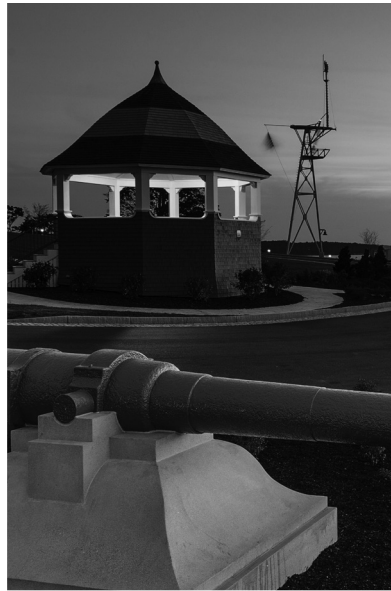


TO: Cumberland Planning Board and other interested parties
FROM: Christina Silberman, Admin. Asst.
DATE: November 2, 2017
RE: Orchard Road Subdivision tax map/lot number error

On review of the documents submitted for the Orchard Road Subdivision Preliminary Review that will be heard by the Cumberland Planning Board on November 21, 2017, I discovered that the incorrect lot number was used. Please note that this project is slated for Tax Map R08, Lot 59 and not Tax Map R08, Lot 59 B.

I have confirmed this with Will Haskell of Gorrill Palmer and he apologizes for the error. The materials submitted reference Lot 59 B but it is actually Lot 59.

Relationships.
Responsiveness.
Results.



**Preliminary
Application for
Major Subdivision
Orchard Road
Cumberland, Maine**

PREPARED FOR:
TZ Properties, LLC

October 2017

SUBMITTED BY:
Gorrill Palmer
707 Sable Oaks Drive
Suite 30
So. Portland, ME 04106
207.772.2515

October 31, 2017

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

Subject: Orchard Road Subdivision
Orchard Road
Preliminary Major Subdivision Plan

Dear Carla,

TZ Properties, LLC has retained Gorrill Palmer to prepare and submit a preliminary subdivision application to the Planning Board for a proposed residential development on Orchard Road. The site is shown on the Assessor's Map R08, Lot 59B, is approximately 24.9 acres in size, and is located in the Rural Residential 2 (RR2) District. Figure 1 attached to this letter is a location map depicting the project site.

Site Description

The project site consists of Tax Map R08, Lot 59B as shown on the Cumberland Assessor's Map. The site is approximately 24.9 acres in size and has approximately 285 feet of frontage along Orchard Road.

The project site is currently undeveloped with moderate topography and generally slopes to the south. Abutting land uses include:

- North – Residential
- West – Residential/Apple Orchard
- South – Residential/Undeveloped
- East – Residential

Project Description

The development of the site is anticipated to include construction of a public roadway to support a residential development of single family homes. The lots will be served by individual wells and subsurface wastewater disposal systems. The current configuration of the subdivision includes 10 single family house lots designed as a clustered residential development. Open space consisting of 8.13 acres of undeveloped land has been provided.

Access to the subdivision is proposed as a public roadway entering the property from Orchard Road. The proposed roadway is a dead end with a cul-de-sac and is approximately 1,500 feet long. Each proposed lot will have a driveway off of the subdivision road.

The roadway is anticipated to consist of a 22' wide paved roadway with a 4' wide paved byway along the southerly side of the roadway. The northerly side of the roadway will have a 2 foot paved shoulder in



cubed sections and a 2' gravel shoulder in non-curb sections. Lighting is not proposed for the roadway. Trash pickup is assumed to be municipal collection consistent with other Town roadways.

An abutting parcel northwest of the subject parcel has been designated on the plans as Lot A. The Applicant is currently in discussion with the owners of Lot A in order to come to an agreement for a land swap as shown in the plan set. The land swap will facilitate the creation of the proposed Lot 10. The agreement will be finalized before submission of the Final Subdivision application.

The project will generate less than 200 trip ends per day, which would therefore qualify under the Cumberland Subdivision Ordinance to be classified as a "Residential Access" roadway.

The final subdivision plan will contain the Fire Department notes, Clearing Limit notes, and Recording Limit note.

Major Subdivision Requirement Waivers

The applicant respectfully requests the following waivers from the ordinance requirements:

Trees 10" diameter or more – A waiver is requested to depict trees 10" in diameter or larger. 32.5% of the wooded site is proposed as open space which will preserve the existing woodland and a 75' no cut buffer is provided along the parcel boundary. The open space and buffers will protect the existing trees. The remainder of the site is subject to development therefore the location of the trees is not beneficial.

High Intensity Soil Survey – A waiver is requested for the High Intensity Soil Survey for this project, due to small scale of this project. Test Pits have been conducted on all lots to determine suitability for on-site septic systems and a Hydro-geologic study has also been conducted for the project. A copy of the test pit logs and hydro-geologic study are included in Attachment 7.

Soil boundaries and names superimposed on plot plan – Since a waiver of the High Intensity Soil Survey is requested, a waiver to put the soil boundaries on the plot plan is requested. A medium intensity soil survey is included in the Stormwater Management Report and the Erosion Control Report for this project.

Building locations – The Applicant proposes to construct the roadway, storm drainage, and electric service. The lots will be developed by the lot owners. Building locations will be proposed by the lot owners at the time of applying for building permits to develop each lot. The building envelope, potential subsurface disposal location, and potential well location is indicated for each lot on the subdivision plans. The applicant requests a waiver from the requirement to show building locations on the subdivision plans.

Location of temporary markers in field – A waiver is requested for location of temporary markers in field. The centerline of the proposed roadway has been marked.



Conclusion

As required by the Ordinance, Gorrill Palmer on behalf of TZ Properties, LLC has submitted the application for Preliminary Subdivision Review. The project team looks forward to the Planning Staff and Board's review of this project.

Sincerely,
Gorrill Palmer

A handwritten signature in black ink, reading 'William C. Haskell'. The signature is fluid and cursive, with the first name 'William' being the most prominent.

William C. Haskell, P.E.
Principal

Enclosure

Copy: Zareh DerHagopian

WCH/jwaU:\3236.01 TZ Properties Orchard Rd Cumberland\P Applications\Local\Subdivision Appl\Preliminary Subdivision cover letter 10-18-17.doc

TZ Properties LLC

23 Stormy Brook Rd
Falmouth, ME 04105

1298

25-80/440

PAY TO THE
ORDER OF

Town of Cumberland
One Thousand and no/100 \$ *1000.00*
DOLLARS

UMB Bank N.A.
Kansas City MO 64106

FOR

insurance

⑆044000804⑆⑆228401206367⑆⑆1298

MONARCH

TZ Properties LLC

23 Stormy Brook Rd
Falmouth, ME 04105

1297

25-80/440

PAY TO THE
ORDER OF

Town of Cumberland
Eight hundred fifty and no/100 \$ *850.00*
DOLLARS

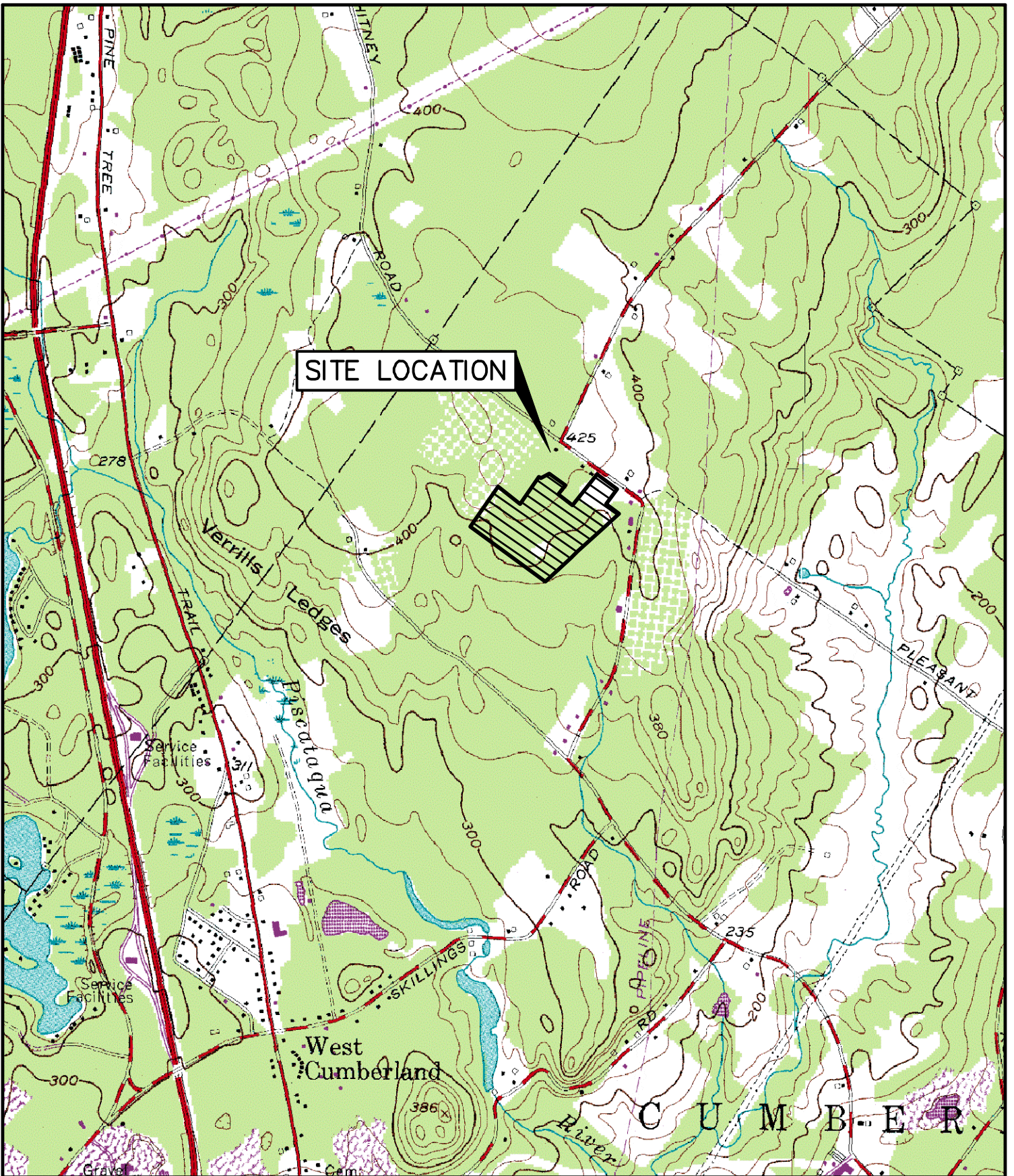
UMB Bank N.A.
Kansas City MO 64106

FOR

Application Fee

⑆044000804⑆⑆228401206367⑆⑆1297

MONARCH



U.S.G.S. Location Map
 Subdivision Feasibility, Orchard Road, Cumberland, Maine
 U.S.G.S. Cumberland Center, State-7.5 Minute Series (Topographic)

| | |
|----------------------------|------------------|
| Design: WCH | Date: OCT 2017 |
| Draft: LAN | Job No.: 3236.01 |
| Checked: WCH | Scale: None |
| File Name: 3236-LOCMAP.dwg | |



Relationships. Responsiveness. Results.
www.gorrillpalmer.com
 207.772.2515

Figure

1



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

October 19, 2017

Zareh DerHagopian
TZ Properties
23 Stormy Brook Road
Falmouth, ME 04105

RE: Designation of Agent

Dear Zareh,

As required by various approval agencies, please indicate by signing below that Gorrill Palmer is authorized to act as TZ Properties agent for the specific purpose of preparing and submitting permit applications on your behalf. This designation of agent is for the following development projects:

- Orchard Road Subdivision

Sincerely,

Gorrill-Palmer Consulting Engineers, Inc.

William C. Haskell, PE
Principal

The undersigned hereby gives Gorrill Palmer the authority to act as agent for TZ Properties for the specific purpose of preparing and submitting permit applications for the project(s) identified above.

[Zareh DerHagopian]

10-19-17
Date

NARRATIVE

The following narrative addresses the approval criteria of the Town of Cumberland Subdivision Ordinance.

Chapter 250 Article I General Provisions

- A. Pollution – The proposed subdivision will not result in undue water or air pollution
 1. The property is located a minimum of 390 feet above sea level and is not within a zone A 100-year floodplain. Attachment 5 contains a copy of the flood map for the project area.
 2. Test pits have been excavated to determine the adequacy of the on-site soils to safely dispose of wastewater. The test pit logs are included in Attachment 7.
 3. The site does not contain excessive slopes. Subsurface wastewater disposal systems will be appropriately sized to treat wastewater based upon the test pit results in Attachment 7.
 4. The existing stream will not be used for disposal of effluents.
 5. The subsurface wastewater disposal systems and well locations will conform to all applicable state and local regulations.
- B. Sufficient Water – The lots will be served by individual wells, a hydrogeologic study is included in Attachment 7. A water sample was collected from an abutter's water system and submitted to Katahdin for testing. The results are included in Attachment 7.
- C. Municipal Water Supply – Not Applicable
- D. Erosion – The erosion and sedimentation control report contained in Attachment 10 addresses best management practices to limit the erosion of soil during the construction and post construction phases of the project.
- E. Traffic – A traffic assessment of the proposed project is included in Attachment 12.
- F. Sewage Disposal – Individual subsurface wastewater disposal systems are proposed for each lot. Attachment 7 contains subsurface investigation logs.
- G. Municipal Solid Waste Disposal – The ten single family residences proposed for this subdivision are not anticipated to cause an unreasonable burden on the Town's ability to dispose of solid waste. The applicant proposes that the roadway be accepted by the Town and the utilization of municipal solid waste disposal.
- H. Aesthetic, Cultural, and Natural Values – The subdivision is not anticipated to have an adverse impact on aesthetic, cultural, and natural values. A 75 foot wide no cut buffer is proposed along the project boundary, 8.13 acres of open space is proposed, and the State historic and natural resource agencies have been contacted to ensure that the project will not adversely affect historic or natural resources. The response from the Natural Areas Program and MDIF&W is included in Attachment 8. No rare botanical features within the project area or endangered, threatened, or special concern species are listed at the project site. The letter from MDIF&W suggests contacting the US Wildlife Service. An official species list from the US Wildlife Service is included in Attachment 8. The official species list notes that the Northern Long Ear Bat may be present in the project area. In order to avoid potential impacts to the Northern Long Eared Bat, tree cutting on the property will be prohibited during construction between June 1 and July 31. The Historic Preservation Commission contact letter is included in Attachment 8, response from the agency will be forwarded to the Town upon receipt.
- I. Conformance with local ordinances and plans – The proposed subdivision has been designed to conform to the Town of Cumberland Subdivision Ordinance.
- J. Financial and Technical Capacity – TZ properties, LLC has completed several projects in the Cumberland County area and has the financial capacity to complete the infrastructure construction for the proposed subdivision. A list of projects is included in

NARRATIVE

- Attachment 2. The Applicant has hired Gorrill Palmer to prepare the subdivision plans and application. Gorrill Palmer has experience in permitting subdivisions in Cumberland. Attachment 2 contains a list of the consultants who have provided information used to assemble this application.
- K. Surface Waters; Outstanding River Segments – The proposed subdivision will not adversely affect any surface water or outstanding river segment. The Erosion Control plan included with this application will provide strategies to avoid contamination of surface waters. The proposed stream crossing and wetland impacts will be submitted to, and conform to, the requirements of the MDEP and ACOE.
 - L. Groundwater – The proposed subdivision will not adversely affect groundwater. The proposed subsurface wastewater disposal systems will conform to the Maine Subsurface Wastewater Disposal Rules.
 - M. Flood Areas – Attachment 5 contains the Fema Flood Map for the project area. The site is not located within a Zone A 100-year flood zone.
 - N. Stormwater – The stormwater management report contained in Attachment 9 provides for stormwater control to limit the post development peak runoff from the 2-, 10-, and 25-year storm to predevelopment levels.
 - O. Freshwater Wetlands – Wetlands have been delineated and GPS located by TRC. The wetland memo is included in Attachment 11.
 - P. River Stream or Brook – A stream delineated by TRC is located at the northerly end of the parcel and is shown on the plans. The wetland memo in Attachment 11 discusses the stream.

Chapter 250 Article V General Requirements

250-19 Review and approval by other agencies

The project will require a Stormwater Permit, and NRPA Permit by Rule for a stream crossing from MDEP. The project will also require an ACOE Category 2 permit for the stream crossing and notification for wetland and vernal pool habitat impacts. Copies of the applications will be sent to the Town upon submission to the agencies. The approvals will be submitted to the Town prior to Final Plan submission.

250-21 Relationship of subdivision to community services

The applicant proposes the construction of the roadway, driveway aprons to the street line, electrical service from Orchard Road to the proposed transformers, construction of ditches and closed storm drain including driveway culverts, and construction of the two grassed underdrained soil filters. The applicant proposes that the Town accept the roadway as a Town road at which point the Town will be responsible for maintenance of the roadway and storm drainage within the right of way. The applicant proposes a Homeowners Association which will be responsible for the maintenance of the two grassed underdrained soil filters. A draft Homeowners Association document is included in Attachment 3. The ten proposed single family residences will have minimum impact to community services.

250-22 Retention of proposed public sites and open spaces

Open space consisting of 32.5 % of the parcel is proposed by the Applicant. The open space consists of woodland containing uplands and wetlands as well as the stream that traverses the northerly edge of the parcel.

NARRATIVE

250-23 Preservation of natural and historic features

Historic and natural resource agencies have been contacted as part of this application process. Attachment 8 contains a response from the Natural Areas Program and the MDIF&W. A request letter sent to the Historic Preservation Commission is also included. The Applicant will endeavor to preserve any natural or historic features identified by the agencies. Open space consisting of 32.5% of the parcel area has been proposed for preservation. The open space includes the stream at the northerly end of the property.

250-24 Land not suitable for development

The Applicant does not propose construction on land not suitable for development. The site is not located in a 100-year floodplain. Attachment 5 contains the flood map for the project area.

250-25 Blocks

Not applicable to this subdivision proposal.

250-26 Lots

The proposed lots have been laid out in substantial conformance with the Town Ordinance. All lots have the required minimum frontage for a cluster subdivision in the RR-2 zone. The parcel area adjacent to Orchard Road is part of the proposed open space and will provide a minimum 50 foot buffer.

250-27 Utilities

The lots will be served by individual subsurface wastewater disposal systems and wells. Electric service will be extended overhead across Orchard Road to a new pole. The electric service will be underground from the new pole to the transformers. An Ability to serve letter has been sent to CMP and is included in Attachment 6. The response will be forwarded to the Town upon receipt.

250-28 Water Supply

Individual drilled wells are proposed for the subdivision. Each lot owner will contract with a licensed well drilling company to have a well installed as part of the lot development. A well exclusion zone is depicted on the plans for each lot. Results of a water quality test performed on a sample from an abutter's water system is included in Attachment 7.

250-29 Sewage Disposal

Individual subsurface wastewater disposal systems are proposed for the lots. The lot owners will have their contractor construct each system during the lot development process. Attachment 7 contains the test pit information.

250-30 Trees, Open Spaces and Planting Screens

The Applicant proposes to dedicate 8.13 acres of the parcel as open space. As required by Section 315-43.B.4 of the Zoning ordinance, a minimum 75 foot buffer is proposed between the

NARRATIVE

clustered development and adjoining parcels. There are two proposed incursions into the buffer for the installation of stormwater management outlet pipes. The ordinance states that the buffer is intended to eliminate potential adverse impacts of the subdivision including glare, noise, and unsightly views of service areas. It is believed by Gorrill Palmer that the 4 inch diameter outlet pipes will be unobtrusive and will not result in adverse impacts.

List of Attachments

Attachment

1. Subdivision Checklist
2. Consultants
3. Title/Right/Interest
4. Abutters
5. Flood Map
6. Utilities
7. Hydro-geologic Study
8. Natural Resource Letters
9. Stormwater
10. Erosion Control Report
11. Wetland Memo
12. Traffic Assessment

Town of Cumberland
Major Subdivision Submission Checklist
BASED ON APPENDIX D
MAJOR SUBDIVISION SUBMISSION REQUIREMENTS

Subdivision Name

Orchard Road Subdivision

Applicant's Name TZ Properties, LLC Date

10-30-17

Per Section 4.1 *General Procedures*, please note: *The Code Enforcement Officer will first determine if the project will be classified as a major or minor subdivision. Classification will determine submission requirements.*

YOU MUST REVIEW THE PROPOSED PLAN WITH THE CODE ENFORCEMENT OFFICER AND TOWN PLANNER PRIOR SUBMITTING APPLICATION TO RECEIVE THE APPROPRIATE CLASSIFICATION.

Major subdivision x Minor Subdivision

The following is intended to provide a summary of the submission requirements for subdivision review and for the provision of evidence for Findings of Fact. For precise requirements, please refer to the Town of Cumberland Subdivision Ordinance.

THE TOWN PLANNER SHALL DETERMINE IF THE APPLICATION COMPLETE OR INCOMPLETE. ONLY COMPLETE APPLICATIONS SHALL BE REVIEWED BY THE PLANNING BOARD.

Waivers: Please make a check in the *Waiver Request* column for any requested waivers. Attach a separate sheet citing the Subdivision Ordinance section number, description, and reason for request. (Section 15.1)

**Specify below the location of information,
i.e., plan #, narrative, binder section...**

| | Yes or No | Location of Information? | Waiver Requested? |
|---|-----------|--------------------------|-------------------|
| General Submissions: | | | |
| 15 copies of plans and materials. All sheet sized to be 24" x 36" | Yes | | |
| 1"=100' scale for general plan | Yes | | |
| 1"=40' scale for construction of required improvements | Yes | | |
| Traffic Info? | Yes | Narrative | |
| Capacity to Serve letters? | Yes | Narrative | |
| Financial and Technical Capacity (Sec.14) | Yes | Narrative | |

| | | | |
|---|-----|-------|---|
| Sewer user permits required? Status? | N/A | | |
| Deed restrictions, if any, describe | N/A | | |
| | | | |
| | | | |
| | | | |
| Cover Sheet: | | | |
| Proposed subd. name & name of municipality | Yes | Plans | |
| Name & address of record owner, subdivider, and designer of preliminary plan | Yes | Plans | |
| | | | |
| | | | |
| | | | |
| Location Map: | | | |
| ▪ Scale 1"=1000' | Yes | Plans | |
| ▪ Shows area 1000' from property lines | Yes | Plans | |
| ▪ All existing subdivisions | Yes | Plans | |
| Approximate tract lines of adjacent parcels | Yes | Plans | |
| Approximate tract lines of parcels directly across street | Yes | Plans | |
| <i>Location of existing & proposed streets, easements, lot lines & bldg. lines of proposed subd. & adjacent properties.</i> | Yes | Plans | |
| Existing Conditions Plan | | | |
| Existing buildings | N/A | | |
| Watercourses | Yes | Plans | |
| Legend | Yes | Plans | |
| Wetlands | Yes | Plans | |
| existing physical features (trees 10" diameter or more.Stone walls | No | | x |
| Trail System? | N/A | | |
| | | | |
| | | | |
| Subdivision Plan: | | | |
| Date of plan submission, true north & graphic scale | Yes | Plans | |

| | | | |
|--|-----|-----------|--|
| Net residential acreage calculations | Yes | Plans | |
| Legend | Yes | Plans | |
| Trail (connecting?) | N/A | | |
| <i>Widths</i> of existing/proposed streets, easements & bldg. lines | Yes | Plans | |
| <i>Names</i> of existing/proposed streets, easements & bldg. lines | Yes | Plans | |
| Boundaries & designations of zoning districts, parks, public spaces | Yes | Plans | |
| Outline of proposed subd. w/ street system | Yes | Plans | |
| Future probable street system of remaining portion of tract. | N/A | | |
| Opportunities for Connecting Road(s) (13.2D) | N/A | | |
| Space & setback of district | Yes | Plans | |
| Classification of road | Yes | Plans | |
| Width of road(s) | Yes | Plans | |
| Drainage type (open, closed, mix) | Yes | Plans | |
| Type of byway provided (8.4D) | Yes | Plans | |
| | | | |
| | | | |
| | | | |
| | | | |
| Names of adj. subdivisions | N/A | | |
| Names of owners of record of adjacent acreage | Yes | Plans | |
| Any zoning districts boundaries affecting subd. | Yes | Plans | |
| Location & size of existing or proposed sewers, water mains, culverts, hydrants and drains on property | Yes | Yes | |
| Connections w/existing sewer or water systems | N/A | | |
| Private water supply shown | Yes | Plans | |
| Private septic shown | Yes | Plans | |
| Hydro-geologic study | Yes | Narrative | |

| | | | |
|---|-----|-----------------|---|
| (option for Board) | | | |
| Test pit locations | Yes | Plans | |
| Well locations | Yes | Plans | |
| Signature & lic. # of site evaluator | Yes | Narrative | |
| Existing streets: location, name(s), widths w/in and abutting | Yes | Plans | |
| Proposed streets: location, name(s), widths w/in and abutting | Yes | Plans | |
| The above for any highways, easements, bldg. lines, alleys, parks, other open spaces w/in and abutting | Yes | Plans | |
| Grades & street profiles of all streets, sidewalks or other public ways proposed | Yes | Plans | |
| 2' contour lines | Yes | Plans | |
| High intensity soil survey by cert. soil scientist | No | | x |
| Soil boundaries & names superimposed on plot plan | No | | x |
| Deed reference & map of survey of tract boundary by reg. land surveyor tied to established reference points | Yes | Plans | |
| Surface drainage or stormwater mgmt plan w/profiles & cross sections by a P.E. showing prelim. design and conveyances | Yes | Plans/Narrative | |
| Proposed lot lines w/ dimensions and suggested bldg. locations. | No | | x |
| Location of temp. markers in field | No | | x |
| All parcels proposed to be dedicated to public use and conditions of such. | N/A | | |
| Location of all natural features or site elements to be preserved | Yes | Plans | |
| Street lighting details | N/A | | |
| Landscaping and grading plan including natural features to be preserved | Yes | Plans | |

| | | | |
|---|-----------------------|-----------|--|
| Survey stamped by P.E. | Yes | Plans | |
| Soil surveys w/# of soil scientist | N/A | | |
| Septic plan w/ # of prof. site evaluator | Yes | Narrative | |
| Geological evals w/ reg. geologists number | N/A | | |
| Architect's seal | N/A | | |
| For Rt. One: 75' undisturbed buffer applicable to all buildings, structures, parking areas, drainage facilities and uses. | N/A | | |
| Open Space? | Yes | Plans | |
| Any part of parcel in a shoreland zone? | No | | |
| Flood Map Number and rating? | Yes | Plans | |
| Stormwater Report? | Yes | Narrative | |
| Rivers, ponds, wetlands? | Yes | Plans | |
| Historic, archeological features? | Yes | Narrative | |
| Solid waste disposal? | Yes | Narrative | |
| | | | |
| Required Notes on Plan: | | | |
| Fire Department notes | No | | |
| Clearing limits note | No | | |
| <i>Re: approval limit of 90 days before recording or null p. 10</i> | No | | |
| | | | |
| | | | |
| Final Plan Submissions: | <i>See Appendix D</i> | | |
| Actual field survey of boundary lines w/ monumentation shown | | | |
| Assessor's approval of street names and assignment of lot numbers. | | | |
| Designation of all open spaces w/ notes on ownership | | | |
| Copies of declarations, agreements or other documents showing the manner in which open space or easements are to | | | |

| | | | |
|--|--|--|--|
| be held and maintained. | | | |
| Written offer for any conveyance to the Town of open space or easements along with written evidence that the Council is willing to accept such offer | | | |
| | | | |
| Evidence of Outside Agency Approvals | | | |
| | | | |
| | | | |
| | | | |

As per Section 7.2 - REVIEW AND APPROVAL BY OTHER AGENCIES:

- A. Where review and approval of any subdivisions or site plan by any other governmental agency is required, such approval shall be submitted to the Planning Board in writing prior to the submission of the Final Plan.*

Please list below all outside agency approvals that are required for this subdivision.

Maine Department of Environmental Protection: *List type of permit(s) required (e.g., SLODA, NRPA (tier type?), Maine Construction General Permit, etc.)*

Stormwater Permit/Construction General Permit, NRPA Permit by rule for stream crossing

US Army Corps of Engineers: Category 2 for stream crossing, wetland impact, vernal pool habitat impacts.

Maine Department of Transportation: *List type of permit(s) required.*

N/A

Maine Department of Inland Fisheries and Wildlife:

N/A

Other: (List)

Project Consultants

Civil Engineer

Gorrill Palmer
707 Sable Oaks Drive Suite 30
South Portland, ME 04106

Surveyor

Titcomb Associates
133 Gray Road
Falmouth, ME 04105

Site Evaluator

David Chapman
Sebago Technics
75 John Roberts Road Suite 1A
South Portland, ME 04106

Wetland Scientist

Lauren Leclerc
TRC
6 Ashley Drive
Scarborough, ME 04074

Projects

The following list contains projects completed by TZ Properties, LLC and by Zareh DerHagopian, and Tony Procida, the principals of TZ Properties.

Sorrento Condominiums – Gray, Maine (TZ Properties)
6 buildings – 12 units total currently completing construction

Back Cove Flats – 15 Morse Street, Portland, Maine (Zareh)
3 unit condominium – completed 2017

Whitney Ridge – Gray, Maine (Tony)
3 duplex units – completed 2015

Farmhouse Lane – Gray, Maine (Tony)
1 duplex – completed 2014

Single Family Residence Kenneth Street, Portland, Maine (Zareh)
Completed 2013

Single Family Residence Wilkie Street, Portland, Maine (Zareh)
Completed 2011

QUITCLAIM DEED WITH COVENANT

{Maine Statutory Short Form}

KNOW ALL MEN BY THESE PRESENTS, that **Virginia H. Ward**, of 1129 Zylstra Rd, Coupeville, Washington, in consideration of One Dollar (\$1.00) and other good and valuable consideration paid by **TZ Properties, LLC**, a Maine limited liability company with offices at 23 Stormy Brook Rd, Falmouth, Maine, the receipt whereof is hereby acknowledged, does hereby GIVE, GRANT, BARGAIN, SELL AND CONVEY unto the said **TZ Properties, LLC**, its successors and assigns forever, with Quitclaim Covenants, as follows:

A certain lot or parcel of land, together with any improvements thereon, situated on the westerly side of Orchard Road, so-called, in the Town of Cumberland, County of Cumberland and State of Maine, being more particularly described in the attached **Exhibit A**.

Meaning and intending to convey, and hereby conveying, a portion of that property described in a deed from Virginia H. Ward to Frances June Ward, April 29, 2002 and recorded in Cumberland County Registry of Deeds at Book 17716, Page 53. Frances June Ward died December 31, 2005, her estate having not been probated, leaving no widower and Virginia H. Ward as her only child and sole heir at law.

IN WITNESS WHEREOF, Virginia H. Ward has hereunto placed her hand and seal this 27 day of July 2017.

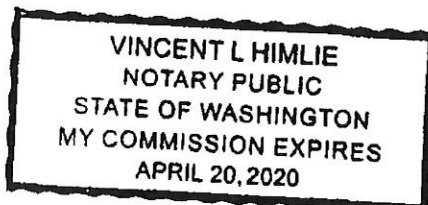
Witness

Virginia H. Ward
Virginia H. Ward

State of WA
County of MASON

7-27, 2017

Then personally appeared the above named Virginia H. Ward and acknowledged the foregoing instrument to be her free act and deed.



Vincent L Himlie
Notary Public/Attorney-at-Law

MAINE REAL ESTATE TAX PAID

Exhibit A

**Description of Large Ward "Back Lot"
On the Westerly Side of Orchard Road
Cumberland, Maine**

A certain parcel of land, located on the westerly side of Orchard Road in Cumberland, County of Cumberland, State of Maine, said parcel being a portion of those premises depicted on a plan entitled, "BOUNDARY SURVEY REMAINING LAND NOW OF VIRGINIA H. WARD dated January 18, 2017 conducted by Sitelines,PA and recorded in Cumberland County Registry of Deeds at Plan Book 217, Page 39 and more particularly described as follows:

BEGINNING at a 5/8 inch rebar set on the assumed westerly right of way line of Orchard Road at the most easterly corner of the Lilac LLC lot shown on said plan;

THENCE S 40° 40' 29" E on said road line, a distance of 285.49 feet to a 5/8 inch rebar set at land now or formerly of Philip J. Terison;

THENCE S 49° 19' 31" W along said Terison lot, a distance of 209.91 feet to a 5/8 inch rebar set;

THENCE S 40° 40' 29" E along said Terison lot, a distance of 179.00 feet to a 5/8 inch rebar set;

THENCE S 60° 36' 25" W along the stone wall marking land of Gordon, a distance of 234.00 feet to a survey pin with cap #1328;

THENCE S 60° 51' 11" W along said stone wall, marking land of Parker, a distance of 395.88 feet to a pin;

THENCE S 60° 39' 40" W along said stone wall, marking land of Stone, a distance of 99.90 feet to a pin;

THENCE S 60° 32' 58" W along said stone wall, marking land of McCabe, a distance of 396.73 feet to a 1/2 inch rebar;

THENCE N 40° 37' 30" W along land now or formerly of the Suzanne L. McCormack Trust, a distance of 1036.60 feet to a rebar set;

THENCE N 47° 14' 45" E along land now or formerly of Carl Terison, Jr, a distance of 548.95 feet to a rebar set;

THENCE S 38° 15' 34" E along land formerly of Allen, a distance of 314.44 feet to a rebar set;

THENCE N 48° 55' 44" E along said Allen lot, a distance of 368.95 feet to a point on the south side of the driveway;

THENCE S 41° 04' 16" E a distance of 20.00 feet;

THENCE N 76° 44' 18" E a distance of 111.58 feet to a rebar set at the most westerly corner of the Christopher S. Neagle lot, as shown on said plan;

THENCE S 40° 40' 29" E along said Neagle lot, a distance of 220.01 feet to a rebar set;

THENCE S 51° 12' 22" W along the aforesaid Lilac LLC lot, a distance of 128.27 feet to a rebar set;

THENCE S 38° 47' 38" E along said Lilac LLC lot, a distance of 200.50 feet to a rebar set;

THENCE N 51° 12' 22" E along said Lilac LLC lot, a distance of 445.02 feet to the **POINT OF BEGINNING.**

The Above Parcel Containing 24.97 ac. ± Total, being a portion of those premises conveyed to Frances June Ward by deed dated April 29, 2002 and recorded in Cumberland County Registry of Deeds at Book 17716, Page 053.

All survey pins set are 5/8" rebar with an aluminum cap bearing the name Smith and PLS 1175.

Received
Recorded Register of Deeds
Jul 31, 2017 02:45:56P
Cumberland County
Nancy A. Lane

**DECLARATION OF PROTECTIVE COVENANTS AND COMMON EASEMENTS
ORCHARD ROAD SUBDIVISION
TOWN OF CUMBERLAND, COUNTY OF CUMBERLAND, STATE OF MAINE
BY
TZ PROPERTIES, LLC**

THIS DECLARATION dated this _____ day of _____, 2017, by TZ Properties, LLC, a Maine limited liability company with a mailing address of _____ (hereinafter referred to as the "Declarant").

WITNESSETH:

WHEREAS, the Declarant owns certain real property in the Town of Cumberland, Cumberland County, State of Maine, as described on **Exhibit A** attached hereto and as delineated on a plan entitled "Orchard Road Subdivision, Cumberland, Maine" prepared for Declarant by Gorrill Palmer and dated October 2017, and recorded in the Cumberland County Registry of Deeds in Plan Book xxx, Page xxx (the "Plan"), which subdivision consists of Ten (10) lots numbered on the Plan as 1-10 and also a parcel of land designated "Open Space." Lots 1 through 10 inclusive shall hereinafter be referred to as the "Lots," and together with the appurtenant Common Open Space easements shown on the Plan or referenced in this Declaration hereinafter referred to as the "Property." Declarant proposes to develop and improve the Property in accordance with the Plan; and

WHEREAS, Declarant desires to assure quality standards for the orderly development of the Property and to promote the interest and welfare of each owner of a part of the Property and therefore desires to subject the Property to protective covenants and common easements as set forth hereinafter.

WHEREAS, Declarant desires to subject the Property to protective covenants and common easements as set forth hereinafter to incorporate the conditions of the Town of Cumberland Planning Board approval for the subdivision of the Property.

NOW, THEREFORE, Declarant hereby declares that the Property is and shall be owned, occupied, improved, transferred, leased and otherwise used and disposed of subject to the protective covenants and common easements set forth herein, all of which are declared to be in furtherance of a uniform scheme of mutual equitable servitudes upon each and every portion thereof, in favor of each and every other portion thereof, and to create reciprocal rights and privity of contract and estate between all persons acquiring or owning an interest in any portion thereof, which protective covenants and common easements shall be determined to run with the land and be a burden and benefit upon and to, and be enforceable by, all persons having any interest in any portion of the Property, their heirs, successors and assigns.

**ARTICLE I
DEFINITIONS.**

1. Association: "Association" shall mean and refer to *Orchard Road Subdivision Homeowners Association*, its successors and assigns, a non-profit, non-stock Maine corporation, to be formed by Declarant pursuant to the terms of Article V below.

2. **Building:** "Building" shall mean and refer to any dwelling, garage, or storage structures or other improvement now or hereafter constructed on a Lot.
3. **Common Expenses:** "Common Expenses" shall mean and refer to expenditures made by or financial liabilities of the Association, together with any allocations to capital or other reserve accounts.
4. **Lot:** "Lot" shall mean each whole Lot or any interest therein as joint tenants or tenants in common.
5. **Remaining Land:** "Remaining Land" shall mean and refer to any land not a Lot and all improvements thereon, including without limitation the roads, curbing, and storm water drainage fixtures and improvements, all as shown on the Plan. Remaining Land also shall include the Common Open Space, which shall be owned as tenants-in-common by each of the Lot Owners.
6. **Easement Areas:** "Easement Areas" shall mean and refer to all of the easements areas shown on the Plan or described below or on Exhibit A attached hereto that burden any Lot or Lots or that benefit the Association and all of the Lots, including without limitation utility easements, pedestrian access to open space easement, vehicle and pedestrian access easements in the roadway, forested buffer easements, drainage easements, and and all improvements on, in, across or under such easement areas including pavement, curbing, landscaping, storm water drainage fixtures and improvements.
7. **Member:** "Member" shall mean and refer to those persons entitled to membership in the Association as determined by the Bylaws of the Association and as set forth herein.
8. **Owners:** "Owners" or in the singular, "Owner", shall mean and refer to the record owner or owners of fee simple title in and to any Lot, and shall include the Declarant so long as it owns any Lot or any other portion of the Property, but shall not include any person or legal entity owning an interest merely as security for an obligation.

ARTICLE II

PROTECTIVE COVENANTS AND RESTRICTIONS.

Each conveyance by Declarant, its successors and assigns, of any Lot, and all subsequent conveyances of any Lot, whether directly or by operation of law, shall be subject to the following:

1. **No Commercial Uses:** Subject to the rights of the Declarant to develop and sell the Lots and such other rights of the Declarant as are set forth in this Declaration, each Lot shall be used only for residences, and no commercial enterprise of any nature or description shall be conducted or maintained on any portion of the Property, except that Lots may be used for a home office for telecommuting purposes by the Owners of such Lots provided that no customer, client or employee visits are made to the Lots incident to such commercial use.
2. **Buildings and Lot Improvements:** One single family residential structure shall be constructed or kept on any Lot. Each such Lot shall be improved subject to the following restrictions:
 - (a) No structure shall be constructed outside of the building envelope shown on the Plan, which building envelope is determined by the application of the Town of Cumberland set-back requirements. No sheds or other storage structures, whether permanent or temporary,

shall be installed or placed on any Lot except in furtherance of Declarant's construction activities. All antennae or satellite dishes to be installed on a Lot shall first be approved in writing by the Declarant, or after the sale of the last Lot by Declarant, the Association board; such approval and any conditions imposed in connection therewith are subject to the rights and limitations imposed by Federal law.

- (b) Any additions to a structure after initial construction that increase the footprint, that materially change the exterior appearance, or that require structural modification to the structure must be approved by the Declarant, or after the Declarant has conveyed the last Lot, by the Board of Directors of the Association, in writing prior to commencement of construction of such additions or modifications.
- (c) Declarant reserves to itself, its successors and assigns, the exclusive right to erect, place and maintain such facilities in or upon any portion of the Property as in its sole discretion may be necessary or convenient while selling the Lots or portions thereof, selling or constructing residences and other improvements upon the Property. Such facilities shall include, but are not limited to, sales and construction offices, storage areas, model units, signs, and portable toilet facilities.

3. Damage of Destruction: Any Building on any Lot that is destroyed or damaged in whole or in part by fire, windstorm, or other casualty promptly must be rebuilt or all debris removed and the affected portion of the Lot restored to its natural condition without delay.

4. Compliance with Governmental Regulations: Owners shall occupy and maintain the Lots in accordance with the rules, regulations, ordinances, and statutes enacted by governmental entities having jurisdiction over the Property, including without limitation the terms and conditions imposed by the Town of Cumberland Planning Board in connection with the subdivision approval for the Property on xxx, and xxx (the "Town Approvals"), and as reflected on the Plan.

5. Maintenance of the Remaining Land and Easement Areas: The Association shall bear all cost (subject to the right to assess lots as provided below) and responsibility of operation, upkeep, maintenance, repair and replacement of any Remaining Land and Easement Areas, including without limitation any necessary routine maintenance and repair of the roads, storm drainage and grassed underdrained soil filters, landscaping, curbing, utility wires and conduits, development signage or other common area improvements. The Association shall also obtain and maintain adequate commercial general liability insurance on said Remaining Land and with respect to the Easement Areas, which insurance shall be obtained on an occurrence basis in an amount not less than \$5,000,000 combined single limit. Until and only until conveyance of any portion of the Remaining Land to the Association, the Declarant shall undertake the maintenance responsibilities of the Association with respect to the Remaining Land and Easement Areas; provided, however, the Association shall be unconditionally obligated to accept conveyance of the Remaining Land and Easement Areas or any part thereof, and Declarant may record a deed or deeds to the Association for such areas without further action by the Association. The Remaining Land shall be conveyed to the Association by Declarant at any time prior to or contemporaneously with Declarant conveying out the last Lot of the Property, with the timing of such conveyance to be in Declarant's sole discretion. Upon any such conveyance to the Association, the Declarant shall be relieved of all obligations under this paragraph with respect to the land conveyed.

6. Animals: No poultry, swine, livestock or other animals shall be kept on a Lot or otherwise on the Property, except household pets of the kind and number normally housed in a

residence. There shall be no exterior pet fencing, shelters, or caging. No boarding of dogs, cats or other household pets shall be conducted on a Lot.

7. Prohibited Vehicles: Except in the development and sale of the Lots by the Declarant and construction of houses and other Buildings by Owners, no business or commercial vehicle or vehicle of similar nature shall be brought upon, or be maintained, or be permitted to remain on the Property except that a business or commercial vehicle regularly used by an Owner in his or her occupation may remain on a Lot. No junk automobiles or other vehicles that do not display a current State of Maine motor vehicle inspection sticker may be kept or maintained on the Property unless parked in a garage or storage shed.

8. Prohibited Activities: No hunting or use of firearms, air guns, or bows shall be allowed anywhere on the Property.

9. Rubbish and Debris: Except during the initial construction of a Building, rubbish and debris shall be stored between pickups in the garage in sanitary receptacles with sealing covers or as required by Town of Cumberland ordinances or regulations and shall be placed curbside for pickup in such receptacles with the covers placed tightly over the receptacles and promptly re-stored in a garage after rubbish pickup.

10. Exterior Lighting: Any exterior lighting shall be directed to illuminate only the ground or the Buildings on the Lot and shall be installed such that no light is directly visible from any other part of the Property.

ARTICLE III **DURATION.**

The protective covenants, common easements and other provisions of this Declaration as set forth herein and as may be amended from time to time as provided below in Article X, shall run with the land and burden the Property and shall inure to the benefit of and be enforceable by the Declarant, the Association, and any other Owner of any portion of the Property, their respective legal representatives, heirs, successors or assigns, in perpetuity.

ARTICLE IV **DECLARANT'S RESERVED RIGHTS.**

The conveyance of the Lots to Owners shall be subject to the following rights reserved by the Declarant until completion of the construction, marketing and sale of all Lots:

1. To change the size, number, dimension, and location of Lots and other improvements owned by the Declarant, subject to the requirement that Declarant obtain necessary approval from the Town of Cumberland planning authority. The foregoing change or changes shall be effective upon the recording by the Declarant of an amendment to this Declaration, no other signatures being necessary on such amendment, and/or the recording by the Declarant of an amended subdivision plan indicating the changes made;

2. To locate on the Property, even though not depicted on the Plan, and grant and reserve easements and rights of way for the installation, maintenance, repair, replacement and

inspection of utility lines, wires, pipes, conduits and facilities, including, but not limited to, water, electric, telephone, cable and sewer;

3. To connect with and make use of utility lines, wires, pipes and conduits located on the Property for construction and sales purposes, provided that the Declarant shall be responsible for the cost of services so used;

4. To use the roads shown on the Plan and access easements appurtenant to the Property for ingress and egress to the Property or any portion thereof for all purposes including, but not limited to development and construction of a residential subdivision and use the Property for the storage of materials used in the construction of the residences and improvements on the Lots and infrastructure on the Property and equipment used in the completion of the project;

5. To install and maintain signs and lighting for marketing and sales purposes; and

6. To do all things reasonably necessary to facilitate the development of the Property and the marketing and sale of the Lots.

Declarant further reserves from the land described in Exhibit A attached hereto a perpetual easement in gross, assignable to any other party or parties in part or in whole, for vehicular and pedestrian access on and all utilities under, across or over the 50' wide roadway right-of-way as shown on the Plan. The foregoing reserved easement may benefit any additional land and any number of additional lots or dwellings without exceeding the scope of or overburdening the reserved easement rights. The foregoing reserved easement is perpetual in nature and does not expire upon the sale of the Lots by Declarant.

ARTICLE V **HOMEOWNERS ASSOCIATION.**

On or about the date of execution and recording of this Declaration, there will be formed *Orchard Road Subdivision Homeowners Association*, a non-profit, non-stock corporation organized under the laws of the State of Maine (the "Association"). Each Owner or Owners of a Lot, including the Declarant prior to the conveyance of each Lot, shall automatically become and be a member of the Association as long as said Owner(s) continues as record owner of a Lot. Upon termination of the interest of an Owner in a Lot, the Owner's membership and any interest in the Association shall automatically terminate and transfer and inure to the next successive record owner of the Lot. Each Owner shall be bound by the Bylaws of the Association, as the same may be amended from time to time, and each Owner shall comply strictly with such Bylaws. No holder of a mortgage on a Lot shall be considered as an Owner until such holder shall have acquired title to such Lot by foreclosure or deed in lieu of foreclosure. With respect to Association governance matters requiring a vote of the Owners, each Lot shall have One (1) vote.

ARTICLE VI **ASSESSMENTS FOR COMMON EXPENSES.**

1. Upon ratification of the budget for Common Expenses (as defined herein), the Association shall cause to be sent to each Owner a statement showing such Owner's share of the Common Expenses. The Common Expenses shall include, without limitation, the costs necessary to own, operate, manage, maintain, repair and replace the Remaining Land and Easement Areas and to operate, maintain, repair and replace the roads, curbing, landscaping, signage, drainage swales,

grassed underdrained soil filter, and all structures and equipment related or connected thereto. Assessments for Common Expenses shall be billed on or about the first day of each quarter. All sums so assessed and billed shall become due no later than 30 days after the date of mailing or delivery of each bill. The Members of the Association may from time to time at special meetings levy additional assessments, in accordance with the terms of the Bylaws.

2. Assessments authorized and billed by the Association shall be a charge on the Lot and shall be a continuing lien upon the Lot upon which such assessment is made. If the assessment to an Owner shall not be paid within Thirty (30) days after the date when due, then said assessment shall be delinquent and shall, together with interest at the rate of one percent (1%) per month or any portion thereof, costs of collection and attorneys' fees, become a continuing lien on the Lot owned by the delinquent Owner, which lien shall bind the Lot with the Building and improvements thereon, as well as the delinquent Owner, his heirs, devisees, successors, personal representatives and assigns, without the necessity of filing any document of record. Such lien may be enforced and foreclosed by the Association in the manner provided by applicable law for the foreclosure of real estate mortgages. The lien for unpaid assessments established hereby shall be prior to all liens and encumbrances on the Lot other than (i) the first mortgage recorded prior to the date on which the assessment that is sought to be enforced becomes delinquent, (ii) any second mortgage in favor of Declarant, (iii) liens for real estate taxes and other governmental/municipal assessments or charges against the Lot, or (iv) any other lien that according to law takes priority over existing liens pursuant to any statute. All such assessments, in addition to being a lien, shall also constitute the personal liability of the Owner of the Lot so assessed at the time of the assessment. In the collection of any assessment, the defaulting Owner also shall pay all of the Association's costs of collection, including attorneys' fees.

ARTICLE VII **EASEMENTS.**

The Lots and the Remaining Land are and shall be subject to all of the conditions, restrictions, easements and reservations set forth on the Plan, as it may be amended from time to time, and as more fully described below, and all Owners shall be bound by all of said conditions, restrictions, easements and reservations.

1. "Common Open Space": An easement for maintenance and use of the land for passive recreational activities such as walking, running, snowshoeing, and Nordic skiing.

2. "Roadway Access and Utility Easement": An easement for access by pedestrians and vehicles to and from the Lots and including the right to construct, maintain, repair and replace the roadway, including without limitation the gravel, pavement and curbing therefor. Also an easement to construct, install, use, repair, maintain and replace above and/or below ground any and all utility lines, pipes, conduits, wires, poles, guys, transformer and juncture boxes including without limitation those necessary for the provision of sewer, water, electricity, telephone, cable television, data and other communication services, including the right to enter the easement area at any time and from time to time with workers and equipment to exercise the rights reserved pursuant to this easement, including without limitation the removal of stumps and roots, the construction decorative walls and columns, and the alteration of the grade of the earth, including the right to maintain and replace all of the foregoing, including the right to enter the easement area at any time and from time to time with pedestrians, motor vehicles and equipment to exercise the rights reserved pursuant to this easement. Declarant reserves for itself and its successors and assigns the right to dedicate and convey the right-of-way to the Town of Cumberland for all public purposes.

3. “Drainage Swales”: An easement for the installation, maintenance, repair, and replacement of level lip spreaders and drainage swales for the purpose of treating storm water runoff, which easement includes access thereto with workers and equipment for such purposes.

4. “Winter Maintenance Easement”: An easement across the roadway for the Town of Cumberland to use for all purposes in connection with the plowing and snow removal activities on the roadway right-of-way, in the event that the roadway is offered and accepted by the Town of Cumberland for winter maintenance purposes.

ARTICLE VIII

MAINTENANCE OF STORMWATER MANAGEMENT FACILITIES AND RESERVED SEPTIC AREAS

The Association shall comply with the recommendations and requirements contained in the “Stormwater management report and Erosion and Sedimentation Control Report for Orchard Road Subdivision, Cumberland, Maine” prepared by Gorrill Palmer for Declarant and dated _____, 2017, as such maintenance plan has been approved by the Town of Cumberland Planning Board, which recommendations and requirements are incorporated into this Declarant as if set forth herein.

ARTICLE IX

RESTRICTED BUFFER AREAS.

To preserve the “75’No Cut Buffer.” areas shown on the Plan (hereinafter referred to as the “Restricted Buffer Areas”), the Restricted Buffer Areas shall be maintained as follows:

The Restricted Buffer Areas are and shall forever be held, transferred, sold, conveyed, occupied and maintained subject to the conditions and restrictions set forth in this Article IX of the Declaration (the “Restrictions”). The Restrictions shall run with the Restricted Buffer Areas and shall be binding on all parties having any right, title or interest in and to the Restricted Buffer Areas, or any portion thereof, and their heirs, personal representatives, successors, and assigns. Any present or future owner or occupant of the Restricted Buffer Areas or any portion thereof, by the acceptance of a deed of conveyance of all or part of the Restricted Buffer Areas or an instrument conveying any interest therein, whether or not the deed or instrument shall so express, shall be deemed to have accepted the Restricted Buffer Areas subject to the Restrictions and shall agree to be bound by, to comply with and to be subject to each and every one of the Restrictions hereinafter set forth.

1. Restrictions on Restricted Buffer Area. The Restricted Buffer Area must remain undeveloped in perpetuity. To maintain the ability of the Restricted Buffer Area to filter and absorb stormwater, the use of the Restricted Buffer Area is hereinafter limited as follows.
 - a. No soil, loam, peat, sand, gravel, concrete, rock or other mineral substance, refuse, trash, vehicle bodies or parts, rubbish, debris, junk waste, pollutants or other fill material may be placed, stored or dumped on the Restricted Buffer Area, nor may the topography of the area be altered or manipulated in any way;

b. Any removal of trees or other vegetation within the Restricted Buffer Area must be limited to the following:

- (i) No purposefully cleared openings may be created and an evenly distributed stand of trees and other vegetation must be maintained. An "evenly distributed stand of trees " is defined as maintaining a minimum rating score of 24 points in any 50 foot by 50 foot square (2500 square feet) area, as determined by the following rating scheme:

| Diameter of tree at 4 1/2 feet above ground level | Points |
|---|--------|
| 2-4 inches | 1 |
| 4-8 inches | 2 |
| 8-12 inches | 4 |
| >12 inches | 8 |

Where existing trees and other vegetation result in a rating score less than 24 points, no trees may be cut or sprayed with biocides except for the normal maintenance of dead, wind- blown or damaged trees and for pruning of tree branches below a height of 12 feet provided two thirds of the tree's canopy is maintained;

- (ii) No undergrowth, ground cover vegetation, leaf litter, organic duff layer or mineral soil may be disturbed except that one winding path, that is no wider than six feet and that does not provide a downhill channel for runoff, is allowed through the area;
- c. No building or other temporary or permanent structure may be constructed, placed or permitted to remain on the Restricted Buffer Area, except for a sign, utility pole or fence;
- d. No trucks, cars, dirt bikes, ATVs, bulldozers, backhoes, or other motorized vehicles or mechanical equipment may be permitted on the Restricted Buffer Area;

Any activity on or use of the Restricted Buffer Area inconsistent with the purpose of these Restrictions is prohibited.

2. **Binding Effect.** If a Restricted Buffer Area is at any time owned by more than one owner, each owner shall be bound by the foregoing restrictions to the extent that any of the Restricted Buffer Area is included within such owner's property.

ARTICLE X **AMENDMENTS.**

This declaration may be amended at any time and from time to time by written instrument duly executed by the Owners of record of six of the ten Lots; provided, however, that at any time during which the Declarant owns one or more Lots, no amendment shall be effective unless the written consent of the Declarant to such amendment is obtained and further provided that no provisions of this Declaration required as conditions of approval for the subdivision of the Property

may be terminated or modified without the approval of the planning authority of the Town of Cumberland. Any such amendment shall be recorded in the Cumberland County Registry of Deeds.

ARTICLE XI
GENERAL PROVISIONS.

1. Enforcement. By the acceptance of the deed to a Lot, each Owner covenants and agrees for himself, his heirs, devisees, successors, personal representatives and assigns, to comply with the covenants and restrictions set forth in this Declaration. Any failure to so comply shall be grounds for an action against the Owner, his heirs, devisees, successors, personal representatives and assigns, to recover damages or for injunctive relief or both. Such action may be maintained by the Association, the Declarant or by any aggrieved Owner. Notwithstanding anything in this Declaration to the contrary, the Association shall enforce the provisions of this Declaration that satisfy the conditions of the Town Approvals. In the event the Association, Declarant or an Owner shall substantially prevail in any such action, they shall be entitled to recover attorneys' fees and related expenses incurred in enforcing the terms of this Declaration. Nothing herein shall require the Declarant to enforce any of the covenants and restrictions in this Declaration.

2. Waivers. No delay or omission on part of the Declarant, the Association, or any Owner in enforcing the covenants set forth herein shall be construed as a waiver of any right to enforce or seek such remedy or acquiescence in such breach.

3. Severability. In the event any one or more of the provisions of this Declaration shall be found for any reason by a court of competent jurisdiction to be unenforceable or null and void, such judgment or decree shall not affect, modify, change, abrogate or nullify any other provision of this Declaration.

4. Pronouns. Wherever used, the singular number shall include the plural, the plural the singular, and the use of any gender shall be applicable to all genders.

IN WITNESS WHEREOF, TZ Properties, LLC, has caused this Declaration to be executed by Anthony J. Procida, its duly-authorized Manager, as of the day and year first above written.

WITNESS:

TZ PROPERTIES, LLC

By: _____

Anthony J. Procida, its Manager

STATE OF MAINE
COUNTY OF CUMBERLAND

_____, 2017

Personally appeared before me the above-named Anthony J. Procida, Manager of TZ Properties, LLC, as aforesaid, and acknowledged the foregoing to be his free act and deed in said capacity and the free act and deed of said company.

Print name:
Notary Public/Attorney-at-Law

DRAFT

EXHIBIT A

[ADD PERIMETER DESCRIPTION OF PROPERTY FROM DEED]

The access and utility easement in gross reserved by Declarant pursuant to Article IV above.

DRAFT

**Abutters List
Orchard Road Subdivision
TZ Properties, LLC
JN 3236.01**

Tax Map R08 Lot 59 / Orchard Road

TZ Properties, LLC
23 Stormy Brook Lane
Falmouth, ME 04105

Tax Map R08 Lot 60 / 65 Orchard Road

Brian S. Stearns / Amanda L. Stearns
65 Orchard Road
Cumberland, ME 04021

Tax Map R08 Lot 55A / 9 Whitney Road

Carl Terison Jr. / Annette Terison
62 Orchard Road
Cumberland, ME 04021

Tax Map R08 Lot 60A / 79 Orchard Road

Evan J. Nicholas
79 Orchard Road
Cumberland, ME 04021

Tax Map R08 Lot 56 / 8 WHitney Road

Carl Terison Jr. / Annette Terison
62 Orchard Road
Cumberland, ME 04021

Tax Map R08 Lot 61 / 63 Orchard Road

Breanna J. Copp-Petersen / Ryan E. Petersen
63 Orchard Road
Cumberland, ME 04021

Tax Map R08 Lot 57 / 4 Whitney Road

Jillane M. Bolduc / Christopher J. Bolduc
4 Whitney Road
Cumberland, ME 04021

Tax Map R08 Lot 62 / 50 Orchard Road

Amy Y. Parker
50 Orchard Road
Cumberland, ME 04021

Tax Map R08 Lot 58 / 76 Orchard Road

Christopher S. Neagle
76 Orchard Road
Cumberland, ME 04021

Tax Map R08 Lot 62A / 58 Orchard Road

Thomas U. Gordon / Norma J. Gordon
58 Orchard Road
Cumberland, ME 04021

Tax Map R08 Lot 59A / 62 Orchard Road

Philip J. Terison
62 Orchard Road
Cumberland, ME 04021

Tax Map R08 Lot 62C / 48 Orchard Road

Margaret E. Stone / Stephen S. Carey
48 Orchard Road
Cumberland, ME 04021

Tax Map R08 Lot 59B / 74 Orchard Road

Zachary O. Davis
Jenny J. Davis
21 Sawyer Street – Unit 31
Portland, ME 04103

Tax Map R08 Lot 67 / Blanchard Road

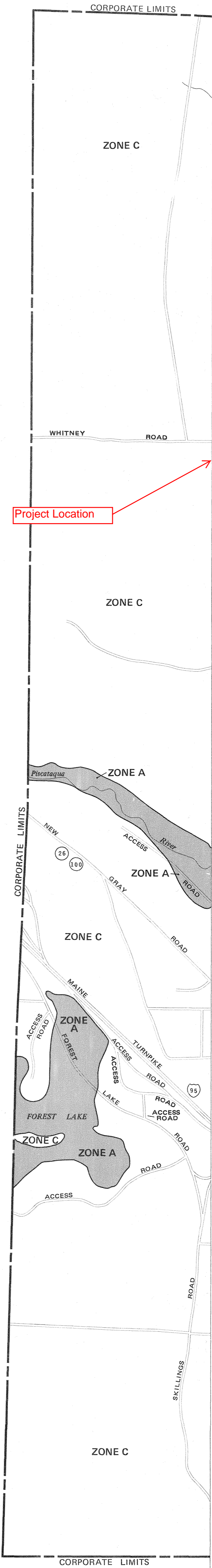
Peter J. McCabe / Cinderella J. McCabe
345 Blanchard Road
PO Box 17
Cumberland Ctr., ME 04021

Tax Map R08 Lot 59C / 78 Orchard Road

Tyler Weidner
9 Poswland Street – Unit #2
Portland, ME 04102

Tax Map R08 Lot 68A / 365 Blanchard Rd

Suzanne L. McCormack – Trustee
365 Blanchard Road
Cumberland Ctr., ME 04021



KEY TO MAP

500-Year Flood Boundary
100-Year Flood Boundary
Zone Designations* With Date of Identification e.g., 12/2/74
100-Year Flood Boundary
500-Year Flood Boundary

Base Flood Elevation Line With Elevation In Feet**

Base Flood Elevation in Feet Where Uniform Within Zone**

Elevation Reference Mark

River Mile

**Referenced to the National Geodetic Vertical Datum of 1929

ZONE B
ZONE A1 DATE
ZONE A5 DATE
ZONE B

513

(EL 987)

RM7 X

• M1.5

*EXPLANATION OF ZONE DESIGNATIONS

| ZONE | EXPLANATION |
|--------|--|
| A | Areas of 100-year flood; base flood elevations and flood hazard factors not determined. |
| A0 | Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined. |
| AH | Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined. |
| A1-A30 | Areas of 100-year flood; base flood elevations and flood hazard factors determined. |
| A99 | Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined. |
| B | Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading) |
| C | Areas of minimal flooding. (No shading) |
| D | Areas of undetermined, but possible, flood hazards. |
| V | Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined. |
| V1-V30 | Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined. |

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

For adjoining map panels, see separately printed Index To Map Panels.

INITIAL IDENTIFICATION:

AUGUST 30, 1977

FLOOD HAZARD BOUNDARY MAP REVISIONS:

FLOOD INSURANCE RATE MAP EFFECTIVE:

MAY 19, 1981

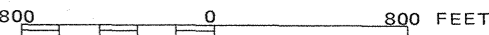
FLOOD INSURANCE RATE MAP REVISIONS:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE date shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program at (800) 638-6620, or (800) 424-8872.



APPROXIMATE SCALE



NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

TOWN OF
CUMBERLAND, MAINE
CUMBERLAND COUNTY

PANEL 10 OF 25
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
230162 0010 B

EFFECTIVE DATE:
MAY 19, 1981



federal emergency management agency
federal insurance administration



500-Year Flood Boundary

100-Year Flood Boundary

Zone Designations* With Date of Identification
e.s., 12/2/74

100-Year Flood Boundary

500-Year Flood Boundary

Base Flood Elevation Line
With Elevation In Feet**

Base Flood Elevation In Feet
Where Uniform Within Zone**

Elevation Reference Mark

River Mile

**Referenced to the National Geodetic Vertical Datum of 1929

ZONE B

ZONE A1
DATE

ZONE A5
DATE

ZONE B

513

(EL 987)

RM7 X

M1.5

*EXPLANATION OF ZONE DESIGNATIONS

| ZONE | EXPLANATION |
|--------|--|
| A | Areas of 100-year flood; base flood elevations and flood hazard factors not determined. |
| AD | Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined. |
| AH | Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined. |
| A1-A30 | Areas of 100-year flood; base flood elevations and flood hazard factors determined. |
| A99 | Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined. |
| B | Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading) |
| C | Areas of minimal flooding. (No shading) |
| D | Areas of undetermined, but possible, flood hazards. |
| V | Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined. |
| V1-V30 | Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined. |

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

For adjoining map panels, see separately printed Index To Map Panels.

INITIAL IDENTIFICATION:

AUGUST 30, 1977

FLOOD HAZARD BOUNDARY MAP REVISIONS:

FLOOD INSURANCE RATE MAP EFFECTIVE:

MAY 19, 1981

FLOOD INSURANCE RATE MAP REVISIONS:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE date shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program at (800) 638-6620, or (800) 424-8872.

APPROXIMATE SCALE

800 0 800 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

TOWN OF
CUMBERLAND, MAINE
CUMBERLAND COUNTY

PANEL 15 OF 25
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
230162 0015 B

EFFECTIVE DATE:
MAY 19, 1981

federal emergency management agency
federal insurance administration

October 25, 2017

Central Maine Power
162 Canco Road
Portland, ME 04103

Re: Proposed Residential Subdivision
Orchard Road, Cumberland
Letter of Ability to Serve

To Whom It May Concern:

TZ Properties, LLC has retained Gorrill Palmer to prepare plans and permit applications for a proposed residential subdivision off Orchard Road. The site is shown on Assessor's Map R 08 Lot 59B, is approximately 24.9 acres in size and is located in the Residential Rural District 2 (RR-2). As required by the reviewing authorities, we are writing to request a letter indicating the ability of Central Maine Power to serve this project. A preliminary utility plan is enclosed for your review.

Description of Development Site

The project site is currently undeveloped with slopes of 5% to 17%.

Abutting land uses include:

- North –Residential
- West –Residential/Orchard
- South – Residential
- East – Residential

Refer to Figure 1 – Location Map following this page for the project location.

Project Description

The project is a proposed ten lot residential subdivision. Existing electric service is located at Orchard Road across the street from the site. Electric service is proposed overhead from the existing pole to a new pole along the parcel frontage. The service to the lots will be underground from the new pole. Transformers will be placed as needed along the proposed roadway.

At this time, service requirements are not known. It is anticipated that this development would have single phase electric service requirements similar to other residential developments within the Greater Portland area.



Ability to Serve

In support of the applications to the reviewing authorities, we are writing to request a letter indicating the ability of Central Maine Power Company to serve the project. In addition, we are interested in receiving:

- Indication as to the acceptability of the proposed layout.
- Information as to any easements that you may require on-site.
- Any estimate of connection fees
- Any other information that you believe would be useful as this project proceeds.

Sincerely,

Gorrill Palmer

A handwritten signature in blue ink that reads "James Attianese".

James Attianese



**GROUNDWATER IMPACT STUDY
ORCHARD ROAD SUBDIVISION
ORCHARD ROAD, CUMBERLAND**

INTRODUCTION:

The purpose of this study is to make an assessment of the hydrogeologic conditions of the above-mentioned site and estimate the groundwater quality impact caused by the proposed on-site subsurface wastewater disposal systems for 10 three-bedroom houses.

The proposed development is located along southwest and west sides of Orchard Road opposite the intersection of Orchard Road and Apple Blossom Way at the position indicated on the attached topographic map (Appendix A, Figure 1). Data used for this project includes a site plan titled *Concept Plan – Cluster for TZ Properties* prepared by Gorrill & Palmer and dated June, 2017 along with test pit logs generated by Sebago Technics and published regional maps and literature.

DISPOSAL FIELDS AND WATER SUPPLY:

The proposed disposal fields will be ten individual subsurface wastewater disposal systems (SSWD) each designed to serve a three-bedroom home. Water for this project will be provided by individual on-site wells. The location of test pits, wastewater disposal systems, well exclusion zones and simulated nitrate-nitrogen (NO₃-N) plumes are shown on the Groundwater Impact Study Map (Appendix A, Figure 2).

A potential water supply related concern was raised concerning the potential presence of arsenic in the groundwater under the site. Arsenic is a naturally occurring element in bedrock and was a component of some pesticides used in orchards historically. To evaluate the potential presence of arsenic in the bedrock aquifer under the site, Sebago Technics collected a sample from the water supply at 74 Orchard Road. The water supply consists of a drilled well located near the north wall of the house.

The sample was placed in containers provided by Katahdin Analytical (Katahdin) of Scarborough, Maine. The containers were stored in a cooler, on ice, and delivered to Katahdin the same day. Katahdin analyzed the samples for arsenic and nitrates. Katahdin reported the arsenic level at below the Practical Quantitation Level (PQL) of 0.008 mg/L. The nitrate concentration was reported at 1.1 mg/L. A copy of the Katahdin report is in Appendix B.

SURFICIAL GEOLOGY AND TOPOGRAPHY:

The site is located on the *U.S.G.S. Cumberland Center, Maine 7.5 Minute Series* (Appendix A, Figure 1). Site area topography slopes generally downward from north to south towards Blanchard Road.

The *Significant Sand and Gravel Aquifer Map of the Cumberland Center, Maine Quadrangle* (Appendix A, Figure 3) shows that the site does not fall within a Significant Sand and Gravel Aquifer.

The *Surficial Geology Map of the Cumberland Center, Maine Quadrangle* (Appendix A, Figure 5) shows glacial till underlying the Site.

According to the U.S. Department of Agriculture-National Cooperative Soil Service (USDA-NCSS) soil web, the soil under the site consists of four types of glacial till: Hollis fine sandy loam, Paxton fine sandy loam, Woodbridge fine sandy loam and Ridgebury fine sandy loam. Hollis and Paxton soil forms at the summits and shoulders of hills. Woodbridge soil forms till plains on the shoulders and back slopes of hills. Ridgebury forms till plains in toe slopes environments. Logs for Testpit 101 to 110 are included in Appendix B.

HYDROGEOLOGY:

Precipitation falling on this site enters the open pore spaces on the upper soil horizon, and percolates vertically downward until the water table is encountered. Thereupon, flow is both horizontal and downhill. Two factors of importance in determining the amount of recharge of precipitation into the soil on this site are the groundwater slope or gradient and soil texture. The groundwater seepage velocity is used to calculate the extent of groundwater impact downgradient of the disposal field sites and has been calculated utilizing the following equation:

$$v = Ki/n$$

where,

| | |
|---|---|
| v | = groundwater seepage velocity (ft/day) |
| K | = hydraulic conductivity (ft/day) |
| i | = hydraulic gradient (ft/ft) |
| n | = effective porosity (dimensionless) |

The hydraulic conductivity of the soil in the disposal area is estimated at 2 feet per day. The average hydraulic gradient under the areas downgradient of the disposal fields varied from 3 to 8%. A groundwater surface gradient of 1.5% was used for the flatter areas and 3% for steeper areas was used as the slope parameter in the model.

CONTAMINATION POTENTIAL:

It is assumed that the worst potential for contamination is the nitrate-nitrogen (NO₃-N) released from wastewater disposal fields. NO₃-N is known to cause methemoglobinemia in infants and is a suspected cause of stomach cancer. The average NO₃-N concentration value of untreated septic tank effluent entering a disposal field is assumed to be 40 milligrams per liter (mg/L). A level of 1.1 mg/L (according to onsite sampling results) was used as a background nitrate concentration in the aquifer. The Federal and State Drinking Water Limit for NO₃-N in public water supplies is 10 mg/L.

The primary mechanism of NO₃-N concentration reduction is through dilution in groundwater and surface water. Since groundwater is always slowly flowing beneath a disposal field, the NO₃-N intercepting the water table below a disposal field mixes and dilutes in the groundwater and moves in the direction of groundwater flow in the form of a plume. NO₃-N is more concentrated in the center than near the edges of a plume. A source that emanates a constant quantity of potential contaminants into groundwater will eventually reach a "steady state." The plume can then be characterized with regard to size, shape, and distribution of concentration.

The method of analysis used to assess the impact of the septic systems on groundwater is an analytical model used to simulate individual plumes. Analysis of the results of this model is instructive in assessing the possible shape and size of wastewater plumes. The model was developed by Baetsle (1969) to depict the migration of radionuclides in porous media, which is adapted here to represent the subsurface

migration of NO₃-N. It is a three-dimensional transport model of plumes generated by continuous, point sources in a uniform groundwater flow field. Variables employed include seepage velocity (hydraulic conductivity multiplied by hydraulic gradient, divided by effective porosity), nitrate mass, time, and dispersivity. The concentration of NO₃-N is calculated at a downgradient point at a specified time by use of the following equation:

$$C(x, y, z, t) = \left[\frac{CoVo}{8(\pi t)^{1.5} \sqrt{DxDyDz}} \right] \exp \left[-\frac{(x - vt)^2}{4Dxt} - \frac{y^2}{4Dyt} - \frac{z^2}{4Dzt} \right] ;$$

where,

| | | |
|------------|---|--|
| C(x,y,z,t) | = | NO ₃ -N concentration at specified location and time (mg/L) |
| x | = | specified distance from source parallel to the direction of groundwater flow (ft) |
| y | = | specified distance from source perpendicular to the direction of groundwater flow (ft) |
| z | = | specified vertical distance from source (ft) |
| Co | = | initial concentration at the source (mg/L) |
| Vo | = | volume of source (ft ³) |
| t | = | time elapsed (day) |
| Dx,Dy,Dz | = | dispersion coefficient along the x,y,z axes (ft ² /day) |
| v | = | average linear velocity (ft/day). |

Assuming that groundwater flow is horizontal, the dispersion coefficient can be calculated as follows:

$$D_{x,y,z} = v \alpha_{x,y,z};$$

where $\alpha_{x,y,z}$ is dispersivity (ft).

The contaminant velocity of a solute subject to sorption/adsorption is calculated as follows:

$$V_p = v/R_d;$$

where V_p is the contaminant velocity (ft/day) and R_d is the retardation factor (unitless). The retardation factor for NO₃-N is equal to one, however, so the contaminant velocity is equal to the average linear velocity ($V_p = v$). Dispersivity is estimated by an equation based on a weighted least-squares statistical analysis of collected longitudinal dispersivity data versus scale (Xu, Eckstein, 1995). Longitudinal dispersivity can be estimated based on the following calculation:

$$\alpha_x = (0.83)[\log_{10}(L_p)]^{2.414};$$

where α_x is longitudinal dispersivity (ft), and L_p is the plume length (ft). The plume length is a function of the elapsed time and is calculated by the following equation:

$$L_p = V_p t.$$

It has already been established that for NO₃-N, the contaminant velocity (V_p) is equal to the average linear velocity (v). Thus, $L_p = vt$. The transverse and vertical dispersivities are related to the longitudinal dispersivity, as shown below:

$$\alpha_y = \alpha_x/3$$

$$z = \frac{x}{20}.$$

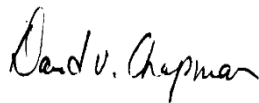
This method is used to calculate a downgradient $\text{NO}_3\text{-N}$ concentration at a specified elapsed time for a single release of $\text{NO}_3\text{-N}$. However, by applying the superposition technique, the estimated concentration of $\text{NO}_3\text{-N}$ downgradient at a specified time can be calculated for reoccurring daily $\text{NO}_3\text{-N}$ releases to simulate the $\text{NO}_3\text{-N}$ plume of a septic system (Chang, *et al.* 1998).

In the main equation, CoVo is represented as a daily mass of nitrate-nitrogen loaded into the subsurface wastewater disposal systems. This is estimated by multiplying the design flow volume of effluent by the assumed $\text{NO}_3\text{-N}$ concentration in the effluent. The simulations were run based on average annual precipitation during drought conditions (60% of average annual precipitation). The $\text{NO}_3\text{-N}$ concentration of the wastewater is diluted by the rainfall infiltrating the disposal fields during drought conditions. The rainfall is assumed to have a $\text{NO}_3\text{-N}$ concentration of 0.5 mg/L. The percent of rainfall infiltrating the soils above the disposal fields is estimated based on the soil type and ground surface slope (Maine Department of Environmental Protection, 1991).

Parameters and results for the disposal field are displayed in Appendix D. The resulting 10 mg/L $\text{NO}_3\text{-N}$ concentration plume lengths for the disposal fields are shown on the site plan. The 10 mg/L plumes do not cross the boundaries of the subdivision.

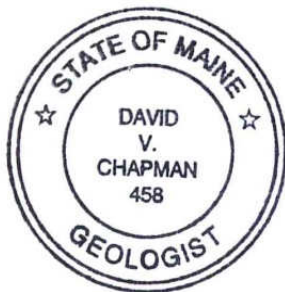
CONCLUSION:

According to the assumptions made for this simulation, the wastewater disposal system will not result in an increase of $\text{NO}_3\text{-N}$ concentrations above 10 mg/L in groundwater at the subdivision perimeter property line.



David Chapman
Maine Certified Geologist #458

DVC/llg



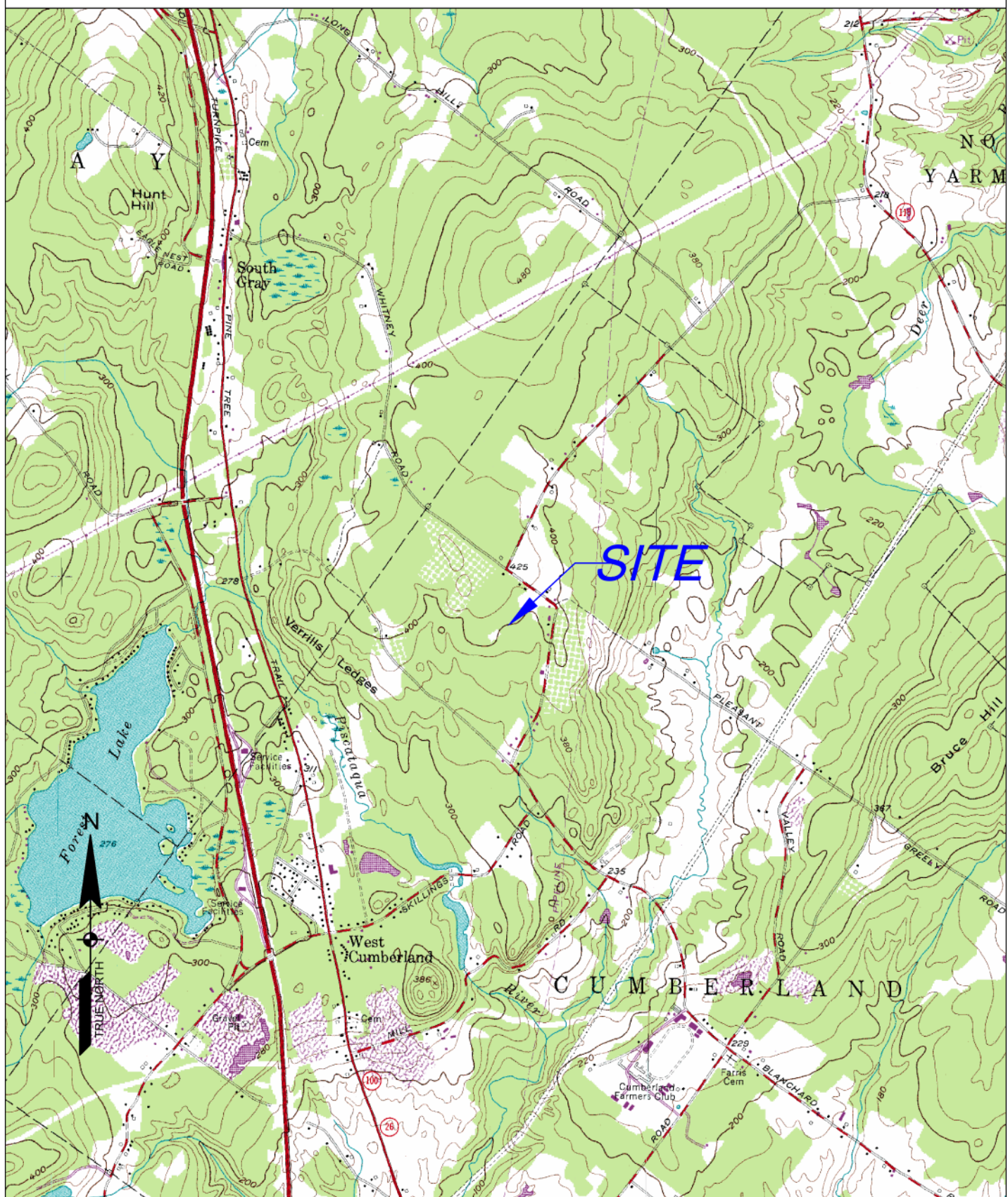
REFERENCES

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- Chang, Tan-yuch, Winkley, W., Montgomery, J., *Utilizing Baetsle's Equation to Model the Fate and Transport of MTBE in Groundwater*, Proceedings of the Petroleum Hydrocarbons and Organic Chemicals in Ground Water Prevention, Detection, and Remediation Conference, 1998, Houston, TX.
- Department of Human Services, *et al.*, Maine Subsurface Waste Water Disposal Rules, 144A CMR 241.
- Fetter, C.W., 1994, Applied Hydrogeology, 3rd Edition, Prentice Hall.
- Maine Association of Professional Soil Scientists and USDA Soil Conservation Service of Maine, *Soil Series of Maine Soil Interpretations*.
- Maine Geological Survey, Cumberland Center, Maine, Significant Sand and Gravel Aquifers.
- Maine Geological Survey, Cumberland Center Quadrangle (Maine), Surficial Geology.
- U.S.G.S., Cumberland Center Quadrangle (Maine) 7.5' Quadrangle 1:24,000, Topographic Map.
- Xu, M. and Y. Eckstein, 1995, *Use of Weighted Least-Squares Method in Evaluation of the Relationship Between Dispersivity and Field Scale*: Ground Water, vol.33, No.6, pp.905-908.

APPENDIX A

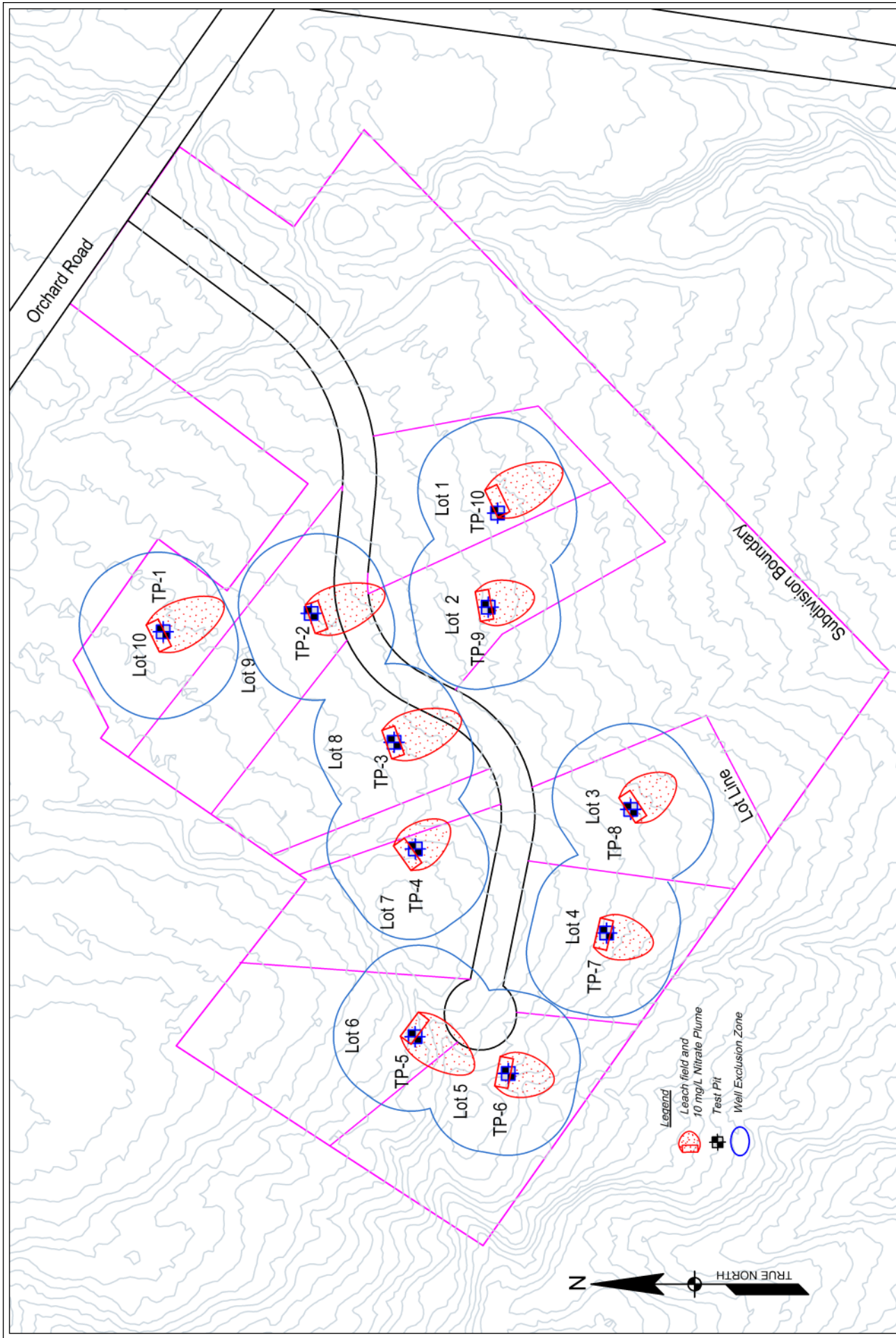
FIGURES

FIGURE 1. TOPOGRAPHIC MAP



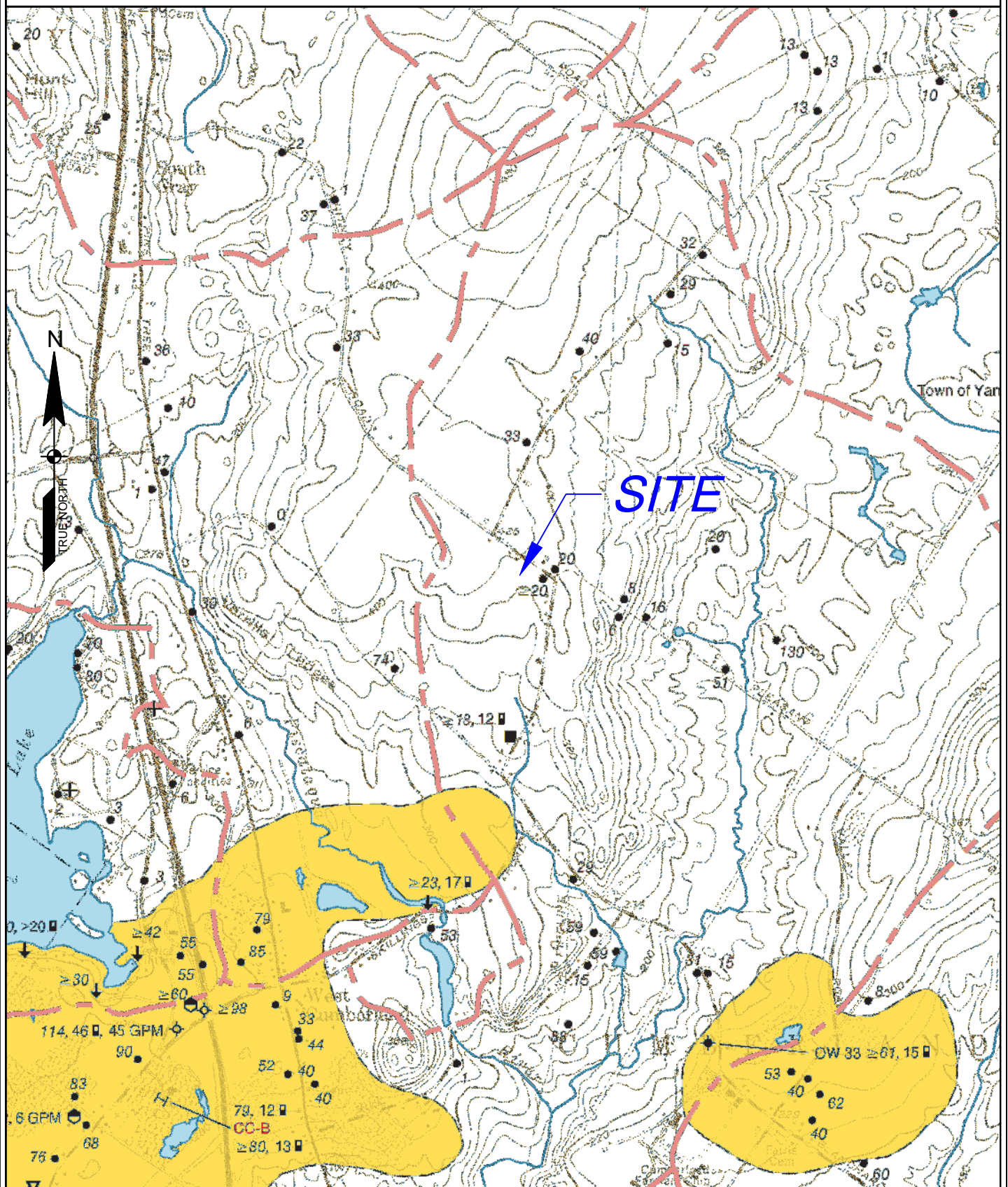
**ORCHARD ROAD SUBDIVISION
ORCHARD ROAD
CUMBERLAND**

Sebago Technics
75 John Roberts Road –
South Portland, ME
Phone: (207) 200-2100



| | |
|--|---|
| <p>Figure 2 Groundwater Impact Study Map</p> | <p>0 200' 400'</p> <p>SCALE: 1" = 200'</p> |
| <p>ORCHARD ROAD SUBDIVISION ORCHARD ROAD CUMBERLAND</p> | <p><i>Sebago Technics</i> 75 John Roberts Road South Portland, ME Phone: (207) 200-2100</p> |

FIGURE 3. SIGNIFICANT SAND & GRAVEL AQUIFERS



**ORCHARD ROAD SUBDIVISION
ORCHARD ROAD
CUMBERLAND**

Sebago Technics
75 John Roberts Road –
South Portland, ME
Phone: (207) 200-2100

FIGURE 4. AQUIFERS LEGEND

Significant Sand & Gravel Aquifer Map Unit and Symbol Descriptions



Surficial deposits with good to excellent potential ground-water yield; yields generally greater than 50 gallons per minute to a properly constructed well. Deposits consist primarily of glacial sand and gravel, but can include areas of sandy till and alluvium; yield zones are based on subsurface data where available, and may vary from mapped extent in areas where data are unavailable.



Surficial deposits with moderate to good potential ground-water yield; yields generally greater than 10 gallons per minute to a properly constructed well. Deposits consist primarily of glacial sand and gravel, but can include areas of sandy till and alluvium; yields may exceed 50 gallons per minute in deposits hydraulically connected with surface-water bodies, or in extensive deposits where subsurface data are available.



Areas with moderate to low or no potential ground-water yield (includes areas underlain by till, marine deposits, eolian deposits, alluvium, swamps, thin glacial sand and gravel deposits, or bedrock); yields in surficial deposits generally less than 10 gallons per minute to a properly constructed well.



Drilled overburden well



Drilled bedrock well



Quarry



Dug well



Driven point



Test pit



Bedrock outcrop

50

Depth to bedrock, in feet below land surface

≥ 13

Penetration depth of boring; ≥ symbol refers to minimum depth to bedrock based on boring depth or refusal

6

Depth to water level in feet below land surface (observed in well, spring, test boring, pit, or seismic line)



Gravel pit (overburden thickness noted in feet, e.g. 5-12')

4 GPM

Yield (flow) of well or spring in gallons per minute (GPM)



Spring, with general direction of flow



Observation well (project well if labeled; nonproject well if unlabeled)



Test boring (project boring if labeled; nonproject boring if unlabeled)



Potential point source of ground-water contamination



Surface-water drainage-basin boundary; surface-water divides generally correspond to ground-water divides. Horizontal direction of ground-water flow generally is away from divides and toward surface-water bodies.



MAP-7 131, 23

Twelve-channel seismic line, with depth to bedrock and depth to water shown at the midpoint of the line, in feet below land surface.

69, 12

Single-channel seismic line, with depth to bedrock and depth to water shown at each end of the line, in feet below land surface.

MAP-E

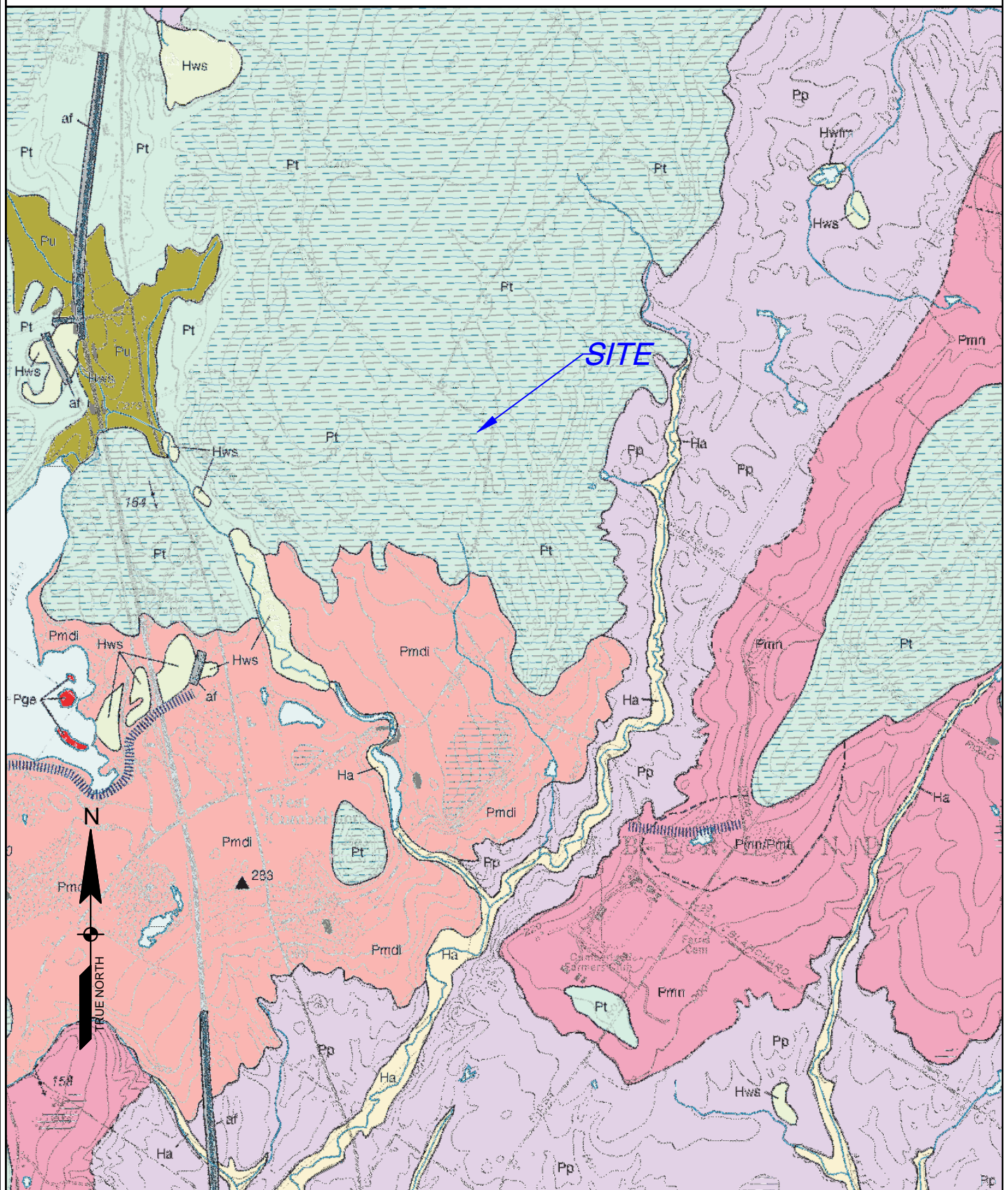
72, 12

Unless otherwise indicated, data shown above the line-identifier box refers to the northern end of the seismic line.

**ORCHARD ROAD SUBDIVISION
ORCHARD ROAD
CUMBERLAND**

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South Portland, ME
Phone: (207) 200-2100

FIGURE 5. SURFICIAL GEOLOGY



ORCHARD ROAD SUBDIVISION
ORCHARD ROAD
CUMBERLAND

Sebago Technics
75 John Roberts Road –
South Portland, ME
Phone: (207) 200-2100

FIGURE 6. SURFICIAL GEOLOGY LEGEND























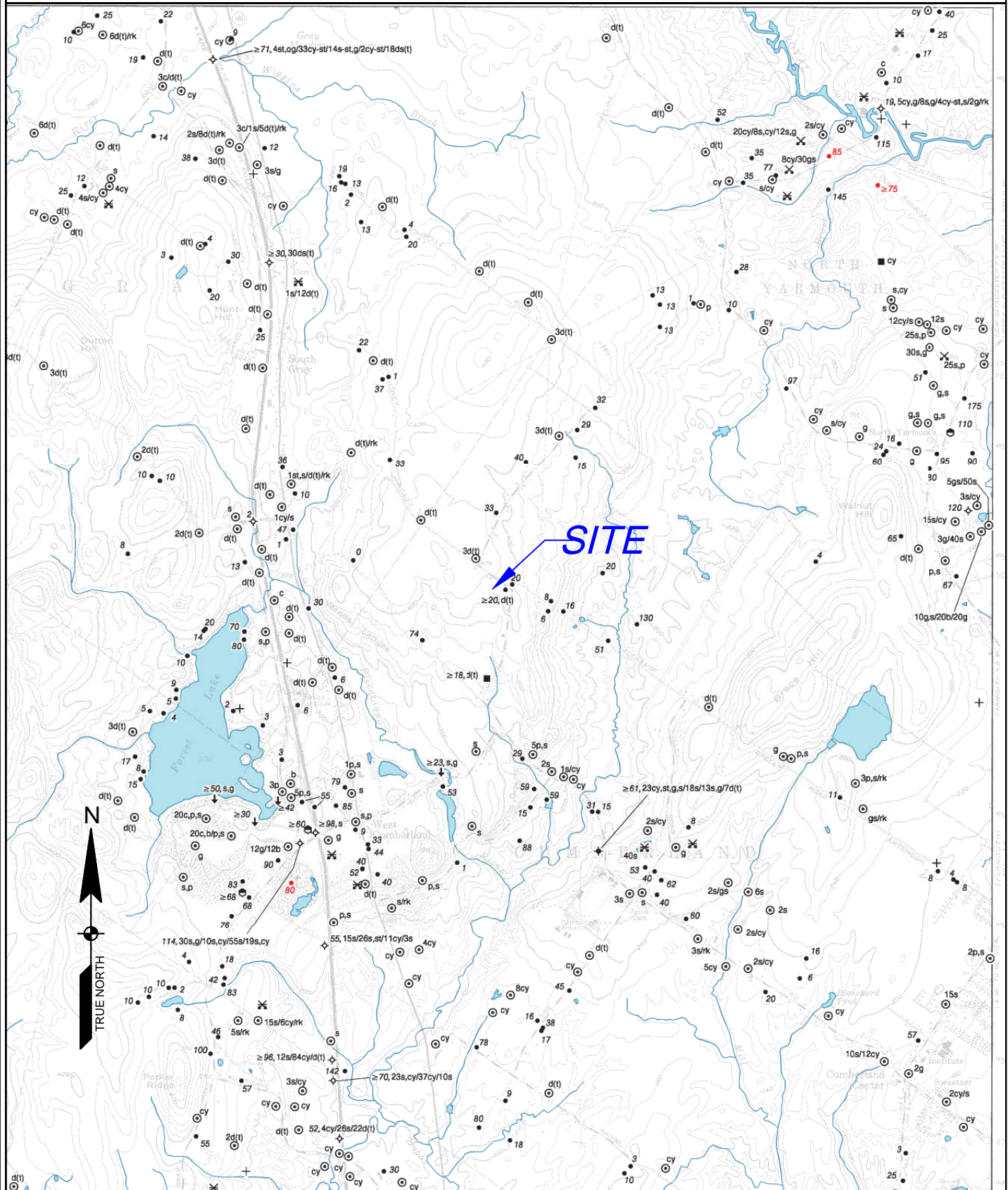
| | |
|---|---|
| HOLOCENE DEPOSITS | |
|  | Stream alluvium - Sand, silt, and minor amounts of gravel deposited on flood plains of modern streams |
|  | Stream terraces - Flat alluvial benches situated above modern flood plains of streams. Materials forming the depositional terrace include gravel, sand, silt, and clay. Step-like morphology is created by downcutting of the stream through previously deposited material, of glacial or postglacial origin and age |
|  | Wetland, swamp - Peat and fine-grained inorganic sediment. Poorly drained area with standing water common. Hwsp indicates swamps which are likely to include peat deposits that equal or exceed 1.5 meters in thickness |
|  | Wetland, freshwater marsh - Peat and fine-grained inorganic sediment. Poorly drained grassland with standing water common. Hwfp indicates marshes that are likely to include peat deposits that equal or exceed 1.5 meters in thickness |
| PLEISTOCENE DEPOSITS | |
|  | Marine nearshore deposits - Sand and gravel deposits formed as beaches, and shallow marine sand bodies formed during marine submergence and regression. |
|  | Presumpscot Formation - Fine-grained marine mud (silt and clay with local sandy beds and lenses) locally with marine fossils and dropstones deposited in deeper quieter water during the marine submergence of the coastal lowland |
|  | Marine fan - Layered gravel and sand deposited on the seafloor in a wedge or mound form at the glacier margin during marine submergence |
|  | Marine delta - Sorted and stratified sand and gravel deposited in the late-glacial sea, with flat top graded to ocean surface |
|  | Marine ice-contact delta - Ice-contact delta composed primarily of sorted and stratified sand and gravel. Deposit was graded to surface of late-glacial sea and is distinguished by flat top and foreset and topset beds |
|  | Esker - Gravel and sand deposited in an ice tunnel by subglacial meltwater stream |
|  | End moraine complex - Area of end moraines and associated glaciomarine sediments (submarine fan and sea-floor deposits). Composed of till, sand, and gravel deposited at the margin of the late Wisconsinan ice sheet |
|  | Till - Poorly sorted mixture of gravel, sand, silt, and clay deposited directly by the action of glacier ice. |
|  | Undifferentiated sediments - Pleistocene surficial sediments of uncertain origin. |
|  | Bedrock - Gray dots indicate individual outcrops of ledge exposed at the surface. Horizontal ruled pattern indicates areas where bedrock is covered by a thin veneer of surficial sediments. |
|  | Artificial fill - Mixture of till, gravel, sand, clay, and artificial materials transported and dumped to form elevated sections of roadways, etc. |
|  | Contact - Indicates boundary between adjacent map units, dashed where approximate. |
|  | Glacial striation or groove - Arrow shows direction of former ice movement. Dot marks point of observation. |
|  | End moraine - Ridge of till, sand, and gravel deposited and/or deformed by glacier ice. |
|  | Ice margin position - Line shows approximate position of ice margin during glacial retreat for major ice-margin positions. Dashed where approximate. |
|  | Glacially streamlined hill - Symbol shows trend of long axis, which is parallel to former ice-flow direction. |
|  | Marine fossil locality - Indicates site where marine fossils were located. Sites where radiocarbon age estimates were obtained also show radiocarbon age estimate. |
|  | Glaciomarine delta - Elevation of contact between topset and foreset beds in glaciomarine delta, which indicates former position of sea level (from Thompson and others, 1989). |
| <div> <div>ORCHARD ROAD SUBDIVISION</div> <div>ORCHARD ROAD</div> <div>CUMBERLAND</div> </div> <div> <u>Sebago Technics</u> 75 John Roberts Road – South Portland, ME Phone: (207) 200-2100 </div> | |

FIGURE 7. SURFICIAL MATERIALS



ORCHARD ROAD SUBDIVISION
ORCHARD ROAD
CUMBERLAND

Sebago Technics
75 John Roberts Road –
South Portland, ME
Phone: (207) 200-2100

FIGURE 8. SURFICIAL MATERIALS LEGEND

Surficial Material Symbol Descriptions

This map shows the textures of surficial sediments in the quadrangle, independent of interpretations regarding their origin. For example, poorly sorted sediments deposited directly from glacial ice are shown here as "diamicton", although they may be genetically classified as "till".

The symbols listed below indicate materials observed in borrow pits and other surface exposures, as well as subsurface data from various sources. Where more than one textural class is present, materials are separated by commas and listed in decreasing order of abundance (e.g. s, st, cy). Individual materials may occur in distinct layers, or they may be mixed. Hyphens show the ranges of particle sizes present where their relative abundances are uncertain (e.g. st-c). Slash marks indicate superposition of materials; thicknesses are in feet (e.g. 10s/3cy). "E" indicates a significant stratigraphic sequence of interbedded materials. Some borrow pits and other localities may be designated by numbers that refer to descriptions in the quadrangle text. Not all symbols will necessarily be found on the map.

g Undifferentiated gravel, used as a general term. Can be subdivided by size as follows:

- b** Boulder gravel >256 mm (10")
- c** Cobble gravel 64-256 mm (2.5-10")
- p** Pebble gravel 2-64 mm (0.1-2.5")

gs Gravelly sand (this is a special case for sand with lesser amounts of intermixed gravel, i.e. pebbly sand, cobbly sand, or bouldery sand)

sg Sand and gravel (used only to describe slumped face or other site where relative abundances of sand vs. gravel are unknown).

s Undifferentiated sand, used as a general term. Can be subdivided by size as follows:

- vcs** Very coarse sand (1-2 mm)
- cs** Coarse sand (0.5-1 mm)
- ms** Medium sand (0.25-0.5 mm)
- fs** Fine sand (0.125-0.25 mm)
- vfs** Very fine sand (0.0625-0.125 mm)

st Silt (0.002-0.0625 mm)

cy Clay (<0.002 mm)

og Organic-rich sediment (can be any organic material, including forest litter, wood, shells, etc.)

pt Peat (reserved for actual fibrous peat)

d Undifferentiated diamicton (poorly-sorted sediment in which particle sizes may range from clay to boulders). Used as a general term or subdivided as follows:

- dg** Gravelly-matrix diamicton
- ds** Sandy-matrix diamicton
- dt** Silty-matrix diamicton
- dy** Clayey-matrix diamicton

Note: Diamictons of glacial origin may be classified as one of the following varieties of till (shown on the map in parentheses):

- t** Till, undifferentiated. Usually of late Wisconsinan age (deposited by the last glacial ice sheet).
- ta** Ablation till. Deposited during retreat of the late Wisconsinan ice sheet. Typically sandy, stony, and not very compact.
- tl** Lodgement till. Inferred to have been deposited at the base of the late Wisconsinan ice sheet. Usually very compact.
- tf** Flowtill. Deposited by slumping adjacent to glacial ice.
- T** Variably weathered till (usually a lodgment facies) of inferred pre-late Wisconsinan age.

af Artificial fill (e.g. road fills, building sites, dumps)

bd Scattered boulders; interpreted as till where followed by (t)

rk Bedrock (observed in pit floor, boring, or natural exposure)

rs Rottenstone, disintegrated or weathered bedrock, saprolite,

u Unknown (material unidentified)

R Refusal (in test boring or well)

(f) Fossiliferous (used to indicate fossiliferous units within a sequence).

- Bedrock well
- ⊙ Drilled overburden well
- Dug well
- ↓ Driven point
- ⊕ Bedrock outcrop
- ⊗ Quarry

◆ 20fs/st Observation well with materials data

◆ 10gs/rk Test boring with materials data

⊙ 8s-b Materials data from shovel hole, hand-auger hole, natural exposure, or excavation (other than borrow pit).

56 Depth to bedrock from well (≥ is used to indicate minimum depth to bedrock), in feet below land surface

✕ s-b Borrow pit, recently active at time of mapping, with materials data.

✕ s-p Borrow pit, evidently abandoned or in long disuse at time of mapping, with materials data.

9 Location of site for which a data sheet is on file at the Maine Geological Survey.

• 56 Depth to bedrock from seismic line, in feet below land surface

ORCHARD ROAD SUBDIVISION
ORCHARD ROAD
CUMBERLAND

Sebago Technics
75 John Roberts Road –
South Portland, ME
Phone: (207) 200-2100

APPENDIX B
KATAHDIN ANALYTICAL REPORT

October 27, 2017

Mr. Dave Chapman
Sebago Technics
75 John Roberts Rd
Suite 1A
South Portland, ME 04106

RE: Katahdin Lab Number: SK9925
Project ID: Orchard Road IVIT
Project Manager: Mr. Galen Nickerson
Sample Receipt Date(s): October 25, 2017

Dear Mr. Chapman:

Please find enclosed the following information:

- * Report of Analysis (Analytical and/or Field)
- * Chain of Custody (COC)
- * Login Report

A copy of the Chain of Custody is included in the paginated report. The original COC is attached as an addendum to this report.

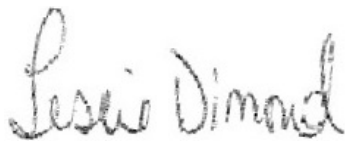
Should you have any questions or comments concerning this Report of Analysis, please do not hesitate to contact the project manager listed above. The results contained in this report relate only to the submitted samples. This cover letter is an integral part of the ROA.

We certify that the test results provided in this report meet all the requirements of the NELAC standards unless otherwise noted in an attached technical narrative or in the Report of Analysis.

We appreciate your continued use of our laboratory and look forward to working with you in the future. The following signature indicates technical review and acceptance of the data.

Please go to <http://www.katahdinlab.com/cert.html> for copies of Katahdin Analytical Services Inc. current certificates and analyte lists.

Sincerely,
KATAHDIN ANALYTICAL SERVICES



Authorized Signature - Quality Assurance Officer

10/27/2017

Date

KATAHDIN ANALYTICAL SERVICES – INORGANIC DATA QUALIFIERS

The sampled date indicated on the attached Report(s) of Analysis (ROA) is the date for which a grab sample was collected or the date for which a composite sample was completed. Beginning and start times for composite samples can be found on the Chain-of-Custody.

U Indicates the compound was analyzed for but not detected above the specified level. This level may be the Practical Quantitation Level (PQL) (also called Limit of Quantitation (LOQ)), the Limit of Detection (LOD) or Method Detection Limit (MDL) as required by the client.

Note: All results reported as "U" MDL have a 50% rate for false negatives compared to those results reported as "U" PQL "U" LOQ or "U" LOD, where the rate of false negatives is <1%.

E Estimated value. This flag identifies compounds whose concentrations exceed the upper level of the calibration range of the instrument for that specific analysis.

J Estimated value. The analyte was detected in the sample at a concentration less than the laboratory Practical Quantitation Level (PQL) (also called Limit of Quantitation (LOQ)), but above the Method Detection Limit (MDL).

I-7 The laboratory's Practical Quantitation Level (PQL) or LOQ could not be achieved for this parameter due to sample composition, matrix effects, sample volume, or quantity used for analysis.

A-4 Please refer to cover letter or narrative for further information.

H_ Please note that the regulatory holding time for _____ is "analyze immediately". Ideally, this analysis must be performed in the field at the time of sample collection. _____ for this sample was not performed at the time of sample collection. The analysis was performed as soon as possible after receipt by the laboratory.

H1 - pH

H2 - DO

H3 - sulfite

H4 - residual chlorine

T1 The client did not provide the full volume of at least one liter for analysis of TSS. Therefore, the PQL of 2.5 mg/L could not be achieved.

T2 The client provided the required volume of at least one liter for analysis of TSS, but the laboratory could not filter the full one liter volume due to the sample matrix. Therefore, the PQL of 2.5 mg/L could not be achieved.

M1 The matrix spike and/or matrix spike duplicate recovery performed on this sample was outside of the laboratory acceptance criteria. Sample matrix is suspected. The laboratory criteria was met for the Laboratory Control Sample (LCS) analyzed concurrently with this sample.

M2 The matrix spike and/or matrix spike duplicate recovery was outside of the laboratory acceptance criteria. The native sample concentration is greater than four times the spike added concentration so the spike added could not be distinguished from the native sample concentration.

R1 The relative percent difference (RPD) between the duplicate analyses performed on this sample was outside of the laboratory acceptance criteria (when both values are greater than ten times the PQL).

MCL Maximum Contaminant Level

NL No limit

NFL No Free Liquid Present

FLP Free Liquid Present

NOD No Odor Detected

TON Threshold Odor Number

D-1 As required by Method 5210B, APHA Standard Methods for the Examination of Water and Wastewater (21st edition), the BOD value reported for this sample is 'qualified' because the check standard run concurrently with the sample analysis did not meet the criteria specified in the method (198 +/- 30.5 mg/L). These results may not be reportable for compliance purposes.

D-2 The measured final dissolved oxygen concentrations of all dilutions were less than the method-specified limit of 1 mg/L. The reported BOD result was calculated assuming a final oxygen concentration equal to 1 mg/L. The reported value should be considered a minimum value.

D-3 The dilution water used to prepare this sample did not meet the method and/or regulatory criteria of less than 0.2 or 0.4 mg/L dissolved oxygen (DO) uptake over the five day period of incubation. These results may not be reportable for compliance purposes.



REPORT OF ANALYTICAL RESULTS

Client: Dave Chapman
Sebago Technics
75 John Roberts Rd
Suite 1A
South Portland, ME 04106

Lab Sample ID: SK9925-001
Report Date: 10/27/2017
PO No.:
Project: Orchard Road IVIT

| Sample Description | | | | | | Matrix | | Filtered | Date Sampled | | Date Received | | |
|--------------------|---------|-------|--------------|-----------------|-------|-------------------|---------------|-----------|--------------|--------------|---------------|----------|-------|
| 74 ORCHARD ROAD | | | | | | AQ | | No(Total) | 10/25/2017 | | 10/25/2017 | | |
| Parameter | Result | Units | Adjusted PQL | Dilution Factor | PQL | Analytical Method | Analysis Date | By | Prep Method | Prepped Date | By | QC | Notes |
| ARSENIC | U 0.008 | mg/L | 0.008 | 1 | 0.008 | SW846 6010 | 10/26/17 | MD | SW846 3010 | 10/26/17 | AMJ | KJ26ICW2 | |

Report of Analytical Results

Client: Dave Chapman
Sebago Technics
75 John Roberts Rd
South Portland, ME 04106

Lab Sample ID: SK9925-1
Report Date: 26-OCT-17
Client PO:
Project: Orchard Road IVIT
SDG: SK9925

Sample Description
74 ORCHARD ROAD

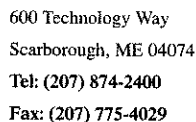
Matrix **Date Sampled** **Date Received**
AQ 25-OCT-17 09:20:00 25-OCT-17

| Parameter | Result | Adj PQL | Adj MDL | Anal. Method | QC Batch | Analysis Date | Prep. Method | Prep. Date | Analyst | Footnotes | RPD/RSD |
|--------------|----------|---------|---------|--------------|----------|--------------------|--------------|------------|---------|-----------|---------|
| Nitrate As N | 1.1 mg/L | 0.050 | .0152 | EPA 353.2 | WG216349 | 25-OCT-17 16:56:23 | N/A | N/A | AP | | |

| | | |
|--------------------------------|------------------------------|--------------------------------------|
| Client: <u>Sebago Tech</u> | KAS PM: <u>GN</u> | Sampled By: <u>Client</u> |
| Project: | KIMS Entry By: <u>SO</u> | Delivered By: <u>Client</u> |
| KAS Work Order#: <u>SK9925</u> | KIMS Review By: <u>GN</u> | Received By: <u>JCB</u> |
| SDG #: | Cooler: <u>1</u> of <u>1</u> | Date/Time Rec.: <u>10.25.17 1800</u> |

| Receipt Criteria | Y | N | EX* | NA | Comments and/or Resolution |
|---|---|---|-----|-------------------------------------|---|
| 1. Custody seals present / intact? | <input checked="" type="checkbox"/> | | | | |
| 2. Chain of Custody present in cooler? | <input checked="" type="checkbox"/> | | | | |
| 3. Chain of Custody signed by client? | <input checked="" type="checkbox"/> | | | | |
| 4. Chain of Custody matches samples? | <input checked="" type="checkbox"/> | | | | |
| 5. Temperature Blanks present? If not, take temperature of any sample w/ IR gun. | <input checked="" type="checkbox"/> | | | | Temp (°C): <u>4.6</u> |
| Samples received at <6 °C w/o freezing? | <input checked="" type="checkbox"/> | | | | Note: Not required for metals (except Hg soil) analysis. |
| Ice packs or ice present? | <input checked="" type="checkbox"/> | | | | The lack of ice or ice packs (i.e. no attempt to begin cooling process) or insufficient ice may not meet certain regulatory requirements and may invalidate certain data. |
| If yes, was there sufficient ice to meet temperature requirements? | <input checked="" type="checkbox"/> | | | | |
| If temp. out, has the cooling process begun (i.e. ice or packs present) and sample collection times <6hrs., but samples are not yet cool? | | | | <input checked="" type="checkbox"/> | Note: No cooling process required for metals (except Hg soil) analysis. |
| 6. Volatiles: | | | | | |
| Aqueous: No bubble larger than a pea? | | | | <input checked="" type="checkbox"/> | |
| Soil/Sediment: | | | | | |
| Received in airtight container? | | | | <input checked="" type="checkbox"/> | |
| Received in methanol? | | | | <input checked="" type="checkbox"/> | |
| Methanol covering soil? | | | | <input checked="" type="checkbox"/> | |
| D.I. Water - Received within 48 hour HT? | | | | <input checked="" type="checkbox"/> | |
| Air: Refer to KAS COC for canister/flow controller requirements. | <input checked="" type="checkbox"/> if air included | | | | |
| 7. Trip Blank present in cooler? | | | | <input checked="" type="checkbox"/> | |
| 8. Proper sample containers and volume? | <input checked="" type="checkbox"/> | | | | |
| 9. Samples within hold time upon receipt? | <input checked="" type="checkbox"/> | | | | |
| 10. Aqueous samples properly preserved? | <input checked="" type="checkbox"/> | | | | |
| Metals, COD, NH3, TKN, O/G, phenol, TPO4, N+N, TOC, DRO, TPH - pH <2 | | | | | |
| Sulfide - >9 | | | | <input checked="" type="checkbox"/> | |
| Cyanide - pH >12 | | | | <input checked="" type="checkbox"/> | |

* Log-In Notes to Exceptions: document any problems with samples or discrepancies or pH adjustments.



**PLEASE BEAR DOWN AND
PRINT LEGIBLY IN PEN**

Page 1 of 1

THE TERMS AND CONDITIONS ON THE REVERSE SIDE HEREOF SHALL GOVERN SERVICES, EXCEPT WHEN A SIGNED CONTRACTUAL AGREEMENT EXISTS.



Katahdin Analytical Services
Login Chain of Custody Report (Ino1)

Page: 1 of 1

Oct. 25, 2017

11:05 AM

Quote/Incoming:

Login Number: SK9925

Account: SEBAGOTECH001

Sebago Technics

NoWeb

Project:

Primary Report Address:

Dave Chapman

Sebago Technics

75 John Roberts Rd

Suite 1A

South Portland, ME 04106

dchapman@sebagotechnics.com

Primary Invoice Address:

Accounts Payable

Sebago Technics

75 John Roberts Rd

Suite 1A

South Portland, ME 04106

Report CC Addresses:

Invoice CC Addresses:

Login Information:

ANALYSIS INSTRUCTIONS : FIRM-HARD COPY BY END OF DAY

CHECK NO. :

CLIENT PO# :

CLIENT PROJECT MANAGE :

CONTRACT :

COOLER TEMPERATURE : 4.6

DELIVERY SERVICES : Client

EDD FORMAT :

LOGIN INITIALS : SO

PM : GN

PROJECT NAME : Orchard Road IVIT

QC LEVEL : I

REPORT INSTRUCTIONS : email pdf, EDD and Invoice to Dave, no HC

SDG ID :

SDG STATUS :

VERBAL TAT :

| Laboratory Sample ID | Client Sample Number | Collect Date/Time | Receive Date | PR | Verbal Date | Due Date | Mailed |
|-------------------------|-------------------------|----------------------|--------------------|--------------|----------------|-------------|--------|
| SK9925-1 | 74 ORCHARD ROAD | 25-OCT-17 09:20 | 25-OCT-17 | | 27-OCT-17 | 27-OCT-17 | |
| Matrix | Product | Hold Date (shortest) | Bottle Type | Bottle Count | Comments | | |
| Aqueous | S E353.2-NITRATE | 27-OCT-17 | 125mL Plastic | | | | |
| Aqueous | S SW3010-PREP | 23-APR-18 | 250mL Plastic+HNO3 | | | | |
| Aqueous | S SW6010-ARSENIC | 23-APR-18 | 250mL Plastic+HNO3 | | | | |

Total Samples: 1

Total Analyses: 3

APPENDIX C
TESTPIT LOGS

| SOIL PROFILE / CLASSIFICATION INFORMATION | | DETAILED DESCRIPTION OF SUBSURFACE CONDITIONS AT PROJECT SITES |
|--|-------------------------------------|---|
| Project Name: Orchard Road Subdivision | Applicant Name: Gorrill & Palmer | Project Location (municipality): Cumberland |

| | | | | |
|---|-----------------------|-----------------------|---------------------|---|
| Observation Hole # <u>TP-1</u> <input checked="" type="checkbox"/> Test Pit <input type="checkbox"/> Boring | | | | |
| <u>1-2</u> " Depth of organic horizon above mineral soil | | | | |
| Depth below mineral soil surface (inches) | Texture | Consistency | Color | Mottling |
| 0 | | | | |
| 6 | Fine Sandy Loam | Friable | Dark Brown | |
| 12 | | | | |
| 18 | | | | |
| 24 | Sandy Loam | Firm | Light Olive Brown | Many/ Prominant |
| 30 | | | | |
| 36 | | | | |
| 42 | | | | |
| 48 | | | | |
| Limit of Excavation at 20" | | | | |
| Soil | Classification | Slope | Limiting Factor | <input checked="" type="checkbox"/> Groundwater <input type="checkbox"/> Restrictive Layer <input type="checkbox"/> Bedrock |
| <u>3</u> Profile | <u>D</u> Condition | <u>0-3</u> Percent | <u>12"</u> Depth | |

| | | | | |
|---|-----------------------|-----------------------|---------------------|---|
| Observation Hole # <u>TP-2</u> <input checked="" type="checkbox"/> Test Pit <input type="checkbox"/> Boring | | | | |
| <u>1-2</u> " Depth of organic horizon above mineral soil | | | | |
| Depth below mineral soil surface (inches) | Texture | Consistency | Color | Mottling |
| 0 | | | | |
| 6 | Fine Sandy Loam | Friable | Dark Brown | |
| 12 | | | | |
| 18 | | | | |
| 24 | Sandy Loam | | Light Olive Brown | Common/ Distinct |
| 30 | | Firm | | |
| 36 | | | | |
| 42 | | | | |
| 48 | | | | |
| Limit of Excavation at 30" | | | | |
| Soil | Classification | Slope | Limiting Factor | <input checked="" type="checkbox"/> Groundwater <input type="checkbox"/> Restrictive Layer <input type="checkbox"/> Bedrock |
| <u>3</u> Profile | <u>C</u> Condition | <u>0-3</u> Percent | <u>12"</u> Depth | |

| | | | | |
|---|-----------------------|-----------------------|----------------------|---|
| Observation Hole # <u>TP-3</u> <input checked="" type="checkbox"/> Test Pit <input type="checkbox"/> Boring | | | | |
| <u>1-2</u> " Depth of organic horizon above mineral soil | | | | |
| Depth below mineral soil surface (inches) | Texture | Consistency | Color | Mottling |
| 0 | Fine Sandy Loam | | | |
| 6 | | Friable | Dark Yellowish Brown | |
| 12 | Sandy Loam | | | |
| 18 | | | | |
| 24 | | | | |
| 30 | | Firm | Light Olive Brown | Common/ Distinct |
| 36 | | | | |
| 42 | | | | |
| 48 | | | | |
| Limit of Excavation at 26" | | | | |
| Soil | Classification | Slope | Limiting Factor | <input checked="" type="checkbox"/> Groundwater <input type="checkbox"/> Restrictive Layer <input type="checkbox"/> Bedrock |
| <u>3</u> Profile | <u>C</u> Condition | <u>3-8</u> Percent | <u>24"</u> Depth | |

| | | | | |
|---|-----------------------|-----------------------|-------------------------|--|
| Observation Hole # <u>TP-4</u> <input checked="" type="checkbox"/> Test Pit <input type="checkbox"/> Boring | | | | |
| <u>1-2</u> " Depth of organic horizon above mineral soil | | | | |
| Depth below mineral soil surface (inches) | Texture | Consistency | Color | Mottling |
| 0 | | | Dark Yellowish Brown | |
| 6 | | | | |
| 12 | Sandy Loam | Friable | | None Observed |
| 18 | | | Yellowish Brown | |
| 24 | | | | |
| 30 | | | | |
| 36 | | | | |
| 42 | | | | |
| 48 | | | | |
| Limit of Excavation at 24" | | | | |
| Soil | Classification | Slope | Limiting Factor | <input type="checkbox"/> Groundwater <input type="checkbox"/> Restrictive Layer <input type="checkbox"/> Bedrock |
| <u>3</u> Profile | <u>C</u> Condition | <u>3-8</u> Percent | <u>>24"</u> Depth | |

| INVESTIGATOR INFORMATION AND SIGNATURE | |
|--|---|
| Signature: <u>David V. Chapman</u> | Date: <u>9-27-17</u> |
| Name Printed/typed: <u>David V. Chapman</u> | Cert/Lic/Reg.# 293 |
| Title: <input checked="" type="checkbox"/> Licensed Site Evaluator <input type="checkbox"/> Certified Soil Scientist <input type="checkbox"/> Certified Geologist <input type="checkbox"/> Other: | |

| SOIL PROFILE / CLASSIFICATION INFORMATION | | DETAILED DESCRIPTION OF SUBSURFACE CONDITIONS AT PROJECT SITES |
|---|-------------------------------------|---|
| Project Name: Orchard Road Subdivision | Applicant Name: Gorrill & Palmer | Project Location (municipality): Cumberland |

| | | | | |
|---|---|--------------------------------|---------------------------------------|---|
| Observation Hole # <u>TP-5</u> <input checked="" type="checkbox"/> Test Pit <input type="checkbox"/> Boring | | | | |
| <u>1-2</u> " Depth of organic horizon above mineral soil | | | | |
| Texture | Consistency | Color | Mottling | |
| 0 | | | | |
| 6 | Friable | Dark Brown | | |
| 12 | | Light Olive Brown | None Observed | |
| 18 | | | | |
| 24 | Firm | | | |
| 30 | | | | |
| 36 | | | | |
| 42 | | | | |
| 48 | Limit of Excavation at 24" | | | |
| Soil <u>3</u> Profile | Classification <u>C</u> Condition | Slope <u>3-8</u> Percent | Limiting Factor <u>21</u> Depth | <input type="checkbox"/> Groundwater <input checked="" type="checkbox"/> Restrictive Layer <input type="checkbox"/> Bedrock |

| | | | | |
|---|---|--------------------------------|--|---|
| Observation Hole # <u>TP-6</u> <input checked="" type="checkbox"/> Test Pit <input type="checkbox"/> Boring | | | | |
| <u>1-2</u> " Depth of organic horizon above mineral soil | | | | |
| Texture | Consistency | Color | Mottling | |
| 0 | | | | |
| 6 | Friable | Dark Brown | | |
| 12 | | Light Olive Brown | None Observed | |
| 18 | | | | |
| 24 | Firm | | | |
| 30 | | | | |
| 36 | | | | |
| 42 | | | | |
| 48 | Limit of Excavation at 24" | | | |
| Soil <u>3</u> Profile | Classification <u>D</u> Condition | Slope <u>3-8</u> Percent | Limiting Factor <u>21"</u> Depth | <input type="checkbox"/> Groundwater <input checked="" type="checkbox"/> Restrictive Layer <input type="checkbox"/> Bedrock |

| | | | | |
|---|---|--------------------------------|--|---|
| Observation Hole # <u>TP-7</u> <input checked="" type="checkbox"/> Test Pit <input type="checkbox"/> Boring | | | | |
| <u>1-2</u> " Depth of organic horizon above mineral soil | | | | |
| Texture | Consistency | Color | Mottling | |
| 0 | | | | |
| 6 | Friable | Dark Yellowish Brown | | |
| 12 | | Light Olive Brown | None Observed | |
| 18 | | | | |
| 24 | Firm | | | |
| 30 | | | | |
| 36 | | | | |
| 42 | | | | |
| 48 | Limit of Excavation at 25" | | | |
| Soil <u>3</u> Profile | Classification <u>C</u> Condition | Slope <u>3-8</u> Percent | Limiting Factor <u>20"</u> Depth | <input type="checkbox"/> Groundwater <input checked="" type="checkbox"/> Restrictive Layer <input type="checkbox"/> Bedrock |

| | | | | |
|---|---|--------------------------------|--|---|
| Observation Hole # <u>TP-8</u> <input checked="" type="checkbox"/> Test Pit <input type="checkbox"/> Boring | | | | |
| <u>1-2</u> " Depth of organic horizon above mineral soil | | | | |
| Texture | Consistency | Color | Mottling | |
| 0 | | | | |
| 6 | Friable | Dark Yellowish Brown | | |
| 12 | | Light Yellowish Brown | None Observed | |
| 18 | | | | |
| 24 | Firm | | | |
| 30 | | | | |
| 36 | | | | |
| 42 | | | | |
| 48 | Limit of Excavation at 27" | | | |
| Soil <u>3</u> Profile | Classification <u>C</u> Condition | Slope <u>0-3</u> Percent | Limiting Factor <u>23"</u> Depth | <input type="checkbox"/> Groundwater <input checked="" type="checkbox"/> Restrictive Layer <input type="checkbox"/> Bedrock |

| INVESTIGATOR INFORMATION AND SIGNATURE | |
|--|--|
| Signature: <u>David V. Chapman</u> | Date: <u>9-27-17</u> |
| Name Printed/typed: <u>David V. Chapman</u> | Cert/Lic/Reg.# <u>293</u> |
| Title: <input checked="" type="checkbox"/> Licensed Site Evaluator <input type="checkbox"/> Certified Soil Scientist <input type="checkbox"/> Certified Geologist <input type="checkbox"/> Other: | |

| SOIL PROFILE / CLASSIFICATION INFORMATION | | DETAILED DESCRIPTION OF SUBSURFACE CONDITIONS AT PROJECT SITES |
|---|-------------------------------------|---|
| Project Name: Orchard Road Subdivision | Applicant Name: Gorrill & Palmer | Project Location (municipality): Cumberland |

| | | | | |
|---|---|--------------------------------|--|---|
| Observation Hole # <u>TP-9</u> <input checked="" type="checkbox"/> Test Pit <input type="checkbox"/> Boring | | | | |
| <u>1-2</u> " Depth of organic horizon above mineral soil | | | | |
| Texture | Consistency | Color | Mottling | |
| 0 | | | | |
| 6 | Sandy Loam | Friable | Brown | |
| 12 | | | | |
| 18 | | | Light Olive Brown | Common/ Distinct |
| 24 | | | | |
| 30 | | Firm | | |
| 36 | | | | |
| 42 | | | | |
| 48 | | | | |
| Limit of Excavation at 27" | | | | |
| Soil <u>3</u> Profile | Classification <u>D</u> Condition | Slope <u>0-3</u> Percent | Limiting Factor <u>14"</u> Depth | <input checked="" type="checkbox"/> Groundwater <input type="checkbox"/> Restrictive Layer <input type="checkbox"/> Bedrock |

| | | | | |
|--|---|--------------------------------|--|---|
| Observation Hole # <u>TP-10</u> <input checked="" type="checkbox"/> Test Pit <input type="checkbox"/> Boring | | | | |
| <u>1-2</u> " Depth of organic horizon above mineral soil | | | | |
| Texture | Consistency | Color | Mottling | |
| 0 | | | | |
| 6 | Sandy Loam | Friable | Dark Yellowish Brown | |
| 12 | | | | |
| 18 | | | Light Olive Brown | Common/ Distinct |
| 24 | | | | |
| 30 | | | | |
| 36 | | | | |
| 42 | | | | |
| 48 | | | | |
| Limit of Excavation at 22" | | | | |
| Soil <u>3</u> Profile | Classification <u>D</u> Condition | Slope <u>0-3</u> Percent | Limiting Factor <u>10"</u> Depth | <input checked="" type="checkbox"/> Groundwater <input type="checkbox"/> Restrictive Layer <input type="checkbox"/> Bedrock |

| | | | | |
|--|--------------------------------------|---------------------------|-----------------------------------|--|
| Observation Hole # _____ <input type="checkbox"/> Test Pit <input type="checkbox"/> Boring | | | | |
| _____ " Depth of organic horizon above mineral soil | | | | |
| Texture | Consistency | Color | Mottling | |
| 0 | | | | |
| 6 | | | | |
| 12 | | | | |
| 18 | | | | |
| 24 | | | | |
| 30 | | | | |
| 36 | | | | |
| 42 | | | | |
| 48 | | | | |
| Soil _____ Profile | Classification _____ Condition | Slope _____ Percent | Limiting Factor _____ Depth | <input type="checkbox"/> Groundwater <input type="checkbox"/> Restrictive Layer <input type="checkbox"/> Bedrock |

| | | | | |
|--|--------------------------------------|---------------------------|-----------------------------------|--|
| Observation Hole # _____ <input type="checkbox"/> Test Pit <input type="checkbox"/> Boring | | | | |
| _____ " Depth of organic horizon above mineral soil | | | | |
| Texture | Consistency | Color | Mottling | |
| 0 | | | | |
| 6 | | | | |
| 12 | | | | |
| 18 | | | | |
| 24 | | | | |
| 30 | | | | |
| 36 | | | | |
| 42 | | | | |
| 48 | | | | |
| Soil _____ Profile | Classification _____ Condition | Slope _____ Percent | Limiting Factor _____ Depth | <input type="checkbox"/> Groundwater <input type="checkbox"/> Restrictive Layer <input type="checkbox"/> Bedrock |

| INVESTIGATOR INFORMATION AND SIGNATURE | |
|--|---|
| Signature: <u>David V. Chapman</u> | Date: <u>9-27-17</u> |
| Name Printed/typed: <u>David V. Chapman</u> | Cert/Lic/Reg.# 293 |
| Title: <input checked="" type="checkbox"/> Licensed Site Evaluator <input type="checkbox"/> Certified Soil Scientist <input type="checkbox"/> Certified Geologist <input type="checkbox"/> Other: | |

APPENDIX D

PARAMETERS AND RESULTS

**Groundwater Impact Study, Nitrates
Model Input Parameters and Solution
Orchard Road Subdivision
Orchard Road, Cumberland, Maine
Lot 1, 6, 8, 9, and 10**

| | |
|--|-----------|
| Annual rainfall (inches): | 44 |
| Hydrologic soil group* (above disposal field): | C to D |
| % Slope (above disposal field): | 3 to 8% |
| % Infiltration* (into disposal field): | 21 |
| Assumed rainfall flow into disposal field (gal/day): | 14.20 |
| Assumed rainfall flow into disposal field during drought conditions^(gal/day): | 8.52 |
| Background NO3-N concentration (mg/L): | 0 |
| Assumed effluent NO3-N concentration (mg/L): | 41 |
| Assumed effluent flow into disposal field (gal/day): | 270 |
| Assumed NO3-N concentration in rainfall (mg/L): | 0.5 |
| Hydraulic conductivity of aquifer (ft/day): | 2 |
| Hydraulic gradient of aquifer (ft/ft): | 0.015 |
| Effective porosity of aquifer: | 0.21 |
| Seepage velocity of aquifer (ft/day): | 0.14 |
| Retardation factor | 1 |
| Half-Life (0 for no decay) | 0 |
| Simulation duration to reach NO3-N concentration equilibrium (days) | 2,312 |
| Longitudinal dispersivity at end of simulation duration (ft) | 2.08 |
| Lateral dispersivity at end of simulation duration (ft) | 0.69 |
| Vertical dispersivity at end of simulation duration (ft) | 0.10 |
| Disposal bed length (ft) | 45 |
| Disposal bed width (ft) | 20 |
| Length of 10 mg/L plume during drought conditions (ft) | 98 |

Notes:

* - from The State of Maine Department of Environmental Protection, 1991, The guidelines for expediting the processing of applications under the site location of development act.

^ - drought conditions equals 60% of average annual rainfall

% - percent

gal/day - gallons per day

ft - feet

mg/L - milligrams per liter

NO3-N - Nitrate-Nitrogen

**Groundwater Impact Study, Nitrates
Model Input Parameters and Solution
Orchard Road Subdivision
Orchard Road, Cumberland
Lots 2, 3, 4, 5, and 7**

| | |
|--|-----------|
| Annual rainfall (inches): | 44 |
| Hydrologic soil group* (above disposal field): | C to D |
| % Slope (above disposal field): | 1 to 5% |
| % Infiltration* (into disposal field): | 21 |
| Assumed rainfall flow into disposal field (gal/day): | 14.20 |
| Assumed rainfall flow into disposal field during drought conditions^(gal/day): | 8.52 |
| Background NO3-N concentration (mg/L): | 0 |
| Assumed effluent NO3-N concentration (mg/L): | 41 |
| Assumed effluent flow into disposal field (gal/day): | 270 |
| Assumed NO3-N concentration in rainfall (mg/L): | 0.5 |
| Hydraulic conductivity of aquifer (ft/day): | 2 |
| Hydraulic gradient of aquifer (ft/ft): | 0.015 |
| Effective porosity of aquifer: | 0.21 |
| Seepage velocity of aquifer (ft/day): | 0.14 |
| Retardation factor | 1 |
| Half-Life (0 for no decay) | 0 |
| Simulation duration to reach NO3-N concentration equilibrium (days) | 1,001 |
| Longitudinal dispersivity at end of simulation duration (ft) | 3.85 |
| Lateral dispersivity at end of simulation duration (ft) | 1.28 |
| Vertical dispersivity at end of simulation duration (ft) | 0.19 |
| Disposal bed length (ft) | 45 |
| Disposal bed width (ft) | 20 |
| Length of 10 mg/L plume during drought conditions (ft) | 66 |

Notes:

* - from The State of Maine Department of Environmental Protection, 1991, The guidelines for expediting the processing of applications under the site location of development act.

^ - drought conditions equals 60% of average annual rainfall

% - percent

gal/day - gallons per day

ft - feet

mg/L - milligrams per liter

NO3-N - Nitrate-Nitrogen



STATE OF MAINE
DEPARTMENT OF AGRICULTURE, CONSERVATION & FORESTRY

93 STATE HOUSE STATION

AUGUSTA, MAINE 04333

PAUL R. LePAGE
GOVERNOR

WALTER E. WHITCOMB
COMMISSIONER

October 23, 2017

James Attianese
Gorrill Palmer
707 Sable Oaks Drive, Suite 30
South Portland, ME 04106

Via email: jattianese@gorrillpalmer.com

Re: Rare and exemplary botanical features in proximity to: Job #3236.01, Orchard Road Subdivision, Cumberland, Maine

Dear Mr. Attianese:

I have searched the Natural Areas Program's Biological and Conservation Data System files in response to your request received October 20, 2017 for information on the presence of rare or unique botanical features documented from the vicinity of the project in Cumberland, Maine. Rare and unique botanical features include the habitat of rare, threatened, or endangered plant species and unique or exemplary natural communities. Our review involves examining maps, manual and computerized records, other sources of information such as scientific articles or published references, and the personal knowledge of staff or cooperating experts.

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

According to the information currently in our Biological and Conservation Data System files, there are no rare botanical features documented specifically within the project area. This lack of data may indicate minimal survey efforts rather than confirm the absence of rare botanical features. You may want to have the site inventoried by a qualified field biologist to ensure that no undocumented rare features are inadvertently harmed.

If a field survey of the project area is conducted, please refer to the enclosed supplemental information regarding rare and exemplary botanical features documented to occur in the vicinity of the project site. The list may include information on features that have been known to occur historically in the area as well as recently field-verified information. While historic records have not been documented in several years, they may persist in the area if suitable habitat exists. The enclosed list identifies features with potential to occur in the area, and it should be considered if you choose to conduct field surveys.

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

MOLLY DOCHERTY, DIRECTOR
MAINE NATURAL AREAS PROGRAM



PHONE: (207) 287-8044
FAX: (207) 287-8040
WWW.MAINE.GOV/DACF/MNAP

The Natural Areas Program 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. The Natural Areas Program welcomes coordination with individuals or organizations proposing environmental alteration, or conducting environmental assessments. If, however, data provided by the Natural Areas Program are to be published in any form, the Program should be informed at the outset and credited as the source.

The 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 the Natural Areas Program 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,

A handwritten signature in cursive script, appearing to read "Krist Puryear".

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

Rare and Exemplary Botanical Features within 4 miles of Project: #3236.01, Orchard Road Subdivision, Cumberland, Maine

| Common Name | State Status | State Rank | Global Rank | Date Last Observed | Occurrence Number | Habitat |
|---|--------------|------------|-------------|--------------------|-------------------|--|
| Broad Beech Fern | | | | | | |
| | SC | S2 | G5 | 2001-08-28 | 28 | Hardwood to mixed forest (forest, upland) |
| Engelmann's Spikerush | | | | | | |
| | PE | SH | G4G5Q | 1916-08-31 | 2 | Open wetland, not coastal nor rivershore (non-forested, wetland) |
| Enriched Northern Hardwoods Forest | | | | | | |
| | <null> | S3 | GNR | 2001-08-28 | 34 | Hardwood to mixed forest (forest, upland) |
| Fern-leaved False Foxglove | | | | | | |
| | SC | S3 | G5 | 1902-09-02 | 13 | Dry barrens (partly forested, upland),Hardwood to mixed forest (forest, upland) |
| Great Blue Lobelia | | | | | | |
| | PE | SX | G5 | 1905-09 | 3 | Forested wetland,Non-tidal rivershore (non-forested, seasonally wet) |
| Horned Pondweed | | | | | | |
| | SC | S2 | G5 | 1913-09-13 | 9 | Tidal wetland (non-forested, wetland) |
| Marsh Milkwort | | | | | | |
| | PE | SH | G5T4 | 1903-08-18 | 1 | Dry barrens (partly forested, upland),Open wetland, not coastal nor rivershore (non-forested, wetland) |
| Oak - Hickory Forest | | | | | | |
| | <null> | S1 | G4G5 | 2014-08-21 | 5 | Hardwood to mixed forest (forest, upland) |
| Rattlesnake Hawkweed | | | | | | |
| | E | S1 | G5T4Q | 1909-07 | 1 | Dry barrens (partly forested, upland) |
| Spotted Pondweed | | | | | | |
| | T | S1 | G5 | 1995-10-01 | 3 | Open water (non-forested, wetland) |
| Spotted Wintergreen | | | | | | |
| | E | S2 | G5 | 2009-07-26 | 30 | Conifer forest (forest, upland),Hardwood to mixed forest (forest, upland) |

**Rare and Exemplary Botanical Features within 4 miles of
Project: #3236.01, Orchard Road Subdivision, Cumberland, Maine**

| Common Name | State Status | State Rank | Global Rank | Date Last Observed | Occurrence Number | Habitat |
|----------------------------------|--------------|------------|-------------|--------------------|-------------------|------------------------------------|
| Upper Floodplain Hardwood Forest | | | | | | |
| <null> | | S3 | GNR | 2010-08-24 | 18 | Forested wetland |
| Water-plantain Spearwort | | | | | | |
| PE | | SH | G4 | 1903-07-29 | 2 | Open water (non-forested, wetland) |

STATE RARITY RANKS

- S1** Critically imperiled in Maine because of extreme rarity (five or fewer occurrences or very few remaining individuals or acres) or because some aspect of its biology makes it especially vulnerable to extirpation from the State of Maine.
- S2** Imperiled in Maine because of rarity (6-20 occurrences or few remaining individuals or acres) or because of other factors making it vulnerable to further decline.
- S3** Rare in Maine (20-100 occurrences).
- S4** Apparently secure in Maine.
- S5** Demonstrably secure in Maine.
- SU** Under consideration for assigning rarity status; more information needed on threats or distribution.
- SNR** Not yet ranked.
- SNA** Rank not applicable.
- S#?** Current occurrence data suggests assigned rank, but lack of survey effort along with amount of potential habitat create uncertainty (e.g. S3?).

Note: **State Rarity Ranks** are determined by the Maine Natural Areas Program for rare plants and rare and exemplary natural communities and ecosystems. The Maine Department of Inland Fisheries and Wildlife determines State Rarity Ranks for animals.

GLOBAL RARITY RANKS

- G1** Critically imperiled globally because of extreme rarity (five or fewer occurrences or very few remaining individuals or acres) or because some aspect of its biology makes it especially vulnerable to extinction.
- G2** Globally imperiled because of rarity (6-20 occurrences or few remaining individuals or acres) or because of other factors making it vulnerable to further decline.
- G3** Globally rare (20-100 occurrences).
- G4** Apparently secure globally.
- G5** Demonstrably secure globally.
- GNR** Not yet ranked.

Note: **Global Ranks** are determined by NatureServe.

STATE LEGAL STATUS

Note: State legal status is according to 5 M.R.S.A. § 13076-13079, which mandates the Department of Conservation to produce and biennially update the official list of Maine's **Endangered** and **Threatened** plants. The list is derived by a technical advisory committee of botanists who use data in the Natural Areas Program's database to recommend status changes to the Department of Conservation.

- E** ENDANGERED; Rare and in danger of being lost from the state in the foreseeable future; or federally listed as Endangered.
- T** THREATENED; Rare and, with further decline, could become endangered; or federally listed as Threatened.

NON-LEGAL STATUS

- SC** SPECIAL CONCERN; Rare in Maine, based on available information, but not sufficiently rare to be considered Threatened or Endangered.
- PE** Potentially Extirpated; Species has not been documented in Maine in past 20 years or loss of last known occurrence has been documented.

ELEMENT OCCURRENCE RANKS - EO RANKS

Element Occurrence ranks are used to describe the quality of a rare plant population or natural community based on three factors:

- **Size**: Size of community or population relative to other known examples in Maine. Community or population's viability, capability to maintain itself.
- **Condition**: For communities, condition includes presence of representative species, maturity of species, and evidence of human-caused disturbance. For plants, factors include species vigor and evidence of human-caused disturbance.
- **Landscape context**: Land uses and/or condition of natural communities surrounding the observed area. Ability of the observed community or population to be protected from effects of adjacent land uses.

These three factors are combined into an overall ranking of the feature of **A**, **B**, **C**, or **D**, where **A** indicates an **excellent** example of the community or population and **D** indicates a **poor** example of the community or population. A rank of **E** indicates that the community or population is **extant** but there is not enough data to assign a quality rank. The Maine Natural Areas Program tracks all occurrences of rare (S1-S3) plants and natural communities as well as A and B ranked common (S4-S5) natural communities.

Note: **Element Occurrence Ranks** are determined by the Maine Natural Areas Program for rare plants and rare and exemplary natural communities and ecosystems. The Maine Department of Inland Fisheries and Wildlife determines Element Occurrence ranks for animals.

Visit our website for more information on rare, threatened, and endangered species!
<http://www.maine.gov/dacf/mnap>



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

CHANDLER E. WOODCOCK
COMMISSIONER

October 27, 2017

James Attianese
Gorrill Palmer
707 Sable Oaks Drive, Suite 30
South Portland, ME 04106

RE: Information Request - Orchard Road subdivision, Cumberland

Dear James:

Per your request received October 23, 2017, 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 *Orchard Road subdivision Project* in Cumberland.

Our Department has not mapped any Essential Habitats or fisheries habitats that would be directly affected by your project.

Endangered, Threatened, and Special Concern Species

Bats

Of the eight species of bats that occur in Maine, the three *Myotis* species are protected under Maine's Endangered Species Act (MESA) and are afforded special protection under 12 M.R.S §12801 - §12810. The three *Myotis* species include little brown bat (*M. lucifugus*, State Endangered); northern long-eared bat (*M. septentrionalis*, State Endangered); and eastern small-footed bat (*M. leibii*, State Threatened). The five remaining bat species are listed as Special Concern: big brown bat (*Eptesicus fuscus*); red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), silver-haired bat (*Lasionycteris noctivagans*), and tri-colored bat (*Perimyotis subflavus*).

While a comprehensive statewide inventory for bats has not been completed, it is likely that several of these species occur within the project area during migration and/or the breeding season. We recommend that you contact the U.S. Fish and Wildlife Service--Maine Fish and Wildlife Complex (Wende Mahaney, 207-902-1569) for further guidance, as the northern long-eared bat is also listed as a Threatened Species under the Federal Endangered Species Act. Otherwise, our Agency does not anticipate significant impacts to any of the bat species as a result of this project.

Significant Wildlife Habitat

Significant Vernal Pools

At this time, MDIFW Significant Wildlife Habitat (SWH) maps indicate no known presence of SWHs within the project area, which include Waterfowl and Wading Bird Habitats, Seabird Nesting Islands, Shorebird Areas, and Significant Vernal Pools. However, a comprehensive statewide inventory for Significant Vernal Pools has not been completed. Therefore, we strongly recommend that surveys for vernal pools be conducted within the project boundary by qualified wetland scientists prior to final project design to determine whether there are Significant Vernal Pools present in the area. These surveys should extend up to 250 feet beyond the anticipated project footprint because of potential performance standard requirements for off-site Significant Vernal Pools, assuming such pools are located on land owned or controlled by the applicant. Once surveys are completed, our Department will need to review and verify any vernal pool data prior to final determination of significance.

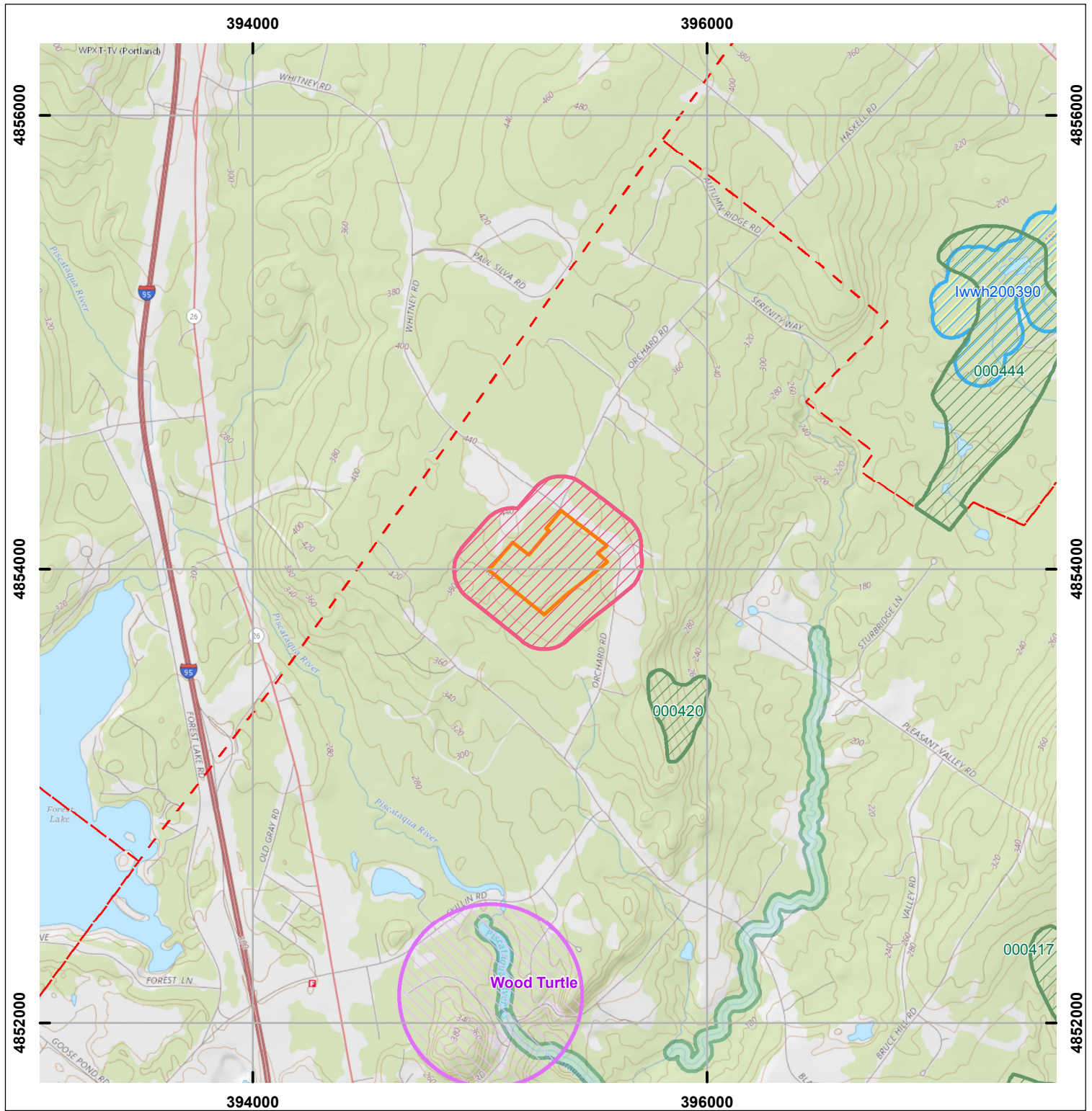
This consultation review has been conducted specifically for known MDIFW jurisdictional features and should not be interpreted as a comprehensive review for the presence of other regulated features that may occur in this area. Prior to the start of any future site disturbance we recommend additional 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,

A handwritten signature in blue ink, appearing to read "John Perry", with a stylized flourish at the end.

John Perry
Environmental Review Coordinator



Environmental Review of Fish and Wildlife Observations and Priority Habitats

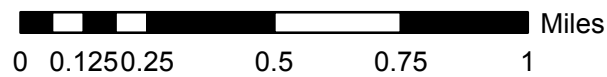
Project Name:

raremussels

(Version 1)



Maine Department of
Inland Fisheries and Wildlife



Projection: UTM, NAD83, Zone 19N

Date: 10/24/2017

- | | | | |
|--|------------------------------------|--|---|
| | ProjectPolys | | Deer Winter Area |
| | ProjectSearchAreas | | Inland Waterfowl/Wading Bird |
| | ETSc Environmental Review Polygons | | Special Concern-occupied habitats(100ft buffer) |





United States Department of the Interior

FISH AND WILDLIFE SERVICE

Maine Ecological Services Field Office

P. O. Box A

East Orland, ME 04431

Phone: (207) 469-7300 Fax: (207) 902-1588

<http://www.fws.gov/mainefieldoffice/index.html>



In Reply Refer To:

September 14, 2017

Consultation Code: 05E1ME00-2017-SLI-1012

Event Code: 05E1ME00-2017-E-01978

Project Name: Orchard Road Subdivision

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies the threatened, endangered, candidate, and proposed species and designated or proposed critical habitat that may occur within the boundary of your proposed project or may be affected by your proposed project. This species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC Web site at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having

similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the Endangered Species Consultation Handbook at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>

This species list also identifies candidate species under review for listing and those species that the Service considers species of concern. Candidate species have no protection under the Act but are included for consideration because they could be listed prior to completion of your project. Species of concern are those taxa whose conservation status is of concern to the Service (i.e., species previously known as Category 2 candidates), but for which further information is needed.

If a proposed project may affect only candidate species or species of concern, you are not required to prepare a Biological Assessment or biological evaluation or to consult with the Service. However, the Service recommends minimizing effects to these species to prevent future conflicts. Therefore, if early evaluation indicates that a project will affect a candidate species or species of concern, you may wish to request technical assistance from this office to identify appropriate minimization measures.

Please be aware that bald and golden eagles are not protected under the Endangered Species Act but are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.). Projects affecting these species may require development of an eagle conservation plan: http://www.fws.gov/windenergy/eagle_guidance.html Information on the location of bald eagle nests in Maine can be found on the Maine Field Office Web site: <http://www.fws.gov/mainefieldoffice/Project%20review4.html>

Additionally, wind energy projects should follow the wind energy guidelines: <http://www.fws.gov/windenergy/> for minimizing impacts to migratory birds and bats. Projects may require development of an avian and bat protection plan.

Migratory birds are also a Service trust resource. Under the Migratory Bird Treaty Act, construction activities in grassland, wetland, stream, woodland, and other habitats that would result in the take of migratory birds, eggs, young, or active nests should be avoided. Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at:

<http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm> and at:
<http://www.towerkill.com>; and at:
<http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html>

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Maine Ecological Services Field Office

P. O. Box A

East Orland, ME 04431

(207) 469-7300

Project Summary

Consultation Code: 05E1ME00-2017-SLI-1012

Event Code: 05E1ME00-2017-E-01978

Project Name: Orchard Road Subdivision

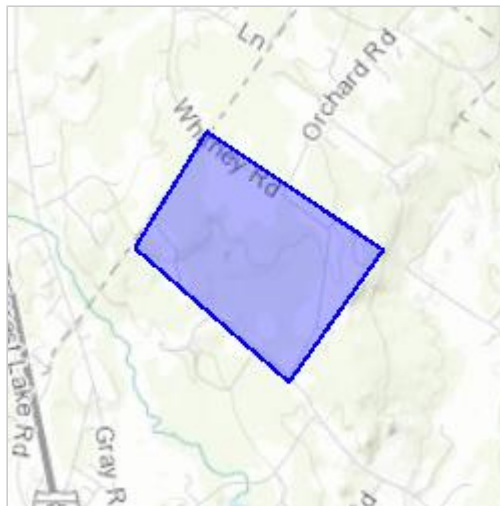
Project Type: DEVELOPMENT

Project Description: Residential Subdivision

Project Location:

Approximate location of the project can be viewed in Google Maps:

<https://www.google.com/maps/place/43.830749558722346N70.30330228389299W>



Counties: Cumberland, ME

Endangered Species Act Species

There is a total of 1 threatened, endangered, or candidate species on this species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

Mammals

| NAME | STATUS |
|--|------------|
| Northern Long-eared Bat <i>Myotis septentrionalis</i> | Threatened |
| No critical habitat has been designated for this species. | |
| Species profile: https://ecos.fws.gov/ecp/species/9045 | |

Critical habitats

There are no critical habitats within your project area under this office's jurisdiction.



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

October 19, 2017

Mr. Kirk Mohny
State Historic Preservation Officer
Maine Historic Preservation Commission
55 Capitol Street, State House Station 65
Augusta, ME 04333

Subject: Presence of Historical Areas
Orchard Road Subdivision
Cumberland, Maine

Dear Mr. Mohny,

TZ Properties has retained Gorrill Palmer to prepare design plans for a ten lot single family residential subdivision located off Orchard Road in Cumberland, Maine. The development includes construction of a 1,500 linear foot roadway and associated utilities and stormwater controls with development of the lots by the lot owners.

The attached Location Map shows the project location.

The project will include a roadway stream crossing of an unnamed stream tributary to the Piscataqua River.

As part of permitting for the project, Gorrill Palmer requests information from your department relative to the presence of any nearby structure or area with historical, architectural or archeological significance as defined by the National Historic Preservation Act.

Thank you for your consideration. If you have any questions regarding the proposed project, please contact our office.

Sincerely,

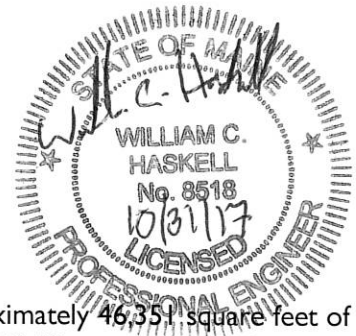
Gorrill Palmer

James Attianese

Enclosure

JWA/jwa/U:\3236.01 TZ Properties Orchard Rd Cumberland\IP Applications\Local\Resource Letters\Mohny_10-3-17.doc

STORMWATER MANAGEMENT



12.1 Overview

The proposed 10 lot single family residential subdivision will create approximately 46,351 square feet of impervious area. Pursuant to the Cumberland Subdivision Ordinance 250-38, projects which create more than 10,000 square feet of impervious area shall submit a stormwater management plan. Section 250-39 of the subdivision ordinance states that the peak discharge from the developed site shall not exceed the peak discharge for the undeveloped site for the two- and twenty five-year storms.

12.2 Introduction

Gorrill Palmer has been retained by TZ Properties, LLC to prepare a Stormwater Report for the proposed ten lot subdivision off Orchard Road in Cumberland, Maine. Figure 1 is a map showing the project location. The project will also need a Stormwater Permit from the MDEP. This narrative contains the stormwater management report for the construction of the project. The plans prepared by Gorrill Palmer include the infrastructure necessary to serve the project.

12.3 Development Description

The development site comprises approximately 24.9 acres and is currently undeveloped. The Applicant proposes the construction of a dead end roadway approximately 1,500 feet in length, construction of related stormwater drainage conveyances, and construction of two proposed grassed underdrained soil filters. The lot development will be by the individual lot owners.

Abutting land uses include:

- North – Residential
- East – Residential
- South – Residential/Undeveloped
- West – Residential/Apple Orchard

Runoff from the site is tributary to an unnamed stream which conveys the flow to the Piscataqua River. Neither the unnamed stream, nor the Piscataqua River are currently listed as "Urban Impaired Streams", therefore, the development will not be required to meet the Chapter 500 Urban Impaired Stream Standard.

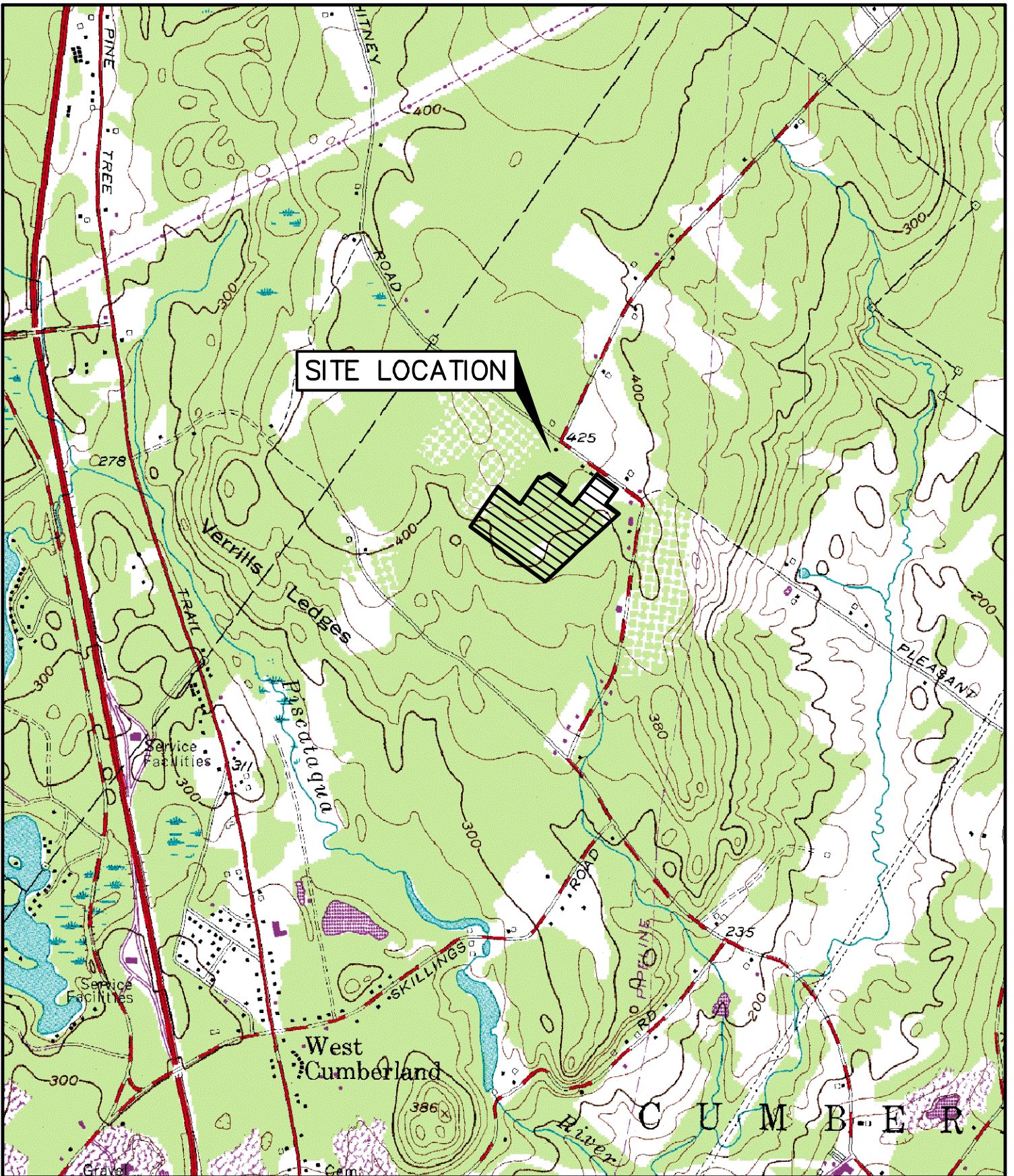
The construction of the subdivision roadway will result in approximately 1.08 acres of new impervious area.

12.4 Surface Water

There are no lakes located on, adjacent to or downstream of the project site.

12.5 General Topography

Topography in the area of the proposed construction is moderately steep with slopes of approximately 5% to 17%.



U.S.G.S. Location Map
 Subdivision Feasibility, Orchard Road, Cumberland, Maine
 U.S.G.S. Cumberland Center, State-7.5 Minute Series (Topographic)

| | |
|----------------------------|------------------|
| Design: WCH | Date: OCT 2017 |
| Draft: LAN | Job No.: 3236.01 |
| Checked: WCH | Scale: None |
| File Name: 3236-LOCMAP.dwg | |



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Figure

1

12.6 Flooding

Based upon the FEMA maps, no part of the site is located within a Zone A 100-year floodplain.

12.7 Natural Drainage Ways

The project will require a stream crossing and a wetland crossing which will be submitted to MDEP and the ACOE for permitting.

12.8 Alterations to Land Cover

Changes in land cover will include removal of wooded areas through portions of the project site and the addition of roof, paved surfaces and lawn areas.

12.9 Stormwater Management Control

This stormwater management report will address the Town of Cumberland peak flow requirements. Although the Applicant does not propose construction of the house lots, an allowance of 3,000 square feet of impervious area and 12,000 square feet of lawn was utilized in the post development condition for each lot to analyze the peak flow.

12.9.1 Approach and Analysis for Quantity Control

Since the proposed subdivision will require approval from the MDEP, grassed underdrained soil filters designed to conform with the MDEP BMP's have been used to provide stormwater peak control. The water quality control provided by the grassed underdrained soil filters will be addressed in the MDEP Stormwater Law permit submission which will be copied to the Town upon submission.

12.9.2 Water Quantity Sizing Requirements

The stormwater management study provides an analysis of predevelopment and post development stormwater runoff rates.

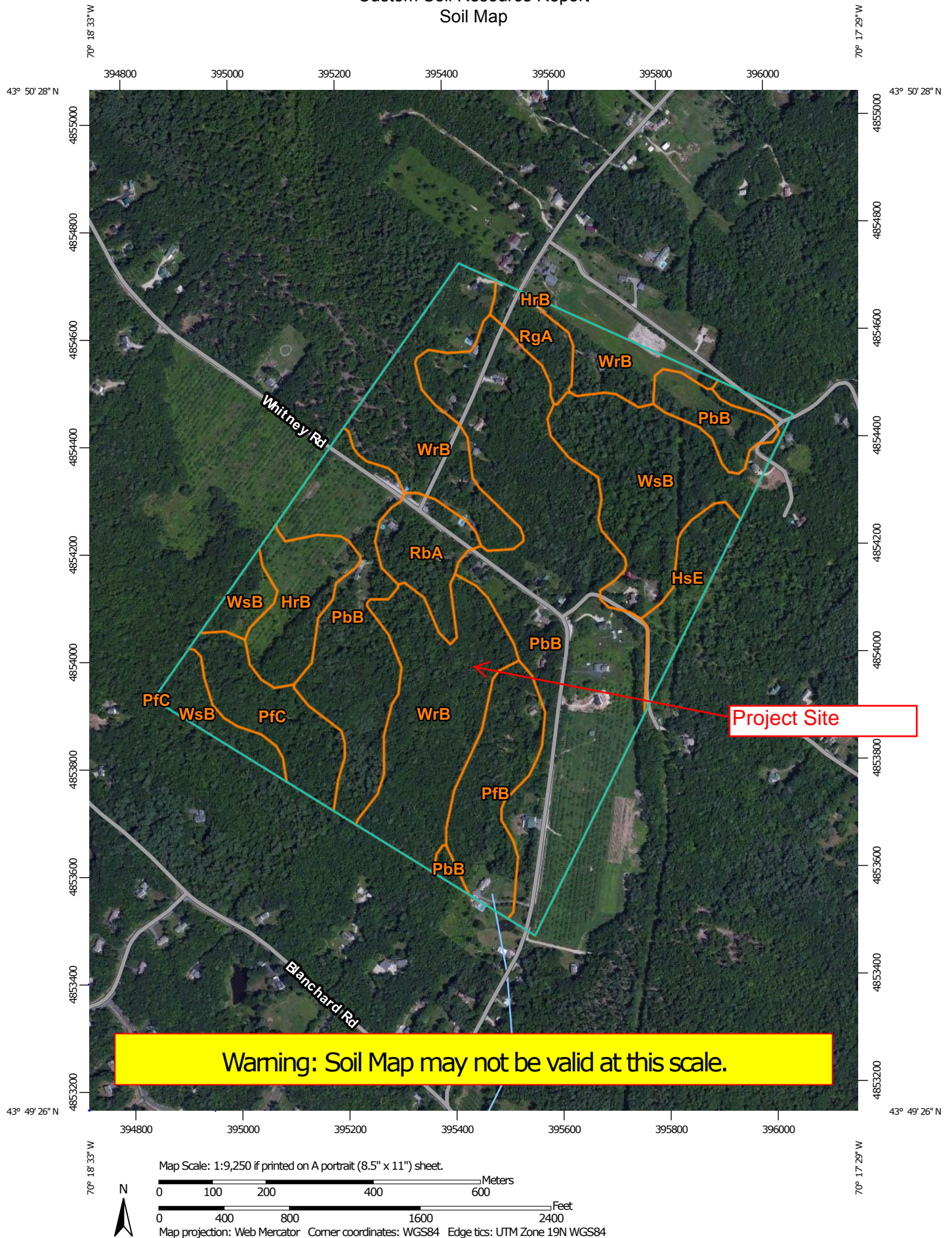
The soil types are shown on the watershed maps included in Attachment A and were obtained from the NRCS Cumberland County Medium Intensity Soil Survey which follows this page.

The SCS TR-20 methodology, using the HydroCad program, was employed by Gorrill Palmer to analyze predevelopment and post development conditions. A 24-hour, SCS Type III storm distribution for the two, ten, and twenty-five year storm frequencies were used. The corresponding rainfall amounts for these storms are 3.1", 4.6", and 5.8" respectively.

Land use cover, delineations of watershed hydraulic flow paths, and hydraulic soils data were obtained using the following data:

1. Cumberland Center 7.5 Minute Quadrangle Maps prepared by the U.S.G.S.
2. On-site topographic survey with 1' contour intervals from an existing conditions plan of the site.


Custom Soil Resource Report Soil Map



Custom Soil Resource Report


MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)


Soils


 Soil Map Unit Polygons


 Soil Map Unit Lines


 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit


 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot


 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water


 Perennial Water

 Rock Outcrop


 Saline Spot

 Sandy Spot

 Severely Eroded Spot


 Sinkhole


 Slide or Slip

 Sodic Spot


 Spoil Area

 Stony Spot


 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals


Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Cumberland County and Part of Oxford County, Maine
Survey Area Data: Version 12, Sep 15, 2016

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

Date(s) aerial images were photographed: Jun 20, 2010—Jul 18, 2010

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

Map Unit Legend

| Cumberland County and Part of Oxford County, Maine (ME005) | | | |
|--|--|--------------|----------------|
| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
| HrB | Hollis fine sandy loam, 3 to 8 percent slopes | 8.8 | 4.5% |
| HsE | Hollis very rocky fine sandy loam, 20 to 35 percent slopes | 6.0 | 3.1% |
| PbB | Paxton fine sandy loam, 3 to 8 percent slopes | 76.5 | 39.3% |
| PfB | Paxton very stony fine sandy loam, 3 to 8 percent slopes | 11.9 | 6.1% |
| PfC | Paxton very stony fine sandy loam, 8 to 15 percent slopes | 9.5 | 4.9% |
| RbA | Ridgebury fine sandy loam, 0 to 3 percent slopes | 7.1 | 3.6% |
| RgA | Ridgebury very stony fine sandy loam, 0 to 3 percent slopes | 3.9 | 2.0% |
| WrB | Woodbridge fine sandy loam, 0 to 8 percent slopes | 42.9 | 22.0% |
| WsB | Woodbridge very stony fine sandy loam, 0 to 8 percent slopes | 28.2 | 14.5% |
| Totals for Area of Interest | | 194.7 | 100.0% |

Map Unit Descriptions

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

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

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different

3. Aerial Photography of the project site and aerial contours, obtained from the Maine Office of GIS.
4. Field Reconnaissance.

Predevelopment Conditions

The drainage study analyzes the watersheds in the predevelopment condition as depicted on the Predevelopment Watershed Map.

The predevelopment condition was analyzed as seven subcatchments with seven points of interest (POI). The tributary areas to the POIs which are affected by the proposed redevelopment are analyzed for this stormwater report.

Subcatchment 1 consists of wooded area and orchard tributary to POI 1. The orchard area was modelled as a meadow landcover. The subcatchment is the area that is tributary to an existing swale at the westerly corner of the property.

Subcatchment 2 is a wooded area tributary to a swale that exits the southwesterly edge of the parcel which is designated as POI 2.

Subcatchment 3 is a wooded area tributary to a swale that exits the southwesterly edge of the parcel which is designated as POI 3.

Subcatchment 4 contains onsite and offsite area consisting of woodland, residential land, and orchard, which is tributary to a drainage swale that exits the southerly edge of the parcel. POI 4 is located at the parcel property line. The existing drainage swale conveys runoff from an offsite farm pond across the subdivision parcel.

Subcatchment 5 is a wooded area that conveys runoff across the southeasterly property line. POI 5 is located within a wetland area at the parcel boundary.

Subcatchment 6 is a wooded area that also conveys runoff to the southeasterly property line with POI 6 located within a wetland area at the parcel boundary.

Subcatchment 7 contains onsite and offsite area tributary to the unnamed stream which exits the parcel at the southeasterly property line. The subcatchment consists of woodland, roadway, residential land, and orchard.

A watershed map for the predevelopment condition is attached to this section as drawing number W1 in Attachment A. Table 1 presents the peak flow rates at the POI for the design storms.

| Table I– Predevelopment Peak Flow Rates (cfs) | | | |
|---|-----------------|---------|---------|
| Point of Interest | Peak Flow (cfs) | | |
| | 2 Year | 10 Year | 25 Year |
| POI #1 | 3.5 | 7.4 | 10.8 |
| POI # 2 | 0.7 | 1.7 | 2.6 |
| POI # 3 | 0.7 | 1.7 | 2.7 |
| POI # 4 | 6.2 | 13.8 | 20.5 |
| POI # 5 | 2.1 | 5.3 | 8.2 |
| POI # 6 | 2.1 | 5.0 | 7.7 |
| POI # 7 | 9.2 | 20.0 | 29.5 |

Copies of the calculations for the predevelopment conditions are included in Attachment B.

Post development Conditions

Analysis for the post development condition consists of determining post development peak flows and limiting the post development flows to predevelopment levels. Detention will be provided within the grassed underdrained soil filters.

The seven predevelopment subcatchments have been modified to reflect the proposed project, the post development condition contains nine subcatchments tributary to seven points of interest. The points of interest are the same as the predevelopment points of interest. The overall watershed area remains the same as in the predevelopment condition.

Subcatchment 1 is predevelopment subcatchment 1 reduced in size as a result of the proposed roadway construction.

Subcatchment 2 is predevelopment subcatchment 1 reduced in size as a result of the proposed roadway construction.

Subcatchment 3 is predevelopment subcatchment 1 reduced in size as a result of the proposed roadway construction.

Subcatchment 4 is predevelopment subcatchment 4 which is not tributary to the proposed grassed underdrained soil filter.

Subcatchment 4A is the area tributary to the grassed underdrained soil filter. The outflow of the grassed underdrained soil filter is tributary to POI 4.

Subcatchment 5 is the southerly portion of predevelopment subcatchment 5 tributary to POI 5.

Subcatchment 6 is the southerly portion of predevelopment subcatchment 6 tributary to POI 6.

Subcatchment 6A is the northerly portion of predevelopment subcatchment 5 and 6 which is tributary to the grassed underdrained soil filter. The outflow of the grassed underdrained soil filter is tributary to POI 6.

Subcatchment 7 is the post development area tributary to the unnamed stream and is tributary to POI 7.

A watershed map for the post development condition is attached as drawing number W2 in Attachment A. Attachment B contains the TR-20 calculations.

A comparison of predevelopment and post development peak flow at the POI without detention is presented in the following table.

| Table 2 – Comparison of Peak flows without detention (cfs) | | | | | | |
|---|-----------------|------|---------|------|---------|------|
| Point of Interest | Peak Flow (cfs) | | | | | |
| | 2 Year | | 10 Year | | 25 Year | |
| | Pre | Post | Pre | Post | Pre | Post |
| POI #1 | 3.5 | 3.5 | 7.4 | 7.1 | 10.8 | 10.3 |
| POI #2 | 0.7 | 0.6 | 1.7 | 1.3 | 2.6 | 2.0 |
| POI #3 | 0.7 | 0.7 | 1.7 | 1.7 | 2.7 | 2.6 |
| POI #4 | 6.2 | 7.2 | 13.8 | 15.5 | 20.5 | 22.8 |
| POI #5 | 2.1 | 1.8 | 5.3 | 4.3 | 8.2 | 6.5 |
| POI #6 | 2.1 | 4.3 | 5.0 | 9.5 | 7.7 | 13.9 |
| POI #7 | 9.2 | 9.1 | 20.0 | 19.8 | 29.5 | 29.2 |

As can be seen from Table 2, detention is required to reduce the peak flow at POI 4, and 6 to predevelopment levels. The remainder of subcatchments remain at or below predevelopment flows due to changes in subcatchment area.

The grassed underdrained soil filters will provide detention of stormwater runoff for this project.

Pond I

The grassed underdrained soil filter has been analyzed to determine its performance for the 2-, 10-, and 25-year storms. The stormwater runoff from subcatchment 4A will enter the grassed underdrained soil filter through the inlet ditch. The smaller storms which generate runoff volume equal to or less than the channel protection volume will be conveyed through the soil filter and underdrain system. Larger storms will be conveyed through the soil filter underdrain and through the outlet control structure. The outlet control structure has an orifice with its invert set at the channel protection elevation, and a second orifice set at the 2-year stage. An emergency spillway is set at the 25-year storm stage and modelled as a broad crested weir. Flow over the weir during the 25 year storm, assuming the weir is the sole outlet, results in 1 foot of freeboard to the top of the pond berm. The following table presents the pond performance.

| Table 3– Pond 1 | | | |
|------------------------|-------------|---------|---------|
| | Storm Event | | |
| | 2 Year | 10 Year | 25 Year |
| Peak Inflow (cfs) | 2.42 | 5.13 | 7.49 |
| Peak Outflow (cfs) | 0.5 | 1.31 | 1.73 |
| Stage (Max. Elevation) | 397.68 | 398.46 | 399.13 |
| Storage (cf) | 4,251 | 8,587 | 13,048 |
| Depth above base (ft) | 2.01 | 2.79 | 3.46 |

Pond 2

The grassed underdrained soil filter has been analyzed to determine its performance for the 2-, 10-, and 25-year storms. The stormwater runoff from subcatchment 6A will enter the grassed underdrained soil filter through the stormdrain system. The smaller storms which generate runoff volume equal to or less than the channel protection volume will be conveyed through the soil filter and underdrain system. Larger storms will be conveyed through the soil filter underdrain and through the outlet control structure. The outlet control structure has a weir with its invert set above channel protection elevation. An emergency spillway is set at the 25-year storm stage and modelled as a broad crested weir. Flow over the weir during the 25 year storm, assuming the weir is the sole outlet, results in 1 foot of freeboard to the top of the pond berm. The following table presents the pond performance.

| Table 4– Pond 2 | | | |
|------------------------|-------------|---------|---------|
| | Storm Event | | |
| | 2 Year | 10 Year | 25 Year |
| Peak Inflow (cfs) | 3.11 | 6.59 | 9.63 |
| Peak Outflow (cfs) | 0.85 | 3.10 | 5.07 |
| Stage (Max. Elevation) | 406.57 | 407.42 | 408.00 |
| Storage (cf) | 7,919 | 13,593 | 18,613 |
| Depth above base (ft) | 2.40 | 3.25 | 3.83 |

As presented in Table 2 previously, detention of tributary runoff to POI 4, and POI 6 is required. The following table presents a comparison of peak flow with detention at the two POIs.

| Table 5 – Comparison of Peak flows with detention (cfs) | | | | | | |
|---|-----------------|------|---------|------|---------|------|
| Point of Interest | Peak Flow (cfs) | | | | | |
| | 2 Year | | 10 Year | | 25 Year | |
| | Pre | Post | Pre | Post | Pre | Post |
| POI #4 | 6.2 | 6.2 | 13.8 | 13.8 | 20.5 | 20.2 |
| POI #6 | 2.1 | 1.3 | 5.0 | 4.6 | 7.7 | 7.7 |

As can be seen from Table 5 above, the peak post development flow is at or below predevelopment levels at POI 4, and POI 6.

12.9.3 Conclusion – Overall Water Quantity

The peak flow at the Points of Interest have been reduced to be at or below predevelopment peak levels.

12.10 Construction BMPs

Additional water quality treatment will be provided during construction by best management practices (BMP). Standard BMPs to be employed include siltation fencing around the downslope construction perimeter, siltation fence around the vegetated underdrains, riprap, pipe, stabilized construction entrances, and erosion control fabrics applied to slopes prior to revegetation.

12.11 Maintenance of Facilities

See the Erosion and Sedimentation Control report for this project.

12.12 Conclusion

Gorrill Palmer has been retained by TZ Properties, LLC to prepare plans and permit applications for the proposed ten lot subdivision off Orchard Road in Cumberland. Based upon the attached calculations, the proposed subdivision meets or exceeds the Cumberland stormwater management requirement through the use of detention within grassed underdrained soil filters.

12.13 Attachments

Attached to this section are the following items:

Attachment A – Watershed Maps (Pre, Post,)

Attachment B – TR-20 Calculations

Attachment C – Ditch and Stormdrain Calculations

ATTACHMENT A

WATERSHED MAPS

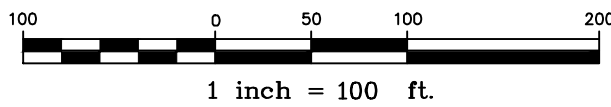
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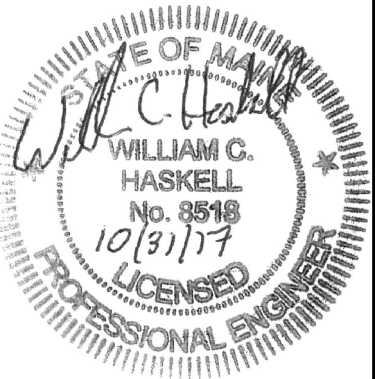
LEGEND

- 1 SUBCATCHMENT AREA
- > A TIME OF CONCENTRATION FLOW PATH
- WATERSHED BOUNDARY
- WETLAND BOUNDARY
- SF SHEET FLOW
- PF PIPE FLOW
- SCF SHALLOW CONCENTRATED FLOW
- CF CHANNEL FLOW
- POI POINT OF INTEREST
- 1 REACH

| SOIL SCHEDULE | |
|------------------|-----------------------|
| SOIL | HYDROLOGIC SOIL GROUP |
| HrB - Hollis | D |
| PbB - Paxton | C |
| RbA - Ridgebury | C/D |
| WrB - Woodbridge | C |
| WsB - Woodbridge | C |



NOTE: THIS PLAN SET IS ISSUED FOR PERMITTING PURPOSES AND SHALL NOT BE USED FOR CONSTRUCTION.



| Rev. | Date | Revision |
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| Preliminary Subdivision Application | | 10-31-17 | WCH |
| Issued For | | Date | By |

| | | |
|--|----------------|----------------|
| Design: JWA | Draft: LAN | Date: OCT 2017 |
| Checked: WCH | Scale: 1"=100' | Job No.: 3236 |
| File Name: 3236-WS-PRE.dwg | | |
| This plan shall not be modified without written permission from GorrillPalmer(GP). Any alterations, authorized or otherwise, shall be at the user's sole risk and without liability to GP. | | |

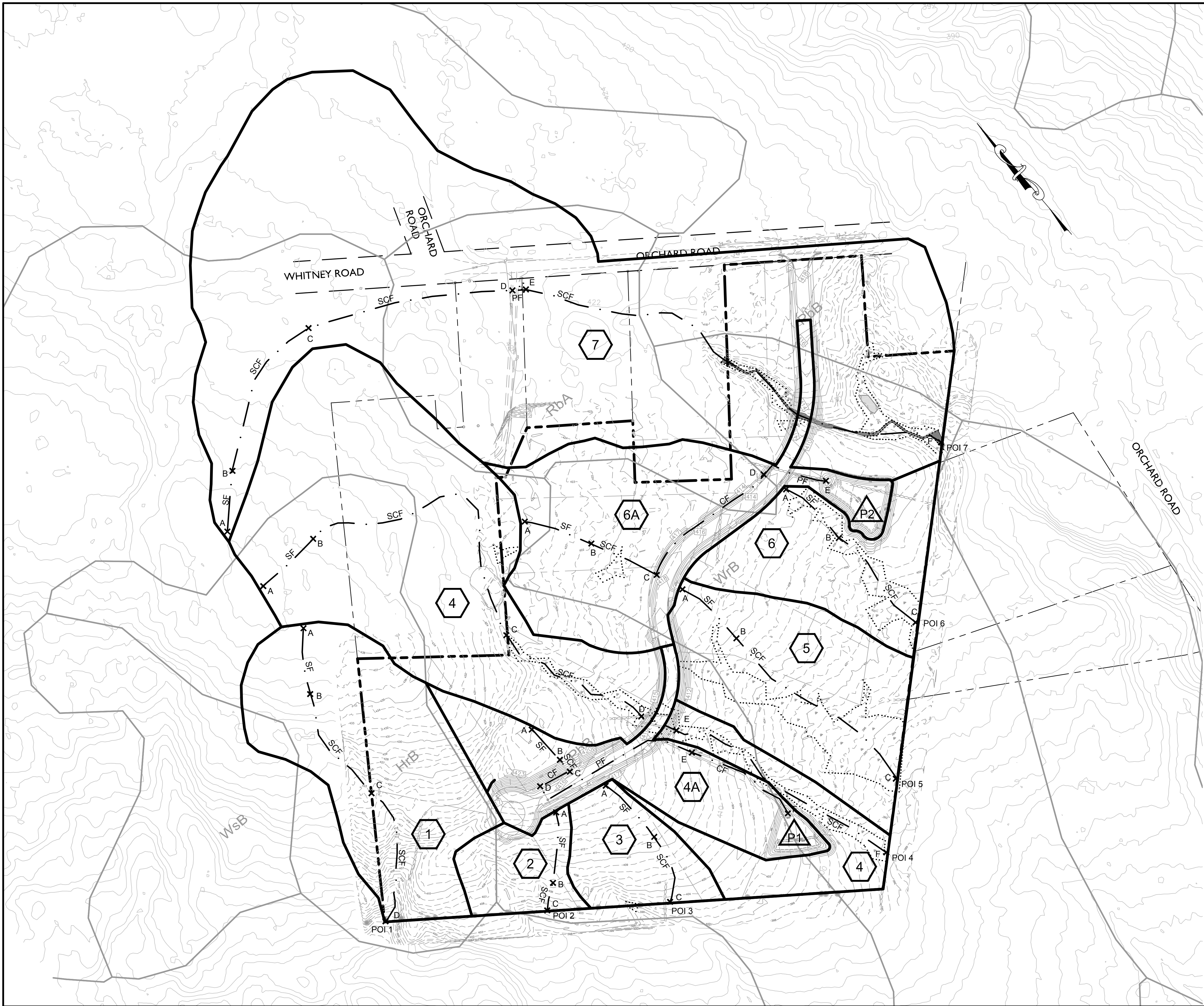


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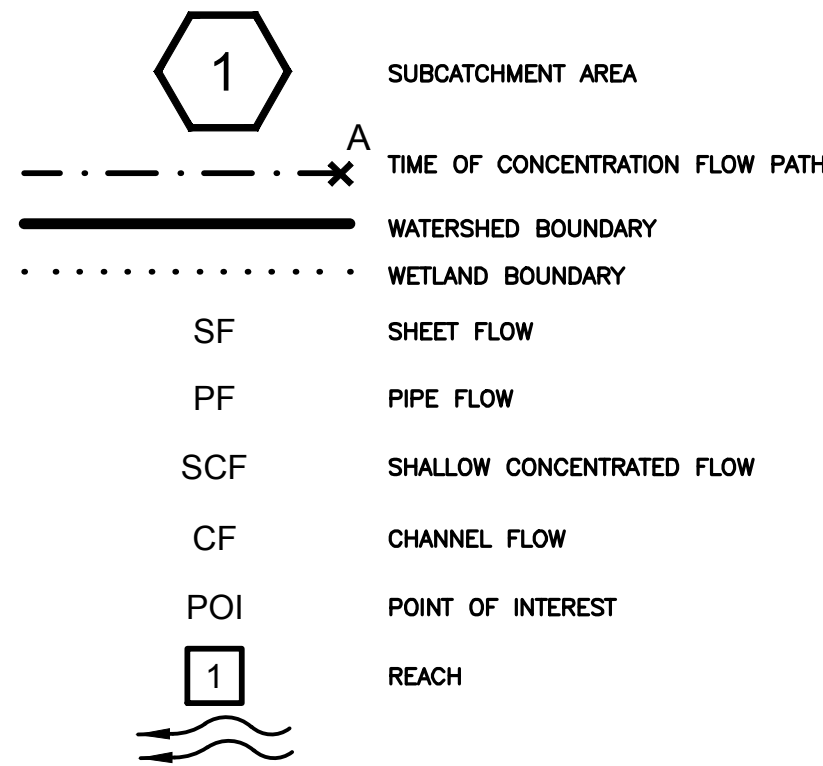
| | |
|---------------|---|
| Drawing Name: | Pre Development Watershed Map |
| Project: | Orchard Road Subdivision Cumberland, Maine |
| Client: | TZ Properties Falmouth, Me 04105 |

| |
|-------------|
| Drawing No. |
| W1 |

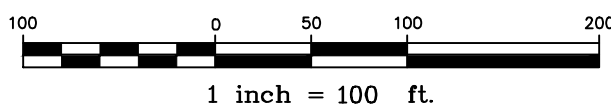
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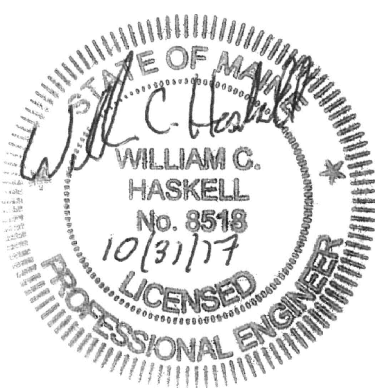
LEGEND



| SOIL SCHEDULE | |
|------------------|-----------------------|
| SOIL | HYDROLOGIC SOIL GROUP |
| HrB - Hollis | D |
| PbB - Paxton | C |
| RbA - Ridgebury | C/D |
| WrB - Woodbridge | C |
| WsB - Woodbridge | C |



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| Preliminary Subdivision Application | | 10-31-17 | WCH |
| Issued For | | Date | By |

| | | |
|--|----------------|----------------|
| Design: JWA | Draft: LAN | Date: OCT 2017 |
| Checked: WCH | Scale: 1"=100' | Job No.: 3236 |
| File Name: 3236-WS-POST.dwg | | |
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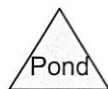
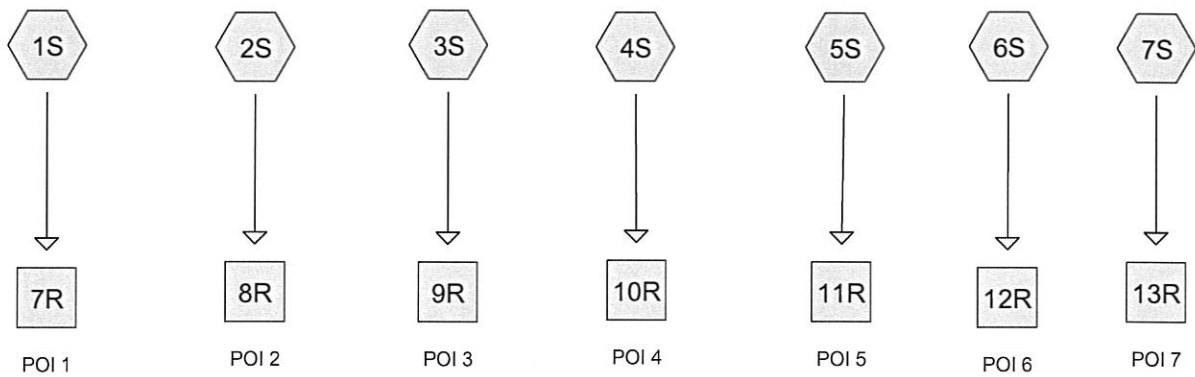
| | |
|---------------|---|
| Drawing Name: | Post Development Watershed Map |
| Project: | Orchard Road Subdivision Cumberland, Maine |
| Client: | TZ Properties Falmouth, Me 04105 |

Drawing No.

W2

ATTACHMENT B

TR-20 CALCULATIONS



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

| | |
|-------------------------|---|
| Subcatchment 1S: | Runoff Area=211,000 sf 0.00% Impervious Runoff Depth=1.08" Flow Length=690' Tc=27.1 min CN=76 Runoff=3.48 cfs 0.437 af |
| Subcatchment 2S: | Runoff Area=56,900 sf 0.00% Impervious Runoff Depth=0.82" Flow Length=350' Tc=23.9 min CN=71 Runoff=0.70 cfs 0.089 af |
| Subcatchment 3S: | Runoff Area=65,200 sf 0.00% Impervious Runoff Depth=0.77" Flow Length=470' Tc=28.4 min CN=70 Runoff=0.69 cfs 0.096 af |
| Subcatchment 4S: | Runoff Area=485,000 sf 4.32% Impervious Runoff Depth=0.97" Flow Length=1,690' Tc=35.6 min CN=74 Runoff=6.23 cfs 0.902 af |
| Subcatchment 5S: | Runoff Area=244,400 sf 0.00% Impervious Runoff Depth=0.77" Flow Length=950' Tc=42.6 min CN=70 Runoff=2.13 cfs 0.360 af |
| Subcatchment 6S: | Runoff Area=222,000 sf 0.00% Impervious Runoff Depth=0.82" Flow Length=965' Tc=43.0 min CN=71 Runoff=2.09 cfs 0.348 af |
| Subcatchment 7S: | Runoff Area=800,400 sf 6.57% Impervious Runoff Depth=1.03" Flow Length=1,890' Tc=49.3 min CN=75 Runoff=9.21 cfs 1.572 af |
| Reach 7R: POI 1 | Inflow=3.48 cfs 0.437 af Outflow=3.48 cfs 0.437 af |
| Reach 8R: POI 2 | Inflow=0.70 cfs 0.089 af Outflow=0.70 cfs 0.089 af |
| Reach 9R: POI 3 | Inflow=0.69 cfs 0.096 af Outflow=0.69 cfs 0.096 af |
| Reach 10R: POI 4 | Inflow=6.23 cfs 0.902 af Outflow=6.23 cfs 0.902 af |
| Reach 11R: POI 5 | Inflow=2.13 cfs 0.360 af Outflow=2.13 cfs 0.360 af |
| Reach 12R: POI 6 | Inflow=2.09 cfs 0.348 af Outflow=2.09 cfs 0.348 af |
| Reach 13R: POI 7 | Inflow=9.21 cfs 1.572 af Outflow=9.21 cfs 1.572 af |

Total Runoff Area = 47.863 ac Runoff Volume = 3.805 af Average Runoff Depth = 0.95"
96.47% Pervious = 46.175 ac 3.53% Impervious = 1.688 ac

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

| | |
|-------------------------|--|
| Subcatchment 1S: | Runoff Area=211,000 sf 0.00% Impervious Runoff Depth=2.21" Flow Length=690' Tc=27.1 min CN=76 Runoff=7.39 cfs 0.892 af |
| Subcatchment 2S: | Runoff Area=56,900 sf 0.00% Impervious Runoff Depth=1.82" Flow Length=350' Tc=23.9 min CN=71 Runoff=1.70 cfs 0.198 af |
| Subcatchment 3S: | Runoff Area=65,200 sf 0.00% Impervious Runoff Depth=1.74" Flow Length=470' Tc=28.4 min CN=70 Runoff=1.72 cfs 0.218 af |
| Subcatchment 4S: | Runoff Area=485,000 sf 4.32% Impervious Runoff Depth=2.05" Flow Length=1,690' Tc=35.6 min CN=74 Runoff=13.78 cfs 1.902 af |
| Subcatchment 5S: | Runoff Area=244,400 sf 0.00% Impervious Runoff Depth=1.74" Flow Length=950' Tc=42.6 min CN=70 Runoff=5.31 cfs 0.816 af |
| Subcatchment 6S: | Runoff Area=222,000 sf 0.00% Impervious Runoff Depth=1.82" Flow Length=965' Tc=43.0 min CN=71 Runoff=5.02 cfs 0.773 af |
| Subcatchment 7S: | Runoff Area=800,400 sf 6.57% Impervious Runoff Depth=2.13" Flow Length=1,890' Tc=49.3 min CN=75 Runoff=20.00 cfs 3.260 af |
| Reach 7R: POI 1 | Inflow=7.39 cfs 0.892 af Outflow=7.39 cfs 0.892 af |
| Reach 8R: POI 2 | Inflow=1.70 cfs 0.198 af Outflow=1.70 cfs 0.198 af |
| Reach 9R: POI 3 | Inflow=1.72 cfs 0.218 af Outflow=1.72 cfs 0.218 af |
| Reach 10R: POI 4 | Inflow=13.78 cfs 1.902 af Outflow=13.78 cfs 1.902 af |
| Reach 11R: POI 5 | Inflow=5.31 cfs 0.816 af Outflow=5.31 cfs 0.816 af |
| Reach 12R: POI 6 | Inflow=5.02 cfs 0.773 af Outflow=5.02 cfs 0.773 af |
| Reach 13R: POI 7 | Inflow=20.00 cfs 3.260 af Outflow=20.00 cfs 3.260 af |

Total Runoff Area = 47.863 ac Runoff Volume = 8.058 af Average Runoff Depth = 2.02"
 96.47% Pervious = 46.175 ac 3.53% Impervious = 1.688 ac

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

| | |
|-------------------------|--|
| Subcatchment 1S: | Runoff Area=211,000 sf 0.00% Impervious Runoff Depth=3.21" Flow Length=690' Tc=27.1 min CN=76 Runoff=10.80 cfs 1.295 af |
| Subcatchment 2S: | Runoff Area=56,900 sf 0.00% Impervious Runoff Depth=2.74" Flow Length=350' Tc=23.9 min CN=71 Runoff=2.60 cfs 0.298 af |
| Subcatchment 3S: | Runoff Area=65,200 sf 0.00% Impervious Runoff Depth=2.65" Flow Length=470' Tc=28.4 min CN=70 Runoff=2.67 cfs 0.330 af |
| Subcatchment 4S: | Runoff Area=485,000 sf 4.32% Impervious Runoff Depth=3.02" Flow Length=1,690' Tc=35.6 min CN=74 Runoff=20.50 cfs 2.800 af |
| Subcatchment 5S: | Runoff Area=244,400 sf 0.00% Impervious Runoff Depth=2.65" Flow Length=950' Tc=42.6 min CN=70 Runoff=8.21 cfs 1.238 af |
| Subcatchment 6S: | Runoff Area=222,000 sf 0.00% Impervious Runoff Depth=2.74" Flow Length=965' Tc=43.0 min CN=71 Runoff=7.70 cfs 1.163 af |
| Subcatchment 7S: | Runoff Area=800,400 sf 6.57% Impervious Runoff Depth=3.11" Flow Length=1,890' Tc=49.3 min CN=75 Runoff=29.54 cfs 4.766 af |
| Reach 7R: POI 1 | Inflow=10.80 cfs 1.295 af Outflow=10.80 cfs 1.295 af |
| Reach 8R: POI 2 | Inflow=2.60 cfs 0.298 af Outflow=2.60 cfs 0.298 af |
| Reach 9R: POI 3 | Inflow=2.67 cfs 0.330 af Outflow=2.67 cfs 0.330 af |
| Reach 10R: POI 4 | Inflow=20.50 cfs 2.800 af Outflow=20.50 cfs 2.800 af |
| Reach 11R: POI 5 | Inflow=8.21 cfs 1.238 af Outflow=8.21 cfs 1.238 af |
| Reach 12R: POI 6 | Inflow=7.70 cfs 1.163 af Outflow=7.70 cfs 1.163 af |
| Reach 13R: POI 7 | Inflow=29.54 cfs 4.766 af Outflow=29.54 cfs 4.766 af |

Total Runoff Area = 47.863 ac Runoff Volume = 11.890 af Average Runoff Depth = 2.98"
96.47% Pervious = 46.175 ac 3.53% Impervious = 1.688 ac

Summary for Subcatchment 1S:

Runoff = 10.80 cfs @ 12.38 hrs, Volume= 1.295 af, Depth= 3.21"

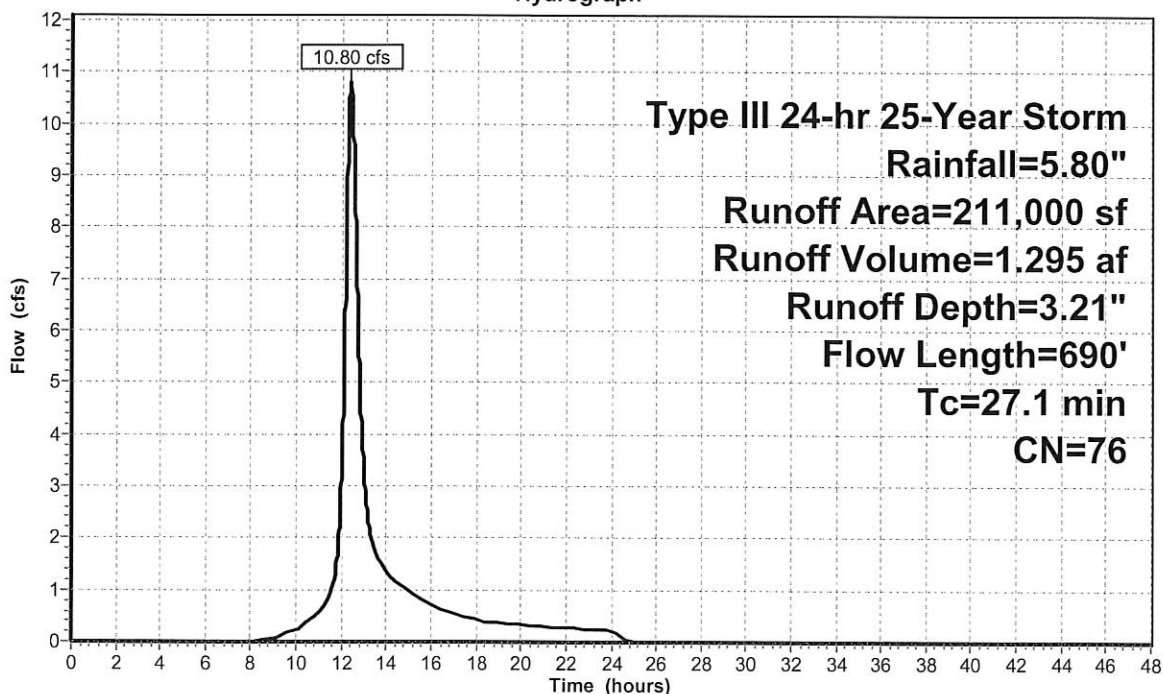
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.80"

| Area (sf) | CN | Description |
|-----------|----|---------------------------|
| 7,600 | 71 | Meadow, non-grazed, HSG C |
| 77,200 | 78 | Meadow, non-grazed, HSG D |
| 29,900 | 70 | Woods, Good, HSG C |
| 96,300 | 77 | Woods, Good, HSG D |
| 211,000 | 76 | Weighted Average |
| 211,000 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|--|
| 22.9 | 150 | 0.0400 | 0.11 | | Sheet Flow, A-B Woods: Light underbrush n= 0.400 P2= 3.10" |
| 1.0 | 240 | 0.0700 | 3.97 | | Shallow Concentrated Flow, B-C Grassed Waterway Kv= 15.0 fps |
| 3.2 | 300 | 0.1000 | 1.58 | | Shallow Concentrated Flow, C-D Woodland Kv= 5.0 fps |
| 27.1 | 690 | Total | | | |

Subcatchment 1S:

Hydrograph



Summary for Subcatchment 2S:

Runoff = 2.60 cfs @ 12.35 hrs, Volume= 0.298 af, Depth= 2.74"

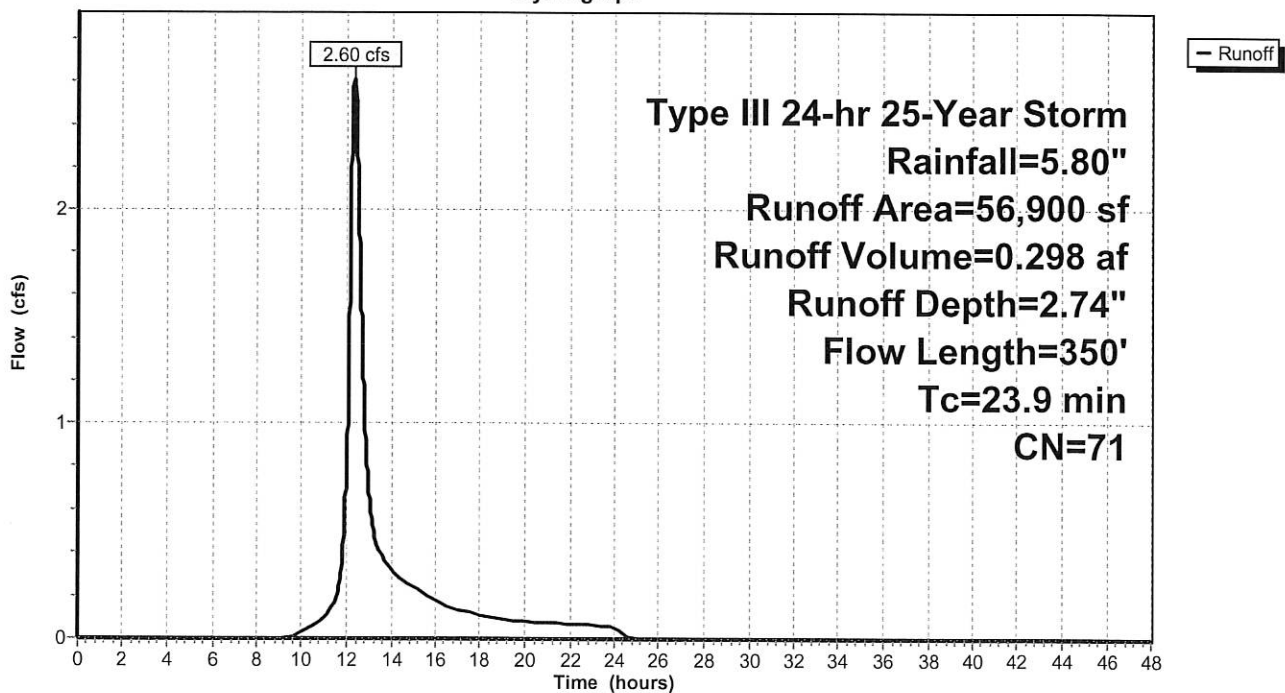
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.80"

| Area (sf) | CN | Description |
|-----------|----|--------------------|
| 44,800 | 70 | Woods, Good, HSG C |
| 12,100 | 77 | Woods, Good, HSG D |
| 56,900 | 71 | Weighted Average |
| 56,900 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|--|
| 21.4 | 150 | 0.0470 | 0.12 | | Sheet Flow, A-B |
| | | | | | Woods: Light underbrush n= 0.400 P2= 3.10" |
| 2.5 | 200 | 0.0700 | 1.32 | | Shallow Concentrated Flow, B-C |
| | | | | | Woodland Kv= 5.0 fps |
| 23.9 | 350 | Total | | | |

Subcatchment 2S:

Hydrograph



Summary for Subcatchment 3S:

Runoff = 2.67 cfs @ 12.40 hrs, Volume= 0.330 af, Depth= 2.65"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

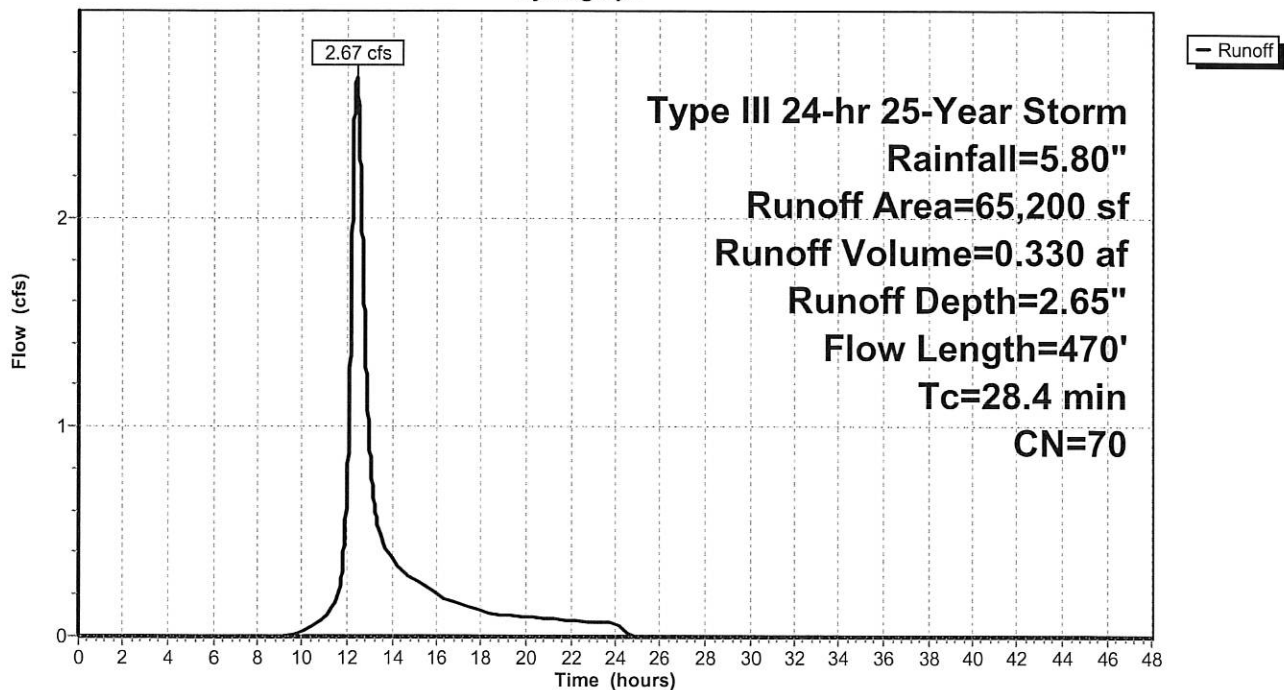
Type III 24-hr 25-Year Storm Rainfall=5.80"

| Area (sf) | CN | Description |
|-----------|----|--------------------|
| 65,200 | 70 | Woods, Good, HSG C |
| 65,200 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|--|
| 23.9 | 150 | 0.0360 | 0.10 | | Sheet Flow, A-B |
| | | | | | Woods: Light underbrush n= 0.400 P2= 3.10" |
| 4.5 | 320 | 0.0550 | 1.17 | | Shallow Concentrated Flow, B-C |
| | | | | | Woodland Kv= 5.0 fps |
| 28.4 | 470 | Total | | | |

Subcatchment 3S:

Hydrograph



Summary for Subcatchment 4S:

Runoff = 20.50 cfs @ 12.50 hrs, Volume= 2.800 af, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.80"

| Area (sf) | CN | Description |
|-----------|----|-----------------------------|
| 118,700 | 77 | 2 acre lots, 12% imp, HSG C |
| 55,800 | 82 | 2 acre lots, 12% imp, HSG D |
| 45,000 | 71 | Meadow, non-grazed, HSG C |
| 51,600 | 78 | Meadow, non-grazed, HSG D |
| 211,900 | 70 | Woods, Good, HSG C |
| 2,000 | 77 | Woods, Good, HSG D |
| 485,000 | 74 | Weighted Average |
| 464,060 | | Pervious Area |
| 20,940 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|---------------------------------------|
| 17.1 | 150 | 0.0300 | 0.15 | | Sheet Flow, A-B |
| | | | | | Grass: Dense n= 0.240 P2= 3.10" |
| 3.7 | 630 | 0.0360 | 2.85 | | Shallow Concentrated Flow, B-C |
| | | | | | Grassed Waterway Kv= 15.0 fps |
| 14.8 | 910 | 0.0420 | 1.02 | | Shallow Concentrated Flow, C-D |
| | | | | | Woodland Kv= 5.0 fps |
| 35.6 | 1,690 | Total | | | |

Pre 10-18-17

Prepared by Gorrill Palmer

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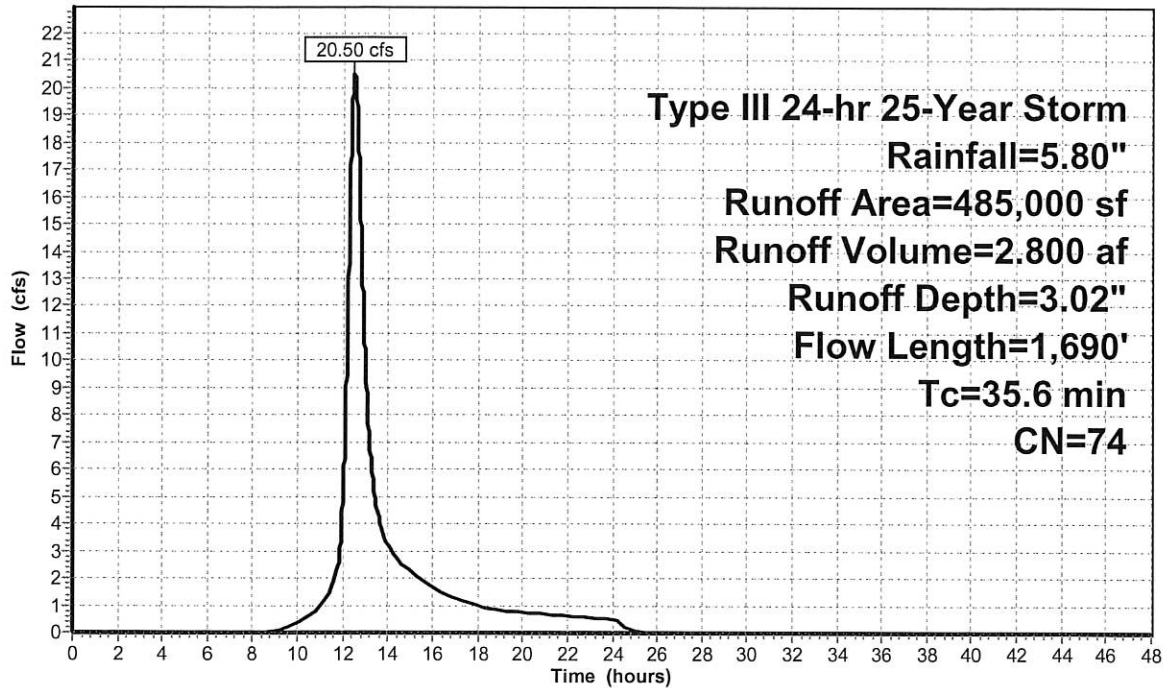
Type III 24-hr 25-Year Storm Rainfall=5.80"

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Page 7

Subcatchment 4S:

Hydrograph



Summary for Subcatchment 5S:

Runoff = 8.21 cfs @ 12.60 hrs, Volume= 1.238 af, Depth= 2.65"

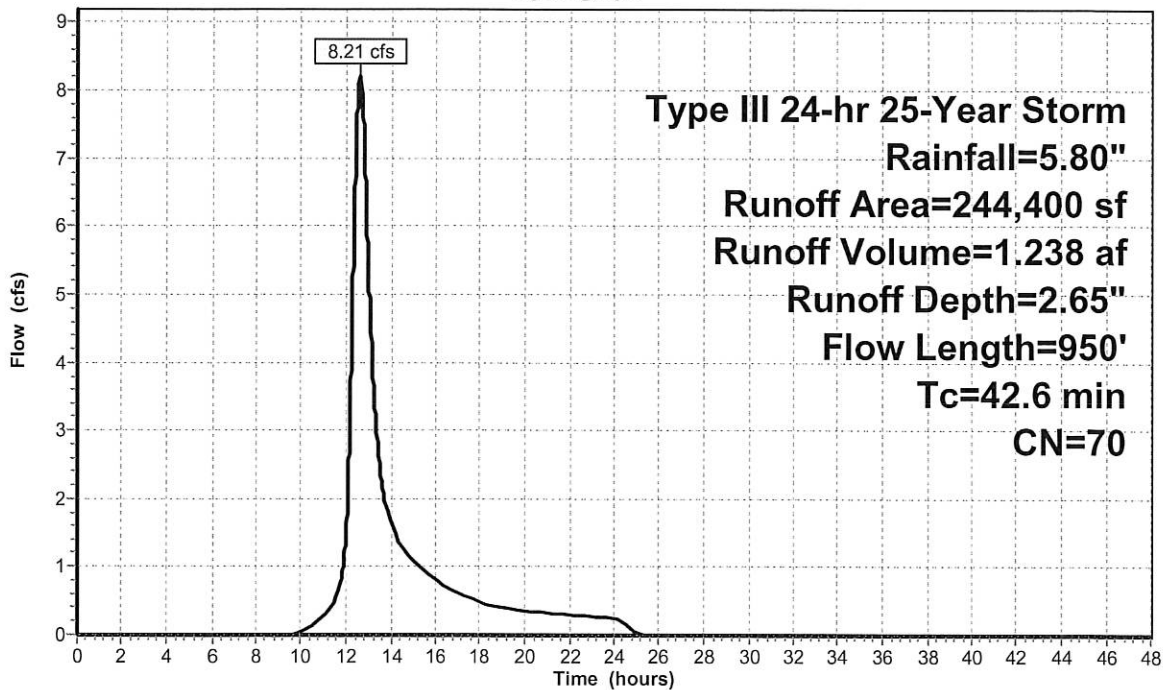
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.80"

| Area (sf) | CN | Description |
|-----------|----|--------------------|
| 244,400 | 70 | Woods, Good, HSG C |
| 244,400 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|--|
| 29.6 | 150 | 0.0210 | 0.08 | | Sheet Flow, A-B |
| | | | | | Woods: Light underbrush n= 0.400 P2= 3.10" |
| 13.0 | 800 | 0.0420 | 1.02 | | Shallow Concentrated Flow, B-C |
| | | | | | Woodland Kv= 5.0 fps |
| 42.6 | 950 | Total | | | |

Subcatchment 5S:

Hydrograph



Summary for Subcatchment 6S:

Runoff = 7.70 cfs @ 12.61 hrs, Volume= 1.163 af, Depth= 2.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

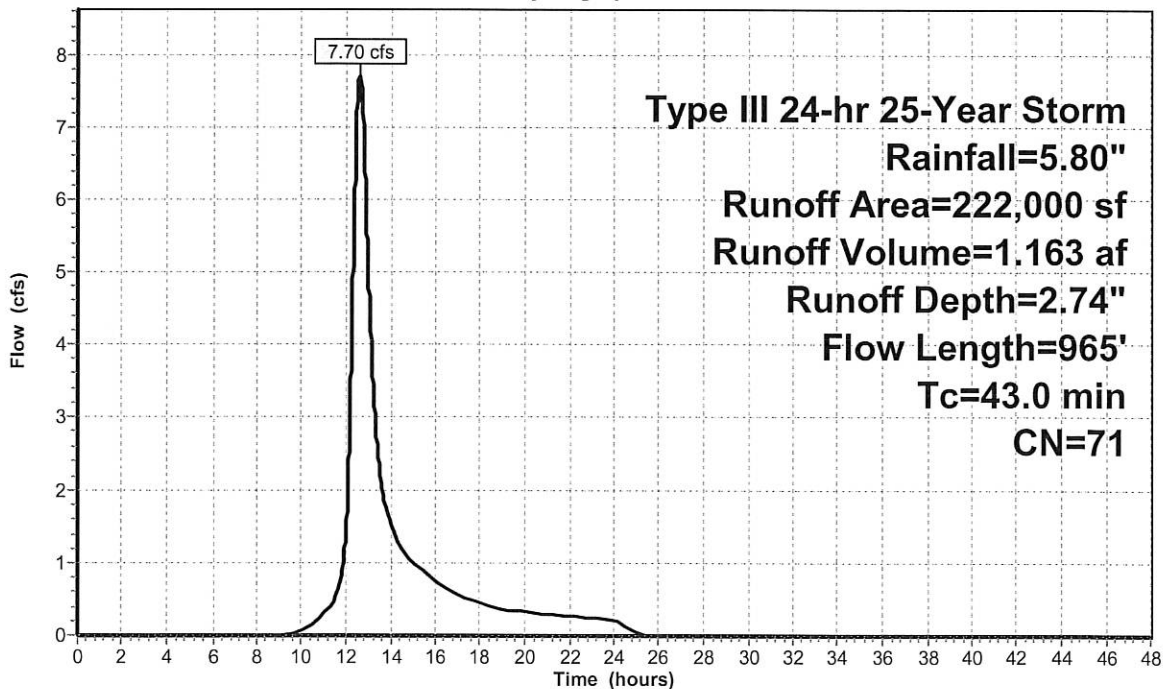
Type III 24-hr 25-Year Storm Rainfall=5.80"

| Area (sf) | CN | Description |
|-----------|----|--------------------|
| 185,600 | 70 | Woods, Good, HSG C |
| 36,400 | 77 | Woods, Good, HSG D |
| 222,000 | 71 | Weighted Average |
| 222,000 | | Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|--|
| 26.8 | 150 | 0.0270 | 0.09 | | Sheet Flow, A-B |
| | | | | | Woods: Light underbrush n= 0.400 P2= 3.10" |
| 16.2 | 815 | 0.0280 | 0.84 | | Shallow Concentrated Flow, B-C |
| | | | | | Woodland Kv= 5.0 fps |
| 43.0 | 965 | Total | | | |

Subcatchment 6S:

Hydrograph



Summary for Subcatchment 7S:

Runoff = 29.54 cfs @ 12.66 hrs, Volume= 4.766 af, Depth= 3.11"

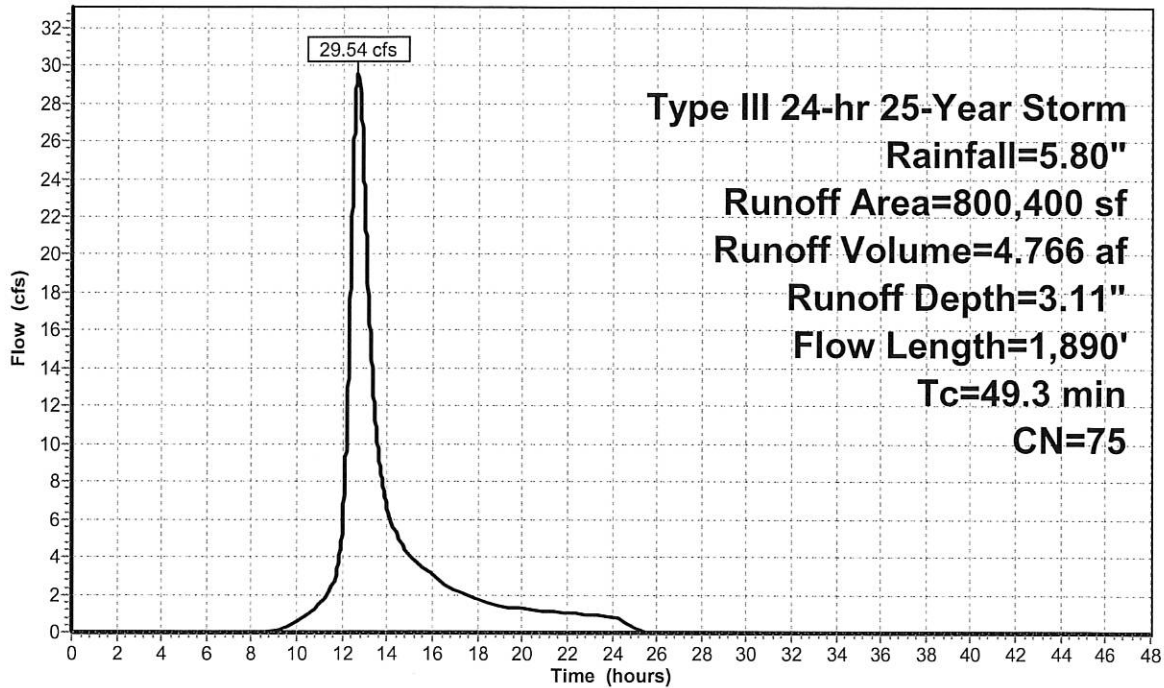
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.80"

| Area (sf) | CN | Description |
|-----------|----|-----------------------------|
| 2,712 | 98 | Paved parking & roofs |
| 218,288 | 77 | 2 acre lots, 12% imp, HSG C |
| 197,200 | 82 | 2 acre lots, 12% imp, HSG D |
| 76,700 | 71 | Meadow, non-grazed, HSG C |
| 284,400 | 70 | Woods, Good, HSG C |
| 21,100 | 77 | Woods, Good, HSG D |
| 800,400 | 75 | Weighted Average |
| 747,829 | | Pervious Area |
| 52,571 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|---|
| 18.3 | 150 | 0.0250 | 0.14 | | Sheet Flow, A-B Grass: Dense n= 0.240 P2= 3.10" |
| 2.8 | 390 | 0.0240 | 2.32 | | Shallow Concentrated Flow, B-C Grassed Waterway Kv= 15.0 fps |
| 10.0 | 390 | 0.0170 | 0.65 | | Shallow Concentrated Flow, C-D Woodland Kv= 5.0 fps |
| 0.1 | 20 | 0.0100 | 6.22 | 7.63 | Circular Channel (pipe), D-E Diam= 15.0" Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 |
| 18.1 | 940 | 0.0300 | 0.87 | | Shallow Concentrated Flow, E-F Woodland Kv= 5.0 fps |
| 49.3 | 1,890 | Total | | | |

Subcatchment 7S:

Hydrograph



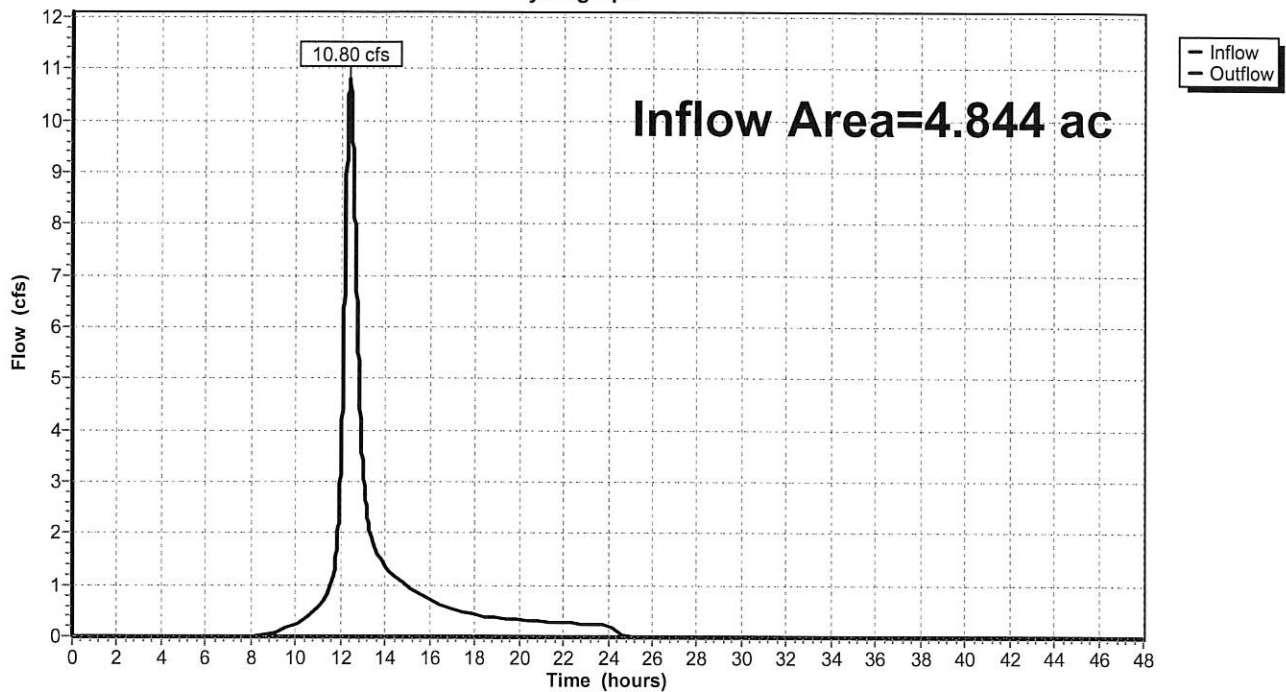
Summary for Reach 7R: POI 1

Inflow Area = 4.844 ac, 0.00% Impervious, Inflow Depth = 3.21" for 25-Year Storm event
Inflow = 10.80 cfs @ 12.38 hrs, Volume= 1.295 af
Outflow = 10.80 cfs @ 12.38 hrs, Volume= 1.295 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3

Reach 7R: POI 1

Hydrograph



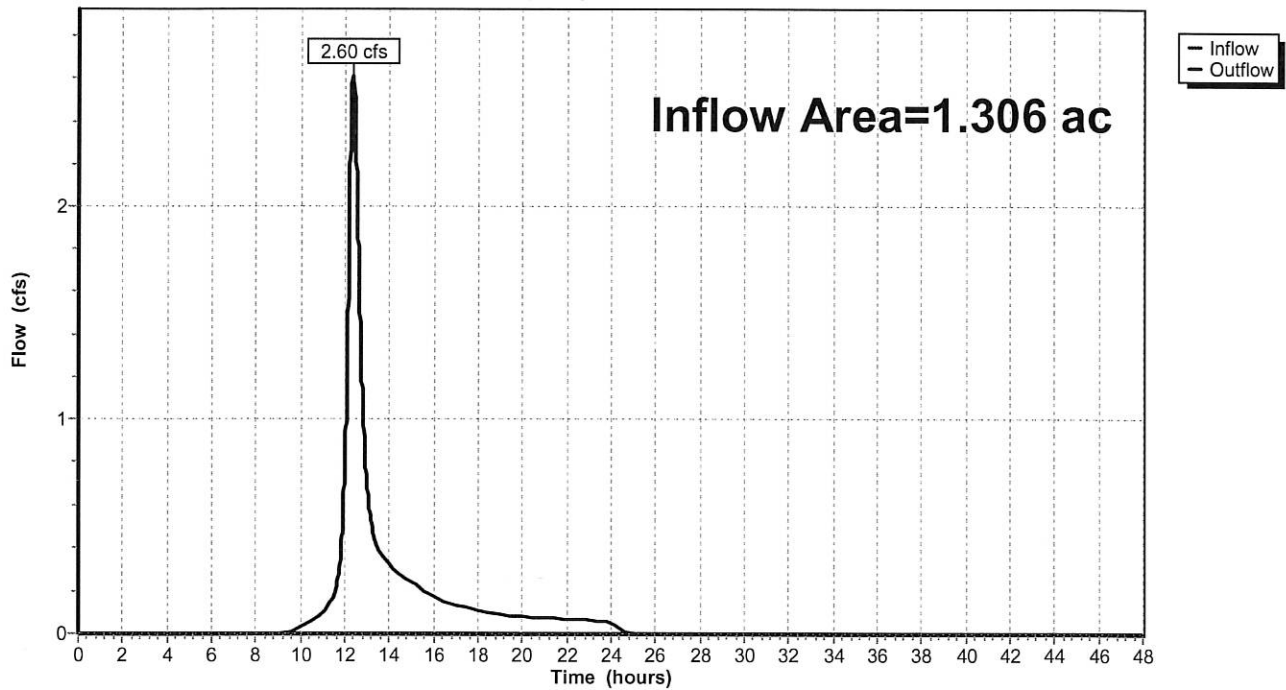
Summary for Reach 8R: POI 2

Inflow Area = 1.306 ac, 0.00% Impervious, Inflow Depth = 2.74" for 25-Year Storm event
Inflow = 2.60 cfs @ 12.35 hrs, Volume= 0.298 af
Outflow = 2.60 cfs @ 12.35 hrs, Volume= 0.298 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3

Reach 8R: POI 2

Hydrograph



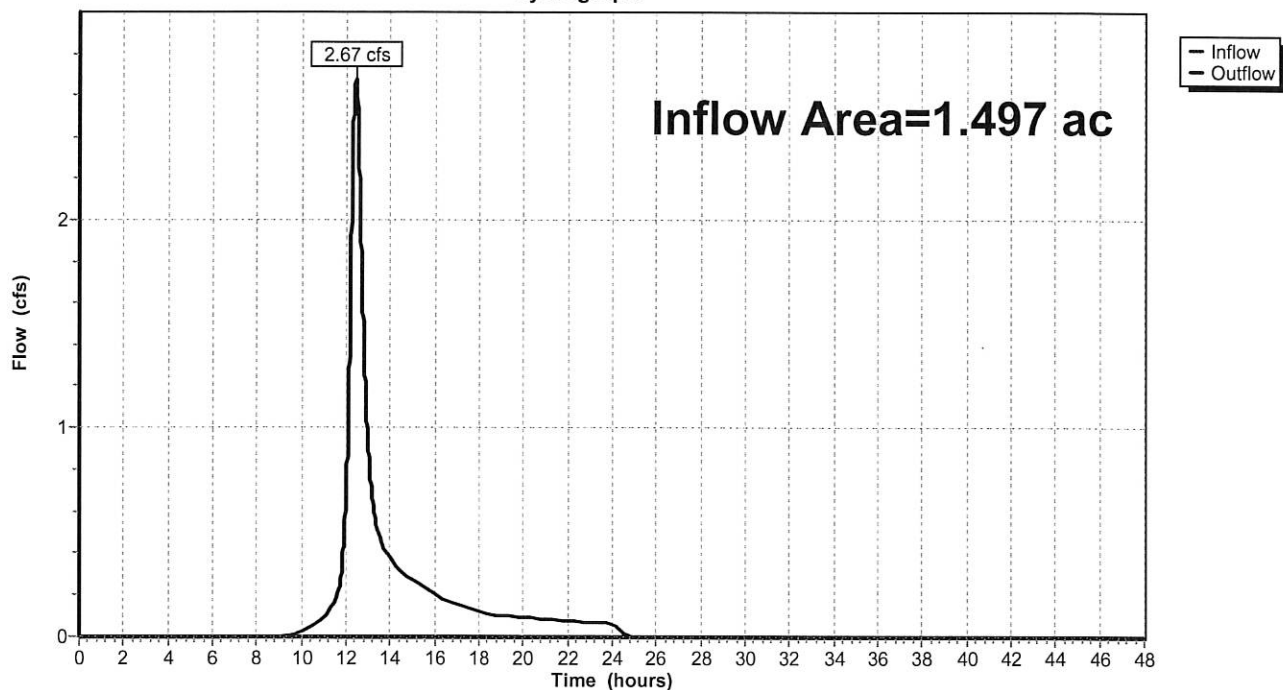
Summary for Reach 9R: POI 3

Inflow Area = 1.497 ac, 0.00% Impervious, Inflow Depth = 2.65" for 25-Year Storm event
Inflow = 2.67 cfs @ 12.40 hrs, Volume= 0.330 af
Outflow = 2.67 cfs @ 12.40 hrs, Volume= 0.330 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3

Reach 9R: POI 3

Hydrograph



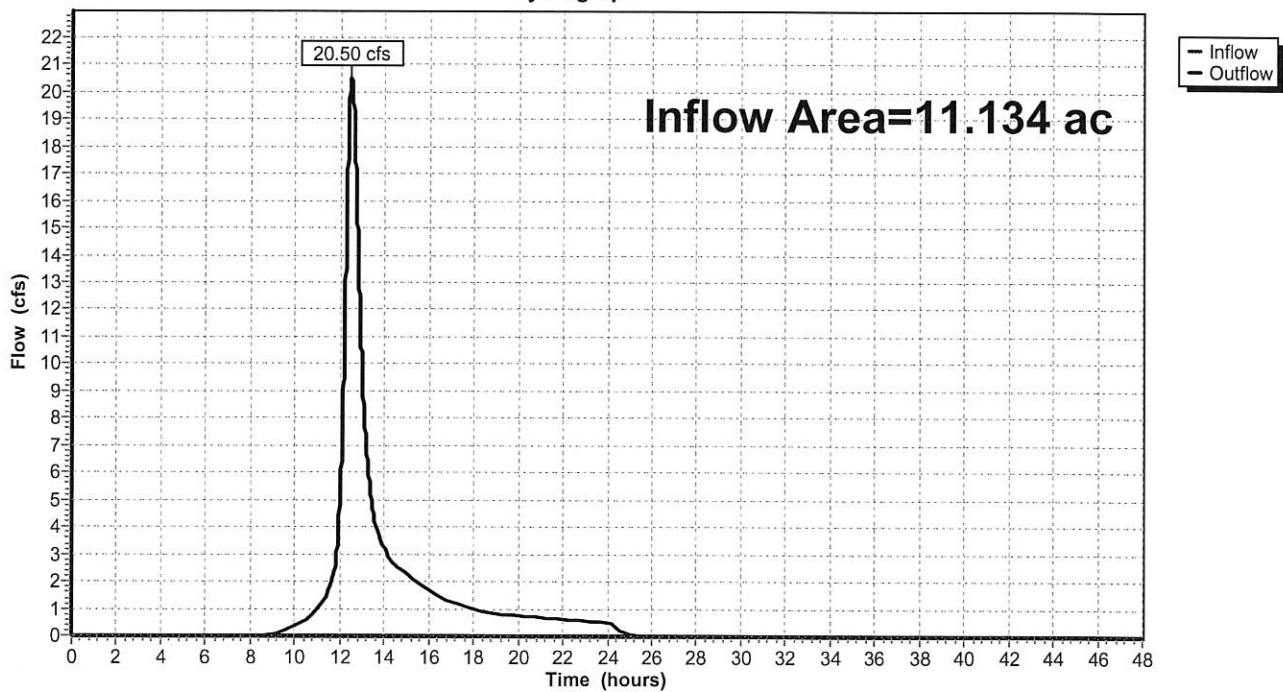
Summary for Reach 10R: POI 4

Inflow Area = 11.134 ac, 4.32% Impervious, Inflow Depth = 3.02" for 25-Year Storm event
Inflow = 20.50 cfs @ 12.50 hrs, Volume= 2.800 af
Outflow = 20.50 cfs @ 12.50 hrs, Volume= 2.800 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3

Reach 10R: POI 4

Hydrograph



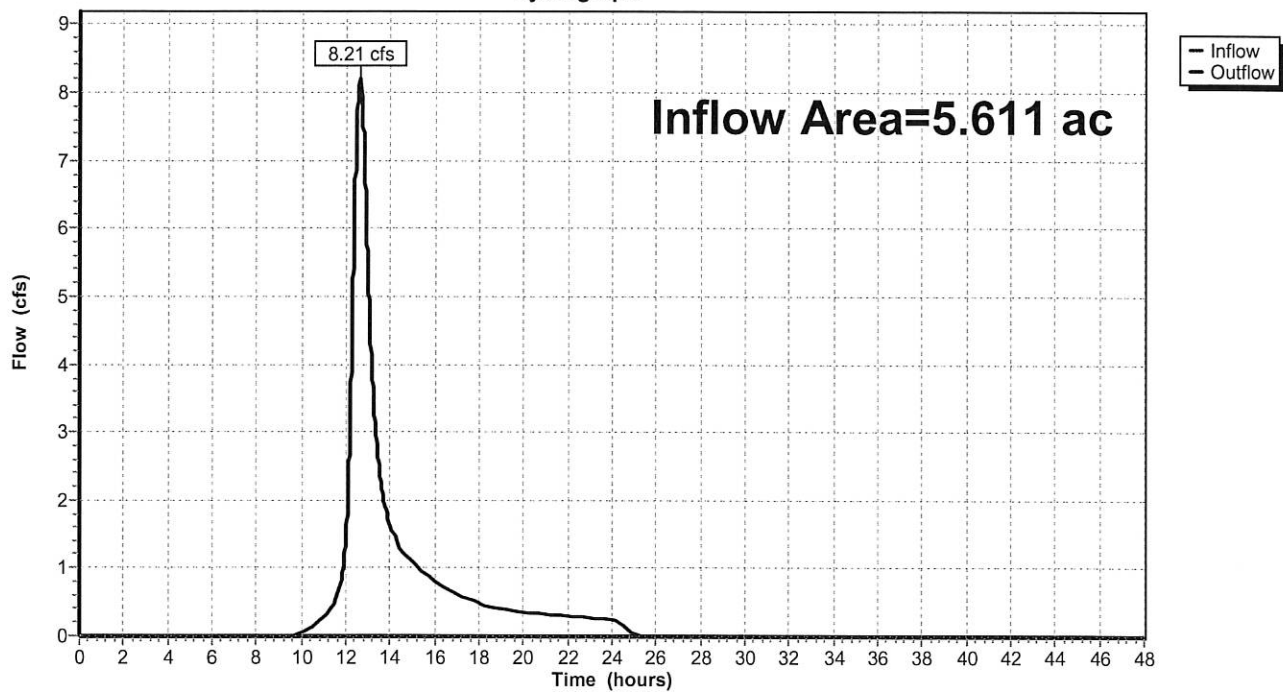
Summary for Reach 11R: POI 5

Inflow Area = 5.611 ac, 0.00% Impervious, Inflow Depth = 2.65" for 25-Year Storm event
Inflow = 8.21 cfs @ 12.60 hrs, Volume= 1.238 af
Outflow = 8.21 cfs @ 12.60 hrs, Volume= 1.238 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3

Reach 11R: POI 5

Hydrograph



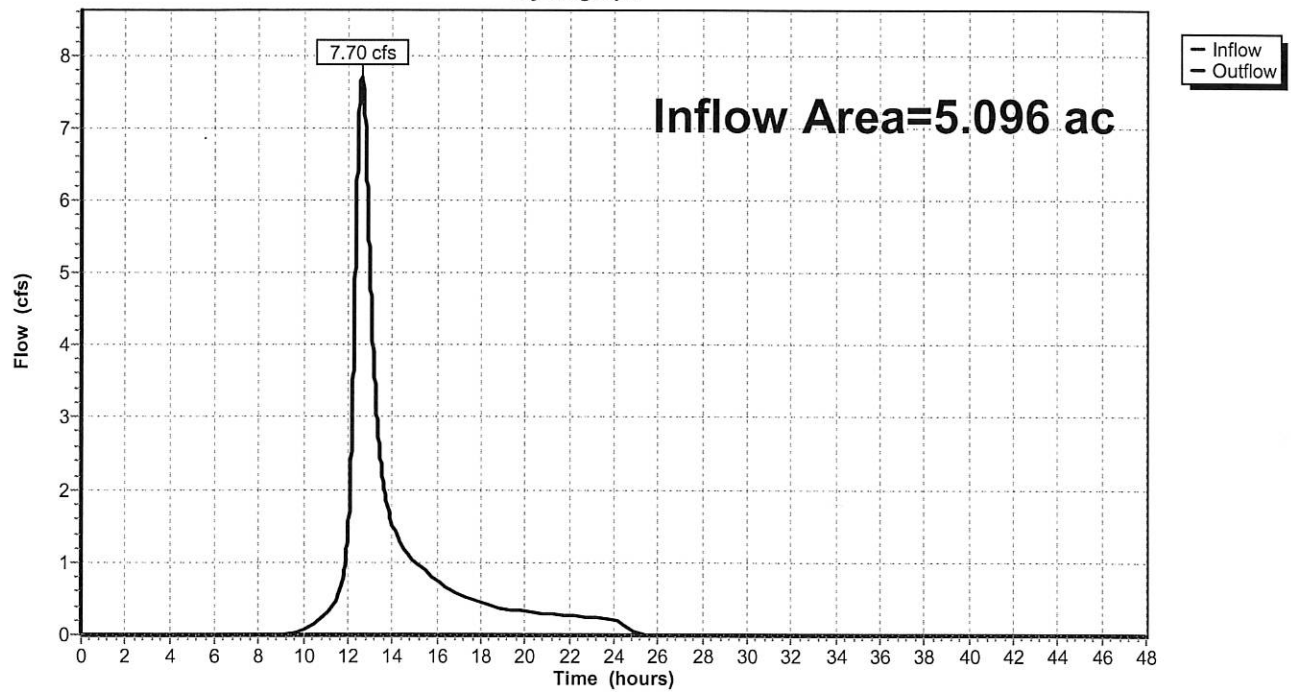
Summary for Reach 12R: POI 6

Inflow Area = 5.096 ac, 0.00% Impervious, Inflow Depth = 2.74" for 25-Year Storm event
Inflow = 7.70 cfs @ 12.61 hrs, Volume= 1.163 af
Outflow = 7.70 cfs @ 12.61 hrs, Volume= 1.163 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3

Reach 12R: POI 6

Hydrograph



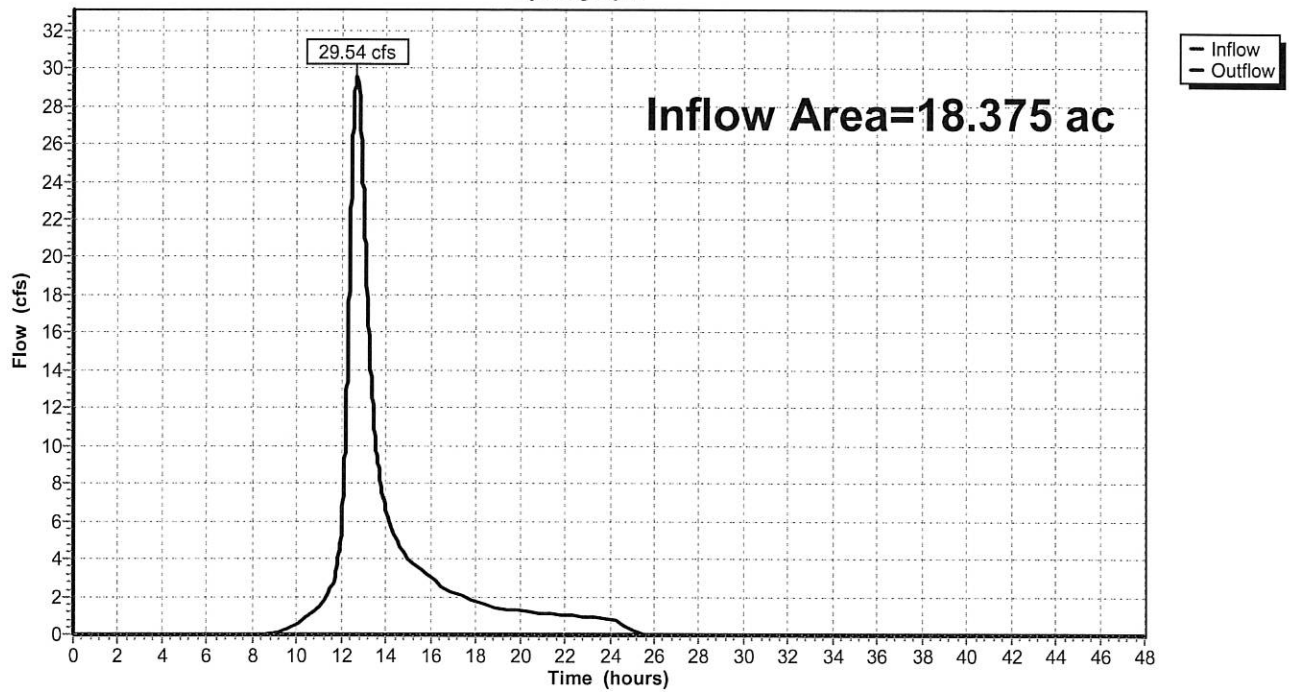
Summary for Reach 13R: POI 7

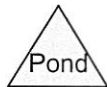
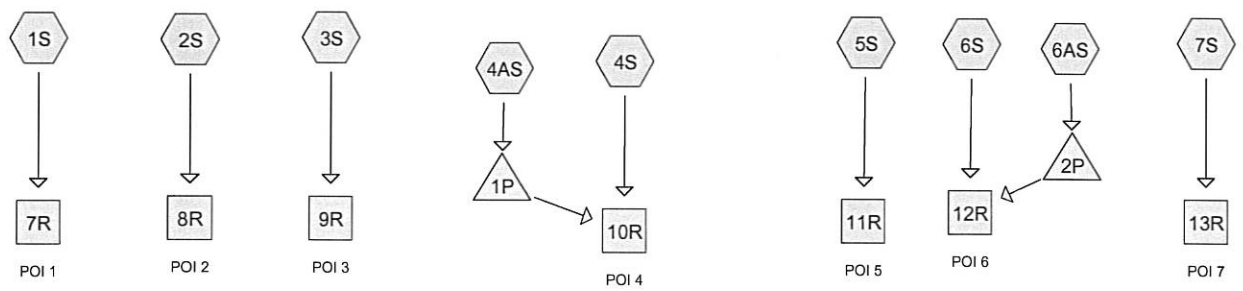
Inflow Area = 18.375 ac, 6.57% Impervious, Inflow Depth = 3.11" for 25-Year Storm event
Inflow = 29.54 cfs @ 12.66 hrs, Volume= 4.766 af
Outflow = 29.54 cfs @ 12.66 hrs, Volume= 4.766 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3

Reach 13R: POI 7

Hydrograph





Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

| | |
|--------------------------|---|
| Subcatchment 1S: | Runoff Area=189,100 sf 3.29% Impervious Runoff Depth=1.20" Flow Length=690' Tc=27.1 min CN=78 Runoff=3.52 cfs 0.434 af |
| Subcatchment 2S: | Runoff Area=39,800 sf 4.46% Impervious Runoff Depth=0.92" Flow Length=200' Tc=22.0 min CN=73 Runoff=0.59 cfs 0.070 af |
| Subcatchment 3S: | Runoff Area=55,900 sf 5.37% Impervious Runoff Depth=0.87" Flow Length=300' Tc=26.0 min CN=72 Runoff=0.72 cfs 0.093 af |
| Subcatchment 4AS: | Runoff Area=115,632 sf 17.76% Impervious Runoff Depth=1.08" Flow Length=785' Tc=15.3 min CN=76 Runoff=2.42 cfs 0.240 af |
| Subcatchment 4S: | Runoff Area=424,528 sf 5.50% Impervious Runoff Depth=1.03" Flow Length=1,690' Tc=35.6 min CN=75 Runoff=5.82 cfs 0.834 af |
| Subcatchment 5S: | Runoff Area=158,400 sf 1.89% Impervious Runoff Depth=0.82" Flow Length=600' Tc=30.2 min CN=71 Runoff=1.77 cfs 0.248 af |
| Subcatchment 6AS: | Runoff Area=208,960 sf 13.69% Impervious Runoff Depth=1.08" Flow Length=760' Tc=34.1 min CN=76 Runoff=3.11 cfs 0.433 af |
| Subcatchment 6S: | Runoff Area=100,550 sf 2.98% Impervious Runoff Depth=0.87" Flow Length=390' Tc=27.3 min CN=72 Runoff=1.26 cfs 0.167 af |
| Subcatchment 7S: | Runoff Area=792,062 sf 7.10% Impervious Runoff Depth=1.03" Flow Length=1,890' Tc=49.3 min CN=75 Runoff=9.12 cfs 1.556 af |
| Reach 7R: POI 1 | Inflow=3.52 cfs 0.434 af Outflow=3.52 cfs 0.434 af |
| Reach 8R: POI 2 | Inflow=0.59 cfs 0.070 af Outflow=0.59 cfs 0.070 af |
| Reach 9R: POI 3 | Inflow=0.72 cfs 0.093 af Outflow=0.72 cfs 0.093 af |
| Reach 10R: POI 4 | Inflow=6.22 cfs 1.049 af Outflow=6.22 cfs 1.049 af |
| Reach 11R: POI 5 | Inflow=1.77 cfs 0.248 af Outflow=1.77 cfs 0.248 af |
| Reach 12R: POI 6 | Inflow=1.29 cfs 0.541 af Outflow=1.29 cfs 0.541 af |
| Reach 13R: POI 7 | Inflow=9.12 cfs 1.556 af Outflow=9.12 cfs 1.556 af |

Post 10-26-17

Type III 24-hr 2-Year Storm Rainfall=3.10"

Prepared by Gorrill Palmer

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Page 2

Pond 1P:

Peak Elev=397.68' Storage=4,251 cf Inflow=2.42 cfs 0.240 af
Primary=0.48 cfs 0.154 af Secondary=0.02 cfs 0.062 af Outflow=0.50 cfs 0.216 af

Pond 2P:

Peak Elev=406.57' Storage=7,919 cf Inflow=3.11 cfs 0.433 af
Primary=0.82 cfs 0.282 af Secondary=0.03 cfs 0.092 af Outflow=0.85 cfs 0.374 af

Total Runoff Area = 47.863 ac Runoff Volume = 4.074 af Average Runoff Depth = 1.02"
93.01% Pervious = 44.518 ac 6.99% Impervious = 3.346 ac

Post 10-26-17

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Type III 24-hr 10-Year Storm Rainfall=4.60"

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Page 3

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

| | |
|--------------------------|--|
| Subcatchment 1S: | Runoff Area=189,100 sf 3.29% Impervious Runoff Depth=2.38" Flow Length=690' Tc=27.1 min CN=78 Runoff=7.15 cfs 0.859 af |
| Subcatchment 2S: | Runoff Area=39,800 sf 4.46% Impervious Runoff Depth=1.97" Flow Length=200' Tc=22.0 min CN=73 Runoff=1.34 cfs 0.150 af |
| Subcatchment 3S: | Runoff Area=55,900 sf 5.37% Impervious Runoff Depth=1.89" Flow Length=300' Tc=26.0 min CN=72 Runoff=1.68 cfs 0.203 af |
| Subcatchment 4AS: | Runoff Area=115,632 sf 17.76% Impervious Runoff Depth=2.21" Flow Length=785' Tc=15.3 min CN=76 Runoff=5.13 cfs 0.489 af |
| Subcatchment 4S: | Runoff Area=424,528 sf 5.50% Impervious Runoff Depth=2.13" Flow Length=1,690' Tc=35.6 min CN=75 Runoff=12.57 cfs 1.729 af |
| Subcatchment 5S: | Runoff Area=158,400 sf 1.89% Impervious Runoff Depth=1.82" Flow Length=600' Tc=30.2 min CN=71 Runoff=4.27 cfs 0.551 af |
| Subcatchment 6AS: | Runoff Area=208,960 sf 13.69% Impervious Runoff Depth=2.21" Flow Length=760' Tc=34.1 min CN=76 Runoff=6.59 cfs 0.883 af |
| Subcatchment 6S: | Runoff Area=100,550 sf 2.98% Impervious Runoff Depth=1.89" Flow Length=390' Tc=27.3 min CN=72 Runoff=2.96 cfs 0.364 af |
| Subcatchment 7S: | Runoff Area=792,062 sf 7.10% Impervious Runoff Depth=2.13" Flow Length=1,890' Tc=49.3 min CN=75 Runoff=19.79 cfs 3.226 af |
| Reach 7R: POI 1 | Inflow=7.15 cfs 0.859 af Outflow=7.15 cfs 0.859 af |
| Reach 8R: POI 2 | Inflow=1.34 cfs 0.150 af Outflow=1.34 cfs 0.150 af |
| Reach 9R: POI 3 | Inflow=1.68 cfs 0.203 af Outflow=1.68 cfs 0.203 af |
| Reach 10R: POI 4 | Inflow=13.81 cfs 2.193 af Outflow=13.81 cfs 2.193 af |
| Reach 11R: POI 5 | Inflow=4.27 cfs 0.551 af Outflow=4.27 cfs 0.551 af |
| Reach 12R: POI 6 | Inflow=4.55 cfs 1.187 af Outflow=4.55 cfs 1.187 af |
| Reach 13R: POI 7 | Inflow=19.79 cfs 3.226 af Outflow=19.79 cfs 3.226 af |

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Type III 24-hr 10-Year Storm Rainfall=4.60"

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Page 4

Pond 1P:

Peak Elev=398.46' Storage=8,587 cf Inflow=5.13 cfs 0.489 af
Primary=1.29 cfs 0.400 af Secondary=0.02 cfs 0.064 af Outflow=1.31 cfs 0.464 af

Pond 2P:

Peak Elev=407.42' Storage=13,593 cf Inflow=6.59 cfs 0.883 af
Primary=3.07 cfs 0.727 af Secondary=0.03 cfs 0.096 af Outflow=3.10 cfs 0.823 af

Total Runoff Area = 47.863 ac Runoff Volume = 8.455 af Average Runoff Depth = 2.12"
93.01% Pervious = 44.518 ac 6.99% Impervious = 3.346 ac

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Type III 24-hr 25-Year Storm Rainfall=5.80"

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Page 2

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

| | |
|--------------------------|--|
| Subcatchment 1S: | Runoff Area=189,100 sf 3.29% Impervious Runoff Depth=3.40" Flow Length=690' Tc=27.1 min CN=78 Runoff=10.27 cfs 1.231 af |
| Subcatchment 2S: | Runoff Area=39,800 sf 4.46% Impervious Runoff Depth=2.92" Flow Length=200' Tc=22.0 min CN=73 Runoff=2.02 cfs 0.223 af |
| Subcatchment 3S: | Runoff Area=55,900 sf 5.37% Impervious Runoff Depth=2.83" Flow Length=300' Tc=26.0 min CN=72 Runoff=2.55 cfs 0.303 af |
| Subcatchment 4AS: | Runoff Area=115,632 sf 17.76% Impervious Runoff Depth=3.21" Flow Length=785' Tc=15.3 min CN=76 Runoff=7.49 cfs 0.710 af |
| Subcatchment 4S: | Runoff Area=424,528 sf 5.50% Impervious Runoff Depth=3.11" Flow Length=1,690' Tc=35.6 min CN=75 Runoff=18.52 cfs 2.528 af |
| Subcatchment 5S: | Runoff Area=158,400 sf 1.89% Impervious Runoff Depth=2.74" Flow Length=600' Tc=30.2 min CN=71 Runoff=6.53 cfs 0.830 af |
| Subcatchment 6AS: | Runoff Area=208,960 sf 13.69% Impervious Runoff Depth=3.21" Flow Length=760' Tc=34.1 min CN=76 Runoff=9.63 cfs 1.282 af |
| Subcatchment 6S: | Runoff Area=100,550 sf 2.98% Impervious Runoff Depth=2.83" Flow Length=390' Tc=27.3 min CN=72 Runoff=4.49 cfs 0.544 af |
| Subcatchment 7S: | Runoff Area=792,062 sf 7.10% Impervious Runoff Depth=3.11" Flow Length=1,890' Tc=49.3 min CN=75 Runoff=29.24 cfs 4.716 af |
| Reach 7R: POI 1 | Inflow=10.27 cfs 1.231 af Outflow=10.27 cfs 1.231 af |
| Reach 8R: POI 2 | Inflow=2.02 cfs 0.223 af Outflow=2.02 cfs 0.223 af |
| Reach 9R: POI 3 | Inflow=2.55 cfs 0.303 af Outflow=2.55 cfs 0.303 af |
| Reach 10R: POI 4 | Inflow=20.18 cfs 3.212 af Outflow=20.18 cfs 3.212 af |
| Reach 11R: POI 5 | Inflow=6.53 cfs 0.830 af Outflow=6.53 cfs 0.830 af |
| Reach 12R: POI 6 | Inflow=7.65 cfs 1.765 af Outflow=7.65 cfs 1.765 af |
| Reach 13R: POI 7 | Inflow=29.24 cfs 4.716 af Outflow=29.24 cfs 4.716 af |

Post 10-26-17

Type III 24-hr 25-Year Storm Rainfall=5.80"

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Page 3

Pond 1P:

Peak Elev=399.13' Storage=13,048 cf Inflow=7.49 cfs 0.710 af
Primary=1.71 cfs 0.619 af Secondary=0.02 cfs 0.066 af Outflow=1.73 cfs 0.684 af

Pond 2P:

Peak Elev=408.00' Storage=18,613 cf Inflow=9.63 cfs 1.282 af
Primary=5.04 cfs 1.123 af Secondary=0.03 cfs 0.098 af Outflow=5.07 cfs 1.221 af

Total Runoff Area = 47.863 ac Runoff Volume = 12.367 af Average Runoff Depth = 3.10"
93.01% Pervious = 44.518 ac 6.99% Impervious = 3.346 ac

Summary for Subcatchment 1S:

Runoff = 10.27 cfs @ 12.38 hrs, Volume= 1.231 af, Depth= 3.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Type III 24-hr 25-Year Storm Rainfall=5.80"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 6,212 | 98 | Paved parking & roofs |
| 18,000 | 80 | >75% Grass cover, Good, HSG D |
| 7,600 | 71 | Meadow, non-grazed, HSG C |
| 77,200 | 78 | Meadow, non-grazed, HSG D |
| 6,000 | 70 | Woods, Good, HSG C |
| 74,088 | 77 | Woods, Good, HSG D |
| 189,100 | 78 | Weighted Average |
| 182,888 | | Pervious Area |
| 6,212 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|--|
| 22.9 | 150 | 0.0400 | 0.11 | | Sheet Flow, A-B |
| | | | | | Woods: Light underbrush n= 0.400 P2= 3.10" |
| 1.0 | 240 | 0.0700 | 3.97 | | Shallow Concentrated Flow, B-C |
| | | | | | Grassed Waterway Kv= 15.0 fps |
| 3.2 | 300 | 0.1000 | 1.58 | | Shallow Concentrated Flow, C-D |
| | | | | | Woodland Kv= 5.0 fps |
| 27.1 | 690 | Total | | | |

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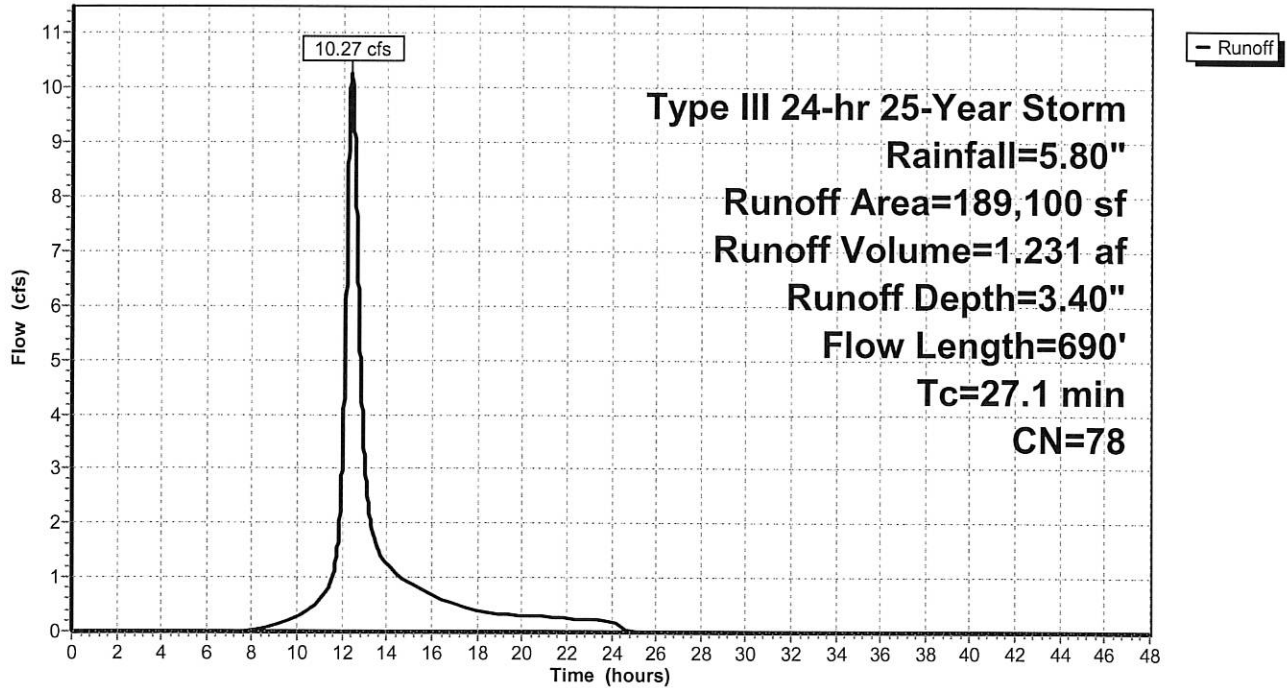
Type III 24-hr 25-Year Storm Rainfall=5.80"

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Page 5

Subcatchment 1S:

Hydrograph



Summary for Subcatchment 2S:

Runoff = 2.02 cfs @ 12.30 hrs, Volume= 0.223 af, Depth= 2.92"

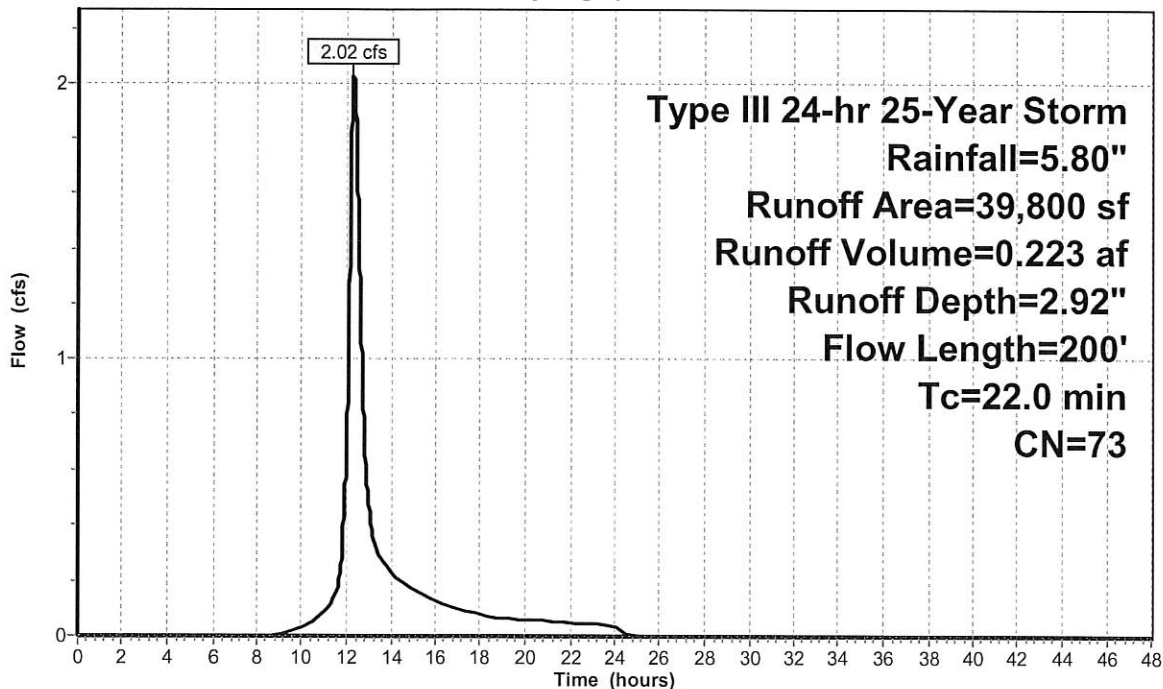
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.80"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 1,776 | 98 | Paved parking & roofs |
| 5,000 | 80 | >75% Grass cover, Good, HSG D |
| 28,400 | 70 | Woods, Good, HSG C |
| 4,624 | 77 | Woods, Good, HSG D |
| 39,800 | 73 | Weighted Average |
| 38,024 | | Pervious Area |
| 1,776 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|--|
| 21.4 | 150 | 0.0470 | 0.12 | | Sheet Flow, A-B |
| | | | | | Woods: Light underbrush n= 0.400 P2= 3.10" |
| 0.6 | 50 | 0.0700 | 1.32 | | Shallow Concentrated Flow, B-C |
| | | | | | Woodland Kv= 5.0 fps |
| 22.0 | 200 | Total | | | |

Subcatchment 2S:

Hydrograph



Summary for Subcatchment 3S:

Runoff = 2.55 cfs @ 12.37 hrs, Volume= 0.303 af, Depth= 2.83"

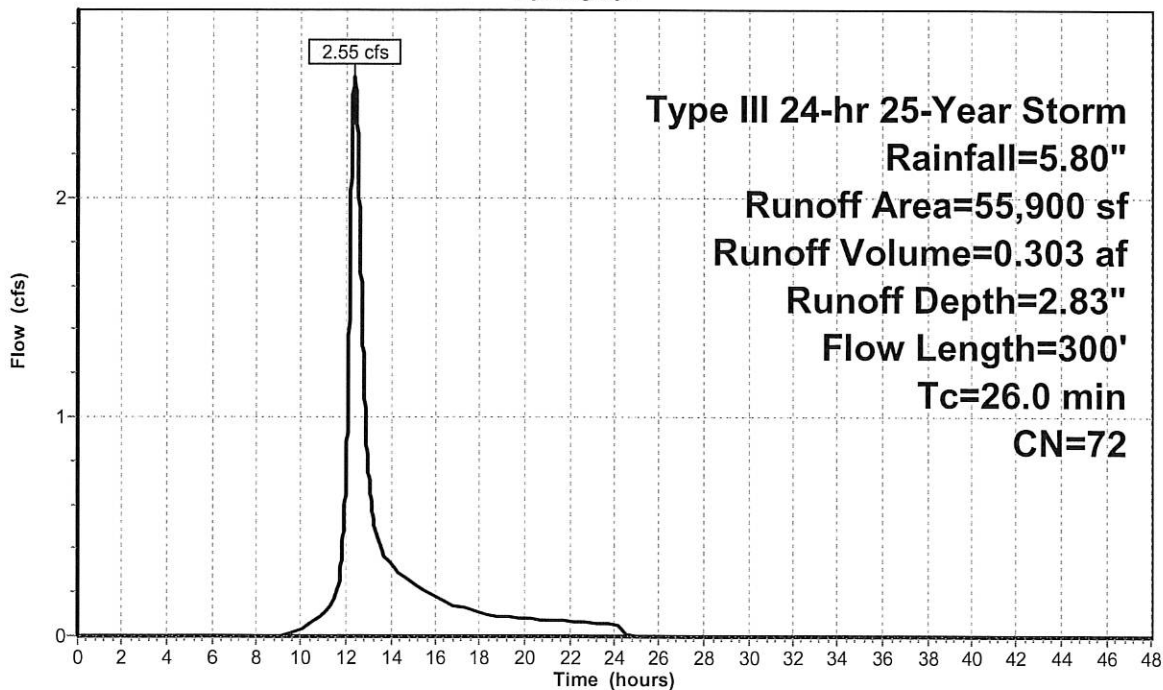
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.80"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 3,000 | 98 | Paved parking & roofs |
| 12,000 | 74 | >75% Grass cover, Good, HSG C |
| 40,900 | 70 | Woods, Good, HSG C |
| 55,900 | 72 | Weighted Average |
| 52,900 | | Pervious Area |
| 3,000 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|--|
| 23.9 | 150 | 0.0360 | 0.10 | | Sheet Flow, A-B |
| | | | | | Woods: Light underbrush n= 0.400 P2= 3.10" |
| 2.1 | 150 | 0.0550 | 1.17 | | Shallow Concentrated Flow, B-C |
| | | | | | Woodland Kv= 5.0 fps |
| 26.0 | 300 | Total | | | |

Subcatchment 3S:

Hydrograph



— Runoff

Summary for Subcatchment 4AS:

Runoff = 7.49 cfs @ 12.21 hrs, Volume= 0.710 af, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Type III 24-hr 25-Year Storm Rainfall=5.80"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 20,542 | 98 | Paved parking & roofs |
| 42,904 | 74 | >75% Grass cover, Good, HSG C |
| 52,186 | 70 | Woods, Good, HSG C |
| 115,632 | 76 | Weighted Average |
| 95,090 | | Pervious Area |
| 20,542 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|--|
| 13.3 | 100 | 0.0250 | 0.13 | | Sheet Flow, A-B |
| | | | | | Grass: Dense n= 0.240 P2= 3.10" |
| 0.0 | 20 | 0.3300 | 8.62 | | Shallow Concentrated Flow, B-C |
| | | | | | Grassed Waterway Kv= 15.0 fps |
| 0.3 | 65 | 0.0100 | 4.32 | 60.45 | Trap/Vee/Rect Channel Flow, C-D |
| | | | | | Bot.W=1.00' D=2.00' Z= 3.0 '/' Top.W=13.00' n= 0.035 |
| 1.2 | 380 | 0.0100 | 5.26 | 6.46 | Circular Channel (pipe), D-E |
| | | | | | Diam= 15.0" Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 |
| 0.5 | 220 | 0.0570 | 6.77 | 27.09 | Trap/Vee/Rect Channel Flow, E-F |
| | | | | | Bot.W=1.00' D=1.00' Z= 3.0 '/' Top.W=7.00' n= 0.035 |
| 15.3 | 785 | Total | | | |

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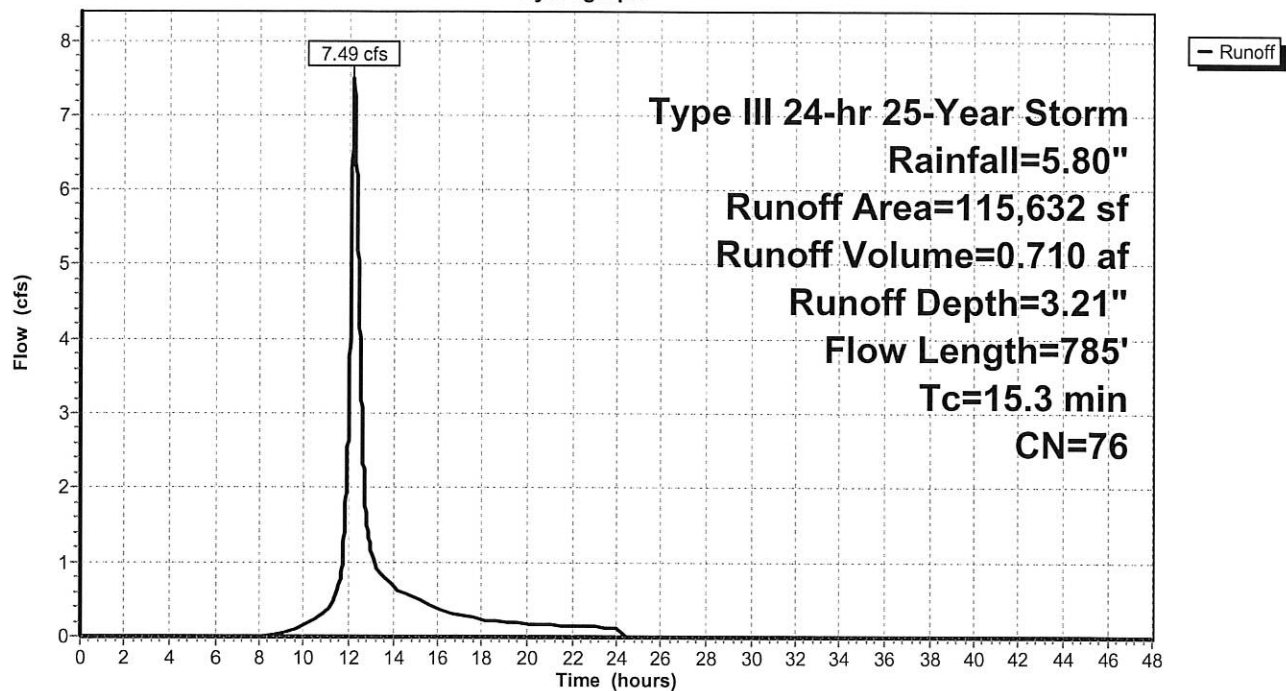
Type III 24-hr 25-Year Storm Rainfall=5.80"

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Page 9

Subcatchment 4AS:

Hydrograph



Summary for Subcatchment 4S:

Runoff = 18.52 cfs @ 12.50 hrs, Volume= 2.528 af, Depth= 3.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.80"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 2,394 | 98 | Paved parking & roofs |
| 10,672 | 74 | >75% Grass cover, Good, HSG C |
| 118,700 | 77 | 2 acre lots, 12% imp, HSG C |
| 55,800 | 82 | 2 acre lots, 12% imp, HSG D |
| 45,000 | 71 | Meadow, non-grazed, HSG C |
| 51,600 | 78 | Meadow, non-grazed, HSG D |
| 138,362 | 70 | Woods, Good, HSG C |
| 2,000 | 77 | Woods, Good, HSG D |
| 424,528 | 75 | Weighted Average |
| 401,194 | | Pervious Area |
| 23,334 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|-------------|------------------|------------------|----------------------|-------------------|---------------------------------------|
| 17.1 | 150 | 0.0300 | 0.15 | | Sheet Flow, A-B |
| | | | | | Grass: Dense n= 0.240 P2= 3.10" |
| 3.7 | 630 | 0.0360 | 2.85 | | Shallow Concentrated Flow, B-C |
| | | | | | Grassed Waterway Kv= 15.0 fps |
| 14.8 | 910 | 0.0420 | 1.02 | | Shallow Concentrated Flow, C-D |
| | | | | | Woodland Kv= 5.0 fps |
| 35.6 | 1,690 | Total | | | |

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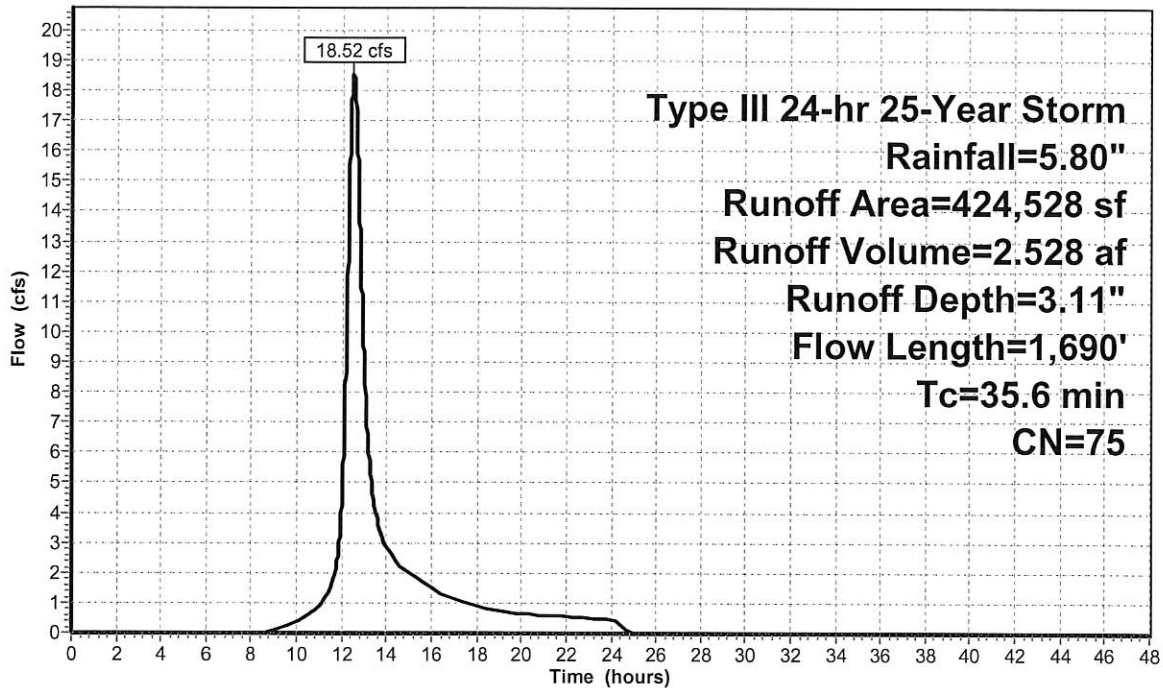
Type III 24-hr 25-Year Storm Rainfall=5.80"

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Page 11

Subcatchment 4S:

Hydrograph



Summary for Subcatchment 5S:

Runoff = 6.53 cfs @ 12.44 hrs, Volume= 0.830 af, Depth= 2.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

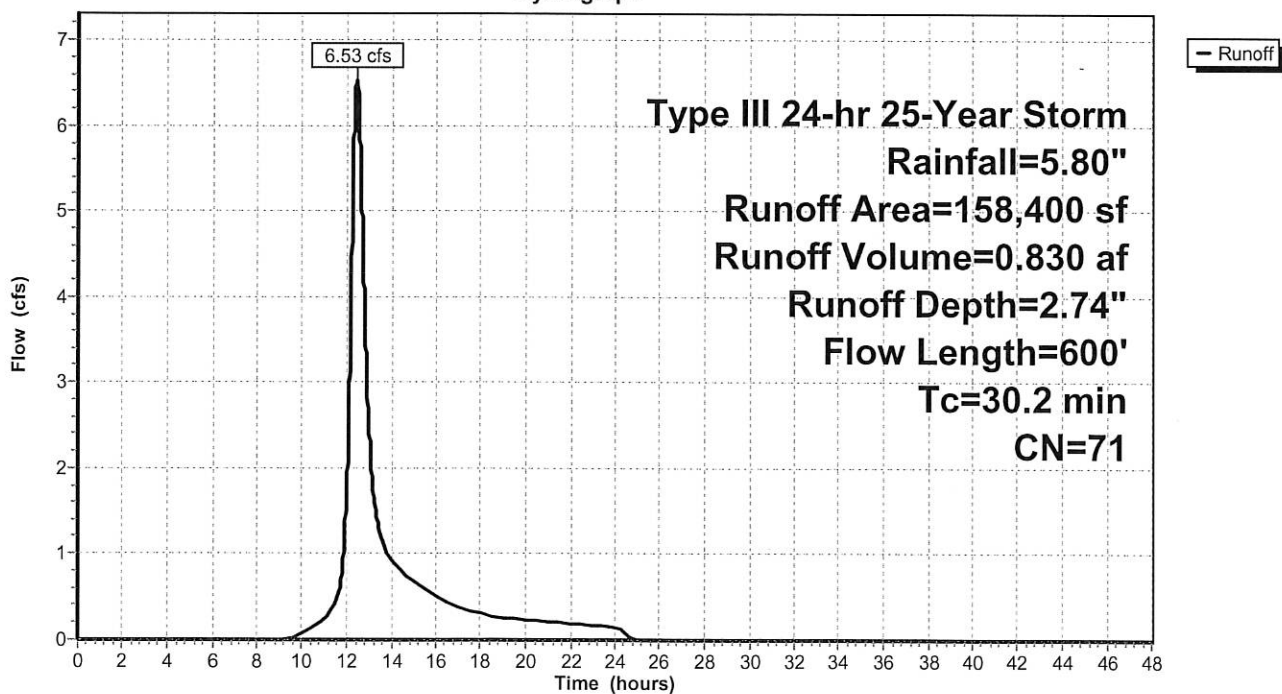
Type III 24-hr 25-Year Storm Rainfall=5.80"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 3,000 | 98 | Paved parking & roofs |
| 12,000 | 74 | >75% Grass cover, Good, HSG C |
| 143,400 | 70 | Woods, Good, HSG C |
| 158,400 | 71 | Weighted Average |
| 155,400 | | Pervious Area |
| 3,000 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|--|
| 22.9 | 150 | 0.0400 | 0.11 | | Sheet Flow, A-B |
| | | | | | Woods: Light underbrush n= 0.400 P2= 3.10" |
| 7.3 | 450 | 0.0420 | 1.02 | | Shallow Concentrated Flow, B-C |
| | | | | | Woodland Kv= 5.0 fps |
| 30.2 | 600 | Total | | | |

Subcatchment 5S:

Hydrograph



Summary for Subcatchment 6AS:

Runoff = 9.63 cfs @ 12.47 hrs, Volume= 1.282 af, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.80"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 28,610 | 98 | Paved parking & roofs |
| 70,092 | 74 | >75% Grass cover, Good, HSG C |
| 82,558 | 70 | Woods, Good, HSG C |
| 27,700 | 77 | Woods, Good, HSG D |
| 208,960 | 76 | Weighted Average |
| 180,350 | | Pervious Area |
| 28,610 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|--|
| 29.6 | 150 | 0.0210 | 0.08 | | Sheet Flow, A-B |
| | | | | | Woods: Light underbrush n= 0.400 P2= 3.10" |
| 2.8 | 140 | 0.0270 | 0.82 | | Shallow Concentrated Flow, B-C |
| | | | | | Woodland Kv= 5.0 fps |
| 1.3 | 330 | 0.0100 | 4.32 | 60.45 | Trap/Vee/Rect Channel Flow, C-D |
| | | | | | Bot.W=1.00' D=2.00' Z= 3.0 ' ' Top.W=13.00' n= 0.035 |
| 0.4 | 140 | 0.0100 | 5.26 | 6.46 | Circular Channel (pipe), D-E |
| | | | | | Diam= 15.0" Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 |
| 34.1 | 760 | Total | | | |

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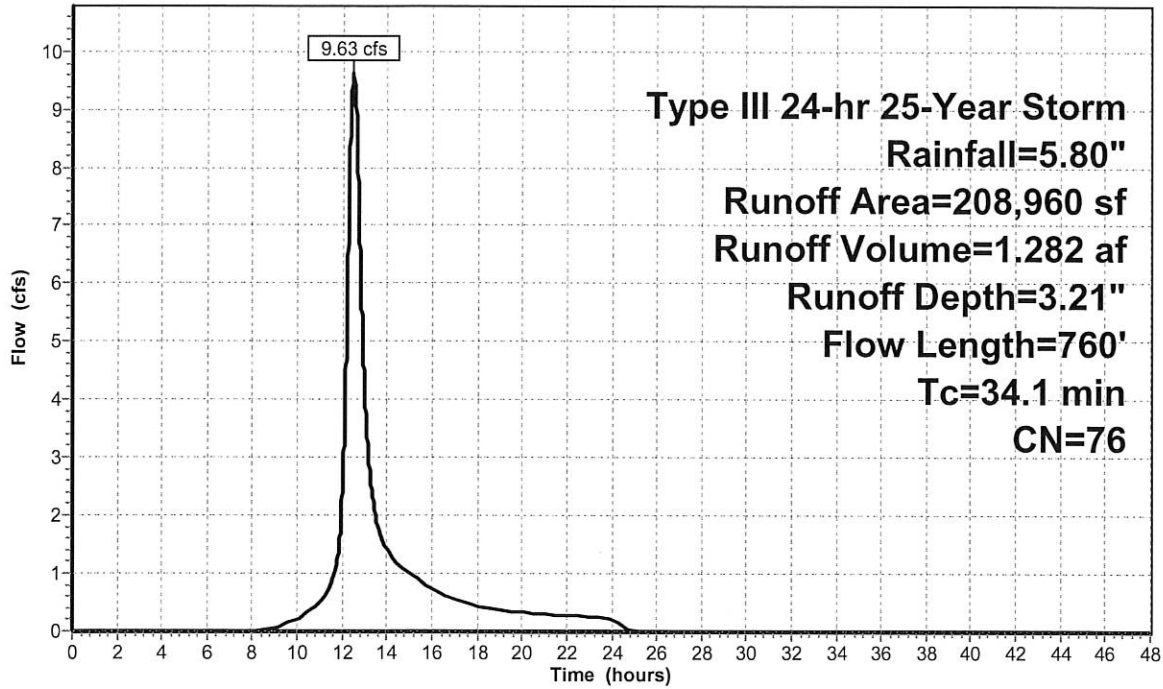
Type III 24-hr 25-Year Storm Rainfall=5.80"

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Page 14

Subcatchment 6AS:

Hydrograph



Summary for Subcatchment 6S:

Runoff = 4.49 cfs @ 12.40 hrs, Volume= 0.544 af, Depth= 2.83"

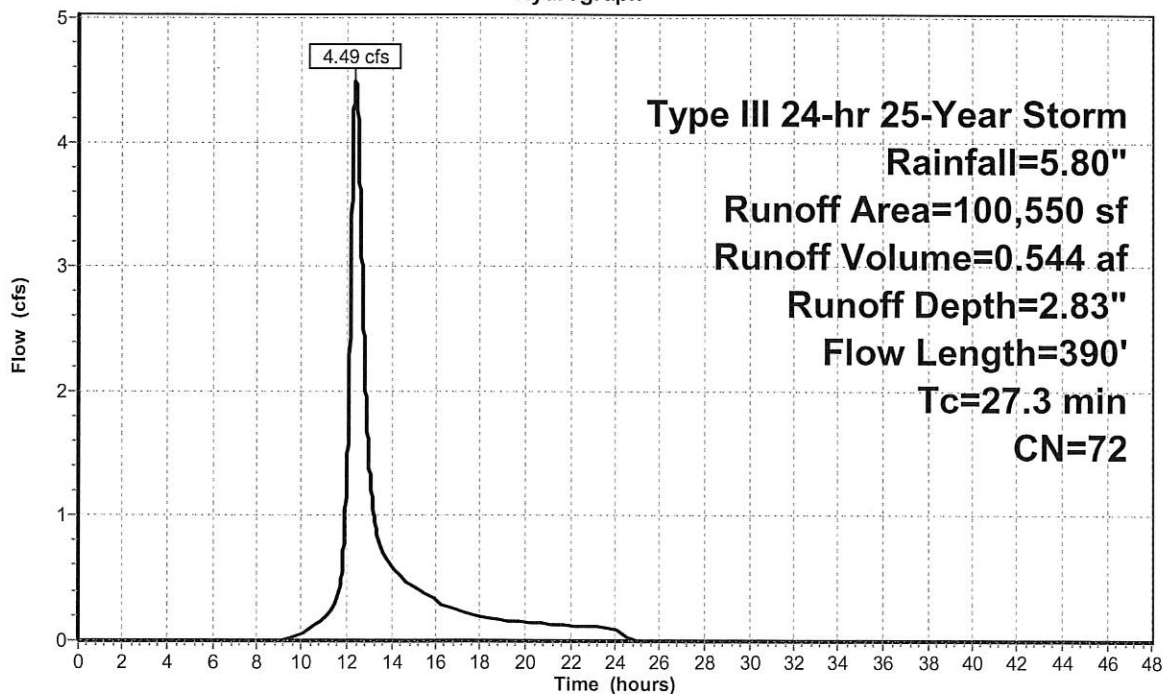
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.80"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 3,000 | 98 | Paved parking & roofs |
| 18,000 | 74 | >75% Grass cover, Good, HSG C |
| 79,550 | 70 | Woods, Good, HSG C |
| 100,550 | 72 | Weighted Average |
| 97,550 | | Pervious Area |
| 3,000 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|--|
| 22.9 | 150 | 0.0400 | 0.11 | | Sheet Flow, A-B |
| | | | | | Woods: Light underbrush n= 0.400 P2= 3.10" |
| 4.4 | 240 | 0.0330 | 0.91 | | Shallow Concentrated Flow, B-C |
| | | | | | Woodland Kv= 5.0 fps |
| 27.3 | 390 | Total | | | |

Subcatchment 6S:

Hydrograph



Summary for Subcatchment 7S:

Runoff = 29.24 cfs @ 12.66 hrs, Volume= 4.716 af, Depth= 3.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.80"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 6,412 | 98 | Paved parking & roofs |
| 6,800 | 74 | >75% Grass cover, Good, HSG C |
| 218,288 | 77 | 2 acre lots, 12% imp, HSG C |
| 197,200 | 82 | 2 acre lots, 12% imp, HSG D |
| 76,700 | 71 | Meadow, non-grazed, HSG C |
| 265,562 | 70 | Woods, Good, HSG C |
| 21,100 | 77 | Woods, Good, HSG D |
| 792,062 | 75 | Weighted Average |
| 735,791 | | Pervious Area |
| 56,271 | | Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|----------|---------------|---------------|-------------------|----------------|--|
| 18.3 | 150 | 0.0250 | 0.14 | | Sheet Flow, A-B |
| | | | | | Grass: Dense n= 0.240 P2= 3.10" |
| 2.8 | 390 | 0.0240 | 2.32 | | Shallow Concentrated Flow, B-C |
| | | | | | Grassed Waterway Kv= 15.0 fps |
| 10.0 | 390 | 0.0170 | 0.65 | | Shallow Concentrated Flow, C-D |
| | | | | | Woodland Kv= 5.0 fps |
| 0.1 | 20 | 0.0100 | 6.22 | 7.63 | Circular Channel (pipe), D-E |
| | | | | | Diam= 15.0" Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 |
| 18.1 | 940 | 0.0300 | 0.87 | | Shallow Concentrated Flow, E-F |
| | | | | | Woodland Kv= 5.0 fps |
| 49.3 | 1,890 | Total | | | |

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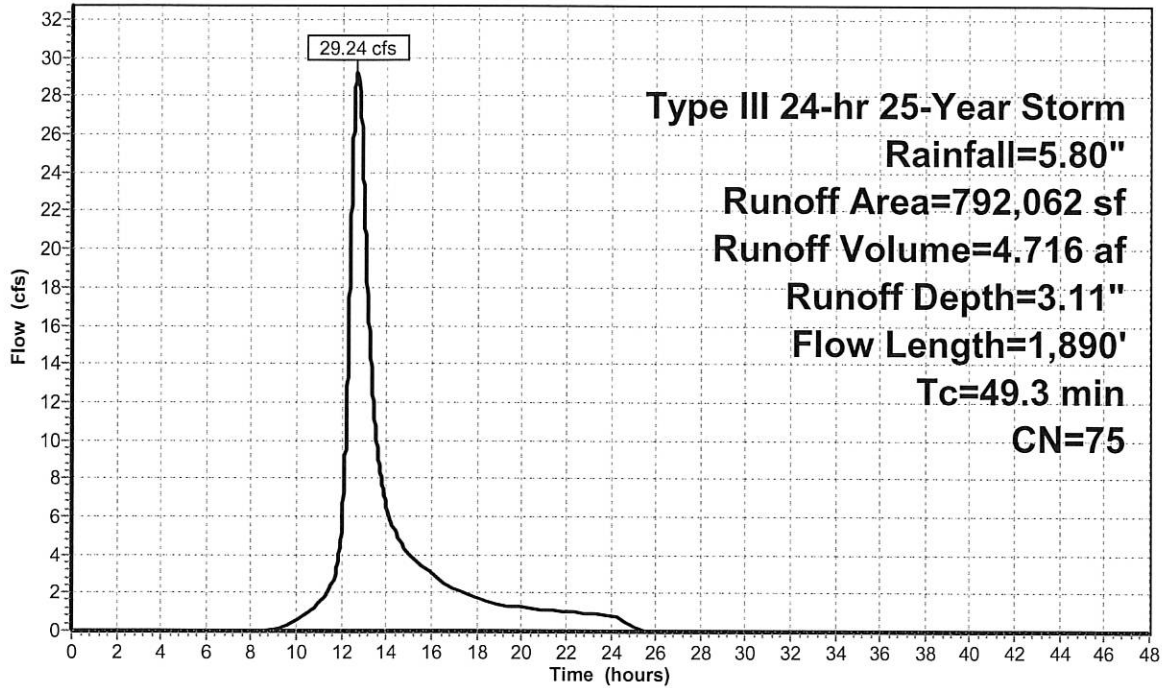
Type III 24-hr 25-Year Storm Rainfall=5.80"

Printed 10/27/2017

Page 17

Subcatchment 7S:

Hydrograph



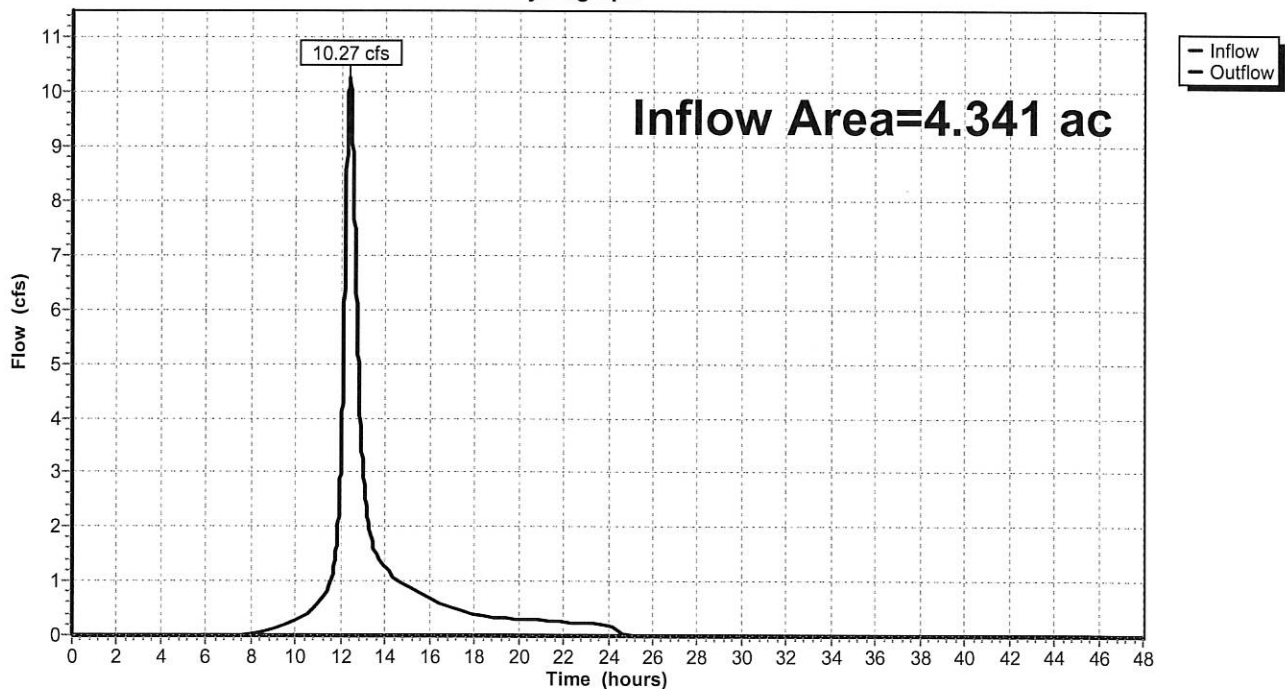
Summary for Reach 7R: POI 1

Inflow Area = 4.341 ac, 3.29% Impervious, Inflow Depth = 3.40" for 25-Year Storm event
 Inflow = 10.27 cfs @ 12.38 hrs, Volume= 1.231 af
 Outflow = 10.27 cfs @ 12.38 hrs, Volume= 1.231 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3

Reach 7R: POI 1

Hydrograph



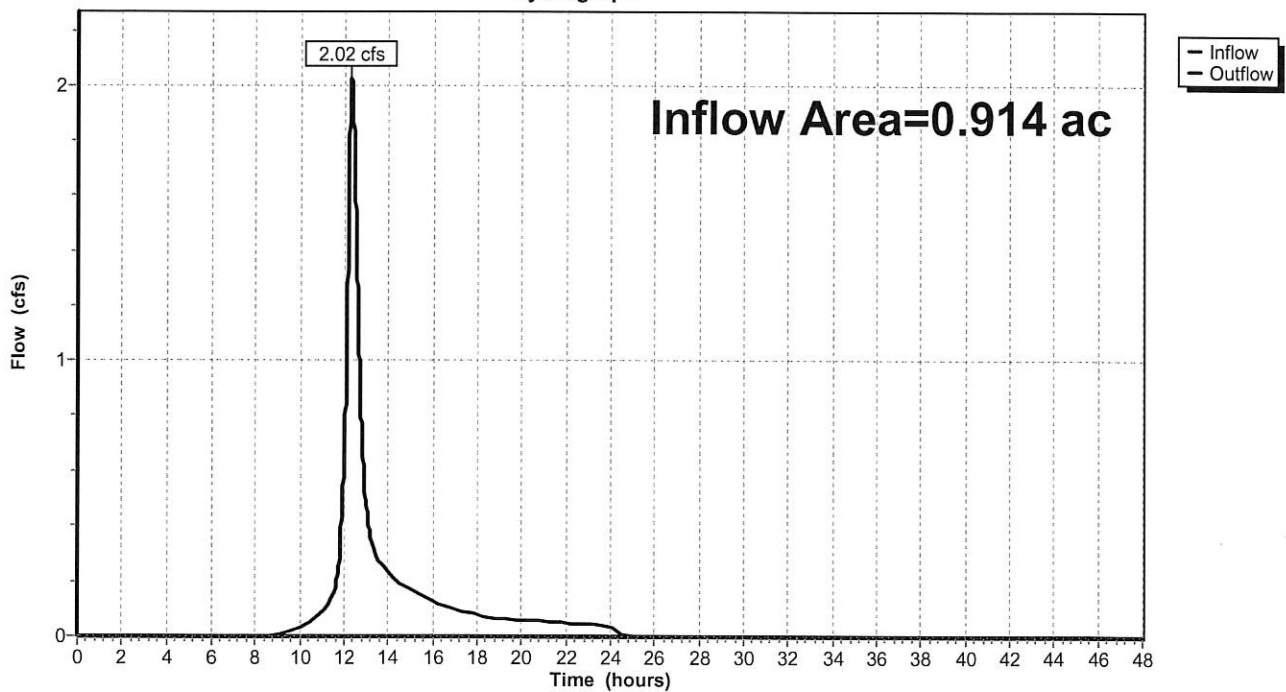
Summary for Reach 8R: POI 2

Inflow Area = 0.914 ac, 4.46% Impervious, Inflow Depth = 2.92" for 25-Year Storm event
 Inflow = 2.02 cfs @ 12.30 hrs, Volume= 0.223 af
 Outflow = 2.02 cfs @ 12.30 hrs, Volume= 0.223 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3

Reach 8R: POI 2

Hydrograph



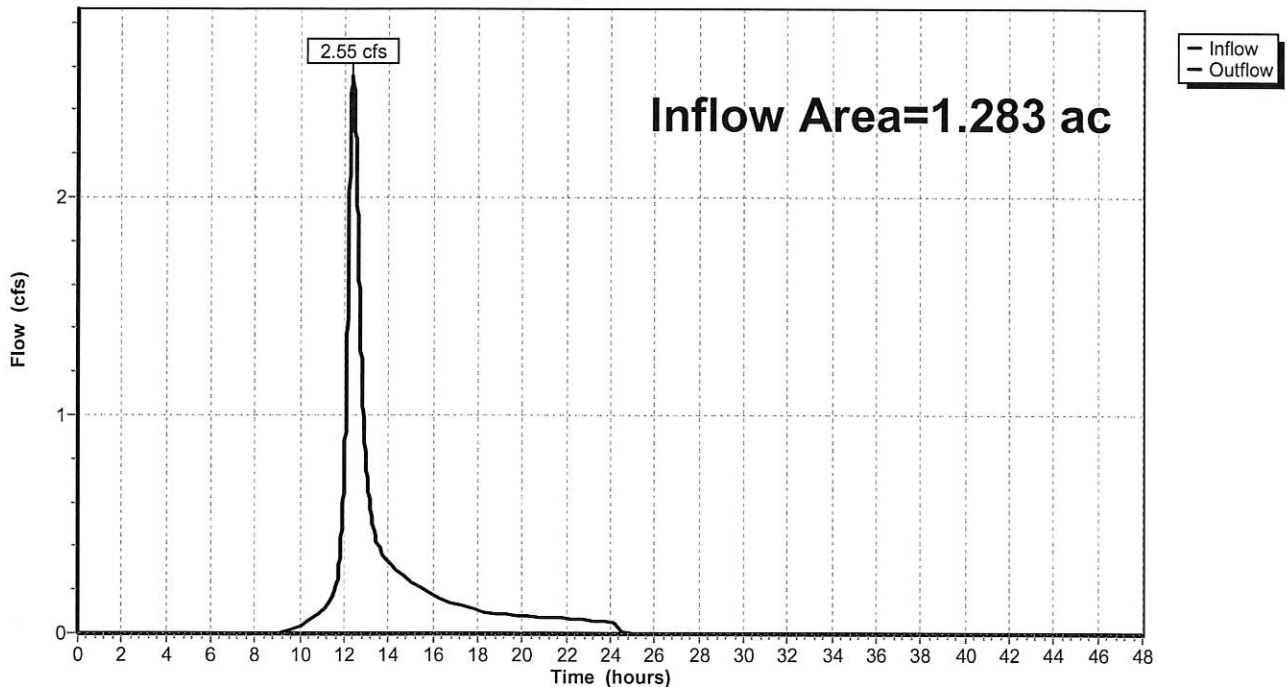
Summary for Reach 9R: POI 3

Inflow Area = 1.283 ac, 5.37% Impervious, Inflow Depth = 2.83" for 25-Year Storm event
 Inflow = 2.55 cfs @ 12.37 hrs, Volume= 0.303 af
 Outflow = 2.55 cfs @ 12.37 hrs, Volume= 0.303 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3

Reach 9R: POI 3

Hydrograph



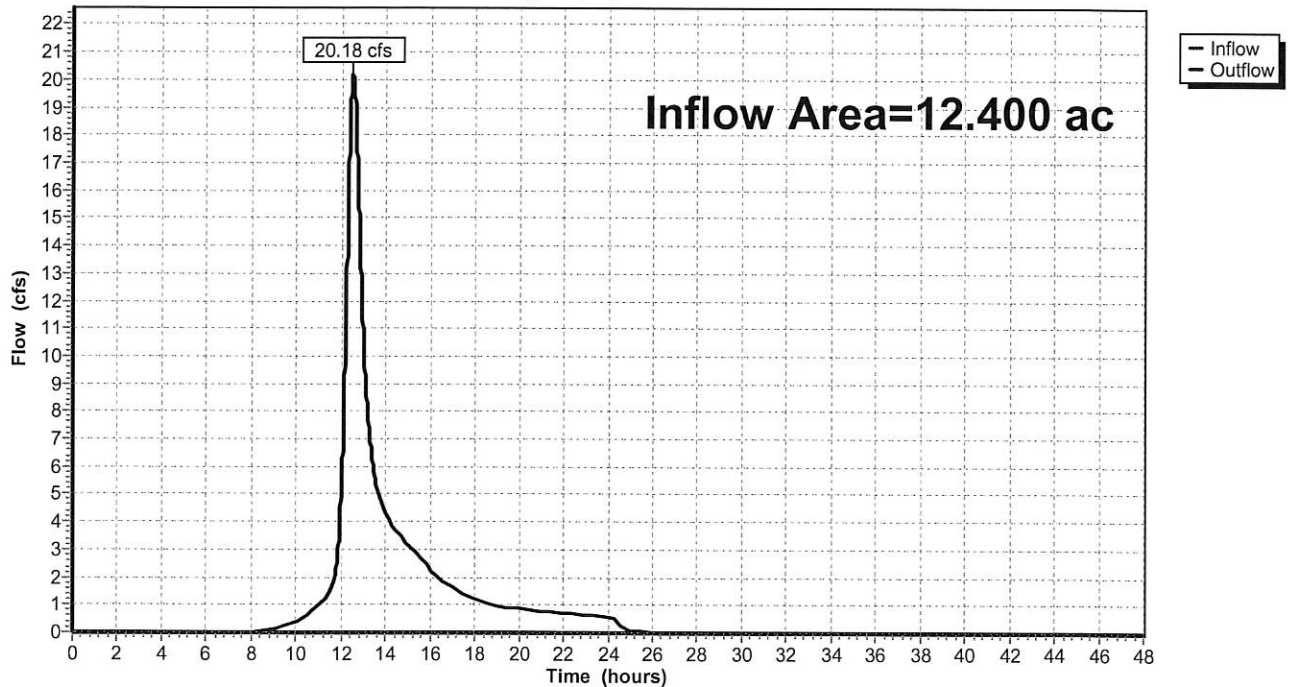
Summary for Reach 10R: POI 4

Inflow Area = 12.400 ac, 8.12% Impervious, Inflow Depth > 3.11" for 25-Year Storm event
 Inflow = 20.18 cfs @ 12.50 hrs, Volume= 3.212 af
 Outflow = 20.18 cfs @ 12.50 hrs, Volume= 3.212 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3

Reach 10R: POI 4

Hydrograph



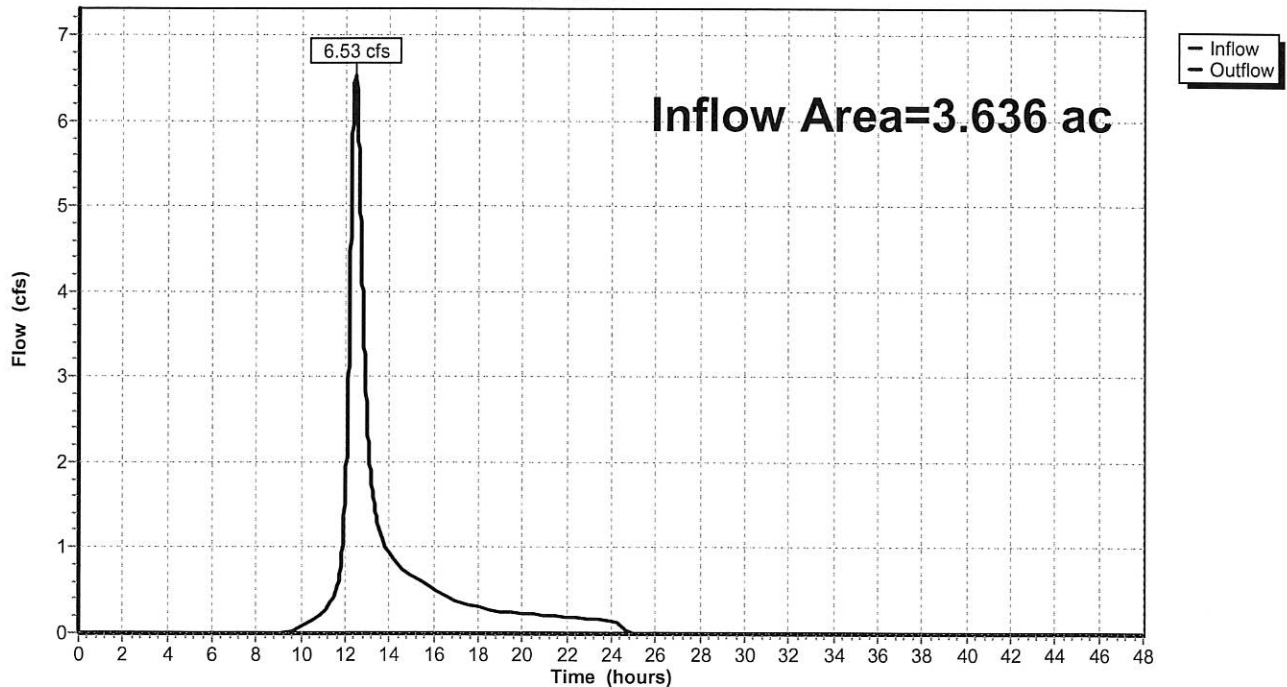
Summary for Reach 11R: POI 5

Inflow Area = 3.636 ac, 1.89% Impervious, Inflow Depth = 2.74" for 25-Year Storm event
 Inflow = 6.53 cfs @ 12.44 hrs, Volume= 0.830 af
 Outflow = 6.53 cfs @ 12.44 hrs, Volume= 0.830 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3

Reach 11R: POI 5

Hydrograph



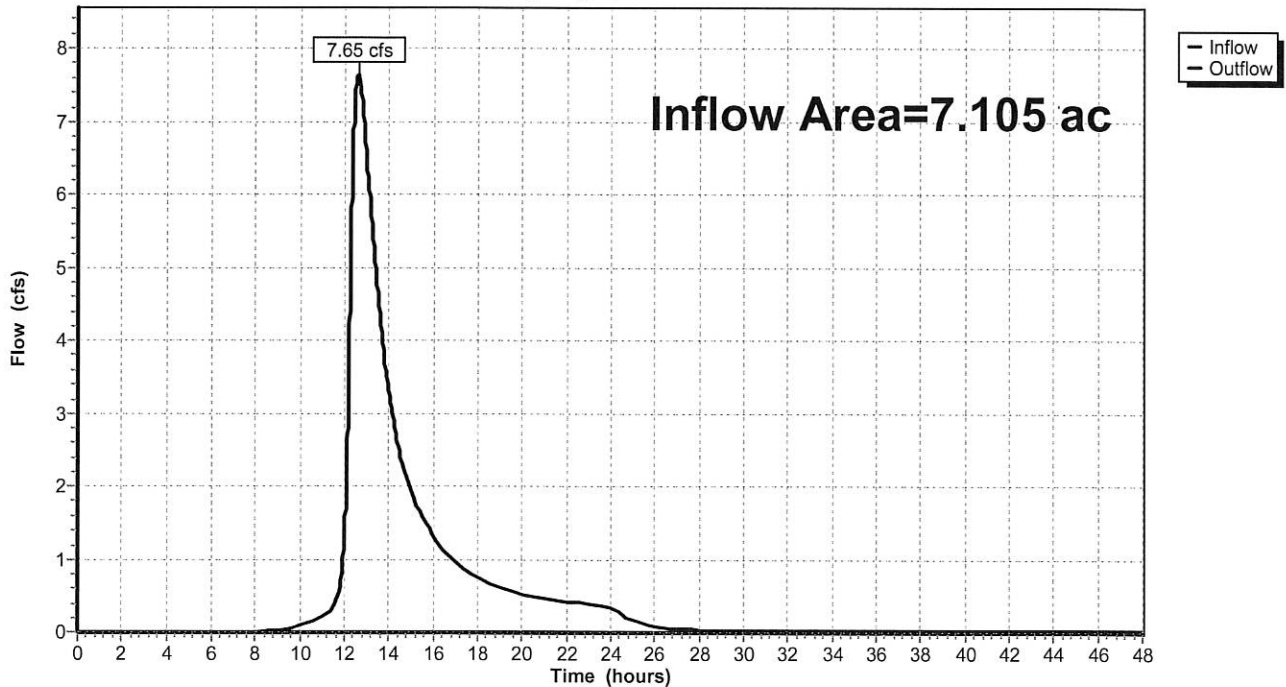
Summary for Reach 12R: POI 6

Inflow Area = 7.105 ac, 10.21% Impervious, Inflow Depth > 2.98" for 25-Year Storm event
 Inflow = 7.65 cfs @ 12.59 hrs, Volume= 1.765 af
 Outflow = 7.65 cfs @ 12.59 hrs, Volume= 1.765 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3

Reach 12R: POI 6

Hydrograph



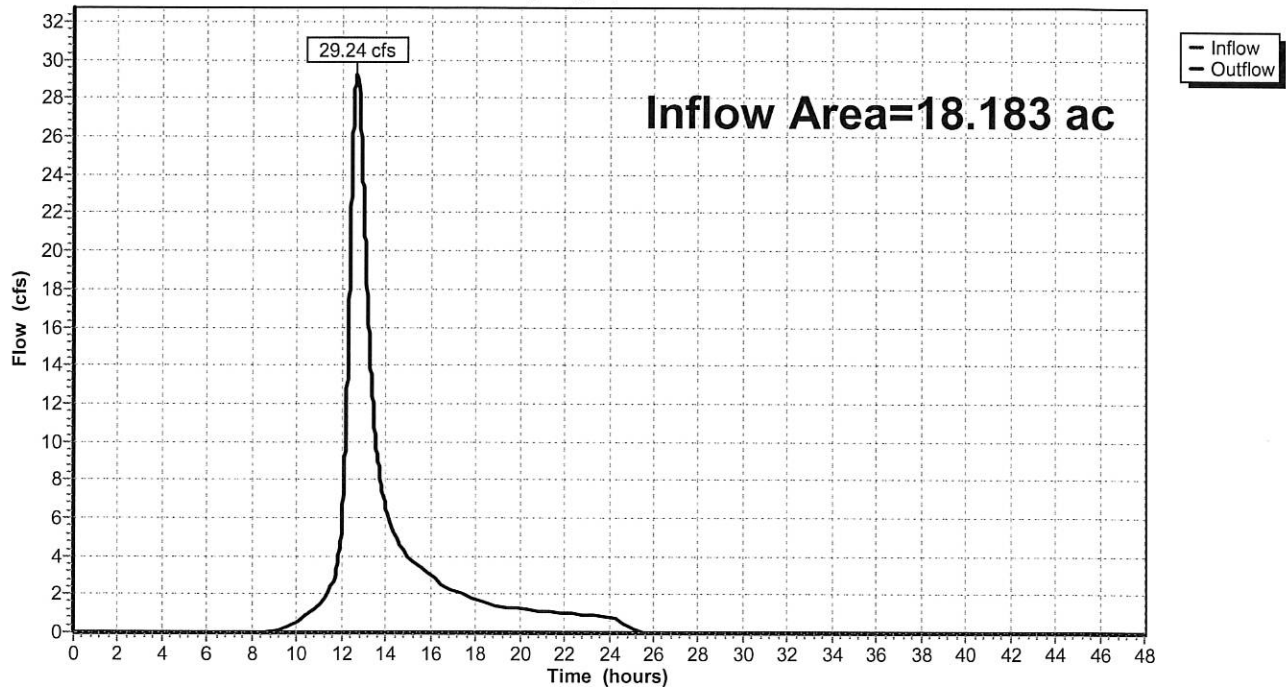
Summary for Reach 13R: POI 7

Inflow Area = 18.183 ac, 7.10% Impervious, Inflow Depth = 3.11" for 25-Year Storm event
 Inflow = 29.24 cfs @ 12.66 hrs, Volume= 4.716 af
 Outflow = 29.24 cfs @ 12.66 hrs, Volume= 4.716 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3

Reach 13R: POI 7

Hydrograph



Summary for Pond 1P:

Inflow Area = 2.655 ac, 17.76% Impervious, Inflow Depth = 3.21" for 25-Year Storm event
 Inflow = 7.49 cfs @ 12.21 hrs, Volume= 0.710 af
 Outflow = 1.73 cfs @ 12.76 hrs, Volume= 0.684 af, Atten= 77%, Lag= 32.8 min
 Primary = 1.71 cfs @ 12.76 hrs, Volume= 0.619 af
 Secondary = 0.02 cfs @ 9.05 hrs, Volume= 0.066 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
 Peak Elev= 399.13' @ 12.76 hrs Surf.Area= 7,076 sf Storage= 13,048 cf

Plug-Flow detention time= 177.7 min calculated for 0.684 af (96% of inflow)
 Center-of-Mass det. time= 157.5 min (991.6 - 834.1)

| Volume | Invert | Avail.Storage | Storage Description |
|--------|---------|---------------|--|
| #1 | 395.67' | 19,701 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 395.67 | 1,244 | 0 | 0 |
| 397.17 | 2,196 | 2,580 | 2,580 |
| 398.00 | 5,700 | 3,277 | 5,857 |
| 400.00 | 8,144 | 13,844 | 19,701 |

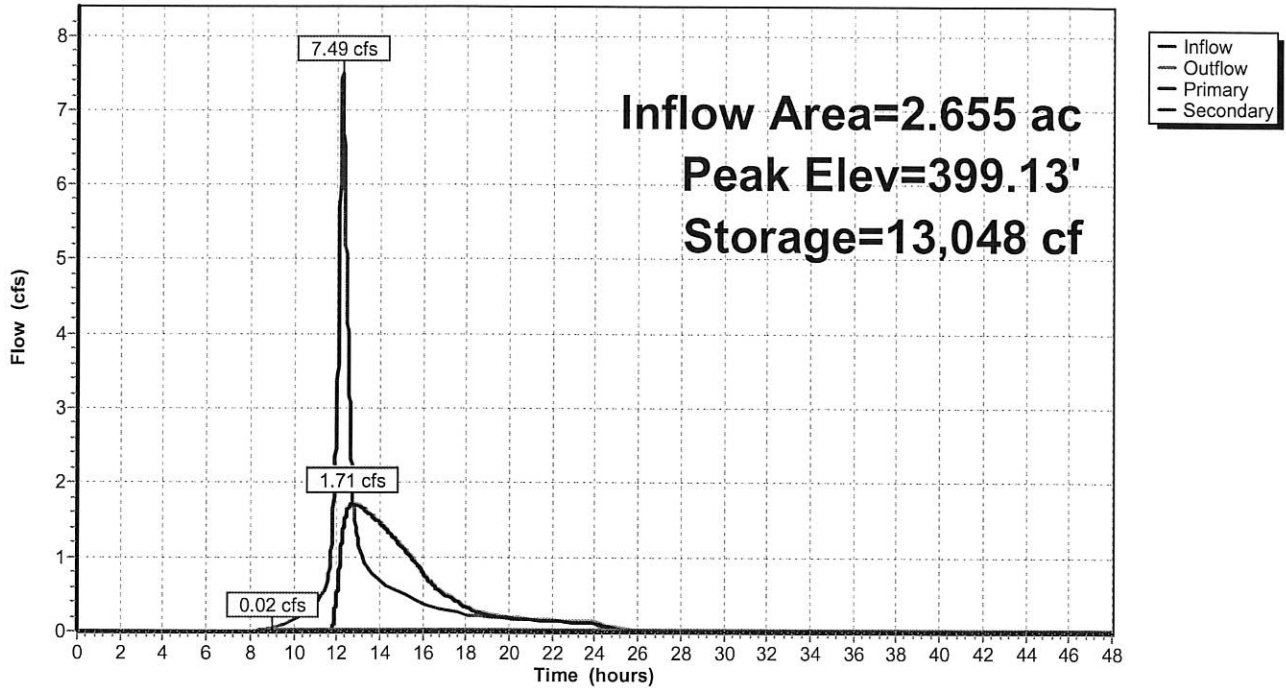
| Device | Routing | Invert | Outlet Devices |
|--------|-----------|---------|--|
| #1 | Secondary | 395.67' | 0.02 cfs Exfiltration at all elevations |
| #2 | Primary | 397.17' | 6.0" Vert. Orifice/Grate C= 0.600 |
| #3 | Primary | 397.68' | 4.0" Vert. Orifice/Grate C= 0.600 |

Primary OutFlow Max=1.71 cfs @ 12.76 hrs HW=399.13' TW=0.00' (Dynamic Tailwater)
 ↳ **2=Orifice/Grate** (Orifice Controls 1.23 cfs @ 6.29 fps)
 ↳ **3=Orifice/Grate** (Orifice Controls 0.48 cfs @ 5.45 fps)

Secondary OutFlow Max=0.02 cfs @ 9.05 hrs HW=395.70' TW=0.00' (Dynamic Tailwater)
 ↳ **1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Pond 1P:

Hydrograph



Summary for Pond 2P:

Inflow Area = 4.797 ac, 13.69% Impervious, Inflow Depth = 3.21" for 25-Year Storm event
 Inflow = 9.63 cfs @ 12.47 hrs, Volume= 1.282 af
 Outflow = 5.07 cfs @ 12.90 hrs, Volume= 1.221 af, Atten= 47%, Lag= 26.0 min
 Primary = 5.04 cfs @ 12.90 hrs, Volume= 1.123 af
 Secondary = 0.03 cfs @ 9.31 hrs, Volume= 0.098 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3

Peak Elev= 408.00' @ 12.90 hrs Surf.Area= 9,389 sf Storage= 18,613 cf

Plug-Flow detention time= 152.2 min calculated for 1.221 af (95% of inflow)

Center-of-Mass det. time= 125.7 min (977.3 - 851.6)

| Volume | Invert | Avail.Storage | Storage Description |
|--------|---------|---------------|--|
| #1 | 404.17' | 29,326 cf | Custom Stage Data (Prismatic) Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 404.17 | 2,136 | 0 | 0 |
| 405.67 | 3,168 | 3,978 | 3,978 |
| 409.00 | 12,056 | 25,348 | 29,326 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|---------|--|
| #1 | Secondary | 404.17' | 0.03 cfs Exfiltration at all elevations |
| #2 | Device 3 | 405.90' | 0.5' long x 0.7' 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 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32 |
| #3 | Primary | 405.00' | 15.0" x 37.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 404.00' S= 0.0270 ' /' Cc= 0.900 n= 0.013 |

Primary OutFlow Max=5.04 cfs @ 12.90 hrs HW=408.00' TW=0.00' (Dynamic Tailwater)

↑ **3=Culvert** (Passes 5.04 cfs of 9.11 cfs potential flow)

↑ **2=Broad-Crested Rectangular Weir** (Weir Controls 5.04 cfs @ 4.80 fps)

Secondary OutFlow Max=0.03 cfs @ 9.31 hrs HW=404.20' TW=0.00' (Dynamic Tailwater)

↑ **1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Post 10-26-17

Prepared by Gorrill Palmer

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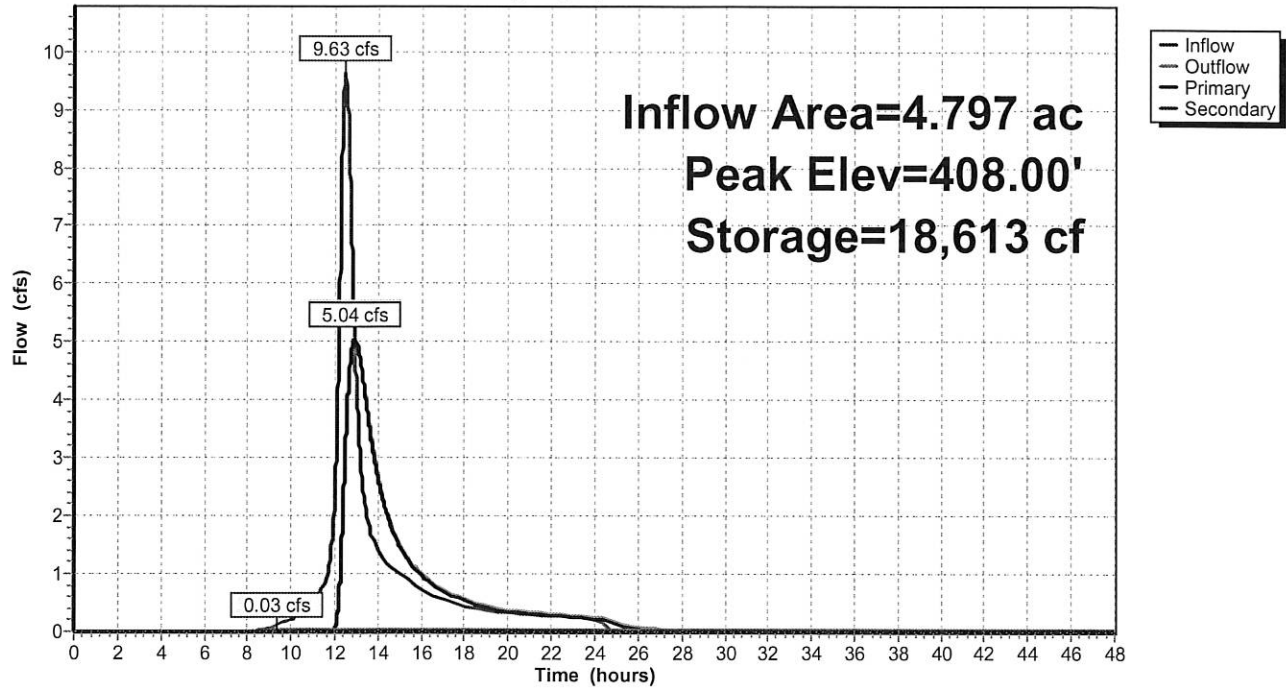
Type III 24-hr 25-Year Storm Rainfall=5.80"

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Page 28

Pond 2P:

Hydrograph



ATTACHMENT C

DITCH AND STORMDRAIN



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JOB 3236.01
SHEET NO. 1 OF 1
CALCULATED BY JA DATE 10-27-17
CHECKED BY JA DATE 10-27-17
SCALE 1" = 40'

STORM DRAINAGE

DRIVEWAY CULVERT LOT 7

$$\text{TOTAL AREA} = 2.96(80^2) = 18,944 \text{ ft}^2 = 0.43 \text{ Ac}$$

$$\text{IMP} = 370(13) = 4810 \text{ ft}^2 = 0.11 \text{ Ac} \quad C = 0.9$$

$$\text{IMP} = 3000 \text{ ft}^2 (\text{HOUSE/DW}) = 0.07 \text{ Ac} \quad C = 0.9$$

$$\text{LAWN} = 6,000 \text{ ft}^2 = 0.14 \text{ Ac} \quad C = 0.2$$

$$\text{WOODS} = 5134 \text{ ft}^2 = 0.12 \text{ Ac} \quad C = 0.2$$

$$\text{ASSUME } T_c = 5 \text{ MIN} \quad i_{25} = 6.2 \text{ in/hr}$$

$$\text{COMPOSITE } C = \frac{0.18}{0.43}(0.9) + \frac{0.26}{0.43}(0.2) = 0.50$$

$$Q_{25} = 0.5(6.2)(0.43) = 1.3 \text{ cfs}$$

USE 12" CULVERT

INLET STA 24+00 RT

FROM LOT 7 DRIVEWAY CULVERT $A = 0.43 \quad C = 0.50$

$$\text{TOTAL ADDITIONAL AREA} = 5.02(80^2) = 32,128 \text{ ft}^2 = 0.74 \text{ Ac}$$

$$\text{PAVE} = 120(13) + 90(20) = 3360 \text{ ft}^2 = 0.08 \text{ Ac} \quad C = 0.9$$

$$\text{VEG} = 28,768 \text{ ft}^2 = 0.66 \text{ Ac} \quad C = 0.20$$

$$\text{COMPOSITE } C = \frac{0.43}{1.17}(0.5) + \frac{0.08}{1.17}(0.9) + \frac{0.66}{1.17}(0.20) = 0.36$$



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JOB 3236.01
SHEET NO. 2 OF _____
CALCULATED BY JP DATE 10-27-17
CHECKED BY _____ DATE _____
SCALE _____

INLET STA 24+00 RT

ASSUME $T_c = 5 \text{ MIN}$ $i_{25} = 6.2 \text{ in/hr}$

$$Q_{25} = 0.36(6.2)(1.17) = 2.6 \text{ cfs}$$

USE 12" SD

INLET STA 24+00 LT USE 12" BY INSPECTION
 $A = 0.129 \text{ Ac}$ $C = 0.55$

DRIVEWAY CULVERT LOT 8 USE 12" BY INSPECTION

DRIVEWAY CULVERT LOT 9

$$\text{TOTAL AREA} = 11.98(80') = 76,672 \text{ ft}^2 = 1.76 \text{ Ac}$$

$$\text{IMP} = 3,000 + 3,000 + 250(13) = 9250 \text{ ft}^2 = 0.2 \text{ Ac } C = 0.9$$

$$\text{VEG} = 67,422 \text{ ft}^2 = 1.55 \text{ Ac } C = 0.2$$

$$\text{COMPOSITE } C = \frac{0.2}{1.76}(0.9) + \frac{1.55}{1.76}(0.2) = 0.28$$

$$\text{FROM HYDROCAD } T_c = 30 \text{ MIN } Q_{25} = 0.28(3)1.76 = 1.5 \text{ cfs}$$

$$i_{25} = 3 \text{ in/hr}$$

USE 12" CULVERT



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SHEET NO. 3 OF 19
CALCULATED BY 19 DATE 10-27-17
CHECKED BY _____ DATE _____
SCALE _____

LOT 10 DRIVEWAY CULVERT

FROM LOT 9 DRIVEWAY CULVERT $A = 1.76 A_c$ $C = 0.28$

$$\text{TOTAL ADDITIONAL AREA} = 12.65(80^2) = 80,960 \text{ ft}^2 \\ \text{TO INLET @ 15100 \text{ RT}} \\ = 1.86 A_c$$

$$\text{IMP} = 3,000 \text{ ft}^2 + 150(13) = 4,950 \text{ ft}^2 \quad 0.11 A_c \quad C = 0.9$$

$$\text{VEG} = 76,010 \text{ ft}^2 = 1.74 A_c \quad C = 0.2$$

$$\text{COMPOSITE } C = \frac{1.76}{3.92} (0.28) + \frac{0.11}{3.92} (0.9) + \frac{1.74}{3.92} (0.2)$$

$$C = 0.24$$

$$Q_{25} = 0.24(3)(3.92) = 2.82 \text{ cfs}$$

USE 15" CULVERT

CB 1

$$\text{IMP} = 190(15) = 2,850 \text{ ft}^2 \quad C = 0.9 \quad T_c = 5 \text{ MIN}$$

$$Q_{25} = 0.9(6.2) 0.06 = 0.33 \text{ cfs}$$

$$\text{CB 2} \quad 220(13) = 2,860 \text{ ft}^2 \quad C = 0.9 \quad T_c = 5 \text{ MIN}$$

$$Q_{25} = 0.9(6.2) 0.07 = 0.39 \text{ cfs}$$

LOT 1 DRIVEWAY CULVERT = 12" BY INSPECTION



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JOB 3236.01
SHEET NO. 4 OF 1
CALCULATED BY JP DATE 10-27-17
CHECKED BY _____ DATE _____
SCALE _____

ROADSIDE DITCH FLOW

ASSUMING WORST CASE AT STA 16+00 RT +

$$Q_{15} = 2.8 \text{ cfs}$$

PERMISSIBLE VEGETATED VELOCITY
WOOD BRIDGE SOIL = 3 ft/s

$$V = 2.8 \text{ ft/s}$$

USE VEGETATED LINING

DITCH TO GRASSED UNDERDRAINED SOIL
FILTER ADJACENT TO LOT 3

RIP RAP SLOPE $D_{50} = 6''$

DITCH TO GRASSED UNDERDRAINED SOIL FILTER
ADJACENT TO LOT 1

LOW FLOW FROM LEFT SIDE ROADSIDE DITCH

USE VEGETATED LINING

MAINE EROSION AND SEDIMENT CONTROL BMPs – 10/2016

| SOIL NAME | K factor | SURFACE WATER PERMISSIBLE VELOCITY | | WATERTABLE | | | DEPTH TO BEDROCK | HYDRIC SOIL | |
|----------------------|----------------|------------------------------------|-------------------|--------------------------|----------|-------------|------------------|-------------|--------|
| | (10"-20") | BARE ft/sec | VEGETATED ft/sec. | INFLOW RATE cfs/1000 ft. | Kind | Depth in ft | Duration | | inches |
| Hydrologic Group C | | | | | | | | | |
| Becket | 0.17 | 1.5 | 3 | 0.1 | Perched | 2.0-3.5 | Mar-Apr | >60 | N |
| Chesuncook* | 0.24/0.32 | 1.5 | 3 | 0.1 | Perched | 1.5-3.0 | Mar-May | >60 | N |
| Conant | 0.24 | 2 | 3.5 | 0.15 | Apparent | 1.0-2.5 | Nov-May | >60 | N |
| Dixfield* | 0.20 | 2 | 3.5 | 0.1 | Perched | 1.5-2.5 | Nov-Apr | >60 | N |
| Elliottsville | 0.24 | 1.5 | 3 | ---- | ---- | ---- | ---- | 20-40 | N |
| Howland* | 0.24 | 2 | 3.5 | 0.1 | Perched | 1.5-2.5 | Oct-May | >60 | N |
| Linneus | 0.28 | 1.5 | 3 | ---- | ---- | ---- | ---- | 20-40 | N |
| Mapleton | 0.20 | 2 | 3.5 | ---- | ---- | ---- | ---- | 10-20 | N |
| Marlow | 0.24/0.32/0.20 | 2 | 4 | 0.1 | Perched | 2.0-3.5 | Mar-Apr | >60 | N |
| Melrose | 0.32/0.49 | 2 | 4 | 0.1 | ---- | >6 | ---- | >60 | N |
| Paxton | 0.24/0.32/0.20 | 2 | 4 | 0.1 | Perched | 2.0-3.5 | Mar-Apr | >60 | N |
| Penquis | 0.32 | 1.5 | 3 | ---- | ---- | ---- | ---- | 20-40 | N |
| Perham* | 0.24/0.32/0.37 | 1.5 | 3 | 0.1 | Perched | 1.5-2.5 | Mar-May | >60 | N |
| Peru* | 0.24/0.32/0.37 | 1.5 | 3 | 0.1 | Perched | 1.5-2.5 | Nov-May | >60 | N |
| Plaisted | 0.24 | 2 | 3.5 | 0.1 | Perched | 2.0-3.5 | Nov-May | >60 | N |
| Ragmuff* | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Rawsonville | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Sisk | 0.28/0.32 | ---- | ---- | ---- | ---- | >6 | ---- | >60 | N |
| Skerry** | 0.20/0.28/0.17 | 1.5 | 3 | 0.1 | Perched | 1.5-2.5 | Nov-May | >60 | N |
| Suffield | 0.32/0.49 | 1.5 | 3.5 | 0.05 | Perched | 1.5-3.0 | Nov-May | >60 | N |
| Surplus* | 0.28/0.32 | ---- | ---- | ---- | Perched | 1.0-2.0 | Oct-May | >60 | N |
| Tunbridge | 0.24/0.20 | 2 | 3.5 | ---- | ---- | ---- | ---- | 20-40 | N |
| Winnecook | 0.28 | 1.5 | 3 | 1 | ---- | ---- | ---- | 20-40 | N |
| Hydrologic Group C/D | | | | | | | | | |
| Boothbay # | 0.32/0.49 | 1.5 | 3 | 0.05 | Apparent | 1.0-2.0 | Nov-May | >60 | N |
| Buxton # | 0.32/0.49 | 1.5 | 3.5 | 0.05 | Perched | 1.5-3.0 | Nov-May | >60 | N |
| Chesuncook** | 0.24/0.32 | 1.5 | 3 | 0.1 | Perched | 1.5-3.0 | Mar-May | >60 | N |
| Dixfield** | 0.20 | 2 | 3.5 | 0.1 | Perched | 1.5-2.5 | Nov-Apr | >60 | N |
| Dixmont | 0.28 | 1.5 | 3 | 0.15 | Perched | 1.0-2.0 | Nov-Jun | >60 | N |
| Easton | 0.24/0.37 | 1.5 | 3 | 0.1 | Apparent | 0-1.5 | Oct-May | >60 | Y/N |
| Howland** | 0.24 | 2 | 3.5 | 0.1 | Perched | 1.5-2.5 | Oct-May | >60 | N |
| Lamoine | 0.32/0.49 | 1.5 | 3 | 0.05 | Perched | 0.5-2.0 | Nov-Jun | >60 | N |
| Leicester | 0.32 | 1.5 | 3 | 0.1 | Perched | 0-1.0 | Nov-Jun | >60 | Y |
| Perham** | 0.24/0.32/0.37 | 1.5 | 3 | 0.1 | Perched | 1.5-2.5 | Mar-May | >60 | N |
| Peru** | 0.24/0.32/0.37 | 1.5 | 3 | 0.1 | Perched | 1.5-2.5 | Nov-May | >60 | N |
| Pushaw | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Ragmuff** | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Skerry* | 0.20/0.28/0.17 | 1.5 | 3 | 0.1 | Perched | 1.5-2.5 | Nov-May | >60 | N |
| Surplus** | 0.28/0.32 | ---- | ---- | ---- | Perched | 1.0-2.0 | Oct-May | >60 | N |
| Washburn | 0.24/0.37 | 2 | 3.5 | 0.1 | Apparent | +1-0.5 | Oct-Jul | >60 | Y |
| Woodbridge | 0.24/0.32/0.37 | 1.5 | 3 | 0.1 | Perched | 1.5-2.5 | Nov-May | >60 | N |

TRAPAZOIDAL DITCH SIZING
Gorrill Palmer

JOB DATA

Project: 3236.01
Calc. by: JWA
Date: 10/26/2017
Ditch at:

EQUATIONS:

Manning's Equation, $V = (1.49/n)R^{2/3}S^{1/2}$
 $Q = VA$
Froude number, $F = V/(gd)^{1/2}$

INPUT:

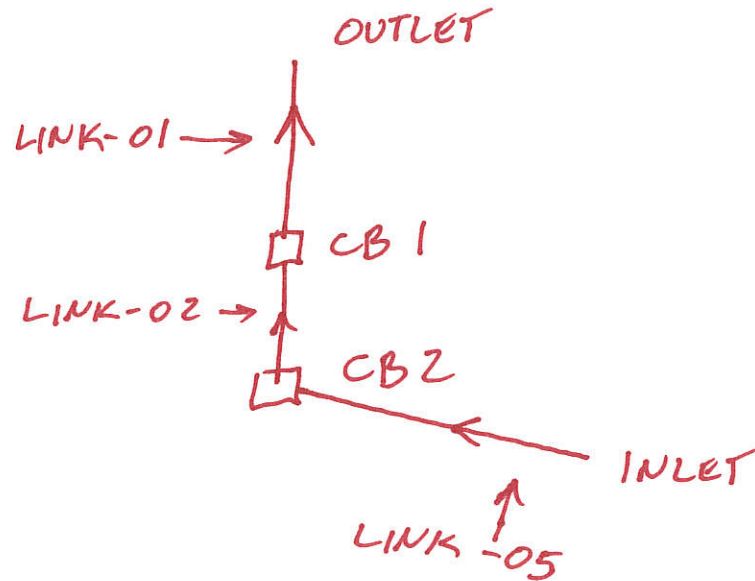
Base width (b) = 1.0 ft
Sideslope (z) = 3 on 1
Sideslope (z) = 3 on 1
Depth of flow (d) = 0.44 ft
Manning's n = 0.030 (grass)
Slope of ditch (s) = 0.0180 ft/ft

OUTPUT:

Wet Perimeter (P) = 3.78 ft
Area of Flow (A) = 1.02 sq. ft.
Hydr. Radius (R) = 0.27 ft
Velocity of Flow (V) = 2.8 fps
Flow Capacity (Q) = 2.8 cfs
Froude Number (F) = 0.74 < 1, subcritical flow



| SN | Element Description ID | From (Inlet Node) | To (Outlet Node) | Length (ft) | Inlet Invert Elevation (ft) | Inlet Invert Offset (ft) | Outlet Invert Elevation (ft) | Outlet Invert Offset (ft) | Total Drop (ft) | Average Slope (%) | Pipe Shape | Pipe Diameter or Height (inches) |
|----|---------------------------|----------------------|---------------------|----------------|--------------------------------------|-----------------------------------|---------------------------------------|------------------------------------|-----------------------|-------------------------|---------------|---|
| 1 | Link-01 | Inlet-01 | Out-01 | 77.00 | 406.82 | 0.00 | 405.00 | 0.00 | 1.82 | 2.3600 | CIRCULAR | 15.000 |
| 2 | Link-02 | Inlet-02 | Inlet-01 | 22.00 | 407.20 | -0.10 | 406.92 | 0.10 | 0.28 | 1.2700 | CIRCULAR | 15.000 |
| 3 | Link-05 | 64 | Inlet-02 | 48.00 | 410.00 | 0.00 | 407.30 | 0.00 | 2.70 | 5.6200 | CIRCULAR | 15.000 |



| Pipe Width | Manning's Roughness | Entrance Losses | Exit/Bend Losses | Additional Losses | Initial Flow | Flap Gate | Lengthening Factor | Peak Flow | Time of Peak Flow Occurrence | Max Flow Velocity | Travel Time | Design Flow Capacity |
|------------|---------------------|-----------------|------------------|-------------------|--------------|-----------|--------------------|-----------|------------------------------|-------------------|-------------|----------------------|
| (inches) | | | | | (cfs) | | | (cfs) | (days hh:mm) | (ft/sec) | (min) | (cfs) |
| 15.00 | 0.0150 | 0.5000 | 0.5000 | 0.0000 | 0.00 | NO | 1.00 | 2.77 | 0 00:30 | 5.85 | 0.22 | 8.61 |
| 15.00 | 0.0150 | 0.5000 | 0.5000 | 0.0000 | 0.00 | NO | 1.00 | 2.77 | 0 00:30 | 4.77 | 0.08 | 7.36 |
| 15.00 | 0.0150 | 0.5000 | 0.8000 | 0.0000 | 0.00 | NO | 1.00 | 2.77 | 0 00:30 | 5.51 | 0.15 | 13.28 |

| Max Flow / Design Flow Ratio | Max Flow Depth / Total Depth Ratio | Total Time Surcharged (min) | Max Flow Depth (ft) | Reported Condition |
|------------------------------------|---|--------------------------------------|------------------------------|-----------------------|
| 0.32 | 0.41 | 0.00 | 0.51 | Calculated |
| 0.38 | 0.48 | 0.00 | 0.60 | Calculated |
| 0.21 | 0.43 | 0.00 | 0.54 | Calculated |

| SN | Element ID | X Coordinate | Y Coordinate | Description | Invert Elevation | Boundary Type | Flap Gate | Fixed Water Elevation | Peak Inflow |
|----|---------------|--------------|--------------|-------------|---------------------|------------------|--------------|-----------------------------|----------------|
| | | | | | (ft) | | | (ft) | (cfs) |
| 1 | Out-01 | 2205.88 | 8431.37 | | 405.00 | NORMAL | NO | | 2.77 |

| Peak Lateral Inflow | Maximum HGL Depth Attained | Maximum HGL Elevation Attained |
|---------------------------|----------------------------------|--------------------------------------|
| (cfs) | (ft) | (ft) |
| 0.00 | 0.49 | 405.49 |

| SN | Element ID | X Coordinate | Y Coordinate | Description | Inlet Manufacturer | Manufacturer Part Number |
|----|---------------|--------------|--------------|-------------|-----------------------|--------------------------------|
| 1 | Inlet-01 | 2205.88 | 7647.06 | | FHWA HEC-22 GENERIC | N/A |
| 2 | Inlet-02 | 2215.69 | 7088.24 | | FHWA HEC-22 GENERIC | N/A |

| Inlet Location | Number of Inlets | Catchbasin Invert Elevation | Max (Rim) Elevation | Max (Rim) Offset | Initial Water Elevation | Initial Water Depth | Ponded Area | Grate Clogging Factor | Roadway Longitudinal Slope |
|-------------------|---------------------|-----------------------------------|---------------------------|------------------------|-------------------------------|---------------------------|----------------|-----------------------------|----------------------------------|
| | | (ft) | (ft) | (ft) | (ft) | (ft) | (ft²) | (%) | (ft/ft) |
| On Sag | 1 | 406.82 | 412.51 | 5.69 | 0.00 | 0.00 | 10.00 | 0.00 | N/A |
| On Sag | 1 | 407.30 | 412.55 | 5.25 | 0.00 | 0.00 | 10.00 | 0.00 | N/A |

| Roadway Cross Slope (ft/ft) | Roadway Manning's Roughness | Gutter Cross Slope (ft/ft) | Gutter Width (ft) | Gutter Depression (inches) | Median Ditch Longitudinal Slope (ft/ft) | Median Ditch Bottom Width (ft) | Median Ditch Left Side Slope (V:H) | Median Ditch Right Side Slope (V:H) |
|--|-----------------------------------|---|-----------------------------|--------------------------------------|---|--|--|---|
| 0.0200 | 0.0160 | 0.0620 | 2.00 | 2.0000 | 45.0000 | 45.0000 | 64 | 64 |
| 0.0200 | 0.0160 | 0.0620 | 2.00 | 2.0000 | 45.0000 | 45.0000 | 64 | 64 |

| Median Ditch Manning's Roughness | Peak Flow (cfs) | Peak Lateral Inflow (cfs) | Peak Flow Intercepted by Inlet (cfs) | Peak Flow Bypassing Inlet (cfs) | Inlet Efficiency during Peak Flow (%) | Allowable Spread (ft) | Max Gutter Spread during Peak Flow (ft) | Max Gutter Water Elev. during Peak Flow (ft) |
|---|-----------------------|------------------------------------|--|---|---|-----------------------------|---|--|
| 45.0000 | 0.33 | 0.33 | N/A | N/A | N/A | 7.00 | 0.43 | 412.60 |
| 45.0000 | 0.39 | 0.39 | N/A | N/A | N/A | 7.00 | 0.51 | 412.66 |

| Max Gutter Water Depth during Peak Flow (ft) | Time of Maximum Depth Occurrence (days hh:mm) | Total Flooded Volume (ac-inches) | Total Time Flooded (minutes) |
|--|---|---|---------------------------------------|
| 0.09 | 0 00:30 | 0.00 | 0.00 |
| 0.11 | 0 00:30 | 0.00 | 0.00 |

| SN | Element ID | X Coordinate | Y Coordinate | Description | Invert Elevation | Ground/Rim (Max) Elevation | Ground/Rim (Max) Offset | Initial Water Elevation |
|----|---------------|--------------|--------------|-------------|---------------------|----------------------------------|-------------------------------|-------------------------------|
| | | | | | (ft) | (ft) | (ft) | (ft) |
| 1 | 64 | 3705.88 | 6843.14 | | 410.00 | 413.00 | 3.00 | 0.00 |

| Initial Water Depth | Surcharge Elevation | Surcharge Depth | Ponded Area | Minimum Pipe Cover | Peak Inflow | Peak Lateral Inflow | Maximum HGL Elevation Attained | Maximum HGL Depth Attained | Maximum Surcharge Depth Attained |
|---------------------------|------------------------|--------------------|--------------------|-----------------------|----------------|---------------------------|---|-------------------------------------|---|
| (ft) | (ft) | (ft) | (ft ²) | (inches) | (cfs) | (cfs) | (ft) | (ft) | (ft) |
| -410.00 | 0.00 | -413.00 | 0.00 | 21.00 | 2.78 | 2.78 | 410.41 | 0.41 | 0.00 |

| Minimum Freeboard Attained (ft) | Average HGL Elevation Attained (ft) | Average HGL Depth Attained (ft) | Time of Maximum HGL Occurrence (days hh:mm) | Time of Peak Flooding Occurrence (days hh:mm) | Total Flooded Volume (ac-inches) | Total Time Flooded (minutes) |
|--|---|---|---|---|---|---------------------------------------|
| 2.59 | 410.04 | 0.04 | 0 00:30 | 0 00:00 | 0.00 | 0.00 |

| SN | Element Description ID | Area | Drainage Node ID | Weighted Runoff Coefficient | Accumulated Precipitation | Total Runoff | Peak Runoff | Rainfall Intensity |
|----|---------------------------|---------|---------------------|-----------------------------------|------------------------------|-----------------|----------------|-----------------------|
| | | (acres) | | | (inches) | (inches) | (cfs) | (inches/hr) |
| 1 | Sub-01 | 3.92 | 64 | 0.2400 | 1.48 | 0.35 | 2.78 | 2.950 |
| 2 | Sub-03 | 0.06 | Inlet-01 | 0.9000 | 0.52 | 0.47 | 0.34 | 6.200 |
| 3 | Sub-04 | 0.07 | Inlet-02 | 0.9000 | 0.52 | 0.47 | 0.39 | 6.200 |

**Time
of
Concentration**

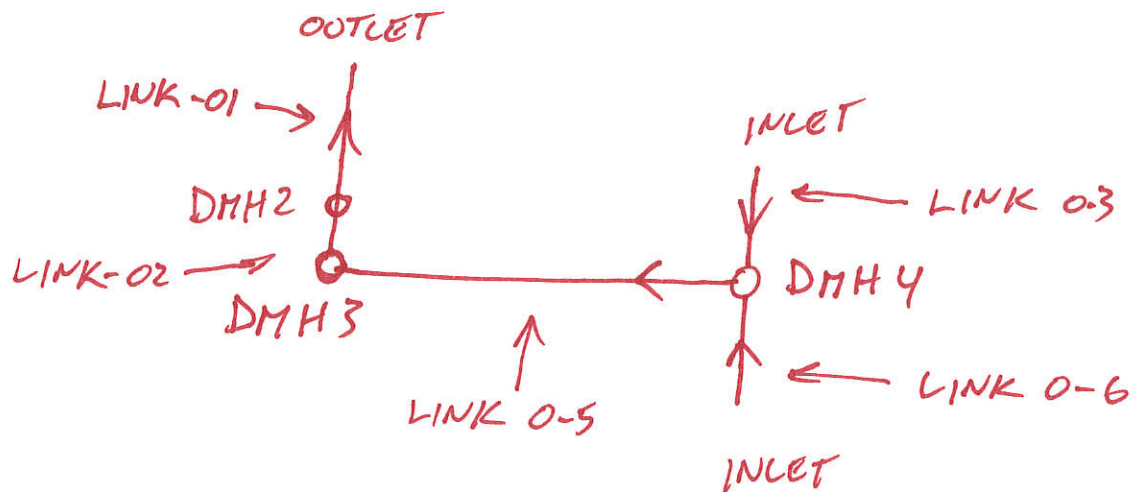
(days hh:mm:ss)

0 00:30:00

0 00:05:00

0 00:05:00

| SN | Element Description ID | From (Inlet) Node | To (Outlet) Node | Length (ft) | Inlet Invert Elevation (ft) | Inlet Invert Offset (ft) | Outlet Invert Elevation (ft) | Outlet Invert Offset (ft) | Total Drop (ft) |
|----|---------------------------|----------------------|---------------------|----------------|--------------------------------------|-----------------------------------|---------------------------------------|------------------------------------|-----------------------|
| 1 | Link-01 | 64 | Out-01 | 55.00 | 407.40 | 0.00 | 407.00 | 0.00 | 0.40 |
| 2 | Link-02 | 64 | 64 | 23.00 | 408.15 | 0.00 | 407.50 | 0.10 | 0.65 |
| 3 | Link-03 | Inlet-01 | 64 | 11.00 | 413.00 | 0.00 | 410.78 | 0.10 | 2.22 |
| 4 | Link-05 | 64 | 64 | 255.00 | 410.68 | 0.00 | 408.25 | 0.10 | 2.43 |
| 5 | Link-06 | 64 | 64 | 29.00 | 413.00 | 0.00 | 410.78 | 0.10 | 2.22 |



| Average Slope | Pipe Shape | Pipe Diameter or Height | Pipe Width | Manning's Roughness | Entrance Losses | Exit/Bend Losses | Additional Losses | Initial Flow | Flap Gate |
|------------------|---------------|-------------------------------|---------------|------------------------|--------------------|---------------------|----------------------|-----------------|--------------|
| (%) | | (inches) | (inches) | | | | | (cfs) | |
| 0.7300 | CIRCULAR | 15.000 | 15.00 | 0.0150 | 0.5000 | 0.5000 | 0.0000 | 0.00 | NO |
| 2.8300 | CIRCULAR | 12.000 | 12.00 | 0.0150 | 0.5000 | 0.5000 | 0.0000 | 0.00 | NO |
| 20.1800 | CIRCULAR | 12.000 | 12.00 | 0.0150 | 0.5000 | 0.8000 | 0.0000 | 0.00 | NO |
| 0.9500 | CIRCULAR | 12.000 | 12.00 | 0.0150 | 0.5000 | 0.8000 | 0.0000 | 0.00 | NO |
| 7.6600 | CIRCULAR | 12.000 | 12.00 | 0.0150 | 0.5000 | 0.8000 | 0.0000 | 0.00 | NO |

| Lengthening Factor | Peak Flow | Time of Peak Flow Occurrence | Max Flow Velocity | Travel Time | Design Flow Capacity | Max Flow / Design Flow Ratio | Max Flow Depth / Total Depth Ratio | Total Time Surcharged |
|-----------------------|--------------|---------------------------------------|-------------------------|----------------|----------------------------|------------------------------------|---|-----------------------------|
| | (cfs) | (days hh:mm) | (ft/sec) | (min) | (cfs) | | | (min) |
| 1.00 | 2.98 | 0 00:06 | 3.72 | 0.25 | 4.77 | 0.62 | 0.62 | 0.00 |
| 1.00 | 2.98 | 0 00:06 | 4.84 | 0.08 | 5.19 | 0.57 | 0.73 | 0.00 |
| 1.00 | 0.99 | 0 00:05 | 6.24 | 0.03 | 13.87 | 0.07 | 0.51 | 0.00 |
| 1.00 | 2.98 | 0 00:06 | 4.28 | 0.99 | 3.01 | 0.99 | 0.85 | 0.00 |
| 1.00 | 2.60 | 0 00:05 | 6.60 | 0.07 | 8.54 | 0.30 | 0.62 | 0.00 |

| Max Flow Depth | Reported Condition |
|----------------------|-----------------------|
|----------------------|-----------------------|

(ft)

| | |
|------|------------|
| 0.78 | Calculated |
| 0.73 | Calculated |
| 0.51 | Calculated |
| 0.85 | Calculated |
| 0.62 | Calculated |

| SN | Element ID | X Coordinate | Y Coordinate | Description | Invert Elevation | Boundary Type | Flap Gate | Fixed Water Elevation | Peak Inflow |
|----|---------------|--------------|--------------|-------------|---------------------|------------------|--------------|-----------------------------|----------------|
| | | | | | (ft) | | | (ft) | (cfs) |
| 1 | Out-01 | 1627.45 | 7509.80 | | 407.00 | NORMAL | NO | | 2.98 |

| Peak Lateral Inflow | Maximum HGL Depth Attained | Maximum HGL Elevation Attained |
|---------------------------|----------------------------------|--------------------------------------|
| (cfs) | (ft) | (ft) |
| 0.00 | 0.72 | 407.72 |

| SN | Element ID | X Coordinate | Y Coordinate | Description | Invert Elevation | Ground/Rim (Max) Elevation | Ground/Rim (Max) Offset | Initial Water Elevation |
|----|---------------|--------------|--------------|-------------|---------------------|----------------------------------|-------------------------------|-------------------------------|
| | | | | | (ft) | (ft) | (ft) | (ft) |
| 1 | Inlet-01 | 3627.45 | 6568.63 | | 413.00 | 416.00 | 3.00 | 0.00 |
| 2 | 64 | 1617.65 | 6735.29 | DMH2 | 407.40 | 412.00 | 4.60 | 0.00 |
| 3 | 64 | 1616.81 | 6420.22 | DMH3 | 408.15 | 418.00 | 9.85 | 0.00 |
| 4 | 64 | 3626.98 | 6312.68 | DMH4 | 410.68 | 415.78 | 5.10 | 0.00 |
| 5 | 64 | 3631.12 | 6047.97 | | 413.00 | 416.00 | 3.00 | 0.00 |

| Initial Water Depth | Surcharge Elevation | Surcharge Depth | Ponded Area | Minimum Pipe Cover | Peak Inflow | Peak Lateral Inflow | Maximum HGL Elevation Attained | Maximum HGL Depth Attained | Maximum Surcharge Depth Attained |
|---------------------------|------------------------|--------------------|--------------------|-----------------------|----------------|---------------------------|---|-------------------------------------|---|
| (ft) | (ft) | (ft) | (ft ²) | (inches) | (cfs) | (cfs) | (ft) | (ft) | (ft) |
| -413.00 | 0.00 | -416.00 | 10.00 | 24.00 | 0.99 | 0.99 | 413.18 | 0.18 | 0.00 |
| -407.40 | 0.00 | -412.00 | 0.00 | 40.20 | 2.98 | 0.00 | 408.24 | 0.84 | 0.00 |
| -408.15 | 0.00 | -418.00 | 0.00 | 105.00 | 2.98 | 0.00 | 408.88 | 0.73 | 0.00 |
| -410.68 | 0.00 | -415.78 | 0.00 | 48.00 | 3.59 | 0.00 | 411.64 | 0.96 | 0.00 |
| -413.00 | 0.00 | -416.00 | 0.00 | 24.00 | 2.61 | 2.61 | 413.43 | 0.43 | 0.00 |

| Minimum Freeboard Attained | Average HGL Elevation Attained | Average HGL Depth Attained | Time of Maximum HGL Occurrence | Time of Peak Flooding Occurrence | Total Flooded Volume | Total Time Flooded |
|----------------------------------|---|-------------------------------------|---|---|----------------------------|--------------------------|
| (ft) | (ft) | (ft) | (days hh:mm) | (days hh:mm) | (ac-inches) | (minutes) |
| 2.82 | 413.01 | 0.01 | 0 00:05 | 0 00:00 | 0.00 | 0.00 |
| 3.76 | 407.42 | 0.02 | 0 00:06 | 0 00:00 | 0.00 | 0.00 |
| 9.12 | 408.17 | 0.02 | 0 00:06 | 0 00:00 | 0.00 | 0.00 |
| 4.14 | 410.71 | 0.03 | 0 00:06 | 0 00:00 | 0.00 | 0.00 |
| 2.57 | 413.01 | 0.01 | 0 00:05 | 0 00:00 | 0.00 | 0.00 |

| SN | Element Description ID | Area | Drainage Node ID | Weighted Runoff Coefficient | Accumulated Precipitation | Total Runoff | Peak Runoff | Rainfall Intensity |
|----|---------------------------|---------|---------------------|-----------------------------------|------------------------------|-----------------|----------------|-----------------------|
| | | (acres) | | | (inches) | (inches) | (cfs) | (inches/hr) |
| 1 | Sub-01 | 0.29 | Inlet-01 | 0.5500 | 0.52 | 0.28 | 0.99 | 6.200 |
| 2 | Sub-02 | 1.17 | 64 | 0.3600 | 0.52 | 0.19 | 2.61 | 6.200 |

**Time
of
Concentration**

(days hh:mm:ss)

0 00:05:00

0 00:05:00

EROSION AND SEDIMENTATION CONTROL BASIC STANDARDS



I.1 Overview

This Exhibit demonstrates the developer has made adequate provision for controlling erosion and sedimentation.

I.2 Introduction

Gorrill Palmer has been retained by TZ Properties, LLC to prepare an Erosion and Sedimentation Control Report for a proposed 10 lot residential subdivision off Orchard Road in Cumberland, Maine. TZ Properties, LLC proposes the construction of the roadway, stormwater management facilities, and electric service to the transformer location. House lot construction will be by the individual lot owners. Figure 1 is a map showing the project location. The developer is currently seeking a Subdivision Permit from the Town of Cumberland and a Stormwater Permit from MDEP. Gorrill Palmer has prepared an Erosion and Sedimentation Control Plan for the proposed development. This narrative contains the general erosion and sedimentation control measures, which are appropriate for the construction of the project.

I.3 Narrative

I.3.1 Existing Conditions and Soil Types

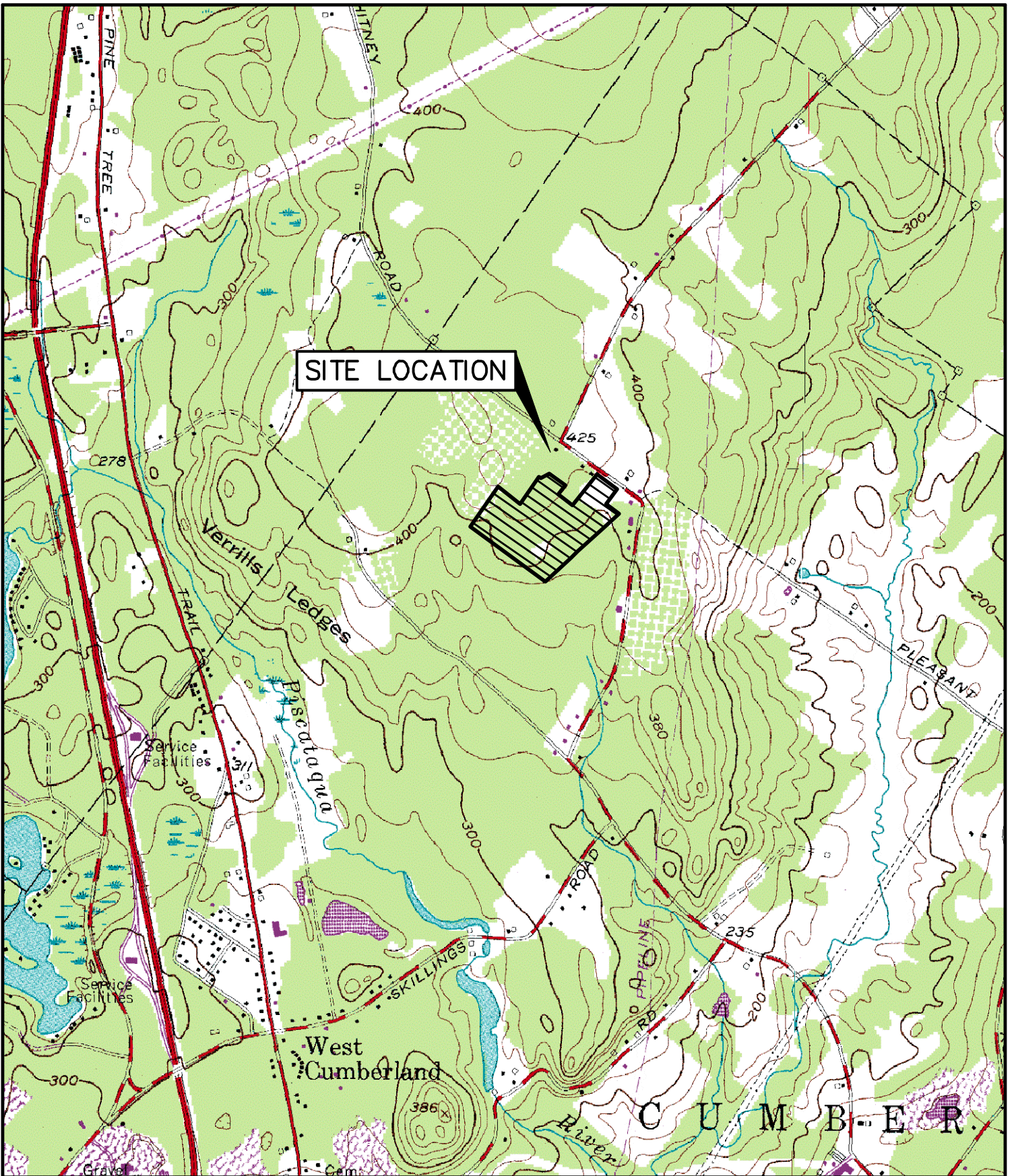
The development parcel is approximately 24.9 acres in size and is located off Orchard Road in Cumberland, Maine. The site is currently undeveloped and forested. Abutting land uses include:

- North – Residential
- East – Residential
- South – Residential/Undeveloped
- West – Residential/Apple Orchard

Topography in the area of the proposed construction is moderately steep with slopes of approximately 5% to 17%.

The Medium Intensity Soil Survey for Cumberland County as prepared by the Natural Resources Conservation Service was utilized in identifying the on-site soils. The soil report for this vicinity follows this page. The susceptibility of soils to erosion is indicated on a relative "K" scale of values over a range of 0.02 to 0.69. The higher values are indicative of the more erodible soils. The following table lists the soils found on site and their K values:

| K VALUE | | |
|------------|------------|------------|
| Type | Subsurface | Substratum |
| Hollis | 0.32 | - |
| Paxton | 0.32 | 0.20 |
| Ridgebury | 0.24 | 0.24 |
| Woodbridge | 0.32 | 0.24 |



U.S.G.S. Location Map
 Subdivision Feasibility, Orchard Road, Cumberland, Maine
 U.S.G.S. Cumberland Center, State-7.5 Minute Series (Topographic)

| | |
|----------------------------|------------------|
| Design: WCH | Date: OCT 2017 |
| Draft: LAN | Job No.: 3236.01 |
| Checked: WCH | Scale: None |
| File Name: 3236-LOCMAP.dwg | |

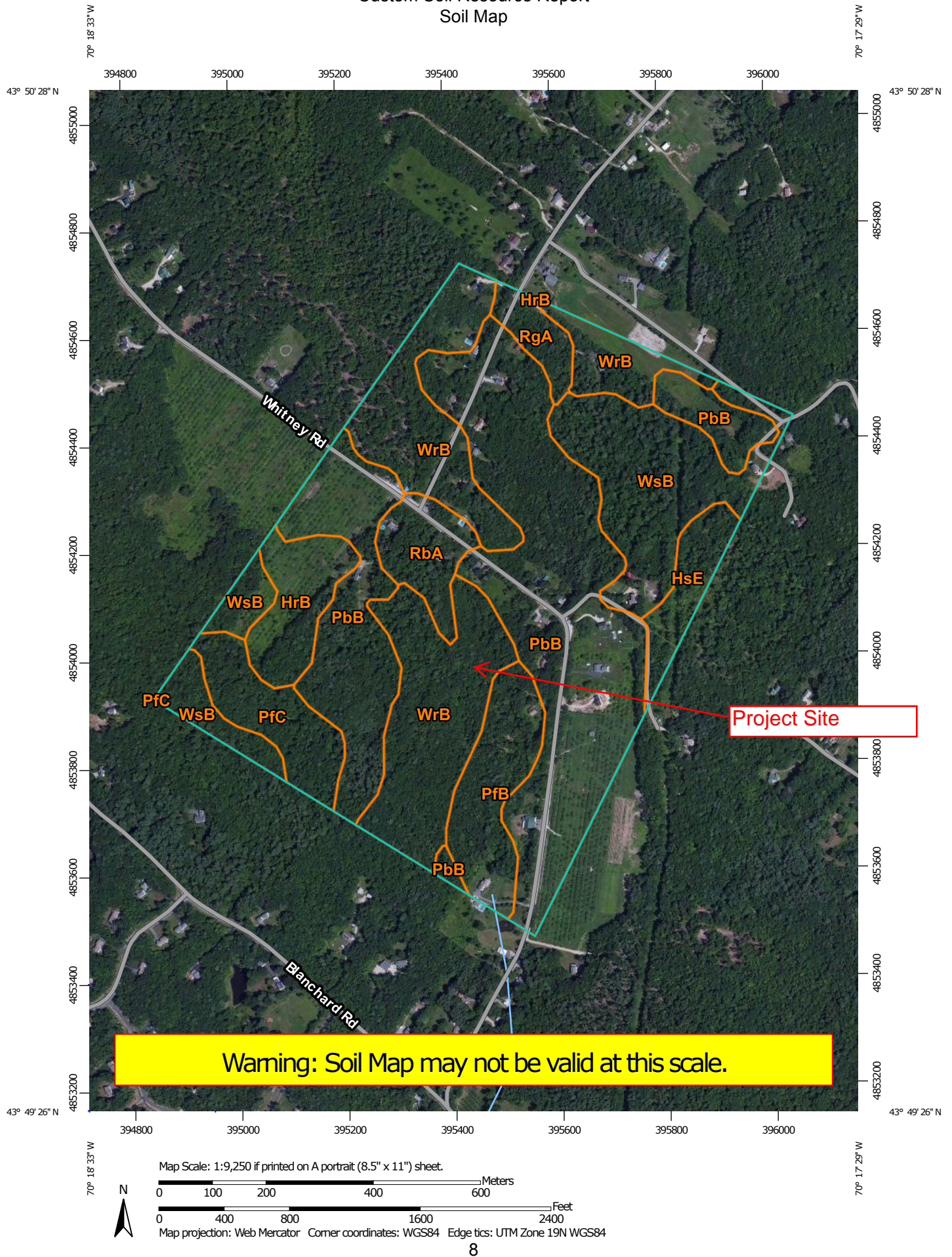


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 207.772.2515

Figure

1


Custom Soil Resource Report Soil Map



Custom Soil Resource Report


MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)


Soils


 Soil Map Unit Polygons


 Soil Map Unit Lines


 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit


 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot


 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water


 Perennial Water

 Rock Outcrop


 Saline Spot

 Sandy Spot

 Severely Eroded Spot


 Sinkhole


 Slide or Slip

 Sodic Spot


 Spoil Area

 Stony Spot


 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals


Transportation

 Rails


 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Cumberland County and Part of Oxford County, Maine
Survey Area Data: Version 12, Sep 15, 2016

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

Date(s) aerial images were photographed: Jun 20, 2010—Jul 18, 2010

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

Map Unit Legend

| Cumberland County and Part of Oxford County, Maine (ME005) | | | |
|--|--|--------------|----------------|
| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
| HrB | Hollis fine sandy loam, 3 to 8 percent slopes | 8.8 | 4.5% |
| HsE | Hollis very rocky fine sandy loam, 20 to 35 percent slopes | 6.0 | 3.1% |
| PbB | Paxton fine sandy loam, 3 to 8 percent slopes | 76.5 | 39.3% |
| PfB | Paxton very stony fine sandy loam, 3 to 8 percent slopes | 11.9 | 6.1% |
| PfC | Paxton very stony fine sandy loam, 8 to 15 percent slopes | 9.5 | 4.9% |
| RbA | Ridgebury fine sandy loam, 0 to 3 percent slopes | 7.1 | 3.6% |
| RgA | Ridgebury very stony fine sandy loam, 0 to 3 percent slopes | 3.9 | 2.0% |
| WrB | Woodbridge fine sandy loam, 0 to 8 percent slopes | 42.9 | 22.0% |
| WsB | Woodbridge very stony fine sandy loam, 0 to 8 percent slopes | 28.2 | 14.5% |
| Totals for Area of Interest | | 194.7 | 100.0% |

Map Unit Descriptions

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

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

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different

Based on a review of the K Values, the on-site soils have moderate susceptibility to erosion.

I.3.2 Existing Erosion Problems

Gorrill Palmer is not aware of any existing erosion problems on site.

I.3.3 Critical Areas

Critical areas that would require special attention during construction would be side slopes adjacent to any wetlands or streams.

I.3.4 Protected Natural Resources

Wetlands on-site have been delineated and GPS located by TRC of Scarborough, Maine, and are shown on project plans. The total area of wetlands located on the site is approximately 88,453 +/- s.f. (2.03 acres). It is anticipated that approximately 3,802 s.f. of wetlands will be impacted during development of the site. Based upon the FEMA maps, the site is not located within a Zone A 100-year floodplain.

I.3.5 Erosion Control Measures and Site Stabilization

The primary emphasis of the erosion/sedimentation control plan, which will be implemented for this project, is as follows:

- ◆ Development of a careful construction sequence.
- ◆ Rapid revegetation of denuded areas to minimize the period of soil exposure.
- ◆ Rapid stabilization of drainage paths to avoid rill and gully erosion.
- ◆ The use of on-site measures to capture sediment (hay bales/ stone check dams/silt fence, etc.)

The following temporary and permanent erosion and sediment control devices will be implemented as part of the site development. These devices shall be installed as indicated on the plans or as described within this report. For further reference, see the latest edition of the Maine Erosion and Sediment Control Practices Field Guide for Contractors.

A. Dewatering

Water from construction trench dewatering shall pass first through a filter bag or secondary containment structure (e.g. hay bale lined pool) prior to discharge. The discharge site shall be selected to avoid flooding, icing, and sediment discharges to a protected resource. In no case shall the filter bag or containment structure be located within 50 feet of a protected natural resource.

B. Inspection and Monitoring

Maintenance measures shall be applied as needed during the entire construction season. After each rainfall, snow storm or period of thawing and runoff, the site contractor shall perform a visual inspection of all installed erosion control measures and perform repairs as needed to insure their continuous function. Following the temporary and/or final seeding and mulching, the contractor shall in the spring inspect and repair any damages and/or unestablished spots. Established vegetative cover means a minimum of 90% of areas vegetated with vigorous growth.

The following standards must be met during construction.

(a) **Inspection and corrective action.** Inspect disturbed and impervious areas, erosion control measures, materials storage areas that are exposed to precipitation, and locations where vehicles enter or exit the site. Inspect these areas at least once a week as well as before and within 24 hours after a storm event (rainfall), and prior to completing permanent stabilization measures. A person with knowledge of erosion and stormwater control, including the standards and conditions in the permit, shall conduct the inspections.

(b) **Maintenance.** If best management practices (BMPs) need to be repaired, the repair work should be initiated upon discovery of the problem but no later than the end of the next workday. If additional BMPs or significant repair of BMPs are necessary, implementation must be completed within 7 calendar days and prior to any storm event (rainfall). All measures must be maintained in effective operating condition until areas are permanently stabilized.

(c) **Documentation.** Keep a log (report) summarizing the inspections and any corrective action taken. 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, materials storage areas, and vehicles access points to the parcel. Major observations must include BMPs that need maintenance, BMPs that failed to operate as designed or proved inadequate for a particular location, and location(s) 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 MDEP and Town of Cumberland staff and a copy must be provided upon request. The permittee shall retain a copy of the log for a period of at least three years from the completion of permanent stabilization.

C. Temporary Erosion Control Measures

The following measures are planned as temporary erosion/sedimentation control measures during construction:

1. Crushed stone-stabilized construction entrance shall be placed at the entrance from Orchard Road.
2. Siltation fence or wood waste compost berms shall be installed downstream of any disturbed areas to trap runoff-borne sediments until grass areas are revegetated. The silt

fence and/or wood waste compost berms shall be installed per the details provided in this package and inspected at least once a week and before and immediately after a storm event of 0.5 inches or greater, and at least daily during prolonged rainfall. Repairs shall be made if there are any signs of erosion or sedimentation below the fence or berm line. If there are signs of undercutting at the center or the edges, or impounding of large volumes of water behind the fence or berm, the barrier shall be replaced with a stone check dam. Wood waste compost berms are not to be used adjacent to wetland areas that are not to be disturbed.

3. Straw or hay mulch including hydroseeding is intended to provide cover for denuded or seeded areas until revegetation is established. Mulch placed between April 15th and October 15th on slopes of less than 15 percent shall be anchored by applying water; mulch placed on slopes of equal to or steeper than 15 percent shall be covered by a fabric netting and anchored with staples in accordance with manufacturer's recommendation. Fabric netting and staples shall be used on disturbed areas within 50' of lakes, streams, and wetlands regardless of the upstream slope. Mulch placed between October 15th and April 15th on slopes equal to or steeper than 8 percent shall be covered with a fabric netting and anchored with staples in accordance with the manufacturer's recommendations. Slopes steeper than 3:1 and equal to or flatter than 2:1, which are to be revegetated, shall receive curlex blankets by American Excelsior or equal. Slopes steeper than 2:1 shall receive riprap as noted on the plans. The mulch application rate for both temporary and permanent seeding is 75 lbs per 1000 sf as identified in Attachment A of this section. Mulch shall not be placed over snow.

4. Temporary stockpiles of stumps, grubblings, or common excavation will be protected as follows:

- a) Temporary stockpiles shall not be located within 100 feet of any wetlands which will not be disturbed and shall be located away from drainage swales.
- b) Stockpiles shall be stabilized within 7 days by either temporarily seeding the stockpile by a hydroseed method containing an emulsified mulch tackifier or by covering the stockpile with mulch, such as hay, straw, or erosion control mix.
- c) Stockpiles shall be surrounded by sedimentation barrier at the time of formation.

5. All denuded areas that are within 100 feet of an undisturbed wetland, which have been rough graded and are not located within a building pad, parking area, or access drive subbase area, shall receive mulch or erosion control mesh fabric within 48 hours of initial disturbance of soil. All areas within 100 feet of an undisturbed wetland shall be mulched prior to any predicted rain event regardless of the 48 hour window. In other areas, the time period may be extended to 7 days.

6. For work, which is conducted between October 15th and April 15th of any calendar year, all denuded areas, shall be covered with hay mulch or erosion control mix, applied at twice the normal application rate and anchored with a fabric netting. The time period for applying mulch shall be limited to 2 days for all areas.

7. Orchard Road shall be swept to control mud and dust as necessary. Additional stone shall be added to the stabilized construction entrance to minimize the tracking of material off the site and onto the surrounding roadways.
8. During grubbing operations stone check dams shall be installed at any evident concentrated flow discharge points and as directed on the Erosion Control Plans.
9. Silt fencing with a minimum stake spacing of 6 feet shall be used, unless the fence is supported by wire fence reinforcement of minimum 14 gauge and with a maximum mesh spacing of 6 inches, in which case stakes may be spaced a maximum of 10 feet apart. The bottom of the fence shall be anchored. A double row of silt fence shall be used adjacent to wetlands.
10. Wood waste compost/bark berms may be used in lieu of siltation fencing. Berms shall be removed and spread in a layer not to exceed 3" thick once upstream areas are completed and a 90% catch of vegetation is attained.
11. Storm drain catch basin inlet protection shall be provided through the use of stone sediment barriers or approved sediment bags (such as Silt Sack). Installation details are provided in the plan set. The barriers shall be inspected after each rainfall and repairs made as necessary. Sediment shall be removed and the barrier restored to its original dimensions when the sediment has accumulated to 1/2 the design depth of the barrier. The barrier shall be removed when the tributary drainage area has been stabilized.
12. Water and/or calcium chloride shall be furnished and applied in accordance with MDOT specifications – Section 637 – Dust Control.
13. Loam and seed is intended to serve, as the primary permanent revegetative measure for all denuded areas not provided with other erosion control measures, such as riprap. Application rates are provided in Attachment A of this section. Seeding shall not occur over snow.

D. Permanent Erosion Control Measures

The following permanent erosion control measures have been designed as part of the Erosion/Sedimentation Control Plan:

1. All areas disturbed during construction, but not subject to other restoration (paving, riprap, etc.) will be loamed, limed, fertilized, mulched, and seeded. Fabric netting, anchored with staples, shall be placed over the mulch in areas as noted in **Temporary Erosion Control Measures** paragraph 3 of this report. All areas within 100 feet of an undisturbed wetland shall be mulched prior to any predicted rain event regardless of the 48 hour window. Native topsoil shall be stockpiled and reused for final restoration when it is of sufficient quality.
2. All storm drain pipe outlets shall have riprap aprons at their outlet to protect the outlet and receiving channel from scour and deterioration. Installation details are provided in the plan set. The aprons shall be installed and stabilized to the extent practicable prior to directing runoff to the tributary pipe or culvert.

3. Catch basins shall be provided with sediment sumps and inlet hoods (the Snout) for all outlet pipes that are 18" in diameter or less.

I.4 Implementation Schedule

The following construction sequence shall be required to insure the effectiveness of the erosion and sedimentation control measures are optimized:

It is anticipated that construction of the Subdivision roadway and related infrastructure will commence in Spring of 2018 and be completed by Winter of 2018.

Note: For all grading activities, the contractor shall exercise extreme caution not to overexpose the site, this shall be accomplished by limiting the disturbed area.

1. Install stabilized construction entrance at the intersection of the proposed roadway and Orchard Road.
2. Install perimeter silt fence and/or wood waste berms prior to grubbing respective areas.
3. Clear and grub roadway and stormwater management areas using caution not to overexpose the site. Install stone check dams at any evident concentrated flow discharge points.
4. Commence earthwork and grading to subgrade.
5. Commence installation of drainage appurtenances.
6. Commence construction grassed underdrained soil filter.
7. Commence installation of electric/cable/telephone lines.
8. Complete remaining earthwork operations.
9. Complete installation of catch basins and appurtenances.
10. Install sub-base and base gravel within roadway.
11. Install curbing along the streets as needed.
12. Install base course paving for roadway.
13. Loam, lime, fertilize, seed and mulch disturbed areas.
14. Install surface course paving for roadway. Stripe per plan.
15. Once the site is stabilized and a 90% catch of vegetation has been obtained, remove all temporary erosion control measures.
16. Touch up loam and seed.

Note: All denuded areas not subject to final paving, riprap, or gravel shall be revegetated.

Prior to construction of the project, the contractor shall submit to the owner a schedule for the completion of the work, which will satisfy the following criteria:

1. The above construction sequence should generally be completed in the specified order; however, several separate items may be constructed simultaneously. Work must also be scheduled or phased to reduce the extent of the exposed areas as specified below. The intent of this sequence is to provide for erosion control and to have structural measures such as silt fence and construction entrances in place before large areas of land are denuded.
2. The work shall be conducted in sections which shall:
 - a) Limit the amount of exposed area to those areas in which work is expected to be undertaken during the proceeding 30 days.
 - b) Revegetate disturbed areas as rapidly as possible. All areas shall be permanently stabilized within 7 days of final grading or before a storm event; or temporarily stabilized within 48 hours of initial disturbance of soil for areas within 100 feet of an undisturbed wetland and 7 days for all other areas. Areas within 100 feet of an undisturbed wetland shall be mulched prior to any predicted rain event regardless of the 48 hour window.
 - c) Incorporate planned inlets and drainage system as early as possible into the construction phase. The ditches shall be immediately lined or revegetated as soon as their installation is complete.

1.5 Erosion, Sedimentation and Stabilization Control Plan

The Erosion Control Plan is included in the plan set.

1.6 Details and Specifications

The Erosion Control details and specifications are included in the plan set.

1.7 Winter Stabilization Plan

The winter construction period is from November 1 through April 15. If the construction site is not stabilized with pavement, a road gravel base, 75% mature vegetation cover or riprap by November 15 then the site needs to be protected with over-winter stabilization. An area considered open is any area not stabilized with pavement; vegetation, mulching, erosion control mats, riprap or gravel base on a road.

Winter excavation and earthwork shall be completed such that any area left exposed can be controlled by the contractor. Limit the exposed area to those areas in which work is expected to be under taken during the proceeding 15 days and that can be mulched in one day prior to any snow event.

All areas shall be considered to be denuded until the subbase gravel is installed in roadway/parking areas or the areas of future loam and seed have been loamed, seeded and mulched. Hay and straw mulch rate shall be a minimum of 150 lbs./1,000 s.f. (3 tons/acre) and shall be properly anchored.

The contractor shall install any added measures which may be necessary to control erosion/sedimentation from the 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.

1. Soil Stockpiles

Stockpiles of soil or subsoil shall be mulched for over winter protection with hay or straw at twice the normal rate or at 150 lbs/1,000 s.f. (3 tons per acre) or with a four-inch layer of woodwaste erosion control mix. This shall be done within 24 hours of stocking and re-established prior to any rainfall or snowfall. Any soil stockpile shall not be placed (even covered with hay or straw) within 100 feet from any natural resources.

2. Natural Resource Protection

Any areas within 100 feet from any natural resources, if not stabilized with a minimum of 75% mature vegetation catch, shall be mulched by December 1 and anchored with plastic netting or protected with erosion control mats. During winter construction, a double line of sediment barriers (i.e. silt fence backed with hay bales or erosion control mix) 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. Existing projects not stabilized by December 1 shall be protected with the second line of sediment barrier to ensure functionality during the spring thaw and rains.

3. Sediment Barriers

During frozen conditions, sediment barriers shall consist of woodwaste filter berms as frozen soil prevents the proper installation of hay bales and sediment silt fences.

4. Mulching

An area shall be considered denuded until areas of future loam and seed have been loamed, seeded and mulched. Hay and straw mulch shall be applied at a rate of 150 lb. per 1,000 square feet or 3 tons/acre (twice the normal accepted rate of 75-lbs./1,000 s.f. or 1.5 tons/acre) and shall be properly anchored. Mulch shall not be spread on top of snow. The snow shall be removed down to a one-inch depth or less prior to application. After each day of final grading, the area shall be properly stabilized with anchored hay or straw or erosion control matting. An area shall be considered to have been stabilized when exposed surfaces have been either mulched with straw or hay at a rate of 150 lb. per 1,000 square feet (3 tons/acre) and adequately anchored that ground surface is not visible through the mulch.

Between the dates of November 1 and April 15, all mulch shall be anchored by peg line, mulch netting, asphalt emulsion chemical, or wood cellulose fiber. When ground surface is not visible through the mulch then cover is sufficient. After November 1st, mulch and anchoring of all bare soil shall occur at the end of each final grading workday.

5. Mulching on Slopes and Ditches

Slopes shall not be left exposed for any extended time of work suspension unless fully mulched and anchored with peg and netting or with erosion control blankets. Mulching shall be applied at a rate of 230 lbs/1,000 s.f. on all slopes greater than 8%.

Mulch netting shall be used to anchor mulch in all drainage ways with a slope greater than 3% for slopes exposed to direct winds and for all other slopes greater than 8%. Erosion control blankets shall be used in lieu of mulch in all drainage ways with slopes greater than 8%. Erosion control mix can be used to substitute erosion control blankets on all slopes except ditches.

6. Seeding

Between the dates of October 15 and April 1st, loam or seed will not be required. During periods of above freezing temperatures finished areas shall be fine graded and either protected with mulch or temporarily seeded and mulched until such time as the final treatment can be applied. If the date is after November 1st and if the exposed area has been loamed, final graded with a uniform surface, then the area may be dormant seeded at a rate of 3 times higher than specified for permanent seed and then mulched. Dormant seeding may be selected to be placed prior to the placement of mulch and fabric netting anchored with staples. If dormant seeding is used for the site, all disturbed areas shall receive 4" of loam and seed at an application rate of 5 lbs/1,000 s.f. All areas seeded during the winter shall be inspected in the spring for adequate catch. All areas insufficiently vegetated (less than 75% catch) shall be revegetated by replacing loam, seed and mulch. If dormant seeding is not used for the site, all disturbed areas shall be revegetated in the spring.

Standards for Timely Stabilization of Construction Sites During Winter

1. Standard for the timely stabilization of ditches and channels -- The applicant shall construct and stabilize all stone-lined ditches and channels on the site by November 15. The applicant shall construct and stabilize all grass-lined ditches and channels on the site by September 1. If the applicant fails to stabilize a ditch or channel to be grass-lined by September 1, then the applicant will take one of the following actions to stabilize the ditch for late fall and winter.

Install a sod lining in the ditch -- The applicant shall line the ditch 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, watering the sod to promote root growth into the disturbed soil, and anchoring the sod with jute or plastic mesh to prevent the sod strips from sloughing during flow conditions.

Install a stone lining in the ditch -- The applicant shall line the ditch with stone riprap by November 15. The applicant shall hire a registered professional engineer to determine the stone size and lining thickness needed to withstand the anticipated flow velocities and flow depths within the ditch. If necessary, the applicant shall regrade the ditch prior to placing the stone lining so to prevent the stone lining from reducing the ditch's cross-sectional area.

2. Standard for the timely stabilization of disturbed slopes -- The applicant shall construct and stabilize stone-covered slopes by November 15. The applicant shall seed and mulch all slopes to be vegetated by September 1. The department shall consider any area having a grade greater than 15% to be a slope. If the applicant fails to stabilize any slope to be vegetated by September 1, then the applicant shall take one of the following actions to stabilize the slope for late fall and winter.

Stabilize the soil with temporary vegetation and erosion control mats -- By September 1 the applicant shall seed the disturbed slope with winter rye at a seeding rate of 3 pounds per 1,000 square feet and apply erosion control mats over the mulched slope. The applicant shall 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 slope by November 1, then the applicant shall cover the slope with a layer of woodwaste compost as described in item iii of this standard or with stone riprap as described in item iv of this standard.

Stabilize the slope with sod -- The applicant shall stabilize the disturbed slope with properly installed sod by September 1. Proper installation includes the applicant pinning the sod onto the slope 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 shall not use late-season sod installation to stabilize slopes having a grade greater than 33% (3H:1V).

Stabilize the slope with woodwaste compost -- The applicant shall place a six-inch layer of woodwaste compost on the slope by November 15. Prior to placing the woodwaste compost, the applicant shall remove any snow accumulation on the disturbed slope. The applicant shall not use woodwaste compost to stabilize slopes having grades greater than 50% (2H:1V) or having groundwater seeps on the slope face.

Stabilize the slope with stone riprap -- The applicant shall place a layer of stone riprap on the slope by November 15. The applicant shall hire a registered professional engineer to determine the stone size needed for stability and to design a filter layer for underneath the riprap.

3. Standard for the timely stabilization of disturbed soils -- By September 15 the applicant shall 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 shall take one of the following actions to stabilize the soil for late fall and winter.

Stabilize the soil with temporary vegetation -- By September 1 the applicant shall 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 shall 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 1, then the applicant shall mulch the area for over-winter protection as described below.

Stabilize the soil with sod -- The applicant shall stabilize the disturbed soil with properly installed sod by September 15. 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.

Stabilize the soil with mulch -- By November 15 the applicant shall 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. Prior to applying the mulch, the applicant shall 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.

1.8 Maintenance of facilities

The stormwater facilities will be maintained by the Applicant, TZ Properties, LLC or their assigned heirs. The contract documents will require the contractor to designate a person responsible for maintenance of the sedimentation control features during construction as required by the Erosion Control Report. Long-term operation/maintenance recommended for the stormwater facilities is presented below.

The responsible party may contract with such professionals, as may be necessary in order to comply with this provision and may rely on the advice of such professionals in carrying out its duty hereunder, provided, that the following operation and maintenance procedures are hereby established as a minimum for compliance with this section. A maintenance log of the inspections shall be kept by the responsible party.

Inspection and Maintenance Frequency and Corrective Measures:

The following areas, facilities, and measures will be inspected and the identified deficiencies will be corrected. Clean-out must include the removal and legal disposal of any accumulated sediments and debris.

Catch Basins:

Inspect catch basins 2 times per year (preferably in Spring and Fall) to ensure that the catch basins are working in their intended fashion and that they are free of debris. Clean structures when sediment depths reach 12" from invert of outlet. If the basin outlet is designed with a hood to trap floatable materials (i.e. Snout), check to ensure watertight seal is working. At a minimum, remove floating debris and hydrocarbons at the time of the inspection.

Culverts:

Inspect culverts 2 times per year (preferably in Spring and Fall) to ensure that the culverts are working in their intended fashion and that they are free of debris. Remove any obstructions to flow; remove accumulated sediments and debris at the inlet, at the outlet, and within the conduit and repair any erosion damage at the culvert's inlet and outlet.

Inlet/Outlet Control Structures:

Inspect structures and piping 2 times per year (preferably in Spring and Fall) to ensure that the structures are working in their intended fashion and that they are free of debris. Remove any obstructions to flow; remove accumulated sediments and debris within the structure.

Stormdrain Outlets:

Inspect outlets 2 times per year (preferably in Spring and Fall) to ensure that the outlets are working in their intended fashion and that they are free of debris. Remove any obstructions to flow; remove accumulated sediments and debris at the outlet and within the conduit. Repair any erosion damage at the stormdrain outlet.

Soil Filter – Bio-Filtration:

Inspect all upstream pre-treatment measures 2 times per year (preferably in Spring and Fall) for sediment and floatables accumulation. Remove and dispose of any sediments or debris.

Surface (Underdrain Pond, Swale or Bio-Filter):

The soil filter will be inspected within the first three months after construction; thereafter the filter will be inspected 2 times per year (preferably in Spring and Fall) to ensure that the filter is draining within 24 to 48 hours of a rain event equivalent to 1" or more. Adjustments will be made to the outlet valve to ensure that the grassed underdrained soil filter drains within 24 to 48 hours. Failure to drain in 72 hours will require part or all of the soil filter media to be removed and replaced with new material meeting the soil filter gradation. The facilities will be inspected after major storms and any identified deficiencies will be corrected. Harvesting and weeding of excessive growth shall be performed as needed. Inspect for unwanted or invasive plants and remove as necessary.

Vegetated Areas:

Inspect slopes and embankments early in the growing season 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. The facilities will be inspected after major storms and any identified deficiencies will be corrected.

Ditches, Swales and other Open Stormwater Channels:

Inspect 2 times per year (preferably in Spring and Fall) to ensure they are working in their intended fashion and that they are free of sediment and debris. Remove any obstructions to flow, including accumulated sediments and debris and vegetated growth. Repair any erosion of the ditch lining. Vegetated ditches will 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 on areas where any underlying filter fabric or underdrain gravel is showing through the stone or where stones have dislodged. Correct any erosion of the channel's bottom or sideslopes. The facilities shall be inspected after major storms and any identified deficiencies shall be corrected.

Roadways and Parking Surfaces: Clear accumulations of winter sand in parking lots and along roadways at least once a year, preferably in the spring. Accumulations on pavement may be removed by pavement sweeping. 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. Repair potholes and other roadway obstructions and hazards. Plowing and sanding of paved areas shall be performed as necessary to maintain vehicular traffic safety.

Recertification

As part of the Stormwater Permit, the applicant is required to meet the standards in Appendix B of the Chapter 500 Rules. Appendix B states that a project must submit a certification of the following to the department within three months of the expiration of each five-year interval from the date of issuance of the permit.

- (a) Identification and repair of erosion problems. All areas of the project site have been inspected for areas of erosion, and appropriate steps have been taken to permanently stabilize these areas.
- (b) Inspection and repair of stormwater control system. All aspects of the stormwater control system have been inspected for damage, wear, and malfunction, and appropriate steps have been taken to repair or replace the system, or portions of the system.

- (c) Maintenance. The erosion and stormwater maintenance plan for the site is being implemented as written, or modifications to the plan have been submitted to and approved by the department, and the maintenance log is being maintained.
- (d) Proprietary Systems. All proprietary systems have been maintained according to the manufacturer's recommendations. Where required by the Department, the permittee shall execute a 5-year maintenance contract with a qualified professional for the coming 5-year interval. The maintenance contract must include provisions for routine inspections, cleaning, and general maintenance.

Housekeeping

As part of the Stormwater Permit, the applicant is required to meet the standards in Appendix C of the Chapter 500 Rules. The following procedures are hereby established as a minimum for compliance with this section. For further information on the procedures listed below, refer to Chapter 500 rules – Appendix C.

Spill Prevention:

Appropriate spill prevention, containment, and response planning/implementation shall be used to prevent pollutants from being discharged from materials on site.

Groundwater Protection:

During construction, hazardous materials with the potential to contaminate groundwater shall not be stored or handled in areas of the site which drain to an infiltration area.

Fugitive Sediment and Dust:

Appropriate measures shall be taken to ensure that activities do not result in noticeable erosion of the soils and water and/or calcium chloride shall be used to ensure that activities do not result in fugitive dust emissions during or after construction.

Debris and Other Materials:

Litter, construction debris, and chemicals exposed to stormwater must be prevented from becoming a pollutant source.

Trench or Foundation De-watering:

Water collected through the process of trenching and/or de-watering must be removed from the ponded area, and must be spread through natural wooded buffers or other areas that are specifically designed to collect the maximum amount of sediment possible.

Non-stormwater Discharges:

Identify and prevent contamination by non-stormwater discharges.

Conclusion

The Applicant has provided temporary and permanent erosion control measures as well as specifying a sequence of construction as measures to minimize erosion and sedimentation.

Attachments

- Attachment A - Seeding Plan
- Attachment B - Inspection Report

ATTACHMENT A

SEEDING PLAN

SEEDING PLAN

Project: Orchard Road Subdivision

Site Location: Orchard Road, Cumberland, ME

☐ Permanent Seeding ☒ Temporary Seeding

1. Instruction on preparation of soil: Prepare a good seed bed for planting method used.
2. Apply lime as follows: _____ # / acres, OR 138 # /M Sq. Ft.
3. Fertilize with _____ pounds of _____ N-P-K/ac. OR 13.8 pounds of 10-10-10 N-P-K/M Sq. Ft.
4. Method of applying lime and fertilizer: Spread and work into the soil before seeding.
5. Seed with the following mixture:
 50% Winter Rye
 50% Annual Rye

6. Mulching instructions: Apply at the rate of _____ per acre, OR 75 pounds per M. Sq. Ft.

| | <u>Amount</u> | <u>Unit # Tons. Etc.</u> |
|--|---------------|--------------------------|
| 7. TOTAL LIME | 138 | #/1000 sq. ft. |
| 8. TOTAL FERTILIZER | 13.8 | #/1000 sq. ft. |
| 9. TOTAL SEED | 1.03 | #/1000 sq. ft. |
| 10. TOTAL MULCH | 75 | #/1000 sq. ft. |
| 11. TOTAL other materials, seeds, etc. | <hr/> | |
| 12. REMARKS | | |

Spring seeding is recommended; however, late summer (prior to September 1) seeding can be made. Permanent seeding should be made prior to August 5 or as a dormant seeding after the first killing frost and before the first snowfall. If seeding cannot be done within these seeding dates, temporary seeding and mulching shall be used to protect the site. Permanent seeding shall be delayed until the next recommended seeding period.

SEEDING PLAN

Project: Orchard Road Subdivision

Site Location: Orchard Road, Cumberland, ME

☒ Permanent Seeding ☐ Temporary Seeding

1. Instruction on preparation of soil: Prepare a good seed bed for planting method used.
2. Apply lime as follows: _____ # / acres, OR 138 # /M Sq. Ft.
3. Fertilize with _____ pounds of _____ N-P-K/ac. OR 18.4 pounds of 10-20-20 N-P-K/M Sq. Ft.
4. Method of applying lime and fertilizer: Spread and work into the soil before seeding.
5. Seed with the following mixture:
 - 40% Creeping Red Fescue
 - 30% Charger II Perennial Ryegrass
 - 20% KenBlue Kentucky Bluegrass
 - 10% Tiffany Chewings Fescue
6. Mulching instructions: Apply at the rate of _____ per acre, OR 75 pounds per M. Sq. Ft.

| | <u>Amount</u> | <u>Unit # Tons. Etc.</u> |
|--|---------------|--------------------------|
| 7. TOTAL LIME | 138 | #/1000 sq. ft. |
| 8. TOTAL FERTILIZER | 18.4 | #/1000 sq. ft. |
| 9. TOTAL SEED | 1.03 | #/1000 sq. ft. |
| 10. TOTAL MULCH | 75 | #/1000 sq. ft. |
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Spring seeding is recommended, however, late summer (prior to September 1) seeding can be made. Permanent seeding should be made prior to August 5 or as a dormant seeding after the first killing frost and before the first snowfall. If seeding cannot be done within these seeding dates, temporary seeding and mulching shall be used to protect the site. Permanent seeding shall be delayed until the next recommended seeding period.

ATTACHMENT B

INSPECTION REPORT

STORMWATER POLLUTION PREVENTION PLAN

INSPECTION REPORT

PROJECT INFORMATION

Project Name: Orchard Road Subdivision

Address: Orchard Road
Cumberland, Maine

CONTRACTOR/SUBCONTRACTOR INFORMATION

Inspector Name: _____

Firm: _____

Title: _____

Qualifications: _____

INSPECTION SUMMARY

Date of Inspection: _____

Major Observations: _____

THE FACILITY IS IN COMPLIANCE WITH THE STORMWATER POLLUTION PREVENTION PLAN WITH THE FOLLOWING EXCEPTIONS:

ACTIONS NECESSARY TO BRING FACILITY INTO COMPLIANCE:

REQUIRED MODIFICATIONS TO STORMWATER POLLUTION PREVENTION PLAN
(MUST BE IMPLEMENTED WITHIN 7 DAYS OF INSPECTION):

CERTIFICATION STATEMENT:

“I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the systems, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.”

Signature

Typed Name

Title

Date

TRC
6 Ashley Drive
Scarborough, ME 04074

Main 207-879-1930
Fax 207-879-9293

Memorandum

To: Will Haskell, Gorrill-Palmer

From: Lauren Leclerc

Subject: Ward Farm Property: Wetland, Stream and Vernal Pool Survey – Cumberland

Date: May 24, 2017

CC: Rich Jordan and David Brenneman (TRC)

Dear Will,

On May 3rd and 4th, 2017, I visited the Ward Farm property located south of Orchard Road, in Cumberland, Maine. The purpose of my site visit was to delineate wetlands, streams, and vernal pools on the property. A third site visit was conducted on May 10, 2017 for a second vernal pool check. Below I will detail the methods and findings of my recent resources delineation.

Property Description and Survey Area

The entire property is approximately 27 acres. The northwestern portion of the property is relatively flat while there is a valley with a wetland, stream and vernal pool located in the northeastern corner of the property. The topography of the central portion of the site slopes slightly to the southeast while the topography of the southern portion of the site slopes to the south. Uplands onsite are dominated by northern red oak (*Quercus rubra*), eastern white pine (*Pinus strobus*), quaking aspen (*Populus tremuloides*), American beech (*Fagus grandifolia*), and Canada mayflower (*Maianthemum canadense*). A small pine plantation is located in the southcentral portion of the site, near the southern property boundary. Wetlands are interspersed throughout the site, except within the southwestern corner which is comprised of upland. The property has been logged in the past and forestry trails can be found throughout the site. The entire property was surveyed for wetlands, waterbodies, and vernal pools. A map depicting the limits of my resources survey, which includes the natural resources identified is attached to this memo.

Methodology

To identify natural resources within the property boundary, I visited the study area on May 3rd and 4th, 2017. Prior to the site visit, I reviewed existing data sources including:

- United States Geological Survey (USGS) topographic mapping;
- United States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) mapping;
- Natural Resources Conservation Service (NRCS) medium-intensity soil survey mapping;
- Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs);

- State of Maine Office of GIS (MEGIS) data; and
- Recent and historic aerial photography.

These data were used to assist in the identification of protected natural resources during my field survey.

Wetlands: Wetland delineations were conducted in accordance with the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region, v2 (U.S. Army Corps of Engineers [USACE] 2012). This supplement follows criteria established in the USACE Wetlands Delineation Manual (Environmental Laboratory, Technical Report T-87-1, 1987), but is region specific, giving the wetland delineator a better tool to apply to regional vegetation communities, indicators of hydrology and indicators of hydric soils when conducting a wetland boundary determination. This document provides a repeatable methodology to identify potential wetland areas.

The study area was investigated on foot. When a location having the requisite three factors that constitute a wetland (i.e., hydrophytic vegetation, indicators of hydrology, and the presence of hydric soils) was encountered, the boundaries were flagged in the field and each flag was geo-located using a mapping grade global positioning system (GPS) unit (Trimble GeoXT). The data was then post-processed using data collection and processing standards designed by the manufacturer to achieve sub-meter accuracy. These data were provided to Gorrill-Palmer for use in project design and planning natural resource avoidance and minimization measures.

Streams: Watercourse identification followed the Maine Natural Resources Protection Act (NRPA) definition of a “River, stream or brook.” Streams meeting this definition were flagged and geolocated as described in the wetlands section.

Vernal Pools: The study area was also surveyed for the presence of vernal pools. Wetlands that contain natural vernal pool habitat and exhibit a high level of breeding productivity are considered Significant Wildlife Habitat under the Maine NRPA. Under the USACE’s Maine General Permit, vernal pool habitats of natural or anthropogenic origin of any level of functionality may require a higher level of project review depending upon the scope of a project and its proposed impacts. Our field study was performed within the breeding season of vernal pool indicator species (e.g., wood frogs (*Lithobates sylvatica*) and spotted salamanders [*Ambystoma maculatum*]). Thus, a vernal pool (VP) survey was conducted pursuant to the Maine Association of Wetland Scientists’ (MAWS) Vernal Pool Survey Protocol (April 2014) description of “breeding season surveys.” TRC’s wetland scientist performed the survey within the study area based on current state and federal definitions, as well as looking for indicators such as topographic changes (including isolated depressions with a sparsely vegetated bottom), ecological use, standing water or evidence thereof, evidence of secondary indicator species (e.g., caddisfly larvae cases, fingernail clam shells, aquatic snail shells) and best professional judgment.

Findings

My survey identified seven wetlands, one perennial stream, and two natural, non-significant vernal pools on the property.

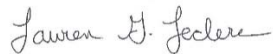
Attached you will find copies of the completed wetland summary and USACE data forms, Maine State Vernal Pool Assessment Forms, and a photographic log from my site visit. GIS shapefiles showing the location of the delineated resources were previously provided to you via email on May 10, 2017. The unique identifiers noted on the data forms can be crossed referenced against the data herein and the resources map to see where a particular resource is located. I have included summary tables below that outline the delineated resources.

| RESOURCE SUMMARY TABLES | | | |
|-----------------------------------|-------------------------|--|---|
| WETLANDS | | | |
| Resource ID | Covertypes ¹ | Dominant Vegetation | Comments |
| Wetland W 1 | PFO1/4E | Red maple (<i>Acer rubrum</i>), eastern hemlock (<i>Tsuga canadensis</i>), quaking aspen, American beech, winterberry (<i>Ilex verticillata</i>), Canada mayflower | Pit and mound forested wetland which contains natural, non-significant vernal pool VP 1. |
| Wetland W 2 | PFO1B | Red maple, quaking aspen, eastern hemlock, broad-leaf meadow sweet (<i>Spiraea latifolia</i>), red osier (<i>Cornus alba</i>), interrupted fern (<i>Osmunda claytoniana</i>) | Small isolated forested wetland. |
| Wetland W 3 | PFO1E | Red maple, eastern white pine, yellow birch (<i>Betula alleghaniensis</i>) | Forested wetland swale fed by offsite pond. |
| Wetland W 4 | PFO1B | Red maple, ash species (<i>Fraxinus</i> sp.), eastern hemlock | Headwaters of seep at property boundary. |
| Wetland W 5 | PFO1E | Red maple, black ash (<i>Fraxinus nigra</i>), yellow birch, American beech, Canada mayflower, interrupted fern | Pit and mound forested wetland. |
| Wetland W 6 | PEM1E/PFO1E | Red maple, meadowsweet, winterberry, sensitive fern (<i>Onoclea sensibilis</i>) | Emergent/forested wetland swale associated with perennial stream S 1 and natural, non-significant VP 2. |
| Wetland W 7 | PFO1E | Red maple, yellow birch, quaking aspen, ash species, eastern hemlock, white pine, Canada mayflower, cinnamon fern (<i>Osmundastrum cinnamomeum</i>) | Pit and mound forested wetland. |
| ¹ Per Cowardin et. al. | | | |

| STREAMS | | | | | |
|-------------|-------------|-------------|-------------|----------------------|--------------------|
| Resource ID | Flow Regime | Width (ft.) | Depth (in.) | Substrate | Comments |
| Stream S 1 | Perennial | 5-8 | 1-4 | Sand, gravel, cobble | Unnamed tributary. |

Thank you for allowing me to assist you in assessing the natural resources on this property. If you have any questions regarding my assessments, or if you would like additional assistance with project permitting, please do not hesitate to contact me or Rich.

Respectfully submitted,

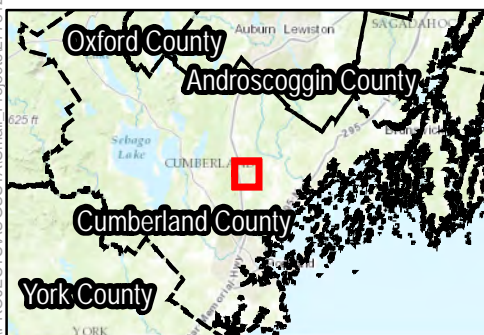
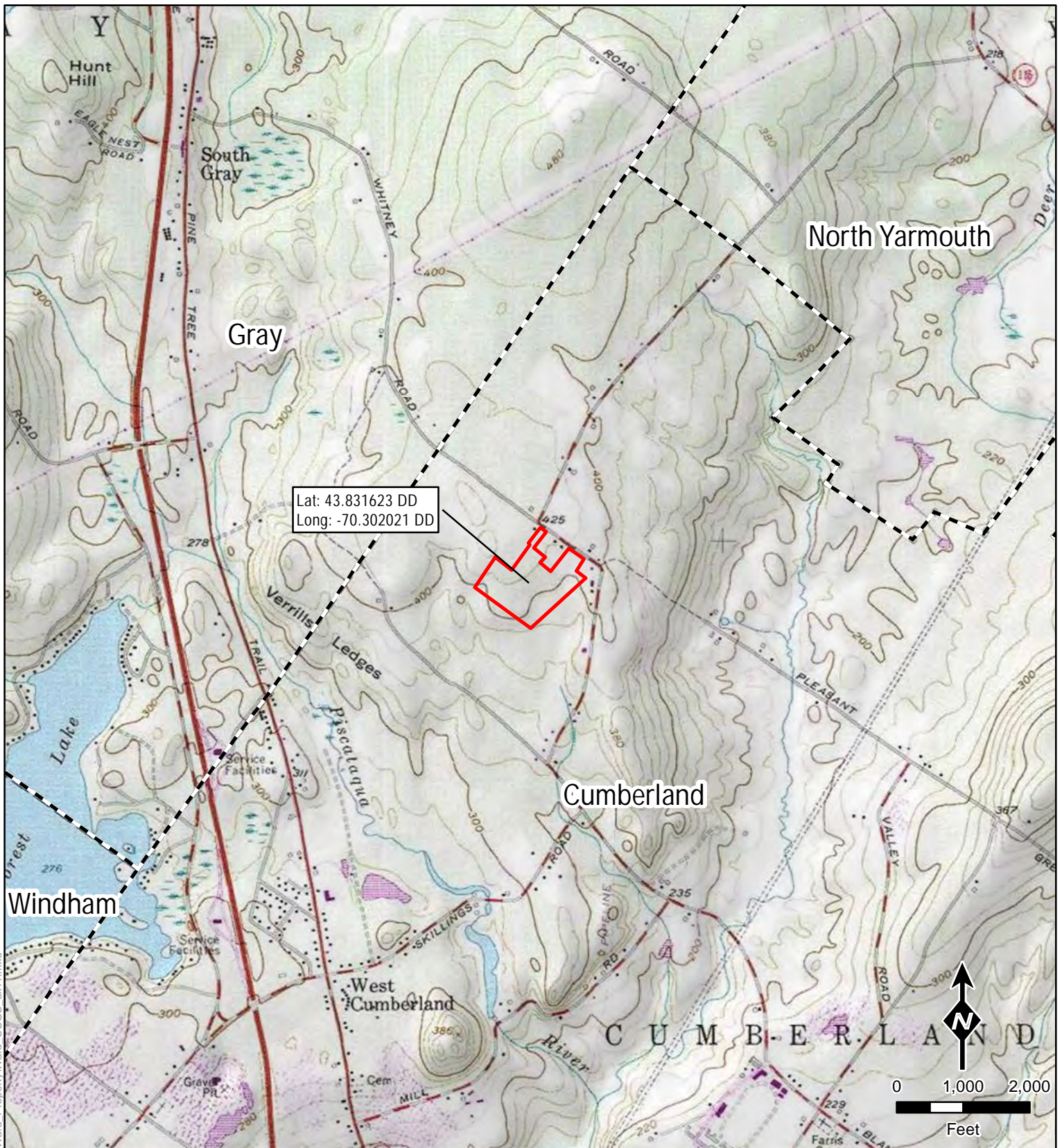


Lauren Leclerc, PWS (#2363)
Wetland Scientist

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Email: lleclerc@trcsolutions.com

ATTACHMENT A

Resource Mapping



- Subject Property
- Town Boundary
- County Boundary

Coordinate System: NAD 1983 StatePlane Maine West FIPS 1802 Feet
Units: Foot US
Sources: ESRI, USGS, MEGIS

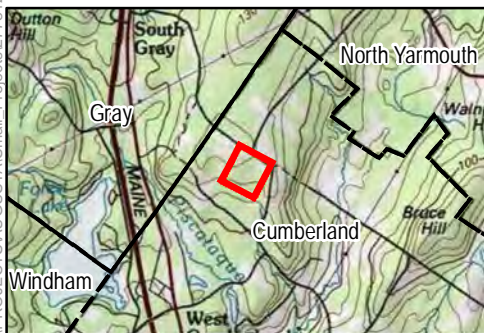
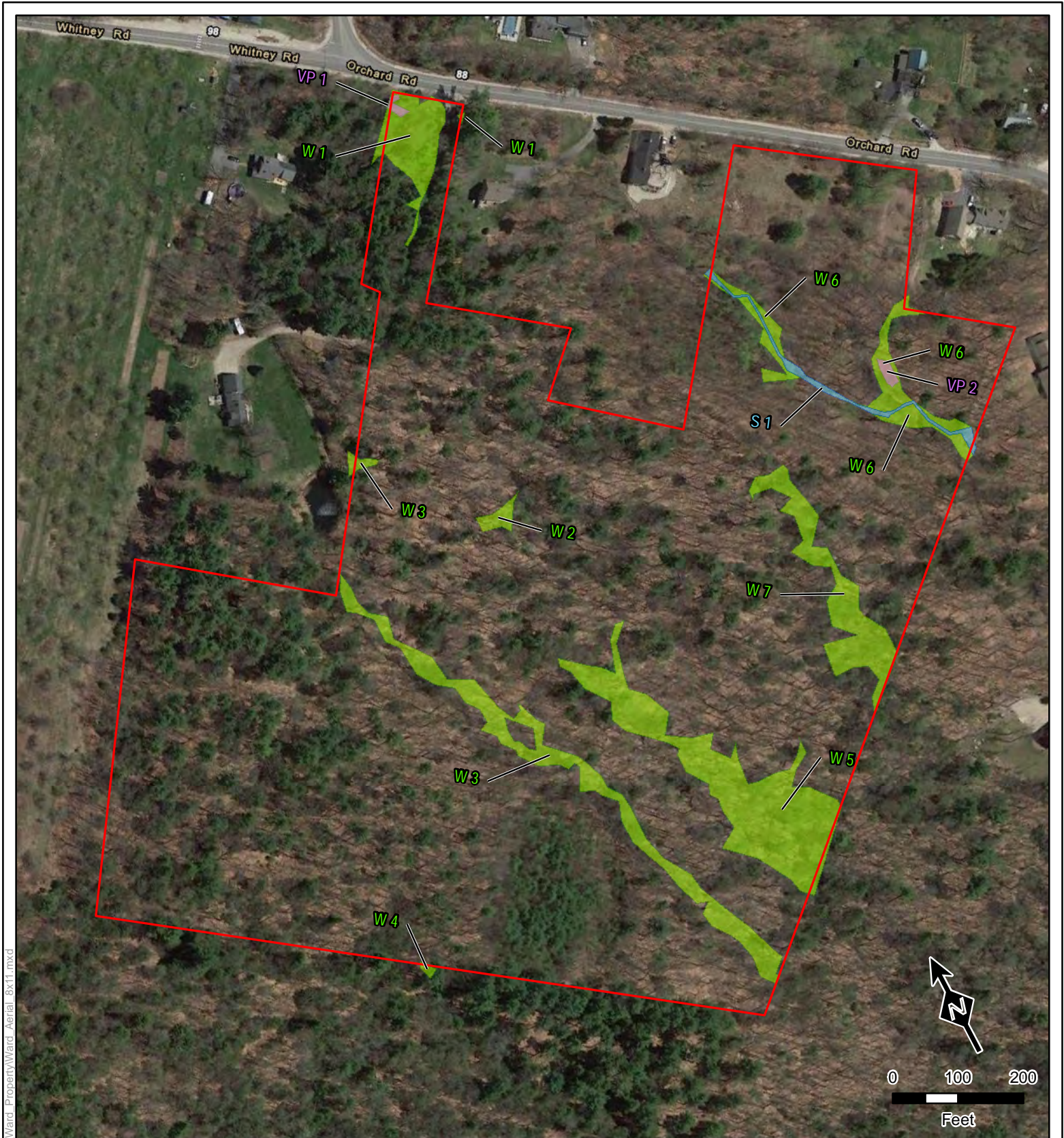
Ward Property

Cumberland County,
Cumberland, ME

USGS Location Map



5/10/2017



- Subject Property
- Delineated Stream
- Delineated Wetland
- Natural, Not Significant
- Delineated Vernal Pool
- Town Boundary

Coordinate System: NAD 1983 StatePlane Maine West FIPS 1802 Feet
Units: Foot US
Sources: ESRI, USGS, MEGIS

Ward Property

Cumberland County,
Cumberland, ME

Resource Map



5/10/2017

ATTACHMENT B

Photographic Log

Photographic Log
Ward Farm Property – Orchard Road, Cumberland, Maine



Wetland W 1: Looking northwest at forested wetland adjacent to driveway and Orchard Road, 05/03/2017.



Wetland W 1 and Vernal Pool VP 1: Looking northwest at forested wetland and natural, non-significant vernal pool south of Orchard Road, 05/03/2017.

Photographic Log
Ward Farm Property – Orchard Road, Cumberland, Maine



Vernal Pool VP 1: Spotted salamander egg mass within VP 1, 05/03/2017.



Wetland W 2: Looking west across the forested wetland, 05/03/2017.

Photographic Log
Ward Farm Property – Orchard Road, Cumberland, Maine



Wetland W 3: Looking south along the wetland swale which runs north-south across the southern extents of the property, 05/03/2017.



Wetland W 3: Looking north along the wetland swale which runs north-south across the southern extents of the property, 05/04/2017.

Photographic Log
Ward Farm Property – Orchard Road, Cumberland, Maine



Wetland W 4: Headwaters of forested wetland seep at southern property boundary, looking south, 05/04/2017.



Wetland W 5: Looking southeast from the northern end of the forested wetland, slightly downslope, 05/04/2017.

Photographic Log
Ward Farm Property – Orchard Road, Cumberland, Maine



Wetland W 5: Looking east at windthrows in forested wetland, near eastern property boundary, 05/04/2017.



Wetland W 6 and Stream S 1: Emergent component of wetland and associated Stream S 1 looking south and downstream, 05/04/2017.

Photographic Log
Ward Farm Property – Orchard Road, Cumberland, Maine



Wetland W 6 and Vernal Pool VP 2: Looking north at forested wetland and natural, non-significant VP 2, 05/04/2017.



Vernal Pool VP 2: Spotted salamander egg mass within VP 2, 05/04/2017.

Photographic Log
Ward Farm Property – Orchard Road, Cumberland, Maine



Wetland W 7: Looking north at forested wetland and seep, 05/04/2017.



Upland: Looking northeast at forested upland to the northeast of Wetland W 3, 05/04/2017.

Photographic Log
Ward Farm Property – Orchard Road, Cumberland, Maine



**Upland: Looking southwest at forested upland to the south of Wetland W 2,
05/03/2017.**

ATTACHMENT C

Wetland Summary and Wetland Data Forms

TRC -- [REDACTED] WETLAND SUMMARY FORM

Observers: L. Lederc Date: 5-4-17
 Corps plot: Yes ☒ No ☐ Feature ID: 21
 REVISIT? Yes ☒ No ☐ If Yes, any changes? ☐ Yes ☐ No ☐ If yes, Explain:

Dominant NWI Class: PFO/14E Other NWI Classes:

Representative/Dominant Wetland Vegetation by Strata

| Tree | Sapling | Shrub | Herb | Vines |
|-----------------|-----------------|----------------|---------------|-----------|
| <u>Acer rub</u> | <u>Acer rub</u> | <u>Tsugar</u> | <u>Maican</u> | <u>NA</u> |
| <u>Tsugar</u> | | <u>Ileever</u> | | |
| <u>Poptree</u> | | <u>Acerub</u> | | |
| <u>Fag. gra</u> | | | | |

Representative Wetland Hydrology

☐ Permanently Flooded ☒ Seasonally Flooded ☒ Saturated
 (approximate depth -) (approximate depth -)

Hydrologic Indicators: ☒ Surface Water; ☒ Water Stained Leaves; ☐ Sediment Deposits;
☐ Sparsely Vegetated Concave Surface; ☐ Water Marks; ☐ Drift Lines;
☐ Surface Scouring; ☐ Drainage Patterns; ☐ Buttressed Trees; ☐ Elevated Roots;
☐ Moss Trim Lines

Other Observations: Sett to surface
High wtr table w/lt 2" immed

Soils

| Depth (inches) | Horizon | Matrix Color | Redox Features Color / Percent | Texture | Notes |
|----------------|-----------|-----------------|--------------------------------|------------|------------------|
| <u>0-7</u> | <u>OL</u> | <u>black</u> | | | |
| <u>7-11</u> | <u>B</u> | <u>10YR 4/2</u> | <u>10YR 4/6-5</u> | <u>FSL</u> | <u>w/ gravel</u> |
| | | | | | |
| | | | | | |
| | | | | | |

Representative Hydric Soils: ☒ Mineral ☐ Organic

Other Observations:

Stream # 1 Name: NA

Width (Top-of-Bank-Top-of-Bank): ☐ Depth @ Center: ☐ Perennial ☐ Intermittent ☐

Bank Configuration: ☐ Undercut ☐ Vertical ☐ Gradual

Channel Substrate: ☐ Peat-Muck ☐ Silt-Mud ☐ Sand ☐ Gravel/Cobble ☐ Boulder ☐ Bedrock

Stream # 2 Name:

Width (Top-of-Bank-Top-of-Bank): ☐ Depth @ Center: ☐ Perennial ☐ Intermittent ☐

Bank Configuration: ☐ Undercut ☐ Vertical ☐ Gradual

Channel Substrate: ☐ Peat-Muck ☐ Silt-Mud ☐ Sand ☐ Gravel/Cobble ☐ Boulder ☐ Bedrock

Wildlife Observations/Sign

spotted salamander egg masses passerine birds

Notes

VPI assoc w/

SKETCH ON BACK

pit & mound microtopography

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Ward Farm Parcel City/County: Cumberland Sampling Date: 5-3-17
 Applicant/Owner: Garrill-Palmer State: ME Sampling Point: # 2
 Investigator(s): L. Leclerc Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): Flat area Local relief (concave, convex, none): Slightly convex Slope (%): 0.5%
 Subregion (LRR or MLRA): LRR Lat: 43.83213044 Long: -70.3003181 Datum: NAD83
 Soil Map Unit Name: Woodbridge Fine Sandy loam NWI classification: PFO1B
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? No Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | |
|---|---|
| Hydrophytic Vegetation Present? Yes <u>X</u> No _____ | Is the Sampled Area within a Wetland? Yes <u>X</u> No _____ |
| Hydric Soil Present? Yes <u>X</u> No _____ | If yes, optional Wetland Site ID: <u>#2</u> |
| Wetland Hydrology Present? Yes <u>X</u> No _____ | |

Remarks: (Explain alternative procedures here or in a separate report.)

slight depression in flat upland landscape

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

☐ Surface Water (A1)
☒ High Water Table (A2)
☒ Saturation (A3)
☐ Water Marks (B1)
☐ Sediment Deposits (B2)
☐ Drift Deposits (B3)
☐ Algal Mat or Crust (B4)
☐ Iron Deposits (B5)
☐ Inundation Visible on Aerial Imagery (B7)
☐ Sparsely Vegetated Concave Surface (B8)

☒ Water-Stained Leaves (B9)
☐ Aquatic Fauna (B13)
☐ Marl Deposits (B15)
☐ Hydrogen Sulfide Odor (C1)
☐ Oxidized Rhizospheres on Living Roots (C3)
☐ Presence of Reduced Iron (C4)
☐ Recent Iron Reduction in Tilled Soils (C6)
☐ Thin Muck Surface (C7)
☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

☐ Surface Soil Cracks (B6)
☐ Drainage Patterns (B10)
☐ Moss Trim Lines (B16)
☐ Dry-Season Water Table (C2)
☐ Crayfish Burrows (C8)
☐ Saturation Visible on Aerial Imagery (C9)
☐ Stunted or Stressed Plants (D1)
☒ Geomorphic Position (D2)
☐ Shallow Aquitard (D3)
☐ Microtopographic Relief (D4)
☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____
 Water Table Present? Yes X No _____ Depth (inches): to surface
 Saturation Present? Yes X No _____ Depth (inches): to surface
 (includes capillary fringe)

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

 Sampling Point: V2

| Tree Stratum (Plot size: <u>15'</u>) | Absolute % Cover | Dominant Species? | Indicator Status | Dominance Test worksheet: |
|--|------------------|-------------------|------------------|--|
| 1. <u>Populus tremuloides</u> | <u>30</u> | <u>X</u> | <u>FACU</u> | Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A) Total Number of Dominant Species Across All Strata: <u>6</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>67%</u> (A/B) |
| 2. <u>Acer rubrum</u> | <u>25</u> | <u>X</u> | <u>FAC</u> | |
| 3. _____ | _____ | _____ | _____ | |
| 4. _____ | _____ | _____ | _____ | |
| 5. _____ | _____ | _____ | _____ | |
| 6. _____ | _____ | _____ | _____ | |
| 7. _____ | _____ | _____ | _____ | |
| <u>55</u> = Total Cover | | | | Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____ |
| Sapling/Shrub Stratum (Plot size: <u>15'</u>) | | | | |
| 1. <u>Tsuga canadensis</u> | <u>10</u> | <u>X</u> | <u>FACU</u> | |
| 2. <u>Spiraea latifolia</u> | <u>10</u> | <u>X</u> | <u>FACW</u> | |
| 3. <u>Cornus alba</u> | <u>5</u> | <u>X</u> | <u>FACW</u> | |
| 4. _____ | _____ | _____ | _____ | |
| 5. _____ | _____ | _____ | _____ | |
| <u>25</u> = Total Cover | | | | |
| Herb Stratum (Plot size: <u>5'</u>) | | | | |
| 1. <u>Osmunda claytoniana</u> | <u>30</u> | <u>X</u> | <u>FAC</u> | Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. |
| 2. <u>Maianthemum canadense</u> | <u>5</u> | | | |
| 3. <u>Carex species</u> | <u>2</u> | | | |
| 4. _____ | _____ | _____ | _____ | |
| 5. _____ | _____ | _____ | _____ | |
| 6. _____ | _____ | _____ | _____ | |
| 7. _____ | _____ | _____ | _____ | |
| 8. _____ | _____ | _____ | _____ | |
| 9. _____ | _____ | _____ | _____ | |
| 10. _____ | _____ | _____ | _____ | |
| 11. _____ | _____ | _____ | _____ | |
| 12. _____ | _____ | _____ | _____ | |
| <u>37</u> = Total Cover | | | | |
| Woody Vine Stratum (Plot size: <u>15'</u>) | | | | |
| 1. <u>None</u> | | | | Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
| 2. _____ | _____ | _____ | _____ | |
| 3. _____ | _____ | _____ | _____ | |
| 4. _____ | _____ | _____ | _____ | |
| _____ = Total Cover | | | | |
| Remarks: (Include photo numbers here or on a separate sheet.) <u>Adjusted tree & vine radius to 15' to account for narrow wetland</u> | | | | |

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Ward Parcel City/County: Cumberland Sampling Date: 5-3-17
 Applicant/Owner: Gorrell - Palmer State: ME Sampling Point: U-V2
 Investigator(s): L. Leclerc Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): flat Local relief (concave, convex, none): none Slope (%): 0%
 Subregion (LRR or MLRA): LRR Lat: 43.83205175 Long: -70.36202252 Datum: NAD83
 Soil Map Unit Name: Woodbridge fine sandy loam NWI classification: Upland
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? No Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | |
|---|--|
| Hydrophytic Vegetation Present? Yes _____ No <u>X</u> | Is the Sampled Area within a Wetland? Yes _____ No <u>X</u> If yes, optional Wetland Site ID: _____ |
| Hydric Soil Present? Yes _____ No <u>X</u> | |
| Wetland Hydrology Present? Yes <u>X</u> No _____ | |
| Remarks: (Explain alternative procedures here or in a separate report.) <u>upland has many old woods roads</u> | |

HYDROLOGY

| Wetland Hydrology Indicators: | | Secondary Indicators (minimum of two required) |
|--|---|--|
| Primary Indicators (minimum of one is required; check all that apply) | | |
| <input type="checkbox"/> Surface Water (A1) | <input type="checkbox"/> Water-Stained Leaves (B9) | <input type="checkbox"/> Surface Soil Cracks (B6) |
| <input checked="" type="checkbox"/> High Water Table (A2) | <input type="checkbox"/> Aquatic Fauna (B13) | <input type="checkbox"/> Drainage Patterns (B10) |
| <input checked="" type="checkbox"/> Saturation (A3) | <input type="checkbox"/> Marl Deposits (B15) | <input type="checkbox"/> Moss Trim Lines (B16) |
| <input type="checkbox"/> Water Marks (B1) | <input type="checkbox"/> Hydrogen Sulfide Odor (C1) | <input type="checkbox"/> Dry-Season Water Table (C2) |
| <input type="checkbox"/> Sediment Deposits (B2) | <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) | <input type="checkbox"/> Crayfish Burrows (C8) |
| <input type="checkbox"/> Drift Deposits (B3) | <input type="checkbox"/> Presence of Reduced Iron (C4) | <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) |
| <input type="checkbox"/> Algal Mat or Crust (B4) | <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) | <input type="checkbox"/> Stunted or Stressed Plants (D1) |
| <input type="checkbox"/> Iron Deposits (B5) | <input type="checkbox"/> Thin Muck Surface (C7) | <input type="checkbox"/> Geomorphic Position (D2) |
| <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) | <input type="checkbox"/> Other (Explain in Remarks) | <input type="checkbox"/> Shallow Aquitard (D3) |
| <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) | | <input type="checkbox"/> Microtopographic Relief (D4) |
| | | <input type="checkbox"/> FAC-Neutral Test (D5) |
| Field Observations: | | |
| Surface Water Present? Yes _____ No _____ Depth (inches): | | |
| Water Table Present? Yes <u>X</u> No _____ Depth (inches): <u>6"</u> | | |
| Saturation Present? Yes <u>X</u> No _____ Depth (inches): <u>9"</u> | | |
| (includes capillary fringe) | | Wetland Hydrology Present? Yes <u>X</u> No _____ |
| Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: | | |
| Remarks: | | |

VEGETATION – Use scientific names of plants.

 Sampling Point: U 12

| Tree Stratum (Plot size: <u>30'</u>) | Absolute % Cover | Dominant Species? | Indicator Status | Dominance Test worksheet: |
|--|------------------|-------------------|------------------|--|
| 1. <u>Populus tremuloides</u> | <u>40</u> | <u>X</u> | <u>FACU</u> | Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>7</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>14</u> ⁹⁰ (A/B) |
| 2. <u>Quercus rubra</u> | <u>10</u> | | <u>FACU</u> | |
| 3. <u>Acer rubrum</u> | <u>20</u> | <u>X</u> | <u>FAC</u> | |
| 4. _____ | _____ | _____ | _____ | |
| 5. _____ | _____ | _____ | _____ | |
| 6. _____ | _____ | _____ | _____ | |
| 7. _____ | _____ | _____ | _____ | |
| <u>70</u> = Total Cover | | | | Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>0</u> x 2 = <u>0</u> FAC species <u>20</u> x 3 = <u>60</u> FACU species <u>120</u> x 4 = <u>480</u> UPL species <u>0</u> x 5 = _____ Column Totals: <u>190</u> (A) <u>540</u> (B) Prevalence Index = B/A = <u>3.86</u> |
| Sapling/Shrub Stratum (Plot size: <u>15'</u>) | Absolute % Cover | Dominant Species? | Indicator Status | Hydrophytic Vegetation Indicators: |
| 1. <u>Fagus grandifolia</u> | <u>25</u> | <u>X</u> | <u>FACU</u> | <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. |
| 2. <u>Pinus strobus</u> | <u>15</u> | <u>X</u> | <u>FACU</u> | |
| 3. _____ | _____ | _____ | _____ | |
| 4. _____ | _____ | _____ | _____ | |
| 5. _____ | _____ | _____ | _____ | |
| 6. _____ | _____ | _____ | _____ | |
| 7. _____ | _____ | _____ | _____ | |
| <u>40</u> = Total Cover | | | | Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height. |
| Herb Stratum (Plot size: <u>5'</u>) | Absolute % Cover | Dominant Species? | Indicator Status | Hydrophytic Vegetation Present? |
| 1. <u>Pinus strobus</u> | <u>10</u> | <u>X</u> | <u>FACU</u> | Yes _____ No <u>X</u> |
| 2. <u>Polystichum acrostichoides</u> | <u>5</u> | <u>X</u> | <u>FACU</u> | |
| 3. <u>Maianthemum canadense</u> | <u>5</u> | <u>X</u> | <u>FACU</u> | |
| 4. _____ | _____ | _____ | _____ | |
| 5. _____ | _____ | _____ | _____ | |
| 6. _____ | _____ | _____ | _____ | |
| 7. _____ | _____ | _____ | _____ | |
| <u>20</u> = Total Cover | | | | |
| Woody Vine Stratum (Plot size: <u>30'</u>) | Absolute % Cover | Dominant Species? | Indicator Status | Remarks: (Include photo numbers here or on a separate sheet.) |
| 1. <u>None</u> | _____ | _____ | _____ | |
| 2. _____ | _____ | _____ | _____ | |
| 3. _____ | _____ | _____ | _____ | |
| 4. _____ | _____ | _____ | _____ | |
| _____ = Total Cover | | | | |

Sampling Point: U-V2

Northcentral and Northeast Region – Version 2.0

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: WARD PARCEL City/County: Cumberland Sampling Date: 5-9-17
 Applicant/Owner: Gosnell-Palmer State: ME Sampling Point: Y3
 Investigator(s): L. Lederer Section, Township, Range: —
 Landform (hillslope, terrace, etc.): Swale Local relief (concave, convex, none): Slightly concave Slope (%): 20%
 Subregion (LRR or MLRA): U22L Lat: 43.83097235 Long: -70.323289 Datum: WGS 1989
 Soil Map Unit Name: Woodbridge fine sandy loam NWI classification: PFO1E
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No — (If no, explain in Remarks.)
 Are Vegetation —, Soil —, or Hydrology — significantly disturbed? No — Are "Normal Circumstances" present? Yes X No —
 Are Vegetation —, Soil —, or Hydrology — naturally problematic? No — (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---------------------------------|--------------------------|---------------------------------------|--------------------------|
| Hydrophytic Vegetation Present? | Yes <u>X</u> No <u>—</u> | Is the Sampled Area within a Wetland? | Yes <u>Y</u> No <u>—</u> |
| Hydric Soil Present? | Yes <u>X</u> No <u>—</u> | If yes, optional Wetland Site ID: | <u>Y3</u> |
| Wetland Hydrology Present? | Yes <u>X</u> No <u>—</u> | | |

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

| Wetland Hydrology Indicators: | | Secondary Indicators (minimum of two required) |
|---|---|--|
| Primary Indicators (minimum of one is required; check all that apply) | | |
| <u>X</u> Surface Water (A1) | <u>X</u> Water-Stained Leaves (B9) | <u>X</u> Surface Soil Cracks (B6) |
| <u>X</u> High Water Table (A2) | <u>—</u> Aquatic Fauna (B13) | <u>X</u> Drainage Patterns (B10) |
| <u>X</u> Saturation (A3) | <u>—</u> Marl Deposits (B15) | <u>—</u> Moss Trim Lines (B16) |
| <u>—</u> Water Marks (B1) | <u>—</u> Hydrogen Sulfide Odor (C1) | <u>—</u> Dry-Season Water Table (C2) |
| <u>X</u> Sediment Deposits (B2) | <u>—</u> Oxidized Rhizospheres on Living Roots (C3) | <u>—</u> Crayfish Burrows (C8) |
| <u>X</u> Drift Deposits (B3) | <u>—</u> Presence of Reduced Iron (C4) | <u>—</u> Saturation Visible on Aerial Imagery (C9) |
| <u>—</u> Algal Mat or Crust (B4) | <u>—</u> Recent Iron Reduction in Tilled Soils (C6) | <u>—</u> Stunted or Stressed Plants (D1) |
| <u>—</u> Iron Deposits (B5) | <u>—</u> Thin Muck Surface (C7) | <u>—</u> Geomorphic Position (D2) |
| <u>—</u> Inundation Visible on Aerial Imagery (B7) | <u>—</u> Other (Explain in Remarks) | <u>—</u> Shallow Aquitard (D3) |
| <u>—</u> Sparsely Vegetated Concave Surface (B8) | | <u>—</u> Microtopographic Relief (D4) |
| | | <u>—</u> FAC-Neutral Test (D5) |

Field Observations:

| | | | |
|--|--------------------------|-----------------------------------|---|
| Surface Water Present? | Yes <u>X</u> No <u>—</u> | Depth (inches): <u>2"</u> | Wetland Hydrology Present? Yes <u>X</u> No <u>—</u> |
| Water Table Present? | Yes <u>X</u> No <u>—</u> | Depth (inches): <u>to surface</u> | |
| Saturation Present? (includes capillary fringe) | Yes <u>X</u> No <u>—</u> | Depth (inches): <u>to surface</u> | |

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: Y3

| Tree Stratum (Plot size: <u>15'</u>) | Absolute % Cover | Dominant Species? | Indicator Status | | | | | | | | | | | | | | | |
|--|------------------|-------------------|------------------|--|-------------------|--------------|----------------------|----------------|-----------------------|----------------|-----------------------|------------------|-----------------------|-----------------|----------------------|----------------|------------------------------|----------------|
| 1. <u>Acer rubrum</u> | <u>65</u> | <u>X</u> | <u>FAC</u> | Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>2</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>50%</u> (A/B) | | | | | | | | | | | | | | |
| 2. _____ | _____ | _____ | _____ | | | | | | | | | | | | | | | |
| 3. _____ | _____ | _____ | _____ | | | | | | | | | | | | | | | |
| 4. _____ | _____ | _____ | _____ | | | | | | | | | | | | | | | |
| 5. _____ | _____ | _____ | _____ | | | | | | | | | | | | | | | |
| 6. _____ | _____ | _____ | _____ | | | | | | | | | | | | | | | |
| 7. _____ | _____ | _____ | _____ | | | | | | | | | | | | | | | |
| <u>60</u> = Total Cover | | | | Prevalence Index worksheet: <table style="width: 100%;"> <tr> <th>Total % Cover of:</th> <th>Multiply by:</th> </tr> <tr> <td>OBL species <u>0</u></td> <td>x 1 = <u>0</u></td> </tr> <tr> <td>FACW species <u>0</u></td> <td>x 2 = <u>0</u></td> </tr> <tr> <td>FAC species <u>65</u></td> <td>x 3 = <u>195</u></td> </tr> <tr> <td>FACU species <u>5</u></td> <td>x 4 = <u>20</u></td> </tr> <tr> <td>UPL species <u>0</u></td> <td>x 5 = <u>0</u></td> </tr> <tr> <td>Column Totals: <u>70</u> (A)</td> <td><u>215</u> (B)</td> </tr> </table> Prevalence Index = B/A = <u>3.0</u> | Total % Cover of: | Multiply by: | OBL species <u>0</u> | x 1 = <u>0</u> | FACW species <u>0</u> | x 2 = <u>0</u> | FAC species <u>65</u> | x 3 = <u>195</u> | FACU species <u>5</u> | x 4 = <u>20</u> | UPL species <u>0</u> | x 5 = <u>0</u> | Column Totals: <u>70</u> (A) | <u>215</u> (B) |
| Total % Cover of: | Multiply by: | | | | | | | | | | | | | | | | | |
| OBL species <u>0</u> | x 1 = <u>0</u> | | | | | | | | | | | | | | | | | |
| FACW species <u>0</u> | x 2 = <u>0</u> | | | | | | | | | | | | | | | | | |
| FAC species <u>65</u> | x 3 = <u>195</u> | | | | | | | | | | | | | | | | | |
| FACU species <u>5</u> | x 4 = <u>20</u> | | | | | | | | | | | | | | | | | |
| UPL species <u>0</u> | x 5 = <u>0</u> | | | | | | | | | | | | | | | | | |
| Column Totals: <u>70</u> (A) | <u>215</u> (B) | | | | | | | | | | | | | | | | | |
| Sapling/Shrub Stratum (Plot size: <u>15'</u>) | | | | | | | | | | | | | | | | | | |
| 1. <u>Pinus strobus</u> | <u>5</u> | <u>X</u> | <u>FACU</u> | | | | | | | | | | | | | | | |
| 2. _____ | _____ | _____ | _____ | | | | | | | | | | | | | | | |
| 3. _____ | _____ | _____ | _____ | | | | | | | | | | | | | | | |
| 4. _____ | _____ | _____ | _____ | | | | | | | | | | | | | | | |
| 5. _____ | _____ | _____ | _____ | | | | | | | | | | | | | | | |
| 6. _____ | _____ | _____ | _____ | | | | | | | | | | | | | | | |
| 7. _____ | _____ | _____ | _____ | | | | | | | | | | | | | | | |
| <u>X</u> = Total Cover | | | | | | | | | | | | | | | | | | |
| Herb Stratum (Plot size: <u>5'</u>) | | | | | | | | | | | | | | | | | | |
| 1. <u>None</u> | _____ | _____ | _____ | | | | | | | | | | | | | | | |
| 2. _____ | _____ | _____ | _____ | | | | | | | | | | | | | | | |
| 3. _____ | _____ | _____ | _____ | | | | | | | | | | | | | | | |
| 4. _____ | _____ | _____ | _____ | | | | | | | | | | | | | | | |
| 5. _____ | _____ | _____ | _____ | | | | | | | | | | | | | | | |
| 6. _____ | _____ | _____ | _____ | | | | | | | | | | | | | | | |
| 7. _____ | _____ | _____ | _____ | | | | | | | | | | | | | | | |
| 8. _____ | _____ | _____ | _____ | | | | | | | | | | | | | | | |
| 9. _____ | _____ | _____ | _____ | | | | | | | | | | | | | | | |
| 10. _____ | _____ | _____ | _____ | | | | | | | | | | | | | | | |
| 11. _____ | _____ | _____ | _____ | | | | | | | | | | | | | | | |
| 12. _____ | _____ | _____ | _____ | | | | | | | | | | | | | | | |
| _____ = Total Cover | | | | | | | | | | | | | | | | | | |
| Woody Vine Stratum (Plot size: <u>15'</u>) | | | | | | | | | | | | | | | | | | |
| 1. <u>None</u> | _____ | _____ | _____ | | | | | | | | | | | | | | | |
| 2. _____ | _____ | _____ | _____ | | | | | | | | | | | | | | | |
| 3. _____ | _____ | _____ | _____ | | | | | | | | | | | | | | | |
| 4. _____ | _____ | _____ | _____ | | | | | | | | | | | | | | | |
| _____ = Total Cover | | | | | | | | | | | | | | | | | | |
| Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) | | | | | | | | | | | | | | | | | | |
| Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height. | | | | | | | | | | | | | | | | | | |
| Hydrophytic Vegetation Present? Yes <u>X</u> No | | | | | | | | | | | | | | | | | | |
| Remarks: (Include photo numbers here or on a separate sheet.) <u>Plot size adjusted to account for narrow wetland width</u> | | | | | | | | | | | | | | | | | | |

Sampling Point: 3

Sampling Point:

[illegible]²Location: PL=Pore Lining, M=Matrix.

Indicators for Problematic Hydric Soils³:

- | | | |
|---|--|--|
| <input type="checkbox"/> Histosol (A1) | <input type="checkbox"/> Polyvalue Below Surface (S8) (LRR R, MLRA 149B) | <input type="checkbox"/> 2 cm Muck (A10) (LRR K, L, MLRA 149B) |
| <input type="checkbox"/> Histic Epipedon (A2) | <input type="checkbox"/> Thin Dark Surface (S9) (LRR R, MLRA 149B) | <input type="checkbox"/> Coast Prairie Redox (A16) (LRR K, L, R) |
| <input type="checkbox"/> Black Histic (A3) | <input type="checkbox"/> Loamy Mucky Mineral (F1) (LRR K, L) | <input type="checkbox"/> 5 cm Mucky Peat or Peat (S3) (LRR K, L, R) |
| <input type="checkbox"/> Hydrogen Sulfide (A4) | <input type="checkbox"/> Loamy Gleyed Matrix (F2) | <input type="checkbox"/> Dark Surface (S7) (LRR K, L, M) |
| <input type="checkbox"/> Stratified Layers (A5) | <input type="checkbox"/> Depleted Matrix (F3) | <input type="checkbox"/> Polyvalue Below Surface (S8) (LRR K, L) |
| <input checked="" type="checkbox"/> Depleted Below Dark Surface (A11) | <input type="checkbox"/> Redox Dark Surface (F6) | <input type="checkbox"/> Thin Dark Surface (S9) (LRR K, L) |
| <input type="checkbox"/> Thick Dark Surface (A12) | <input type="checkbox"/> Depleted Dark Surface (F7) | <input type="checkbox"/> Iron-Manganese Masses (F12) (LRR K, L, R) |
| <input type="checkbox"/> Sandy Mucky Mineral (S1) | <input type="checkbox"/> Redox Depressions (F8) | <input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 149B) |
| <input type="checkbox"/> Sandy Gleyed Matrix (S4) | | <input type="checkbox"/> Mesic Spodic (TA6) (MLRA 144A, 145, 149B) |
| <input type="checkbox"/> Sandy Redox (S5) | | <input type="checkbox"/> Red Parent Material (F21) |
| <input type="checkbox"/> Stripped Matrix (S6) | | <input type="checkbox"/> Very Shallow Dark Surface (TF12) |
| <input type="checkbox"/> Dark Surface (S7) (LRR R, MLRA 149B) | | <input type="checkbox"/> Other (Explain in Remarks) |

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Type: rocky
Depth (inches): 19

Hydric Soil Present? Yes X No

Remarks:

TRC - [REDACTED] WETLAND SUMMARY FORM

Observers: LGL Date: 5-4-17
 Corps plot: Yes ☒ No ☐ Feature ID: 4
 REVISIT? Yes ☒ No ☐ If Yes, any changes? ? Yes ☐ No ☐ If yes, Explain:

Dominant NWI Class: PF01 downslope Other NWI Classes: seep with in survey area

Representative/Dominant Wetland Vegetation by Strata

Tree Sapling Shrub Herb Vines
downslope & off-site Frasp Tsacan Tsu None
Ac rub

No wea. wlin in survey area

Representative Wetland Hydrology

Permanently Flooded ☐ Seasonally Flooded ☐ ☒ Saturated
 (approximate depth -) (approximate depth -)

Hydrologic Indicators: ☐ Surface Water; ☒ Water Stained Leaves; ☐ Sediment Deposits;
☒ Sparsely Vegetated Concave Surface; ☐ Water Marks; ☐ Drift Lines;
☐ Surface Scouring; ☒ Drainage Patterns; ☐ Buttressed Trees; ☐ Elevated Roots;
☐ Moss Trim Lines

Other Observations: high water table, saturation, 1/2-1" surface

Soils

| Depth (inches) | Horizon | Matrix Color | Redox Features Color / Percent | Texture | Notes |
|----------------|---------|--------------|--------------------------------|---------|-------|
| 0-3 | A | 10YR2/2 | — | S.L | |
| 3-9 | B | 10YR3/2 | 10YR3/4 | S.L | |
| 9+ | rocky | | 10% | | |
| | | | | | |
| | | | | | |

Representative Hydric Soils: ☒ Mineral ☐ Organic

Other Observations:

sat to surface, see H₂O @

Stream # 1 Name: NA
 Width (Top-of-Bank-Top-of-Bank): ☐ Depth @ Center: ☐ Perennial ☐ Intermittent ☐
 Bank Configuration: ☐ Undercut ☐ Vertical ☐ Gradual
 Channel Substrate: ☐ Peat-Muck ☐ Silt-Mud ☐ Sand ☐ Gravel/Cobble ☐ Boulder ☐ Bedrock

Stream # 2 Name: NA
 Width (Top-of-Bank-Top-of-Bank): ☐ Depth @ Center: ☐ Perennial ☐ Intermittent ☐
 Bank Configuration: ☐ Undercut ☐ Vertical ☐ Gradual
 Channel Substrate: ☐ Peat-Muck ☐ Silt-Mud ☐ Sand ☐ Gravel/Cobble ☐ Boulder ☐ Bedrock

Wildlife Observations/Sign

None obs.

Notes

Headwaters of seep with no veg

SKETCH ON BACK

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Ward Parcel City/County: Cumberland Sampling Date: 5-4-17
 Applicant/Owner: Gerrill-Palmer State: ME Sampling Point: 45
 Investigator(s): L Ledesc Section, Township, Range: —
 Landform (hillslope, terrace, etc.): Slight swale Local relief (concave, convex, none): concave Slope (%): 12%
 Subregion (LRR or MLRA): LLR Lat: 43.83116276 Long: -70.3012013 Datum: NAD83
 Soil Map Unit Name: Woodbridge fine sandy loam NWI classification: PF01E
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No — (If no, explain in Remarks.)
 Are Vegetation —, Soil —, or Hydrology — significantly disturbed? No Are "Normal Circumstances" present? Yes X No —
 Are Vegetation —, Soil —, or Hydrology — naturally problematic? NO (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | |
|---|--|
| Hydrophytic Vegetation Present? Yes <u>X</u> No <u>—</u> | Is the Sampled Area within a Wetland? Yes <u>X</u> No <u>—</u> |
| Hydric Soil Present? Yes <u>X</u> No <u>—</u> | If yes, optional Wetland Site ID: <u>45</u> |
| Wetland Hydrology Present? Yes <u>X</u> No <u>—</u> | |
| Remarks: (Explain alternative procedures here or in a separate report.) | |

HYDROLOGY

| Wetland Hydrology Indicators: | | Secondary Indicators (minimum of two required) |
|--|---|---|
| Primary Indicators (minimum of one is required; check all that apply) | | |
| <u>X</u> Surface Water (A1) | <u>X</u> Water-Stained Leaves (B9) | <u>X</u> Surface Soil Cracks (B6) |
| <u>X</u> High Water Table (A2) | <u>—</u> Aquatic Fauna (B13) | <u>X</u> Drainage Patterns (B10) |
| <u>X</u> Saturation (A3) | <u>—</u> Marl Deposits (B15) | <u>—</u> Moss Trim Lines (B16) |
| <u>—</u> Water Marks (B1) | <u>—</u> Hydrogen Sulfide Odor (C1) | <u>—</u> Dry-Season Water Table (C2) |
| <u>—</u> Sediment Deposits (B2) | <u>—</u> Oxidized Rhizospheres on Living Roots (C3) | <u>—</u> Crayfish Burrows (C8) |
| <u>—</u> Drift Deposits (B3) | <u>—</u> Presence of Reduced Iron (C4) | <u>—</u> Saturation Visible on Aerial Imagery (C9) |
| <u>—</u> Algal Mat or Crust (B4) | <u>—</u> Recent Iron Reduction in Tilled Soils (C6) | <u>—</u> Stunted or Stressed Plants (D1) |
| <u>—</u> Iron Deposits (B5) | <u>—</u> Thin Muck Surface (C7) | <u>—</u> Geomorphic Position (D2) |
| <u>—</u> Inundation Visible on Aerial Imagery (B7) | <u>—</u> Other (Explain in Remarks) | <u>—</u> Shallow Aquitard (D3) |
| <u>—</u> Sparsely Vegetated Concave Surface (B8) | | <u>—</u> Microtopographic Relief (D4) |
| | | <u>—</u> FAC-Neutral Test (D5) |
| Field Observations: | | |
| Surface Water Present? Yes <u>X</u> No <u>—</u> | Depth (inches): <u>nearby 12"</u> | |
| Water Table Present? Yes <u>X</u> No <u>—</u> | Depth (inches): <u>to surface</u> | |
| Saturation Present? Yes <u>X</u> No <u>—</u> | Depth (inches): <u>to surface</u> | |
| (includes capillary fringe) | | Wetland Hydrology Present? Yes <u>X</u> No <u>—</u> |
| Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: | | |
| Remarks: <u>Buttressed trunks & elevated roots on many trees</u> | | |

VEGETATION – Use scientific names of plants.

Sampling Point: Y5

| Tree Stratum (Plot size: <u>30'</u>) | Absolute % Cover | Dominant Species? | Indicator Status | Dominance Test worksheet: |
|---|------------------|-------------------|------------------|---|
| 1. <u>Acer rubrum</u> | <u>40</u> | <u>X</u> | <u>FAC</u> | Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A) Total Number of Dominant Species Across All Strata: <u>6</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>67%</u> (A/B) |
| 2. <u>Fraxinus nigra</u> | <u>20</u> | <u>X</u> | <u>FACW</u> | |
| 3. <u>Populus tremuloides</u> | <u>15</u> | | <u>FACU</u> | |
| 4. <u>Pinus strobus</u> | <u>15</u> | | <u>FACU</u> | |
| 5. _____ | _____ | _____ | _____ | Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____ |
| 6. _____ | _____ | _____ | _____ | |
| 7. _____ | _____ | _____ | _____ | |
| _____ | _____ | _____ | _____ | |
| Sapling/Shrub Stratum (Plot size: <u>15'</u>) <u>90</u> = Total Cover | | | | Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input checked="" type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) |
| 1. <u>Betula alleghaniensis</u> | <u>35</u> | <u>X</u> | <u>FACU</u> | |
| 2. <u>Fagus grandifolia</u> | <u>10</u> | <u>X</u> | <u>FACU</u> | |
| 3. _____ | _____ | _____ | _____ | |
| 4. _____ | _____ | _____ | _____ | ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. |
| 5. _____ | _____ | _____ | _____ | |
| 6. _____ | _____ | _____ | _____ | |
| 7. _____ | _____ | _____ | _____ | |
| Herb Stratum (Plot size: <u>5'</u>) <u>45</u> = Total Cover | | | | Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height. |
| 1. <u>Hieracium canadense</u> | <u>10</u> | <u>X</u> | <u>FACU</u> | |
| 2. <u>Osmunda claytoniana</u> | <u>10</u> | <u>X</u> | <u>FAC</u> | |
| 3. _____ | _____ | _____ | _____ | |
| 4. _____ | _____ | _____ | _____ | Hydrophytic Vegetation Present? Yes <u>X</u> No |
| 5. _____ | _____ | _____ | _____ | |
| 6. _____ | _____ | _____ | _____ | |
| 7. _____ | _____ | _____ | _____ | |
| Woody Vine Stratum (Plot size: <u>30'</u>) <u>_____</u> = Total Cover | | | | |
| 1. <u>None</u> | _____ | _____ | _____ | |
| 2. _____ | _____ | _____ | _____ | |
| 3. _____ | _____ | _____ | _____ | |
| 4. _____ | _____ | _____ | _____ | _____ = Total Cover |
| Remarks: (Include photo numbers here or on a separate sheet.) | | | | |

Sampling Point: 15

25

[illegible]²Location: PL=Pore Lining, M=Matrix.

Indicators for Problematic Hydric Soils³:

- ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
☐ Coast Prairie Redox (A16) (LRR K, L, R)
☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
☐ Dark Surface (S7) (LRR K, L, M)
☐ Polyvalue Below Surface (S8) (LRR K, L)
☐ Thin Dark Surface (S9) (LRR K, L)
☐ Iron-Manganese Masses (F12) (LRR K, L, R)
☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
☐ Red Parent Material (F21)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

Restrictive Layer (if observed):

none observed

Hydric Soil Present? Yes ☒ No ☐

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Ward Parcel City/County: Cumberland Sampling Date: 5-4-17
 Applicant/Owner: Garrill - Palmer State: ME Sampling Point: U-3/15
 Investigator(s): L. Lederc Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): flat area Local relief (concave, convex, none): — Slope (%): 0%
 Subregion (LRR or MLRA): _____ Lat: 43.83100824 Long: -70.3026788 Datum: NAD83
 Soil Map Unit Name: Woodbridge fine sandy loam NWI classification: UPL
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? No Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | |
|---|---|
| Hydrophytic Vegetation Present? Yes _____ No _____ | Is the Sampled Area within a Wetland? Yes _____ No <u>X</u> |
| Hydric Soil Present? Yes _____ No <u>X</u> | If yes, optional Wetland Site ID: <u>U btwn 3/15 385</u> |
| Wetland Hydrology Present? Yes _____ No <u>X</u> | |
| Remarks: (Explain alternative procedures here or in a separate report.) | |

HYDROLOGY

| | | |
|---|--|---|
| Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> _____ Surface Water (A1) _____ Water-Stained Leaves (B9) _____ High Water Table (A2) _____ Aquatic Fauna (B13) _____ Saturation (A3) _____ Marl Deposits (B15) _____ Water Marks (B1) _____ Hydrogen Sulfide Odor (C1) _____ Sediment Deposits (B2) _____ Oxidized Rhizospheres on Living Roots (C3) _____ Drift Deposits (B3) _____ Presence of Reduced Iron (C4) _____ Algal Mat or Crust (B4) _____ Recent Iron Reduction in Tilled Soils (C6) _____ Iron Deposits (B5) _____ Thin Muck Surface (C7) _____ Inundation Visible on Aerial Imagery (B7) _____ Other (Explain in Remarks) _____ Sparsely Vegetated Concave Surface (B8) | | <u>Secondary Indicators (minimum of two required)</u> _____ Surface Soil Cracks (B6) _____ Drainage Patterns (B10) _____ Moss Trim Lines (B16) _____ Dry-Season Water Table (C2) _____ Crayfish Burrows (C8) _____ Saturation Visible on Aerial Imagery (C9) _____ Stunted or Stressed Plants (D1) _____ Geomorphic Position (D2) _____ Shallow Aquitard (D3) _____ Microtopographic Relief (D4) _____ FAC-Neutral Test (D5) |
| Field Observations: Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes _____ No <u>X</u> Depth (inches): _____ Saturation Present? Yes <u>X</u> No _____ Depth (inches): <u>13"</u> (includes capillary fringe) | | Wetland Hydrology Present? Yes _____ No <u>X</u> |
| Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: | | |
| Remarks: | | |

VEGETATION – Use scientific names of plants.

Sampling Point: U 3/5

| Tree Stratum (Plot size: <u>30'</u>) | Absolute % Cover | Dominant Species? | Indicator Status | Dominance Test worksheet: |
|--|------------------|-------------------|------------------|--|
| 1. <u>Fagus grandifolia</u> | <u>40</u> | <u>X</u> | <u>FACU</u> | Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>5</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>40%</u> (A/B) |
| 2. <u>Betula alleghaniensis</u> | <u>30</u> | <u>X</u> | <u>FAC</u> | |
| 3. <u>Acer rubrum</u> | <u>20</u> | <u>X</u> | <u>FAC</u> | |
| 4. <u>Quercus rubra</u> | <u>10</u> | | <u>FACU</u> | |
| 5. _____ | _____ | _____ | _____ | Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>0</u> x 2 = <u>0</u> FAC species <u>50</u> x 3 = <u>150</u> FACU species <u>112</u> x 4 = <u>448</u> UPL species <u>0</u> x 5 = <u>0</u> Column Totals: <u>162</u> (A) <u>598</u> (B) Prevalence Index = B/A = <u>3.7</u> |
| 6. _____ | _____ | _____ | _____ | |
| 7. _____ | _____ | _____ | _____ | |
| _____ | <u>100</u> | = Total Cover | | |
| Sapling/Shrub Stratum (Plot size: <u>15'</u>) | | | | Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) |
| 1. <u>Fagus grandifolia</u> | <u>40</u> | <u>X</u> | <u>FACU</u> | |
| 2. _____ | _____ | _____ | _____ | |
| 3. _____ | _____ | _____ | _____ | |
| 4. _____ | _____ | _____ | _____ | ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. |
| 5. _____ | _____ | _____ | _____ | |
| 6. _____ | _____ | _____ | _____ | |
| 7. _____ | _____ | _____ | _____ | |
| 8. _____ | _____ | _____ | _____ | Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height. |
| 9. _____ | _____ | _____ | _____ | |
| 10. _____ | _____ | _____ | _____ | |
| 11. _____ | _____ | _____ | _____ | |
| 12. _____ | _____ | _____ | _____ | Hydrophytic Vegetation Present? Yes _____ No <u>X</u> |
| _____ | <u>40</u> | = Total Cover | | |
| Herb Stratum (Plot size: <u>5'</u>) | | | | |
| 1. <u>Nanthemum canadense</u> | <u>20</u> | <u>X</u> | <u>FACU</u> | |
| 2. <u>Prunus serotina</u> | <u>2</u> | | <u>FACU</u> | Woody Vine Stratum (Plot size: <u>30'</u>) 1. <u>None</u> 2. _____ 3. _____ 4. _____ _____ = Total Cover |
| 3. _____ | _____ | _____ | _____ | |
| 4. _____ | _____ | _____ | _____ | |
| 5. _____ | _____ | _____ | _____ | |
| 6. _____ | _____ | _____ | _____ | Remarks: (Include photo numbers here or on a separate sheet.) |
| 7. _____ | _____ | _____ | _____ | |
| 8. _____ | _____ | _____ | _____ | |
| 9. _____ | _____ | _____ | _____ | |
| 10. _____ | _____ | _____ | _____ | |
| 11. _____ | _____ | _____ | _____ | |
| 12. _____ | _____ | _____ | _____ | |
| _____ | <u>22</u> | = Total Cover | | |

Sampling Point: V 3/5

Northcentral and Northeast Region – Version 2.0

TRC - [REDACTED] WETLAND SUMMARY FORM

Observer: L. Leclerc Date: 5-4-17
 Corps plot: Yes ☒ No ☐ Feature ID: 16, VP2, STM1
 REVISIT? Yes ☒ No ☐ If Yes, any changes? ☐ Yes ☒ No ☐ If yes, Explain:

Dominant NWI Class: Pelt Other NWI Classes: PFO1 E

Representative/Dominant Wetland Vegetation by Strata

Tree Sapling Shrub Herb Vines
Acer rub Spir lat Ile ver Ox sen
Spir lat

Representative Wetland Hydrology

☐ Permanently Flooded ☒ Seasonally Flooded ☒ Saturated
 (approximate depth -) (approximate depth - 2")

Hydrologic Indicators: ☒ Surface Water; ☒ Water Stained Leaves; ☒ Sediment Deposits;
☒ Sparsely Vegetated Concave Surface; ☒ Water Marks; ☐ Drift Lines;
☒ Surface Scouring; ☒ Drainage Patterns; ☐ Buttressed Trees; ☐ Elevated Roots;
☐ Moss Trim Lines

Other Observations:

Soils

| Depth (inches) | Horizon | Matrix Color | Redox Features Color / Percent | Texture | Notes |
|----------------|---------|--------------|--------------------------------|---------|-------|
| 0-2 | A | 10YR2/1 | - | FSL | |
| 2-11 | B | 10YR4/2 | 10YR4/6-10% | FSL | |
| 11+ | rocky | | | | |
| | | | | | |
| | | | | | |

Representative Hydric Soils: ☒ Mineral ☐ Organic

Other Observations:

Free H₂O @ 4" immediately 5dph

Stream # 1 Name:

Width (Top-of-Bank-Top-of-Bank): 5-8' Depth @ Center: 1-4' Perennial ☒ Intermittent ☐

Bank Configuration: ☐ Undercut ☐ Vertical ☒ Gradual

Channel Substrate: ☐ Peat-Muck ☐ Silt-Mud ☒ Sand ☒ Gravel/Cobble ☐ Boulder ☐ Bedrock

Stream # 2 Name:

Width (Top-of-Bank-Top-of-Bank): NA Depth @ Center: NA Perennial ☐ Intermittent ☐

Bank Configuration: ☐ Undercut ☐ Vertical ☐ Gradual

Channel Substrate: ☐ Peat-Muck ☐ Silt-Mud ☐ Sand ☐ Gravel/Cobble ☐ Boulder ☐ Bedrock

Wildlife Observations/Sign

VP2 w/in

VP 1-6 END
CNCT TO 1

Notes

SKETCH ON BACK

TRC -- [REDACTED] - WETLAND SUMMARY FORM

Observers: L. Leders Date: 5-9-17
 Corps plot: Yes X No Feature ID: 7
 REVISIT? Yes X No If Yes, any changes? Yes No If yes, Explain:

Dominant NWI Class: PFOIF Other NWI Classes:

Representative/Dominant Wetland Vegetation by Strata

| Tree | Sapling | Shrub | Herb | Vine |
|---------------|---------------|---------------|----------------|-----------|
| <u>Ac rub</u> | <u>Betall</u> | <u>Tsugar</u> | <u>Mai can</u> | <u>NA</u> |
| <u>Betall</u> | <u>Aerub</u> | <u>Pinstr</u> | <u>osmcin</u> | |
| <u>Poptre</u> | | | | |
| <u>Frasp</u> | | | | |

Representative Wetland Hydrology

Permanently Flooded Seasonally Flooded X Saturated X
 (approximate depth -) (approximate depth - 1-2')

Hydrologic Indicators: X Surface Water; X Water Stained Leaves; Sediment Deposits;
 Sparsely Vegetated Concave Surface; Water Marks; Drift Lines;
 Surface Scouring; X Drainage Patterns; Buttressed Trees; Elevated Roots;
 Moss Trim Lines
 Other Observations: soap @ headwaters

Soils

| Depth (inches) | Horizon | Matrix Color | Redox Features Color / Percent | Texture | Notes |
|----------------|-----------|----------------|--------------------------------|------------|--------------|
| <u>0-8</u> | <u>A:</u> | <u>10YR2/1</u> | | <u>S.L</u> | <u>mucky</u> |
| <u>8-12</u> | <u>B</u> | <u>10YR4/2</u> | <u>10YR4/6</u> | <u>S.L</u> | |
| | | | | | |
| | | | | | |
| | | | | | |

Representative Hydric Soils: X Mineral Organic

Other Observations: Free H₂O & sat. to surface

Stream # 1 Name: N/A
 Width (Top-of-Bank-Top-of-Bank): Depth @ Center: Perennial Intermittent
 Bank Configuration: Undercut Vertical Gradual
 Channel Substrate: Peat-Muck Silt-Mud Sand Gravel/Cobble Boulder Bedrock
 Stream # 2 Name:
 Width (Top-of-Bank-Top-of-Bank): Depth @ Center: Perennial Intermittent
 Bank Configuration: Undercut Vertical Gradual
 Channel Substrate: Peat-Muck Silt-Mud Sand Gravel/Cobble Boulder Bedrock

Wildlife Observations/Sign

passerine birds

Notes wind-throws

SKETCH ON BACK

ATTACHMENT D

2017 Vernal Pool Survey Results



Maine State Vernal Pool Assessment Form



INSTRUCTIONS:

- Complete all 3 pages of form thoroughly. Most fields are required for pool registration.
- Clear photographs of a) the pool AND b) the indicators (one example of each species egg mass) are required for all observers.

Observer's Pool ID: VPI

MDIFW Pool ID: _____

1. PRIMARY OBSERVER INFORMATION

- a. Observer name: L. Heclerc
- b. Contact and credentials previously provided? ☐ No (submit Addendum 1) ☒ Yes

2. PROJECT CONTACT INFORMATION

- a. Contact name: ☒ same as observer ☐ other _____
- b. Contact and credentials previously provided? ☐ No (submit Addendum 1) ☒ Yes
- c. Project Name: Unknown

3. LANDOWNER CONTACT INFORMATION

- a. Are you the landowner? ☐ Yes ☒ No If no, was landowner permission obtained for survey? ☒ Yes ☐ No
- b. Landowner's contact information (required)
- Name: _____ Phone: _____
- Street Address: _____ City: _____ State: _____ Zip: _____
- c. ☐ Large Projects: check if separate project landowner data file submitted

4. VERNAL POOL LOCATION INFORMATION

- a. Location Township: Cumberland

Brief site directions to the pool (using mapped landmarks):

South of the intersection of Orchard & Whitney Roads in Cumberland, Maine, south of Orchard Rd

b. Mapping Requirements

- i. USGS topographic map OR aerial photograph with pool clearly marked.

ii. GPS location of vernal pool (use Datum NAD83 / WGS84)

Longitude/Easting: 43.833867 Latitude/Northing: -70.30517

Coordinate system: WGS 1984

Check one: ☒ GIS shapefile

- send to Jason.Czapiga@maine.gov; observer has reviewed shape accuracy (Best)

☐ The pool perimeter is delineated by multiple GPS points. (Excellent)

- Include map or spreadsheet with coordinates.

☐ The above GPS point is at the center of the pool. (Good)

☐ The center of the pool is approximately _____ m ☐ ft ☐ in the compass direction of _____ degrees from the above GPS point. (Acceptable)



Maine State Vernal Pool Assessment Form

VP 1



5. VERNAL POOL HABITAT INFORMATION

a. Habitat survey date (only if different from indicator survey dates on page 3): _____

b. Wetland habitat characterization

■ Choose the best descriptor for the landscape setting:

- ☐ Isolated depression
☐ Floodplain depression
☒ Pool associated with larger wetland complex
☐ Other: _____

■ Check all wetland types that best apply to this pool:

- | | | | |
|--|---|--|---|
| <input checked="" type="checkbox"/> Forested swamp | <input type="checkbox"/> Wet meadow | <input type="checkbox"/> Slow stream | <input type="checkbox"/> Dug pond or borrow pit |
| <input checked="" type="checkbox"/> Shrub swamp | <input type="checkbox"/> Lake or pond cove | <input type="checkbox"/> Floodplain | <input type="checkbox"/> Roadside ditch |
| <input type="checkbox"/> Peatland (fen or bog) | <input type="checkbox"/> Abandoned beaver flowage | <input type="checkbox"/> Mostly unvegetated pool | <input type="checkbox"/> Other: _____ |
| <input type="checkbox"/> Emergent marsh | <input type="checkbox"/> Active beaver flowage | <input type="checkbox"/> ATV or skidder rut | |

c. Vernal pool status under the Natural Resources Protection Act (NRPA)

i. Pool Origin: ☒ Natural ☐ Natural-Modified ☐ Unnatural ☐ Unknown

If modified, unnatural or unknown, describe any modern or historic human impacts to the pool (required):

Though perhaps pooled as a result of road, although not likely as there is pooling on opposite side of road

ii. Pool Hydrology

■ Select the pool's estimated hydroperiod AND provide rationale in box (required):

- ☐ Permanent
☐ Semi-permanent (drying partially in all years and completely in drought years)
☒ Ephemeral (drying out completely in most years)
☐ Unknown

Explain:

Winterberry & Cinnamon fern & grasses/sedges growing throughout pool bottom

■ Maximum depth at survey: ☒ 0-12" (0-1 ft.) ☐ 12-36" (1-3 ft.) ☐ 36-60" (3-5 ft.) ☐ >60" (>5 ft.)

■ Approximate size of pool (at spring highwater): Width: 30 m ☒ ft Length: 50 m ☒ ft

■ Predominate substrate in order of increasing hydroperiod:

- ☒ Mineral soil (bare, leaf-litter bottom, or upland mosses present)
☐ Mineral soil (sphagnum moss present)
☐ Organic matter (peat/muck) shallow or restricted to deepest portion
☐ Organic matter (peat/muck) deep and widespread

■ Pool vegetation indicators in order of increasing hydroperiod (check all that apply):

- | | |
|--|---|
| <input type="checkbox"/> Terrestrial nonvascular spp. (e.g. haircap moss, lycopodium spp.) | <input type="checkbox"/> Wet site ferns (e.g. royal fern, marsh fern) |
| <input type="checkbox"/> Dry site ferns (e.g. spinulose wood fern, lady fern, bracken fern) | <input checked="" type="checkbox"/> Wet site shrubs (e.g. highbush blueberry, maleberry, winterberry, mountain holly) |
| <input checked="" type="checkbox"/> Moist site ferns (e.g. sensitive fern, cinnamon fern, interrupted fern, New York fern) | <input type="checkbox"/> Wet site graminoids (e.g. blue-joint grass, tussock sedge, cattail, bulrushes) |
| <input type="checkbox"/> Moist site vasculars (e.g. skunk cabbage, jewelweed, blue flag iris, swamp candle) | <input type="checkbox"/> Aquatic vascular spp. (e.g. pickerelweed, arrowhead) |
| <input type="checkbox"/> Sphagnum moss (anchored or suspended) | <input type="checkbox"/> Floating or submerged aquatics (e.g. water lily, water shield, pond weed, bladderwort) |
| | <input type="checkbox"/> No vegetation in pool |

■ Faunal indicators (check all that apply):

- ☐ Fish ☐ Bullfrog or Green Frog tadpoles ☐ Other: none obs

iii. Inlet/Outlet Flow Permanency

Type of inlet or outlet (a seasonal or permanent channel providing water flowing into or out of the pool):

- ☒ No inlet or outlet
☐ Intermittent inlet or outlet
☐ Permanent inlet or outlet (channel with well-defined banks and permanent flow)
☐ Other or Unknown (explain): _____



Maine State Vernal Pool Assessment Form

VPI



6. VERNAL POOL INDICATOR INFORMATION

a. Indicator survey dates: 5-9-17 & 5-10-17

b. Indicator abundance criteria and pool survey effort

- Is pool depression bisected by 2 ownerships (straddler pool)? ☒ Yes ☐ No
- Was the entire pool surveyed for egg masses? ☐ Yes ☒ No; what % of entire pool surveyed? 70%
- For each indicator species, indicate the exact number of egg masses, confidence level for species determination, and egg mass maturity. Separate cells are provided for separate survey dates.

| INDICATOR SPECIES | Egg Masses (or adult Fairy Shrimp) | | | | | | Tadpoles/Larvae ⁴ | | | |
|---------------------------|------------------------------------|----------|----------|-------------------------------|--|--------------------------------|------------------------------|----------|--|-------------------------------|
| | Visit #1 | Visit #2 | Visit #3 | Confidence Level ¹ | | Egg Mass Maturity ² | | Observed | | Confidence Level ¹ |
| Wood Frog | 0 | 0 | | 3 | | | | | | |
| Spotted Salamander | 2 | 2 | | 3 | | | | | | |
| Blue-spotted Salamander | 0 | 0 | | 3 | | | | | | |
| Fairy Shrimp ³ | NA | NA | | 3 | | | | | | |

1-Confidence level: 1 = <60%, 2 = 60-95%, 3 = >95%

2-Egg mass maturity: F= Fresh (<24 hrs), M= Mature (round embryos), A= Advanced (loose matrix, curved embryos), H= Hatched or Hatching

3-Fairy shrimp: X = present

4-Tadpoles/larvae: X = present

no WFEX or tadpoles observed

c. Rarity criteria

None observed

- Note any rare species associated with vernal pools. Observations should be accompanied by photographs.

| SPECIES | Method of Verification* | | | CL** | SPECIES | Method of Verification* | | | CL** |
|-------------------|--------------------------|--------------------------|--------------------------|------|--------------|--------------------------|--------------------------|--------------------------|------|
| | P | H | S | | | P | H | S | |
| Blanding's Turtle | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | Wood Turtle | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Spotted Turtle | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | Ribbon Snake | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Ringed Boghaunter | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | Other: | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

*Method of verification: P = Photographed, H = Handled, S = Seen

**CL - Confidence level in species determination: 1 = <60%, 2 = 60-95%, 3 = >95%

d. Optional observer recommendation:

☐ SVP ☐ Potential SVP ☒ Non Significant VP ☐ Indicator Breeding Area

e. General vernal pool comments and/or observations of other wildlife:

caddisfly larvae observed in pool

Send completed form and supporting documentation to: Maine Dept. of Inland Fisheries and Wildlife
Attn: Vernal Pools
650 State Street, Bangor, ME 04401

NOTE: Digital submission (to Jason.Czapiga@maine.gov) of vernal pool field forms and photographs is only acceptable for projects with 3 or fewer assessed pools; larger projects must be mailed as hard copies.

For MDIFW use only

Reviewed by MDIFW Date:

Initials:

This pool is: ☐ Significant ☐ Potentially Significant but lacking critical data ☐ Not Significant due to: ☐ does not meet biological criteria ☐ does not meet MDEP vernal pool criteria.

Comments:



Maine State Vernal Pool Assessment Form



INSTRUCTIONS:

- Complete all 3 pages of form thoroughly. Most fields are required for pool registration.
- Clear photographs of a) the pool AND b) the indicators (one example of each species egg mass) are required for all observers.

Observer's Pool ID: VP 2

MDIFW Pool ID: _____

1. PRIMARY OBSERVER INFORMATION

- a. Observer name: L. Lederer
- b. Contact and credentials previously provided? ☐ No (submit Addendum 1) ☒ Yes

2. PROJECT CONTACT INFORMATION

- a. Contact name: ☒ same as observer ☐ other _____
- b. Contact and credentials previously provided? ☐ No (submit Addendum 1) ☒ Yes
- c. Project Name: _____

3. LANDOWNER CONTACT INFORMATION

- a. Are you the landowner? ☐ Yes ☒ No If no, was landowner permission obtained for survey? ☒ Yes ☐ No
- b. Landowner's contact information (required)
- Name: _____ Phone: _____
- Street Address: _____ City: _____ State: _____ Zip: _____
- c. ☐ Large Projects: check if separate project landowner data file submitted

4. VERNAL POOL LOCATION INFORMATION

- a. Location Township: Cumberland

Brief site directions to the pool (using mapped landmarks):

Approx 600' to the east of the intersection of Orchard & Whiting roads in Cumberland & approx 300' south of Orchard Rd.

b. Mapping Requirements

- i. USGS topographic map OR aerial photograph with pool clearly marked.

ii. GPS location of vernal pool (use Datum NAD83 / WGS84)

Longitude/Easting: 43.831928 Latitude/Northing: -70.297705

Coordinate system: WGS 1984

Check one: ☒ GIS shapefile

- send to Jason.Czapiga@maine.gov; observer has reviewed shape accuracy (Best)

- ☐ The pool perimeter is delineated by multiple GPS points. (Excellent)
- Include map or spreadsheet with coordinates.

- ☐ The above GPS point is at the center of the pool. (Good)

- ☐ The center of the pool is approximately _____ m ☐ ft ☐ In the compass direction of _____ degrees from the above GPS point. (Acceptable)



Maine State Vernal Pool Assessment Form

VP 2 

5. VERNAL POOL HABITAT INFORMATION

a. Habitat survey date (only if different from indicator survey dates on page 3): _____

b. Wetland habitat characterization

■ Choose the best descriptor for the landscape setting:

- ☐ Isolated depression ☒ Pool associated with larger wetland complex
☐ Floodplain depression ☐ Other: _____

■ Check all wetland types that best apply to this pool:

- | | | | |
|---|---|--|---|
| <input type="checkbox"/> Forested swamp | <input type="checkbox"/> Wet meadow | <input type="checkbox"/> Slow stream | <input type="checkbox"/> Dug pond or borrow pit |
| <input checked="" type="checkbox"/> Shrub swamp | <input type="checkbox"/> Lake or pond cove | <input type="checkbox"/> Floodplain | |
| <input type="checkbox"/> Peatland (fen or bog) | <input type="checkbox"/> Abandoned beaver flowage | <input type="checkbox"/> Mostly unvegetated pool | <input type="checkbox"/> Roadside ditch |
| <input type="checkbox"/> Emergent marsh | <input type="checkbox"/> Active beaver flowage | <input type="checkbox"/> ATV or skidder rut | <input type="checkbox"/> Other: _____ |

c. Vernal pool status under the Natural Resources Protection Act (NRPA)

i. Pool Origin: ☒ Natural ☐ Natural-Modified ☐ Unnatural ☐ Unknown

If modified, unnatural or unknown, describe any modern or historic human impacts to the pool (required):

ii. Pool Hydrology

■ Select the pool's estimated hydroperiod AND provide rationale in box (required):

- ☐ Permanent ☐ Semi-permanent (drying partially in all years and completely in drought years) ☒ Ephemeral (drying out completely in most years) ☐ Unknown

Explain:

Shallow depth with winterberry growing throughout pool

■ Maximum depth at survey: ☒ 0-12" (0-1 ft.) ☐ 12-36" (1-3 ft.) ☐ 36-60" (3-5 ft.) ☐ >60" (>5 ft.)

■ Approximate size of pool (at spring highwater): Width: 30 m ☒ ft Length: 45 m ☒ ft

■ Predominate substrate in order of increasing hydroperiod:

- ☒ Mineral soil (bare, leaf-litter bottom, or upland mosses present) ☐ Organic matter (peat/muck) shallow or restricted to deepest portion
☐ Mineral soil (sphagnum moss present) ☐ Organic matter (peat/muck) deep and widespread

■ Pool vegetation indicators in order of increasing hydroperiod (check all that apply):

- | | |
|---|---|
| <input checked="" type="checkbox"/> Terrestrial nonvascular spp. (e.g. haircap moss, lycopodium spp.) | <input type="checkbox"/> Wet site ferns (e.g. royal fern, marsh fern) |
| <input type="checkbox"/> Dry site ferns (e.g. spinulose wood fern, lady fern, bracken fern) | <input checked="" type="checkbox"/> Wet site shrubs (e.g. highbush blueberry, maleberry, winterberry, mountain holly) |
| <input type="checkbox"/> Moist site ferns (e.g. sensitive fern, cinnamon fern, interrupted fern, New York fern) | <input type="checkbox"/> Wet site graminoids (e.g. blue-joint grass, tussock sedge, cattail, bulrushes) |
| <input type="checkbox"/> Moist site vasculars (e.g. skunk cabbage, jewelweed, blue flag iris, swamp candle) | <input type="checkbox"/> Aquatic vascular spp. (e.g. pickerelweed, arrowhead) |
| <input type="checkbox"/> Sphagnum moss (anchored or suspended) | <input type="checkbox"/> Floating or submerged aquatics (e.g. water lily, water shield, pond weed, bladderwort) |
| | <input type="checkbox"/> No vegetation in pool |

■ Faunal indicators (check all that apply): None obs.

- ☐ Fish ☐ Bullfrog or Green Frog tadpoles ☐ Other: _____

iii. Inlet/Outlet Flow Permanency

Type of inlet or outlet (a seasonal or permanent channel providing water flowing into or out of the pool):

- ☐ No inlet or outlet ☐ Permanent inlet or outlet (channel with well-defined banks and permanent flow)
☒ Intermittent inlet or outlet ☐ Other or Unknown (explain): _____

wetland seep above, wetland seep → stream below

on rocks above water level



Maine State Vernal Pool Assessment Form

VP2



6. VERNAL POOL INDICATOR INFORMATION

a. Indicator survey dates: 5-4-17 & 5-10-17

b. Indicator abundance criteria and pool survey effort

- Is pool depression bisected by 2 ownerships (straddler pool)? ☐ Yes ☒ No
- Was the entire pool surveyed for egg masses? ☒ Yes ☐ No; what % of entire pool surveyed? _____
- For each indicator species, indicate the exact number of egg masses, confidence level for species determination, and egg mass maturity. Separate cells are provided for separate survey dates.

| INDICATOR SPECIES | Egg Masses (or adult Fairy Shrimp) | | | | | | Tadpoles/Larvae ⁴ | | | |
|---------------------------|------------------------------------|----------|----------|-------------------------------|--|--------------------------------|------------------------------|----------|--|-------------------------------|
| | Visit #1 | Visit #2 | Visit #3 | Confidence Level ¹ | | Egg Mass Maturity ² | | Observed | | Confidence Level ¹ |
| Wood Frog | 0 | 0 | | 3 | | | | | | |
| Spotted Salamander | 9 | 9 | | 3 | | | | | | |
| Blue-spotted Salamander | 0 | 0 | | 3 | | | | | | |
| Fairy Shrimp ³ | NA | NA | | 3 | | | | | | |

1-Confidence level: 1 = <60%, 2 = 60-95%, 3 = >95%

2-Egg mass maturity: F= Fresh (<24 hrs), M= Mature (round embryos), A= Advanced (loose matrix, curved embryos), H= Hatched or Hatching

3-Fairy shrimp: X = present

4-Tadpoles/larvae: X = present

mosquito larvae observed
no wood frog egg masses
or tadpoles observed

c. Rarity criteria None observed

- Note any rare species associated with vernal pools. Observations should be accompanied by photographs.

| SPECIES | Method of Verification* | | | CL** | SPECIES | Method of Verification* | | | CL** |
|-------------------|--------------------------|--------------------------|--------------------------|------|--------------|--------------------------|--------------------------|--------------------------|------|
| | P | H | S | | | P | H | S | |
| Blanding's Turtle | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | Wood Turtle | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Spotted Turtle | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | Ribbon Snake | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Ringed Boghaunter | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | Other: | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

*Method of verification: P = Photographed, H = Handled, S = Seen

**CL - Confidence level in species determination: 1 = <60%, 2 = 60-95%, 3 = >95%

d. Optional observer recommendation:

- ☐ SVP ☐ Potential SVP ☒ Non Significant VP ☐ Indicator Breeding Area

e. General vernal pool comments and/or observations of other wildlife:

Send completed form and supporting documentation to: Maine Dept. of Inland Fisheries and Wildlife
Attn: Vernal Pools
650 State Street, Bangor, ME 04401

NOTE: Digital submission (to Jason.Czapiga@maine.gov) of vernal pool field forms and photographs is only acceptable for projects with 3 or fewer assessed pools; larger projects must be mailed as hard copies.

For MDIFW use only Reviewed by MDIFW Date: _____ Initials: _____

This pool is: ☐ Significant ☐ Potentially Significant but lacking critical data ☐ Not Significant due to: ☐ does not meet biological criteria. ☐ does not meet MDEP vernal pool criteria.

Comments:

555M 1111

Traffic Assessment

Orchard Road Subdivision – Cumberland, Maine

October 2017

Introduction

Gorrill Palmer has completed a traffic assessment for the proposed Orchard Road Subdivision on Orchard Road in Cumberland, Maine. The site is proposed to be accessed via a full movement driveway on Orchard Road, approximately 750 ft south of its intersection with Whitney Road. The development is proposed to be a 10 lot subdivision for 10 single family homes. The following is a summary of the trip generation, crash history, and sight distance evaluation for the proposed project.

Trip Generation

The trip generation for the proposed 10 single family houses has been calculated using the Institute of Transportation Engineers' (ITE) publication, *Trip Generation*, Ninth Edition, Land Use Code (LUC) 210 – Single-Family Detached Housing. The proposed development is forecast to generate the following:

- Weekday: 95 trip ends
- AM peak hour of the generator: 8 trip ends
- PM peak hour of the generator: 10 trip ends
- AM peak hour of the adjacent street: 8 trip ends
- PM peak hour of the adjacent street: 10 trip ends
- Saturday: 99 trip ends
- Saturday Peak hour of the generator: 9 trip ends

This level of trip generation is not anticipated to have a significant impact on the surrounding roadway network. Additionally, the forecast trip generation is less than the threshold of 99 trip ends during a peak hour for requiring a MaineDOT Traffic Movement Permit.

Crash History

GP obtained the three year collision data in the vicinity of the site from MaineDOT (attached) for the period of 2014 to 2016, the most recent period available. To evaluate if a location has a higher rate of crashes, MaineDOT uses two criteria to define a High Crash Location (HCL). Both criteria must be met in order to be classified as an HCL.



1. A critical rate factor (CRF) of 1.00 or more for a three year period. A CRF compares the actual crash rate to the rate for similar intersections in the state. A CRF of less than 1.00 indicates a rate of less than average **and**:
2. A minimum of eight crashes over the same three year period.

Based on a review of the collision data, there are no HCLs in the vicinity of the site.

Sight Distance Evaluation

GP evaluated the sight distance at the proposed site access on Orchard Road. Both the Town and MaineDOT have guidelines for sight distance. The basic sight distance standards are as follows:

Standards for Sight Distance

| Posted Speed (mph) | Sight Distance Requirement (ft) | |
|--------------------|---------------------------------|----------|
| | Town of Cumberland | MaineDOT |
| 25 | 250 | 200 |
| 30 | 300 | 250 |
| 35 | 350 | 305 |
| 40 | 400 | 360 |
| 45 | 450 | 425 |
| 50 | 500 | 495 |

The Town does not specify an evaluation method, so the sight distance has been evaluated using MaineDOT methodology. The evaluation methodology is as follows:

| | |
|--------------------------------|----------------------------------|
| Driveway observation point: | 10 feet off edge of traveled way |
| Height of eye at driveway: | 3 ½ feet above ground |
| Height of approaching vehicle: | 4 ¼ feet above ground |

The speed limit on Orchard Road is 35 mph. The Town requires a sight distance of 350 ft and MaineDOT requires a sight distance of 305 ft. The following table summarizes the measured sight distances at the proposed subdivision road:

Existing Sight Distance Summary

| Approach | Sight Distance (ft) | | | |
|----------------------------------|---------------------|---------------|-------------|----------|
| | Looking Left | Looking Right | Requirement | |
| | | | Town | MaineDOT |
| Exiting Subdivision onto Orchard | 275 | 340 | 350 | 305 |



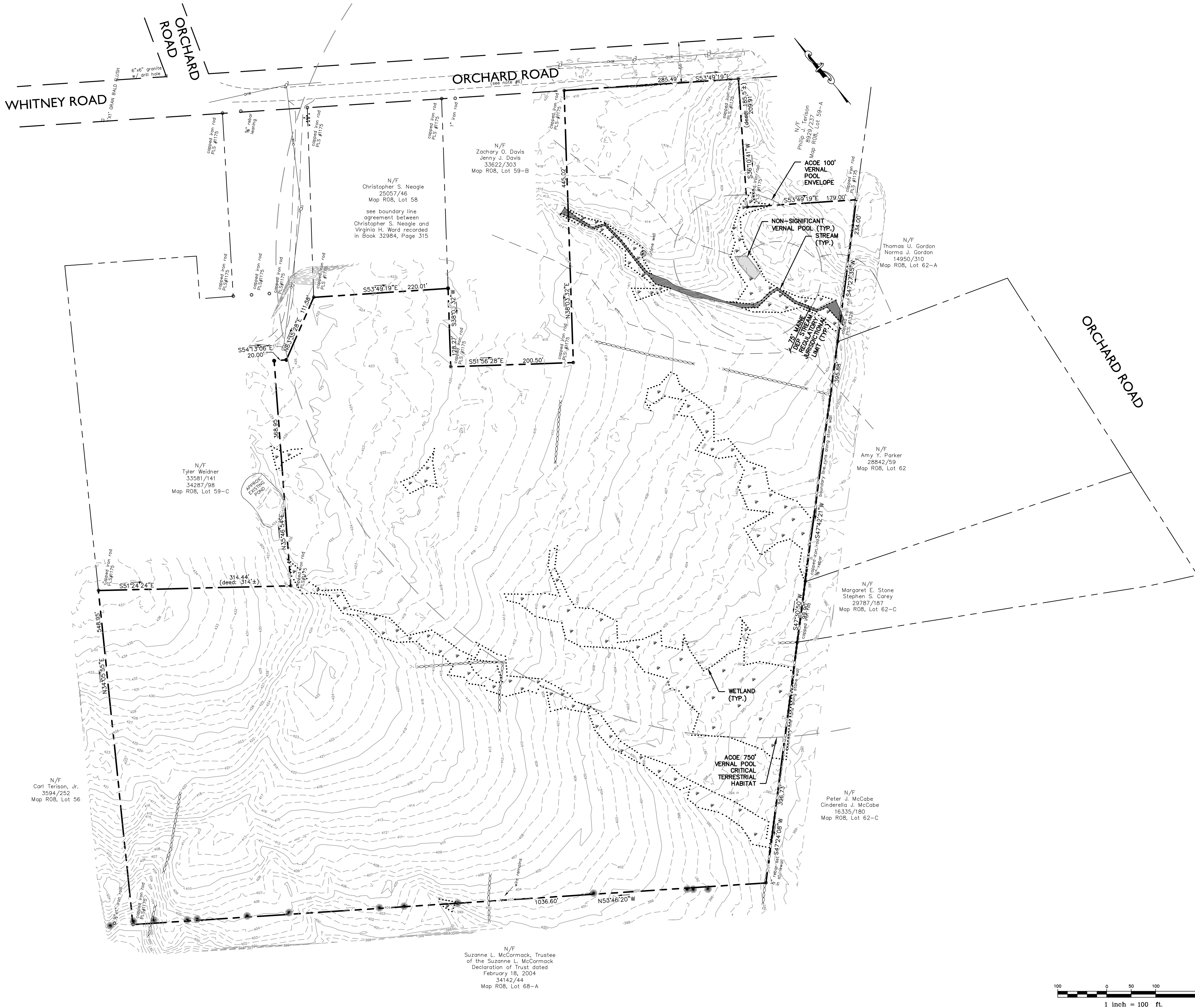
As shown in the table, the existing sight distances are forecast to be less than the sight distances required by the Town and MaineDOT. However, if vegetation in the sight triangle is cleared, the sight distances are anticipated to exceed the Town and MaineDOT requirements. Looking left, if trees are removed adjacent to the site access, the sight distance is anticipated to be greater than 450 ft. Looking right, if brush is cleared along the roadway, the sight distance is anticipated to be 360 ft. The sight distance should be evaluated throughout construction of the site access, to ensure the Town and MaineDOT requirements are met.

Conclusions

The following is a summary of the conclusions:

1. The proposed project is forecast to generate 8 trip ends and 10 trip ends during the Weekday AM and PM peak hours of the generator respectively. This is less than the 99 trip end threshold for requiring a MaineDOT Traffic Movement Permit.
2. Based on a review of the MaineDOT crash data, there are no high crash locations in the vicinity of the site.
3. The sight distances at the site driveway are anticipated to meet the MaineDOT and Town requirements, with the removal of vegetation along the roadway adjacent to the site access.
4. Overall the project is anticipated to have minimal impact on the surrounding roadway network.

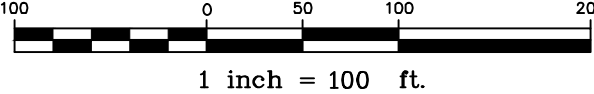
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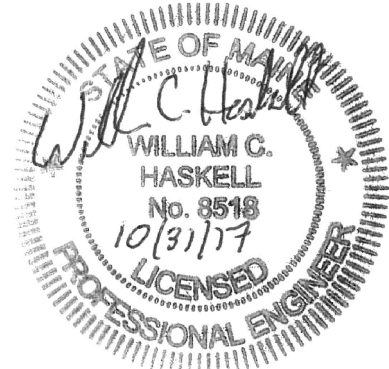
- LEGEND
- Monument - found
 - Iron marker - found
 - Iron marker - set (#5 rebar)
 - Property line (abutter)
 - Right of way line
 - Stone wall
 - Edge of pavement
 - Edge of gravel
 - Utility pole
 - Guy wire
 - Overhead utility line
 - N/F
 - 1234/567
 - Tree line
 - Wetlands
 - Coniferous tree w/ barbed wire remains

- NOTES
- 1) Book and Page references are to the Cumberland County Registry of Deeds unless otherwise noted.
 - 2) Bearings are referenced to grid north, Maine State Plane Coordinate System, NAD83, West Zone.
 - 3) Utility information on this plan is approximate, based on location of visible features. DigSafe and/or the appropriate utilities should be contacted prior to any construction.
 - 4) Property lies within Zone C based on FIRM Community #230162 Panels #0010-B and 0015-B, dated May 19, 1981. It does not lie within a special flood hazard area.
 - 5) Wetlands delineated by others.
 - 6) Orchard Road has a defined width of 4 rods (66 feet) as accepted by the Town of Cumberland on April 10, 1797. Apparent location shown.
 - 7) Not all interior stone walls have been located on the property.

- PLAN REFERENCES
- 1) Plan of Boundary Survey - Remaining Land Now of Virginia H. Ward - Orchard Road - Made for Virginia H. Ward by Brian Smith at Sitelines, PA dated January 18, 2017. Recorded in Plan Book 217, Page 39.
 - 2) Plan of Settlement Worksheet of Chris S. Neagle & Virginia H. Ward - Common Boundary - Made for Chris S. Neagle by Brian Smith at Sitelines, PA dated December 22, 2015. Recorded in Plan Book 216, Page 25.
 - 3) Plan of Standard Boundary Survey of Land of Robert J. Plamplano and Brenda T. Plamplano made for Brenda T. Plamplano by Sebago Technics dated June 11, 1997 and revised through March 26, 1999. Recorded in Plan Book 199, page 177.
 - 4) Plan of Land on Blanchard Road made for Robert Plamplano by Owen Haskell revised through February 2, 1992. Recorded in Plan Book 192, Page 44.
 - 5) Plan of Standard Boundary Survey on Orchard Road made for Robert A. Milliken by Wayne T. Wood & Co. dated June 1990. Recorded in Plan Book 186, Page 24.



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| Rev. | Date | Revision |
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| Preliminary Subdivision Application | 10-31-17 | WCH |
| Issued For | Date | By |

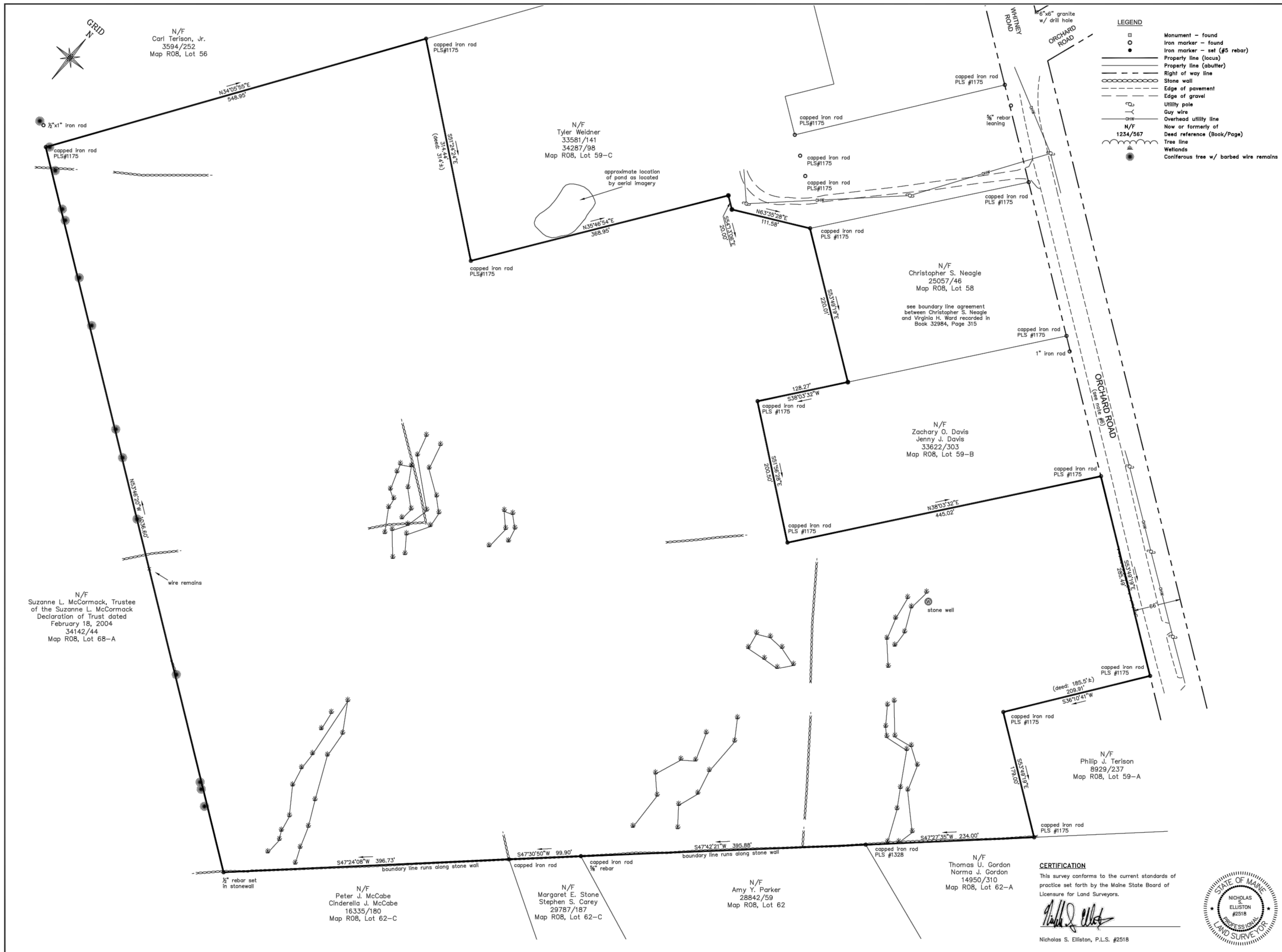
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| Design: JWA | Draft: LAN | Date: OCT 2017 |
| Checked: WCH | Scale: | Job No.: 3236 |
| File Name: 3236-xc.dwg | This plan shall not be modified without written permission from GorrillPalmer(GP). Any alterations, authorized or otherwise, shall be at the user's sole risk and without liability to GP. | |



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|---------------|---|
| Brawing Name: | Existing Conditions Plan |
| Project: | Orchard Road Subdivision Cumberland, Maine |
| Client: | TZ Properties Falmouth, Me 04105 |

| |
|-------------|
| Drawing No. |
| 2 |



VICINITY MAP
No Scale

NOTES

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- 2) Bearings are referenced to grid north, Maine State Plane Coordinate System, NAD83, West Zone.
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- 3) Plan of Standard Boundary Survey of Land of Robert J. Piampiono and Brenda T. Piampiono made for Brenda T. Piampiono by Sebago Technics dated June 11, 1997 and revised through March 26, 1999. Recorded in Plan Book 199, page 177.
- 4) Plan of Land on Blanchard Road made for Robert Piampiono by Owen Hassell revised through February 2, 1992. Recorded in Plan Book 192, Page 44.
- 5) Plan of Standard Boundary Survey on Orchard Road made for Robert A. Milliken by Wayne T. Wood & Co. dated June 1990. Recorded in Plan Book 186, Page 24.

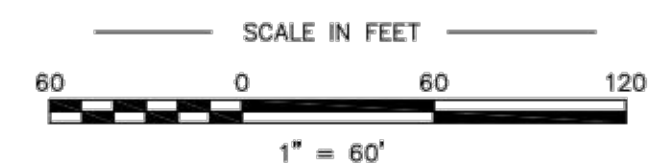
AREA

1,087,921 Sq. Ft. / 24.98 Acres

OWNERS OF RECORD

TZ Properties, LLC
23 Stormy Brook Rd.
Falmouth, ME 04105

Book 34200, Page 67



PLAN OF Standard Boundary Survey

Orchard Road Cumberland, Maine

MADE FOR

Gorrill-Palmer

707 Sable Oaks Drive, Suite 30

South Portland, Maine

JOB #217083

DATE: September 29, 2017

SCALE: 1" = 60'

BOOK #906



217083.dwg

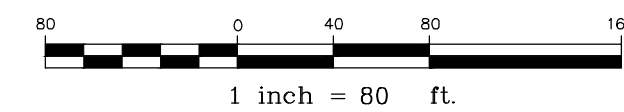
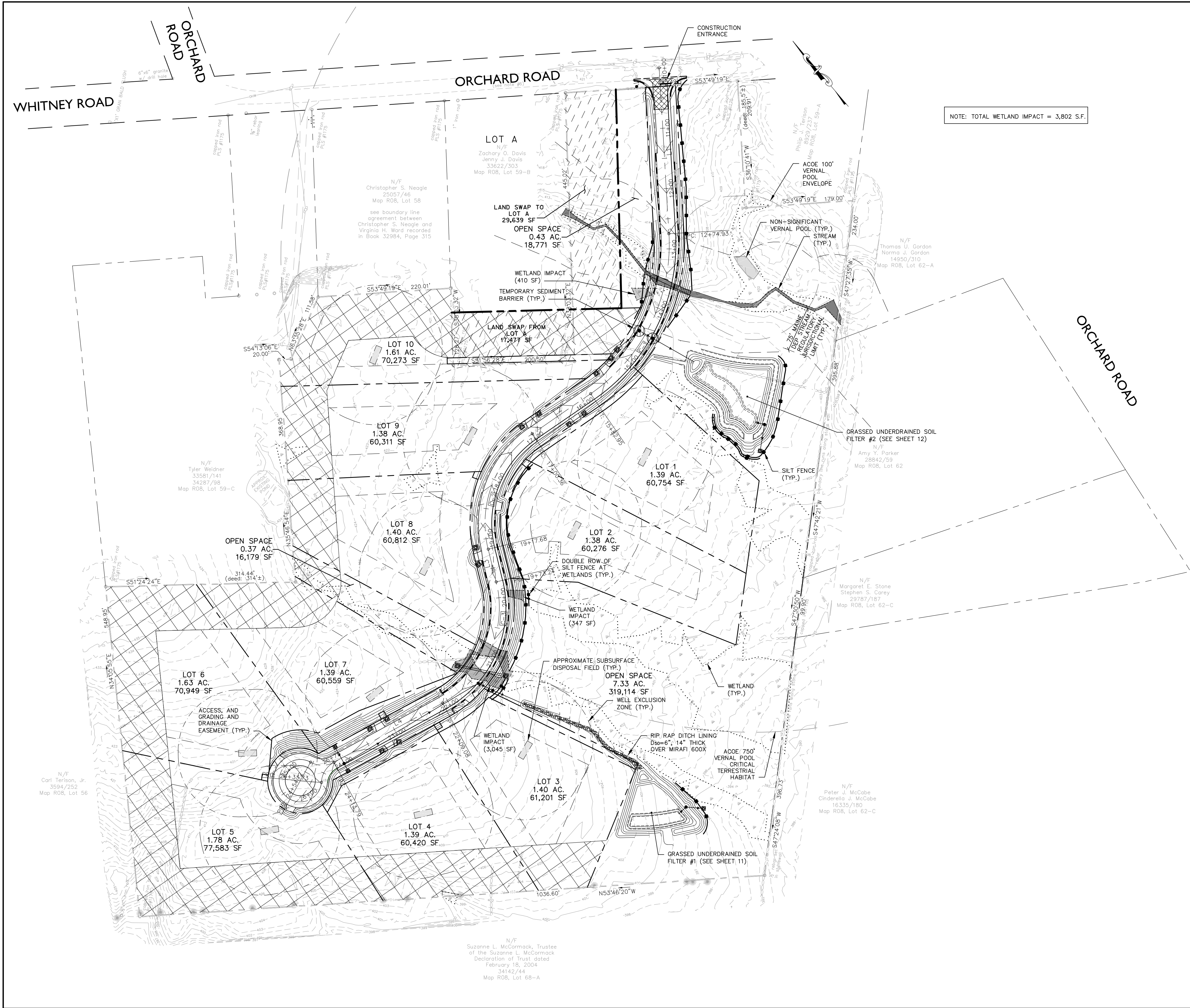
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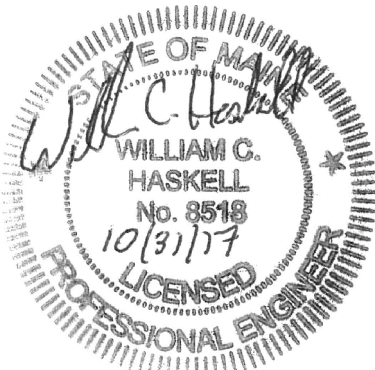
133 Gray Road, Falmouth, Maine 04
(207)797-9199 www.titcombsurvey.com

133 Gray Road, Falmouth, Maine 04
(207)797-9199 www.titcombsurvey.com

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| Design: JWA | Draft: LAN | Date: OCT 2017 |
| Checked: WCH | Scale: | Job No.: 3236 |
| File Name: 3236-GRADING.dwg | | |
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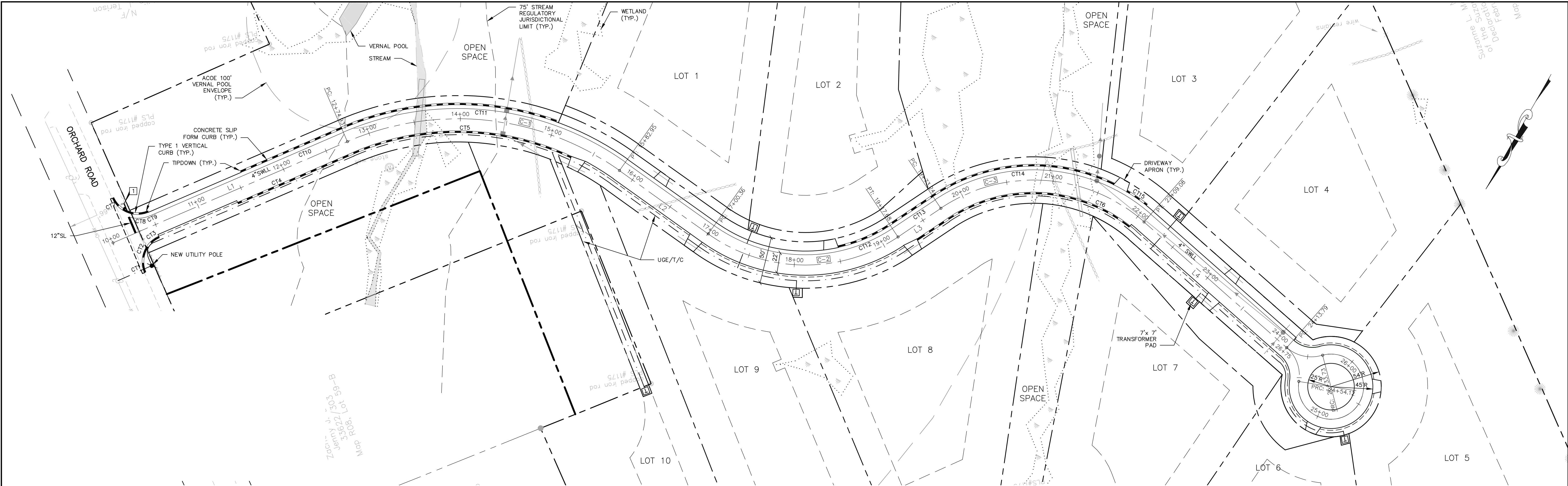


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| Drawing Name: | Overall Grading, Drainage and Erosion Control Plan |
| Project: | Orchard Road Subdivision Cumberland, Maine |
| Client: | TZ Properties Falmouth, Me 04105 |

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| Drawing No. |
| 6 |

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PLAN
SCALE: 1" = 50'

| BASELINE LINE TABLE | | |
|---------------------|--------|-------------|
| LINE NO. | LENGTH | BEARING |
| L1 | 274.93 | S36°39'29"W |
| L2 | 117.41 | N84°30'52"W |
| L3 | 55.56 | S26°18'42"W |
| L4 | 204.72 | N78°37'11"W |

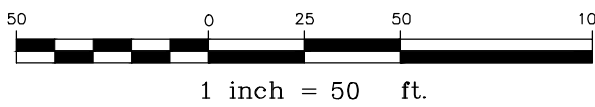
| BASELINE CURVE TABLE | | | | | | | |
|----------------------|--------|--------|---------|-----------|---------------|---------------|-------------|
| CURVE NO. | LENGTH | RADIUS | TANGENT | DELTA | CHORD BEARING | START STATION | END STATION |
| C-1 | 308.02 | 300.00 | 169.14 | 58°49'38" | S66°04'18"W | 12+74.93 | 15+82.95 |
| C-2 | 217.32 | 180.00 | 124.11 | 69°10'26" | S60°53'55"W | 17+00.36 | 19+17.68 |
| C-3 | 235.83 | 180.00 | 138.29 | 75°04'07" | S63°50'45"W | 19+73.24 | 22+09.08 |

| CURBING LEGEND | |
|----------------|-------------------------------|
| | VERTICAL GRANITIC TYPE 1 CURB |
| | EXTRUDED CONCRETE TYPE 2 CURB |

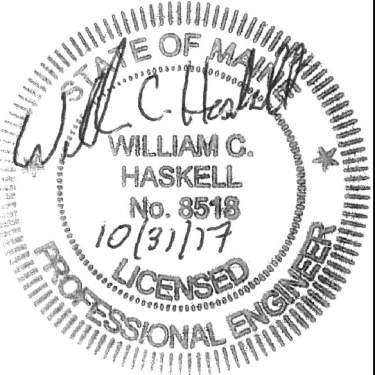
| STRIPING LEGEND | |
|---|--|
| SIGNAGE, STRIPING AND PAVEMENT MARKING SHALL BE IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) REGARDING SIZE, INSTALLATION, LOCATION & REFLECTIVITY. | |
| 12"SL - 12" WIDTH STOP LINE | |
| 4"SWLL 4" SOLID WHITE LANE LINE | |

| SIGN LEGEND | |
|------------------|------|
| | STOP |
| R1-1 30"x 30" | |

| CURB TABLE | | | | | | |
|------------|---------------------|---------------------|-------------|-------------|-----------------|---------|
| CURB ID | STATION/OFFSET FROM | STATION/OFFSET TO | LENGTH (FT) | RADIUS (FT) | CURB TYPE | COMMENT |
| CT1 | 10+18.15, 42.95' RT | 10+18.43, 38.96' RT | 4.00 | 30.00 | TYPE 1 TIP DOWN | |
| CT2 | 10+18.43, 38.96' RT | 10+44.16, 13.27' RT | 39.07 | 30.00 | TYPE 1 | |
| CT3 | 10+44.16, 13.27' RT | 10+48.15, 13.00' RT | 4.00 | 30.00 | TYPE 1 TIP DOWN | |
| CT4 | 10+99.30, 13.00' RT | 12+74.93, 13.00' RT | 175.63 | - | EXTRUDED CONC. | |
| CT5 | 12+74.93, 13.00' RT | 15+00.00, 13.00' RT | 215.32 | 287.00 | EXTRUDED CONC. | |
| CT6 | 20+50.00, 13.00' RT | 22+00.00, 13.00' RT | 139.17 | 167.00 | EXTRUDED CONC. | |
| CT7 | 10+18.31, 44.46' LT | 10+18.64, 40.48' LT | 4.00 | 30.00 | TYPE 1 TIP DOWN | |
| CT8 | 10+18.64, 40.48' LT | 10+44.31, 15.27' LT | 38.58 | 30.00 | TYPE 1 | |
| CT9 | 10+44.31, 15.27' LT | 10+48.30, 15.00' LT | 4.00 | 30.00 | TYPE 1 TIP DOWN | |
| CT10 | 11+00.00, 15.00' LT | 12+74.93, 15.00' LT | 174.93 | - | EXTRUDED CONC. | |
| CT11 | 12+74.93, 15.00' LT | 15+00.00, 15.00' LT | 236.32 | 315.00 | EXTRUDED CONC. | |
| CT12 | 19+00.00, 15.00' LT | 19+17.68, 15.00' LT | 16.21 | 165.00 | EXTRUDED CONC. | |
| CT13 | 19+17.68, 15.00' LT | 19+73.24, 15.00' LT | 55.56 | - | EXTRUDED CONC. | |
| CT14 | 19+73.24, 15.00' LT | 21+61.27, 15.00' LT | 203.70 | 195.00 | EXTRUDED CONC. | |
| CT15 | 21+76.35, 15.00' LT | 22+00.00, 15.00' LT | 25.62 | 195.00 | EXTRUDED CONC. | |



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| Preliminary Subdivision Application | | 10-31-17 | WCH |
| Issued For | | Date | By |

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| Design: JWA | Draft: LAN | Date: OCT 2017 |
| Checked: WCH | Scale: | Job No.: 3236 |
| File Name: 3236-PP.dwg | | |
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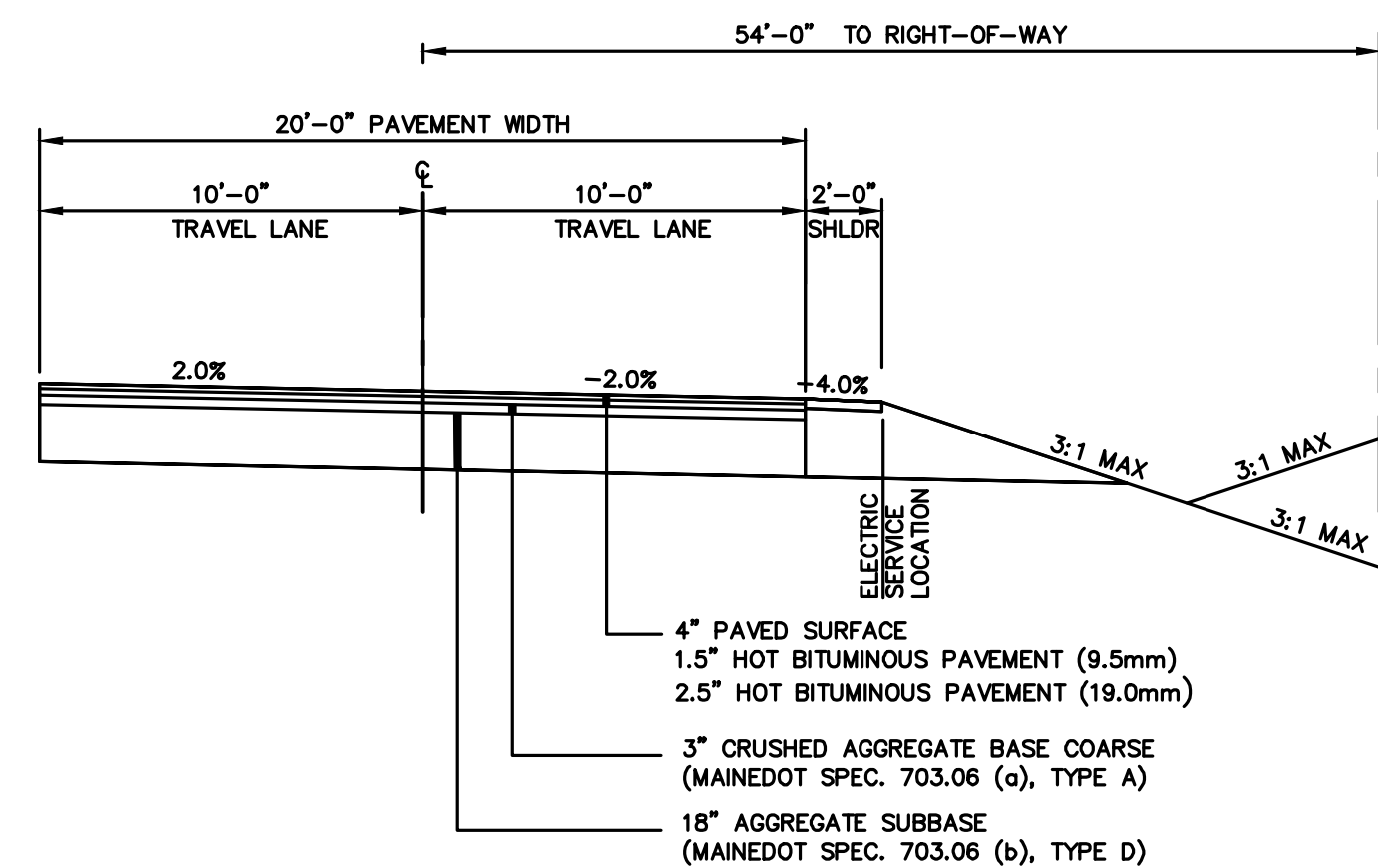
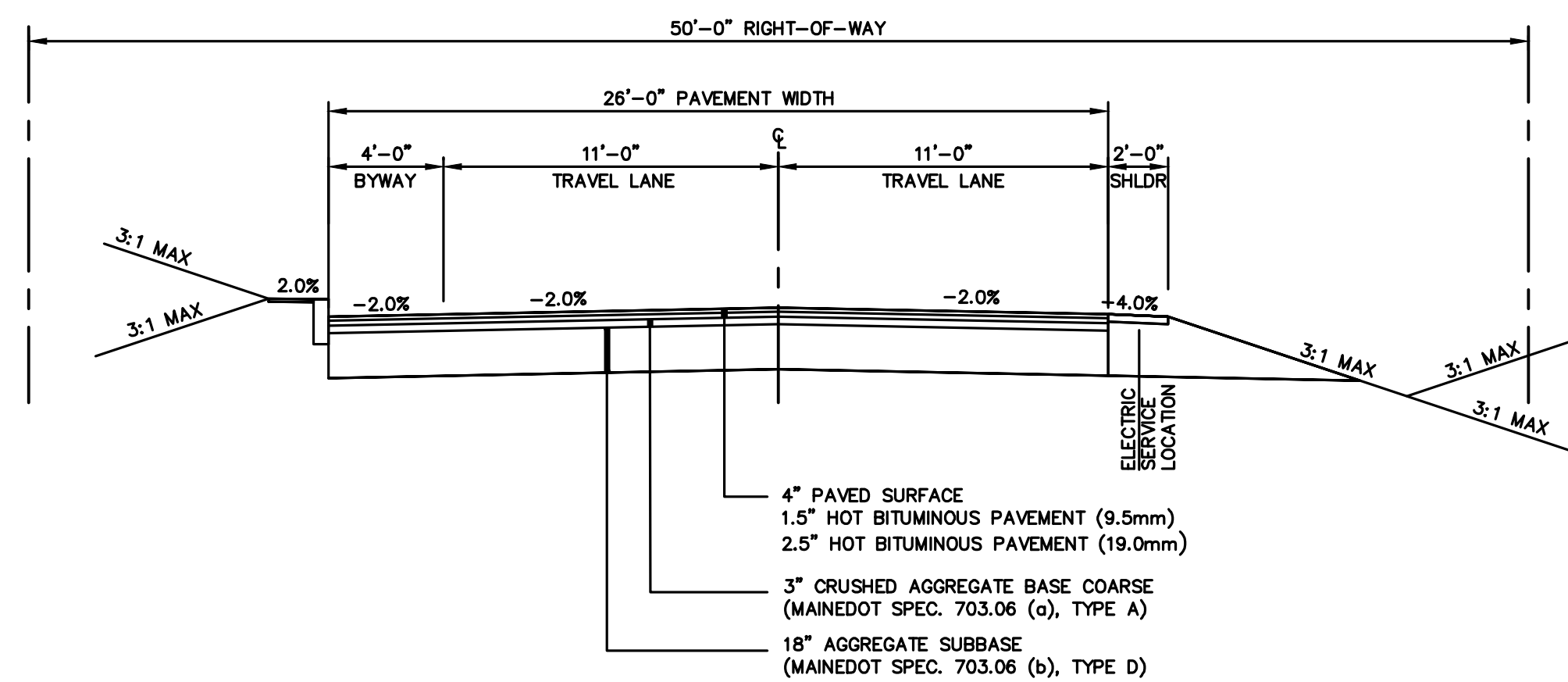


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| Drawing Name: | Layout and Utility Plan |
| Project: | Orchard Road Subdivision Cumberland, Maine |
| Client: | TZ Properties Falmouth, Me 04105 |

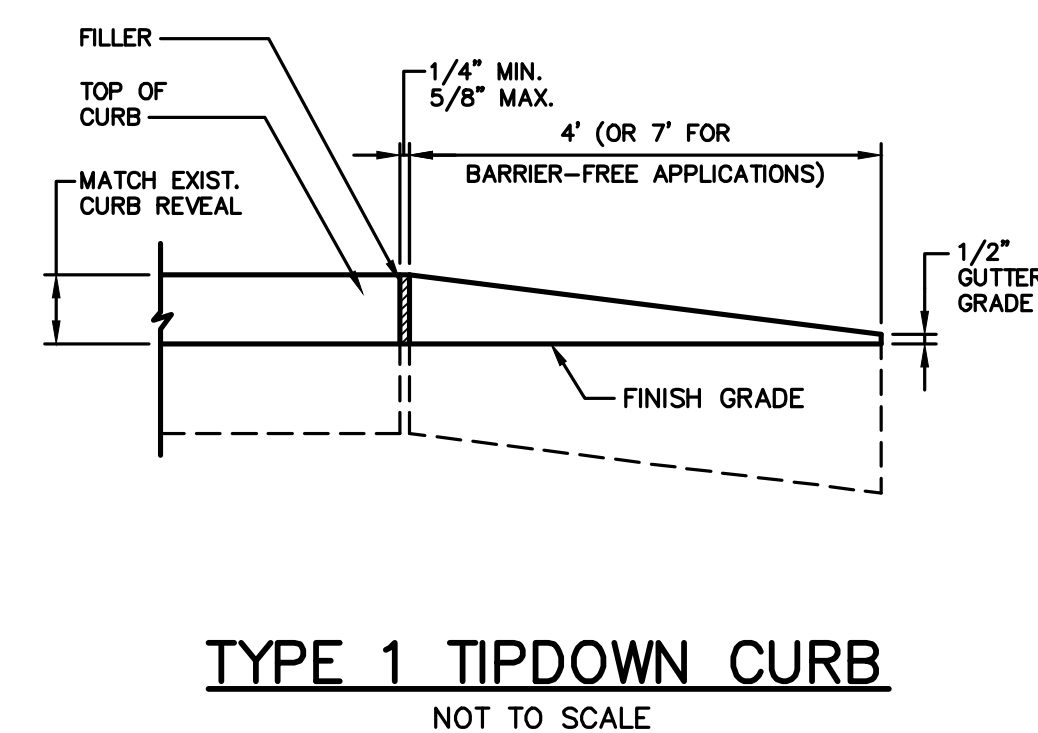
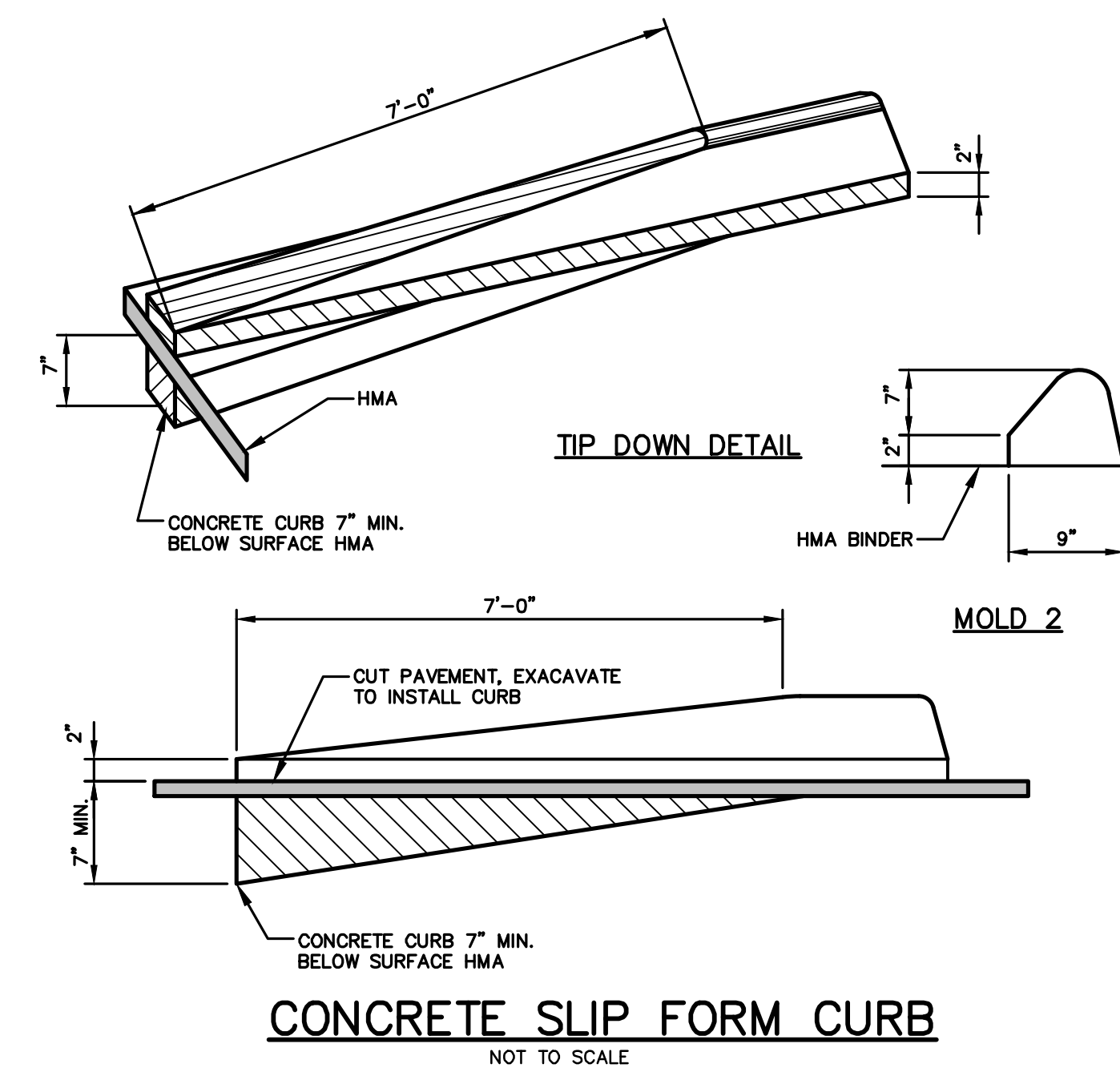
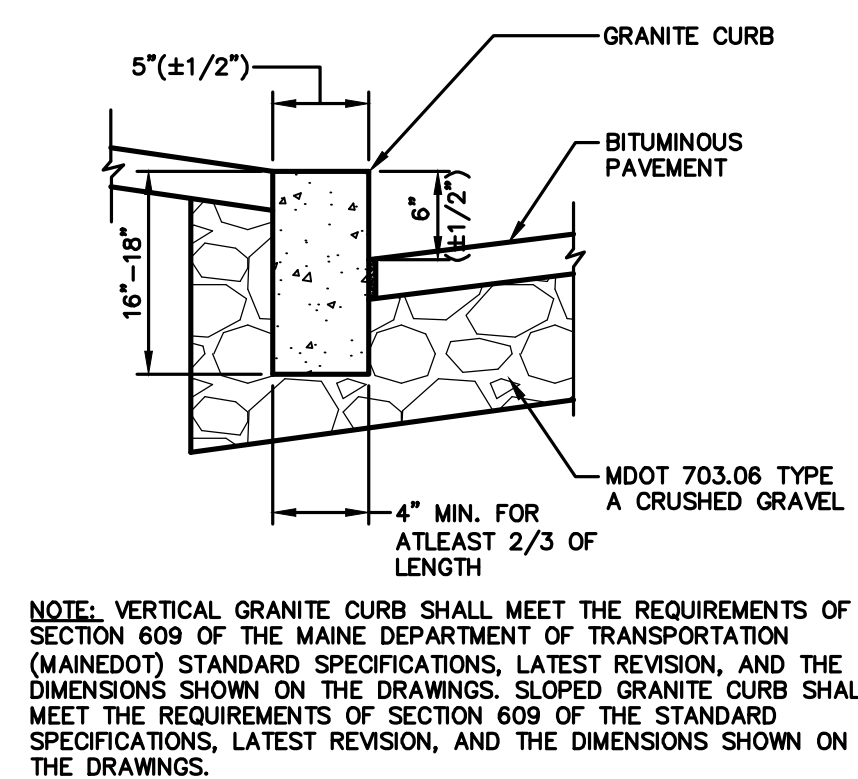
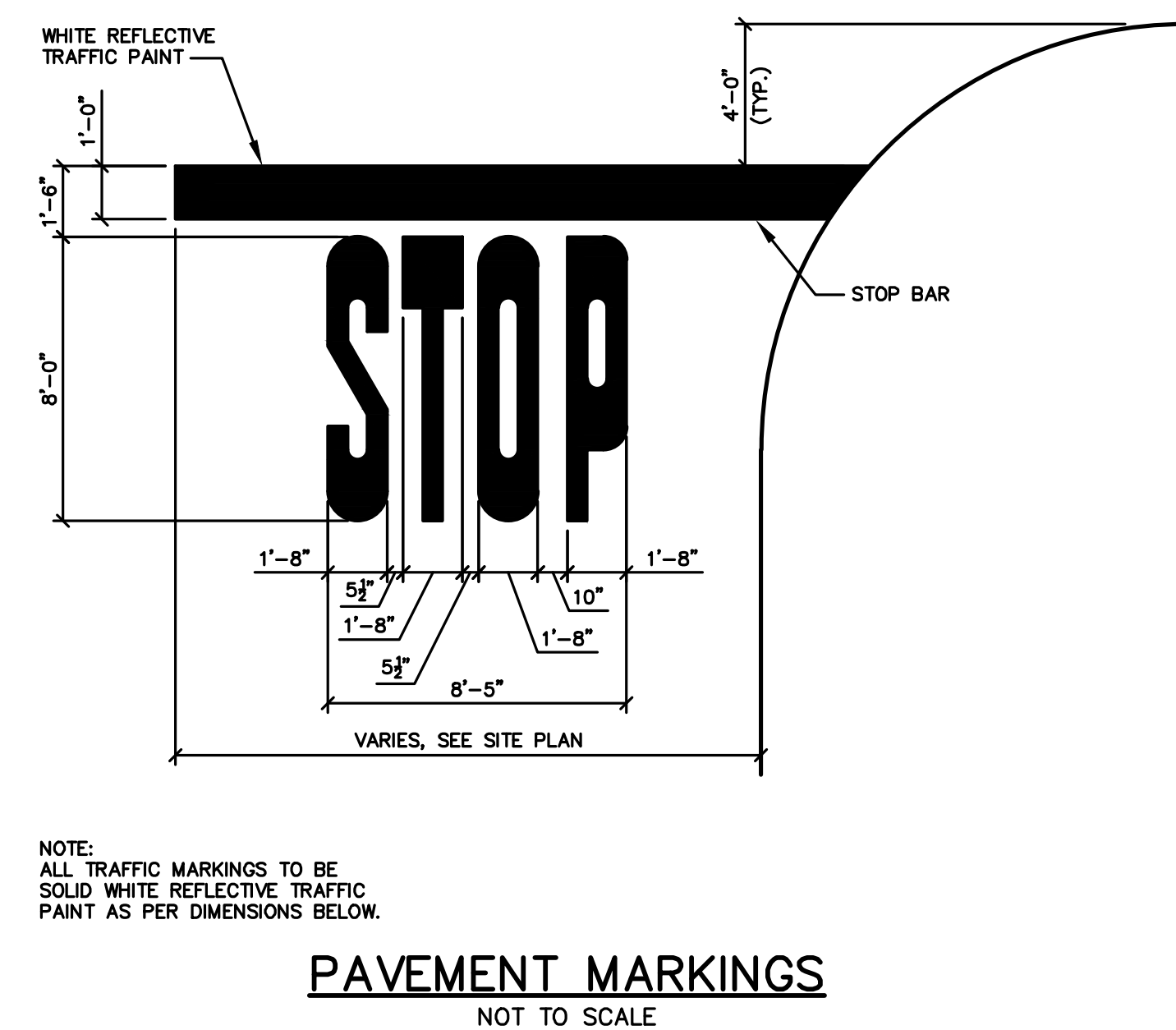
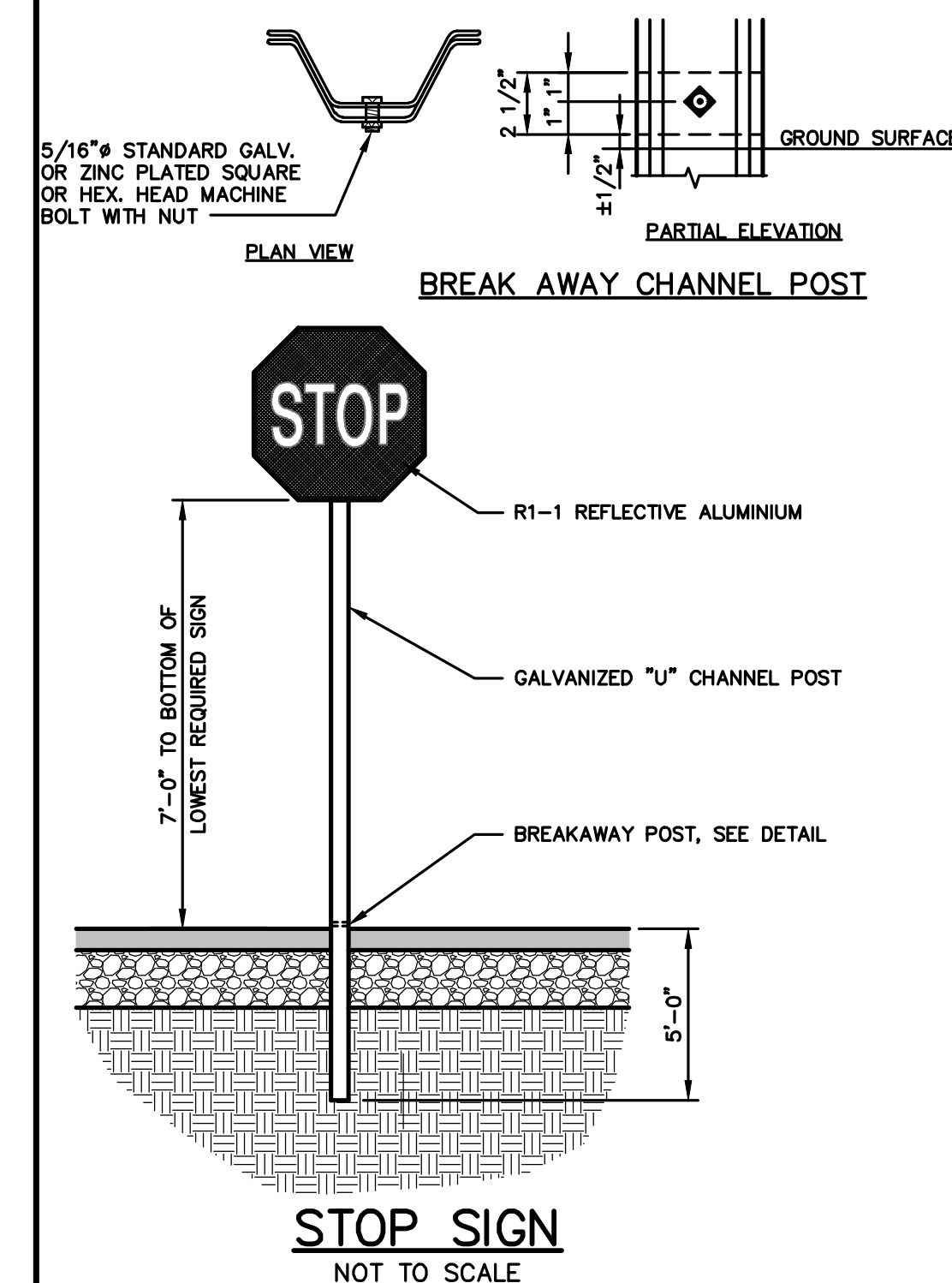
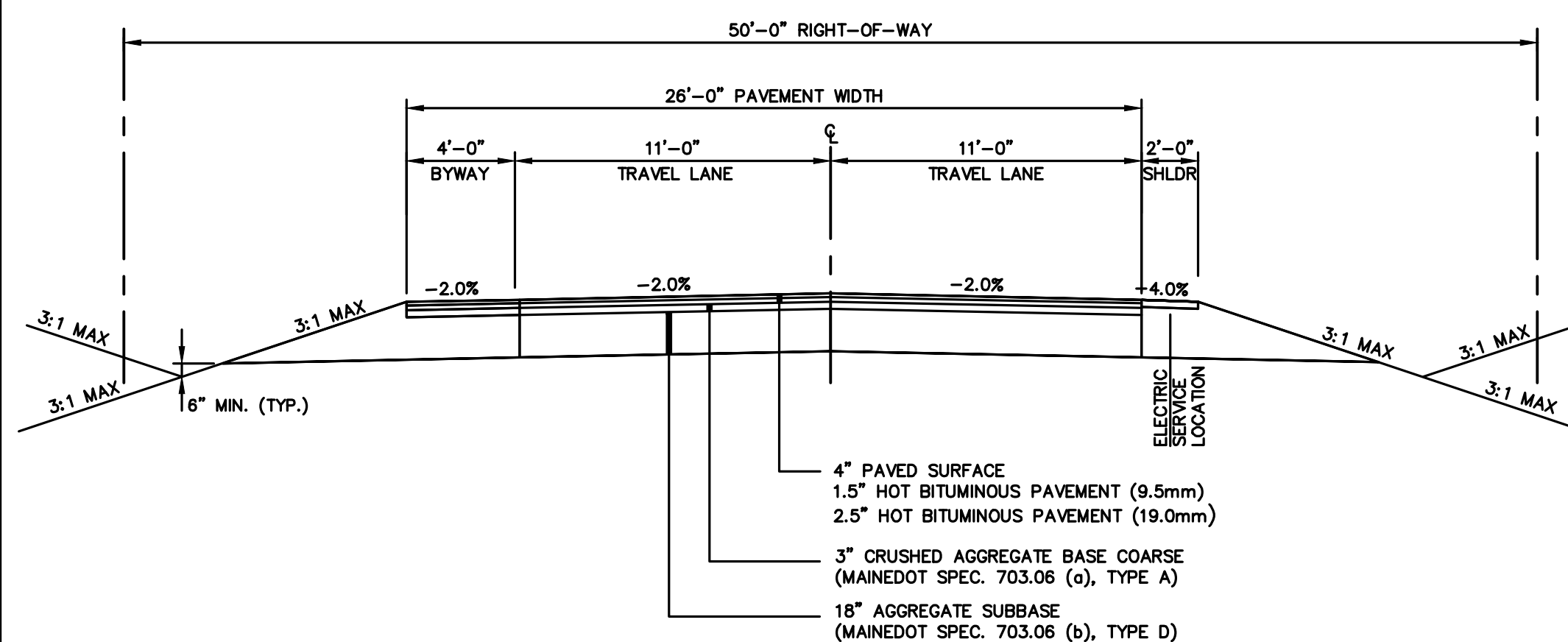
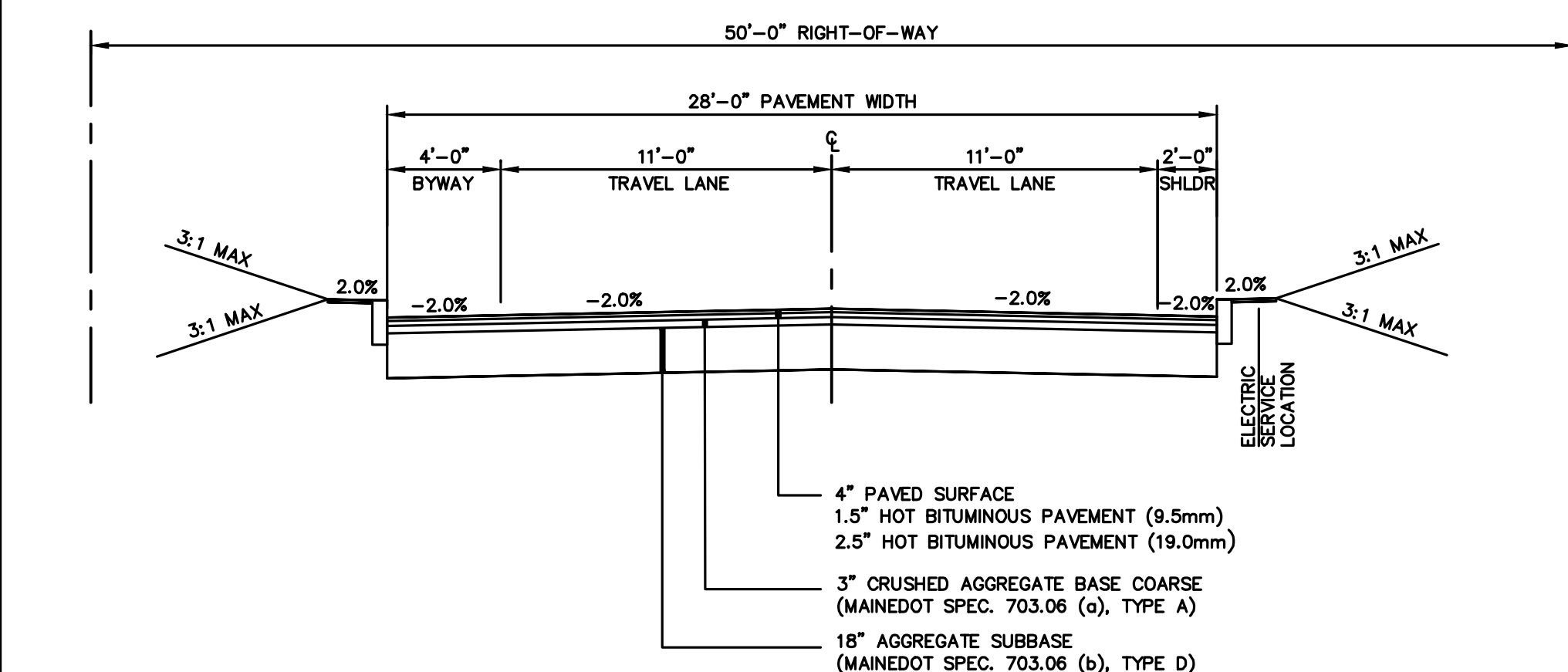
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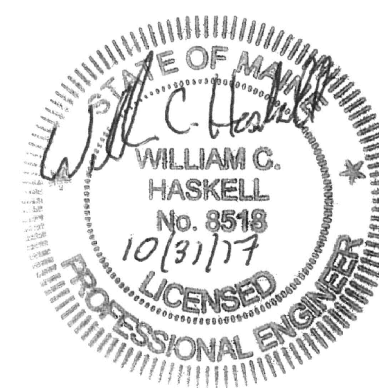


NOTES:

1. COMPACT SUBGRADE TO 95% MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D-1557.
2. ROADWAY TO MEET TOWN OF CUMBERLAND "RESIDENTIAL ACCESS" STANDARD.



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| Preliminary Subdivision Application | 10-31-17 | WCH |
| Issued For | Date | By |

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|-----------------------------|------------|------------------------|
| Design: JWA | Draft: EAN | Date: 04/08/2012 12:11 |
| Checked: WCH | Scale: NTS | Job No.: 3236 |
| File Name: 3236-DETAILS.dwg | | |

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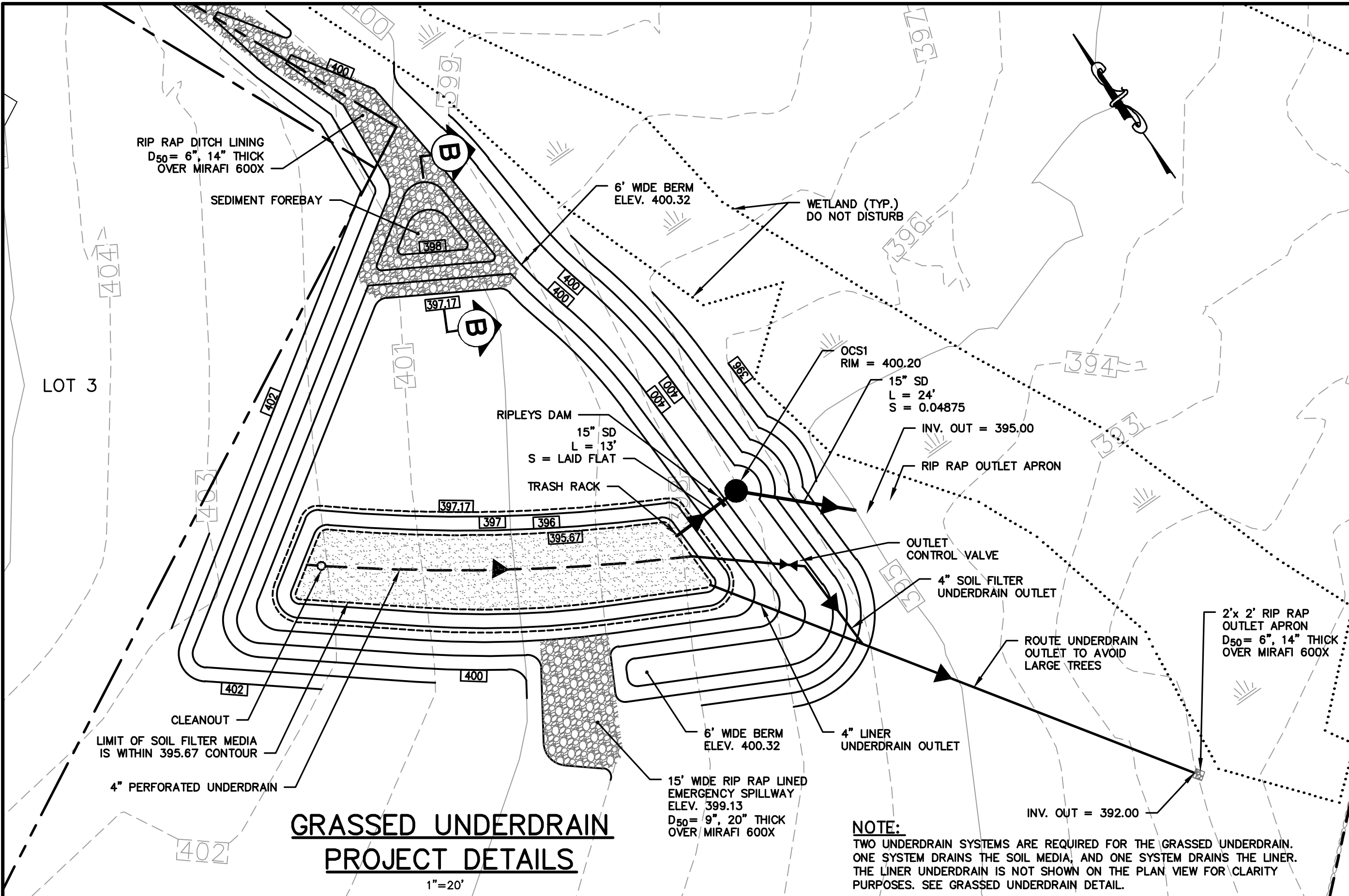


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| Drawing Name: | Site Details |
| Project: | Orchard Road Subdivision Cumberland, Maine |
| Client: | TZ Properties Falmouth, Me 04105 |

Drawing No.

9

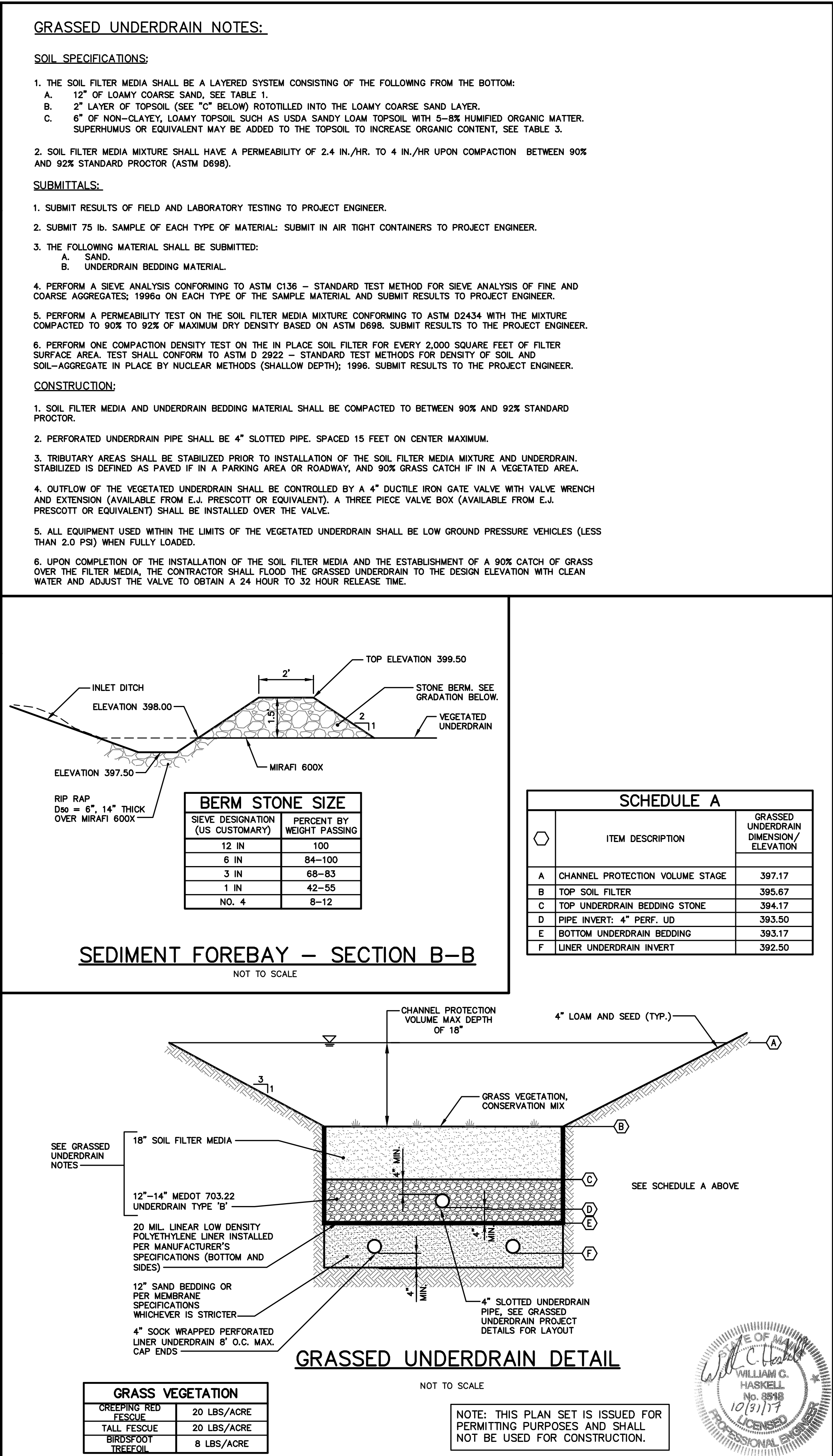
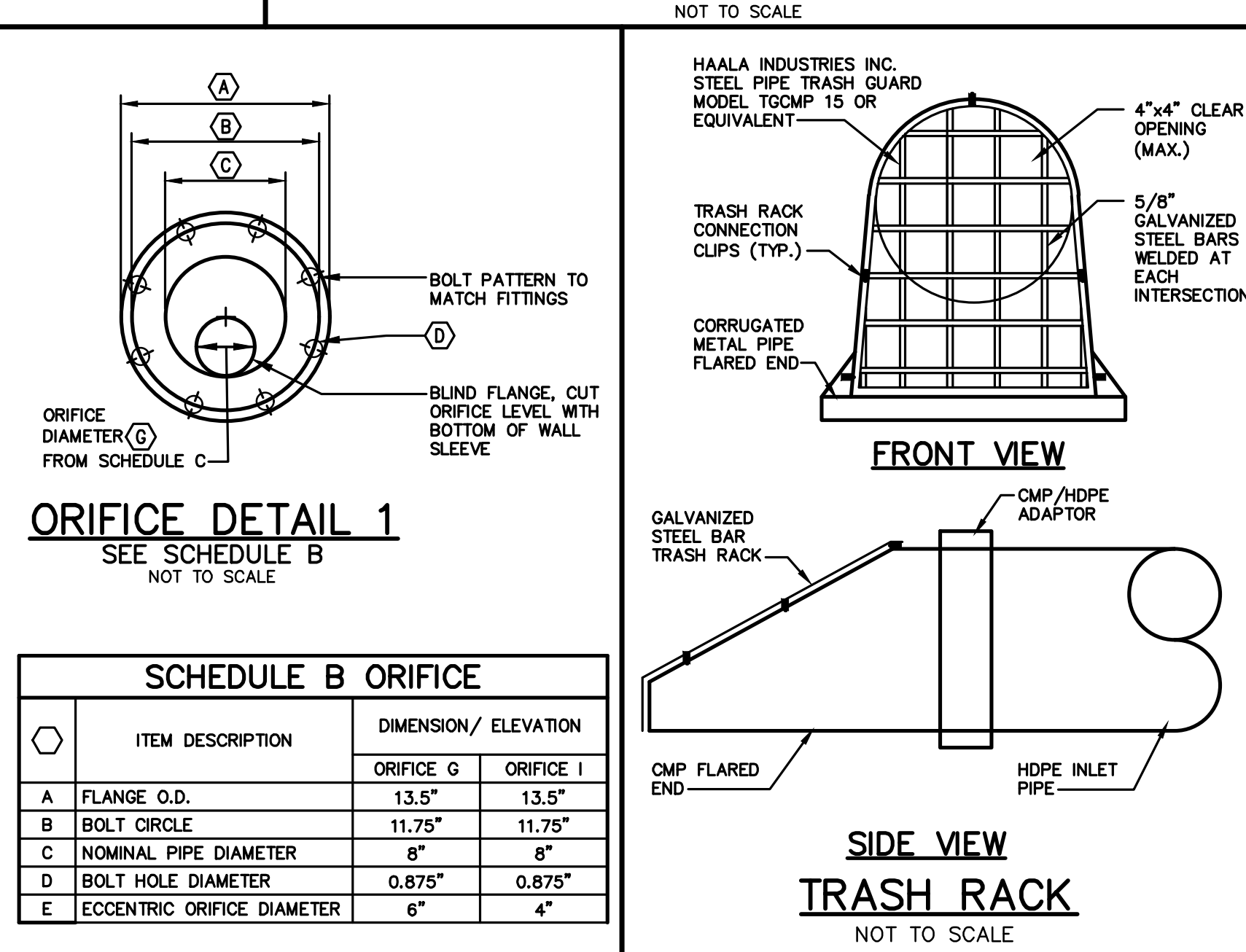
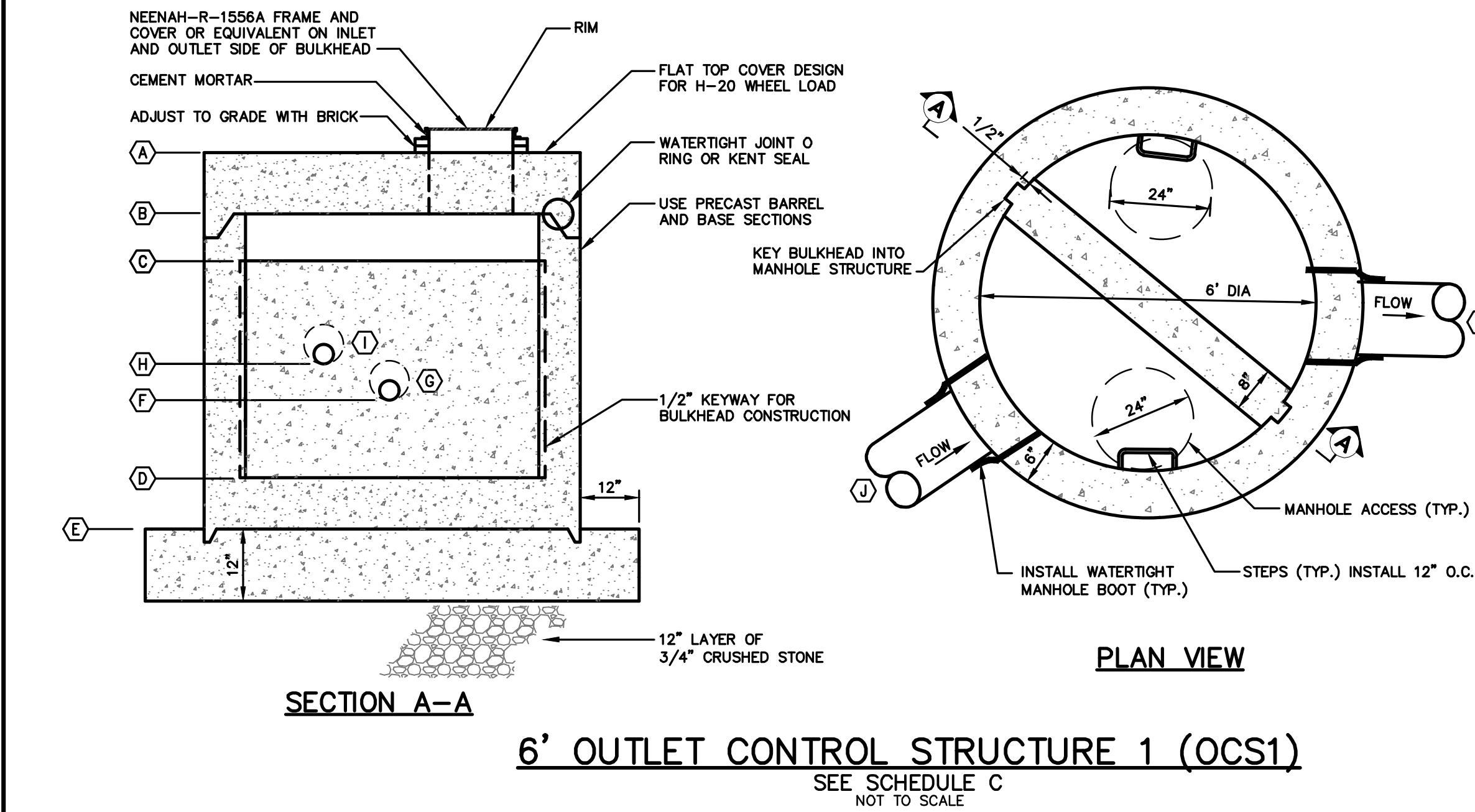


| Table 1 Loamy Coarse Sand | |
|------------------------------|---------------------|
| SIEVE SIZE | % PASSING BY WEIGHT |
| #10 | 85-100 |
| #20 | 70-100 |
| #60 | 15-40 |
| #200 | 8-15 |
| #200 CLAY SIZE | <2.0 |

| Table 2 MEDOT Specifications for Underdrain Type B (MEDOT #703.22) | |
|---|---------------------|
| SIEVE SIZE | % PASSING BY WEIGHT |
| 1" | 90-100 |
| 1/2" | 75-100 |
| #60 | 15-40 |
| #200 | 8-15 |
| #50 | 0-15 |
| #200 | 0-5 |

| Table 3 Sandy Loam Topsoil | |
|-------------------------------|---------------------|
| SIEVE SIZE | % PASSING BY WEIGHT |
| #4 | 75-95 |
| #10 | 60-90 |
| #40 | 35-65 |
| #200 | 20-70 |
| #200 CLAY SIZE | <2.0 |

| SCHEDULE C | |
|-------------------------|-----------|
| ITEM DESCRIPTION | ELEVATION |
| A TOP OF STRUCTURE | 400.32 |
| B UNDERSIDE TOP SLAB | 399.65 |
| C TOP CONCRETE BULKHEAD | 399.13 |
| D MANHOLE INVERT | 395.67 |
| E BOTTOM OF STRUCTURE | 394.67 |
| F ORIFICE INVERT | 397.17 |
| G ORIFICE DIAMETER | 6" |
| H ORIFICE INVERT | 397.68 |
| I ORIFICE DIAMETER | 4" |
| J PIPE DIAMETER | 15" |
| K INVERT IN | 395.67 |
| L PIPE DIAMETER | 15" |
| M INVERT OUT | 397.00 |



| Rev. | Date | Revision |
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| Preliminary Subdivision Application | 10-31-17 | WCH |
| Issued For | Date | By |
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| Design: JWA | Draft: LAN | Date: OCT 2017 |
| Checked: WCH | Scale: AS SHOWN | Job No.: 3236 |
| File Name: 3236-DETAILS.dwg | | |
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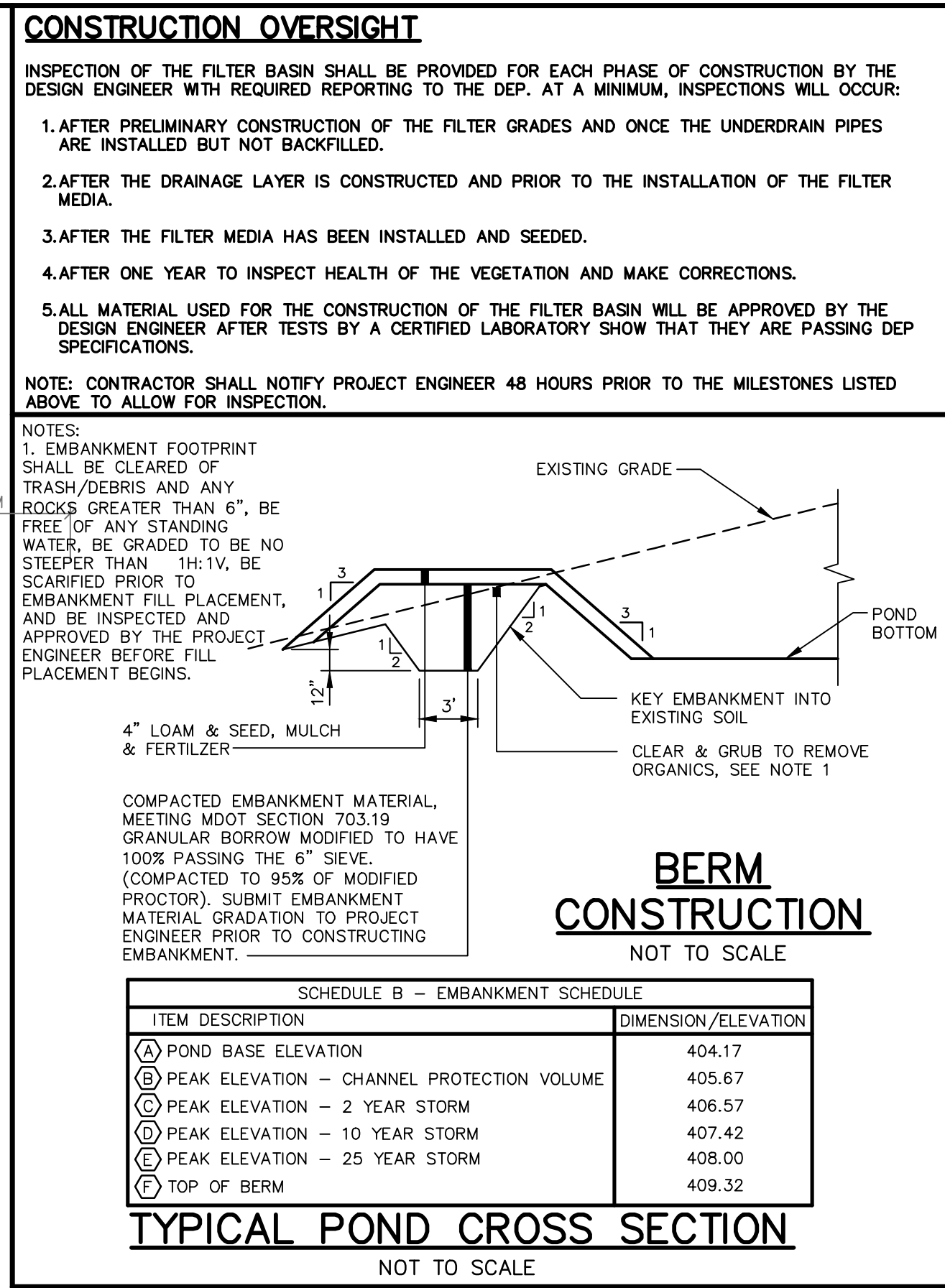
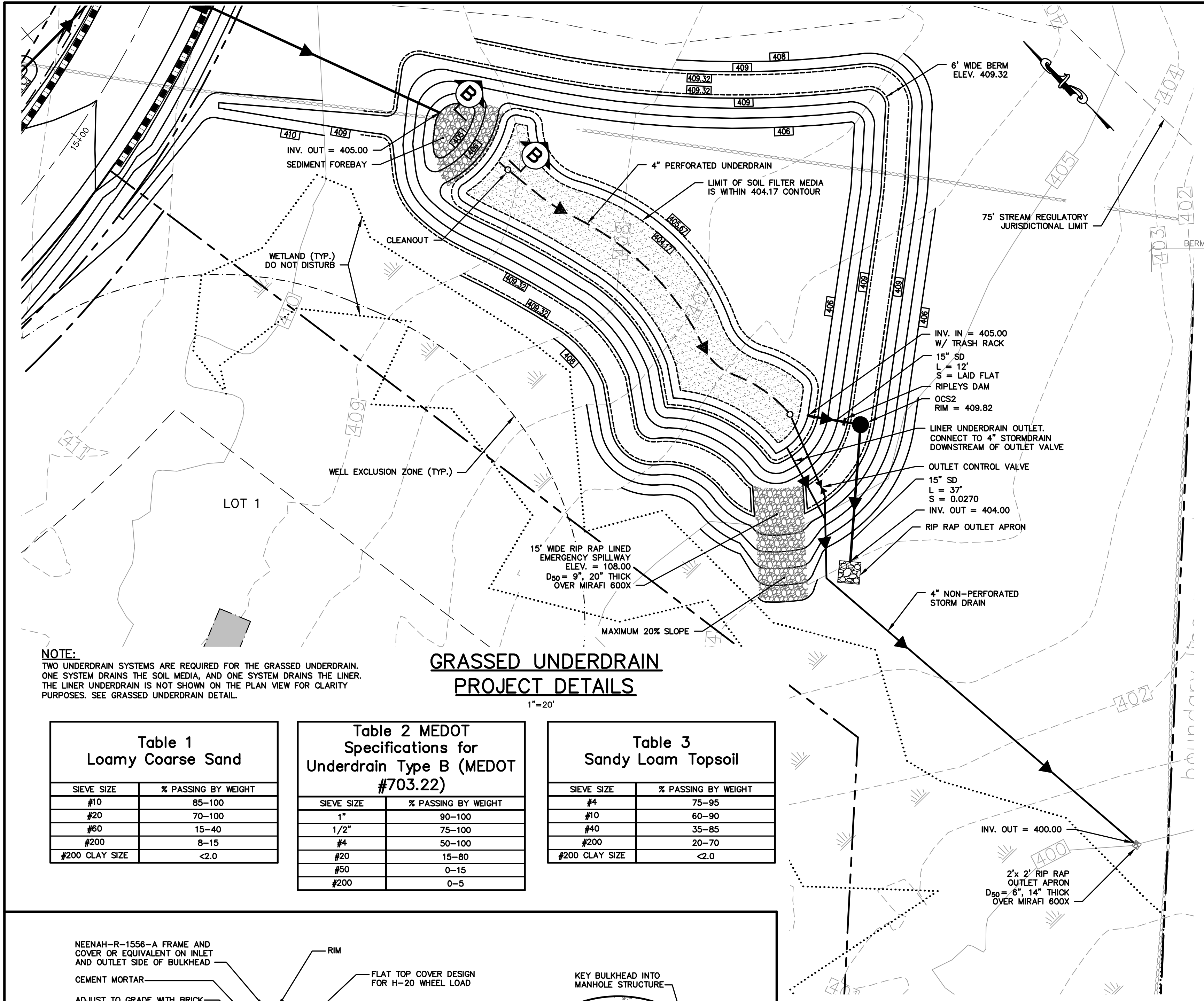


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| Drawing Name: | Grassed Underdrain Filter Plan and Details |
| Project: | Orchard Road Subdivision Cumberland, Maine |
| Client: | TZ Properties Falmouth, Me 04105 |

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|-------------|
| Drawing No. |
| 11 |



- CONSTRUCTION OVERSIGHT**
- INSPECTION OF THE FILTER BASIN SHALL BE PROVIDED FOR EACH PHASE OF CONSTRUCTION BY THE DESIGN ENGINEER WITH REQUIRED REPORTING TO THE DEP. AT A MINIMUM, INSPECTIONS WILL OCCUR:
- AFTER PRELIMINARY CONSTRUCTION OF THE FILTER GRADES AND ONCE THE UNDERDRAIN PIPES ARE INSTALLED BUT NOT BACKFILLED.
 - AFTER THE DRAINAGE LAYER IS CONSTRUCTED AND PRIOR TO THE INSTALLATION OF THE FILTER MEDIA.
 - AFTER THE FILTER MEDIA HAS BEEN INSTALLED AND SEEDING.
 - AFTER ONE YEAR TO INSPECT HEALTH OF THE VEGETATION AND MAKE CORRECTIONS.
5. ALL MATERIAL USED FOR THE CONSTRUCTION OF THE FILTER BASIN WILL BE APPROVED BY THE DESIGN ENGINEER AFTER TESTS BY A CERTIFIED LABORATORY SHOW THAT THEY ARE PASSING DEP SPECIFICATIONS.
- NOTE:** CONTRACTOR SHALL NOTIFY PROJECT ENGINEER 48 HOURS PRIOR TO THE MILESTONES LISTED ABOVE TO ALLOW FOR INSPECTION.
- NOTES:**
- EMBANKMENT FOOTPRINT SHALL BE CLEARED OF TRASH/DEBRIS AND ANY ROCKS GREATER THAN 6", BE FREE OF ANY STANDING WATER, BE GRADED TO BE NO STEEPER THAN 1H:1V, BE SCARIFIED PRIOR TO EMBANKMENT FILL PLACEMENT, AND BE INSPECTED AND APPROVED BY THE PROJECT ENGINEER BEFORE FILL PLACEMENT BEGINS.
- GRASSED UNDERDRAIN NOTES:**
- SOIL SPECIFICATIONS:**
- THE SOIL FILTER MEDIA SHALL BE A LAYERED SYSTEM CONSISTING OF THE FOLLOWING FROM THE BOTTOM:
 - 12" OF LOAMY COARSE SAND, SEE TABLE 1.
 - 2" LAYER OF TOPSOIL (SEE "C" BELOW) ROTOTILLED INTO THE LOAMY COARSE SAND LAYER.
 - 6" OF NON-CLAYEY, LOAMY TOPSOIL SUCH AS USDA SANDY LOAM TOPSOIL WITH 5-8% HUMIFIED ORGANIC MATTER. SUPERHUMUS OR EQUIVALENT MAY BE ADDED TO THE TOPSOIL TO INCREASE ORGANIC CONTENT, SEE TABLE 3.
 - SOIL FILTER MEDIA MIXTURE SHALL HAVE A PERMEABILITY OF 2.4 IN./HR. TO 4 IN./HR UPON COMPACTION BETWEEN 90% AND 92% STANDARD PROCTOR (ASTM D698).
- SUBMITTALS:**
- SUBMIT RESULTS OF FIELD AND LABORATORY TESTING TO PROJECT ENGINEER.
 - SUBMIT 75 lb. SAMPLE OF EACH TYPE OF MATERIAL: SUBMIT IN AIR TIGHT CONTAINERS TO PROJECT ENGINEER.
 - THE FOLLOWING MATERIAL SHALL BE SUBMITTED:
 - SAND.
 - UNDERDRAIN BEDDING MATERIAL.
 - PERFORM A SIEVE ANALYSIS CONFORMING TO ASTM C136 - STANDARD TEST METHOD FOR SIEVE ANALYSIS OF FINE AND COARSE AGGREGATES; 1996g ON EACH TYPE OF THE SAMPLE MATERIAL AND SUBMIT RESULTS TO PROJECT ENGINEER.
 - PERFORM A PERMEABILITY TEST ON THE SOIL FILTER MEDIA MIXTURE CONFORMING TO ASTM D2434 WITH THE MIXTURE COMPACTED TO 90% TO 92% OF MAXIMUM DRY DENSITY BASED ON ASTM D698. SUBMIT RESULTS TO THE PROJECT ENGINEER.
 - PERFORM ONE COMPACTION DENSITY TEST ON THE IN PLACE SOIL FILTER FOR EVERY 2,000 SQUARE FEET OF FILTER SURFACE AREA. TEST SHALL CONFORM TO ASTM D 2922 - STANDARD TEST METHODS FOR DENSITY OF SOIL AND SOIL-AGGREGATE IN PLACE BY NUCLEAR METHODS (SHALLOW DEPTH); 1996. SUBMIT RESULTS TO THE PROJECT ENGINEER.
- CONSTRUCTION:**
- SOIL FILTER MEDIA AND UNDERDRAIN BEDDING MATERIAL SHALL BE COMPACTED TO BETWEEN 90% AND 92% STANDARD PROCTOR.
 - PERFORATED UNDERDRAIN PIPE SHALL BE 4" SLOTTED PIPE, SPACED 15 FEET ON CENTER MAXIMUM.
 - TRIBUTARY AREAS SHALL BE STABILIZED PRIOR TO INSTALLATION OF THE SOIL FILTER MEDIA MIXTURE AND UNDERDRAIN. STABILIZED IS DEFINED AS PAVED IF IN A PARKING AREA OR ROADWAY, AND 90% GRASS CATCH IF IN A VEGETATED AREA.
 - OUTFLOW OF THE VEGETATED UNDERDRAIN SHALL BE CONTROLLED BY A 4" DUCTILE IRON GATE VALVE WITH VALVE WRENCH AND EXTENSION (AVAILABLE FROM E.J. PRESCOTT OR EQUIVALENT). A THREE PIECE VALVE BOX (AVAILABLE FROM E.J. PRESCOTT OR EQUIVALENT) SHALL BE INSTALLED OVER THE VALVE.
 - ALL EQUIPMENT USED WITHIN THE LIMITS OF THE VEGETATED UNDERDRAIN SHALL BE LOW GROUND PRESSURE VEHICLES (LESS THAN 2.0 PSI) WHEN FULLY LOADED.
 - UPON COMPLETION OF THE INSTALLATION OF THE SOIL FILTER MEDIA AND THE ESTABLISHMENT OF A 90% CATCH OF GRASS OVER THE FILTER MEDIA, THE CONTRACTOR SHALL FLOOD THE GRASSED UNDERDRAIN TO THE DESIGN ELEVATION WITH CLEAN WATER AND ADJUST THE VALVE TO OBTAIN A 24 HOUR TO 32 HOUR RELEASE TIME.

Table 1
Loamy Coarse Sand

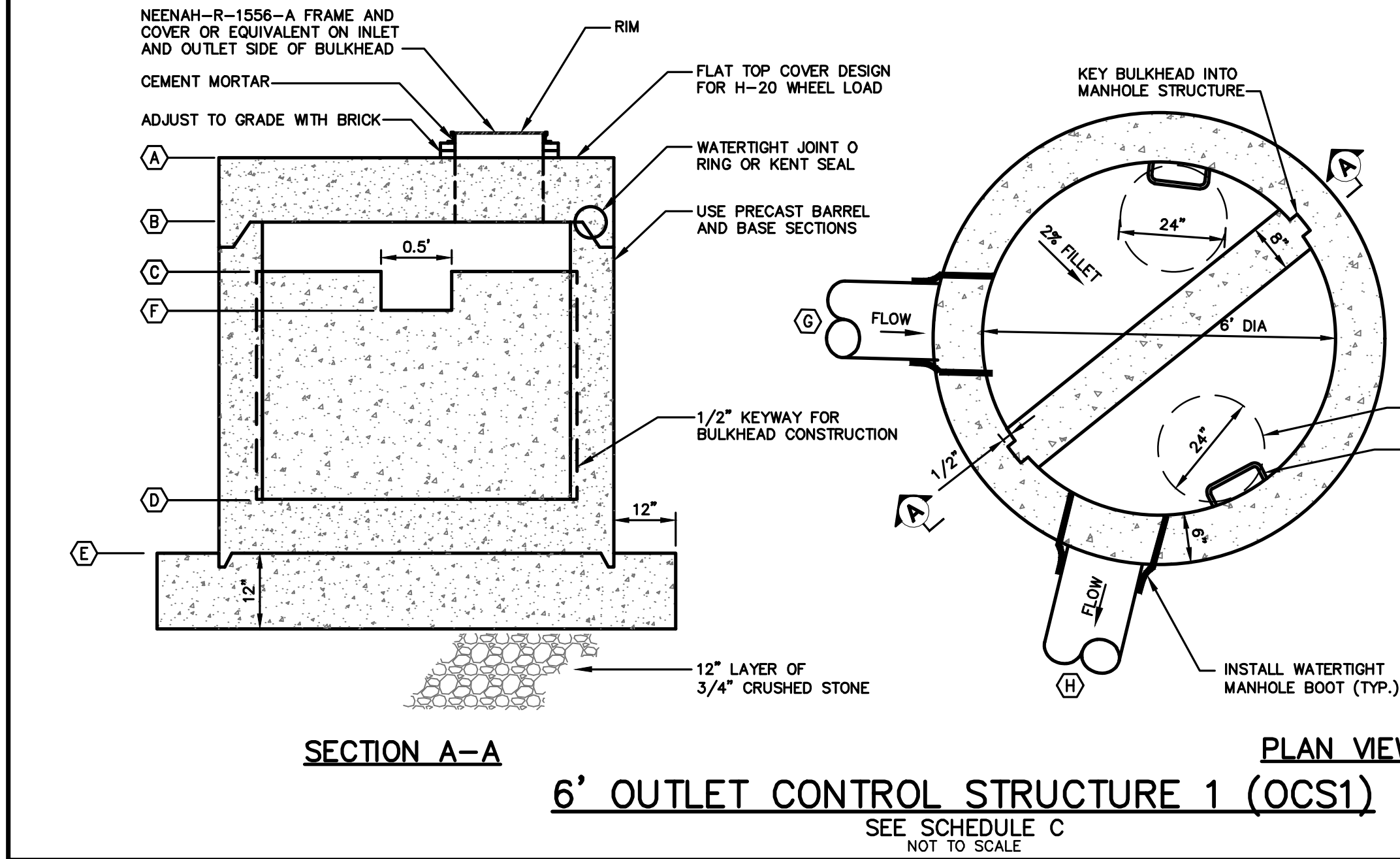
| SIEVE SIZE | % PASSING BY WEIGHT |
|----------------|---------------------|
| #10 | 85-100 |
| #20 | 70-100 |
| #60 | 15-40 |
| #200 | 8-15 |
| #200 CLAY SIZE | <2.0 |

Table 2 MEDOT Specifications for Underdrain Type B (MEDOT #703.22)

| SIEVE SIZE | % PASSING BY WEIGHT |
|------------|---------------------|
| 1" | 90-100 |
| 1/2" | 75-100 |
| #4 | 50-100 |
| #20 | 15-80 |
| #50 | 0-15 |
| #200 | 0-5 |

Table 3
Sandy Loam Topsoil

| SIEVE SIZE | % PASSING BY WEIGHT |
|----------------|---------------------|
| #4 | 75-95 |
| #10 | 60-90 |
| #40 | 35-85 |
| #200 | 20-70 |
| #200 CLAY SIZE | <2.0 |

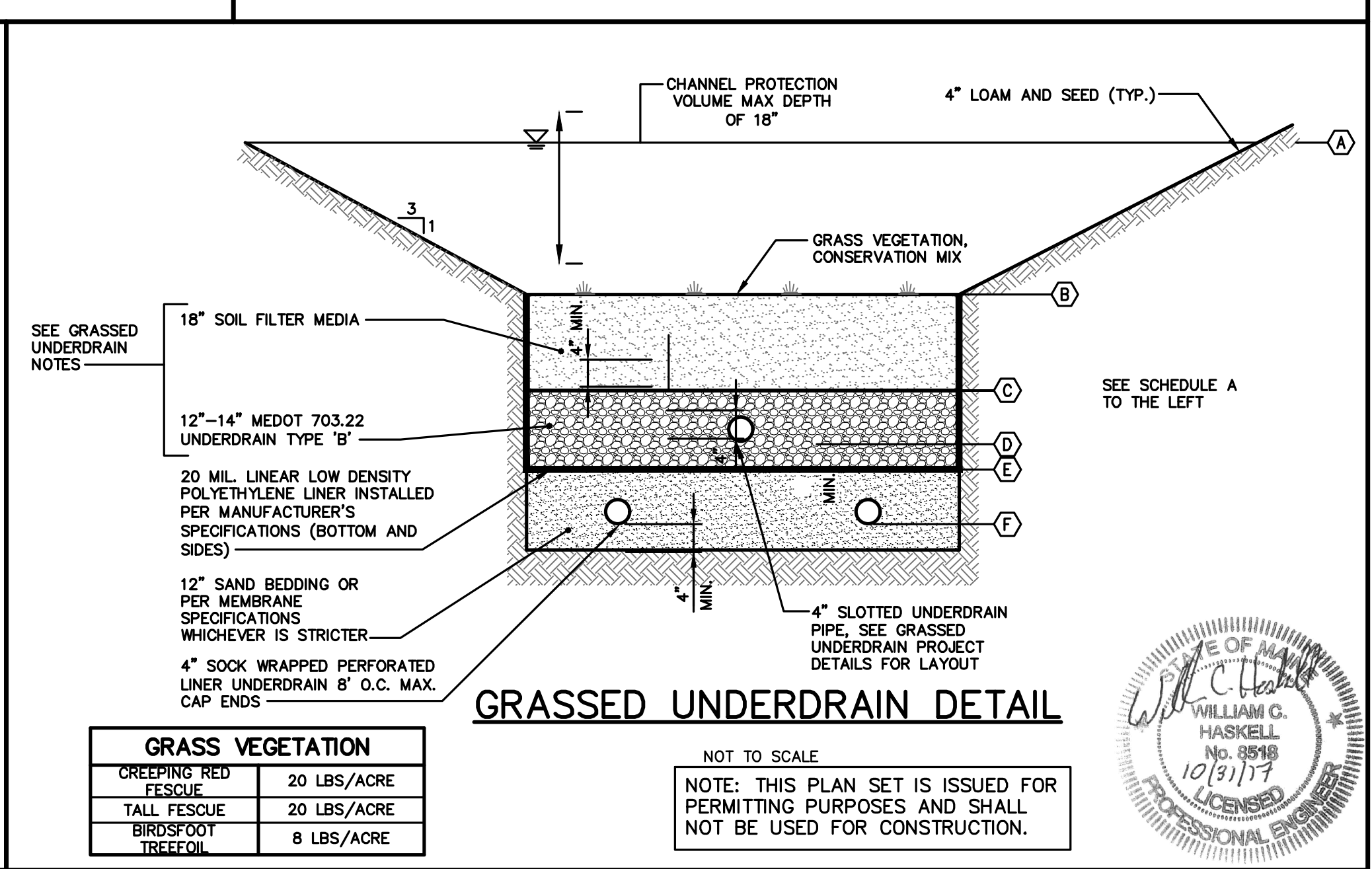
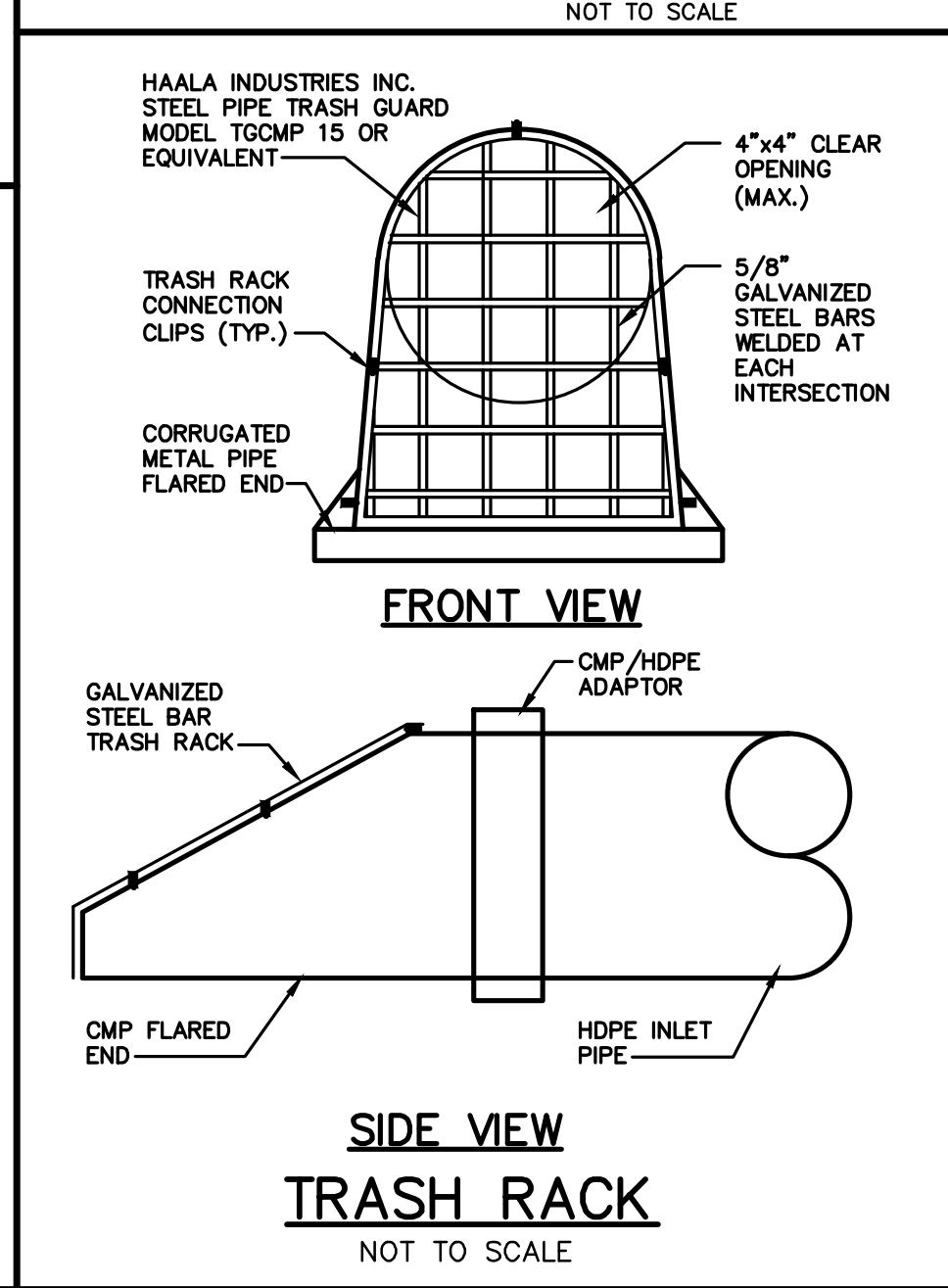


SCHEDULE A

| ITEM DESCRIPTION | GRASSED UNDERDRAIN DIMENSION/ELEVATION |
|-----------------------------------|--|
| A CHANNEL PROTECTION VOLUME STAGE | 405.67 |
| B TOP SOIL FILTER | 404.17 |
| C TOP UNDERDRAIN BEDDING STONE | 402.67 |
| D PIPE INVERT: 4" PERF. UD | 402.00 |
| E BOTTOM UNDERDRAIN BEDDING | 401.67 |
| F LINER UNDERDRAIN INVERT | 401.00 |

SCHEDULE C

| ITEM DESCRIPTION | ELEVATION |
|-------------------------|-----------|
| A TOP OF STRUCTURE | 409.32 |
| B UNDERSIDE TOP SLAB | 408.65 |
| C TOP CONCRETE BULKHEAD | 408.00 |
| D MANHOLE INVERT | 405.00 |
| E BOTTOM OF STRUCTURE | 404.00 |
| F WEIR CREST | 405.90 |
| G PIPE DIAMETER | 15" |
| H INVERT IN | 405.00 |
| I PIPE DIAMETER | 15" |
| J INVERT OUT | 405.00 |



| Rev. | Date | Revision |
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| Issued For | Date | By |

Design: JWA Draft: LAN Date: OCT 2017
Checked: WCH Scale: AS SHOWN Job No.: 3236
File Name: 3236-DETAILS.dwg
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Drawing Name: **Grassed Underdrain Filter Plan and Details**

Project: **Orchard Road Subdivision**
Cumberland, Maine

Client: **TZ Properties**
Falmouth, Me 04105

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SEEDING PLAN

Project: Orchard Road Subdivision

Site Location: Orchard Road, Cumberland, ME

☐ Permanent Seeding ☒ Temporary Seeding

1. Instruction on preparation of soil: Prepare a good seed bed for planting method used.
2. Apply lime as follows: ____ # / acres, OR 138 # /M Sq. Ft.
3. Fertilize with ____ pounds of ____ N-P-K/ac. OR 13.8 pounds of 10-10-10 N-P-K/M Sq. Ft.
4. Method of applying lime and fertilizer: Spread and work into the soil before seeding.
5. Seed with the following mixture:
50% Winter Rye
50% Annual Rye

6. Mulching instructions: Apply at the rate of ____per acre, OR 75 pounds per M. Sq. Ft.

| | Amount | Unit # Tons, Etc. |
|--|--------|-------------------|
| 7. TOTAL LIME | 138 | #/1000 sq. ft. |
| 8. TOTAL FERTILIZER | 13.8 | #/1000 sq. ft. |
| 9. TOTAL SEED | 1.03 | #/1000 sq. ft. |
| 10. TOTAL MULCH | 75 | #/1000 sq. ft. |
| 11. TOTAL other materials, seeds, etc. | | |
| 12. REMARKS | | |

Spring seeding is recommended; however, late summer (prior to September 1) seeding can be made. Permanent seeding should be made prior to August 5 or as a dormant seeding after the first killing frost and before the first snowfall. If seeding cannot be done within these seeding dates, temporary seeding and mulching shall be used to protect the site. Permanent seeding shall be delayed until the next recommended seeding period.

SEEDING PLAN

Project: Orchard Road Subdivision

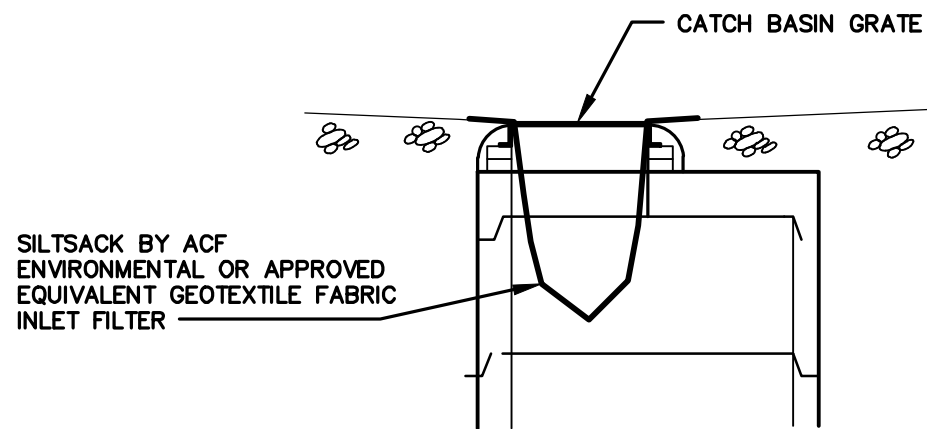
Site Location: Orchard Road, Cumberland, ME

☒ Permanent Seeding ☐ Temporary Seeding

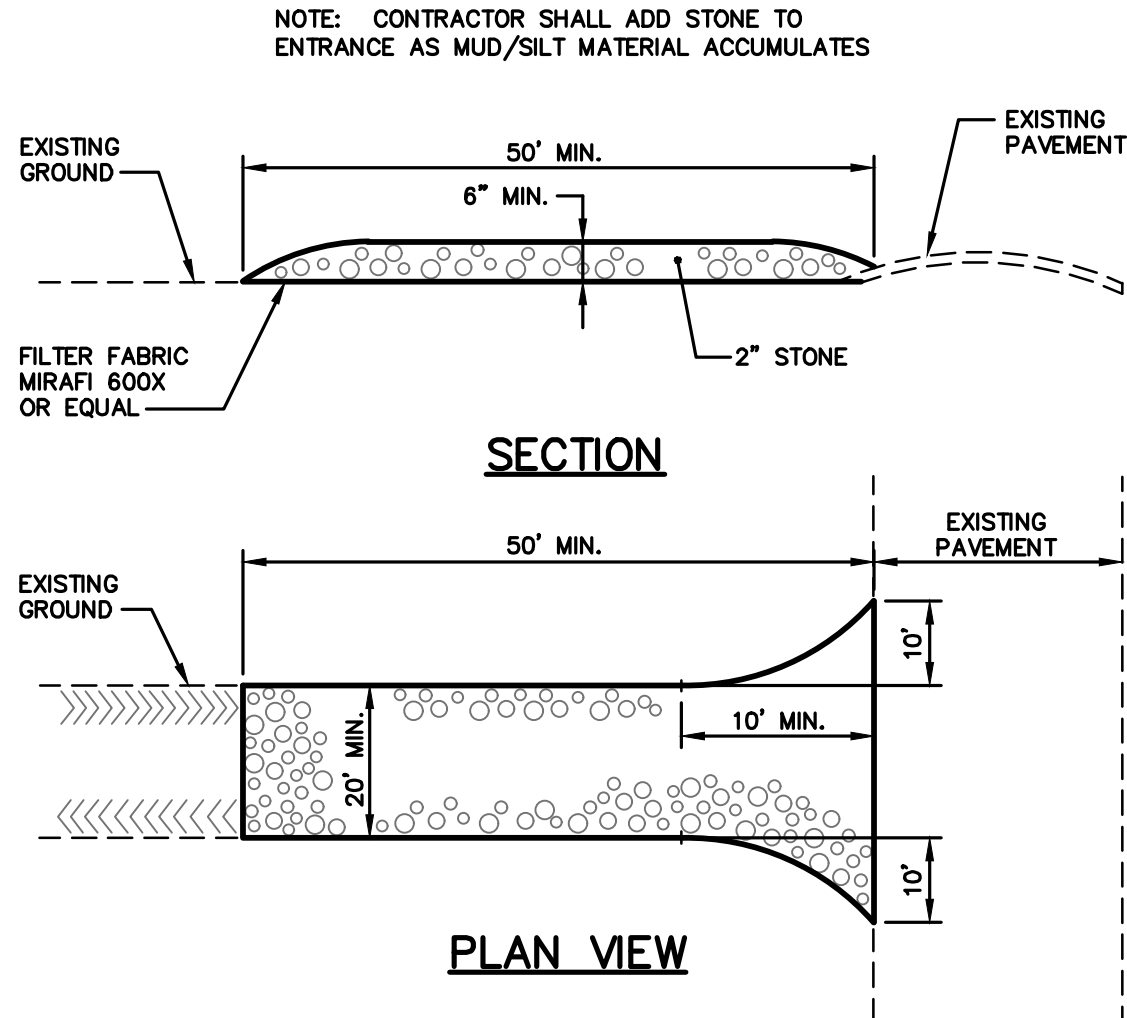
1. Instruction on preparation of soil: Prepare a good seed bed for planting method used.
2. Apply lime as follows: ____ # / acres, OR 138 # /M Sq. Ft.
3. Fertilize with ____ pounds of ____ N-P-K/ac. OR 18.4 pounds of 10-20-20 N-P-K/M Sq. Ft.
4. Method of applying lime and fertilizer: Spread and work into the soil before seeding.
5. Seed with the following mixture:
40% Creeping Red Fescue
30% Charger II Perennial Ryegrass
20% KenBlue Kentucky Bluegrass
10% Tiffany Chewings Fescue
6. Mulching instructions: Apply at the rate of ____per acre, OR 75 pounds per M. Sq. Ft.

| | Amount | Unit # Tons, Etc. |
|--|--------|-------------------|
| 7. TOTAL LIME | 138 | #/1000 sq. ft. |
| 8. TOTAL FERTILIZER | 18.4 | #/1000 sq. ft. |
| 9. TOTAL SEED | 1.03 | #/1000 sq. ft. |
| 10. TOTAL MULCH | 75 | #/1000 sq. ft. |
| 11. TOTAL other materials, seeds, etc. | | |
| 12. REMARKS | | |

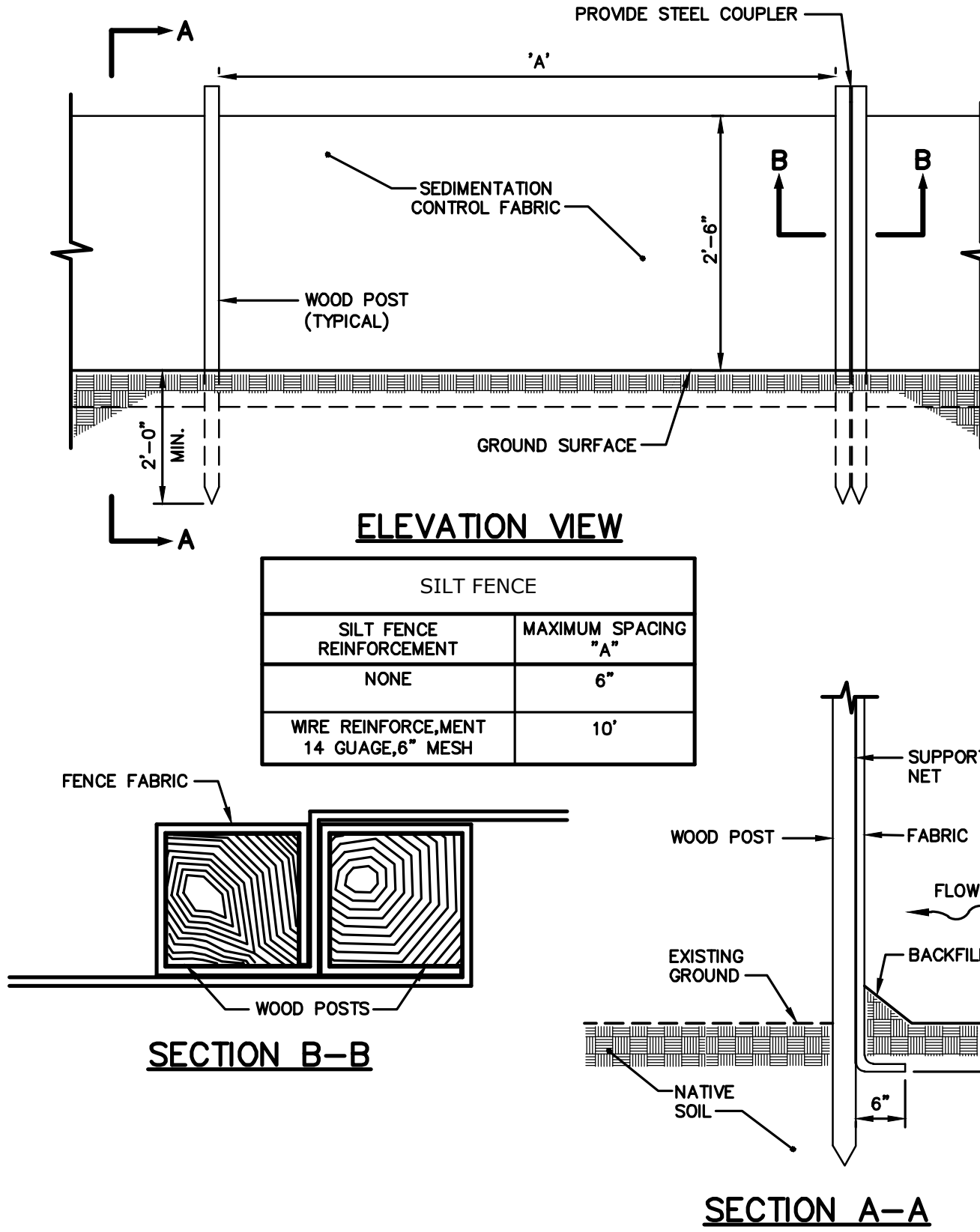
Spring seeding is recommended; however, late summer (prior to September 1) seeding can be made. Permanent seeding should be made prior to August 5 or as a dormant seeding after the first killing frost and before the first snowfall. If seeding cannot be done within these seeding dates, temporary seeding and mulching shall be used to protect the site. Permanent seeding shall be delayed until the next recommended seeding period.



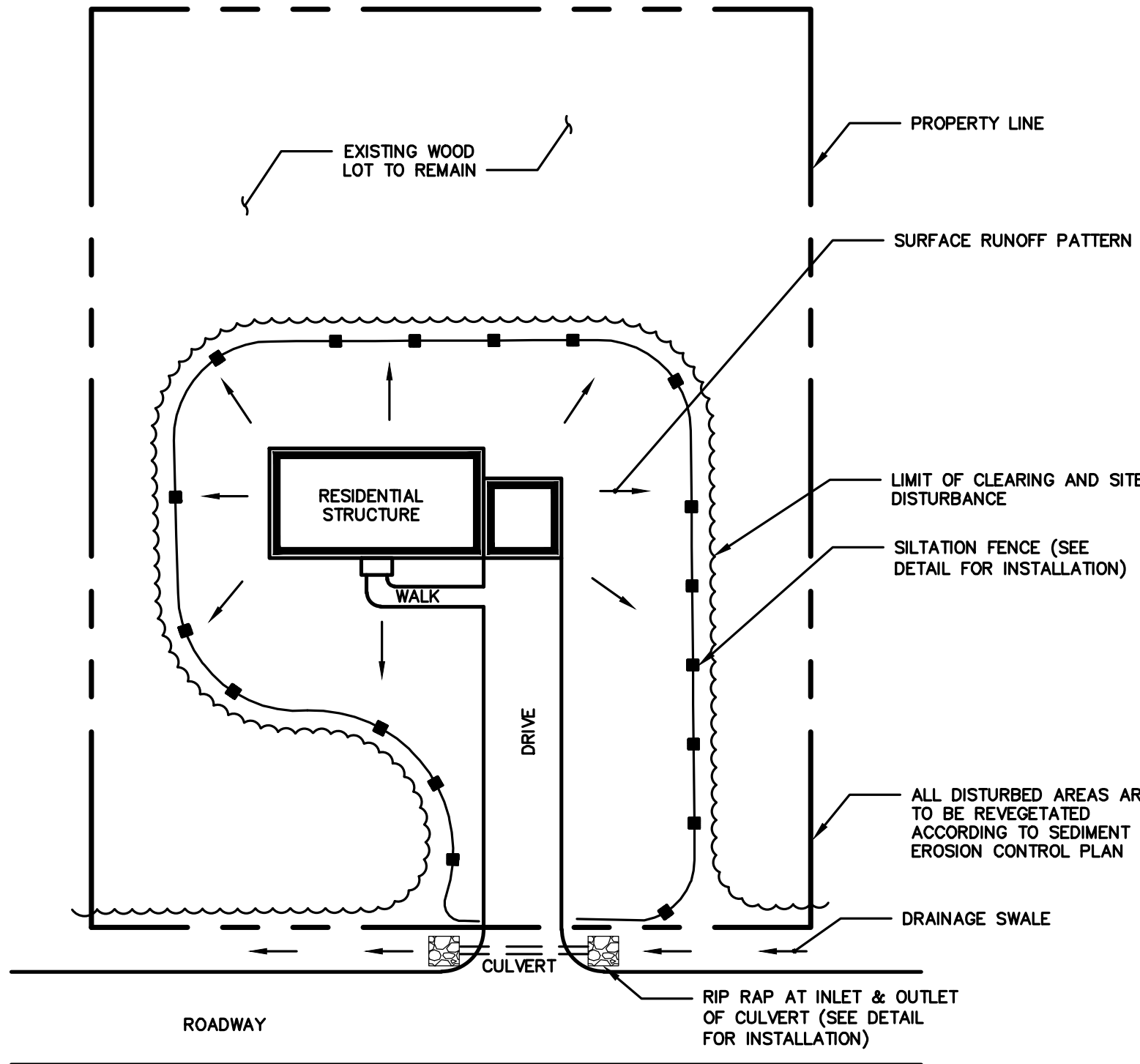
CATCH BASIN INLET FILTER
NOT TO SCALE



STABILIZED CONSTRUCTION ENTRANCE
NOT TO SCALE



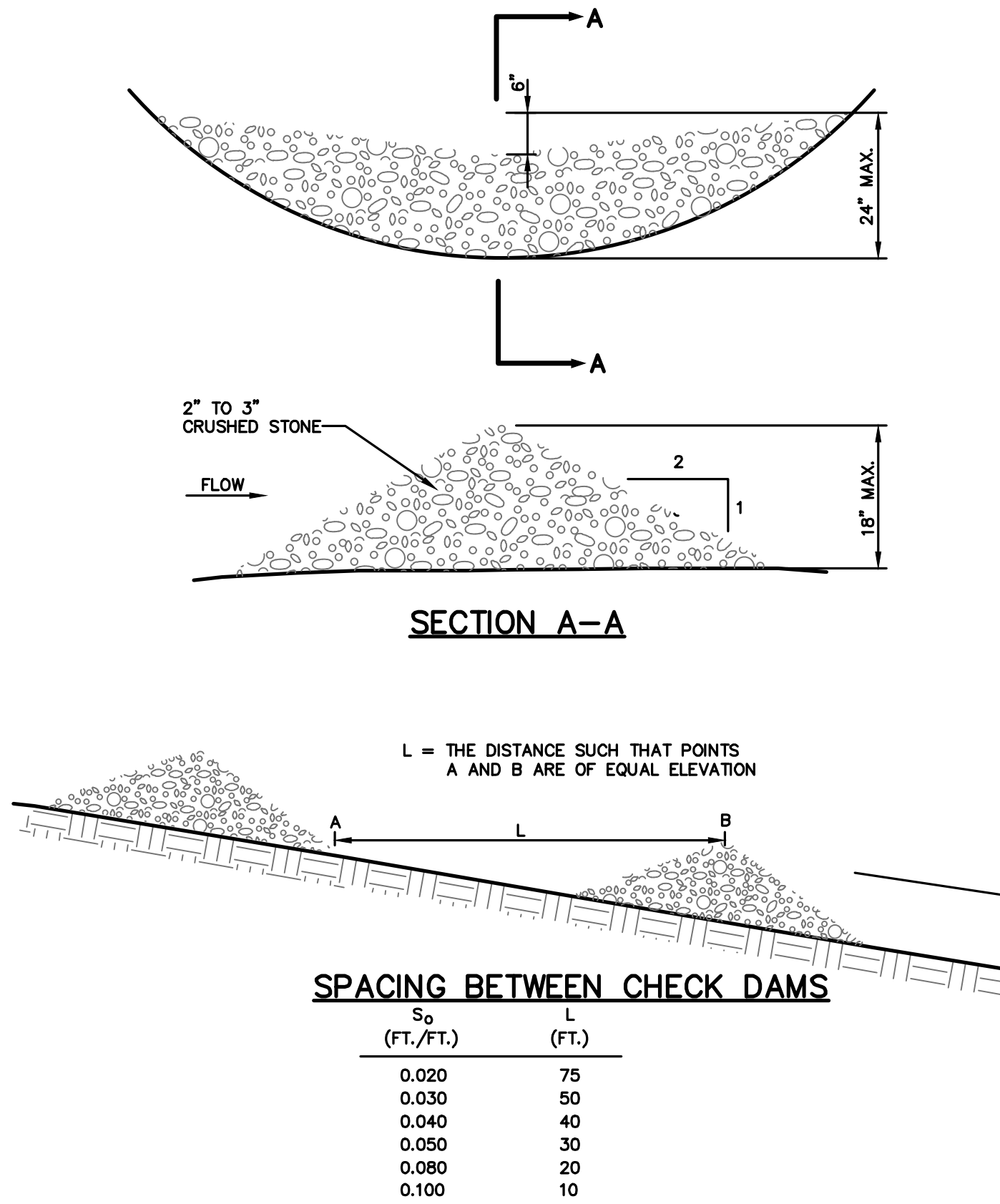
SILTATION FENCE
NOT TO SCALE



INSPECTION NOTES FOR LOT GRADING AND DRIVEWAY LOCATION

INSPECTIONS BY A PROFESSIONAL ENGINEER SHALL CONSIST OF A VISIT TO THE SITE PRIOR TO CONSTRUCTION TO CONSULT WITH THE EARTHWORK CONTRACTOR AND A POST CONSTRUCTION MEETING TO CONFIRM GRADING ON LOTS AND FOR ALL DRIVEWAYS TO ENSURE RUNOFF IS DIRECTED ACCORDINGLY TO PLANS AND TO OVERSEE THE RESTABILIZATION OF THE LOT INTO A VEGETATED COVER.

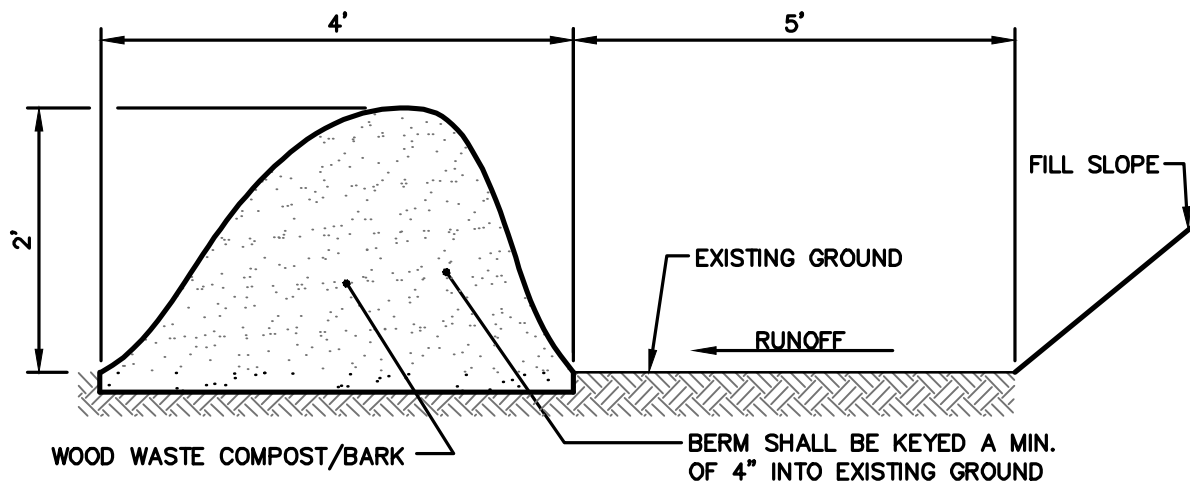
TYPICAL EROSION CONTROL
MEASURES FOR DWELLING UNITS
NOT TO SCALE



STONE CHECK DAM
NOT TO SCALE

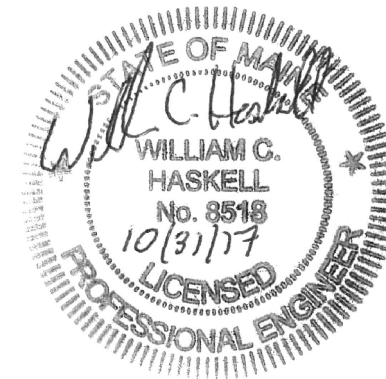
NOTES:

1. THE WOOD WASTE COMPOST/BARK MIX SHALL CONFORM TO THE FOLLOWING STANDARDS:
A. MOISTURE CONTENT - 30-60%
B. pH - 5.0 - 8.0.
C. SCREEN SIZE - 100% LESS THAN 3", MAX. 70% LESS THAN 1".
D. NO LESS THAN 40% ORGANIC MATERIAL (DRY WEIGHT) BY LOSS OF IGNITION.
E. NO STONES LARGER THAN 2" IN DIAMETER.
F. SILTS, CLAYS OR SUGAR SANDS ARE NOT ACCEPTABLE IN THE MIX.
2. THE COMPOST BERM SHALL BE PLACED, UNCOMPACTED, ALONG A RELATIVELY LEVEL CONTOUR.
3. THE WOOD WASTE COMPOST/BARK FILTER BERM MAY BE USED IN LIEU OF SILTATION FENCE, AT THE TOE OF SHALLOW SLOPES, ON FROZEN GROUND, LEDGE OUT CROPS, VERY ROOTED FORESTED AREA OR AT THE EDGE OF GRAVEL PARKING AREAS.
4. BERMS SHALL REMAIN IN PLACE UNTIL UPSTREAM AREA IS COMPLETED OR 70% CATCH OF VEGETATION IS ATTAINED. BERMS SHALL BE REMOVED BY SPREADING SUCH THAT NATIVE EARTH CAN BE SEEN BELOW.
5. WOODWASTE COMPOST BARK FILTER SHALL NOT BE USED IN WETLAND AREAS.



WOOD WASTE COMPOST/BARK
FILTER BERM DETAIL
NOT TO SCALE

NOTE: THIS PLAN SET IS ISSUED FOR PERMITTING PURPOSES AND SHALL NOT BE USED FOR CONSTRUCTION.



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| Preliminary Subdivision Application | 10-31-17 | WCH |
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| Design: JWA | Draft: EAN | Date: 06/06/2017 |
| Checked: WCH | Scale: NTS | Job No.: 3236 |
| File Name: 3236--DETAILS.dwg | | |
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| Drawing Name: | Erosion Control Details |
| Project: | Orchard Road Subdivision Cumberland, Maine |
| Client: | TZ Properties Falmouth, Me 04105 |

Drawing No.

13

