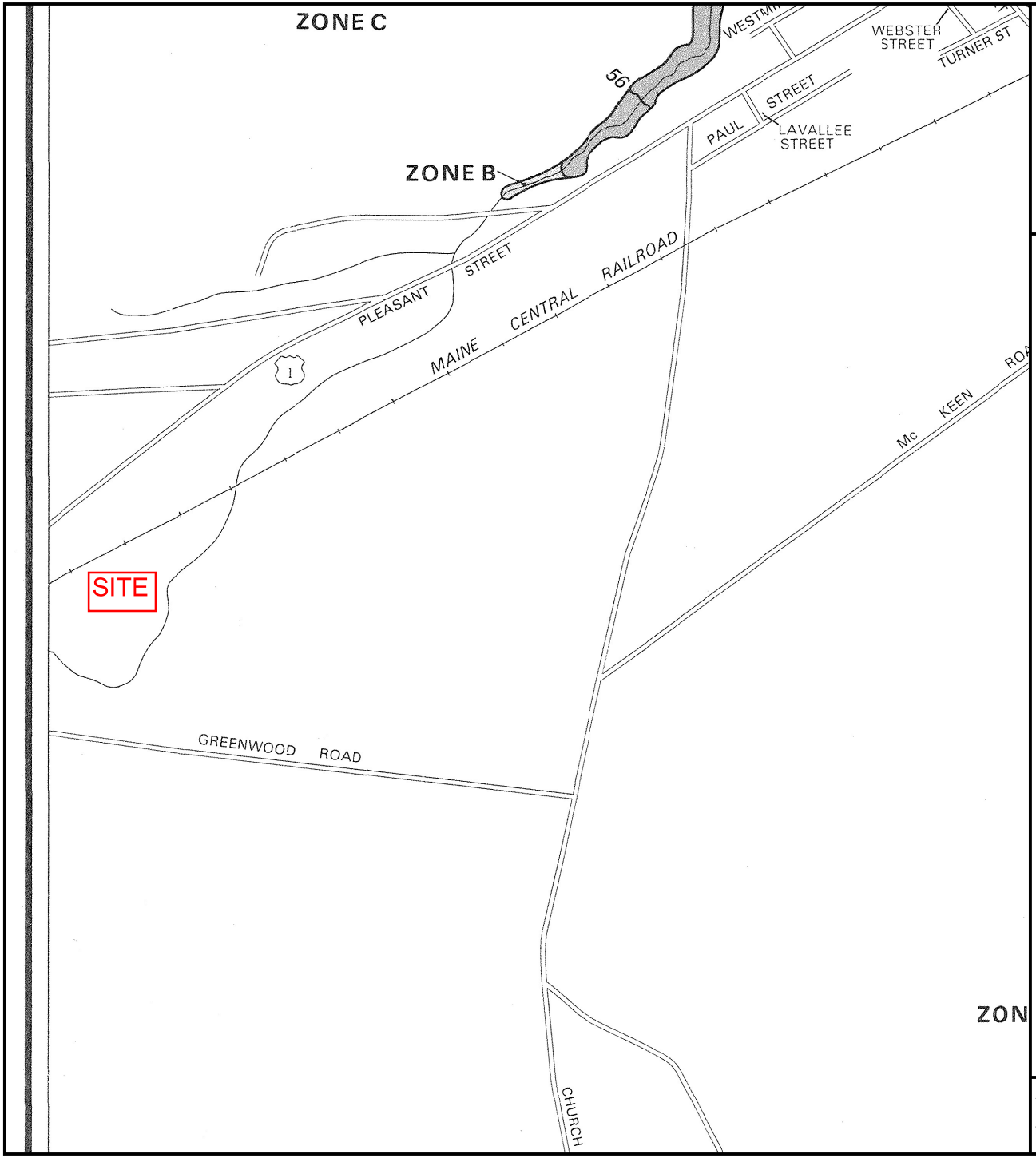
1 inch = 271 Feet

0 271 542 814

January 29, 2020



Data shown on this map is provided for planning and informational purposes only. The municipality and CAI Technologies are not responsible for any use for other purposes or misuse or misrepresentation of this map.



APPROXIMATE SCALE

1000 0 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

TOWN OF
BRUNSWICK, MAINE
CUMBERLAND COUNTY

PANEL 15 OF 35
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
230042 0015 B

EFFECTIVE DATE:
JANUARY 3, 1986

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Aerial Map

Brunswick, ME

1 inch = 135 Feet

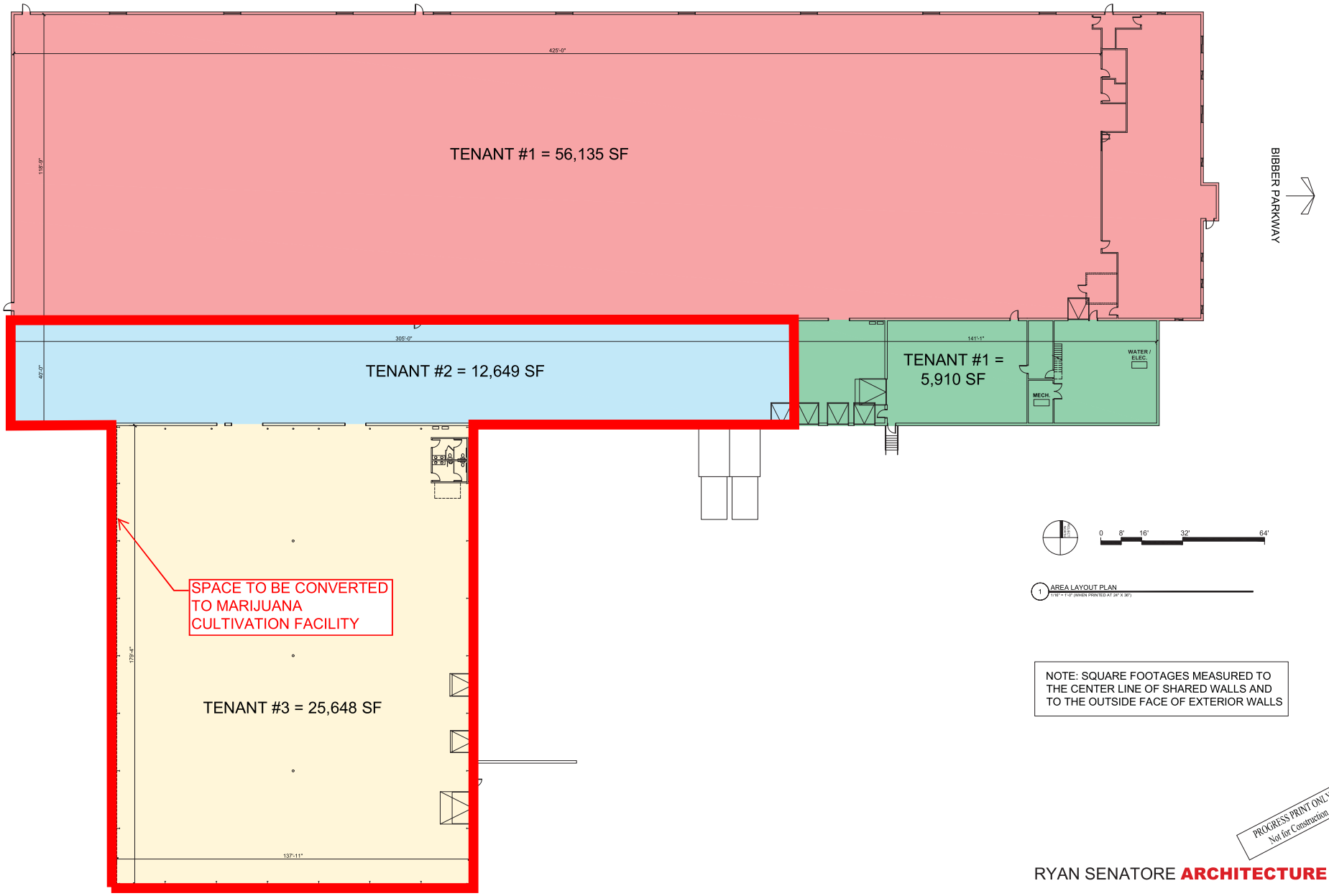
0 135 270 405

January 29, 2020

Data shown on this map is provided for planning and informational purposes only. The municipality and CAI Technologies are not responsible for any use for other purposes or misuse or misrepresentation of this map.

43 BIBBER PARKWAY, BRUNSWICK MAINE

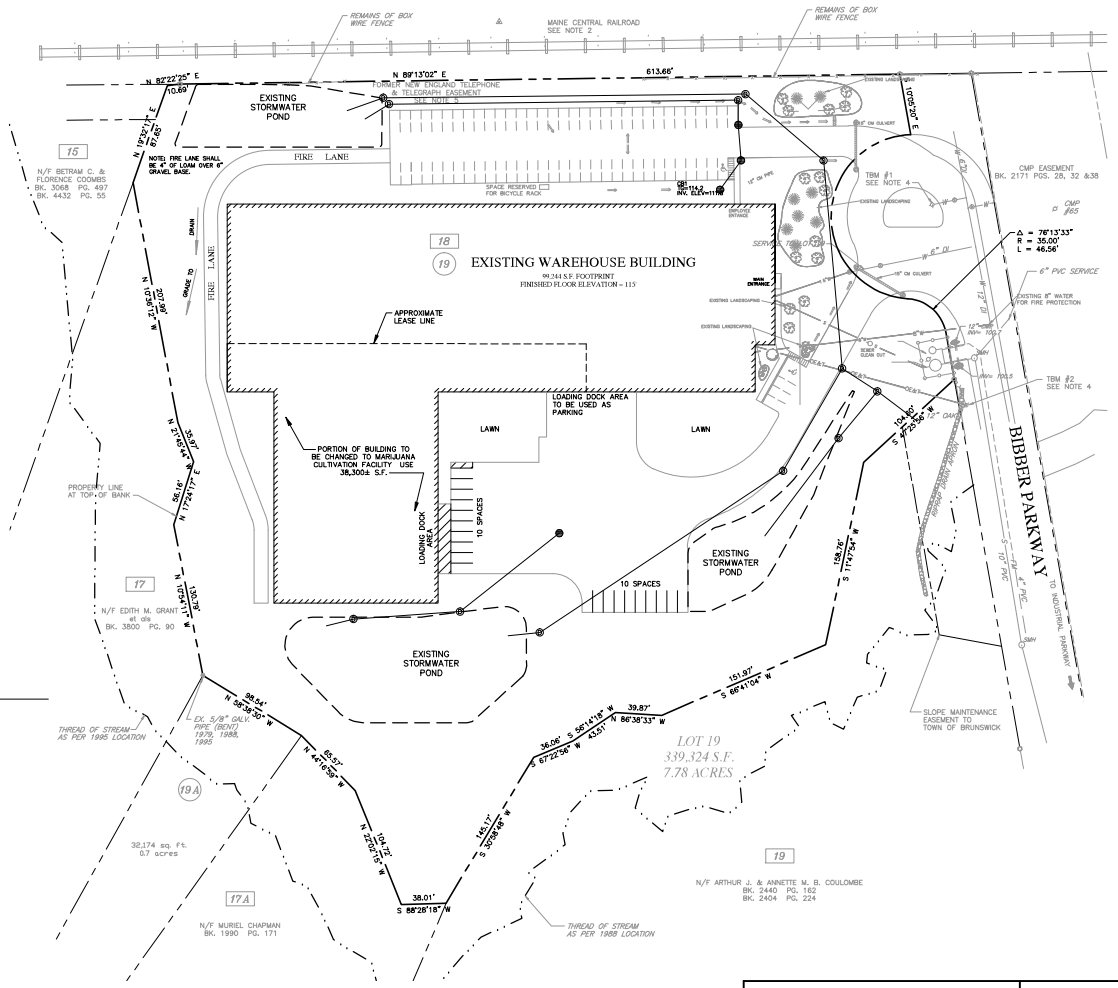
OCTOBER 10, 2018

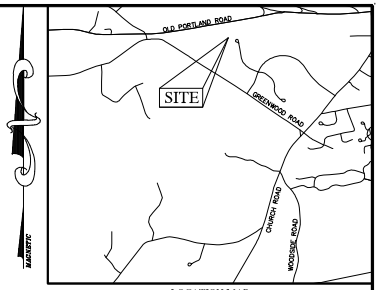


NOTE: SQUARE FOOTAGES MEASURED TO THE CENTER LINE OF SHARED WALLS AND TO THE OUTSIDE FACE OF EXTERIOR WALLS

PROGRESS PRINT ONLY
Not for Construction

RYAN SENATORE **ARCHITECTURE**





LOCATION MAP
NOT TO SCALE

GENERAL NOTES:

1. TITLE REFERENCE FOR SURVEYED PARCEL:

   BK 24324, PG 19

2. PLAN REFERENCE(S):

   (1) TOPOGRAPHIC AND BOUNDARY SURVEY COMPLETED BY WRIGHT PIERCE INC. FOR THE TOWN OF BRUNSWICK ON 03-30-95.

   (2) LAYOUT PLAN COMPLETED BY GORRILL-PALMER CONSULTING ENGINEERS, INC. FOR BIBBER PROPERTIES, LLC, REV. 11-22-06 FOR THE "BRUNSWICK TECHNOLOGIES EXPANSION" PROJECT.

3. AREA INFORMATION:

   LOT AREA: 339,324 S.F. (7.79 ACRES)

4. TAX MAP REFERENCE:

   TAX MAP 17, LOT 59.

5. BASIS OF BEARINGS:

   BEARINGS ARE REFERENCED TO MAGNETIC.

6. FLOOD ZONE INFORMATION:

   PARCEL IS LOCATED WITHIN ZONE C (AREAS OF MINIMAL FLOODING) OF THE FLOOD INSURANCE RATE MAPS FOR CUMBERLAND COUNTY, MAINE. THE PROJECT IS LOCATED ON PANEL 15 OF 35 (COMMUNITY PANEL 230042-0015-B, EFF. DATE JANUARY 3, 1986)

UTILITY NOTES:

1. INFORMATION REGARDING THE LOCATION OF EXISTING UNDERGROUND UTILITIES IS A COMPILATION OF THAT FOUND IN THE FIELD AND THAT SHOWN ON A PREVIOUS PLANS, AND SHALL NOT BE CONSIDERED AN AS-BUILT PLAN. CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFYING UTILITY LOCATIONS PRIOR TO COMMENCING WORK. NOTIFY ENGINEER OF ANY DISCREPANCY BETWEEN UTILITIES AS SHOWN AND AS FOUND. CONTRACTOR SHALL NOTIFY DIG-SAFE (1-888-344-7233) PRIOR TO EXCAVATION.

LAYOUT NOTES:

1. ALL DIMENSIONING, UNLESS NOTED OTHERWISE, IS TO THE FACE OF CURB OR FOUNDATION.

2. BOUNDARY INFORMATION ON LAYOUT PLAN IS FOR REFERENCE ONLY. REFER TO CERTIFIED BOUNDARY PLANS FOR BOUNDARY INFORMATION.

3. ALL HANDICAP ACCESSIBLE PARKING SPACES, RAMPS AND SIDEWALKS SHALL BE CONSTRUCTED IN CONFORMANCE WITH THE AMERICANS WITH DISABILITIES ACT (ADA).

4. ALL SITE SIGNAGE AND PAVEMENT MARKINGS SHALL CONFORM TO THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES. (MUTCD)

5. BUILDING FOUNDATION SHOWN IS NOT FOR FOUNDATION LAYOUT. COORDINATE SITE WORK WITH ARCHITECTURAL DRAWINGS INCLUDING BUILDING FEATURES AND FOUNDATION PLAN. .

GROWTH INDUSTRIAL ZONING DISTRICT (GI)		
ZONING STANDARD	REQUIRED	PROPOSED
MIN. LOT SIZE:	7,000 S.F.	339,324 S.F.
MIN. LOT WIDTH:	50'	264'
MIN. SETBACKS:		
FRONT:	10'	>10'
REAR:	20'	>20"
SIDE:	15'	>15'
MAX. HEIGHT:	60'	<60'
MAX. IMPERVIOUS COVERAGE:	80%	48%

APPROVAL
TOWN OF BRUNSWICK PLANNING BOARD

DATE APPROVED:

DATE SIGNED:

CHAIRMAN:

LEGEND

■	MONUMENT FOUND
●	IRON MARKER FOUND
	BOUNDARY LINE OF SURVEYED PARCEL
	BOUNDARY LINE OF ABUTTERS (APPROX.)
	ROAD RIGHT OF WAY LINE (APPROX.)
	COMPUTATIONAL TIE LINE
	STONE WALL (APPROX.)
	EDGE OF TRAVELED WAY
OHE	UTILITY LINE
CMP 13	UTILITY POLE WITH NUMBER
IPF	IRON PIPE FOUND
IRF	IRON ROD FOUND
DH	DRILL HOLE
Δ 4	ARBITRARY TRAVERSE POINT WITH NUMBER
12, 1001	ARBITRARY COMPUTATIONAL POINT NUMBER
BK 10674, PG 197	DEED BOOK & PAGE IN COUNTY REGISTRY OF DEEDS
PB 195, PG 130	PLAN BOOK & PAGE IN COUNTY REGISTRY OF DEEDS
R/W	RIGHT OF WAY
N/F	NOW OR FORMERLY HELD BY
AC.	ACRES
±	MORE OR LESS
	SEWER MANHOLE
	LIGHT POLE
	CATCH BASIN
	WATER SHUT OFF
	HYDRANT
	SIGN
	WATER VALVE
BM	ELEVATION TEMPORARY BENCH MARK
	TEST PIT

PROGRESS PRINT
THIS PLAN IS ISSUED FOR REVIEW AND INFORMATION PURPOSES ONLY. THIS PLAN IS SUBJECT TO CHANGE AND IS NOT FOR PRICING OR CONSTRUCTION. PRICING BASED ON THIS PLAN IS NOT BINDING UNLESS SIGNED BY BOTH CONTRACTOR AND OWNER.

CALL DIG SAFE UTILITY LOCATION
1-888-344-7233
STATE LAW REQUIRES ADVANCE NOTICE OF AT LEAST 3 BUSINESS DAYS BEFORE YOU DIG, GRADE OR EXCAVATE FOR THE MARKING OF UNDERGROUND UTILITIES

GRAPHIC SCALE
50 0 25 50 100
(IN FEET)
1 inch = 50 ft.

ISSUED FOR:
PERMITTING REVIEW

JOSEPH J. MARDEN 12828 LICENSED PROFESSIONAL ENGINEER STATE OF MAINE
02-04-20

1.	02-04-20	SUBMITTED TO TOWN FOR SKETCH REVIEW JJM

TITLE:
SITE DEVELOPMENT PLAN

PROJECT:
CHANGE OF USE – MARIJUANA CULTIVATION FACILITY
43 BIBBER PARKWAY, BRUNSWICK, ME 04011

PREPARED FOR:
BIBBER PROPERTIES, LLC
PO BOX 36092, CHARLOTTE, NC 28236-6092

SITELINES
119 PURINTON ROAD, SUITE A
BRUNSWICK, MAINE 04011
207.725.1200
CIVIL ENGINEERS ▪ PLANNERS ▪ LAND SURVEYORS

FIELD WK: MC/MH	SCALE: 1"=50	SHEET: 1
DRN BY: JJM	JOB #: 4029	
CHD BY: CYN	MAP/LOT: 17/56	
DATE: 01-30-20	FILE: 4029-SITE	

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X:\LAND PROJECTS\4029 BIBBER PARKWAY - BRUNSWICK\DWG\4029-SITE.DWG, SITE, 2/4/2020 1:58 PM, JOSEPH MARDEN

Town of Brunswick, Maine

DEPARTMENT OF PLANNING AND DEVELOPMENT

MEMORANDUM

TO: Planning Board

FROM: Jared Woolston, AICP

DATE: February 21, 2020

SUBJECT: SPO Zoning Map Amendment

I. ZONING MAP REQUEST SUMMARY

Staff review is based on the material provided in the Town of Brunswick Zoning Amendment Request for Russell and Janet Douglas Survivor's Trust (c/o Paul Douglas) by Sitelines PA (Attn: Curtis Neufeld, PE). The applicant requests adjusting Brunswick's official Shoreland Protection Overlay (SPO) Map to indicate *stream(s)* with no jurisdictional non-forested *freshwater wetland* at the subject parcel (Map 17/U34, Lots 1/15, and 19).

II. MANDATORY SHORELAND ZONING ACT & BRUNSWICK ZONING CONTEXT

Streams within Brunswick's SPO are often depicted with a 75-foot boundary and *freshwater wetlands* with a 250-foot boundary to reflect the jurisdictional shoreland area for these shoreland areas. Most of the larger Shoreland Protection Overlay - Stream Protection Subdistrict (SPO-SP) boundaries that appear on Brunswick's Official Zoning map indicate areas that may have wetlands and streams or simply a vast network of braided streams. Without a field determination, staff must rely on the mapped SPO.

From town records, the Official Brunswick Shoreland Zoning Map was created with the best Geographic Information System (GIS) data and field reports from staff and citizen scientists available at the time of adoption. Nevertheless, the mapped SPO is occasionally determined to be land areas that are not protected by the Brunswick Zoning Ordinance pursuant to the applicable text of the SPO (i.e. definitions and standards). Staff evaluate such land areas within the mapped SPO on a case-by-case basis and are usually able to continue reviewing development proposals based on field reports despite map discrepancies.

The *stream* definition and the *tributary stream*[1] definition require a field evaluation within the SPO

[1] Tributary Stream: For purposes of the Shoreland Protection Overlays (SPO), a channel between defined banks created by the action of surface water, which is characterized by the lack of terrestrial vegetation or by the presence of a bed, devoid of topsoil, containing waterborne deposits or exposed soil, parent material or bedrock; and which is connected hydrologically with other water bodies. "Tributary stream" does not include rills or gullies forming because of accelerated erosion in disturbed soils where the natural vegetation cover has been removed by human activity (amended 8/6/18).

This definition does not include the term "stream" as defined elsewhere in this Ordinance, and only applies to that portion of the tributary stream located within the SPO of the receiving water body or wetland

to determine jurisdictional areas. In some cases, Brunswick's Shoreland Zoning Map contains areas of SPO-SP that contain freshwater wetlands, streams, and tributary streams. Such field evaluations could result in no freshwater wetlands identified within the SPO. However, caution is advised from staff discussions with Maine DEP that the Maine Attorney General's office is less likely to provide technical support for a Shoreland Zoning map that contains an extensive discrepancy between mapped and actual SPO conditions (i.e. the presence, absence, or true location of shoreland areas).

Maine Department of Environmental Protection (DEP) Rule Chapter 1000 notes,

> "Municipalities are encouraged to incorporate specific written descriptions of district boundaries into the Ordinance so that disputes over district boundaries are minimized. The Maine Supreme Judicial Court has held that the Official Shoreland Zoning Map is the primary tool to which to refer in determining district boundaries under ordinances that are not more explicit in their district descriptions than the language of the Guidelines, and that where there is inconsistency between the Map and these general text descriptions of the shoreland districts as provided in the minimum guidelines, the Map prevails."

Brunswick's **stream**[2] definition is as follows:

Stream: *For purposes of the Stream Protection Sub-district (SPO-SP) within the Shoreland Protection Overlay (SPO) District, a stream shall include a channel between defined banks. A channel is created by the action of surface water and has two (2) or more of the following characteristics.*

(A) It contains or is known to contain flowing water continuously for a period of at least six (6) months of the year under normal seasonal rainfall conditions.

(B) The channel bed is primarily composed of mineral material such as sand, scoured silt, gravel, clay, or other parent material that has been deposited or scoured by water.

(C) The channel contains aquatic animals such as fish, aquatic insects, or mollusks in the water or, if no surface water is present, within the stream bed.

(D) The channel contains aquatic vegetation and is essentially devoid of upland vegetation. Bordering freshwater wetlands that are not separated from the stream channel by a distinct change in elevation (such as hillside groundwater seeps) or barrier, and wetlands that are subject to periodic flooding or soil saturation as a result of high stream flows are considered part of the stream. Where these wetlands are present, the normal high water line of the stream is measured from the upland/wetland transition of bordering wetlands subject to periodic stream water flooding or saturation, or where changes in wetland vegetation, soil characteristics, or topography clearly demonstrate wetland hydrology not associated with periodic flood flows.

Natural and artificial impoundments at the source and along the course of the stream are considered to be part of the stream.

A stream does not mean a ditch or other drainageway constructed, or constructed and maintained, solely for the purpose of draining storm water or a grassy swale.

Within the Rural Protection Stormwater Management Overlay (RPSMO) District, the edge of the

[2] Brunswick Zoning Ordinance, p. 1-35

stream is at the bankfull stage of the upper level high water flows. The bankfull stage shall be identified at the break in slope of the stream bank at which water starts to flow over the depositional surface of the floodplain. (Amended 10/7/19)

This definition is based on physical characteristics that require field verification.

Brunswick's **freshwater wetland**[3] definition is as follows:

Wetland, Freshwater: *A freshwater swamp, marsh, bog, or similar area other than a forested wetland which is:*

(1) Of ten (10) or more contiguous acres; or of less than ten (10) contiguous acres and adjacent to a surface water body, excluding any river or stream, such that in a natural state, the combined surface area is in excess of ten (10) acres; and

(2) Inundated or saturated by surface or ground water at a frequency and for a duration sufficient to support, and that under normal circumstances does support, a prevalence of wetland vegetation typically adapted for life in saturated soils. Freshwater wetlands may contain small stream channels or inclusions of land that do not conform to the criteria of this definition.

III. STAFF RECOMMENDATION

Based on the information provided in the report prepared by Atlantic Environmental on June 14, 2019 and revised most recently on December 11, 2019 the subject parcel contains a small stream and less than 10 acres of non-forested freshwater wetlands. While field adjustments could be considered by the review authority, amending the Official Zoning map to reflect the true field conditions is advised for consistency with the text of the zoning ordinance.

DRAFT MOTION

That the Planning Board recommends the Town Council amend the Official SPO map to depict the streams on the subject parcel as depicted on the plans entitled "Wetlands Exhibit" prepared by Sitelines and dated September 15, 2019.

[3] Brunswick Zoning Ordinance, p. 1-39

SITELINES
Civil Engineers • Land Surveyors

November 19, 2019

3914

Mr. Jared Woolston
Town Planner
Town of Brunswick
85 Union Street
Brunswick, ME 04011
<via email>

RE: Request for Shoreland Protection Overlay Change
Old Portland Road
Tax Map 17, Lot 1 and Tax Map U34, Lots 15 and 19

Dear Jared:

On behalf of Paul Douglas and Ann Huffsmith, trustees for the Russell and Janet Douglas Survivor's Trust, Sitelines is requesting the Town of Brunswick revise the Shoreland Protection Overlay (SPO) boundaries on Tax Map 17, Lot1 and Tax Map U34 Lots 15 and 19. Almost the entirety of the two parcels is mapped as being within a the SPO. The SPO is based on a wetland delineation from several years ago that did not consider large areas of uplands with the overall perimeter. A new wetland delineation was completed by Atlantic Environmental (Tim Forrester) that identified the upland areas and other differences in the shape and extent of the wetland areas. A comparison of the previous and recent delineations is enclosed for reference.

In addition to the refined wetland boundaries, the wetlands have been identified as 'forested' wetlands. Section 2.3.3 of the Zoning Ordinance states a SPO district consists of:

> All land areas within 250 feet, horizontal distance, of the normal high-water line of any river; within 250 feet, horizontal distance, of the upland edge of a coastal wetland, including all areas affected by tidal action; within 250 feet of the upland edge of a freshwater wetland; and all land areas within 75 feet, horizontal distance of the edge of a tributary stream *(amended 8/6/18)*.

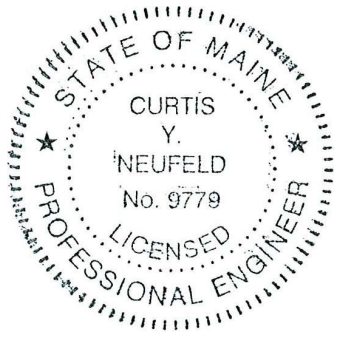
The wetland areas identified on the applicant's parcels do not meet the above definition and the SPO is not appropriate. There is stream traversing the parcel, and the SPO Stream Protection Sub-District (SPO-SP), including all areas within 75-feet from the edge of the stream is applicable and should be identified on the Zoning Map where appropriate.

This information was submitted for review by staff and it is our understanding that staff concur the wetlands and associated SPO are not consistent with section 2.3.3. The potential for significant vernal pools within the parcels was also evaluated and none were found.

We request this matter be brought to the Town of Brunswick Planning Board for consideration and recommendation to the Town Council to amend the SPO as depicted on the Zoning Map and GIS database to reflect the field verified conditions. This amendment will allow areas ranging from 0.5 acres to three (3) or more acres of land to be available for appropriate development within the zone.

We look forward to meeting with the Town Planning Board at their December 10, 2019 meeting to discuss this request as a workshop item. Should you have any questions regarding this proposal, please contact me.

Very truly yours,



Curtis Neufeld, P.E.
Vice President

Enclosure

cc: Paul Douglas, The Russell and Janet Douglas Survivor's Trust
Matt Panfil, Director of Planning and Development
Tim Forrester, Atlantic Environmental

SITELINES
Civil Engineers • Land Surveyors

Attachment A
2019 Wetland Delineation and Vernal Pool Survey

A copy of the vernal pool survey and wetland mapping are enclosed.

ATLANTIC Environmental LLC
135 River Road • Woolwich, ME 04579
tim@atlanticenviromaine.com 207-837-2199
www.atlanticenviromaine.com

~~June 14, 2019~~
(Revised) December 11, 2019

Ms. Ann Huffsmith
Old Portland Road
Brunswick, ME 04011

Re: Wetland Delineation, 0 Portland Road, Brunswick, Maine and follow up site with the Town of Brunswick.

Dear Ms. Huffsmith,

At your request, Atlantic Environmental, LLC. (AE) completed a wetland delineation of three (3) parcels that total 30.4 acres and are identified as Lot #1 on Tax Map #17, and Lot #15 and Lot #19 on Tax Map #U34 in the Town of Brunswick, Maine. The wetland delineation was done in accordance with the U.S. Army Corps of Engineers, Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Regions (Version 2.0). The wetland delineation was performed on May 22, 2019 and May 31, 2019 and all wetlands were flagged with pink, numbered flagging and located with a Global Positioning System (GPS) Trimble® GEO 7X unit by AE staff. A subsequent site visit with Town of Brunswick was held on November 20, 2019.

SITE DESCRIPTION

The entire area is approximately thirty (30) acres in size and is located off Portland Road in the Town of Brunswick. The site is undeveloped and includes forested uplands, forested wetlands and a stream. According to the U.S. Department of Agriculture, *Soil Survey of Cumberland and Part of Oxford County, Maine*, there are several soil types mapped within the project areas. They include Belgrade very fine sandy loam – 0 – 8% slopes (BgB), a moderately well-drained soil, Biddeford mucky peat – 0 – 3% slopes, a very poorly drained soil, Lamoine silt loam – 3 – 8% slopes (BuB), a somewhat poorly drained soil, Lyman-Abram complex – 8 – 15% slopes, very rocky (HsC), a somewhat excessively drained soil, and Scantic silt loam – 0 – 3% slopes (Sn), a poorly drained soil.

SITE VIST WITH JARED WOOLSTON, TOWN PLANNER, TOWN OF BRUNSWICK

At the request of Jared Woolston, Town Planner for the Town of Brunswick, a site visit was conducted on Wednesday November 20, 2019. The focus of the site visit was to review the location of the stream channel as depicted on the Town's shoreland zoning map in comparison to the stream channel shown on AE's wetland delineation map. The subject parcels, as well as, the area between the

I-295 on/off ramps and the area north of the I-295 on ramp were walked. The Town's map indicated a stream channel extends from Old Portland Road northwest off the parcel. AE's map indicated a stream channel begins at Old Portland Road (in the same location as the Town's map) and extends north/northeast to the I-295 off ramp. As a result of that site visit, AE has revised its map to include an additional short channel that extends to the west off of the main channel that runs north. Additionally, the main stem of the channel does not extend all the way to the I-295 off ramp and has been shortened. This discrepancy is an over estimation of the length of the stream channel based on a review of aerial imagery. The wetland to the north of the stream channel is dominated by red maple, speckled alder, winterberry and sensitive fern (see Photograph Nine).

DESCRIPTION OF WETLANDS

AE identified five (5) wetlands and the canopy and shrub layers in each of these wetlands are dominated by Red Maple (*Acer rubrum*) and Speckled Alder (*Alnus incana*). The herbaceous layer includes Sensitive Fern (*Onoclea sensibilis*), High Bush Blueberry (*Vaccinium corymbosum*), Interrupted Fern (*Osmunda claytoniana*), Japanese Honeysuckle (*Lonicera japonica*), Jewelweed (*Impatiens capensis*), and Horsetail (*Equisetum arvense*). The adjacent uplands are dominated by White Pine (*Pinus strobus),* Red Oak (*Quercus rubra), and* Bracken Fern (*Pteridium aquilinum*). The primary hydrology indicators are Saturation (A3) and Water Stained Leaves (B10). Soils within the wetland were identified as hydric within the upper ten (10) inches of the soil profile with a value or three (3) or less and a chroma of two (2) or less. Wetland One (W1) contains a stream channel.

Potential Vernal Pools

AE looked for potentially significant vernal pools that are regulated under Chapter 335 of the Natural Resources Protection Act (NRPA) on April 22, May 22, and May 31, 2019. Based on our assessment, there was an area located off Portland Road in W1 that contained twenty-nine (29) spotted salamander egg masses and twelve (12) wood frog egg masses. However, this area was part of a manmade ditch/wetland area and does not meet the definition of a significant vernal pool as defined in Chapter 335 of the NRPA. Data sheets have been submitted to the Maine Department of Inland Fisheries and Wildlife (MDIFW). If MDIFW agrees with our assessment, the pool location will be recorded as non-significant.

MDIFW and the DEP have signed off that the pool is anthropogenic (manmade) and will not be subject to Significant Vernal Pool regulations.

STATE AND FEDERAL REGULATORY REVIEW -

All wetlands are regulated by the Maine Department of Environmental Protection (DEP) under the Natural Resources Protection Act (NRPA) and by the U.S. Army Corps of Engineers (Corps) under the Programmatic General Permit (PGP). The DEP also defines specific types of wetlands as Wetlands of Special Significance (WOSS) if they meet the specific criteria of Section 4 of Chapter 310 of the NRPA. Based on AE's assessment of the wetlands, the wetlands that are adjacent to the stream meet the definition of a WOSS. There were no WOSS identified in W2 – W5. Under the NRPA, Section 480-Q, a one-time wetland impact less than 4,300 sq. ft. do not require a permit from the DEP. If the proposed project alters more than this amount, AE suggests that impacts to these wetlands and/or the associated

buffers should be reviewed by the U.S. Army Corps of Engineers and the Maine Department of Environmental Protection before any soil disturbance onsite.

TOWN OF BRUNSWICK -

Based on the Town of Brunswick's Zoning Map, The area is mapped as Growth Mixed-Use (GM3). In addition, the majority of the parcels are mapped in the Stream Protection Subdistrict of the Shoreland Protection Overlay Zone – see Figure One. All new principal and accessory structures shall be setback seventy-five (75) feet from the edge of a stream or tributary stream and one hundred and twenty-five (125) feet from the upland edge of a freshwater wetland. AE highly recommends that you contact the Town of Brunswick Planning Department to discuss any proposed development of these parcels.

In addition to the zoning requirements, the Town of Brunswick regulates Freshwater Wetlands as, "a freshwater swamp, marsh, bog, or similar area other than a forested wetland which is:

A. Of ten or more contiguous acres; or of less than ten contiguous acres and adjacent to a surface water body, excluding any river or stream, such that in a natural state, the combined surface area is in excess of ten acres; and

B. Inundated or saturated by surface or ground water at a frequency and for a duration sufficient to support, and that under normal circumstances does support, a prevalence of wetland vegetation typically adapted for life in saturated soils. Freshwater wetlands may contain small stream channels or inclusions of land that do not conform to the criteria of this definition.

All five wetlands are forested wetlands less the 10 acres in size and therefore do not meet the Town's definition as a freshwater wetlands.

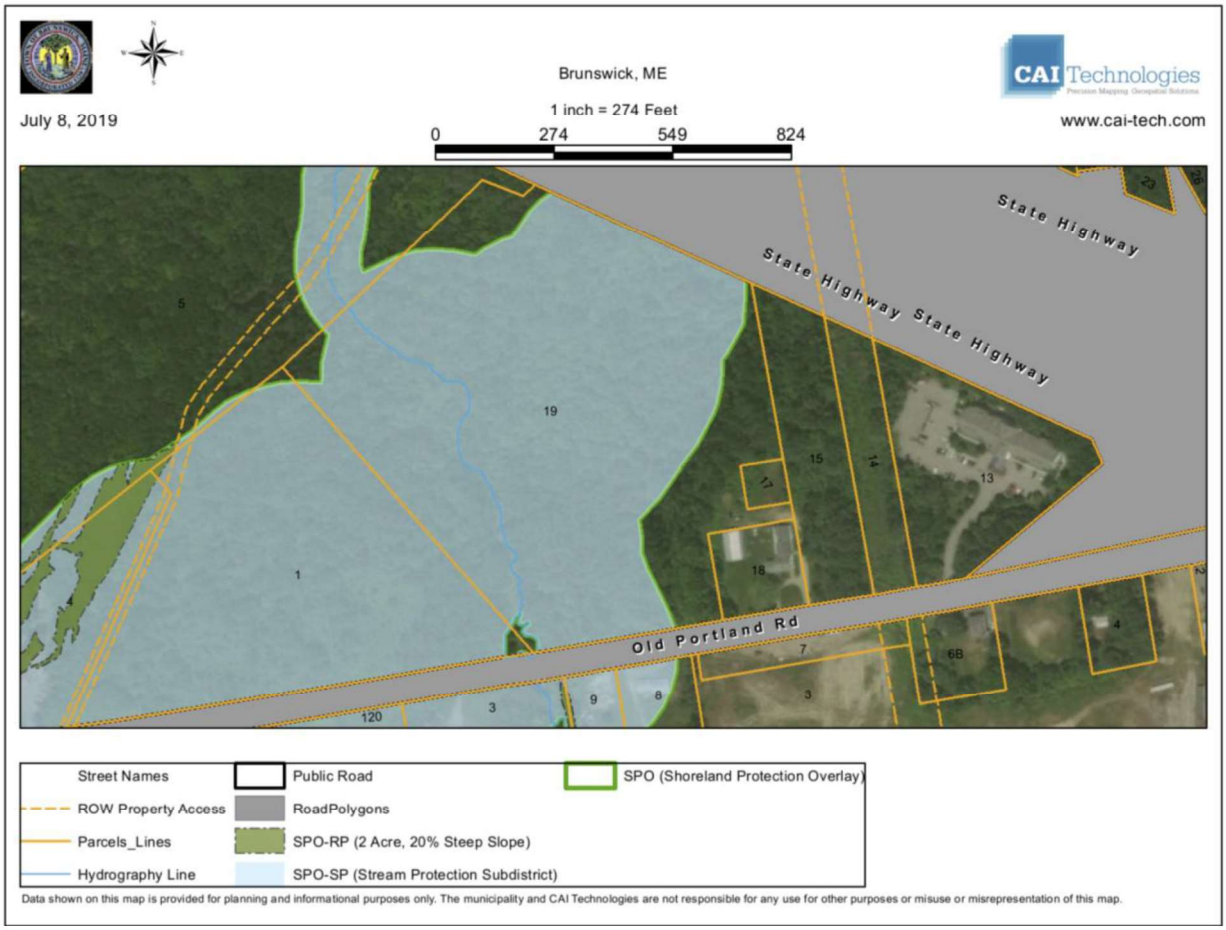


Figure One. Town of Brunswick Zoning Map for subject parcels. Note blue area delineating Stream Protection Subdistrict of the Shoreland Zoning Overlay Zone.

The Town also regulates streams and associated wetlands as-

Stream: A channel between defined banks created by the action of surface water and has two (2) or more of the following characteristics.

A. It contains or is known to contain flowing water continuously for a period of at least 6 months of the year under normal seasonal rainfall conditions.

B. The channel bed is primarily composed of mineral material such as sand, scoured silt, gravel, clay, or other parent material that has been deposited or scoured by water.

C. The channel contains aquatic animals such as fish, aquatic insects or mollusks in the water or, if no surface water is present, within the stream bed.

D. The channel contains aquatic vegetation and is essentially devoid of upland vegetation.

Bordering freshwater wetlands that are not separated from the stream channel by a distinct change in elevation (such as hillside groundwater seeps) or barrier, and wetlands that are subject to periodic flooding or soil saturation as a result of high stream flows are considered part of the stream. Where these wetlands are present, the normal high water line of the stream is measured from the upland / wetland transition of bordering wetlands subject to periodic stream water flooding or saturation, or where changes in wetland vegetation, soil characteristics, or topography clearly demonstrate wetland hydrology not associated with associated with periodic flood flows.

Natural and artificial impoundments at the source and along the course of the stream are considered to be part of the stream. Stream does not mean a ditch or other drainage way constructed, or constructed and maintained, solely for the purpose of draining storm water or a grassy swale.

Based on our field assessment, portions of the area mapped in W1 contain a stream as defined by the DEP and the Town. The Town does require a setback from the edge of the associated wetland of that stream. AE suggests you contact the Town of Brunswick Planning Department prior to any soil disturbance onsite.

Thank you for the opportunity to work with you on this project. Should you have any additional questions, please do not hesitate to contact me at 207-837-2199 or via email at tim@atlanticenviromaine.com.

Sincerely,
Atlantic Environmental LLC.

Timothy A. Forrester, Owner
PWS #1933

ATLANTIC Environmental LLC

Photograph One. View of Wetland One showing portion of delineated wetland. Photographer: Lisa Vickers, Atlantic Environmental, LLC. Date: May 22, 2019.

Photograph Two. Additional View of Wetland One. Photographer: Lisa Vickers, Atlantic Environmental, LLC. Date: May 22, 2019.

Photograph Three. Partial View of Area containing egg masses – note Portland Road in background. Photographer: Lisa Vickers, Atlantic Environmental, LLC. Date: May 22, 2019.

Photograph Four. Wetland Area showing egg masses. Photographer: Lisa Vickers, Atlantic Environmental, LLC. Date: May 22, 2019.

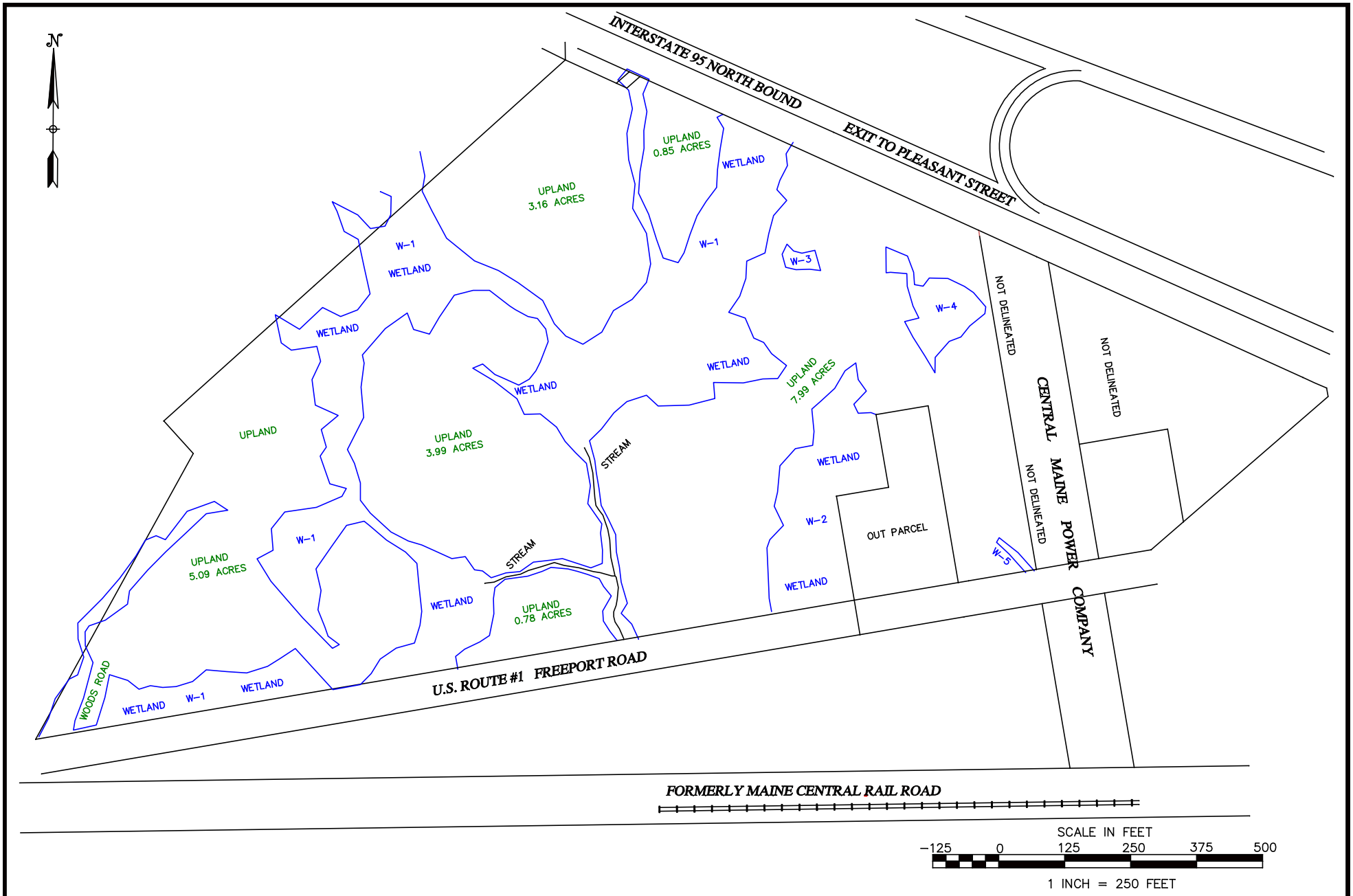
Photograph Five. View of Wetland Two. Photographer: Tim Forrester, Atlantic Environmental, LLC. Date: June 13, 2019.

Photograph Six. View of Wetland Three. Photographer: Tim Forrester, Atlantic Environmental, LLC. Date: June 13, 2019.

Photograph Seven. View of Wetland Four. Photographer: Tim Forrester, Atlantic Environmental, LLC. Date: June 13, 2019.

Photograph Eight. View of Wetland Five. Photographer: Tim Forrester, Atlantic Environmental, LLC. Date: June 13, 2019.

Photograph Nine. View of Wetland One from the end of the stream channel.
Photographer: Tim Forrester, Atlantic Environmental, LLC. **Date: November 20, 2019.**



ATLANTIC ENVIRONMENTAL LLC.
Environmental Consultants
135 River Road, Woolwich, ME 04579
(207) 837-2199
tim@atlanticenviromaine.com

Date: 6/22/2019
Revised: 12/6/2019
Project: Ann Huffsmith
Drafted By: TAF

Wetland Map for 0 Old Brunswick Road, in Brunswick, Maine. Prepared for Ann Huffsmith.

Base Plan provided by Sitelines, PA. This is not a boundary survey and should be used for planning purposes only. Wetland features were GPS located in the field. Property lines are assumed. No delineations were performed east of the CMP line.

Sheet One of One

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JANET T. MILLS
GOVERNOR

GERALD D. REID
COMMISSIONER

July 26, 2019

Tim Forrester
Atlantic Environmental, LLC
135 River Road
Woolwich, ME 04579

Re: Vernal Pool Significance Determination, Pool ID # 3738–Brunswick

Dear Tim Forrester:

Vernal pools are temporary to semi-permanent wetlands occurring in shallow depressions that typically fill during the spring and dry during the summer or in drought years. They provide important breeding and foraging habitat for a wide variety of specialized wildlife species including several rare, threatened, and endangered species.

Based on your field survey, it has been determined that the vernal pool identified above on the property of Anne Huffsmith is NOT SIGNIFICANT because either: 1. the feature does not meet the definition of a vernal pool under the Significant Wildlife Habitat rules, 06-096 CMR 335(9) or 2. the vernal pool does not meet the biological standards for exceptional wildlife use of the Significant Wildlife Habitat rules, 06-096 CMR 335(9)(B). Therefore, activities within 250 feet of the pool are not regulated under the Natural Resources Protection Act (NRPA) unless there are other protected natural resources nearby such as streams or freshwater wetlands. I have attached a copy of the database printout that verifies the State's findings with respect to your survey.

I want to also advise you that the pool area on the property can be considered a freshwater wetland and therefore direct pool alterations may require permitting under the NRPA.

The Department will notify the landowner of the pool status under separate cover. If you have any questions or need further clarification, please contact me at (207) 530-0965 or email at: Nick.Livesay@maine.gov

Sincerely,

Nick Livesay, Director
Bureau of Land Resources

cc. town file

AUGUSTA
17 STATE HOUSE STATION
AUGUSTA, MAINE 04333-0017
(207) 287-7688 FAX: (207) 287-7826

BANGOR
106 HOGAN ROAD, SUITE 6
BANGOR, MAINE 04401
(207) 941-4570 FAX: (207) 941-4584

PORTLAND
312 CANCO ROAD
PORTLAND, MAINE 04103
(207) 822-6300 FAX: (207) 822-6303

PRESQUE ISLE
1235 CENTRAL DRIVE, SKYWAY PARK
PRESQUE ISLE, MAINE 04769
(207) 764-0477 FAX: (207) 760-3143

web site: www.maine.gov/dep

IFW Recommendations for Significant Vernal Pool Determinations

The following is a list of pools and IFW's recommendations for whether or not they qualify as Significant Vernal Pools, one of Maine's Significant Wildlife Habitats.

Data current as of: Friday, July 26, 2019

IFW's Pool ID: 3738 Twp: Brunswick

UTM Coordinates of Pool Center: 418754 E, 4862458 N

Observer's ID: Portland Road - Brunswick

ProjectType: Portland Road Wetland Delineation - Brunswick

Landowner:	Anne Huffsmith	Contact:	Tim Forrester - Atlantic Environmental, LLC
	2899 Blackhawk Court		135 River Road
	Steamboat Springs, CO 80487		Woolwich, ME 04579
	(407) 865-1332		(207) 837-2199 tim@atlanticenvironmain

Survey Date: 4/22/2019 Additional Survey Dates: 05/22/2019, 06/27/2019

IFW's Recommendation: RED: NOT SIGNIFICANT, does not meet the vernal pool definition

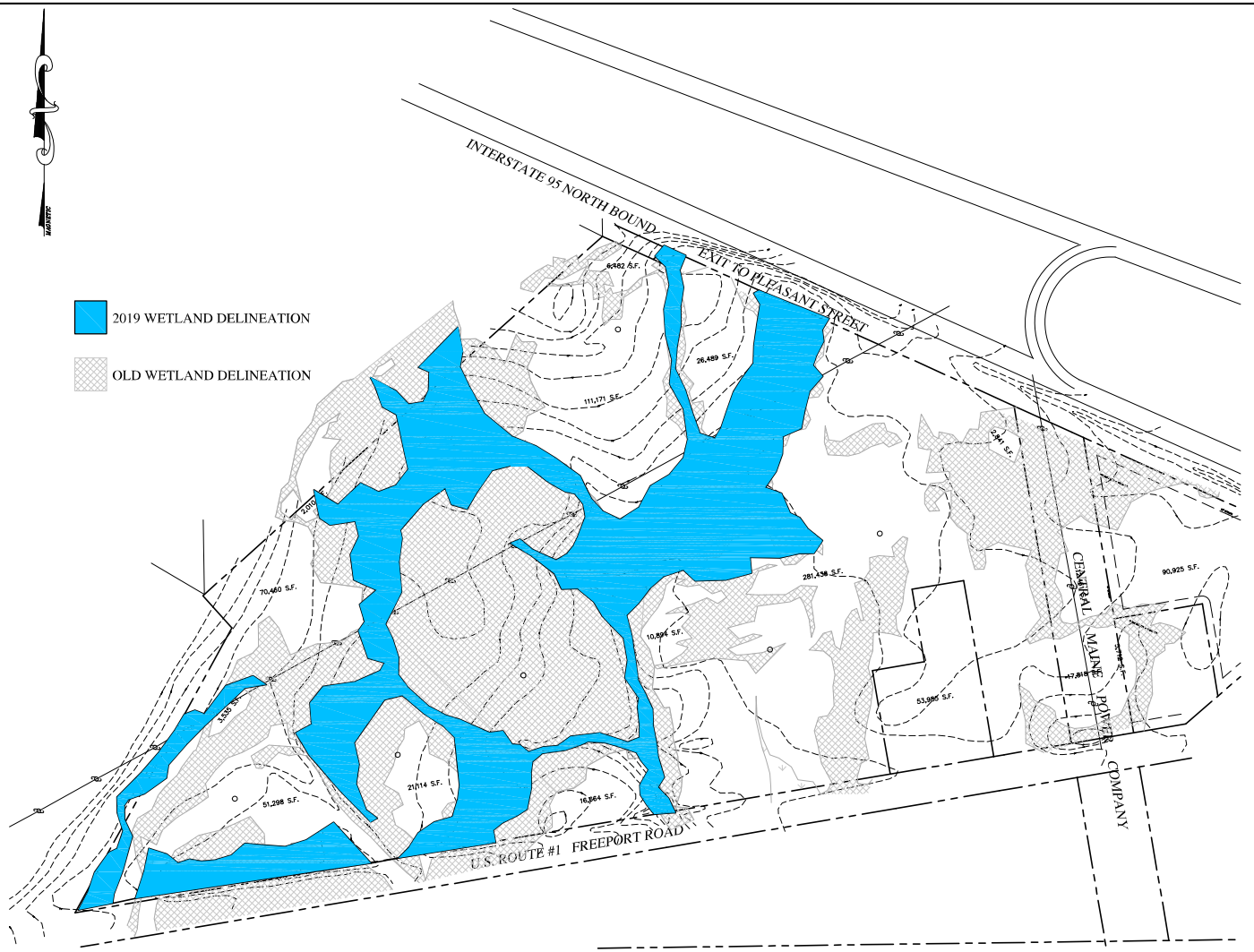
IFW Comments: Pool provides habitat for wood frogs and significant habitat for spotted salamanders, but does not meet MDEP criteria (unnatural -ditch)

Attachment B
Wetland Comparison

B

Wetland comparison

A comparison of the old and 2019 wetland limits is included for reference.



TITLE: WETLANDS EXHIBIT

PROJECT: SHORELAND MAPPING CHANGE

PREPARED FOR: PAUL DOUGLAS
2899 Blackhawk Ct, Steamboat Springs, CO 80487

CALL DIG SAFE UTILITY LOCATION
1-888-344-7233
STATE LAW REQUIRES ADVANCE NOTICE OF AT LEAST 5 BUSINESS DAYS BEFORE YOU DIG, GRADE OR EXCAVATE FOR THE MARKING OF UNDERGROUND UTILITIES

GRAPHIC SCALE
100 0 50 100 200
(IN FEET)
1 inch = 100 ft.

ISSUED FOR:
PERMITTING REVIEW

PROGRESS PRINT
THIS PLAN IS ISSUED FOR REVIEW AND INFORMATION PURPOSES ONLY. THIS PLAN IS SUBJECT TO CHANGE AND IS NOT FOR PRICING OR CONSTRUCTION. PRICING BASED ON THIS PLAN IS NOT BINDING UNLESS SIGNED BY BOTH CONTRACTOR AND OWNER.

SITELINES
119 PURINTON ROAD, SUITE A
BRUNSWICK, MAINE 04011
207.725.1200
CIVIL ENGINEERS • PLANNERS • LAND SURVEYORS

FIELD WK:	SCALE: 1"=100'	SHEET:
DRN BY: CYN	JOB #: 3914	
CH'D BY: CYN	MAP/LOT: 17/1 & U4	
DATE: 09-15-19	FILE:	

X:\LAND PROJECTS\3914 DOUGLAS OLD PORT\LAND TD\ BRUNSWICK\DWG\3914 EXHIBIT.DWG, EX COND-DEMO, 10/3/2019 8:05 PM, CURTIS MEUFELS
THIS DRAWING IS THE PROPERTY AND INSTRUMENT OF SITELINES, PA. NO MODIFICATION OR CHANGES MAY BE MADE TO THIS DRAWING WITHOUT THE EXPRESS WRITTEN PERMISSION OF SITELINES, PA. ANY MODIFICATION, CHANGE OR USE OF THIS DRAWING WITHOUT THE EXPRESS WRITTEN PERMISSION OF SITELINES, PA IS PROHIBITED, AND IS AT THE USER'S RISK.

Attachment C
Supporting Graphics

A copy of the Shoreland Overlay from the Town GIS and tax maps are included for reference.

SHORELAND OVERLAY

DOUGLAS PARCEL

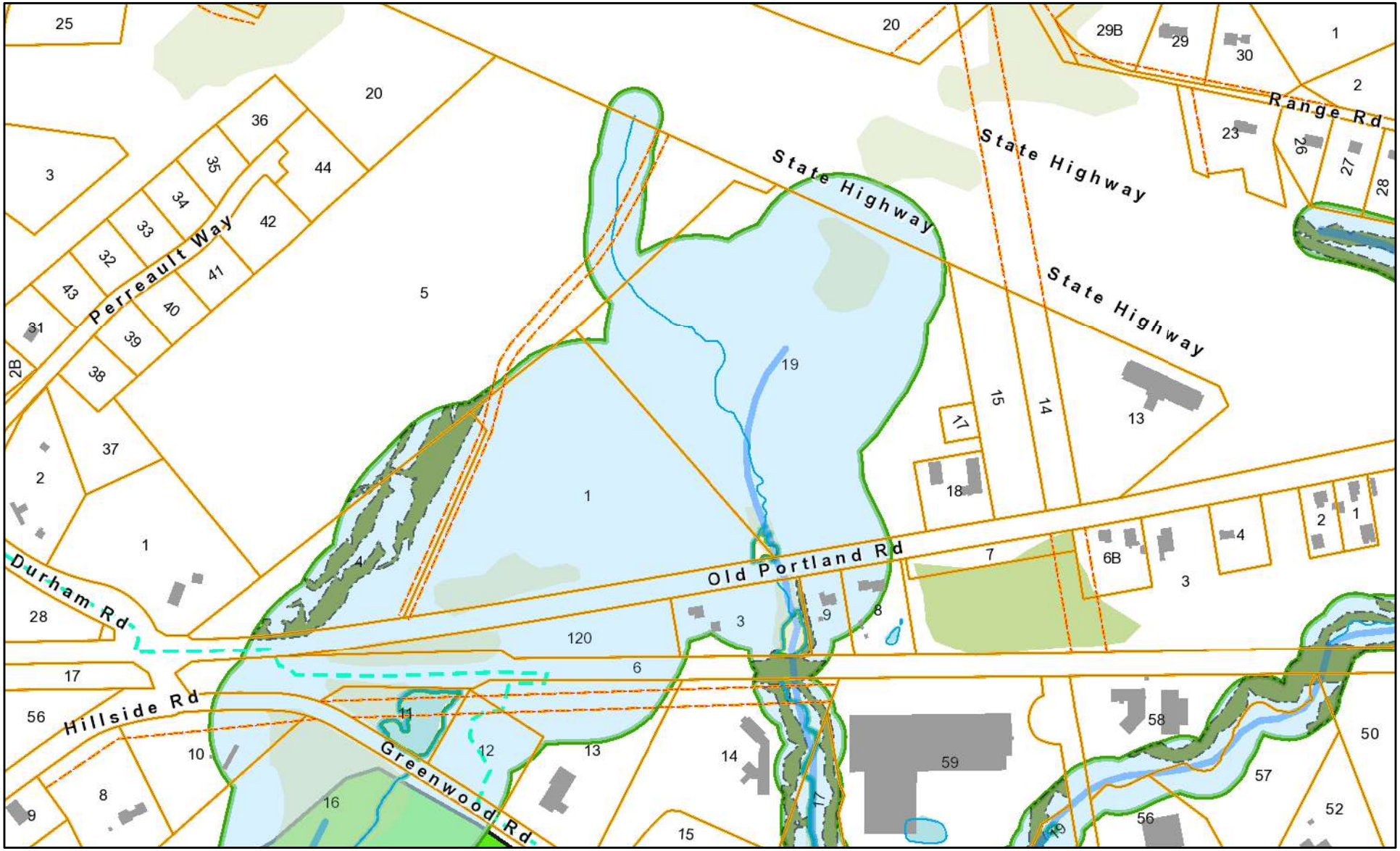
October 3, 2019

1 inch = 400 Feet

0 400 800 1200

CAI Technologies
Precision Mapping. Geospatial Solutions.

www.cai-tech.com



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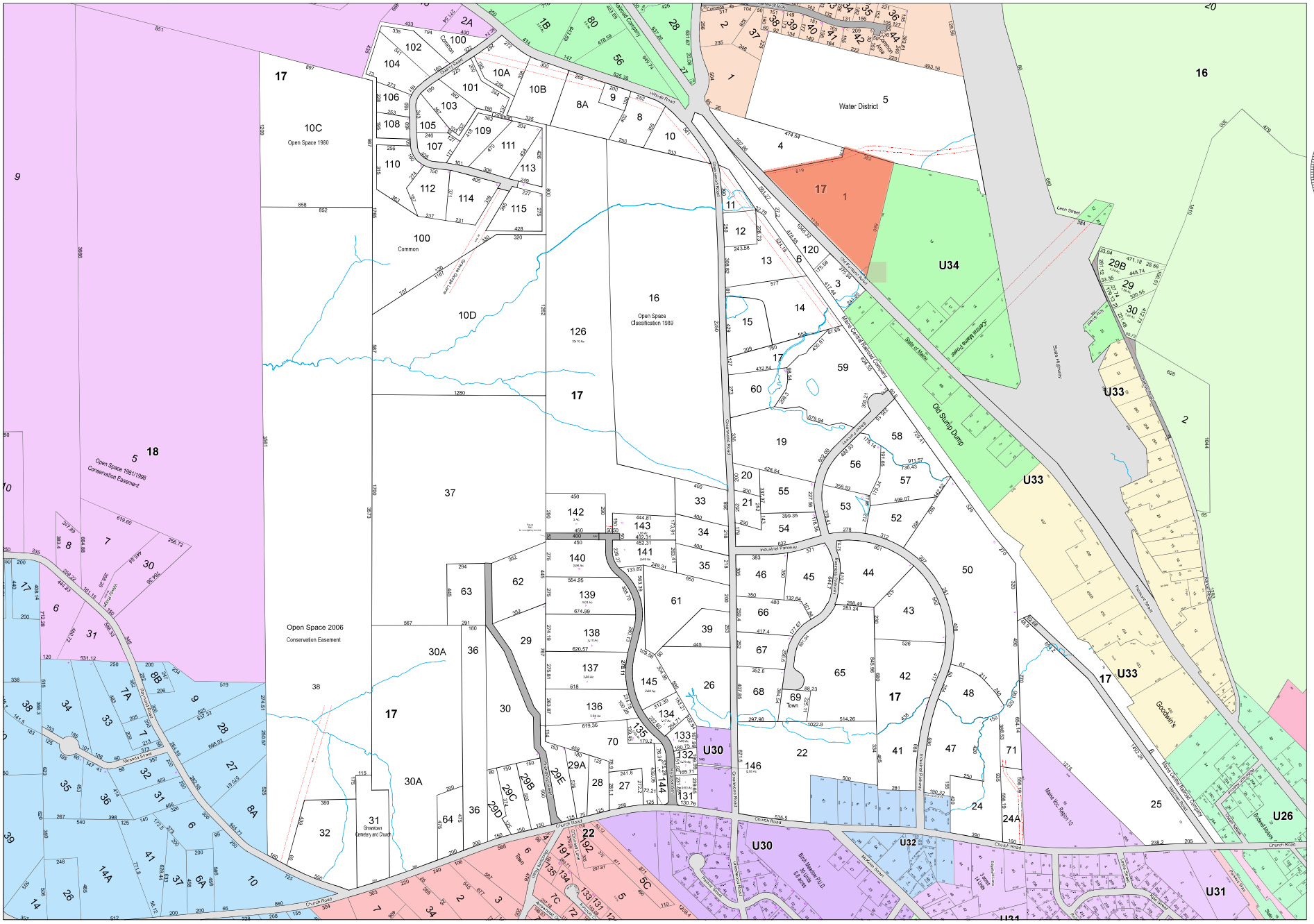

Town of
BRUNSWICK
Maine

Legend

- Lines_Other
- Other Road
- Hydrography Line
- ROW Property Access
- Town Boundary
- Other Lot Boundary
- Parcels_Lines
- Public Road
- Private Road
- ROW
- Water

Disclaimer:
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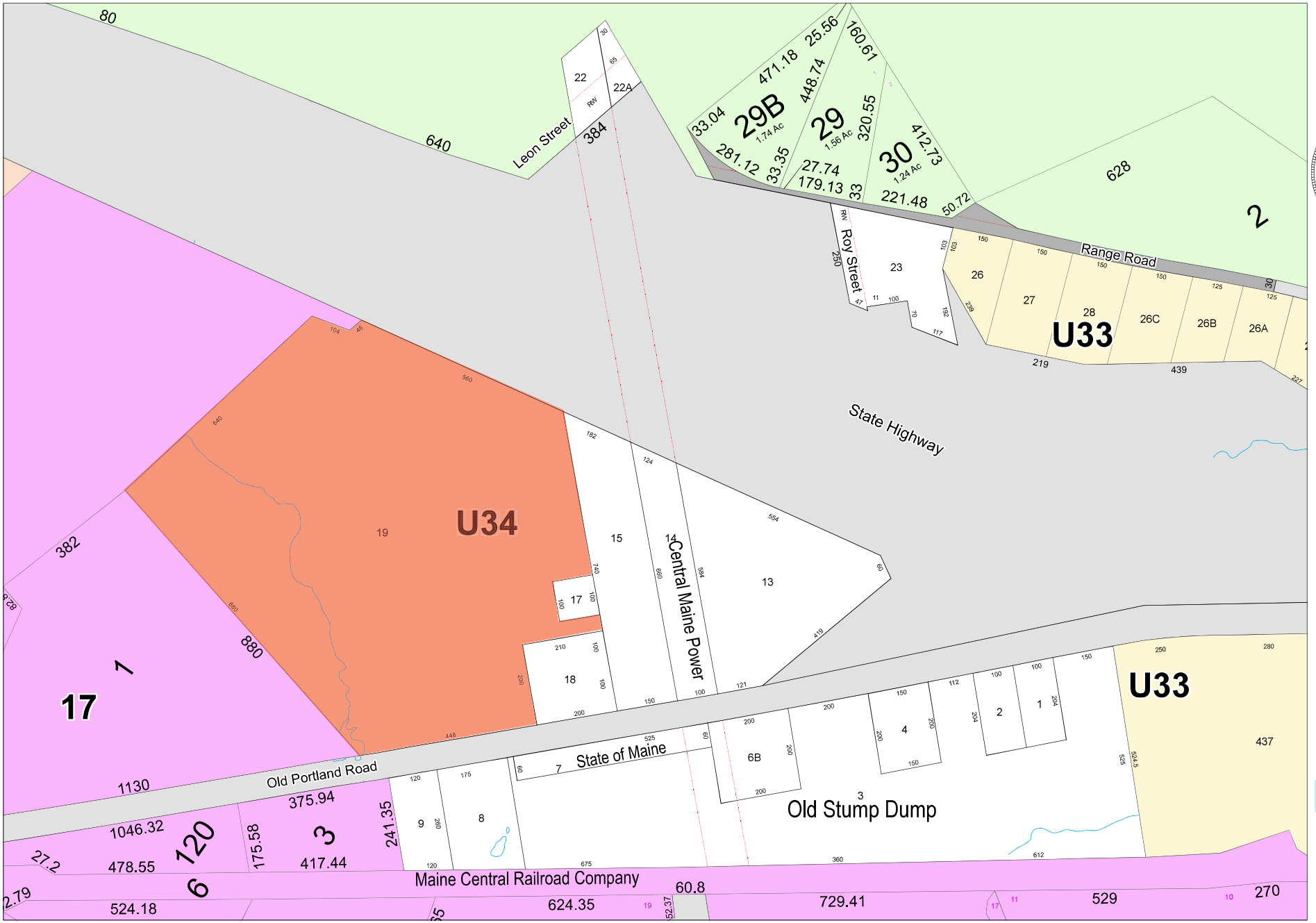
1 inch = 300 feet

Revised To: April 1, 2019

Maps Prepared by:
Town of Brunswick

Revised and Reprinted By:
CAI Technologies
Precision Mapping. Geospatial Solutions

MAP 17



Town of
BRUNSWICK
Maine

Legend

- Lines_Other
- Other Road
- Hydrography Line
- ROW Property Access
- Town Boundary
- Other Lot Boundary
- Parcels_Lines
- Public Road
- Private Road
- ROW
- Water

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N

1 inch = 100 feet

Revised To: April 1, 2019

Maps Prepared by:
Town of Brunswick

Revised and Reprinted By:

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MAP U34

Julie Erdman

From: Jared Woolston
Sent: Friday, January 10, 2020 2:35 PM
To: Julie Erdman
Cc: Matt Panfil
Subject: workshop packet
Attachments: SKM_C754e20011010060.pdf

Julie,

Please include these two (2) separate items and the attachment pertaining to the forested wetland SPO item in the workshop packet.

SPO

1. Attached is a 1953 picture of the farm field that used to be in the shoreland zone from Jeff. This indicates what is now a forested wetland grew out of a wet meadow over 10 acres in size thus qualifying for shoreland zoning then but not as it is today (i.e. forested).

Subdivision Recording

2. Our ordinance states in Section 5.2.9.P(2) Recording, "If the applicant fails to record the Subdivision plan within 90 days after Subdivision approval by the Planning Board, the approval shall expire." I recall advising to remove this part of the draft ordinance when we were going through the ZORC process but I can't find my notes to back up my memory! The way I read it, the town is preempted from requiring a plan to be recorded until day 91 after planning board approval pursuant to 30-A M.R.S. §4408 http://legislature.maine.gov/statutes/30-A/title30-Asec4408.html Subdivision approval therefore expires in 5 years from the date of approval per subsection 5.2.9.Q.3.b.i

    a. Jeff Hutchinson, CEO advised the following on 1/9/2020:

        i. I certainly agree with your interpretation of Subsection 5.2.9.P.(2) such that it is in direct conflict with State Subdivision Law, of which the Town's ordinance refers to for local regulation. I also agree that the referenced subsection of the ordinance should be deleted however; I do believe it would be important to keep/add language to the ordinance regarding the requirement (as stated in State Law) of Recording an approved subdivision plan prior to the marketing and sale of lots, and the issuance of Building permits. This would serve as a reminder to developers to make sure the recording takes place. Perhaps this language could be incorporated in Subsection Q.3.b.

Jared Woolston, AICP
Town Planner
Town of Brunswick
85 Union Street
Brunswick, ME 04011

(207) 725-6660, ext. 4022 (v)
(207) 725-6663 (f)
jwoolston@brunswickme.org
www.brunswickme.org

1/2/20

STAFF REVIEW COMMITTEE NOTES

Staff present: Ryan Barnes, Town Engineer; Matt Panfil, Director of Planning and Development; Dennis Wilson, Town Arborist. Non-voting Staff: Jared Woolston, Planner; Julie Erdman, Planning Technician; Laurel Margerum, Administrative Floater.
Applicants Present: Curt Neufeld, Sitelines, PA
Public Present: None

1. **Workshop:** The Staff Review Committee will hold a workshop at the request of Sitelines, PA to consider modifying the Shoreland Protection Overlay boundaries on Old Portland Road. The subject lots (Map 17, Lot 1; Map U34, Lots 15 and 19) are located within the **GM3 (Growth Mixed Use 3) Zoning District** and the **SPO-SP (Shoreland Protection Overlay – Stream Protection) Subdistrict.**

Curt Neufeld: I'm here today on behalf of the applicant, Paul Douglas, regarding this parcel of land on the northerly end of Old Portland Road that is currently undeveloped. At some point in history there was a wetland delineation done that showed a lot of the parcel encumbered by wetlands. In conjunction with that, the Town had mapped it with the Shoreland Protection Overlay, which basically rendered the parcel undevelopable under the current ordinance. The applicant hired Tim Forester with Atlantic Environmental to go out and revisit the wetlands and he found that while the overall shape was similar, there were definitely some areas that were upland and not wetland. We met with staff and discussed the idea of changing the Shoreland Overlay based on the new delineation and the identification that these were all forested wetlands and not coastal wetlands. We walked the site with Jared and Tim and looked at streams and determined that there were some streams which are now shown on the plan with the appropriate 75' setback. If staff and the Planning Board are agreeable, we are looking to amend the Shoreland Overlay Zone on that parcel to open up some areas for use. We're looking for feedback and we would like to get Planning Board support to take it to the Town Council to amend the official map.

Jared Woolston: As Curt said, the current SPO boundary makes this land pretty much undevelopable. The Stream Protection Subdistrict puts a setback on any new buildings - you can do little trails and things, but that's about it. Almost the entire piece is covered in SPO. What they're talking about doing is basically condensing that humongous SPO blob into this little Y shape. This is a mixed use zoning district so what would probably come later if the zone is changed is a lot more traffic and new opportunities for future development if they choose to go that direction. That maybe something to consider; it would go from not being able to do anything with it to an opportunity for fairly high density uses. As Curt said, I walked the property with Tim Forester and basically these lines through here on the map where it's real tight, there's a stream in there; where it Ys off and it's also pretty tight, there's another stream in there. For the remainder of the property there are no streams. There are some linear wetlands but that's really all they are. For Shoreland zoning, the map is first adopted by the Town, then goes to the State; the State approves it and then it's legally enforceable by the Town. We have to enforce what's on the map. The State gives us some latitude within about 100 feet or so to make some on-the-ground calls; in fact, our ordinance talks about doing field determinations for streams. Once you start talking about going several hundred feet away from what's actually on the ground, this beg some other questions about what's on your map and you tend to lose a little bit of that State support that you rely on if these things ever go in the direction of noncompliance or enforcement. Staff advice was to try and get a field determination from the applicant that would help us refine this map and make it so that what's defined in the text of our ordinance is reflected accurately on

our Shoreland zoning map. As far as wetlands go, the Town Zoning Ordinance has a couple of definitions for wetlands. There's one that's reflective of the national standard - the Army Corp standard for wetlands. That would be jurisdictional for the Corp and for the Maine DEP; also when it gets to development review, there's some language in our development review standard that talks about minimizing your impacts and that kind of thing. Shoreland zoning specifically excludes forested wetlands; these are wetlands with a prevalence of trees. If it's a forested wetland, it could still be protected the way I just described it, but it wouldn't necessarily be Shoreland zoned. The Shoreland Zone wetlands that we want to get at are your big emergent wetlands, the scrub shrub wetlands, anything that's got a prevalence of vegetation that's not forested. That was another thing that we asked Tim Forester to look at - if there are any freshwater wetlands as defined for Shoreland zoning. When we talk about emergent wetlands, it's not just like a small pond, it has to be a 10 acre pond - a 10 acre emergent wetland. There are some linear wetlands out here that have some shrubby vegetation but it doesn't add up to 10 acres so those don't qualify. They would still need to be delineated on a future development plan for others to look at but not necessarily a Shoreland zoning map. I won't speak for Jeff, he has enforcement authority as the Code Officer, but this delineation that's on this map looks like what I saw in the field. I do want to point out that we did some other due diligence things because it's a fairly significant ask to revise the zoning map. I checked the stream habitat viewer which is a state map. There are no mapped streams out here. The property is in an urban impaired stream watershed; the unnamed tributary to the Androscoggin River. The national wetlands inventory is usually painted with a fairly broad brush but it is informative. It does show a small stream just about where Tim has it mapped. The last thing I looked at was the Maine DOT's public map just to see if there were any culverts or potential impoundments that are cutting off watershed flow that could help it cut a channel. There are no large culverts through here and in the field we didn't find any crossing Route 1. There is basically a big old pile of fill under Route 1. That is the long way of saying we've done the research and, at least from the staff perspective, we're pretty satisfied with this.

Curt Neufeld: Just to piggyback on what Jared was saying; this only opens the door for potential site plan or other approvals. Any potential projects would obviously have to come back and get the appropriate permits from the Town, State, DEP and DOT. Certainly this changes the nature of the land and for the owners. I don't think that they would be looking to impact the wetlands; they are expensive and tough to get approved through the DEP under NRPA. With the parcel's close proximity to the interstate and Pleasant Street this change would open up some opportunities.

Matt Panfil: What's the size of this lot?

Curt Neufeld: We didn't have to fill out a standard application form so I don't know offhand.

Jared Woolston: It looks like 18 acres plus another 10.

Matt Panfil: When we get to Planning Board, I think it is important to be able to explain the difference between the forested wetlands the freshwater wetlands in the Shoreland Protection Overlay. It took me a second to fully understand what was going on, but once I did I thought that it's a logical request.

Curt Neufeld: With that in mind, if there are any graphics that you think would help at the Planning Board meeting to step them through it, let me know.

Matt Panfil: Maybe if we included screenshots of some of the maps that Jared has had up during this meeting to make sure we aren't missing anything.

Jared Woolston: I thought the pictures were good. It would have been nice to see some of the non-forested wetland pieces delineated in these middle pockets, but I don't know that they went through and did that.

Curt Neufeld: I don't think so. Do you think would be helpful to have Tim at the meeting?

Jared Woolston: For technical stuff, yes. I can help a little bit, but you should be advocating for your clients.

Curt Neufeld: I thought your presentation was fair but since it's all about natural resources...

Jared Woolston: I think he just called them forested wetlands, but they definitely have non-forested inclusions. It was clearly less than 10 acres so for Shoreland zoning it doesn't matter, but it would be interesting to have that called out.

Matt Panfil: Are there any vernal pools on site?

Curt Neufeld: He looked at that. There is actually a separate letter regarding that in your packet.

Jared Woolston: I think they said they sent that letter to the State, which is what matters. They got the DEP to say that it is all right. Once it's is deemed not significant it is a done deal.

Ryan Barnes: Do you know what the total amount of wetland area is?

Curt Neufeld: I do not.

Ryan Barnes: I was just curious. You said it was 19 acres but they're showing a lot more than that upland so I think the site is bigger than 19.

Curt Neufeld: That is for both of them combined.

Ryan Barnes: Okay. I'd like to know the total area and the "buildable area" potential. There are a lot of small pocketed wetlands that I think with a tier one or a tier two permit would be somewhat easy to develop. I'm seeing 21 acres of upland which is a pretty substantial area, but because of the scale it doesn't look substantial. Just for reference, Old Portland Road is fully DOT jurisdiction.

Dennis Wilson: What was your stream set back again?

Curt Neufeld: 75 feet.

Dennis Wilson: That's something you probably want to have written on your plan too.

Ryan Barnes: I think you would want to show the current SPO versus the proposed so Planning Board can see the difference, as well as a pre and post wetland map.

Curt Neufeld: Okay. Are you going to try to get any comments back from Jeff?

Jared Woolston: Jeff had done quite a bit of research on the construction of this road and what that did to change things out there. He'd done a lot of work so I can try to get some comments from him. He didn't raise any red flags in the office so I don't know if that's enough just to keep it moving, but I'll see if I can get something in writing.

Curt Neufeld: Sounds good. This is a workshop, but you're still sending it to the Planning Board for the January 14th meeting…

Matt Panfil: It looks like the 28th should be the public hearing with the Planning Board. Town Council would probably be the 18th which is the Tuesday after Presidents' Day. Then the Town Council public hearing and vote would be March 2nd hopefully.

Meeting Adjourned

JAE

BRUNSWICK PLANNING BOARD
MEETING MINUTES
SEPTEMBER 10, 2019

MEMBERS PRESENT: Chair Charlie Frizzle, Vice Chair Bill Dana, Jane Arbuckle, Robert Burgess, Alison Harris, and Sande Updegraph

MEMBERS ABSENT: Kelly Matzen

STAFF PRESENT: Matt Panfil, Director of Planning and Development; Jared Woolston, Town Planner

A meeting of the Brunswick Planning Board was held on Tuesday, September 10, 2019, in Council Chambers, 85 Union Street. Chair Charlie Frizzle called the meeting to order at 7:00 P.M.

1. Case #19-032 Kate Furbish Elementary School Discovery Classroom: The Planning Board will review and take action on a Final Plan Major Development Review application submitted by Atlantic Resource Consultants on behalf of the Brunswick School Department to construct a 1,150 square foot free-standing classroom on the elementary school campus at 75 Jordan Avenue. This is an amendment to the site plan "Jordan Acres School Redevelopment" (Case 17-038). The subject lot (Map U06, Lot 5) is within the GR8 (Growth Residential 8) Zoning District.

Jared Woolston introduced the application and stated that there was no public present for the staff review meeting. Jared stated that there were no members of the public present at the Staff Review meeting, but he did receive a call from a member of the public who asked about funding. Jared explained that this is a policy issue and not part of Planning Board purview. Another concern from this individual was visibility from the main school building to the students on the other side of this classroom.

Charlie Frizzle suggested minor clerical changes to the application and noted that the new classroom is to the west, not the east as indicated in the packet materials.

MOTION BY BILL DANA TO DEEM THE APPLICATION COMPLETE. MOTION SECONDED BY ROB BURGESS, APPROVED UNANIMOUSLY.

Applicant representative Andrew Johnston reviewed a picture of the site layout and provided a brief overview of the application materials. Andrew added that there will be two egress lights at the door. From a landscaping perspective, they are not removing any trees as this was originally intended to be lawn. Andrew clarified that this discovery building is being funded by Bowdoin College. In terms of functioning, this building will serve as an additional resource and enables the school to have visiting presentations or exhibits that may be more noisy, messy, or larger than what you would find in a normal classroom.

Concerning the visibility of the students, Andrew Johnston replied that students are not allowed to be outside without supervision. To play in any areas, a teacher needs to be with the children; line of sight is not an issue.

Rob Burgess suggested that the applicant use a 3,000-kelvin maximum. Andrew Johnston replied that he remembers this conversation during the review of the Kate Furbish School building which they changed to 3,000 kelvins. He is sure they can accommodate this for the new building as well.

Alison Harris asked if the walkway between the two buildings was covered. Andrew Johnston replied that it was not. Alison stated that she understands the separation of the main building from the discovery room but asked why they chose to not cover the connecting walkway. Andrew replied that this is a question for the architect; he is not sure if this was a code enforcement issue or a cost issue.

Alison Harris asked if the issues discussed at the Staff Review Committee meeting of August 28, 2019, regarding sewage had been addressed. Jared Woolston replied that he has not spoken to Rob Pontau. Andrew Johnston stated that he received an email right before the Staff Committee Meeting stated that the plan looked good. They were asked to put a clean-out on the end of the forced main which has been added.

Chair Charlie Frizzle opened the meeting to public comment. No comments were made and the public comment period was closed.

MOTION BY BILL DANA THAT ALL APPLICABLE PRIOR CONDITIONS RELATING TO THIS AMENDMENT REMAIN IN EFFECT, IN ADDITION TO ANY NEW CONDITIONS CONTAINED HEREIN. MOTION SECONDED BY SANDE UPDEGRAPH, APPROVED UNANIMOUSLY.

MOTION BY JANE ARBUCKLE THAT THE AMENDED SITE PLAN APPLICATION IS APPROVED WITH THE FOLLOWING CONDITIONS ADDED TO PRIOR CONDITIONS CURRENTLY IN PLACE:

1. That the Board's review and approval does hereby refer to the plans and materials submitted by the applicant and the written and oral comments of the applicant's representatives, reviewing officials and members of the public as reflected in the public record and that any changes to the approved plan not called for in these conditions of approval or otherwise approved by the Director of Planning and Development as a minor modification shall require review and approval in accordance with the Brunswick Zoning Ordinance.

MOTION SECONDED BY SANDE UPDEGRAPH, APPROVED UNANIMOUSLY.

2. Case #19-020 Zoning Amendment: Rural Steep Slopes: The Planning Board will hold a PUBLIC HEARING to review and provide a recommendation to the Town Council on Amendments to the Brunswick Zoning Ordinance and the Official Zoning Map regarding the replacement of standards for slopes greater than 15% within the Rural Protection 1 (RP1) and Rural Protection 2 (RP2) Zoning Districts with a new Rural Protection Stormwater Overlay District. The recommended text and map amendments are associated with the following sections of the Brunswick Zoning Ordinance as follows:

a.) Section 2.3, "Overlay Zoning Districts.":
b.) Subsection 4.1.2, "Single- and Two-Family Dwellings Constructed on Lots Separate From an Approved Subdivision or Site Plan."

c.) Table 4.2.4, "Dimensional and Density Standards Table for Rural Zoning Districts."
d.) Subsection 4.2.5.B.(4)e, "Setback from Slopes over 15 Percent for the Rural Protection (RP1 and RP2) Districts."
e.) Subsection 4.5.4.B.(1), "Specific Standards: Applicability."
f.) Table 5.2.9.B, "Development Review Threshold Criteria."

Matt Panfil referenced his Memo to the Board dated September 10, 2019, and provided a brief background. He reviewed the Summary of Text Amendments to the Zoning Ordinance and described each change.

Charlie Frizzle suggested language changes to the definition of Disturbed Area.

Jared Woolston explained why staff has removed Redeveloped Impervious Area in the most recent draft and stated that it is difficult to do.

Jared Woolston reviewed the definition of a stream and clarified what it meant by bankfull. Jane Arbuckle pointed out that the setback is still 75-feet; she had previously suggested a 100-foot setback. Charlie Frizzle explained that this was discussed again at the Planning Board meeting of 8/27/2019. It was unanimously agreed among members present to leave the setback at 75-feet unless someone could prove that there was a substantial benefit to the additional setback. Jared pointed out that there was an additional setback requirement added in the coastal area and reviewed Section 2.3.10. Jane noted that these are still state minimums and advocated for greater protection. She believes that sticking with the state minimum is not the right action. Rob Burgess replied that adding more complexity here is not necessarily advancing the ball particularly if there is no scientific evidence that additional 25-feet makes a difference. He stated that 100-feet is just as arbitrary as 75-feet. Jane disagreed. Jared pointed out that if an applicant has a little tributary stream in the coastal area, that would have a 75-foot development setback. What they are attempting to do here is manage the stormwater. This is setting the level of review and treatment. Jared pointed out that the stream protections in Brunswick are already above and beyond the state minimum.

Charlie Frizzle suggested changing the longer columns in Table 4.2.4, Dimensional and Density Standards Table for Rural Zoning Districts, into footnotes as it is difficult to read.

Chair Charlie Frizzle opened the meeting to public comment.

Town Councilor Steve Walker suggested that instead of having a sub definition of stream with bankfull, that they clarify throughout that the 75-foot setback is intended to capture high flow conditions, the edge of the stream.

Councilor Walker stated that a concern that he has had through discussions is staff time with regards to maintenance and enforcement. Stormwater treatment when installed and on paper is easy to review, but as properties change, will the new owners know how to properly maintain these systems? Who is going to enforce this? He is concerned that staff will become overwhelmed.

Councilor Walker suggested that they set a 100-foot no cut setback from streams in the inland areas in RP1 and RP2 Zones to save on paperwork and permits for stormwater treatments in inland areas. Councilor Walker stated that there is plenty of literature that says a 100-foot

setback for stormwater is better than a 75-foot setback. In addition, a 100-foot no-cut zone will allow for habitat connectivity and could be easier to enforce.

With respect to Councilor Walker's comments regarding maintenance, Charlie Frizzle referenced Section 2.3.10. Jane Arbuckle agreed with Councilor Walker's suggestion regarding setbacks from a stream and stated that it would make things a lot simpler enforce. Matt Panfil replied that he would need to review the map to see how much this would change things. Alison Harris stated that she would also need to see how many properties would be impacted or deemed undevelopable; how much more development would be prohibited within the RPSMO.

Jared Woolston touched upon the setbacks in the Shoreland Zoning District for thought.

Town Councilor John Perreault stated that he is concerned that they have gone above what was asked of the Board in terms of review. Councilor Perreault stated that many things were discussed at this meeting not regarding steep slopes that he had difficulty understanding; nothing was presented to help the people understand what is going on, what the difference is. Charlie Frizzle replied that there were several materials that the Board has reviewed at past meetings and they will make sure that these materials are included in the materials they forward to the Town Council as part of their submittal. Charlie added that very early in the process staff and Board members went on a site walk at Maquoit Road and viewed several different slope examples. At that time, they unanimously came to the conclusion that steep slopes are too difficult to define on the ground. This makes it very difficult to create an ordinance that relies on the measurement of the slope so they decided upfront to deal with what protections they are trying to accomplish. Matt Panfil raised the issue with the non-conformities that would stay if they kept slopes as part of the equation.

Councilor Perreault does not agree with Councilor Walker's suggestion for increasing the setback to 100-feet no cut, no build.

Charlie Frizzle stated that he is still opposed to extending the setback to 100-feet. Jane Arbuckle suggested that if they are going to stay with the 75-foot setback, that they consider more long-lasting and natural systems. Jared Woolston asked if there were concerns with the BMPS provided by Cumberland County Water and Soil. Jane stated that they area great, but the decision is still up to the homeowner. Bill Dana replied that he spoke with Kevin Clark and Kurt Neufeld of Sitelines after the last meeting about these and they agreed that the BMPS seem over-elaborate. Sande Updegraph stated that her concern is enforcement over. She asked if they can require long-lasting stormwater systems, can they name them specifically, or is this out of their purview. What is the mechanism going forward? Charlie replied that the mechanism going forward is the process that they have been discussing. Over time there is no way for the Codes Enforcement Officer to go around town making sure all the systems are working properly. Jane replied that one way to address this issue is to enforce a greater vegetative buffer. Members discussed the possibility of a deed restriction.

MOTION BY BILL DANA TO FORWARD THIS ORDINANCE CHANGE AS MODIFIED TO TOWN COUNCIL. MOTION SECONDED BY ALISON HARRIS, APPROVED BY ROB BURGESS, BILL DANA, CHARLIE FRIZZLE, ALISON HARRIS, AND SANDE UPDEGRAPH. MOTION OPPOSED BY JANE ARBUCKLE. MOTION APPROVED 5-1.

3. Other Business: No other business.

4. Approval of Minutes: No minutes were reviewed at this meeting.

5. Adjourn

This meeting was adjourned at 8:34 P.M.

Respectfully Submitted,

Tonya Jenusaitis

Recording Secretary

BRUNSWICK PLANNING BOARD
MEETING MINUTES
SEPTEMBER 30, 2019

MEMBERS PRESENT: Chair Charlie Frizzle, Vice Chair Bill Dana, Jane Arbuckle, Robert Burgess, Alison Harris, and Sande Updegraph

MEMBERS ABSENT: Kelly Matzen

STAFF PRESENT: Jared Woolston, Town Planner

A meeting of the Brunswick Planning Board was held on Monday, September 30, 2019, in Council Chambers, 85 Union Street. Chair Charlie Frizzle called the meeting to order at 7:00 P.M.

1. Case #19-033 Midcoast Healing Conditional Use: The Planning Board will hold a PUBLIC HEARING and take action on a Conditional Use Permit application submitted by Midcoast Healing to convert a portion of the building at 14 Industrial Parkway to a Marijuana Cultivation Facility. The subject lot (Map 17, Lot 54) is within the GI (Growth Industrial) Zoning District.

Jared Woolston introduced the Conditional Use Permit application. Jared clarified that there is no LLC set up for this project and the applicant is really Zachariah Dennen and the project is for Midcoast Healing. Jared pointed out that this use has been in this building for roughly five years and a project recently approved by the Planning Board is moving in. It was during inspection for the new tenants that this use was discovered and Zachariah was told he needed to obtain permits.

Motion by Bill Dana to deem the conditional use permit application complete. Motion seconded by Sande Updegraph, approved unanimously.

Applicant, Zachariah Dennen reiterated that he has been in the location for five years and feels as though it is a good fit. He stated he is here to get the new permits as required by the Brunswick Zoning Ordinance. Inspections have been conducted and this is his final step.

Charlie Frizzle asked if there would be any external changes. Zachariah Dennen replied that he does not do anything external, everything is internal.

Rob Burgess asked for clarification in the security changes. Zachariah Dennen replied that after discussion with Commander Waltz of the Brunswick Police Department, he has gone out and purchased and installed what was recommended and referenced in the packet materials.

Chair Charlie Frizzle opened the meeting to public comment. No comments were made and the public comment period was closed.

Members made minor language changes to the Findings of Fact.

MOTION BY JANE UPDEGRAPH THAT THE CONDITIONAL USE PERMIT IS APPROVED WITH THE FOLLOWING CONDITIONS:

1. That the Board's review and approval does hereby refer to these findings of fact, the plans and materials submitted by the applicant and the written and oral comments of the applicant, its representatives, reviewing officials, and members of the public as reflected

in the public record. Any changes to the approved plan not called for in these conditions of approval or otherwise approved by the Director of Planning and Development as a minor modification shall require a review and approval in accordance with the Brunswick Zoning Ordinance.

MOTION SECONDED BY SANDE UPDEGRAPH, APPROVED UNANIMOUSLY.

Sande Updegraph thanked the applicant for the good neighbor plan submitted in the application.

2. Case #19-038 Wild Oats, Brunswick Landing Conditional Use Permit: The Planning Board will hold a PUBLIC HEARING and take action on a Conditional Use Permit application submitted by Wright-Pierce on behalf of the Wild Oats Bakery to construct a 19,064 square foot restaurant and dining facility on Admiral Fitch Avenue. The subject lot (Map 40, Lot 223) is within the GI (Growth Industrial) Zoning District.

Jared Woolston introduced the application.

MOTION BY BILL DANA TO DEEM THE CONDITIONAL USE PERMIT APPLICATION COMPLETE. MOTION SECONDED BY ALISON HARRIS, APPROVED UNANIMOUSLY.

Jan Wiegman of Wright Pierce provided a brief overview of the Conditional Use application. He stated that Wild Oats will have a similar use as Flight Deck which is also located in this zone. They see this as a supportive use in the industrial area that would be used by the local industries and does meet all the other zoning uses. They do not see a major impact with regards to traffic.

Rob Burgess noted that they are requesting 52 additional parking spaces; isn't there an implication that there is going to be a lot of traffic? Jan Wiegman replied that the new spaces are primarily for customer parking while the shared parking between the Flight Deck and the Real School will be for employees and occasionally for overflow parking during busy times. Jan explained that the prime time for Wild Oats is typically the morning and lunchtime. They may overlap with Flight Deck during the afternoon, but not in the evening. The traffic patterns of the neighbors of Wild Oats differs. Rob asked what the determining factor in saying that there will not be an increase in traffic use. Have they conducted a traffic count? How do they come to the conclusion that there will be no increase? Jared Woolston reviewed the traffic standard and stated that the point Jan is trying to make it that this use will not generate more traffic then the business that are already established. Rob clarified that it is traffic that is consistent with what is already there.

Bill Dana noted that the applicant was raising the building and asked how much. Jan Wiegman replied that they area raising it about a foot and a half. They are doing this because it will assist in some of the draining issues and also because the Navy wanted some level of new soil over the existing soil.

Chair Charlie Frizzle opened the meeting to public comment. Hearing none, the public comment period was closed.

Members reviewed the Findings of Fact.

MOTION BY ROB BURGESS, THAT THE CONDITIONAL USE PERMIT IS APPROVED WITH THE FOLLOWING CONDITION:

1. That the Board's review and approval does hereby refer to these findings of fact, the plans and materials submitted by the applicant and the written and oral comments of the applicant, its representatives, reviewing officials, and members of the public as reflected in the public record. Any changes to the approved plan not called for in these conditions of approval or otherwise approved by the Director of Planning and Development as a minor modification shall require a review and approval in accordance with the Brunswick Zoning Ordinance.

MOTION SECONDED BY SANDE UPDEGRAPH, APPROVED UNANIMOUSLY.

3. Case #19-035 Wild Oats, Brunswick Landing: The Planning Board will review and take action on a Streamlined Final Plan Major Development Review application submitted by Wright-Pierce on behalf of the Wild Oats Bakery to construct a 19,064 square foot restaurant and dining facility on Admiral Fitch Avenue. The subject lot (Map 40, Lot 223) is within the GI (Growth Industrial) Zoning District.

Jared Woolston introduced the application and pointed out that this application is for a Sketch Plan Final. The reason why this is not a Streamlined Final Major Development is because the applicant is requesting a waiver for the landscaping plan in the parking area.

MOTION BY JANE ARBUCKLE THAT THE SITE PLAN IS DEEMED COMPLETE.
MOTION SECONDED BY SANDE UPDEGRAPH, APPROVED UNANIMOUSLY.

Jan Wiegman of Wright Pierce provided an overview of the application and reviewed the building and the site layouts. Jan reviewed the parking layout plan as provided in the packet materials. Jan stated that the parking will be screened in part by fencing. There is a sidewalk along Admiral Fitch Ave as well as a sidewalk that comes up to the front entrance and continues along the parking lot thru to the shared parking in the back. Employees will enter through the receiving area that will be located in the back; there is a sidewalk along the back as well.

Jan Wiegman stated that the outdoor seating area will be fenced in with a grassy area and will be contained.

Jan Wiegman stated that the site will be serviced by sewer, water, electricity and natural gas; they have provided information that these utility services have the capacity to serve this facility.

Jan Wiegman stated that this lot is very flat. In order to get the drainage to work, they will be adding soil to generate some slopes and treating stormwater runoff with underground soil filters around the perimeter of the site. In addition, they are collecting stormwater that is not being treated from the existing paved area to obtain the credits they need for stormwater management.

With regards to landscaping, Jan Wiegman pointed out that there are existing Maple Trees along Admiral Fitch and one along Gerzofsky Way that they plan to keep. They will be adding more trees around the perimeter of the site for screening and also to add some vertical elements.

Jan Wiegman stated that they are requesting a waiver for internal islands. The reasoning for this is that they have trees on the sides which they believe meets the intent of the islands. They also want to be able to push the snow on either side without having to go around the islands. If they have to include the islands, it will be a very small area to work in.

Jan Wiegman stated that they do have site lighting that is LED and all 3,000 kelvins. The shared parking area already has existing lighting that they are not requesting any changes to.

Jane Arbuckle asked if they will just have trees along the street or all the way around the lot. Jan Wiegman replied that they go around the entire perimeter of the site.

Allison Harris asked about connectivity between Wild Oats and Flight Deck Brewing. Jan Wiegman replied that currently Flight Deck Brewing has a rope that keeps their area enclosed and their entrance is on the east side of their building. Entrance to Wild Oats is on the front of their building. Although there may be some crossover between the two places, Wild Oats does not want patrons from Flight Deck parking in their lot during business hours and are encouraging people to park in the Flight Deck lot located by their entrance. Jan pointed out that there is an existing walkway that runs along their lot and connects to a sidewalk that goes to the Wild Oats entrance. Alison replied that this seems to be more of a business issue and not a Planning Board issue, she just wanted to ask given that there was so much discussion about this at the Staff Review meeting.

Alison Harris asked if the fencing had been designed yet. Jan Wiegman replied that it is a wood panel with a square wire mesh and is 4 feet high.

Sande Updegraph noticed that there were no solid waste impact fees and asked for clarification. Charlie Frizzle replied that they will have a service contract with Pine Tree and construction debris will be hauled by contract haulers. From the municipal perspective there is no solid waste impact.

Alison Harris thanked that applicant for adding a second bike rack.

XX stated that their current location has many entrances and it is hard to keep track of what is going on, so they are trying to have a clearly identifiable entrance and exist. In addition, they have dedicated parking. They plan on working on more things in the future with Flight Deck, but at the moment they are trying to fix things that have been problematic.

Rob Burgess asked for clarification on signs. Charlie Frizzle stated that the applicant has no particular sign design at the moment. At the time they decide on a design, they will have to submit an application to the Codes Enforcement Officer for approval; this is generally handled in-house.

Chair Charlie Frizzle opened the meeting to public comment.

John Briley, Executive Director of the Brunswick Naval Aviation Museum, is happy that Wild Oats is coming back to Brunswick Landing. He thinks that the nearness to the Flight Deck Brewery will be more complementary and will eventually be a more community feel and endorse this project in its entirety.

Chair Charlie Frizzle closed the public comment period.

Wit regards to the requested waiver, Charlie Frizzle stated that he fully supports this as the applicant is proposing robust plantings around this area. To add islands does not make sense and agrees that it will get in the way of snow removal.

MOTION BY BILL DANA THAT THE REQUESTED WAIVER FOR PARKING LOT LANDSCAPING IS APPROVED. MOTION SECONDED BY SANDE UPDEGRAPH, APPROVED UNANIMOUSLY.

MOTION BY BILL DANA THAT THE FINAL PLAN IS APPROVED WITH THE FOLLOWING CONDITIONS:

1. That the Board's review and approval does hereby refer to these findings of fact, the plans and materials submitted by the applicant and the written and oral comments of the applicant, his representatives, reviewing officials, and members of the public as reflected in the public record. Any changes to the approved plan not called for in these conditions of approval or otherwise approved by the Director of Planning and Development as a minor modification shall require a review and approval in accordance with the Brunswick Zoning Ordinance.

2. Prior to starting construction, the applicant shall provide the approved Maine DEP permit to the Town Engineer and the Director of Planning and Development.

3. Prior to issuance of a building permit, the applicant shall amend the Brunswick Landing Subdivision with the subject lot division to the satisfaction of the Planning Board.

MOTION SECONDED BY ROB BURGESS, APPROVED UNANIMOUSLY.

4. Case #19-037 Zoning Ordinance Amendment – Marijuana Definitions: The Planning Board will hold a workshop and review a proposed Zoning Ordinance Amendment, forwarded by the Town Council, to amend the following four (4) existing marijuana use definitions to keep the Brunswick Zoning Ordinance current with State legislation: marijuana cultivation facility, marijuana products manufacturing facility, marijuana storefront, medical, and marijuana testing facility.

Charlie Frizzle opened the workshop.

Jane Arbuckle asked if an individual could buy marijuana seeds from a cultivation facility. Charlie Frizzle replied that they can only sell to another cultivation facility. Jane Arbuckle asked where individuals can purchase seeds as you are allowed up to three plants. Decision for staff to look into where individuals can purchase marijuana seeds in Brunswick because none of the current definitions include it and to discuss this at the Public Hearing.

Chair Charlie Frizzle closed the workshop.

5. SPECIAL MEETING – Zoning Ordinance Amendment – Marijuana Definitions: The Planning Board will set a PUBLIC HEARING DATE in accordance with Subsection 5.1.3.B of the Brunswick Zoning Ordinance to review and provide a recommendation to the Town Council on a Zoning Ordinance Amendment to amend the four (4) existing marijuana use definitions, as referenced above, in accordance with Chapter 12.2-5 of the Brunswick Code of Ordinances.

MOTION BY ALISON HARRIS TO SCHEDULE A PUBLIC HEARING ON OCTOBER 22, 2019. MOTION SECONDED BY SANDE UPDEGRAPH, APPROVED UNANIMOUSLY.

6. Other Business: No other business was discussed at this meeting.

7. Approval of Minutes: No minutes were approved at this meeting.

8. Adjourn

This meeting was adjourned at 8:01 P.M.

Respectfully Submitted,

Tonya Jenusaitis

Recording Secretary

*THIS MEETING WAS RESCHEDULED FROM TUESDAY, SEPTEMBER 24TH

BRUNSWICK PLANNING BOARD
MEETING MINUTES
NOVEMBER 12, 2019

MEMBERS PRESENT: Chair Charlie Frizzle, Vice Chair Bill Dana, Jane Arbuckle, Rob Burgess, Alison Harris, Kelly Matzen, and Sande Updegraph

MEMBERS ABSENT: No members were absent at this meeting.

STAFF PRESENT: Matt Panfil, Director of Planning and Development; Jared Woolston, Town Planner

A meeting of the Brunswick Planning Board was held on Tuesday, November 12, 2019, in Council Chambers, 85 Union Street. Chair Charlie Frizzle called the meeting to order at 7:00 P.M.

1. Case #19-045 Brunswick Landing Subdivision Lot 6A1; Bank: The Planning Board will review and take action on a Final Plan Major Development Review application submitted by Sitelines on behalf of Priority Leasing, LLC to construct a 5,583 square foot financial institution with a drive-through on Bath Road. The subject lot (Map 40, Lot 98) is located within the GM7 (Growth Mixed Use 7) Zoning District and the mapped SPO-SP (Shoreland Protection Overlay – Stream Protection) Subdistrict.

Jared Woolston introduced the application.

MOTION BY SANDE UPDEGRAPH TO DEEM THE FINAL PLAN MAJOR DEVELOPMENT APPLICATION COMPLETE. MOTION SECONDED BY ROB BURGESS, APPROVED UNANIMOUSLY.

Applicant representative, Curt Neufeld of Sitelines provided a brief background of the project and presented a video architectural representation of the site that includes the coffee shop (Case #19-045).

Curt Neufeld gave a PowerPoint presentation and reviewed the development review, project location, development, site plan layout, staff comments. Concerning staff comments, additional rhododendrons have been added along Bath Road. Two more lights will be added on the Rusty Lantern side of the entrance as requested by staff and DOT. The applicant has also agreed to install a sidewalk connecting to Allagash Drive once pedestrian improvements along Allagash have been made. The reason why they are waiting is that they were asked to narrow this entrance until improvements on Allagash have been made hopefully in the next few years.

Curt Neufeld continued with the PowerPoint presentation and reviewed the bank elevations and the bank renderings.

Chair Charlie Frizzle asked if there was any resolution to Matt Panfil's question at the Staff Review Committee (SRC) meeting of October 30, 2019, regarding a potential break in the fence along Bath Road for walk-up business. Matt Panfil replied that when he made that comment, he hadn't realized that there was a break on the bank side. Curt Neufeld added that placing a break near the coffee shop didn't make sense because it would place pedestrian traffic in the drive-thru area.

Charlie Frizzle asked if the ADA requirements have been met by the crosswalk from the medical office buildings to the proposed parcel. Curt Neufeld replied that they were not able to make this connection ADA ramp compliant because they had to add two steps; a ramp would be steeper than ADA would allow. The connection itself is ADA compliant but does not include an ADA ramp.

Charlie Frizzle asked if the stormwater management landscaping issue had been resolved. Curt Neufeld replied that at the meeting it was discussed that snow storage there would be discouraged as the arborist pointed out that the trees may be to close together and cold cause root intrusion. Rather than provide a stormwater landscaping plan at this time, they have decided to go back to DEP and discuss the possibility of changing the stormwater landscape that is currently designated for the Rusty Lantern. Charlie Frizzle asked staff if they were comfortable with leaving the landscaping buffer to Jim Howard once the stormwater plan has been completed. Matt Panfil replied that they do not see any problems. Jane Arbuckle stated that she would love to see the rhododendrons stay, but is cognizant of the weather exposure.

Alison Harris asked for clarification of the bike rack. Curt Neufeld pointed out the location on the layout.

Alison Harris asked for clarification of the triangular lot that was cut off. Curt Neufeld pointed out the area on the lot layout; this piece of land is part of Lot 6C which is vacant and includes the stormwater area for the Rusty Lantern.

Alison Harris asked about the striping to Merrymeeting Plaza. Curt Neufeld explained that there is not a thru striped lane from here to Merrymeeting Plaza. When the plan was originally approved for the convenience store, the road was a driveway. As part of the traffic movement permit with Maine DOT, he belives that they will stripe that differently.

Sande Updegraph referenced sign 5, and a no right-hand prohibition sign on sheet C3, and stated that it should be a no left turn prohibition. Curt Neufeld replied that sign 5 has been removed and only the no left-hand sign remains. This is meant so that people do not circulate in the parking lot.

Bill Dana asked if when the subsequent build out of Allagash Drive happens and the sidewalk is extended, will it continue along the common access driveway? Curt Neufeld pointed out where the sidewalk exists and stated that it will pick up at the pedestrian connectivity and continue to Allagash Drive.

Rob Burgess pointed out that at the SRC meeting Jim Howard stated that he would install lighting of 3,000 kelvin and asked how they enforce this since there is no standard. Matt Panfil replied that the minutes of the SRC meeting and the minutes of this Planning Board are on record, but they could also make this a Condition of Approval (CoA). Charlie Frizzle replied that adding this as a CoA may be difficult; they will have to rely on the integrity of Jim Howard to install the lighting that is requested.

Charlie Frizzle opened the meeting to public comment. Hearing none, the public comment period was closed.

Members updated and made changes to the Findings of Fact.

MOTION BY BILL DANA THAT THE REQUESTED WAIVERS FOR THE LOCATION AND PROFILES OF EXISTING UTILITIES & THE EXISTING LOCATION, SIZE, AND PROFILE, AND CROSS SECTION OF SANITARY SEWERS ARE APPROVED. MOTION SECONDED BY KELLY MATZEN, APPROVED UNANIMOUSLY.

MOTION BY ALISON HARRIS THAT THE FINAL PLAN IS APPROVED WITH THE FOLLOWING CONDITIONS:

1. That the Board's review and approval does hereby refer to these findings of fact, the plans and materials submitted by the applicant and the written and oral comments of the applicant, their representatives, reviewing officials, and members of the public as reflected in the public record. Any changes to the approved plan not called for in these conditions of approval or otherwise approved by the Director of Planning and Development as a minor modification shall require a review and approval in accordance with the Brunswick Zoning Ordinance.

2. That prior to issuance of a building permit, architectural compatibility of the bank shall be approved by MRRA and documentation of the approval shall be provided to the Director of Planning and Development.

3. That prior to issuance of a building permit, the Maine DOT shall approve traffic movement PERMIT and documentation of the approval shall be provided to the Director of Planning and Development.

4. That prior to issuance of a building permit, the applicant shall set aside funds in escrow to construct a five (5) foot wide bituminous sidewalk to connect the subject parcel to nearby sidewalks. The funds set aside shall be based on an estimate of project costs to be prepared by the applicant and approved by the Town Engineer.

5. That prior to starting construction, the Stormwater Management Law permit shall be approved by the Maine DEP and provided to the Director of Planning and Development.

MOTION SECONDED BY SANDE UPDEGRAPH, APPROVED UNANIMOUSLY.

2. Case #19-046 Brunswick Landing Subdivision Lot 6A2; Coffee Shop: The Planning Board will review and take action on a Final Plan Major Development Review application submitted by Sitelines on behalf of Priority Leasing, LLC to construct a 2,254 square foot coffee shop with a drive-through on Bath Road. The subject lot (Map 40, Lot 98) is located within the GM7 (Growth Mixed Use 7) Zoning District.

Jared Woolston introduced the application.

MOTION BY BILL DANA TO DEEM THE FINAL PLAN MAJOR DEVELOPMENT REVIEW APPLICATION COMPLETE. MOTION SECONDED BY SANDE UPDEGRAPH, APPROVED UNANIMOUSLY.

Curt Neufeld of Sitelines gave a PowerPoint presentation and reviewed development review, development, lot layout, staff comments, landscaping, coffee shop updated elevation, and coffee shop renderings.

Charlie Frizzle pointed out that the only thing that came up from the Staff Review Committee (SRC) meeting of October 30, 2019, was the issue of appearance from Bath Road. The building will look wider and shorter with the addition of the trellis; this is about the best you can do to hide the HVAC. Sande Updegraph asked if they had given more thought about clear story windows and asked if they were precluded because of the size. Curt replied that the HVAC needs lots of air movement that the lattice will allow for; if you were to make it a solid wall it will reduce air flow. Sande replied that she was refereeing to the area below the Dunkin sign. Curt replied that this was not discussed with the architect.

Sande Updegraph pointed out that if they were able to bring the pink and orange striping that is found on the front around to the Bath Road side it might dress up the back more. Curt Neufeld replied that he is happy to bring back any ideas to the applicant.

Per Alison Harris's request, Curt Neufeld navigated potential pedestrian access to the coffee shop.

Rob Burgess asked if they were using posts for the trellis similar to the front and as seen on A2.1. Curt Neufeld replied that the trellis will pop up and be on posts. He agrees that it will add to the look of the Bath Road side.

Chair Charlie Frizzle opened the meeting to public comment. Hearing none the public comment period was closed.

Members reviewed and made changes to the Findings of Fact.

MOTION BY BILL DANA THAT THE REQUESTED WAIVERS FOR THE LOCATION AND PROFILES OF EXISTING UTILITIES & THE EXISTING LOCATION, SIZE, AND PROFILE, AND CROSS SECTION OF SANITARY SEWERS ARE APPROVED. MOTION SECONDED BY SANDE UPDEGRAPH, APPROVED UNANIMOUSLY.

MOTION BY JANE ARBUCKLE THAT THE FINAL PLAN IS APPROVED WITH THE FOLLOWING CONDITIONS:

1. That the Board's review and approval does hereby refer to these findings of fact, the plans and materials submitted by the applicant and the written and oral comments of the applicant, their representatives, reviewing officials, and members of the public as reflected in the public record. Any changes to the approved plan not called for in these conditions of approval or otherwise approved by the Director of Planning and Development as a minor modification shall require a review and approval in accordance with the Brunswick Zoning Ordinance.

2. That prior to issuance of a building permit, architectural compatibility of the coffee shop shall be approved by MRRA and documentation of the approval shall be provided to the Director of Planning and Development.

3. That prior to issuance of a building permit, the Maine DOT shall approve the traffic movement permit and documentation of the approval shall be provided to the Director of Planning and Development.

4. That prior to starting construction, the Stormwater Management Law permit shall be approved by the Maine DEP and provided to the Director of Planning and Development.

MOTION SECONDED BY KELLY MATZEN, APPROVED UNANIMOUSLY.

Chair Charlie Frizzle adjourned the working meeting and turned the meeting over to Vice Chair Bill Dana.

Adjustment to the agenda to move Item #4 to proceed before Item #3

4. Workshop: At the request of Tom Wright, the Planning Board will consider allowing Office use in the GO (Growth Outdoor Recreation) Zoning District.

Jared Woolston stated that Tom Wright did a lot of work on this application and tied it to the 2008 Brunswick Comprehensive Plan very well which is what they always have to do when making ordinance amendments. They don't usually do much with this use, but it comes before the Board because it ties in trials and such. In terms of infrastructure in this district, there isn't much except for the building that Tom owns; this zone does not allow for office space. Jared explained that Tom is looking to have direct stewardship of some trails that exist in the GO District. The idea is that if office use is allowed, they would potentially have the Brunswick Topsham Land Trust as a tenant in the building as well as they are stewards of a large piece of land also in this district.

Jared Woolston pointed out that also on attendance at this meeting is Steve Levesque, Executive Director of MRRA who can provide them with some perspective of the BNAS Master Plan.

Jared Woolston explained the zoning change process and stated that they want to avoid spot zoning.

Charlie Frizzle pointed out that other uses allowed in the zone are golf courses that have buildings and parking lots; why a provision wasn't made when this was written to allow for management and maintenance of these uses unknown to him, but he sees no problem with allowing office use in this district.

Rob Burgess pointed out that office use should be allowed as an accessory use. Jared Woolston replied that it would be allowed as an accessory use if it was tied directly to a use, but this is on a separate lot on its own and becomes the principal use on the lot.

Jared Woolston reviewed the definition of office use and office medical.

Matt Panfil explained that in the beginning, they thought they could change the zone for the lot to be industrial, but the downside is that in the future it could then, in turn, become highly industrial. Rezoning isn't the optimal strategy because it could be considered spot zoning. Jane Arbuckle suggested creating a use that is specific to this zone. Matt replied that the rest of the building would be general office use.

Tom Wright provided a brief overview of his request to allow for office use in the GO District. Tom stated that the concept is to have a center that is conservation and ecology centered that could potentially turn into a center for all the public land.

Steve Levesque explained that when they wrote the reuse plan and did the open space, they had envisioned that this building would serve the open space property. The reason that they didn't zone this as GM7 was that they didn't want this to become medical or general office space that

would then dominate that space; they wanted it to support the open space on the landing. Tom Wright's vision is in line with MRRA.

Lee Cataldo, Director of Programs at BTLT, stated that this building would allow them to not only oversee the adjacent land and trails that they currently own but the opportunity to work with MRRA, Tom Wright and other organizations in including the Brunswick Parks and Recreations building to serve other community needs.

Matt Panfil stated that it sounds like an idea would be that of a definition of office that would allow maintenance type shed, and be ecologically centered.

Matt Panfil suggested that it may be time to add *other* use in the zoning use table. Alison Harris asked if others would go under all the districts and if they would all be conditional. Jane Arbuckle replied that in some districts *other* use may not even be allowed.

Staff to draft zoning ordinance change language.

3. Workshop: The Planning Board will review Lighting Standards, Section 4.10 of the Brunswick Zoning Ordinance.

Matt Panfil passed around additional materials and stated that his goal is to know the scope that the Board wants.

Matt Panfil noted that he has additional information on dark sky, but noted that when you hear darky sky city, there is a lot more that goes into it than just an ordinance.

Sande Updegraph asked how any changes they make will affect the Town updating their lights to LEDs. Matt Panfil replied that the Town does not have any special waivers and will need to abide by the ordinance standards. When and if they talk about lighting in the right of way, they will need to bring in Public Works.

Matt Panfil to reach out to Public Work and ask that they provide an overview of the lighting upgrades that they are planning to make. Bill Dana suggested that they ask the Police Chief his thoughts on lighting. Rob Burgess suggested that they reach out to Troy Moon, the Suitability Director of Portland, to see what he has to say regarding the lighting changes that they have made. Bill suggested that they also reach out to Bowdoin College and its sustainability Director.

Issues to address:

- The economic and technological compulsion to install LED lights and then installing the wrong kind that is around for a very long time.
- Light trespass
- Brightness
- Color
- Direction

Matt Panfil reviewed the next steps.

5. Other Business

6. Approval of Minutes 7/9 7/23

MOTION BY BILL DANA TO APPROVE THE MINUTES OF JULY 9, 2019. MOTION SECONDED BY ALISON HARRIS, APPROVED UNANIMOUSLY AMONG THOSE VOTING.

MOTION BY BILL DANA TO APPROVE THE MINUTES OF JULY 23, 2019. MOTION SECONDED BY KELLY MATZEN, APPROVED UNANIMOUSLY AMONG THOSE VOTING.

7. Adjourn

This meeting was adjourned at 9:21 P.M.

Respectfully Submitted,

Tonya Jenusaitis

Recording Secretary

*This agenda was revised on October 30th, 2019 to add item #3.

*This agenda was revised on November 7th, 2019 to add item #4.

2/12/20

STAFF REVIEW COMMITTEE NOTES

Staff present: Ryan Leighton, Acting Town Assessor; Jay Astle, Public Works Director; Ken Brillant, Fire Chief; Ryan Barnes, Town Engineer; Matt Panfil, Director of Planning and Development; TC Schofield, Brunswick-Topsham Water District; Mark Waltz, Brunswick Police Department; Dennis Wilson, Town Arborist. Non-voting Staff: Jared Woolston, Planner; Laurel Margerum, Administrative Floater; Julie Erdman, Planning Technician.
Applicants Present: Catherine Ferdinand and Don Borkowski, Bowdoin College; Kylie Mason, Rebecca Gabryszewski and Paul Ostrowski, Sebago Technics; Curt Neufeld and Joe Marden, Sitelines PA; Jim Howard, Priority One LLC; and Tim Forrester, Atlantic Environmental; Michael Dipersia, GJoris, LLC.
Public Present: Hannah LeClaire, Times Record; Greg Hastings.

1. **Case #19-039 Bowdoin College Barry Mills Hall & The Center for Arctic Studies:** The Staff Review Committee will review and make a recommendation to the Planning Board on a **Final Plan Major Development Review** application submitted by Sebago Technics on behalf of Bowdoin College to construct two (2) new academic buildings with 44,515 square feet of floor area and reconfigure the adjacent parking lot.. The subject lot (Map U35, Lot A) is within the **GC1 (Growth College 1) Zoning District and the APO3 (Aquifer Protection Overlay 3) District**.

Kylie Mason: The last time we met on this was earlier in the fall. We took all the comments that we received - some circulation questions, some crosswalks - and made changes. We are waiting for our final DEP approval. Ryan specifically requested a sign off on the storm water maintenance agreement and Don has signed that today. We are hoping now we can finalize the DEP permit. I think largely everything is the same. All comments were taken into account from the Planning Board sketch plan meeting. We have provided a ratio for tree clearing which shows that for every tree removed we'll put 1.25 trees back. That was the feedback from the Planning Board Chair Charlie Frizzle, and it makes it a little easier if there are additional trees that come down they will be replaced under this plan. The parking table has been updated. We are doing a small amendment to this that we'd like to resubmit when we send the documents in for final in that we're creating two additional ADA parking spaces from three parking spaces shown on the plan, with a crosswalk coming through the drop off aisle. With that we'll update the parking count. When we did the table, we had broken them out, by individual buildings. Catherine has made some notes in our narrative to combine them all so that we're still working with one baseline number. We think that will be easier to maintain in the future as opposed lots of little numbers. The lights are at 3,000 kelvins. The utilities seem to be well coordinated. We would really like to know what the address is going to be. We have a specific preference towards Polar Loop as opposed to College Street. We would propose 10 and 12 Polar Loop for the new buildings and we're hoping we can get E911 and Assessing and everybody on the same page.

Ken Brillant: 911 addressing is really headed up by the Assessing Office. I don't know if you've had any correspondence with Jeff Emerson at all about this?

Catherine Ferdinand: No. I think we did talk about it at sketch plan…

Jared Woolston: I think we could probably resolve this after this meeting just because there's been some turnover.

Ryan Barnes: We can check the minutes from the previous meeting but I thought Jeff was concerned about addressing off of Polar Loop.

Ken Brillant: I'm just making some notes. He's not back until the 24th and I certainly want him in the loop because I don't know what the discussions have been. So we'll be in touch.

Don Borkowski: There would not be any entrances off of College Street.

Kylie Mason: There is an administrative adjustment for the opaque buffer; to not have it be the opacity at four feet, but rather planted vegetation. At sketch plan, Chair Frizzle seemed to be in support of that. Then there is a solid waste waiver. We also had asked for the aisle width and parking stall adjustments.

Jared Woolston: Parking dimensions keep coming up. This is the second time in the last month or so and there seems to be some acceptance for the smaller dimensions. I just mention that for the record because the Planning Board reviews these minutes and there may be interest in adjusting the zoning ordinance if we routinely get requests for this.

Ryan Barnes: I will just say, as I have before, that 9' x 18' x 24' is not an abnormal dimension in most other communities.

Matt Panfil: It looks like the crosswalk issue we talked about last time has been addressed. I'm okay with the parking dimensions being proposed and I think the elevations look good.

Dennis Wilson: No comments.

Ryan Barnes: We had already talked about how this is replacing your existing facility, so solid waste is fine with a waiver. As far as parking and circulation, it sounds like the intent was to have the new Coffin expansion take up the loss of parking spaces - will Coffin be built before this?

Don Borkowski: It is nearing completion right now. We plan to be done by mid-March when this project hopefully kicks off.

Ryan Barnes: They never came into for a storm water connection permit. Obviously every time there's a project, contractors take up a lot of spaces so having a loss would make it that much more challenging.

TC Schofield: I just want to make sure the intent is to still connect the two buildings underground.

Paul Ostrowski: Yes.

Mark Waltz: No comments.

Jay Astle: No comments.

Ken Brillant: I'm assuming this is going to the Marshall's office for review and sprinkling and all that so I have no comments.

Catherine Ferdinand: Has Jeff weighed in on vehicle access and all that stuff?

Kylie Mason: He didn't have any comments before. Normally if he had something we'd hear about it through Planning. We will bring 9 copies for Planning Board next Wednesday, with two full size. We'll see you for the site walk on Tuesday, the 18th at 4pm at Dayton Lot.

2. **Case #20-003 Mechanic Savings Bank:** The Staff Review Committee will review and take action on a **Sketch/Final Plan Minor Development Review** application submitted by Sitelines, PA on behalf of Priority One, LLC to construct a 2,965 square foot bank with drive-thru at 21 Gurnet Road. The subject lot (Map CC1, Lot 30) is within the **GM4 (Growth Mixed Use 4) Zoning District**.

Jared Woolston: I just want to note that we erroneously had this project listed as being in the Shoreland Protection Overlay – Resource Protection Subdistrict on the agenda. It is not in the Shoreland Zone.

Curt Neufeld: I represent the project on behalf of Priority One LLC and Jim Howard's with me. This site has been known as pad #4 of the development done by Stoneybrook in Cooks Corner Plaza, and was previously permitted through the town. It is part of a project that has a Maine DOT traffic movement permit and DEP Stormwater Site Law approval. The site is currently undeveloped; it's a paved vacant lot. It was approved with a 5,000 square foot restaurant with a drive through. As proposed, it is a 2,965 square foot bank with a single drive through lane. The developed area is about 400 square feet less than what was conceived at the time. We plan on using the same drainage scheme that was approved through the DEP. It will require a condition of compliance approval which will be submitted pending any comments here. I know that there were some comments regarding the traffic and the status of those counts. It provides 12 parking spaces, which I think is slightly in excess of what is required for the building, and one ADA spot. We are showing a connection to the existing sidewalk system within the Plaza itself that provides a route out to Route 24. Utilities have been stubbed to the site, so we see no issues there. You received architectural elevations in the packet with the floor plan. There'll be some landscaping in front of the building which was also included.

Matt Panfil: Did we have financial capacity?

Jared Woolston: They provided a letter from Mechanic Savings Bank which is a little interesting.

Matt Panfil: I didn't notice it in here.

Jim Howard: I've checked their financials. They're in good shape.

Matt Panfil: I just want to make sure that for the record that we have a document somewhere.

Jared Woolston: So we are all on the same page, Priority One is building the project for Mechanic Savings so my understanding is their letter is sort of saying that you have the financial capacity to do the project.

Jim Howard: We're leasing them the land and we're building the building for them and they're going to own it. They're paying for the building themselves with their money. We can write the letter however you'd like.

Jared Woolston: It's supposed to be from a third party. I should have caught that at the beginning. Mechanic Savings Bank saying that they're good for it is not acceptable. We'll just have to do a condition of approval that we still need financial capacity.

Matt Panfil: I think that the bank letter is sufficient. If you write the condition to the satisfaction of the Planning Director, I will deem it satisfactory.

Jared Woolston: Your narrative says "also enclosed is a letter from Mechanic Savings Bank indicating funds available and their past banking relationship with the applicant", so that's where I got a little bit confused. I thought they were vouching for you.

Curt Neufeld: I don't know why it's not in there, but obviously it didn't get included in the PDF, so I apologize for that. I can certainly give you that letter.

Matt Panfil: As far as the Cooks Corner Design Standards go, I would agree it meets them. Although it looks maybe it belongs a little more in my hometown of Chicago with a Prairie style than in New England, it is an attractive building.

Dennis Wilson: Along Gurnet Rd, there is a little estuary but you're not showing any landscaping around it on the landscape plan.

Ryan Barnes: That is a stormwater BMP.

Dennis Wilson: Right, but there's also a tree line going along here.

Jared Woolston: I did point that out in the findings. The existing condition plans don't talk about the shrubs and the three Pin Oaks that are on the front. They do exist and they were shown on another plan, a landscaping plan that was done I believe in 2014. Um, and it also showed some other things. I advise the committee to ask for that additional landscaping.

Dennis Wilson: I'd like you to keep the continuity of the street line with the trees.

Jim Howard: Absolutely. We may end up putting healthier ones there. They don't look so good now.

Curt Neufeld: We can revise that plan. I think some of those that are shown are in the right of way and that's probably why they're not being well maintained. The plantable space outside of the BMP pushes them in within the right of way.

Jared Woolston: Your landscaping plan has some plantings on the interior, but it doesn't include some of the old landscaping that was envisioned 2014. Not that that was approved that way, but it was shown that way and I thought it was a much better landscaping plan.

Jim Howard: We can add some more trees but I don't want to cover the drive through.

Jared Woolston: The 2014 plan had junipers, some street trees and some smaller landscaping beds through here. Yeah. I also advise maybe doing something along this driveway; the standard for the ordinance only requires street trees along an actual street so the Staff Review Committee could easily say that this is a drive through dirt driveway and those standards don't apply.

Curt Neufeld: We talked about that one in house and that piece is just going to be hammered on from both sides by snow and salt.

Jim Howard: We can plant something there that we can cut back in the winter like we did at Goodwill. We will make those changes.

Jared Woolston: In the findings, I basically prescribed what was already designed years ago. I didn't say anything about this other than that advice I just gave you.

Ryan Barnes: As far as traffic, I'm okay with conditions as Jared wrote them up.

Curt Neufeld: There was an exchange of emails yesterday and the permit is now just over five years old so the DOT has an opportunity to look at what's been built. We pulled up the original permit and the uses that were in that versus the uses which have to date. We're over in the PM peak and we're under in the Saturday peak, but overall I think we're consistent more or less with what was originally approved. Diane says she will take a look at it and either call it good or ask for a modification, which is basically a new letter with new trips.

Ryan Barnes: Do you know if the offsite roadway improvements that were included in that permit were completed?

Curt Neufeld: It looks like everything was except for some signs that were reported to be overhead.

Ryan Barnes: DOT will want to make sure all of that has been done.

Jim Howard: It has.

TC Schofield: Curt already mentioned there are domestic and fire stubs already there, so it should be pretty straight forward.

Mark Waltz: It looked like from the landscape plan there aren't any tall hedges planned - we wouldn't want anything like that because if we have a hold up alarm we like to park at distance away and watch the entrance.

Jim Howard: It will all be low.

Jay Astle: Where did we just end up with those sickly trees along the road? They are Town trees right?

Jim Howard: They are on town property but I'll replace them all for you and we'll maintain them even if they're yours.

Jay Astle: It would be helpful to know what species you are going to use for replacements based on proximity to the sidewalk.

Jim Howard: Do you have a preference?

Dennis Wilson: No oaks, no Elm – nothing wide spreading.

Jared Woolston: The old plan showed Japanese Maples and then Lindens across the back. The front was supposed to be Pin Oaks. The draft condition of approval is "prior to issuance of a building permit, landscaping plans shall be revised to the satisfaction of the Town Arborist and provided to the Director of Planning and Development". That gives you the chance to talk to these guys and work it out.

Ken Brillant: You should plan for a KnoxBox on the building. Other than that I have no comments - it's going to be reviewed by the Fire Marshall's office anyway.

Ryan Leighton: No comments.

Jared Woolston: Seeing there are no comments from the public we'll get right into the findings.

MATT PANFIL MADE A MOTION THAT THE APPLICATION IS COMPLETE. MOTION SECONDED BY DENNIS WILSON, APPROVED UNANIMOUSLY.

RYAN BARNES MADE A MOTION THAT THE REQUESTED WAIVERS ARE APPROVED. MOTION SECONDED BY MARK WALTZ, APPROVED UNANIMOUSLY.

KEN BRILLANT MADE A MOTION TO APPROVE THE FINAL PLAN WITH THE FOLLOWING CONDITIONS:

1. That the Committee's review and approval does hereby refer to these findings of fact, the plans and materials submitted by the applicant and the written and oral comments of the applicant, his representatives, reviewing officials, and members of the public as reflected in the public record. Any changes to the approved plan not called for in these conditions of approval or otherwise approved by the Director of Planning and Development as a minor modification shall require a review and approval in accordance with the Brunswick Zoning Ordinance.

2. Prior to issuance of a building permit, written approval from the Maine DOT to demonstrate the proposed traffic movement is acceptable to the Maine DOT and the Town Engineer and any required changes to the approved plan for traffic movement shall be provided to the Director of Planning and Development.

3. Prior to issuance of a building permit, written approval from the Maine DEP to demonstrate the stormwater management plan is in compliance with the Stormwater Management Law and any required changes to the approved plan for stormwater management shall be provided to the Director of Planning and Development.

4. Prior to issuance of a building permit, landscaping plans shall be revised to the satisfaction of the Town Arborist and provided to the Director of Planning and Development.

5. Prior to issuance of a building permit, solid waste impact fees shall be paid to the satisfaction of the Public Works Department.

MOTION SECONDED BY RYAN BARNES, APPROVED UNANIMOUSLY.

2. **Case #20-004 Hinton Recreational Dock, 98 Toads Landing:** The Staff Review Committee will review and make a recommendation to the Planning Board on a **Sketch/Final Plan Major Development Review** application submitted by Atlantic Environmental on behalf of Gregory and Sally Hinton to install a permanent pier and seasonal ramp and float to access coastal wetlands at 98 Toads Landing Rd. The subject lot (Map 36, Lot 28) is within the **RP1 (Rural Protection 1) Zoning District** and contains the following overlays:

RPSMO (Rural Protection Stormwater Management Overlay); SPO-RP (Shoreland Protection Overlay – Resource Protection Subdistrict); **and the FPO (Flood Protection Overlay).**

Tim Forester: The Hintons have asked me to work with Bob Wattle, a dock builder in Harpswell, to come up with a design for a float that would land for full tide access in Buttermilk Cove. We came up with a 6' x 16' foot pier, a 3' x 36' ramp and a 10' x 16' float. We looked at a couple of different locations within the property. They do have a set of existing stairs that comes down right to the edge of the high tide line. It made sense to work off of those existing stairs with a short permanent pier. It's all ledge and rockweed covered ledge in the upper intertidal zone and the float will not ground out at low tide. There's no real navigation issues here; we're hugging the shore as best we can. The ramp in the off season can be slid up onto the pier and the float will be hauled off site. The project has been approved by the Corps of Engineers and Maine Department of Environmental Protection. I understand there's a concern of title, right and interest over whether or not the individual even has the right to construct such a dock in the intertidal zone and if you look at their deed you'll see that they do - it's pretty specific in how it's written. We did have a title of real estate attorney look into this prior to submitting our DEP application. I'm remiss, I didn't include his opinion letter in this application, but I do have it and I'll forward it to Jared.

Jared Woolston: I'll put it in the Planning Board's packet.

Tim Forester: His conclusion was that they do have TRI. We did research back to some of the original deeds where basically it was just a change in the language of how it was written, but the parcel itself has never changed shape or form.

Mark Waltz: The actual legal just says to the high water line.

Tim Forester: Yes, correct. If you look at the letter that was provided by the attorney under principles of ownership along the intertidal, there's further description there that says "thence running by the high water line". The attorney didn't feel that was sufficient to slice off the intertidal.

Jared Woolston: Mark, is this something that you'd like to review before it gets to the Planning Board?

Mark Waltz: Yes. Often you'll see language conveying whatever interest they may have in the intertidal zone, which you don't see in this deed.

Tim Forester: Right. The original deed was written to Buttermilk Cove.

Jared Woolston: Your client's not here, but if you could get the message to them that we apologize for putting them through a little bit of a delay. We had to go through the RPSMO zoning ordinance change, which was a big deal for the town. We got through it as quick as we could. I know it was a big delay for them, but we did our best.

Matt Panfil: Can we have the Town Attorney look at TRI before Planning Board?

Jared Woolston: Yes.

Ryan Barnes: No comments.

TC Schofield: No comments.

Mark Waltz: Nothing further.

Jay Astle: No comments.

Ken Brillant: No comments.

Ryan Leighton: No comments.

3. **Case #20-008 Marijuana Store, 4 Business Parkway:** The Staff Review Committee will review and make a recommendation to the Planning Board on a **Sketch Plan Major Development Review** application submitted by Sitelines, PA on behalf of GJoris LLC to construct a 3,100 square foot Marijuana Store at 4 Business Parkway. The subject lot (Map 17, Lot 66) is within the **GI (Growth Industrial) Zoning District.**

Matt Panfil: Is there a Conditional Use Permit already for this?

Jared Woolston: Joe and I went around about this. There's a need to get the use approved before they can get a final plan review. As far as I can tell, there's no need to get the use approved before sketch plan.

Matt Panfil: My concern is that it can be misrepresented as an acceptance of the site plan, including the use.

Michael Dipersia: With the state, the first process is a conditional from them and there's a period of time where I can submit any change to the construction. Then it gets to the point that they give me an affidavit that I have to bring to the Town for them to sign off on.

Joe Marden: What we're proposing is a 3,100 square feet, single story retail building, for adult use marijuana. This is off of Business Parkway, which is the Industrial Park. Currently it's just a wooded lot. There's a little bit of meadow area in the open, but it's pretty much undeveloped. We're proposing approximately 65 parking spaces with the option to expand up to 85 in the future. We'd like to try and get it all permitted at once if possible. There hasn't been this type of use in the state before but there have been concerns in other States with inadequate parking, so we kind of like to start with 65 and if the demand requires more, we'd like to be able to add it. There will be a loading area in the back with an overhead door so the vehicles can drive right into the building. When Business Parkway was installed sewer and water stubs were extended to the site. We've been in contact with the Water and Sewer Districts to get those locations and we are still working on getting ability to serve letters from them. This parcel was part of the expansion of the Brunswick Industrial Park and that was a Site Law Amendment. Within that amendment there was allocated impervious area and wetland impacts on the property and within those we pretty much just have to drain this property towards Business Parkway. There's a ditch along here that drains into a storm water pond. There were some changes to that storm water pond at one point. I still have to do a little bit of research on what it actually is but I'm fairly confident it is sized for this impervious area. In terms of traffic we have been in contact with Diane Morabito who's sent a letter to DOT. When Business Parkway was put in they allocated a certain number of trips as part of the traffic movement permit. Her assertion is that this project is still within those trips but we're still waiting to hear back from DOT on that.

Jared Woolston: Were there wetland impacts permitted for this lot?

Joe Marden: Yes. They broke it down per lot.

Jared Woolston: I'd like to see that Site Law Permit at final plan.

Joe Marden: Also there was a 50 foot wooded buffer required as part of the Site Law permit so we're maintaining that.

Matt Panfil: One thing that's missing is the 500 foot radius around the property so that we can verify there are no schools within that. I hate to see something so over parked, it's about six times what we need. I understand there's the initial draw. My biggest fear is like a Walmart designed for the day before Christmas.

Michael Dipersia: I actually think it's low to be honest. The way the state is making these retail business operate is the doors are always locked, so everyone has to line up outside and we have to control the flow of people coming in. I'd say it's similar to a beer release. Everything I've seen in Massachusetts shows t that we're low on parking for retail marijuana.

Matt Panfil: How many employees are you going to have at any one time?

Michael Dipersia: Ten. At least two security and the manager as well as six to eight retail employees.

Ryan Barnes: Is there a maximum number that's allowed in the store at one time?

Michael Dipersia: No. They just have to be IDed at the point of entry and point of sale.

Matt Panfil: Everything else seems fine. I just want to go on the record that I would encourage a little less parking but I understand your concern.

Dennis Wilson: Will have a landscape plan eventually for this too?

Joe Marden: Yes, this is just the sketch. He wants it to really look in a really nice coming in here, even though it's located with an industrial park, he wants to have a more retail feel to it.

Dennis Wilson: It would be nice to have something low growing around the foundation and along Business Parkway I'd like to see a few trees and something to soften up the large parking lot too.

Ryan Barnes: I'm echoing Matt's concern that parking seems high based on what your actual footprint of retail is going to be from an occupancy standpoint. You're reviewing and planning to coordinate with DEP if necessary on the stormwater. You are showing dimensional changes for the parking; just remember to ask for a waiver when you get to the next step. I'm fine with a review from Sewell to DOT as long as I kind of copied on the correspondence of that. This is new construction so it would require a solid waste impact fee at building permit.

Jared Woolston: I'm wondering how why the building is this far back instead of pushed up a little bit more so that you have a little bit more high ground. It's a small amount of wetland impact but I'm wondering if it could have been avoided just by shifting at all up to the street a little bit more.

Joe Marden: There was a lot of back and forth on where this was located. Could it be moved forward? We could look at it. I think no matter what, you're still going to have some wetland impacts. I think one aspect was trying to just create more of that entry feel into the parking area.

Michael Dipersia: I was trying for a destination retail feel. I want to do some landscaping along the lot line too to divide it a little bit.

Jared Woolston: For the sketch plan that you submit to the Planning Board, if you could just tighten up this line - you said that you're going to maintain that buffer - this doesn't show where the clearing line is going to be. It would be good to get a better feel about how it's going to lay out.

TC Schofield: No comments.

Mark Waltz: What will happen inside the security fence area? Is it for safety with the overhead door?

Michael Dipersia: Yes.

Mark Waltz: Just for the record, my preference would be to have the parking there because if it is heavily patronized, we'd rather that than have people lined up on the main road.

Jay Astle: What's your sense of the movement of vehicles in the parking lot? How long is the average shopping visits?

Michael Dipersia: I would say it's probably 10 minutes once you get through the door. I think people are going to spend a lot more time outside the building waiting than inside the building. That's why we have that overhang.

Jared Woolston: At final plan they're probably going to have to do some pedestrian access ways in the parking lot. That might be something you'd want to consider now anticipating what you want for parking for final plans. When you do your parking lot layout for parking lots over 30 spaces, it is fairly prescriptive about landscaped areas and internal pedestrian access. You might want to look at that if it's going to delete some spaces. It might change your layout.

Ken Brillant: If there is an alarm system a KnoxBox will be required. This will go to the Fire Marshall's office for review so I have no further comments.

Ryan Leighton: No comments.

Greg Hastings: I'm one of the owners of 3 Business Parkway. Tom Dunham is my partner in that venture and he's not able to be here today. I just want to go on record to say that we're very happy having a cultivation operation across the street; there's not a lot of traffic impact on our property, but I think this retail use - putting it in the industrial park - is a big mistake. I don't think it's the right place to put it. I've been an Industrial Broker for 33 years, specializing in the industrial market. I am seeing in South Portland that retail stores are going in retail environments. They're not going into industrial parks. I'm even more concerned now that I hear the applicant talking about 65 parking spaces being inadequate and that they might actually need more. This is a dead end street that does not have a lot of traffic but there are businesses on it.

Mark Waltz: This was actually a conscious decision. The thought was if a parent wants to raise their kids in Brunswick they might not want to expose them to cannabis stores so that was why the decision was made to allow them here as opposed to the normal retail zone.

Joe Marden: How does the Town feel about the phased parking plan - have you done that in the past?

Jared Woolston: I thought that you were just giving us sort of a sneak peek of what you'd hope to do. I didn't understand that you were asking the Planning Board to consider that as phased. I'd have to check. The size of the

parking is probably something that the Planning Board will want to take up. Also the pedestrian access is not very clear, but again, this is a sketch plan.

Matt Panfil: If you really think you need that, show it that way. Since it is sketch plan, maybe have some options in your back pocket and I think they'll give you some clarity on what they think as well.

Joe Marden: I think from my standpoint, you're not going to build more spaces than you need.

Michael Dipersia: Absolutely not. If people are in the street, I'm building more spaces.

Jared Woolston: How is this done Ryan? Does an engineer or someone go out and do counts?

Ryan Barnes: In this case, I'm really going to lean on the Region One Regional Traffic Engineer. Usually your parking is close to or sometimes even up to double your trip rate, depending on what your entry and stay time is.

Joe Marden: I believe in Diane's trip generation letter she said that the highest peak hour was on Saturday, which makes sense for retail shops and is also when the trips for the other businesses are lowest.

4. **Case #20-009 Marijuana Cultivation Facility, 43 Bibber Parkway:** The Staff Review Committee will review and make a recommendation to the Planning Board on a **Sketch Plan Major Development Review** application submitted by Sitelines, PA on behalf of Bibber Properties LLC for a Marijuana Cultivation Facility. The subject lot (Map 17, Lot 59) is within the **GI (Growth Industrial) Zoning District** and contains the following overlays: **SPO-SP (Shoreland Protection Overlay – Stream Protection Subdistrict and the SPO-RP (Shoreland Protection Overlay – Resource Protection Subdistrict)**.

Joe Marden: We're back in the Brunswick Industrial Park at the end of Bibber Parkway. There's an existing warehouse building there, almost a 100,000 square feet. The applicant is proposing to change approximately half of the building. There is no new pavement proposed. They want do want to convert this loading area to parking spaces for this use. The way the leases are written up for this building there's not necessarily rights for them to park here and walk through the building. They need to have spaces on this side so there's access. I am going to get a handle on utilities, if they anticipate this will increase the demand of the water and sewer. I haven't gotten that yet but when I do coordinate with the districts.

Jared Woolston: The trigger for this one is change of use over 10,000 square feet. This one is going to have a Conditional Use Permit as well so you'll have to go through the Conditional Use Permit process and all the development review standards for this.

Matt Panfil: Again, you will need to show the 500 foot buffer. Did Jeff Hutchinson give you an email or zoning determination letter before he retired that the HVAC training school is not a school as defined by the zoning ordinance?

Joe Marden: Yes, it is post-secondary.

Matt Panfil: I would include that in the packet just to clarify.

Dennis Wilson: On the landscape plan, when you create one, please include the existing trees in the right of way.

TC Schofield: No comments.

Mark Waltz: Is this for medical or retail?

Matt Panfil: For cultivation in the zoning ordinance, we don't distinguish between medical and adult use.

Mark Waltz: I was just curious for the license. It looks like there's a North Carolina address for the LLC. For the Town license you need to be Maine residents.

Joe Marden: They are still working on tenants; the owner of the building is changing the use. They are aware of the requirement.

Jay Astle: No comments.

Ken Brillant: You should put the architect in contact with Deputy Chief Emerson to discuss the separation from the other tenant. That was one whole facility at one point and I know there's security involved with this. The fire alarm system, I think, covers the entire building and if it's going to be separated out, all those things will need to be discussed.

Ryan Leighton: No comments.

Meeting Adjourned

JAE